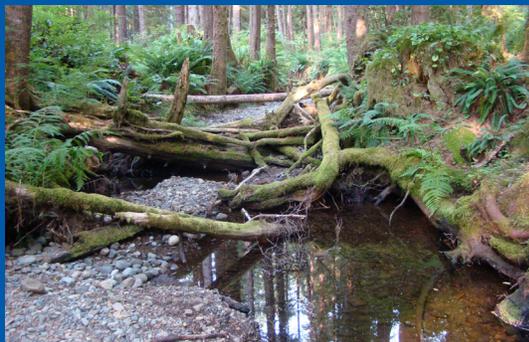


Environmental Guidelines for Urban and Rural Land Development in British Columbia



Section Five: Regional Information Packages

West Coast Region

| | | |
|-------|-------------------------------------|--------|
| 5.8.1 | West Coast Region | 5.8-3 |
| 5.8.2 | Regional Features | 5.8-3 |
| 5.8.3 | Ecosystems at Risk | 5.8-8 |
| 5.8.4 | Regionally Significant Species..... | 5.8-12 |
| 5.8.5 | Invasive Alien Species | 5.8-17 |
| 5.8.6 | Useful Sources | 5.8-20 |

Link to: [Table of Contents](#)

This section of *Develop with Care* offers information on some of the issues, species and ecosystems of concern that are priorities in each region. This section is not a stand-alone guide to environmentally sensitive development in each region—reference to other sections of this document is essential for a full understanding of the recommended environmental guidelines.

Figure 5.8-1: Ministry of Forests, Lands and Natural Resource Operations Regions



Cover Photos:

Left: Riparian ecosystem. Centre: Camas meadow. Right: Cormorants: *Photos: Judith Cullington*



5.8.1 West Coast Region

The West Coast Region includes all of Vancouver Island and the Gulf Islands (except those in Howe Sound and Texada Island), a portion of the Central Coast and Haida Gwaii (**Figure 5.8-2**). Low-lying areas suitable for urban and rural development in this region are experiencing rapid population growth and increasing development pressure.

Figure 5.8-2: West Coast Region



5.8.2 Regional Features

Geology and Topography

The West Coast Region includes steep, rugged topography ranging from sea level to over 3,000 m in the Coast Mountains. The central and largest part of Vancouver Island is comprised of the steep Vancouver Island Ranges. Deep fjords and long inlets dissect the western and central coast, and lowlands frame the northern tip and the eastern coast from Campbell River to Victoria. Glaciation has modified the landscape, rounding and smoothing lowlands and carving steep U-shaped valleys and fjords in the mountainous areas. Areas where urban and rural development can occur are limited by the steep terrain throughout most of the region. The majority of urban and rural development is concentrated along the eastern coast of Vancouver Island and on the Gulf Islands where sandstones, shale, and conglomerates create a relatively flat landscape.

Island View beach in Victoria and the Wilmar Bluffs in Courtenay are examples of sandy areas susceptible to wave erosion.

Zeballos and Horne Lake are vulnerable to rock slides because of their close proximity to steep, failing rock cliffs. Port Alice has constructed a large debris flow training berm and has a warning system for debris flows that might reach the town.



Section 5.8: West Coast Region

The underlying rocks affect development choices, ranging from very dense basal tills that are difficult to excavate (and commonly known as ‘hardpan’) to the deep loose sand and gravel deposits known as the Quadra Sands, which are notoriously unstable and subject to wave erosion.

Haida Gwaii is composed of over 150 islands and numerous islets sitting over an area of high tectonic plate activity. The landscapes have been reshaped by glacial activity to varying degrees. Landforms range from areas of steep, incised and unstable terrain along the West Coast ranges, rolling areas in the Skidegate Plateau and very flat and poorly drained lowlands on the northeastern portion of Graham Island. Most settlement has occurred in the lowland areas along the coastline of Graham Island.



Debris flow following heavy rainstorm. Photo: Judith Cullington

The underlying rock and soil formations across the West Coast Region also affect an area’s vulnerability to hazards. Some areas have finer, ‘plastic’ soils or clays that lose strength when they are saturated with water, causing major stability problems on slopes. Unfortunately, these less stable sediments are often associated with steep cliffs and shorelines that are also attractive for residential development because of the commanding views.

Other terrain hazards include rock falls and slumping (landslides), commonly seen on the east coast of Vancouver Island and Central Coast in association with development along shorelines, as well as debris flows. Earthquakes and tsunamis are also potential hazards in this region, particularly along the south and west coast of Vancouver Island and Haida Gwaii, although the entire region is rated moderate through high for the likelihood of earthquake occurrence.

Information on many hazards is available from the [Provincial Emergency Program website](#). The Province has prepared maps showing the geomorphology of Vancouver Island, including descriptions of the terrain and some terrain hazards. It includes maps of areas with landslide risk and of alluvial rivers vulnerable to destabilization and damage when the riparian vegetation is removed.¹

The Province has completed a [study of lakeshore erosion](#) on lakes with fluctuating water levels, using Horne Lake as a case study. This report presents a method for determining and mapping the shoreline erosion hazard around a lake and suggests appropriate protection measures. It is intended to help lakeshore owners and planners choose where to establish shoreline protection, and offers alternatives that will help maintain the ecological integrity of the land–water interface, while protecting property and property owners.

