

Seeing Cowichan Forests Beyond Trees

Exploring options for protecting private forested land in the Cowichan Region



(Photo: Rainbow Island near Duncan, BC.)

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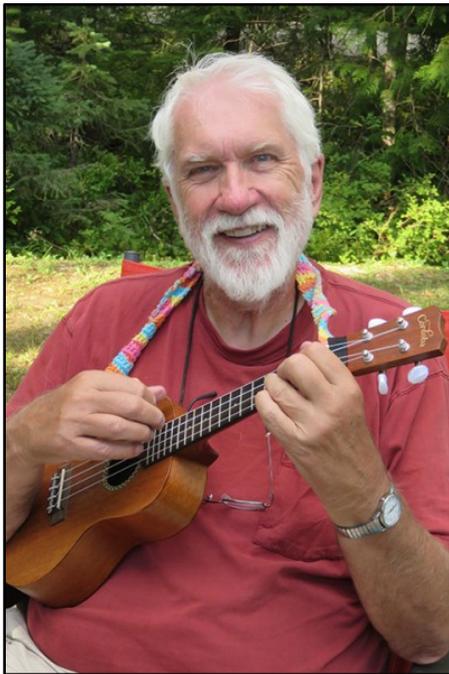
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This project was completed within, and about, the unceded Coast Salish Territory, home to the Quw'utsun, Halalt, Malahat, Penelakut, and Stz'uminus People.

Dedication



May 10, 1943 – July 24, 2020

This project is dedicated to John Scull who led the way in making it happen. John lived a very colourful, active, and meaningful life. He was instrumental in making the Cowichan Community Land Trust (CCLT) a leader in local land protection and stewardship. In 1995 he, along with a small group of like-minded folks, co-founded the CCLT and was an active board member for most of the years since. John was also active in the formation and organizational direction of the Land Trust Alliance of BC. He always brought a practical and supportive approach to the table and provided guidance to others helping community groups experience success in their endeavors.

His involvement in community was not isolated to conservation. He was committed to a variety of worthy causes aimed at co-creating the best possible world for all, such as the Inclusive Leadership cooperative and the Canadian Mental Health Association Cowichan Valley branch.

John's capacity for community stewardship was astounding. John was an incredibly generous mentor and friend to all. As an eco-psychologist, John connected the ecological dots between the wellness of the wild world and human well-being long before it became a popular concept. And his down-to-Earth approach of meeting people where they are at in their own ecological awareness and celebrating the baby steps was a restorative balm for those of us who worked alongside him.

John is missed.

List of Acronyms

ALR	Agricultural Land Reserve
CCLT	Cowichan Community Land Trust
CDF	Coastal Douglas-fir
CTIP	Conservation Tax Incentive Program
CVRD	Cowichan Valley Regional District
CWH	Coastal Western Hemlock
DPA	Development Permit Area
EIS	Ecoforestry Institute Society
HAT	Habitat Acquisition Trust
MNA	Municipal Natural Asset
MNAI	Municipal Natural Asset Initiative
NAPTEP	Natural Area Protection Tax Exemption Program
NGO	Non-government Organization
OCP	Official Community Plan
RCS	Regional Conservation Strategy
SARA	<i>Species at Risk Act</i> (federal)
UWR	Ungulate Winter Range
WHA	Wildlife Habitat Area

Executive Summary

The Cowichan Community Land Trust (CCLT) initiated a project, *Seeing Cowichan Forests Beyond Trees*, to work toward increasing private forest land protection in the Cowichan Region. In addition, this project aims to increase residents' understanding of the various ways that forested ecosystems provide many of life's essential services. As part of this initiative, this report looks at how Cowichan forests have been altered since European settlement began, barriers that limit their protection, legally binding and voluntary land protection tools, and recommendations on how CCLT can help willing landowners protect their forested land.

The Cowichan Region landscape has changed dramatically over the last 150 years. Prior to this time, old growth forests were once common with occasional wildfires renewing small patches. These old and complex ecosystems kept water clean, moderated flows during storms and dry seasons, shaped fish habitat, and provided wildlife elements like dead trees and dead fallen logs. They provided everything that was needed for a prosperous lifestyle for Indigenous cultures.

Since the settlers arrived, nearly all the complex old forest have been replaced by young homogeneous plantations or converted to agricultural lands or communities. Climate change and extensive areas of invasive plants have further degraded these ecosystems. Now, summer droughts cause water shortages, winter storms cause flooding, plant and wildlife species at risk are increasing, and fish populations have plummeted. While parks and other protected areas help to conserve ecological values, there is an inadequate area set aside for conservation purposes according to science. Ideally, intact mature and old forests would cover at least 50% of the landscape; meanwhile less than 10% of the Cowichan Region ecosystems are protected.

Several barriers get in the way of protecting private forest land. High land costs make it difficult for organizations to purchase land for conservation. Federal, provincial, and local governments do not have strong legal tools requiring habitat protection on private lands. There are no region-wide conservation targets and there is a lack of financial incentives to encourage landowners to protect their land. And while many private land owners recognize their rights associated with land ownership, they do not understand their responsibility to manage their land to maintain the many ecosystem services used by their neighbours and surrounding communities.

However, using and adapting the tools that do exist, some creative and motivated people have found ways to ensure permanent protection of their forested land. Legally binding and voluntary tools are often combined, and conservation covenants are often a foundational piece. And conservation covenants that allow some tree removal, sometimes called ecoforestry covenants, are becoming more common.

Property tax exemptions, available in the Islands Trust area, are not supported by legislation for widespread application in BC. However, some property tax revenue is put aside each year for parkland acquisition. Motivated communities, like Cumberland, have raised funds to purchase and place covenants on private land

now known as the Cumberland Community Forest. The federal Ecological Gifts Program also assists with land acquisition; landowners can donate land for conservation purposes and in return receive income tax benefits.

Local governments can encourage forest land protection by way of planning and land development tools. Some developers have worked with local governments to develop new zoning to create conservation communities. In addition to zoning changes, other tools such as subdivision, clustered development, amenity density bonuses, and covenants are used to maximize conservation. For example, to protect large land parcels slated for clearcut logging, developers have raised adequate capital to purchase the property through the sale of several small clustered residential lots. Then, most of the parcel (up to 90% in some communities) is set aside for conservation, usually protected by a covenant and some dedicated public parkland. The conservation covenants may or may not permit tree harvesting. In residential clusters, conservation covenants are often used to limit development footprint and to maximize tree retention.

The province offers additional mechanisms to assist in the protection of private forest land. Conservation lands, consisting of public and private lands that are leased to the Crown for conservation purposes, are administered by the province to conserve and manage fish and wildlife. The *Private Managed Forest Act* attempts to increase protection of key public environmental values on privately owned forest land such as soil conservation, water quality, fish habitat, and critical wildlife habitat. However, in a recent review of the act, most respondents agreed that the key public environmental values considered are insufficient, and that the current regulatory framework does not effectively support achievement of management goals.

The *Riparian Areas Protection Act* and its regulations were established with the intent to improve the features, functions, and conditions of riparian areas on private land classified as residential, commercial, or industrial. This provincial legislation enables local governments to establish legal tools to protect riparian areas through prohibition of tree and shrub removal and soil disturbance. While it does apply to the CVRD, it does not apply to forestry and agricultural activities, which locally, have been observed to reduce riparian retention well below 30 meters.

Carbon offset projects are another tool that can use a legal agreement to conserve private forest land. The Quadra Island carbon project protects 418 ha of forest that would have been logged and/or developed for vacation homes. The Darkwoods project covers over 55,000 ha of private property that historically has been managed for forestry. Over time logging activities will slow down and the carbon credits gained will be used to finance moving the land from an actively managed forest to a protected area.

In 2009, TimberWest (now part of Mosaic Forest Management) initiated a carbon offset project on its private forest land on Vancouver Island. The Strathcona Ecosystem Conservation Project spans approximately 25,000 ha within which about 1,000 ha of old growth forest has been set aside for 25 years. Also, the Municipality

of North Cowichan is exploring carbon credits as a possible revenue stream for their community forest lands. And finally, the Ecoforestry Institute Society on Vancouver Island is currently investigating development of an ecological carbon credit system.

A new movement, the Municipal Natural Assets Initiative, is aimed at protecting important landscape features by local governments. This process will often involve legal tools like conservation covenants to protect ecological features such as riparian corridors, wetlands, lakes, watercourses, forests, soils, and foreshore areas that can be used instead of engineered assets to provide community services such as stormwater management. A benefit of natural assets is that if they are well protected they can last indefinitely unlike engineered assets, which eventually need replacing at great cost.

Voluntary mechanisms have also been developed to inspire and recognize private forest land protection. The Habitat Acquisition Trust (HAT) in Victoria developed the Good Neighbours Program to promote habitat stewardship in local communities. HAT has a program, Wildwood Wetlands Wildlife Corridor, where workshops and property visits are offered to work with landowners to establish a network of functioning wildlife habitat near Victoria.

Advancing private land protection requires community education, financial incentives for landowners, and expertise to turn ideas into actions. Using its expertise in community education, conservation covenants, and stewardship project implementation, the CCLT is well positioned to assist in increasing private forest land protection and stewardship in the Cowichan Region. There is opportunity for CCLT to expand its covenant program by sharing success stories with the community, and by developing conservation covenants that support ecologically responsible forest management. The education program can be expanded to offer forest landowners information on legal and stewardship tools available for protecting their forests, and include a segment that evaluates economic opportunities associated with some of the tools. A new program can also be developed on the principles and practices associated with ecosystem-based forest management to inform forest land owners on how to restore ecological values and/or create income through forest management. Another opportunity for CCLT and community partners is to explore ways to increase landscape connectivity aimed to restore natural structure and functioning in local ecosystems improving overall ecological health.

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Introduction

The Cowichan Region on Vancouver Island is a place rich in beauty and resources in the form of forested hillsides, salmon rivers, and vast vineyards and dairy farms - all providing the backdrop to growing rural and urban communities. Since the settler community arrived over 150 years ago the region has seen tremendous changes, most significantly, the transfer of the unceded lands of the Cowichan People to the settlers and the resulting rapid decline in natural forested ecosystems.

Over the years, local non-government organizations (NGOs) and others have been working toward restoring many of these degraded ecosystems and protecting remaining ecosystems at risk. For example, partnering organizations have seen to the protection of many of the last pockets of the endangered Garry Oak ecosystem. The Cowichan Community Land Trust (CCLT) is one such organization that has contributed to these overarching ambitions by establishing of several conservation covenants, restoring many hectares of riparian habitat, and by providing stewardship education to local youth.

In 2020, CCLT embarked on a somewhat new direction by focusing on protection of *all* forest types, and by working to expand people's understanding that forests are not just trees, rather they are complex and ever-changing ecosystems. This initiative includes a new project, "Seeing Cowichan Forests Beyond Trees", that recognizes that all forests, not just the rare ecosystems, are important for maintaining ecological health and for providing important ecosystem services to people. This project is about "systems change" where forested ecosystems move from being viewed as commodities to providers of services necessary for life.

CCLT Mission: "We help to take care of the land and water in the Cowichan Valley for the benefit of all life now and in the future. We do this by acquiring land, entering into conservation agreements, and by providing education and support to individuals and other groups who are caring for the land."

Since most of the Cowichan Region is private land, the goal is to inspire private forest landowners to protect their forests by facilitating effective and efficient ways to establish that protection. Ultimately, as a community we need to see adequate area of protected forest in the right places to ensure that maintenance and/or restoration of biodiversity and the full range of ecosystem services are addressed, now and in the future as climate change effects unfold.

This initiative supports the Cowichan Valley Regional District (CVRD) and its "12 big ideas for a strong, resilient Cowichan". One of the "big ideas" is to "revive biodiversity which includes acquiring key tracts of land, restore and protect valuable habitats and ecosystems" (CVRD 2010).

Objectives

The overall objective of this project is to identify specific actions the CCLT can take to increase the area of protected private forest land in the Cowichan Region in order to maintain or restore ecosystem processes and services.

While the original intent of the project was to include community workshops and face-to-face meetings with private landowners, the onset of Covid-19 required a different approach. Instead, emphasis shifted to a literature review supplemented by consulting people with experience in key topic areas.

Milestones in this project include:

1. A description of the original character and current condition of key values in selected ecosystems in the Cowichan Region;
2. Identification of barriers to protecting private forest land;
3. A summary of legally binding and voluntary stewardship tools available to support landowners interested in protecting their private forest lands; and
4. Recommendations for a work plan for CCLT that identifies its role in helping willing landowners protect their forested land.

In addition, example scenarios will be used to explore possible strategies to resolve expected common obstacles associated with conserving private forest land.

Study Area

This project focuses on forest land protection strategies for the Cowichan Region, especially dry Coastal Douglas-fir (CDFmm) and Coastal Western Hemlock (CWHxm1, 2) ecosystems¹ in the CVRD on the east slopes of Vancouver Island between Ladysmith and Shawnigan Lake. Parts of 17 different watersheds are captured in the study area.

Although there are many ecosystem types in the study area, including sensitive Garry Oak, shoreline and estuary habitats, this report focuses predominantly on forested ecosystems in the low and middle elevations of the Cowichan Region. This includes young to mature coniferous forests, deciduous and mixed woods forests, and riparian forests along the many streams, lakes, and wetlands.

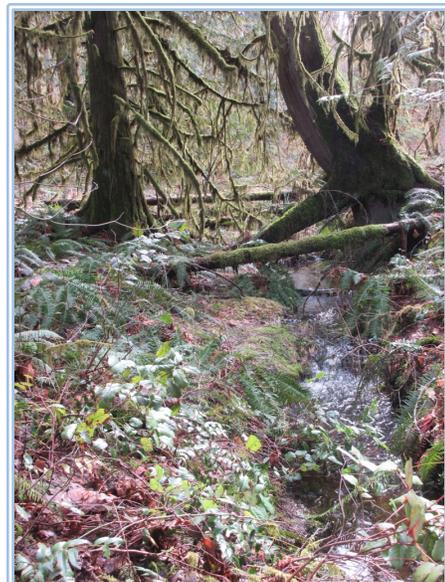


Photo 1. Riparian forest along a tributary to Cowichan River.

¹ The notations “CDFmm” and “CWHxm” are from the biogeoclimatic classification system developed for BC that groups ecosystem types based on climax vegetation community as well as soil moisture and nutrient condition.

Character and Condition of Cowichan Region Forests

Comparing the original character of a landscape to its current condition can offer insights into what structures and functions need to be maintained and/or restored to create healthy ecosystems. This is an important first step that helps us locate priority ecosystems, ecological features, and land use zones before looking at what tools are available for creating this protection.

Original Character

Prior to European settlement, the Cowichan People lived together with the forests, harvesting only what was necessary causing little disturbance to the natural functioning of the landscape. The forests offered medicinal and food plants, wildlife for hunting, clean water, and abundant fish. Old-growth forests covered much of the Cowichan landscape. Lower elevations supported Garry Oak ecosystems and open-growing Douglas-fir forests maintained with low intensity fire ignited by indigenous people for maintaining important food plants and wildlife forage (Bjorkman and Velland 2010). Middle and upper elevations supported dense old forests dominated by Douglas-fir and intermingled with white pine, hemlock, grand fir, and western redcedar.

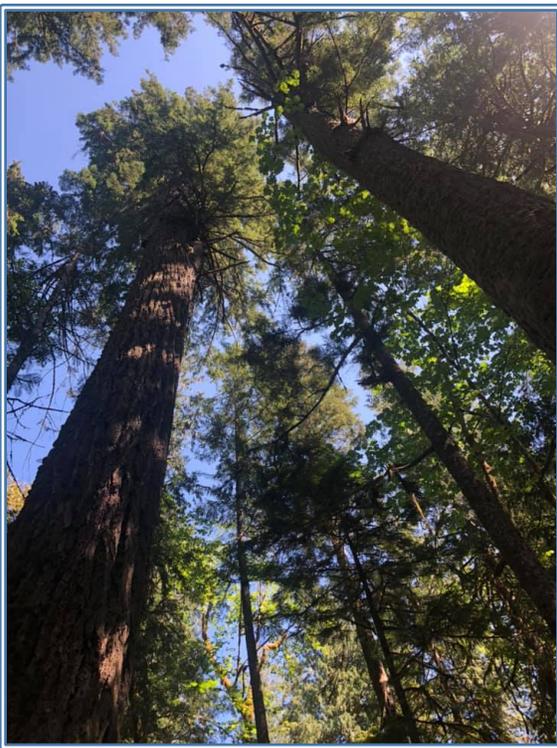


Photo 2. Large old trees were once common in the landscape (Photo: Lorne Duncan).

Wildfire has been the main natural disturbance in the Cowichan Region for the last 6,500 years (Brown and Schoups 2015). Fire frequency varied depending on aspect and site conditions. For example, studies on similar forests in the Pacific Northwest found that wildfire often followed long periods of drought, occurring on average every 434 years (Hemstrom and Franklin 1982). Intervals between fires ranged from over 1,000 years for cool, moist north-facing slopes to 350 years for drier areas. Most forests across the landscape were generally over 100 years old (Hemstrom and Franklin 1982). A cross section from a Douglas-fir tree from the Koksilah River watershed on display at the Forest Discovery Center in Duncan, BC showed that tree reached over 1,300 years before it was blown down.

Land Use and Pressures

In 1862, the first ship of European settlers arrived in the Cowichan Region and extensive development began (HTG 2007). Forested land in low to middle elevations was cleared for agriculture and the building of communities while middle to upper elevation forests were harvested to source local building materials and lumber for export (Pritchard et al. 2019 and references therein). Most of the old growth forests were quickly harvested, replaced with younger stands that are now harvested as young as 40 years old on good growing sites, with some areas in the Cowichan Region now undergoing a “3rd pass” of harvesting. Road density is high reducing water infiltration into the soil and increasing surface run-off and, in turn, the flashiness of some river systems. Water extraction in agricultural areas is causing low summer flows shutting down all irrigation in the Koksilah River system in late summer 2019 (CWB 2020). Land clearing and logging remain the biggest threats to sensitive ecosystems in the CVRD (CVRD 2010).



Photo 3. Springboard stump from historic logging in the Cowichan Valley (Photo: Lorne Duncan).

Not only were forests drastically altered by extensive clearcut logging, but some river channels were also intentionally changed in the early days of settlement. For example, small falls in the Cowichan River were blasted to make log transport easier (O'Donnell 1988). These changes to stream channels, in combination with extensive progressive clear cutting in early days, have affected hydrology in the watersheds and has degraded fish habitat. Estuaries have also been affected by the rapid development. For example, damage to the Cowichan Bay estuary has followed diking to expand agricultural area, filling salt marshes and other terrestrial habitats to increase industrial land, log handling and storage in the marine environment, and pollution from agricultural run-off, sewage disposal and other waste discharge (Lambertsen 1986).

A pivotal event that affects land stewardship today was the establishment of the E&N railway grant in the late 1800s (HTG 2007). Over 800,000 ha of land was granted by the Province of BC to the E&N Railway Company in exchange for the construction of the railroad between Victoria and Nanaimo. Over time, much of the grant land was subdivided and sold, and today, forest companies have ownership of most of this land. The original grant lands occupy 85% of the unceded Hul'qumi'num territory, and current land use has disrupted access to hunting and gathering territories, bathing areas, burial grounds, and special wood (e.g., cedar) important for canoe building and carving (HTG 2007).

New pressures in the study area include increasing population growth, rezoning to more intensive land use categories, and subdivision, all of which have led to increased development and land conversion affecting ecosystem services and watershed health. Impacts due to climate change have become apparent with extensive cedar mortality occurring after successive drought years. Invasive plants have taken hold in many ecosystems. Scotch broom and Himalayan blackberry is evident



Photo 4. Scotch broom immediately overtook this cutblock (Photo: Lorne Duncan).

in exposed areas (in particular on road and power line right of ways) and Japanese knotweed is becoming more and more common in riparian areas². Coastal Douglas-fir ecosystems have been particularly impoverished by invasive plants that have followed intense development.

Current Condition

As a result of these pressures, the Cowichan Region has experienced a loss of wildlife habitat, declining fish populations, declining water quality, more frequent summer droughts, and flooding during severe winter storms (CVRD 2010; Pritchard et al. 2019 and references therein). Ecosystems are being lost or severely reduced in size; extensive land use activities have displaced 78% of the Garry Oak ecosystems in the Cowichan area and Salt Spring Island (CVRD 2010). Only 5% of the original Garry Oak ecosystems remain in their in natural condition (CVRD 2010).

Extensive land use over the last 150 years has degraded Coastal Douglas-fir and Coastal Western Hemlock ecosystems to the point where they are in poor condition, lacking the full range of natural structures, and their ability to function fully is at risk (CVRD 2010). During this time period, 50% of forests on the east coast of Vancouver Island have disappeared. In the CVRD alone, 50% of Coastal Douglas-fir ecosystems have been converted to agriculture, urban and rural development.

Old growth forests, once a dominant feature in the landscape, have all but disappeared from Coastal Douglas-fir and dry Coastal Western Hemlock ecosystems (Price et al. 2020). In a recent study, it was determined that only about 1% of the Koksilah River watershed, located within the study area, has any of the original old forest across all ecosystem types (Pritchard et al. 2019). The loss of old growth puts ecosystem resilience at high risk (Price et al. 2020), which is particularly concerning

² Detailed information on invasive plants is available from the Coastal Invasive Species Committee at <https://www.coastalisc.com>.

with accelerating climate change. Price et al. (2020) recommend that for heavily modified ecosystems such as the Coastal Douglas-fir and dry Coastal Western Hemlock in the Cowichan Region, that all remaining old forest is protected, especially on productive sites; and where little old forest remains, productive mature forests also be retained.



Photo 5. Young plantations dominate the landscape where old forests once grew (Photo: Lorne Duncan).

The following sections look at some important values in the Cowichan Region that have been degraded, in part, by the loss of mature and old forest cover. Concentrated urban, rural and industrial development, extensive road networks, and climate change also contribute to these impacts.

Water

Water supply is a growing concern in the Cowichan Region. Based on recent trends, the CVRD has defined the “new normal³” as increased summer droughts and winter flooding and has even developed a program to encourage residents to take steps to prepare to respond to these extremes. The Cowichan Watershed Board reported that 2019 was a “year of firsts” due to low flows. Drought conditions causing very low flows and affecting fish habitat and downstream water supplies, resulted in the pumping of water over the weir between Cowichan Lake and Cowichan River for three weeks (CWB 2020). In addition, also because of critically low water flows, the province issued an order instructing Koksilah River water users to cease irrigation of forage crops for three weeks.

Many communities source surface water from watersheds with storage capacity provided by lakes. Cowichan, Holland, Shawnigan, and Stocking lakes store water collected in winter helping to maintain summer flows (CVRD 2010). However, some watersheds (e.g., Koksilah) have no significant surface water storage and are more reliant on climate and hydrologically healthy conditions. Wetlands and aquifers are important for water storage (Pritchard et al. 2019). There are 45 classified aquifers in the lower portions of the watersheds in the CVRD (CVRD 2010). Half of those

³ See: <http://cvrldnewnormalcowichan.ca>

aquifers are sand and gravel substrates while the rest are in bedrock. Seventeen of them are highly vulnerable to contamination from spills (CVRD 2010).

While many factors affect water quantity, forest harvesting and land clearing clearly have a role. Research conducted in watersheds similar to those in the Cowichan Region, concluded that summer flows were 50% lower in basins with 34- to 43-year-old forests when compared to summer flows in basins with old forests 150-500 years in age (Perry and Jones 2017). The Koksilah River watershed, located in the study area, has 50% of the area above the water gauging station as young forests 25 to 70 years old with high transpiration rates likely affecting flows (Pritchard et al. 2019). The large tracts of younger forest along with forest conversion to agriculture at lower elevations is believed to contribute to faster surface run-off, lower infiltration, and reduced soil moisture holding capacity all of which contribute to lower summer flows. Therefore retaining older forests in our local watersheds is important for water quantity.

Wildlife, plants, and ecological communities

The Cowichan Region is home to many species and ecological communities at risk, most of which occur on private land (BC CDC 2020; DataBC 2020) (Table 1, Appendix 1). Provincially Red- (i.e., threatened or endangered) and Blue-listed (i.e., special concern) ecological communities occur most frequently and occupy several habitats including coniferous or deciduous forest, wetland, estuary, and rock outcrop. Of the 43 at-risk plant species, seven are non-vascular (i.e., mosses) and 22 are associated with the Garry Oak ecosystem.

Table 1. Number of provincially Red- and Blue-listed species in CDF and CWH ecosystems in the Cowichan Region.

Group	# Red-listed	# Blue-listed
Mammals	1	4
Birds	4	12
Amphibians and reptiles	2	2
Fish	1	1
Invertebrates	14	17
Ecological communities	45	16
Plants	18	23
Total	85	75

The species at risk in the Cowichan Region (Table 1) occupy a wide range of habitat types including coniferous and deciduous forest, riparian forest, shrub, wetland, logged areas, and estuary (BC CDC 2020).



Photo 6. Western Toads are a species of "Special Concern" in Canada.

Under the federal *Species at Risk Act* (SARA), 41 species are listed as threatened, endangered, or special concern for the Cowichan Region (BC CDC 2020). Critical habitat has been established for eight of these species (Table 2). Landowners and land managers for both private and Crown land, have the responsibility to ensure that critical habitat is protected such that the survival and/or recovery of the species at risk is possible. Implementation of legal tools and requirements, in

accordance with specific land designations, is mandatory, otherwise the federal government can enact an

order dictating critical habitat protection (ECCC 2016). In the case of the study area it is important that relevant provincial legislation such as the *Wildlife Act*, *Private Managed Forest Land Act*, *Local Government Act*, and *Community Charter* provide clear legal tools to protect SARA critical habitat. However, each has gaps and weaknesses affecting their ability to effectively protect habitat (Krindle 2014).

Table 2. Wildlife species in the Cowichan Region with critical habitat designated under the *Species at Risk Act*.

Common Name	Scientific Name	SARA Status ¹	Watershed
Painted Turtle – Pacific Coast Pop.	<i>Chrysemys picta pop. 1</i>	Endangered	Chemainus, Koksilah
Little Brown Myotis	<i>Myotis lucifugus</i>	Endangered	Koksilah, Kelvin
Northern Myotis	<i>Myotis septentrionalis</i>	Endangered	Koksilah
Oregon Forestsnail	<i>Allogona townsendiana</i>	Endangered	Westholme
Blue-grey Taildropper	<i>Prophyaon coeruleum</i>	Endangered	Estuary
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	Threatened	Cowichan, Koksilah, Kelvin, Chemainus
Northern Goshawk <i>laingi</i> subspecies	<i>Accipiter gentilis laingi</i>	Threatened	Koksilah, Kelvin
Dun Skipper	<i>Euphyes vestris</i>	Threatened	MNC, Shawnigan

¹Based on BC CDC Species and Ecosystems Explorer (BC CDC 2020).

Although Wildlife Habitat Areas (WHAs) and Ungulate Winter Ranges (UWRs) can only be designated on provincial Crown land, their presence nearby does indicate that important habitat exists in the greater landscape. In the study area, Marbled Murrelet WHAs occur in the Chemainus and Cowichan watersheds, and Black-tailed Deer (*Odocoileus hemionus*) UWRs occur in the Chemainus, Cowichan, and Koksilah watersheds, both in the drier Coastal Western Hemlock ecosystems (DataBC 2020). Forest habitats containing suitable conditions for these and other ungulates and species at risk also occur on private forest lands but don't have any provincial designations for protection or special management.

Wildlife, plants, and ecological communities are affected by declining forest cover in the Cowichan Region in a number of ways, a few of which are discussed here. The loss of large trees, snags, and dead fallen trees decreases habitat availability for denning animals, amphibians, cavity nesters, and other species guilds (Marcot 2017 and references therein; Bunnell et al. 1999 and references therein). In fact, over 25% of all vertebrate species in Coastal Douglas-fir and Coastal Western Hemlock forests require trees with cavities (Bunnell et al. 1999).

Riparian forests, in particular, provide many important habitat features such as large trees (living, dead and downed), deciduous shrubs and trees, as well as abundant forage and insect prey. As a result, wildlife abundance, diversity, and reproductive success is high in riparian forests (Bunnell and Dupuis 1995; Bunnell et al. 1999). In fact, over half of all forest-dwelling vertebrate species occur in riparian forests.



Photo 7. Riparian ecosystems protect streams, contribute to fish habitat, ensure healthy soils, and provide structures for wildlife habitat (Photo: Barry Hetschko).

The loss of connectivity in a modified landscape separates some species from the different habitats they require at different life stages. For example, many amphibian species require wetlands for breeding and then migrate sometimes several kilometers to new territories (Semlitsch and Brodie 2003; COSEWIC 2015). Roads and clearcuts that fragment these different habitat requirements can contribute to population decline (Wind 2000). Other species, like Northern Goshawks require large tracts of intact forest (COSEWIC 2013), which is often lacking in heavily modified landscapes. And some specialized plant species and ecological communities are destroyed when forest cover is removed either directly from cutting or trampling, or indirectly from a change in growing conditions.

Fish

The Cowichan Region, in particular the Cowichan River, is well known for fish production, especially salmon and steelhead. The Chemainus, Cowichan, Koksilah, and Shawnigan systems all support steelhead, rainbow, cutthroat, coho, and chum populations (DataBC 2020). Chinook occur in Chemainus, Cowichan and Koksilah. Kokanee salmon are found in Shawnigan and Cowichan lakes.

Salmon and steelhead populations have been in decline for decades, and rapidly declining since the 1990s such that populations are now at approximately 10% of historic levels (CVRD 2010). There are several pressures that had led to this decline and they have been summarized in the *2010 State of the Environment* report (CVRD 2010). Loss of freshwater habitat is a primary concern, in particular, the changes to water flows attributed to land clearing and land use (including forestry) throughout the watersheds. Also, high winter flows release sediment burying eggs and spawning gravels affecting survival and habitat. In many areas, the finer spawning gravels have been replaced with large cobbles unsuitable for spawning. This is because historic logging created high winter flows with enough force to wash away fine gravels and deposit large cobbles in their place. Rearing habitat in lower reaches and floodplains has also declined because of dyke construction, land development, and channelization of natural streams in the estuary. Loss of riparian cover, lack of large woody debris in streams, establishment of knotweed along shorelines, and loss of eelgrass in the estuary have also contributed to declining fish populations. In marine habitats, commercial harvest has impacted adult populations.

Several invasive fish species have been introduced and are well established in some locations in the Cowichan Region. Shawnigan Lake has several invasive species displacing native fish species including yellow perch, pumpkinseed, smallmouth bass, and brown catfish (DataBC 2020). Pumpkinseed have also been found in the Koksilah River watershed. Brown trout were introduced into the Cowichan River in the 1930s and have become a well-known sport fishery⁴.

⁴See: <https://www.timescolonist.com/entertainment/books/the-magic-of-the-cowichan-river-1.22388662>

While there are many pressures affecting fish populations, loss of forested riparian habitat has many consequences. Without riparian forests, there is a lack of large dead trees in and overtop of the water providing cover from predators and for shaping channel morphology (Bunnell et al. 1999). Water temperatures increase, less leaf and insect drop reduces food availability, and water quality declines due to greater surface soil erosion and decreased bank stability.

Other Ecosystem Services

Harvested trees, fish and wildlife habitat, and drinking water are only a few of the ecosystem services provided by local forests. Although extensively modified, the Cowichan Region forests still support many other important non-timber values. Some of the ecosystem services, such as water storage and filtration, are necessary for our survival, while other services enrich our lives and contribute to our emotional and mental well being. In fact, studies have shown that time spent in nature on a daily basis results in overall improved health and well being, healthier birth weights, improved cardiovascular health, and higher graduation rates (Wolf et al. 2018). Often overlooked, cultural-based ecosystem services such as spiritual value, cultural identity, social cohesion, heritage value, and scenic beauty are also needed (Chan et al. 2012).

Ecosystems services are “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life” (Daily 1997).

Carbon sequestration and storage is an important ecosystem service provided by forests. The trees and soils have the ability to capture, store, and release carbon (Sedjo and Sohngen 2012). On Vancouver Island, old forests on good growing sites store more carbon than any other forest type in Canada, and possibly the world (Wieting 2019). However, when these forests are clearcut or burn during wildfire, vast amounts of carbon are released into the atmosphere contributing to climate change. While the new forest is establishing, more carbon is still released than is sequestered due to the continuing decomposition of organic soil and large volume of downed wood. As the forests mature and begin to grow rapidly, their carbon uptake is at its highest exceeding the volume of carbon

Ecosystem services include (adapted from Daily 1997):

- Purification of air and water
- Mitigation of floods and droughts
- Detoxification and decomposition of wastes
- Soil formation and fertility
- Pollination of crops and vegetation
- Regulation of pests
- Seed dispersal
- Maintenance of biodiversity
- Stabilization of climate
- Beauty and intellectual stimulation

released from respiration and decomposition (Sedjo and Sohngen 2012). Harvested trees themselves can release carbon rapidly when turned into paper or more slowly when manufactured into long-lasting products like furniture.

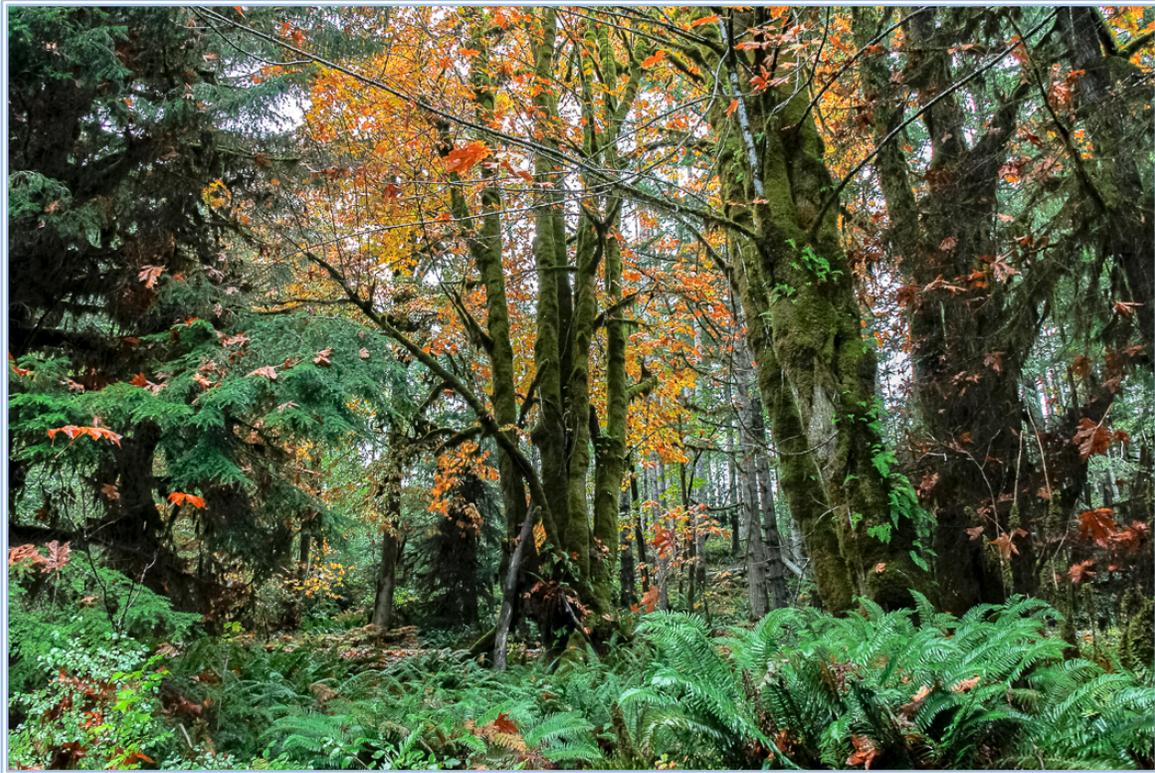


Photo 8. Forested ecosystems provide basic ecosystem services like clean water and also help improve our emotional and mental health (Photo: Barry Hetschko).

Studies have attempted to economically value some ecosystem services while recognizing that many ecosystem services cannot be confidently quantified (e.g., spiritual value). In one example, eelgrass habitats in the Salish Sea were valued at over \$80,000 for their role in carbon sequestration and nutrient cycling, and for providing habitat (ICABCCI 2020). In a cross-Canada study, ecosystem services were valued for several different protected areas at between \$5,800 and \$46,000 per hectare depending on specific site conditions (e.g., forest type) (TD and NCC 2017). Also, a study completed for the watersheds supplying drinking water to the communities of Abbotsford and Mission in BC concluded it is possible to quantify the increase in municipal water treatment costs due to increased sediment on active logging roads (Knowler et al. 2016).

Several provinces have mechanisms in place where landowners receive payments for protecting selected ecosystem services on their property (MNAI 2019b). These provinces include Alberta, Saskatchewan, Manitoba, Ontario, Quebec and PEI. Also in Ontario, programs for water and biodiversity conservation allow for matching funds for projects protecting or restoring fish, wildlife, and plant habitat (MNAI 2019b).

Existing Land Protection

Protected areas established in the Cowichan Region support protection of many of the natural values and ecosystem services described above. There are different opinions as to what constitutes a “*protected area*”. For this section of the report, only land where economic development is not permitted is considered. While there are no National Parks in the Cowichan Region there are many other categories of (potentially) protected areas including:

- Ecological reserves
- Provincial parks
- Wildlife Management Area
- Regional parks
- Conservation lands
- Land covenants
- Carbon offset areas



Photo 9. Garry Oak ecosystems have been the focus of much of the land conservation effort in the Cowichan Region (Photo: Barry Hetschko).

Many of the protected areas occur on public lands (Table 3). Ecological Reserves are considered to be the land designation having the strongest environmental protection value in BC (Krindle 2014). These reserves are protected from all forestry, range, mining, and oil and gas activities. Regulations prohibit road and trail construction and use of motorized vehicles. The Somenos Garry Oak Protected Area

was not established as an ecological reserve in order to allow for treatments in research trials on ecological restoration⁵. A Land Use Order protects additional Crown land adjacent to the Woodley Range Ecological Reserve but only from activities authorized under the *Forest and Range Practices Act* (i.e., tree harvesting and livestock use). Provincial Parks also offer considerable protection, yet promote recreation that can impact environmental values. A Wildlife Management Area is part of the Somenos Marsh complex of protected lands where it is considered an offense to “alter, destroy or damage wildlife habitat” (*Wildlife Act*, sec. 7(1)).

Table 3. Protected areas on provincial Crown land in the Cowichan Region.

Watershed	Protected Area	Ecosystem Type¹	Area (ha)
Bonsall Creek	Eves Provincial Park	CDF	18
Bush Creek	Yellowpoint Bog Ecological Reserve	CDF	137
Bush Creek	Woodley Range Ecological Reserve	CDF	166
Bush Creek	Land Use Order	CDF	?
Chemainus River	Chemainus River Provincial Park	Dry CWH	119
Cowichan River	Mt. Tzuhalem Ecological Reserve	CDF	18
Cowichan River	Cowichan River Provincial Park	Dry CWH (minor CDF)	1,414
Cowichan River	Gordon Bay Provincial Park	Dry CWH	104
Koksilah River	Koksilah River Provincial Park	Dry CWH	230
Shawnigan Creek	West Shawnigan Lake Provincial Park	Dry CWH	9.7
Shawnigan Creek	Memory Island Provincial Park	Dry CWH	1
Somenos Creek	Somenos Garry Oak Protected Area	CDF	?
Somenos Creek	S’amunu Wildlife Management Area	CDF	155
Spectacle Creek	Spectacle Lake Provincial Park	Dry CWH	67
Spectacle Creek	Bamberton Provincial Park	CDF	28
Sutton Creek	Honeymoon Bay Ecological Reserve	Dry CWH	7.5
		Total	2,474+

¹ CDF is Coastal Douglas-fir and CWH is Coastal Western Hemlock.

Regional parks are established for a wide range of reasons, from providing a wide-open area to play baseball to providing recreation opportunities in a forested area (e.g., Bright Angel). Therefore the range of protection they provide varies widely.

Conservation lands include public and private lands that are leased to the Crown for conservation purposes, primarily to conserve and manage fish and wildlife. There are two Conservation Land complexes within the Cowichan Region, the Cowichan/Koksilah River Estuary and the Somenos Marsh⁶. Eight habitat

⁵ See: <http://www.goert.ca/activities/2010/01/somenos/>

⁶ For maps and more information see: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-habitats/conservation-lands>

components covering 295 ha make up the Cowichan/Koksilah River Estuary complex; five habitat components covering 130 ha make up the Somenos Marsh complex. Parts of Cowichan/Koksilah River Estuary are owned by the Nature Trust of BC and Ducks Unlimited Canada and are leased to the province. Parts of Somenos Marsh are also owned by the Nature Trust of BC and are also leased to the province as conservation lands.

Other existing protections occur on private lands. These tools are discussed in greater detail below. Land covenants are regularly used by private landowners interested in ensuring their property is protected in perpetuity. There are covenants on over 530 ha of private land in the Cowichan Region. In addition to this, there are approximately 685 ha of fee simple lands owned by five different conservation groups. Ducks Unlimited of Canada alone owns several parcels covering over 144 ha to help protect the Chemainus estuary (DataBC 2020). Another more recent approach used to protect private land is establishing carbon offset areas to temporarily protect productive forest lands for 20 to 100 years.

How much is enough?

While some forest land is protected in many of the watersheds, there is an overall shortage of protected areas in the Cowichan Region (CVRD 2010). Most of them are located in rare ecosystems like Garry Oak, while few occur in the upland conifer forests. Holt (2007) suggests that around 50% of the landscape needs to be managed for conservation in order to protect and maintain ecological integrity. This is particularly true for Coastal Douglas-fir (and likely dry Coastal Western Hemlock) ecosystems, which are considered to be in a “high risk category” with a “high likelihood that ecological integrity will not be maintained into the future” (Holt 2007 and references therein). A network of reserves interspersed with pockets of conservation-based management will help to restore degraded ecosystems. Riparian reserves are common anchors for these networks (CSSP 1995; Hammond 2015).

With respect to the desired forest age class distribution and forest structural conditions of the Cowichan Region. Table 4 suggested by Holt (2007), aims to over time restore missing structures (e.g., large trees, snags, downed wood) thereby improving functioning of local watersheds (e.g., water and nutrient cycles, wildlife habitat). Ecosystems with restored structures are needed on large, productive, and well-distributed sites.

Table 4. Proposed age class distribution to restore ecological integrity to Coastal Douglas-fir and dry Coastal Western Hemlock ecosystems¹.

Age class	Area
>250 years	20%
>200 years	29%
>140 years	35%
>80 years	45%

¹Based on Holt (2007).

In other studies, it is recommended to protect around 60 to 70% of the old forest that would have occurred under natural disturbance patterns (CIT 2004 in Price et al. 2007). This is required to provide a high degree of certainty that habitats for all wildlife species will be provided. While these studies are based purely on ecological principles, application of policy tends to drive these values down significantly affecting structures and functioning of forested ecosystems and putting some wildlife species at risk (Price et al. 2007 and references therein).

Conservation Priorities

In summary, forests in the Cowichan Region provide many ecosystem services contributing to a high quality of life for the residents who live here. However, the forests have changed drastically over the last 150 years and continuing pressures are degrading important forest values affecting watershed health. This in turn affects the quantity and quality of the ecosystem services we receive. Natural structures required for healthy functioning ecosystems must be protected and restored immediately. These structures include abundant large trees (living, dead, and fallen), deciduous trees and shrubs, and deep, organic undisturbed soils. Ideally, intact mature and old forests cover at least 50% of each watershed (Holt 2007), in networks that connect high value features like wetlands and rock outcrops. Riparian forests would be well protected and a foundational feature in this network. Fish and wildlife habitat would over time recover, as would soil flora and fauna that aid nutrient cycling necessary for healthy trees. Hydrologic recovery would see less intense flooding events in winter and low flows in summer would be less extreme.

Since most land in the Cowichan Region is privately owned, effort must be placed on encouraging landowners to conserve forest values. However, there are a number of barriers that stop people from pursuing any formal protection. For people who want to protect their land, barriers may be economically based, as protection measures can be expensive. In other situations, barriers may be linked to traditional mindsets about forestry and perceived rights associated with land ownership.

For those landowners who want to pursue land protection, there are several legal and voluntary tools available depending on a landowner's interests and objectives. Some tools can be used alone or in combination with others. Some offer enforceable legal protection while others are stewardship driven and voluntary. While many offer protection in perpetuity, some are shorter term. Some tools offer financial incentives to landowners who conserve their forests.

The following sections look at some of the barriers that may prevent landowners from protecting their forested land. This is followed by a summary of legal and voluntary tools that landowners can consider. This evaluation ends with a look at how the CCLT can participate best in a movement to see more private forest land protected in the Cowichan Region.

Barriers to Protecting Private Forest Land

Many forest landowners have a deep appreciation of the natural world and the values it provides, and would like to see that their land is protected beyond their ownership or lifetime. However, after looking at what tools are available, several barriers have been identified that get in the way of landowners and NGOs achieving this goal. These barriers include:

High land costs. The Cowichan Region has become an increasingly attractive place to live. The climate, recreation opportunities, proximity to larger centers, and lower real estate costs compared to Vancouver and Victoria have contributed in recent years to a housing shortage and rising property values. This makes it more difficult for NGOs and local governments to purchase lands for conservation purposes.

No legal requirement to protect habitat on private land. While local governments have tools to protect species at risk and their habitat on private land, and the federal [SARA](#) expects provinces to require it, there is no legal requirement for local governments to do so (Krindle 2014). To a limited degree, bylaws and zoning developed by local governments to comply with the provincial Riparian Areas Protection Regulation protect some riparian areas. However, these rules do not apply to all private land use zones (e.g., forestry, agriculture) and there is no requirement to restore degraded riparian habitats. The *Private Managed Forest Act* and regulations contain some provisions to protect habitat for “critical wildlife areas” encountered during operations, however, protection is temporary (i.e., maximum one year), is limited in area (i.e., maximum 1% of the private managed forest land), and is limited in scope (i.e., future notices cannot be issued for the same area). In all cases, forestry legislation for private land favors socioeconomic considerations over ecological value (Krindle 2014) and therefore is of limited ecological value.

Recognizing the ineffectiveness of provincial species at risk (and habitat) legislation, the current government initiated development of much needed provincial species at risk legislation. However, it appears to have stalled leaving wildlife species and their habitats vulnerable.

Traditional forestry mindset. Forest practices on private land in the Cowichan Region over the last 150 years have emphasized “intensive forest management” resulting in low landscape level retention, high road density, and extensive clearcutting. During most of this time forest practices were unregulated and current legislation offers limited protection. Many landowners appear to not understand the values beyond economics associated with their forests. Some landowners have expressed an attitude favoring their rights as the landowner while not understanding their responsibility to manage for the many ecosystem services that are outside their ownership yet influenced by how they manage their land. And where several adjacent landowners practice intensive forest management or clear large areas for development, ecosystem functioning and ecosystem services can be substantially degraded.



Photo 10. Private land logging in the Koksilah River watershed.

High costs of covenants. Establishing a covenant typically requires development of a baseline report, management plan, and monitoring strategy. While external funding is often available to fund the first two steps, landowners are often required to invest in an endowment fund (currently around \$10,000) to fund future monitoring.

Lack of financial incentives. Landowners expressed that they would be motivated to establish land protection designations on their properties if government provided tax breaks or grants for habitat restoration and protection (MOE 2017). While there may be some tax relief from establishing a conservation covenant, the expenses often outweigh any financial gains.

Also, for landowners that have Managed Forest designation under the *BC Assessment Act* (i.e., are subject to the *PMFL Act*), there is a perceived significant tax disincentive for giving up this designation in exchange for a covenant that restricts tree cutting. However, the magnitude of the change to property taxes will vary from one property to another and in some case may actually decrease with Managed Forest designation. Annual property taxes for Managed Forest are based on bare land value (without trees) instead of market value. Variables affecting tax rate include location, parcel size, soil quality, topography and ease of access⁷. Higher taxes are paid only

⁷ See: <https://info.bccassessment.ca/Services-products/property-classes-and-exemptions/managed-forest-classification-in-british-columbia>

for years when trees are harvested. Tax rates (i.e., mill rates) are also usually higher for land classified by the BC Assessment office as Managed Forest versus Residential. Therefore property tax implications need to be calculated for individual properties when considering changing property tax designation.

Lack of public education on available protection tools. There is a recognized need for public education on private forest land protection (MOE 2017). Many people do not know what tools exist, how they work, or what the associated advantages and disadvantages are. Also, there is likely a lack of understanding about the full range of values provided by forested ecosystems. A greater appreciation for ecosystem services and how every piece of land can contribute to ecosystem health may encourage more people to practice stewardship and/or protect their land.

Lack of coordinated conservation targets for the Cowichan Region. While research and data provide evidence that the Cowichan Region has insufficient old forest, declining fish and wildlife numbers, and overall declining watershed health there are no widely accepted targets for protecting and restoring key values. Although we may expect government as the responsible body to establish these targets, history has shown us that policy-based targets are often compromises that may be ineffective.

In a review of 222 conservation targets established for various values, it was determined that evidence-based targets were up to three times higher than policy-based targets (Svancara et al. 2005). That is, targets based on an ecological evidence of what values are or should be present, and where protected areas exist or are needed, tend to be higher than targets that are influenced by policy which is often swayed by industry. Another important conclusion is that there is no one value alone to protect biodiversity that can be applied broadly, rather it needs to be based on site specific information (Svancara et al. 2005).

Lack of a Regional Conservation Strategy for the CVRD. A Regional Conservation Strategy is a long-term strategy aimed at protecting and restoring ecologically important areas. Important habitat and sensitive ecosystems are key components. It provides direction to government and NGOs when establishing priorities associated with land conservation. While the CVRD has been working toward a strategy since at least 2007 (ELC and Curran 2007), one has yet to be completed. While the CVRD is currently pursuing completing this conservation strategy in 2021 (Jeff Moore, pers. comm.) there is still no guarantee that it will be completed on time.

Other barriers. Other reasons provided by landowners why they would not commit to land protection measures include a fear of red tape, loss of control, and uncertainty around possible changes to regulations associated with species at risk protection (MOE 2017).

In summary, several barriers affect the willingness of private forest land owners to protect their forests in the Cowichan Region. The high costs associated with land acquisition and covenant establishment as well as the lack of financial incentives are primary barriers. There is also a need for public outreach and education on ecosystem services and how covenants and other tools can protect them. And

finally, there is an important role for NGOs to lead the establishment of ecologically-based forest cover targets for the Cowichan Region to improve overall watershed health.

Opportunities for Protecting Private Land Forests

While barriers exist, there are numerous tools available for protecting private forest land. Detailed descriptions of the common tools, unless otherwise referenced, are provided in *Green Bylaws Toolkit* (ELC and Curran 2007), *Innovative Subdivision Design to Retain Valued Community and Environmental Assets* (Soto undated) and *Towards a Collaborative Strategy for Municipal Natural Asset Management: Private Lands* (MNAI 2018). The *Green Bylaws Toolkit* also offers many BC examples and case studies illustrating where different approaches have been applied.

In this general overview, the available tools are split into two main categories: legal tools and voluntary tools. Most tools are legal tools, that is, they are embedded in legislation and/or result in a legal contract. They are further categorized as either existing tools used in BC, or as tools used outside of BC though may be useful here as well. Descriptions for each tool are provided along with some of the important incentives and disincentives to their application.

Legally Binding Conservation Tools

Conservation Covenants

Landowners wanting to protect their property in perpetuity often use conservation covenants. Most covenants are established under authority of Section 219 of the *Land Title Act*. Conservation covenants can also be established under Section 99 of the act, which then allows for subdivision of an ineligible property if that subdivision can be shown to provide ecological benefits. They are difficult to remove and may require a court order or agreement from all parties to do so.

At least one or two land trusts and/or a local government hold the covenant. Covenants are registered against the title and “run with the land”, that is, they apply to all subsequent landowners.

While content of different covenants can vary, they all include a description of the ecological or cultural value being protected and a list of restricted activities aimed at protecting that value. A covenant can act alone or be used effectively with one or more other conservation tools. Local governments often require conservation covenants to

Section 219 of the *Land Title Act* allows for establishment of a covenant to protect, preserve, conserve, maintain, enhance, restore, or keep in its natural state land or a specified amenity.

Amenities include any natural, historical, heritage cultural, scientific, architectural, environmental, wildlife or plant value relating to the land.

protect ecological features when developers are requesting the opportunity to, for example, subdivide or increase housing density. This is described in relevant sections below.

While they can be an effective way for landowners to protect their property, there are some challenges. Covenants can be expensive and time consuming to establish.



Photo 11. Rainbow Island near Duncan, BC is protected by a conservation covenant.

Costs include development of a baseline report describing the current condition of the property and values, a management plan, and a monitoring plan. While external funding can often be sourced for the first two steps, an endowment fund (~\$10,000) is usually required to finance future monitoring. Adequate funding is required to ensure the annual monitoring is conducted well to establish a rigorous data set for potential court challenges with subsequent property owners (Paul Chapman, Nanaimo and Area Land Trust, pers. comm.). The covenant-holder must also invest time and effort to educate new owners of covenanted properties in order to ensure the intent of the covenant is understood and followed.

In some cases, covenants may decrease property value as prospective buyers may want to develop the property or have concerns about ongoing monitoring and associated costs.

Another limitation is that requirements in the covenant are only enforceable by the covenant-holder (Krindle 2014). That is, if the covenant holder is unwilling or unable to act on a non-compliance, the provincial (or other) government cannot be called upon to step in to measure or enforce compliance.

Conservation covenants generally cannot be established for land within the Agricultural Land Reserve. This would require consent from Agricultural Land Reserve Commission, which is unlikely, based on past experience. The Nanaimo and Area Land Trust has attempted to do this without success (Paul Chapman, pers. comm.).

In recent years, the use of conservation covenants has expanded into more innovative directions such as sustainable forestry and burial sites. In 2016, the Land Conservancy of BC worked with a forest landowner on Galiano Island to develop a Sustainable Forestry covenant that permits limited tree removal while moving the

forest toward mature and old conditions⁸. The covenant permits activities such as fuel management and low volume harvest, only 25% of estimated annual growth. It requires retention of full cycle trees to live out their lives, die, fall down and decompose into organic soils supporting the next generation of trees. The landowners are assured that their forest will one day achieve old growth status, it will be protected in perpetuity, and because some harvest and improvement is occurring they will retain Managed Forest designation, which reduces property taxes.

The Denman Island Memorial Society has a Conservation Covenant for land being used as a natural burial cemetery⁹. Bodies are returned to the earth in a natural and gentle way as the surrounding forest continues to grow. There are no grave markers or landscaping and over time an old forest will cover the area.

Tax exemptions

Property tax exemptions for land conservation are often viewed as a desirable tool but they are rarely used. Local governments have the authority to create a riparian tax incentive in bylaw to encourage landowners to place a conservation covenant on their riparian areas. This is consistent with the intent of the provincial *Riparian Areas Protection Act*. ELC and Curran (2007) provide a case study where the Town of Gibsons offered a 10-year tax exemption to 11 landowners along a creek requiring restoration. The tax exemption applied to riparian habitats captured within conservation covenants. However, while landowners were generally in agreement with protection and restoration of their riparian areas only two landowners participated due to uncertainty about how establishing a covenant on their land would affect them and their property value long term.

Locally, the Islands Trust, under the *Islands Trust Act*, established the Natural Areas Protection Tax Exemption Program (NAPTEP). Landowners who chose to register a conservation covenant on part or all of their property receive a 65% property tax exemption for that area. Key features that are eligible for this program include older forests, unique ecosystems, historic and cultural features, and important wildlife habitat. Challenges associated with the program include costs of establishing a covenant, concerns about loss of privacy due to monitoring, inability to collect firewood, inability to conduct fuel reduction treatments, and reluctance in committing to a long term covenant.

As another approach, land is exempt from property transfer tax if the developer transfers land to a land trust or municipality who then establishes a covenant.

⁸ See <http://www.islandstrust.bc.ca/media/347058/sustainable-forestry-covenant-dl-79.pdf>

⁹ <http://dinbc.ca>

Land securement

There are several ways that funds can be sourced to purchase land for conservation:

Direct purchase

Locally, the CVRD has a Parkland Acquisition Fund established in bylaw with contributions based on property values (MNAI 2018). Nearby, the Capitol Regional District has a Land Acquisition Fund also established in bylaw for land purchase and maintenance of park assets. A \$20 levy per household per year is collected generating \$3.7 million per year (MNAI 2018 and references therein). Partners generally contribute 25% toward the purchase of new parkland. Local Conservation Funds, also established in bylaw, exist in the Columbia Valley, Kootenay Lake, and the South Okanagan. They can be used for stewardship activities (including establishing covenants) or land securement.

The City of Surrey through its Biodiversity Conservation Strategy has developed a strategic framework that identifies over 10,000 acres of land required to protect municipal ecosystem services to support wildlife and people (MNAI 2019b). The goal for the City is to manage all these lands through land acquisition as well as stewardship programs on private land (MNAI 2018 and references therein).

The Nanaimo and Area Land Trust is attempting to establish an effective working relationship with Mosaic Forest Management (Paul Chapman, pers. comm.). As a major private land holder in the area, they own parcels with high conservation value of interest to land trusts and other NGOs.

A unique land securement initiative in Cumberland, BC, shows that a community of people can do great things when they set their minds to it. The Cumberland Community Forest Society has successfully fundraised to purchase 110 hectares of forest land between Cumberland and Comox Lake. Fundraising is currently underway to purchase another 91 hectares adjacent to the previous parcels. The Society was formed in 2000 with the mission to “purchase and protect the Cumberland Forest for its ecological, historical, economic and recreational values”¹⁰.

Four goals guide the society’s work: land acquisition, community engagement and outreach, governance and leadership, and special projects (CCFS 2017). Their vision includes protecting forests adjacent to the community to produce old growth forests contributing to the ecological integrity of local watersheds. Ecological, cultural and adventure tourism will provide economic opportunities. Their work centers on the belief that healthy forests are required for healthy communities - physically, mentally, and spiritually.

A Conservation Covenant was placed on the property and a well-developed trail network has been developed. The lands are now managed as a park by the Village of Cumberland (CCFS 2017).

¹⁰ <https://www.cumberlandforest.com>

Subdivision

Local governments have the ability to create bylaws such that when subdivision is proposed, land or money (valued at 5% of the land) can be secured for purchase of parkland (Section 941 of the *Local Government Act*). However, this requirement generally contributes only a small portion of overall parkland.

Ecological Gifts Program

The federal Ecological Gifts Program (also referred to as “eco-gifting”) was initiated in 1995 and is administered by Environment and Climate Change Canada (Environment Canada 2011). It was enabled through the federal *Income Tax Act* and allows landowners (individuals or corporations) to donate land or partial interest in the land in perpetuity for the purposes of conservation. Donors are then eligible to receive income tax benefits (see Environment Canada 2011). The Cowichan Community Land Trust is an eligible environmental charity and can be a recipient of eco-gifts¹¹.

As of March 2019, 195,000 hectares of wildlife habitat in Canada have been eco-gifted. To qualify, a land parcel must meet criteria for ecological sensitivity, the recipient must meet eligibility requirements, and the fair market value of the property must be determined. Lands that have significant ecological value or that include buffers for streams, wetlands and other waterbodies qualify as ecologically sensitive (Environment Canada 2011).

Donations may be in the form of a land donation or as a conservation covenant or easement. Most (60%) of all donations are full title (Environment Canada 2011). Recipients must have the resources to be able to maintain the property. That is, they must be able to finance upkeep costs, insurance, and property taxes.

Estates and Life Estates

In some cases, properties are donated to conservation organizations as part of an estate. Alternately, a cash portion of the estate is donated.

Life estates are another option landowners can consider to protect their land beyond their lifetime. In these cases, the property title is transferred to a recipient “in life” (e.g., a land trust) while the original owners (i.e., the granters of the Life Estate) continue to live on the property for life. This approach has been used locally by the Nanaimo and Area Land Trust to secure at least one property¹².

In all cases, it is important that the conservation organization has the resources for upkeep and to pay property taxes for bequeathed properties. The Nanaimo and Area Land Trust has, in some cases, had to sell bequeathed properties if they cannot be made self sufficient (Paul Chapman, pers. comm.).

¹¹ See <https://www.canada.ca/en/environment-climate-change/services/environmental-funding/ecological-gifts-program/eligible-recipients.html>

¹² See <https://www.nalt.bc.ca/data/files/vanklifeestate-ed.pdf>

Official Community Plans

Official Community Plans (OCPs) are a long-term policy tool providing strategic direction on all local government matters including environmental protection. While they have limited regulatory authority, all bylaws, zoning, and local government plans must be consistent with OCP policy. Therefore it is important that the local OCP and local area plans represent all environmental concerns within the Cowichan Region. In 2015, the Town of Gibsons updated the vision in the OCP to recognize the value of natural assets to the community (MNAI 2018).

Density transfers

When supported by the OCP, density transfers are one way to decrease development in sensitive areas and shift it to more suitable areas. They allow for the transfer of development rights from one property to another. Landowners whose zoning allows for subdivision into 2 or more lots can sell the development potential to a landowner in an area where density transfer units can be received for an approved sustainable development.

Clustered development

Clustered development, if supported by the OCP, may be proposed as part of a subdivision where residential units are concentrated in one area away from sensitive ecosystems or other features of high conservation value. A conservation covenant is usually registered for the sensitive areas. Public benefits are increased parkland while the developer benefits from reduced road and other infrastructure costs. Clustered development is often combined with amenity density bonuses.

Amenity density bonuses

If supported by the OCP, density bonuses can contribute significant parkland. If approved, a developer is provided permission to develop high density in exchange for a public benefit such as parkland acquisition, habitat restoration, or environmental protection. The idea is that both the developer and the public benefit from this option. They are often used together with clustered development and conservation covenants to protect conservation values.

The District of Highlands, just outside Goldstream Provincial Park, has used amenity density bonuses to protect large areas of forest. Details are provided in ELC and Curran (2007) and summarized here. Past and current OCP policies have aimed to keep a rural forested feel. Clustered development has been permitted on non-sensitive areas while large connected networks of parkland protect wetlands, streams, forests, and sensitive ecosystems, and link into four regional parks. Individual lots consist of a residential use zone where clearing can occur while the remaining area is placed within a conservation covenant; in one subdivision 75% of each lot was placed in a covenant. Applying amenity density bonuses and clustered development in one subdivision resulted in 90% of the property maintained in its natural state.

However, amenity density bonus and clustered development can result in controversy. Primarily, community members may be concerned about greater housing densities that are in conflict with OCP zoning.

Comprehensive development zoning

Comprehensive development zoning is usually used for larger parcels where multiple uses are proposed. Because each one is tailored to a specific development project, they are often innovative in approach. Amenity density bonus and clustering are often part of comprehensive development zones allowing for protection of sensitive areas. Specific details are negotiated between the developer and local government; these often describe where development may and may not occur, what types of development may occur, density limits, and location of protected areas.

Development Permits Areas

Development permit areas (DPA) can be established to protect sensitive areas from subdivision, construction, or alterations to the land. They are used most often for ensuring development does not occur in riparian areas without a proper assessment by a qualified environmental professional hired by the landowner. Local governments can also require environmental development permits for natural features to be protected or restored, to require works to protect or restore watercourses or natural features, or to require stream bank restoration. They can require a conservation covenant to protect the natural feature(s). They can be geographically based (e.g., adjacent to streams), specific to selected sensitive ecosystem types (e.g., Garry Oak ecosystems).

Galiano Island has a DPA that covers the entire island to ensure tree removal on the island is limited, sustainable, and strictly necessary for the intended use of the land. It exempts some activities including subdivision, land clearing in order to build a structure, and tree cutting in the ALR.

Challenges in their use are that they are not regulatory; therefore, they are difficult to enforce, they can be expensive to obtain for landowners requiring assessments by qualified professionals, and staff sometimes lack expertise to evaluate the impact of a development.

New zoning

Zoning provides a regulatory tool for local governments to affect how private lands are developed. New zoning, along with many of the other tools listed above, has been used on Vancouver Island and neighbouring Gulf Islands to create conservation communities, also called Living Forest Communities. They are created through subdivision and zoning changes combined with establishment of innovative covenants. Although each conservation community uses these tools in different ways, they all have the common approach of identifying important values first and protecting them before selecting development sites. The goal is to ensure a net ecological gain. Each model demonstrates different ways to create community while

minimizing damage to the environment. Although counter-intuitive, development was the tool used to save the forests.

Siskin Lane

Siskin Lane is located on Cortes Island in the Strathcona Regional District (SRD)¹³. Establishment of this conservation community followed concerns about the upcoming sale of private forest land owned by Weyerhaeuser. The newly formed Renewal Land Company purchased the Siskin property in 2003 and immediately donated a large portion to the regional district for a public park. Next, 25 residential lots were sold to cover the purchase costs of the property. The remaining 140 acres were maintained as a forested common use area with some public walking trails. A covenant covers the entire property with different zones having different restrictions. The Land Conservancy developed and holds the covenant¹⁴.

Plans for developing this community required negotiating with SRD to create new zoning categories: Forest Stewardship zone for the common use area, and Land Stewardship zone for the development sites. A forest management plan was developed for the Forest Stewardship zone based on ecosystem-based principles to move the forest toward mature and old growth conditions. It was last logged in the 1990s. The covenant prohibits future harvesting until 85% of the land supports mature and old trees at which time only half the annual growth can be logged. Harvest trees are to be distributed throughout the property and a 50 m diameter maximum gap size is permitted.

Each residential lot consists of an approximately 2-acre Residential Use Area and an additional 2-acre Residential Conservation Area. Homes and other structures are built on the Residential Use Area while permanently retaining 25% of the trees. On the Residential Conservation Area 75% of the trees must be protected. No trees can be felled for firewood.

The conservation covenant protects all wildlife trees and provides 15m buffers along creeks and other ecologically sensitive areas. Roads are minimized and no further subdivision is permitted.

Treedom

Treedom is another land protection project on Cortes Island contributing to a network of properties with registered conservation covenants held by The Land Conservancy. Like Siskin it provides for residential sites and protection areas.

Everwoods

Everwoods is also on Cortes Island occupying around 61.8 ha (Hopwood 2017). The land was rezoned as Community Land Stewardship, which allows for selective harvest of trees and a limited number of home sites. A conservation covenant covers

¹³ <http://www.renewalpartners.com/renewalland/siskin.html>

¹⁴ See <http://www.renewalpartners.com/renewalland/images/siskinCovenant.pdf>

the property that defines a Residential Use Area and an Ecosystem-based Forest Management Area covering 51.6 ha. The covenant is held by The Land Conservancy and the Trust for Sustainable Forestry, a charitable foundation set up by the founders of Everwoods.

The land at Everwoods was purchased after a group of residents joined together to save the land from being logged. The sale of building lots financed the land purchase. A for-profit company with 15 shareholders was formed called Eco-Initiatives, who owns the land in common and manages land development.

The Trust for Sustainable Forestry holds the timber rights. A forest management plan establishes requirements to protect old forest, biodiversity, soils, water quality, and fish and wildlife habitat (Hopwood 2017). The management plan includes a detailed forest inventory, allows only partial cutting, and establishes a harvest rate that is less than 75% of the annual growth rate of the forest. Harvesting for the first 20 years will focus on thinning smaller trees to help move the forest toward large structures. The covenant guides forestry activities and allows for small patch cuts, narrow roads, wetland restoration, and value-added manufacture using wood debris (e.g., arbutus branch salad servers). Eleven families make a living from the land, including value-added businesses.

Elkington

Following the Everwoods model, the Elkington Living Forest Community was developed (Barry Gates, pers. comm.). Elkington is located on Vancouver Island near Shawnigan Lake and covers 1000 acres¹⁵. Originally, the Elkington family owned the property as a summer retreat after being high-grade logged for old growth Douglas-fir. Living Forest Communities Ltd., a for profit company based in Victoria, is now responsible for management of land development along with its partner, the Trust for Sustainable Forestry. Eighty-five percent of the land is in protective covenants that allow some harvesting with restrictions. The Land Conservancy and CVRD are the covenant holders.

CVRD approved rezoning to Community Land Stewardship to allow for clustered communities where people can live and work. Seventy-seven residential lots occupying about 15% of the landbase are clustered within three hamlets. Houses are built to meet LEEDS standards. A stormwater and waste water treatment facility uses wetlands and sand filtration. The vision guiding development was to create a community rooted in local food production and local employment. There are approximately a dozen organic hobby farms 3 to 4 acres in size.

The goal for the non-residential area is to grow old growth forests and harvest on a 250 year rotation versus the 40 to 80 year rotation on neighbouring industrial forestry lands. Careful consideration was given to identify areas requiring protection within the potential harvest areas. First Nations were invited to identify culturally important sites and culturally-modified trees, biologists prepared an

¹⁵ See <https://elkingtonforest.com/about-us/>

ecological baseline, professional foresters conducted a timber cruise to help determine harvest rates, and a forest ecologist organized data layers and assembled data to guide the planning process.

It is expected that growing larger trees and having longer rotation ages will result in more timber being harvested, as compared to clearcutting, creating an even revenue stream. Harvested logs are processed at a local mill to make value-added products that are Forest Stewardship Council certified. This certification also provides the rigorous monitoring required to ensure any tree harvesting follows stringent ecological principles.

North Pender Island Land Trust Committee

Options to protect important ecological values are currently being explored for North Pender Island. The Raincoast Conservation Foundation has just completed (July 2020) a project looking at a range of options (Shauna Doll, pers. comm.). At the time of writing, the report was not publicly available.

CVRD Regional Conservation Strategy

The CVRD has had the goal to develop a Regional Conservation Strategy (RCS) for many years. There is a current push to complete this work, which will help prioritize properties for protection and exploring available tools for this work (e.g., covenants, parks, development permits) (Jeff Moore, pers. comm.).

If the RCS is part of the OCP or a Regional Growth Strategy then bylaws must be consistent with the RCS.

Conservation Lands

As mentioned above, conservation lands are public and private lands that are leased to the Crown for conservation purposes, primarily to conserve and manage fish and wildlife¹⁶. They are established using a number of different legal tools or agreements. “Administered conservation lands” are lands where management authority has been acquired by the province either as a Wildlife Management Areas under the *Wildlife Act*, a fee simple acquisition, private land under a long term lease to the province, or as a Crown transfer of administration under the *Land Act*. “Non-administered conservation lands” are often established through *Land Act* mechanisms that limit certain uses over a certain time period. Over 900,000 ha of conservation lands have been established in BC. Partnerships between the province, NGOs, local governments, federal government, First Nations, and others are important for ensuring conservation lands are effectively managed and protected. The West Coast Conservation Land Management Program is the local partnership organization that includes the Cowichan Region.

¹⁶ See <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-habitats/conservation-lands>

Private Managed Forest Land Act

The *Private Managed Forest Act* and its regulations were established by the Province in 2003 with the intent to increase protection of key public environmental values on privately owned forest land such as soil conservation, water quality, fish habitat, and critical wildlife habitat¹⁷. Landowners can apply to the Private Managed Forest Council to have their land designated as Managed Forest, which in many cases provides a property tax savings, sometimes significant. The landowner is required to commit to use the land for production and harvesting of timber only. This land use has to adhere to legislated protective measures that aim to protect human drinking water, retain sufficient streamside mature trees and understory vegetation, to protect fish habitat and critical wildlife habitat, and minimize the area occupied by permanent roads, landings and excavated or bladed trails. It is expected that Managed Forest designation provides improved land protection. After the application is approved by the Council, the recommendation for classification as Managed Forest is sent to the BC Assessment Authority who then assess a number of administrative requirements such as parcel size (i.e., it must be > 25ha) and area in productive forest (i.e., versus unproductive areas like rock or shallow soils).

A recent provincial review of the Private Managed Forest Land Program was conducted to determine whether it is meeting its goals to encourage private landowners to manage their forests for long-term forest production and use forest management practices to protect key public environmental values (MFLNRORD 2019). While 52% of respondents agreed with the program goals, most respondents disagreed that the key public environmental values considered are sufficient, and that the current regulatory framework can effectively support achievement of management goals. Local governments, Indigenous Nations, and special interest groups consistently reported concerns about the effectiveness of the current framework to protect environmental and cultural values. The Province has not yet reported on what changes, if any, may be made to the regulatory framework.

Riparian Areas Protection Act and Regulation

The *Riparian Areas Protection Act* and its regulations were established with the intent to improve the features, functions, and conditions of riparian areas on private land classified as residential, commercial, or industrial. This provincial legislation enables local governments to establish legal tools (e.g., development permit areas) for protection of riparian areas up to 30 m from the stream or lake edge through prohibition of tree and shrub removal and soil disturbance. Stream shade, bank stabilization, and stream inputs of litter, insects and large fallen trees are to be maintained. No new buildings or subdivision are permitted in riparian areas.

The regulation was amended in 2019 in response to concerns raised by the Provincial Ombudsperson after investigating its application of the professional reliance model to protect riparian values (Office of the Ombudsperson 2014).

¹⁷ See <https://www.mfcouncil.ca//legislation-policy/protecting-key-environmental-values/>

Twenty-five recommendations were proposed aimed at improving compliance with the intent of the regulation.

While the amended regulation should improve riparian protection, there are still some limitations in its ability to do so. First, it does not apply to all areas of BC; rather, it applies to the Islands Trust Area and highly populated regional districts (Office of the Ombudsperson 2014). While it does apply to the CVRD, it does not apply to forestry and agricultural activities, which locally, have been observed to reduce riparian cover retention well below 30m (Pritchard et al. 2019). An important limitation is that many residents owning properties adjacent to streams and lakes are unaware of the importance of riparian areas and restrictions on activities that disturb soils and vegetation. The author has observed new tree falling, vegetation clearing, and soil excavation and disturbance within the Cowichan River riparian zone on many occasions during recent years.

Carbon Offsets

Carbon offset projects are another tool that can use a legal agreement to conserve private forest land. Permanently retaining large old trees, creating good growing conditions for maturing forests, extending harvest rotation periods, reducing harvest levels, and planting non-forest sites help mitigate climate change pressures (Sedjo and Sohngen 2012; Petersen St-Laurent 2018). These management practices create the foundation for carbon offset programs associated with forest conservation. For forested environments, any practices that increase carbon sequestration and storage, as compared to baseline or (recent) historic practices, can contribute to a carbon offset project. Projects are also evaluated to ensure emissions reductions are real, they are based on conservative baselines, and they must be verifiable and permanent (3GT 2020; Sedjo and Sohngen 2012). The carbon that is offset must be additional to emissions from business as usual – additional to requirements under law. Also, forest conservation projects also cannot result in greater harvest elsewhere (i.e., to make up for the ‘lost’ volume) (Sedjo and Sohngen 2012); they must be “beyond common practice”.

Examples of carbon offset projects for forest land conservation exist in BC. Three of these projects are the Quadra Island Land Conservation Offset Project,¹⁸ the Darkwoods Forest Carbon Project¹⁹, and the Strathcona Ecosystem Conservation Project²⁰. The Quadra Island project protects 418 ha of forest that would have been logged and/or developed for vacation homes. This area is between two parks and contains archaeological sites and was used historically by indigenous people as a portage route. Funds raised from carbon offsets (i.e., protection of forest that would have been clearcut) helped the province buy the property as part of BC’s Carbon Neutral Government program, which was then added to the BC Parks network.

¹⁸ See https://www.offsetters.ca/project-services/offset-projects/by-country/Quadra_Island

¹⁹ See <https://www.offsetters.ca/project-services/offset-projects/by-country/darkwoods>

²⁰ See https://mer.markit.com/br-reg/public/project.jsp?project_id=10000000000706

The Darkwoods project covers a large area of 55,037 ha. It is private property and for the past several decades has been managed for forestry. The Nature Conservancy of Canada (NCC) purchased the property in 2008 intending to increase conservation practices. Over time, as logging activities decline and carbon credits build, the forest will move from an actively managed forest to a protected forest. Darkwoods is adjacent to the West Arm Provincial Park and the Creston Valley Wildlife Management Area and the three properties together will provide 103,000 ha of connected and protected forests and wetlands.

In 2009, TimberWest (now part of Mosaic Forest Management) initiated a carbon offset project on its private forest land on Vancouver Island, part of which overlaps the study area. The Strathcona Ecosystem Conservation Project spans approximately 25,000 ha within which about 1,000 ha of old growth forest has been set aside for 25 years (CCI 2010). Carbon credits have accumulated from carbon storage and sequestration from not logging or building roads into these areas, and from avoiding emissions associated with logging operations and burning of logging debris. To date, the Pacific Carbon Trust of the BC government has purchased 600,000 tonnes of carbon credits from this project²¹. The eventual goal is for Mosaic Forest Management to become carbon neutral and the setting aside old growth forests is one strategy toward this goal.

The Municipality of North Cowichan (MNC) is exploring carbon credits as a possible revenue stream for their community forest lands (3GT 2020). In a preliminary study, various scenarios were evaluated as potential carbon offset projects. Of the four harvest scenarios considered (business as usual, 25%, 50% of current harvest, and no harvest), the no harvesting option generated the highest revenue through selling carbon credits. In addition, this scenario protects many high value ecosystem services. A longer rotation age is another scenario that could be considered.

Should the MNC initiate a carbon project, they could consider extending the project scope to include forest landowners in the area. This would allow for some cost sharing as it is estimated that completing the studies required are estimated to be over \$250,000. Annual costs are also involved for monitoring, annual registration, and brokerage fees (3GT 2020).

While carbon offset projects are gaining interest as a possible revenue source there are some limitations to their effectiveness as a conservation tool. A number of barriers have been identified affecting widespread adoption of forest-based carbon offsets for BC (Peterson St-Laurent 2018; Peterson St-Laurent et al. 2017). These include: i) deficiencies of carbon markets; ii) limited economic benefits; iii) uncertain climate effectiveness; iv) negative public opinion around funding a “right to pollute”; v) limited and uncertain property rights; and vi) governance issues. As with any commodity, demand for carbon credits is unpredictable and prices can be low at times. However, prices vary with the standard selected, project type and

²¹ See <https://www.timberwest.com/wp-content/uploads/TimberWest-FactSheet-Environmental.pdf>

location. Prices are often higher for forest conservation projects and there is a trend of paying more for local projects (3GT 2020). Set up costs are high, largely because carbon offsets are difficult to measure and guarantee.

Ecological Carbon Credits

The Ecoforestry Institute Society in Cedar, BC is currently investigating development of an ecological carbon credit system (Barry Gates, pers. comm.). In addition to targeting landowners wishing to protect their forests, this system will include a component where ecoforestry covenants, supported by ecologically-based forest management plans, allow for some harvesting. The overall intention of this program is to make carbon credits available to and affordable for small landowners much in the same way that the Forest Stewardship Council made forest certification available to small and community forests. While details are still in the making, this initiative offers the potential to finance widespread forest stewardship.

Municipal Natural Asset Management

Protection and restoration of natural assets by local governments is a new movement aimed at protecting important landscape features. This process will often involve legal tools like conservation covenants to protect ecological features.

Municipal natural assets (MNAs) are defined as “stocks of natural resources and/or ecosystems that contribute to one or more services required for the health, well-being and long-term sustainability of a community and its residents” (MNAI 2019a,b). In other words, they are watershed features (e.g., aquifers) that when functioning provide ecosystem services (e.g., drinking water). Natural assets include riparian corridors, wetlands, lakes, watercourses, forests, soils, and foreshore areas. A benefit of natural assets is that if they are well protected they can last indefinitely unlike engineered assets, which eventually need replacing at great cost. Local governments can use covenants to protect natural assets.

The Municipal Natural Asset Initiative (MNAI) was established to undertake projects across Canada investigating how to incorporate natural asset protection into local government planning (MNAI 2019a,b). The Town of Gibsons, BC is one of 4 founding members of the MNAI which was formed to provide scientific, economic, and municipal expertise to help local governments identify, value, and account for natural assets. Other communities on Vancouver Island currently investigating the natural assets approach are the City of Nanaimo and the various local governments around Courtney and Comox.

The Town of Gibsons is a leader in this movement. It was the first place in Canada to pilot natural asset management (Town of Gibsons 2015). They realized that future asset replacement was going to be expensive and determined there must be a better way to manage stormwater and provide clean drinking water. They started with an aquifer mapping project while also investigating other natural assets that could take on the role of engineered assets. They determined that important natural assets include aquifers, wetlands, creeks, natural foreshores, and forests as they provide

ecosystem services such as flood prevention, drinking water, erosion control and rainwater management.

The Town of Gibsons went further and even passed a municipal asset management policy in 2014, the first in North America, that recognizes natural assets as an asset class (TOG 2018). This created the obligation to operate, maintain, and restore natural assets. Bylaws now exist that recognize the role of natural assets (TOG 2018). An inventory of natural assets and the ecosystem services they provide is underway along with estimates of an engineered replacement structure costs.

“In British Columbia, Development Cost Charge Bylaws can be updated to include natural assets and draw a funding stream for their improvement and, in some cases, their rehabilitation” (TOG 2018).

For Nanaimo and Gibsons, it was determined that their protected wetlands manage the same amount of storm water as a \$4 million stormwater management system, which would eventually require replacement (MNAI 2019a,b; TOG 2018). In 2018 the Nanaimo Regional District updated its “Drinking Water and Watershed Protection Plan” and added a new action to quantify watershed natural assets and ecosystem services (RDN 2020). Meanwhile, the Town of Lake Cowichan continues to issue boil water advisories because of water quality concerns. A \$6.3 million water treatment plant upgrade was announced in 2016²²; however, while the upgraded system was to be functional by the end of 2017, problems have persisted and in early 2020 and a boil water advisory was once again issued.

Further north on Vancouver Island, a memorandum of understanding was signed in 2019 between the K’omoks First Nation, Comox Valley Regional District, City of Courtney, Village of Cumberland, and the Town of Comox establishing the framework to investigate the possibility of conducting the first ever watershed-scale assessment of natural assets in providing quality drinking water as compared to engineered assets (CVRD 2019). Large forestry companies own most of the land while Strathcona Provincial Park protects upper reaches of the watershed. A small proportion of the land is owned by small private landowners and municipal and regional governments.

While utilizing natural assets to provide ecosystem services has many advantages, it can be difficult to implement. For example, it often requires cooperation among many landowners and governments. Streams, for example, often travel across several land parcels some of which may be protected while others may be used for forestry, agriculture, industry, or residential. Landowners (e.g., large forestry companies) are unlikely to forgo revenue without some sort of financial incentive.

²² See <http://www.town.lakecowichan.bc.ca/dl/Lake%20Cowichan%20-%20GTF%20Local%20Release%20-%20July%205,%202016.pdf>

Legal Tools: Innovative but not available in BC

Property tax incentive programs

Conservation tax incentive program

Establishing a Conservation Tax Incentive Program (CTIP) was generally supported at a 2017 symposium attended by the provincially led Species and Ecosystems at Risk Working Group (MOE 2017). This program would resemble [NAPTEP](#) and see lower property taxes for landowners willing to protect high conservation values on their property. Proposed tax incentives are 60% and tax-shifting would likely be involved such that it would be revenue neutral.

The Land Trust Alliance of British Columbia also supports this initiative²³. However, progress to date has been minimal as at least three pieces of legislation would require amendments, none of which are under jurisdiction of the MOE. Therefore it will require a significant shift in government mandate for these changes to become priority. Concerns were also expressed by local governments that extra staff and other resources would be required to set up and conduct compliance monitoring, and that motivation for agricultural land would be low as they already have low tax rates (MOE 2017).

Ontario property tax incentive programs

The provincial government in Ontario established the Conservation Land Tax Incentive Program where up to 100% of property tax is relieved for eligible portions of private land having important natural features such as habitat for species at risk, and wetlands and areas of natural and scientific interest that are identified as provincially significant²⁴. The eligible land portion may be as small as 0.5 acre. The provincial government establishes eligibility requirements and is responsible for compliance inspections. There is no long term commitment required; landowners can opt out at any time without penalty.

Ontario also has a Managed Forest Tax Incentive Program where eligible landowners pay 25% of the tax rate set for residential properties²⁵. To be eligible, the landowner must own 4 hectares land, meet a minimum number of trees criterion, and develop a 10-year management plan based on established stewardship guidelines (Government of Ontario 2012). Forest lands must be managed for a range of values that include natural heritage, biodiversity, and economic benefits (Government of Ontario 2010).

Legal Agreements

As an alternative to conservation covenants which can be costly to establish and maintain, recommendations by the provincially led Species and Ecosystems at Risk

²³ See <https://ltabc.ca/programs/tax-incentive-program/>

²⁴ See <https://www.ontario.ca/page/conservation-land-tax-incentive-program>

²⁵ See <https://www.ontario.ca/page/managed-forest-tax-incentive-program>

Working Group include developing a legal agreement that would provide some sort of long term land protection (MOE 2017). This option has not been researched or developed in full, but remains a possibility for the provincial government.

Other saleable ecosystem services

In addition to markets for buying and selling carbon credits, there are also efforts to establish markets to protect other conservation values such as water, wetlands and biodiversity (Deal et al. 2017). There are established regulated examples in the United States. Markets for wetland mitigation banking and water quality trading are enabled under the US *Clean Water Act* and species conservation banking is regulated under the US *Endangered Species Act* (Deal et al. 2012 and references therein). These initiatives have resulted in investment into off-site restoration projects for wetlands and land acquisition for species at risk likely to be harmed by a development proposal.

Deal et al. (2012) suggests that instead of individual programs for different ecosystem services, an integrated approach is used where financial incentives are available to landowners willing to manage for a broad range of conservation goals. The example given by Deal et al. (2012) is that if a landowner restores riparian forest then multiple ecosystem services are improved including wildlife habitat, flood mitigation, and carbon sequestration. In this system, all would be accounted for and sold as a single credit type.

One important challenge in creating markets for buying and selling credits for ecosystem services is that it often will require agreement and cooperation by multiple landowners. For example, effective habitat protection for most wildlife species will often overlap multiple properties. This is also the case for protecting water. In their evaluation of different approaches to value ecosystem services, Patterson and Coelho (2009) conclude that “most ecosystem services are suitable for trade in private markets or for direct payments” and that raising awareness for managing ecosystem services is an important part of the strategy (Patterson and Coelho 2009).

Voluntary incentives

Voluntary Stewardship Agreements

Voluntary Stewardship Agreements are non-binding agreements, relevant only to the current landowner, usually between a landowner and a conservation organization who formalize an intent to protect land values. This approach has been used when a conservation covenant could not be established on a particular ALR parcel. The Nanaimo and Area Land Trust entered into a stewardship agreement for ALR land that includes restrictions similar to those in a typical covenant²⁶.

²⁶ See <https://www.nalt.bc.ca/data/files/vanklifeestate-ed.pdf>

Stewardship education to landowners

Habitat Acquisition Trust

There are many great examples of stewardship education geared toward forest landowners on Vancouver Island. The Habitat Acquisition Trust (HAT) in Victoria developed the Good Neighbours Program to promote habitat stewardship in local communities.

HAT has a program, Wildwood Wetlands Wildlife Corridor, where workshops and property visits are offered to work with landowners to establish a network of functioning wildlife habitat in the Metchosin area near Victoria²⁷. Landowners are invited to first become Habitat Stewards taking measures on their own properties to improve wildlife habitat features and over time will hopefully agree to sign a Stewardship Agreement. This agreement will typically commit the landowner, on a voluntary basis, to establish native plants on their properties, remove invasive plants, avoid pesticide use, and establish riparian plantings.



Photo 12. Live staking is one technique landowners can use to restore degraded riparian areas.

Ecoforestry Institute Society

The Ecoforestry Institute Society (EIS) is well known for its work implementing, researching, and promoting a gentle type of forestry at Wildwood near Nanaimo, BC. Wildwood is a 77-acre parcel of old growth forest purchased in 1938 by Merv Wilkinson. During his life time, Merv experimented with and perfected forest management practices that relied on single-tree selection to accelerate tree growth

²⁷ See <http://hat.bc.ca/good-neighbours-projects/wildwood-wetland-watershed-good-neighbours-project>

and produce more volume over time than had the property been clearcut and managed for smaller younger second growth forests.

In the early 2000s, Merv sold Wildwood to The Land Conservancy and EIS was appointed as the forest manager. In a long and difficult sequence of events linked to the financial difficulties of The Land Conservancy, the EIS eventually became the new owners and Wildwood was able to continue to function as an important education and research center for all public to enjoy and learn from. A new model was put into place that has commitments to maintain three protection measures to ensure Wildwood remains as Merv had intended. An Ecoforestry Management Plan was developed to guide operational activities, a Land Trust Deed was put on the title, and a conservation covenant will reinforce the requirement for ecoforestry-based management.

The Land Trust Deed, which cannot be changed, ensures that Wildwood can never be sold to a private interest and that it must always be held by a like-minded not-for-profit charitable society. It also requires the forest is always managed based on ecoforestry principles.

The management plan ensures no more than 50% of the annual growth is harvested (Walther 2016). Modeling demonstrates that after 250 years at this harvest rate, standing volume will be 125% of the current volume. Again, more volume is available for harvest over this time span as compared to a clearcut scenario.

Case Study

A roughly 100-acre property in the Cowichan Region is owned by people dedicated to forest land conservation. Maturing forest occupies most of the property that includes a fish-bearing stream. Previous owners secured “Managed Forest” designation from BC Assessment, which significantly reduced property taxes. With this designation, the forest must be managed in accordance to the *Private Managed Forest Land Act*, which sets management objectives for soil conservation, water quality, fish habitat, critical wildlife habitat, and reforestation. In addition, the property owners have signed a management commitment that creates a legal commitment to harvest trees.

The landowners are concerned that subsequent owners may clearcut the property, which will destroy the forest they have been caring for and enjoying, and may cause further harm to the fish stream. While investigating options, the landowners discovered that in order to secure a conservation covenant that restricts harvesting, they would have to change property tax category and increased taxes would make the property unaffordable for them.

However, there are other options for them to consider. A conservation covenant that permits ecosystem-based tree harvesting allows the landowners to maintain the Managed Forest designation and property tax savings, while protecting the stream and forest they care about. The forest management plan, which is part of the covenant document, can be developed to ensure any harvesting maintains forest structures, like large trees and dead wood, that support healthy ecosystem functioning. Fish and wildlife habitat are protected, soil integrity and water quality are maintained, and natural forest renewal processes continue. Therefore requirements of the *Private Managed Forest Land Act* are complied with. Within the management plan there are options to let trees grow for longer periods than typically followed in an industrial setting, clearcutting can be prohibited and partial cutting promoted, and the harvest rate can be set lower than the growth rate to ensure the forest biomass is always increasing and old forest structures will form over time. The covenant legally requires all future landowners to comply with these measures.

And over time, if a carbon offset project for small landowners is established in the greater community, the landowners could participate and realize additional carbon revenue. Shifting from industrial to ecosystem-based forest management increases carbon storage and sequestration meeting criteria as a carbon offset project. And if enough revenue could be gained, the landowner could consider a no-harvest covenant instead, remove themselves from the Managed Forest property assessment class, and pay the higher property taxes through carbon revenue.

Luckily, there are options the landowners can consider such that their goal to protect their forest from future clearcutting is met.

Role of Cowichan Community Land Trust for Increasing Protected Forest Land in the Cowichan Region

Increasing the area of protected private forest land in the Cowichan Region is not a straightforward task. The vast area of private land, large number of landowners, and extent of landscape modification presents many challenges. However, there is tremendous capacity to create change in this community due to the number of dedicated people and organizations seeking for better protection and stewardship of local ecosystems. In this section a possible role for CCLT is described for overcoming some of the barriers restricting private forest land protection.

In some cases, CCLT can take on a leadership role by expanding existing or developing new programs. Other recommendations look to CCLT as being an initiator, inspiring other organizations to help develop and participate in larger region-wide projects. Some recommendations are targeted at the board level, while others are work for the Forest Conservation Committee or Executive Director. Many of these recommendations require new funding above and beyond base funding.

There are three focus areas that if addressed will help to inspire change in forest land stewardship. While considering the recommendations below, the CCLT will be most effective if these three broad categories are built into strategic plans:

Community Education

Community members need to know what options are available to them should they want to protect or better manage their forested properties. They need to know why forested ecosystems are important and how they provide essential services we require for a healthy life.

Financial incentives

Although many landowners may want to conserve their forests, many of them may not be able to afford it. However, there are creative ways to finance land protection and these need to be fully understood.

Expertise

While there may be many ways to provide for and finance forest land protection, a third requirement is that there needs to be an organization that delivers leadership and makes land protection accessible to landowners. The CCLT is well experienced in covenants, education, and implementing stewardship projects and can offer and grow this expertise to meet the requirements of landowners wanting to conserve their forests.

While all of the following recommendations are important, the CCLT needs to find a place to start. Therefore the recommendations are rated as (1), (2), or (3) representing the order of which they could be implemented. Priority recommendations set the stage for the CCLT to apply the rest.

Review CCLT board policy

Review CCLT policy on conservation covenants (1). Land trusts and covenants are most often associated with land preservation activities. However, land stewardship where some activities are permitted (e.g. harvesting) can still protect important values. Does the phrase from the CCLT mission statement “we help to take care of the land and water” refer only to preservation-type activities or is ecologically responsible land management supported as providing adequate care of the land? Does the board support the CCLT expanding the use of conservation covenants to include ecologically responsible harvesting?

Encourage private forest land stewardship

Expand covenant toolbox (1). It appears there may be a growing interest in alternate types of covenants. Some innovative examples that CCLT can consider include:

- i. Conservation covenants that allow for some tree harvesting while placing emphasis on maintaining or restoring important forest structures (e.g., dead trees and fallen trees). This could expand the covenant program as it would allow landowners to retain the Managed Forest property tax designation and associated benefits while knowing that future land management will continue to protect ecological values. This would involve developing standards, covenant and management plan templates, monitoring protocol, and an education program for interested landowners.
- ii. Although land stewardship is only a secondary benefit, memorial or cemetery covenants where harvested areas become burial grounds is another avenue CCLT can explore.

Expand the CCLT education program to address private forest land stewardship (1). CCLT actively provides education opportunities to various audience groups within the Cowichan Region. To encourage greater forest land protection, this program could be expanded to include an inspirational segment focused on informing private landowners and potential land donors on the benefits of land acquisition by land conservation groups and on the merits of establishing covenants. This could include education on other available legal and non-legal land protection tools, stewardship opportunities, and innovation in land protection (e.g., conservation communities, Wildwood).

Important messaging for private forest land owners is that there are more options for managing their land than preservation or clearcutting. BC examples of gentle ecosystem-based practices demonstrate that it is possible to maintain continuous forest cover while removing some trees. Landowners can maintain functioning ecosystems and, for example, also maintain the property tax benefits that come with

the Managed Forest Classification. Covenants can also be placed on the property to ensure this gentle management approach is maintained beyond their life or ownership.

Build NGO capacity for creating change

In this category, CCLT's role is to find out if other NGOs are interested in working together on these or other related initiatives. These are big projects but they provide the foundation for everyone's work and would allow for synergies to build, stronger messaging to develop (for communities and government), and greater protection of important features and functions in the Cowichan Region. Local First Nations may also be interested in participating in the following projects and be kept informed on progress.

As a first step, the CCLT could contact potential partner NGOs to determine their interest in these projects and to brainstorm ideas on how this work could be done (e.g., funding opportunities, general approach and common objectives, resources available).

Work with local NGOs to secure greater riparian protection (2). The number of NGO projects proposing greater riparian protection in the Cowichan Region is growing. The Shawnigan Basin Society and Koksilah Working Group have both completed ecosystem-based assessments of their watersheds that include wide riparian buffers (Hammond 2015 and Pritchard et al. 2019). The Somenos Marsh Society is currently examining how to expand riparian protection in the Somenos watershed (Elodie Roger, pers. comm.). The CCLT can offer its support in this endeavor by promoting the use of covenants.

Organize workshop to assess ecosystem services in the Cowichan Region (3). Local NGOs may be interested in organizing and participating in a workshop focused on defining important ecosystem services, pressures affecting them, and indicators of their condition in order to inform conservation work. The Value of Nature to Canadians Study Taskforce developed a guidebook and methodology for conducting a series of workshops that sets out to define issues, identify priority ecosystem services and their indicators, evaluate, and report out (VNCST 2017). The goal is to use this process to guide conservation land priorities. That is, what should we protect or restore and where in order to keep important ecosystem services healthy?

This work could support the development of a natural asset program for the CVRD.

Build "connectivity" into land protection programs. Networks of protected forest that link landscape anchors like parks and sensitive ecosystems aid recovery of heavily impacted watersheds like those in the Cowichan Region. This can be accomplished through large-scale region-wide projects with many partners or by way of smaller sub-watershed scale projects led by single community organizations.

(i) Independent project (1)

The CCLT can initiate a project similar to the Wildwood Wetlands Wildlife Corridor project initiated by the Habitat Acquisition Trust. A sub-watershed can be selected that has private forested land and ecological anchors, and a stewardship program can be built around creating connectivity between these anchors.

(ii) Region-wide project (2)

While a more ambitious project, ecosystem restoration requires a landscape-level plan that guides all projects in the community. This could include a conservation plan and maps that cover the entire Cowichan Region. This plan will illustrate areas and ecosystems already protected as well as identify new areas and features that can contribute to a protected landscape network. Community groups in Shawnigan Lake and Cowichan Station have conducted studies to develop protected landscape networks in their respective watersheds (Hammond 2015 and Pritchard et al. 2019), and the Somenos Marsh Society has started looking at how it could develop a protected network for the Somenos watershed (Elodie Rogers, pers. comm.). The Nanaimo and Area Land Trust is also interested in looking at how it could build partnerships and broaden its scope in land protection given the challenges in acquiring properties (Paul Chapman, pers. comm.). This work can be done by participating in the CVRD-led Conservation Strategy process and/or by organizing an NGO-led project.

Developing protected landscape networks for Cowichan watersheds supports the Quw'utsun teaching:

“Mukuw' stem 'i' utunu tumuhw, 'o' huliitun tst, mukw' stem 'i' utunu tumuhw 'o' slhiilhukw 'ul”

– everything on this Earth is what sustains us, everything on this earth is connected together.

While the CVRD is developing a Conservation Strategy for the Cowichan Region, there are benefits to the CCLT and other NGOs to partner up and assemble similar information. Gathering information and engaging in this type of thinking ahead of the CVRD process will help the NGOs more effectively participate in the CVRD process. CCLT and partner NGOs will be in the position to establish ecosystem-driven protection targets, which tend to be higher than policy-based targets established by government as compromises are usually required. Policy-based targets are typically only one-third the value of ecosystem-based targets (Svancara et al. 2005). While the CVRD has been working on this strategy since at least 2007 (ELC and Curran 2007), it is uncertain how high of a priority it is and when it will be completed.

By assembling existing data layers, maps can be created that show locations of important values, where land protections are already in place, and where additional land protections or stewardship activities could create connectivity to link protected areas. This will provide an ecological baseline to support the establishment of targets – both numerical and geographic. As we learned above, at least 50% of the local landscape needs to be managed for conservation (Holt 2007) and/or 60 to 70% of the original old growth needs to be protected (CIT 2004 in Price et al. 2007).

Establishing targets will guide our conservation partners to focus their projects on ecosystems and areas (e.g., watersheds) most in need of protection. High priority properties will become evident and strategies can be jointly developed to protect them.

This work will help the community answer:

- Which watersheds should we focus protection and stewardship projects on first?
- How much private forest land do we want to see protected or undergoing stewardship activities?
- What are the priority features requiring protection and where are they?
- Which ecosystem services require more protection sooner?
- What are the natural assets in each watershed and in what condition are they?

The CCLT role in this project could be to scope out interest of other potential partners who could then establish a process for moving forward.

Community outreach

Develop communication materials on land protection tools (1). Forest landowners interested in protecting their forests often don't know where to start in their research of options. The CCLT could prepare a pamphlet, website resources, and/or a webinar providing an overview of options and links to detailed sources of information.

Develop communication materials on ecosystem services (1). Information is required by the broad community in order to shift the understanding of forests from one where they are viewed primarily as a commodity to one where a wider range of ecosystem services are recognized. This again could be accomplished with a pamphlet, webinar, and/or website resources, or for students, a card or board game could be developed.

Promote covenants (1). Covenants are a very important legal tool for protected private forest land. They are often used in combination with other tools expanding their value for land protection. However, most landowners do not fully understand what a covenant is, what is involved in establishing one, and how they benefit the environment. An education program promoting covenants to expand their use could include:

- i. Developing a map and supporting descriptions showing where covenanted properties are and demonstrate their benefits (i.e., what conservation values they protect);
- ii. Reporting out on monitoring and enforcement activities to inspire confidence in covenant establishment;
- iii. Securing funding to conduct additional inventories and research to reinforce ecological contribution of covenanted properties. This data helps monitor selected values which keeps (subsequent) landowner interest high; and

- iv. Expanding interest in CCLT projects by developing a campaign that highlights “10 success stories that CCLT is known for”.

Research

Described below are new large-scale initiatives that depending on their application may contribute to greater forest land protection in the Cowichan Region. However, implementing them is well beyond the current scope and capacity of the CCLT. Still, there is benefit in investigating their application and being informed about how they may or may not contribute to forest land protection. CCLT can reach out to possible supporters to determine if there is interest in seeking funds to initiate these types of projects.

Determine the extent of old and mature forests in the Cowichan Region (2). An assessment of forest age classes is required in order to properly evaluate the current status of old and mature forest for the purposes of establishing conservation targets for the Cowichan Region. This is easily accomplished using publicly available Vegetation Resource Inventory (VRI) information assembled by the province and CVRD supplemented by satellite imagery for recent years since the VRI was completed. Methodology in Pritchard et al. (2019) describes how existing data can be used to create a time sequence showing forest cover changes over the last several decades.

Carbon offset research and pilot project (2). Carbon offsets provide the opportunity for private forest landowners to generate income not from harvesting but from protecting their forests and selling carbon credits. As we have seen, the sale of carbon credits can sometimes offset the purchase price of a property by conservation-minded organizations. In an ideal situation, CCLT could initiate a project and invite area landowners to participate. However, initiating a carbon offset project is expensive.

Meanwhile, the Municipality of North Cowichan is exploring selling carbon credits as an alternative to harvesting some or all of its forests. Should they go this route there is an opportunity for CCLT to become a supporting partner working with other small landowners to develop plans and establish covenants to benefit from selling carbon credits. CCLT could have the opportunity to investigate what a small landowner’s carbon offset project in the Cowichan Region might look like.

At this time, CCLT can conduct preliminary research on existing carbon offset programs, local opportunities, and develop criteria for acceptable carbon offset programs. What criteria must be met in order for the CCLT board to support participating in carbon offsetting to protect private forest land protection?

Support for government initiatives

Participate in the provincial Species and Ecosystems at Risk Working Group (3). This would allow CCLT to stay on top of initiatives for tax incentives, legal agreements to supplement covenants, and any other applicable stewardship work.

This group meets virtually a small number of times per year. The contact person is Lynn Campbell, Species at Risk Biologist, BC Ministry of Environment.

Work with local and provincial governments to revise tax policy (3). Although the provincial government has made no progress on tax incentive programs for private forest land protection, CCLT should provide its support for the proposed Conservation Tax Incentive Program. Alternately, CCLT can support actions for a provincial-level property tax incentive program as established in Ontario. Either way, these incentives would require changes to existing legislation or developing new provincial legislation.

Questions that require addressing as part of this movement include: i) Why would a local government want to participate in CTIP? ii) What evidence can we give to show there is a need for CTIP?

Writing to local MLAs would be a first step. Also, CCLT can keep up to date on this initiative through the LTSBC and the provincial Species at Risk Working Group.

Be pro-active in CVRD engagement (2). The CCLT can advance private forest land protection actively engaging with key CVRD staff and Area Directors, including participating in the Conservation Strategy process and Official Community Plan (OCP) updates.

i) Conservation Strategy

The CVRD Conservation Strategy process is aimed, in part, to prioritize properties for protection and exploring available tools for this work (e.g., covenants, parks, development permits) (Jeff Moore, pers. comm.). This strategy aligns well with CCLT goals and CCLT is in a position to bring information to the table to inform the process. CCLT could also be a partner organization in establishing and monitoring of new covenants that arise from the new strategy.

ii) OCP

CCLT should also take an active role in OCP revisions. Soto (2015) lists several areas where land trusts should provide input to local governments. These include, ensuring:

- Mission and vision statements/mandates reflect CCLT values;
- Most population growth is concentrated in an urban containment boundary to reduce development pressure in remaining forested areas;
- The Regional Growth Strategy is consistent with protecting remaining tracts of forest land and that it provides support to land owners wanting to protect their land;
- Strong policies on the environment are in place (e.g., greenways, EDPAs, unmapped riparian areas and raptor nests); policies may vary with ecosystem type; and
- Strong policies related to subdivision applications; encourage cluster development with establishment of a protected area using a conservation covenant.

In addition, CCLT should review any zoning changes for possible impacts to ecological values (e.g., from Forest 1 or 2 to Residential).

Work with Cowichan Region local governments interested in participating in the Municipal Natural Asset Initiative (3). A natural asset project in the Cowichan Region would be an important driver influencing private forest land protection. It would identify locations of and protect important natural assets and the ecosystem services they provide.

Local governments here could investigate the process being undertaken in the Comox-Courtney area as it involves multiple forms of government participation including the regional district, municipalities, and First Nations. The CCLT could first investigate work in the Comox-Courtney area to become better informed about successes and challenges to date undertaking this process.

First Nations relationship building

First Nations engagement (1). While this project has focused on protecting private land, it is important to remember this “private” land is within the unceded lands of the Coast Salish people. Therefore any projects or strategies working toward increasing forest land protection will only be complete if they invite First Nations participation and include traditional knowledge. When moving forward, it is important that CCLT discuss, in the beginning scoping stages, new projects and identify a role for First Nations where there is interest.

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Appendix 1. Possible species and ecosystems at risk present in the Cowichan Region

Invertebrates

English Name	Scientific Name	BC List	SARA	Habitat Subtype
Autumn Meadowhawk	<i>Sympetrum vicinum</i>	Blue		Riparian Shrub;Stream/River;Lake; Mixed Forest (deciduous/coniferous mix);Pond/Open Water;Riparian Herbaceous
Blue Dasher	<i>Pachydiplax longipennis</i>	Blue		Marsh;Riparian Forest;Stream/River;Lake;Cliff; Pond/Open Water
Blue-grey Taildropper	<i>Prophysaon coeruleum</i>	Blue	1-E (Dec 2007)	Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix)
Boisduval's Blue, <i>blackmorei</i> subspecies	<i>Plebejus icarioides blackmorei</i>	Blue		Meadow;Grassland
Broadwhorl Tightcoil	<i>Pristiloma johnsoni</i>	Blue		Talus;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix)
Clodius Parnassian, <i>claudianus</i> subspecies	<i>Parnassius clodius claudianus</i>	Blue		
Meadow Rams-horn	<i>Planorbula campestris</i>	Blue		
Monarch	<i>Danaus plexippus</i>	Blue	1-SC (Jun 2003)	Pasture/Old Field;Cultivated Field;Hedgerow;Meadow;Grass land;Sagebrush Steppe;Urban/Suburban
Moss' Elfin, <i>mossii</i> subspecies	<i>Callophrys mossii mossii</i>	Blue		Cliff;Rock/Sparsely Vegetated Rock;Talus;Grassland;Shrub - Natural;Deciduous/Broadleaf Forest
Prairie Fossaria	<i>Galba bulimoides</i>	Blue		
Sinuuous Snaketail	<i>Ophiogomphus occidentis</i>	Blue		Stream/River;Lake
Sunset Physa	<i>Physella virginea</i>	Blue		
Threaded Vertigo	<i>Nearctula sp. 1</i>	Blue	1-SC (Jul 2012)	Deciduous/Broadleaf Forest;Mixed Forest (deciduous/coniferous mix)
Umbilicate Sprite	<i>Promenetus umbilicatellus</i>	Blue		Vernal Pools/Seasonal Seeps;Stream/River;Lake;Pond /Open Water

Western Pine Elfin, <i>sheltonensis</i> subspecies	<i>Callophrys eryphon sheltonensis</i>	Blue		Bog;Shrub - Natural;Krummholtz
Western Pondhawk	<i>Erythemis collocata</i>	Blue		Marsh;Pond/Open Water
Western Thorn	<i>Carychium occidentale</i>	Blue		Mixed Forest (deciduous/coniferous mix)
Common Ringlet, <i>insulana</i> subspecies	<i>Coenonympha tullia insulana</i>	Red		Pasture/Old Field;Meadow;Grassland;Shrub - Natural;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix)
Common Wood-nymph, <i>incana</i> subspecies	<i>Cercyonis pegala incana</i>	Red		Pasture/Old Field;Cliff;Grassland;Conifer Forest - Dry
Dromedary Jumping-slug	<i>Hemphillia dromedarius</i>	Red	1-T (Jan 2005)	Conifer Forest - Moist/wet
Dun Skipper	<i>Euphyes vestris</i>	Red	1-T (Jun 2003)	Vernal Pools/Seasonal Seeps;Meadow
Edith's Checkerspot, <i>taylori</i> subspecies	<i>Euphydryas editha taylori</i>	Red	1-E (Jun 2003)	Vernal Pools/Seasonal Seeps;Pasture/Old Field;Meadow;Grassland
Edwards' Beach Moth	<i>Anarta edwardsii</i>	Red	1-E (Feb 2011)	
Greenish Blue, <i>insulanus</i> subspecies	<i>Plebejus saepiolus insulanus</i>	Red	1-E (Jun 2003)	Riparian Forest;Riparian Shrub;Pasture/Old Field;Meadow;Grassland;Deciduous/Broadleaf Forest;Riparian Herbaceous;Gravel Bar
Johnson's Hairstreak	<i>Callophrys johnsoni</i>	Red		Conifer Forest - Mesic (average);Conifer Forest - Moist/wet
Northern Abalone	<i>Haliotis kamtschatkana</i>	Red	1-E	Kelp Bed;Intertidal Marine;Subtidal Marine;Reefs;Sheltered Waters - Marine;Pelagic
Propertius Duskywing	<i>Erynnis propertius</i>	Red		Meadow;Mixed Forest (deciduous/coniferous mix);Garry Oak Woodland
Vancouver Fossaria	<i>Galba vancouverensis</i>	Red		Lake;Pond/Open Water
Warty Jumping-slug	<i>Hemphillia glandulosa</i>	Red	1-SC (Jan 2005)	Riparian Forest;Deciduous/Broadleaf Forest;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix)
Western Branded Skipper, <i>oregonia</i> subspecies	<i>Hesperia colorado oregonia</i>	Red		Pasture/Old Field;Grassland;Deciduous/Broadleaf Forest

Zerene Fritillary, <i>bremnerii</i> subspecies	<i>Speyeria zerene bremnerii</i>	Red	Meadow;Grassland;Deciduous/ Broadleaf Forest;Urban/Suburban;Industr ial
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Amphibians and Reptiles

English Name	Scientific Name	BC List	SARA	Habitat Subtype
Wandering Salamander	<i>Aneides vagrans</i>	Blue	1-SC (Feb 2018)	Riparian Forest;Talus;Shrub - Natural;Conifer Forest - Moist/wet;Shrub - Logged
Northern Red-legged Frog	<i>Rana aurora</i>	Blue	1-SC (Jan 2005)	Bog;Fen;Swamp;Marsh;Riparian Forest;Riparian Shrub;Stream/River;Lake;Meadow ;Deciduous/Broadleaf Forest;Pond/Open Water;Riparian Herbaceous;Gravel Bar
Sharp-tailed Snake	<i>Contia tenuis</i>	Red	1-E (Jun 2003)	Caves;Sub-soil;Rock/Sparsely Vegetated Rock;Talus;Meadow;Conifer Forest - Dry;Garry Oak Coastal Bluffs
Painted Turtle - Pacific Coast Population	<i>Chrysemys picta pop. 1</i>	Red	1-E (Dec 2007)	Bog;Fen;Swamp;Marsh;Riparian Forest;Riparian Shrub;Lake;Urban/Suburban;Pond /Open Water;Riparian Herbaceous;Gravel Bar;Industrial

Birds

English Name	Scientific Name	BC List	SARA	Habitat Subtype
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	Blue	1-SC (Feb 2011)	Riparian Forest;Pasture/Old Field;Cultivated Field;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Hot Spring;Urban/Suburban;Warm Spring;Cold Spring

Barn Owl	<i>Tyto alba</i>	Red	1-T (Jun 2018)	Marsh;Riparian Forest;Riparian Shrub;Pasture/Old Field;Cultivated Field;Hedgerow;Meadow;Grass land;Sagebrush Steppe;Mixed Forest (deciduous/coniferous mix);Urban/Suburban;Riparian Herbaceous;Antelope-brush Steppe;Gravel Bar
Barn Swallow	<i>Hirundo rustica</i>	Blue	1-T (Nov 2017)	Estuary;Bog;Fen;Swamp;Marsh; Riparian Forest;Riparian Shrub;Stream/River;Lake;Pasture/Old Field;Cultivated Field;Hedgerow;Meadow;Grass land;Shrub - Natural;Sagebrush Steppe;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Urban/Suburban;Pond/Open Water;Riparian Herbaceous;Antelope-brush Steppe;Gravel Bar;Shrub - Logged;Industrial
Black Swift	<i>Cypseloides niger</i>	Blue	1-E (May 2019)	Bog;Fen;Swamp;Marsh;Stream /River;Lake;Cliff;Pond/Open Water
Great Blue Heron, <i>fannini</i> subspecies	<i>Ardea herodias fannini</i>	Blue	1-SC (Feb 2010)	Estuary;Swamp;Marsh;Vernal Pools/Seasonal Seeps;Riparian Forest;Lake;Pasture/Old Field;Cultivated Field;Hedgerow;Intertidal Marine;Meadow;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Marine Island;Beach;Urban/Suburban; Pond/Open Water;Reefs;Eelgrass Beds;Riparian Herbaceous;Mudflats - Intertidal;Sheltered Waters - Marine

Green Heron	<i>Butorides virescens</i>	Blue		Estuary;Swamp;Marsh;Riparian Forest;Riparian Shrub;Stream/River;Lake;Urban /Suburban;Pond/Open Water;Riparian Herbaceous
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	Blue	1-T (Jun 2003)	Kelp Bed;Riparian Forest;Stream/River;Lake;Rock/ Sparsely Vegetated Rock;Conifer Forest - Mesic (average);Conifer Forest - Moist/wet;Subtidal Marine;Sheltered Waters - Marine
Northern Goshawk, <i>laingi</i> subspecies	<i>Accipiter gentilis laingi</i>	Red	1-T (Jun 2003)	Estuary;Riparian Forest;Pasture/Old Field;Cultivated Field;Hedgerow;Meadow;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Krummholtz
Northern Pygmy-owl, <i>swarthi</i> subspecies	<i>Glaucidium gnoma swarthi</i>	Blue		Bog;Fen;Swamp;Marsh;Riparian Forest;Pasture/Old Field;Cultivated Field;Hedgerow;Meadow;Shrub - Natural;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Krummholtz;Urban/Suburban
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Blue	1-T (Feb 2010)	Bog;Fen;Swamp;Riparian Forest;Conifer Forest - Mesic (average);Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Pond/Open Water

Peregrine Falcon, <i>anatum</i> subspecies	<i>Falco peregrinus anatum</i>	Red	1-SC (Jun 2012)	Bog;Fen;Swamp;Marsh;Alkali Ponds/Salt Flats;Stream/River;Lake;Pasture/Old Field;Cultivated Field;Hedgerow;Cliff;Rock/Spar sely Vegetated Rock;Talus;Meadow;Grassland; Shrub - Natural;Sagebrush Steppe;Beach;Urban/Suburban; Pond/Open Water;Riparian Herbaceous;Antelope-brush Steppe;Gravel Bar
Peregrine Falcon, <i>pealei</i> subspecies	<i>Falco peregrinus pealei</i>	Blue	1-SC (Jun 2003)	Estuary;Marsh;Stream/River;La ke;Pasture/Old Field;Cultivated Field;Hedgerow;Cliff;Rock/Spar sely Vegetated Rock;Intertidal Marine;Meadow;Marine Island;Beach;Urban/Suburban; Pond/Open Water;Riparian Herbaceous;Gravel Bar;Mudflats - Intertidal;Sheltered Waters - Marine
Purple Martin	<i>Progne subis</i>	Blue		Estuary;Bog;Fen;Swamp;Marsh; Riparian Forest;Stream/River;Pasture/Ol d Field;Cultivated Field;Hedgerow;Deciduous/Bro adleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Urban/Suburban;Sh eltered Waters - Marine
Short-eared Owl	<i>Asio flammeus</i>	Blue	1-SC (Jul 2012)	Estuary;Marsh;Pasture/Old Field;Cultivated Field;Hedgerow;Meadow;Grass land;Urban/Suburban;Pond/Op en Water;Riparian Herbaceous;Alpine/Subalpine Meadow;Alpine Grassland
Vesper Sparrow, <i>affinis</i> subspecies	<i>Pooecetes gramineus affinis</i>	Red	1-E (Dec 2007)	Pasture/Old Field;Cultivated Field;Hedgerow;Grassland;Urba n/Suburban
Western Screech-Owl, <i>kennicottii</i> subspecies	<i>Megascops kennicottii kennicottii</i>	Blue	1-T (Jan 2005)	Riparian Forest;Pasture/Old Field;Hedgerow;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Urban/Suburban

Mammals

English Name	Scientific Name	BC List	SARA	Habitat Subtype
Ermine, <i>anguinae</i> subspecies	<i>Mustela erminea anguinae</i>	Blue		Riparian Forest;Riparian Shrub;Pasture/Old Field;Cultivated Field;Hedgerow;Talus;Tundra; Meadow;Shrub - Natural;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Krummholtz;Riparian Herbaceous;Gravel Bar
Roosevelt Elk	<i>Cervus elaphus roosevelti</i>	Blue		Estuary;Bog;Fen;Swamp;Marsh ;Riparian Forest;Riparian Shrub;Lake;Pasture/Old Field;Cultivated Field;Hedgerow;Avalanche Track;Meadow;Grassland;Shrub - Natural;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Pond/Open Water;Riparian Herbaceous;Gravel Bar;Shrub - Logged;Alpine/Subalpine Meadow;Alpine Grassland

Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Blue		Riparian Forest;Caves;Grassland;Shrub - Natural;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Urban/Suburban;Shrub - Logged;Industrial
Western Water Shrew, brooksi subspecies	<i>Sorex navigator brooksi</i>	Blue		Bog;Fen;Swamp;Marsh;Riparian Forest;Riparian Shrub;Stream/River;Riparian Herbaceous;Gravel Bar
Wolverine, <i>vancouverensis</i> subspecies	<i>Gulo gulo vancouverensis</i>	Red	1-SC (Jun 2018)	Estuary;Bog;Fen;Swamp;Marsh ;Stream/River;Cliff;Rock/Sparse ly Vegetated Rock;Talus;Avalanche Track;Meadow;Grassland;Shrub - Natural;Deciduous/Broadleaf Forest;Conifer Forest - Mesic (average);Conifer Forest - Dry;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix);Alpine/Subalpine Meadow;Alpine Grassland

Plants

English Name	Scientific Name	BC List	SARA	Habitat Subtype
alpine anemone	<i>Anemone drummondii</i> var. <i>drummondii</i>	Blue		Rock/Sparsely Vegetated Rock;Tundra;Meadow
American glehnia	<i>Glehnia littoralis</i> ssp. <i>leiocarpa</i>	Blue		Sand Dune;Beach
banded cord-moss	<i>Entosthodon fascicularis</i>	Blue	1-SC (Aug 2006)	Garry Oak Maritime Meadow
beach bindweed	<i>Calystegia soldanella</i>	Blue		Sand Dune
black knotweed	<i>Polygonum paronychia</i>	Blue		Sand Dune;Beach

bog bird's-foot lotus	<i>Hosackia pinnata</i>	Red	1-E (Jul 2005)	Vernal Pools/Seasonal Seeps;Meadow;Grassland;Riparian Herbaceous;Garry Oak Vernal Pool
coastal Scouler's catchfly	<i>Silene scouleri</i> ssp. <i>scouleri</i>	Red	1-E (Jan 2005)	Garry Oak Woodland;Garry Oak Maritime Meadow;Garry Oak Coastal Bluffs
common bluecup	<i>Githopsis specularioides</i>	Blue		Vernal Pools/Seasonal Seeps;Rock/Sparsely Vegetated Rock;Grassland;Garry Oak Maritime Meadow
deltoid balsamroot	<i>Balsamorhiza deltoidea</i>	Red	1-E (Jun 2003)	Rock/Sparsely Vegetated Rock;Grassland;Mixed Forest (deciduous/coniferous mix);Sand Dune;Beach;Garry Oak Woodland
dense spike-primrose	<i>Epilobium densiflorum</i>	Red	1-E (Aug 2006)	Meadow;Garry Oak Vernal Pool
dwarf bramble	<i>Rubus lasiococcus</i>	Blue		Conifer Forest - Mesic (average);Conifer Forest - Moist/wet
fern-leaved desert-parsley	<i>Lomatium dissectum</i>	Red		
giant chain fern	<i>Woodwardia fimbriata</i>	Blue		Stream/River;Rock/Sparsely Vegetated Rock
Henderson's checker-mallow	<i>Sidalcea hendersonii</i>	Blue		Estuary;Marsh
Howell's triteleia	<i>Triteleia howellii</i>	Red	1-E (Jan 2005)	Meadow;Deciduous/Broadleaf Forest;Conifer Forest - Dry;Garry Oak Woodland;Garry Oak Coastal Bluffs
Howell's violet	<i>Viola howellii</i>	Red		Rock/Sparsely Vegetated Rock;Meadow;Conifer Forest - Moist/wet;Garry Oak Woodland
leafy mitrewort	<i>Mitellastrum caulescens</i>	Blue		Riparian Forest;Cliff;Rock/Sparsely Vegetated Rock;Talus;Conifer Forest - Mesic (average);Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix)
Lindley's microseris	<i>Uropappus lindleyi</i>	Red	1-E (Feb 2010)	Cliff;Meadow;Deciduous/Broad leaf Forest;Conifer Forest - Dry;Garry Oak Coastal Bluffs

Macoun's meadow-foam	<i>Limnanthes macounii</i>	Red	1-T (Aug 2006)	Meadow;Deciduous/Broadleaf Forest;Garry Oak Vernal Pool;Garry Oak Maritime Meadow
ochroleucous bladderwort	<i>Utricularia ochroleuca</i>	Blue		Fen;Marsh;Pond/Open Water
Oregon ash	<i>Fraxinus latifolia</i>	Red		Estuary;Swamp;Stream/River
pine broomrape	<i>Orobanche pinorum</i>	Red		Conifer Forest - Mesic (average);Conifer Forest - Moist/wet
prairie lupine	<i>Lupinus lepidus</i>	Red	1-E (Jun 2003)	Rock/Sparsely Vegetated Rock;Meadow;Garry Oak Maritime Meadow
purple sanicle	<i>Sanicula bipinnatifida</i>	Red	1-T (Jun 2003)	Rock/Sparsely Vegetated Rock;Deciduous/Broadleaf Forest;Garry Oak Woodland;Garry Oak Maritime Meadow
slimleaf onion	<i>Allium amplexans</i>	Blue		Vernal Pools/Seasonal Seeps;Rock/Sparsely Vegetated Rock;Meadow;Garry Oak Woodland;Garry Oak Coastal Bluffs
small-flowered tonella	<i>Tonella tenella</i>	Blue	1-E (Jul 2005)	Vernal Pools/Seasonal Seeps;Rock/Sparsely Vegetated Rock;Talus;Conifer Forest - Dry;Garry Oak Woodland
Smith's fairybells	<i>Prosartes smithii</i>	Blue		Riparian Forest;Deciduous/Broadleaf Forest;Conifer Forest - Moist/wet;Mixed Forest (deciduous/coniferous mix)
tall woolly-heads	<i>Psilocarphus elatior</i>	Red	1-E (Jun 2003)	Meadow;Garry Oak Vernal Pool
twisted oak moss	<i>Syntrichia laevipila</i>	Blue	1-SC (Jul 2005)	Garry Oak Woodland
Vancouver Island beggarticks	<i>Bidens amplissima</i>	Blue	1-SC (Jun 2003)	Estuary;Marsh;Beach;Mudflats - Intertidal
white meconella	<i>Meconella oregana</i>	Red	1-E (Aug 2006)	Rock/Sparsely Vegetated Rock;Deciduous/Broadleaf Forest;Garry Oak Coastal Bluffs
white-lip rein orchid	<i>Platanthera ephemerantha</i>	Blue		Conifer Forest - Dry;Garry Oak Woodland

white-top aster	<i>Sericocarpus rigidus</i>	Blue	1-SC (Jun 2003)	Rock/Sparsely Vegetated Rock;Meadow;Mixed Forest (deciduous/coniferous mix);Garry Oak Woodland
wine-cup clarkia	<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	Red		Meadow;Garry Oak Maritime Meadow
yellow montane violet	<i>Viola praemorsa</i> var. <i>praemorsa</i>	Red	1-E (Jun 2003)	Pasture/Old Field;Meadow;Garry Oak Woodland
	<i>Ditrichum schimperi</i>	Blue		
	<i>Funaria muhlenbergii</i>	Blue		
	<i>Platyhypnidium riparioides</i>	Blue		
	<i>Rosulabryum erythroloma</i>	Blue		
	<i>Sphagnum quinquefarium</i>	Blue		

Ecological Communities

Common Name	Scientific Name	BC List	Ecosystem Group
black cottonwood - red alder / salmonberry	<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	Blue	Flood zone Broadleaf forest
black cottonwood / Sitka willow	<i>Populus trichocarpa</i> / <i>Salix sitchensis</i>	Blue	Flood zone Broadleaf forest
buckbean - slender sedge	<i>Menyanthes trifoliata</i> - <i>Carex lasiocarpa</i>	Blue	Wetland
common cattail Marsh	<i>Typha latifolia</i> Marsh	Blue	Wetland
common spike-rush Herbaceous Vegetation	<i>Eleocharis palustris</i> Herbaceous Vegetation	Blue	Wetland
hard-stemmed bulrush Deep Marsh	<i>Schoenoplectus acutus</i> Deep Marsh	Blue	Wetland
Labrador-tea / western bog-laurel / peat-mosses	<i>Rhododendron groenlandicum</i> / <i>Kalmia microphylla</i> / <i>Sphagnum</i> spp.	Blue	Wetland
lodgepole pine / peat-mosses Very Dry Maritime	<i>Pinus contorta</i> / <i>Sphagnum</i> spp. Very Dry Maritime	Blue	Wetland
red alder / salmonberry / common horsetail	<i>Alnus rubra</i> / <i>Rubus spectabilis</i> / <i>Equisetum arvense</i>	Blue	Flood zones
Sitka sedge - Pacific water-parsley	<i>Carex sitchensis</i> - <i>Oenanthe sarmentosa</i>	Blue	Wetland
Wallace's selaginella / reindeer lichens	<i>Selaginella wallacei</i> / <i>Cladina</i> spp.	Blue	Grassland Rock outcrop

western redcedar - Sitka spruce / skunk cabbage	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Blue	Coniferous forest Wetland
western redcedar / sword fern - skunk cabbage	<i>Thuja plicata</i> / <i>Polystichum munitum</i> - <i>Lysichiton americanus</i>	Blue	Coniferous forest Wetland
western redcedar / sword fern Very Dry Maritime	<i>Thuja plicata</i> / <i>Polystichum munitum</i> Very Dry Maritime	Blue	Coniferous forest
western redcedar / three-leaved foamflower Very Dry Maritime	<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Dry Maritime	Blue	Coniferous forest
western redcedar / three-leaved foamflower Very Dry Maritime	<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Dry Maritime	Blue	Coniferous forest
American glasswort - sea-milkwort	<i>Sarcocornia pacifica</i> - † <i>Lysimachia maritima</i>	Red	
arbutus / hairy manzanita	<i>Arbutus menziesii</i> / <i>Arctostaphylos columbiana</i>	Red	Broadleaf forest
arctic rush - Alaska plantain	<i>Juncus arcticus</i> - <i>Plantago macrocarpa</i>	Red	Estuarine
beaked ditch-grass Herbaceous Vegetation	<i>Ruppia maritima</i> Herbaceous Vegetation	Red	Estuarine
Douglas-fir - arbutus	<i>Pseudotsuga menziesii</i> - <i>Arbutus menziesii</i>	Red	Coniferous forest
Douglas-fir - lodgepole pine / reindeer lichens	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Cladina</i> spp.	Red	Coniferous forest
Douglas-fir - western hemlock / salal Dry Maritime	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> Dry Maritime	Red	Coniferous forest
Douglas-fir / Alaska oniongrass	<i>Pseudotsuga menziesii</i> / <i>Melica subulata</i>	Red	Coniferous forest
Douglas-fir / dull Oregon-grape	<i>Pseudotsuga menziesii</i> / <i>Berberis nervosa</i>	Red	Coniferous forest
Douglas-fir / sword fern	<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>	Red	Coniferous forest
dune wildrye - beach pea	<i>Leymus mollis</i> ssp. <i>mollis</i> - <i>Lathyrus japonicus</i>	Red	Beach
Garry oak - arbutus	<i>Quercus garryana</i> - <i>Arbutus menziesii</i>	Red	Broadleaf forest
Garry oak / California brome	<i>Quercus garryana</i> / <i>Bromus carinatus</i>	Red	Broadleaf forest
Garry oak / oceanspray	<i>Quercus garryana</i> / <i>Holodiscus discolor</i>	Red	Broadleaf forest
grand fir / dull Oregon-grape	<i>Abies grandis</i> / <i>Berberis nervosa</i>	Red	Coniferous forest

grand fir / three-leaved foamflower	<i>Abies grandis / Tiarella trifoliata</i>	Red	Coniferous forest
Henderson's checker-mallow Tidal Marsh	<i>Sidalcea hendersonii</i> Tidal Marsh	Red	Estuarine
large-headed sedge Herbaceous Vegetation	<i>Carex macrocephala</i> Herbaceous Vegetation	Red	Beach
lodgepole pine / peat-mosses CDFmm	<i>Pinus contorta / Sphagnum</i> spp. CDFmm	Red	Wetland
Lyngbye's sedge herbaceous vegetation	<i>Carex lyngbyei</i> Herbaceous Vegetation	Red	Estuarine
northern wormwood - red fescue / grey rock-moss	<i>Artemisia campestris - Festuca rubra / Racomitrium canescens</i>	Red	Beach
red alder / skunk cabbage	<i>Alnus rubra / Lysichiton americanus</i>	Red	Wetland
red alder / slough sedge [black cottonwood]	<i>Alnus rubra / Carex obnupta [Populus trichocarpa]</i>	Red	Wetland
Roemer's fescue - junegrass	<i>Festuca roemeri - Koeleria macrantha</i>	Red	Grassland Rock outcrop
seacoast bulrush Alkali Marsh	<i>Bolboschoenus maritimus</i> var. <i>paludosus</i> Alkali Marsh	Red	Wetland
seashore saltgrass - Pacific swampfire	<i>Distichlis spicata - Sarcocornia pacifica</i>	Red	Estuarine
Sitka spruce / salmonberry Very Dry Maritime	<i>Picea sitchensis / Rubus spectabilis</i> Very Dry Maritime	Red	Mixed forest Flood zone
Sitka willow - Pacific willow / skunk cabbage	<i>Salix sitchensis - Salix lasiandra</i> var. <i>lasiandra / Lysichiton americanus</i>	Red	Wetland
slender sedge - white beak-rush	<i>Carex lasiocarpa - Rhynchospora alba</i>	Red	Wetland
sweet gale / Sitka sedge	<i>Myrica gale / Carex sitchensis</i>	Red	Wetland
three-way sedge	<i>Dulichium arundinaceum</i> Herbaceous Vegetation	Red	Wetland
tiny mousetail - montias - Macoun's meadow-foam	<i>Myosurus minimus - Montia</i> spp. - <i>Limnanthes macounii</i>	Red	Vernal pool
trembling aspen / Pacific crab apple / slough sedge	<i>Populus tremuloides / Malus fusca / Carex obnupta</i>	Red	Wetland
tufted hairgrass - Douglas' aster	<i>Deschampsia cespitosa</i> ssp. <i>beringensis - Symphyotrichum subspicatum</i>	Red	Estuarine
tufted hairgrass - Henderson's checker-mallow	<i>Deschampsia cespitosa - Sidalcea hendersonii</i>	Red	Estuarine

tufted hairgrass - meadow barley	<i>Deschampsia cespitosa</i> ssp. <i>beringensis</i> - <i>Hordeum</i> <i>brachyantherum</i>	Red	Estuarine
western hemlock - Douglas-fir / Oregon beaked-moss	<i>Tsuga heterophylla</i> - <i>Pseudotsuga</i> <i>menziesii</i> / <i>Eurhynchium oreganum</i>	Red	Coniferous forest
western hemlock - western redcedar / deer fern	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Struthiopteris spicant</i>	Red	Coniferous forest
western redcedar - Douglas-fir / Oregon beaked-moss	<i>Thuja plicata</i> - <i>Pseudotsuga</i> <i>menziesii</i> / <i>Eurhynchium oreganum</i>	Red	Coniferous forest
western redcedar / black twinberry	<i>Thuja plicata</i> / <i>Lonicera involucrata</i>	Red	Coniferous forest
western redcedar / common snowberry	<i>Thuja plicata</i> / <i>Symphoricarpos</i> <i>albus</i>	Red	Mixed forest Flood zone
western redcedar / Indian-plum	<i>Thuja plicata</i> / <i>Oemleria</i> <i>cerasiformis</i>	Red	Coniferous forest
western redcedar / salmonberry	<i>Thuja plicata</i> / <i>Rubus spectabilis</i>	Red	Coniferous forest
western redcedar / slough sedge	<i>Thuja plicata</i> / <i>Carex obnupta</i>	Red	Coniferous forest Wetland
western redcedar / vanilla-leaf	<i>Thuja plicata</i> / <i>Achlys triphylla</i>	Red	Coniferous forest