¹ Available from http://www.env.gov.bc.ca/wld/documents/techpub/rr01/rr01_geom_vi.html and http://www.env.gov.bc.ca/wld/documents/techpub/rr02/rr02_geom_vi.html.



Rock formations on West Coast
of Vancouver Island.

Photo: Judith Cullington

Climate

Precipitation on the west coast varies widely, from less than 700 mm/year around Victoria to nearly 4,260 mm/yr in Haida Gwaii. In general, the east coast lowlands of Vancouver Island receive about 1,600 mm/year, mostly as rain. Occasionally, rain and wind from a winter storm melts snow, producing as a 'pineapple express' or 'rain-on-snow event' with unusually high runoff. Most slopes of Vancouver Island drain rapidly, resulting in the 'flashy' response of streams following a storm. Flooding problems are a chronic concern in communities where development has occurred within the floodplain along these streams.

Climate change in the region is already bringing warmer temperatures year round, with more rain in the spring but less during the rest of the year (**Table 5.8-1**). This trend is expected to continue. This change has implications for the ecosystems and species, as well as for development. Winter snow packs, which usually provide a water source until early summer, are being affected by the higher winter temperatures.

In the Cowichan Basin, a partnership of local and senior governments, First Nations, community groups and resource users have prepared a long-term Water Management Plan, recognizing that summer droughts are likely to become of increasing concern due to climate change and population growth in the area (<http://www.cvr.bc.ca/index.aspx?NID=1008>).

Table 5.8-1: Climatic trends at Victoria International Airport, 1950–2001

| Trend 1950-2001 | Winter | Spring | Summer | Fall | Annual |
|---|--------|--------|--------|--------|--------|
| Change to minimum temperature (°C/decade) | +0.19° | +0.36° | +0.19° | +0.08° | +0.17° |
| Change to maximum temperature (°C/decade) | +0.20° | +0.25° | +0.21° | +0.15° | +0.20° |
| Precipitation (% change) | -16.75 | 13.26 | -3.86 | -3.33 | -3.11 |

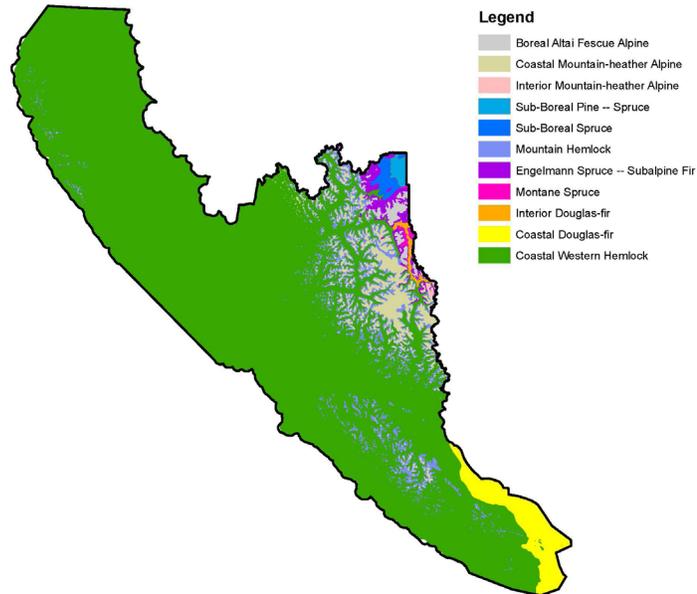


Biogeoclimatic Zones

For information on biogeoclimatic classification (BEC) see [Biogeoclimatic Zones](#) and the BEC website: <http://www.for.gov.bc.ca/hre/becweb/>.

There are three primary biogeoclimatic zones in the region (**Figure 5.8-3**).

Figure 5.8-3: Biogeoclimatic Zones in West Coast Region



Much of the region is in the [Coastal Western Hemlock](#) biogeoclimatic zone. These 'temperate rainforests' are complex and highly productive ecosystems, with a variety of habitats for birds and mammals. Because these forest soils are generally nutrient poor, fungi and seedlings depend on fallen trees, while the forest canopy provides habitat for lichens, mosses, and insects. Where there are gaps in the canopy, understory vegetation flourishes, supplying forage for Roosevelt elk and other wildlife. The many streams are excellent habitat for fish and other aquatic species.

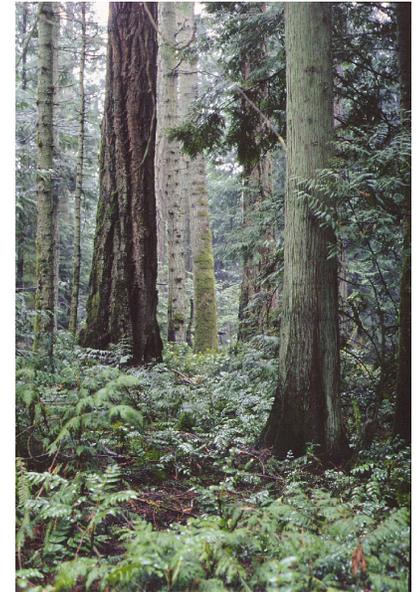
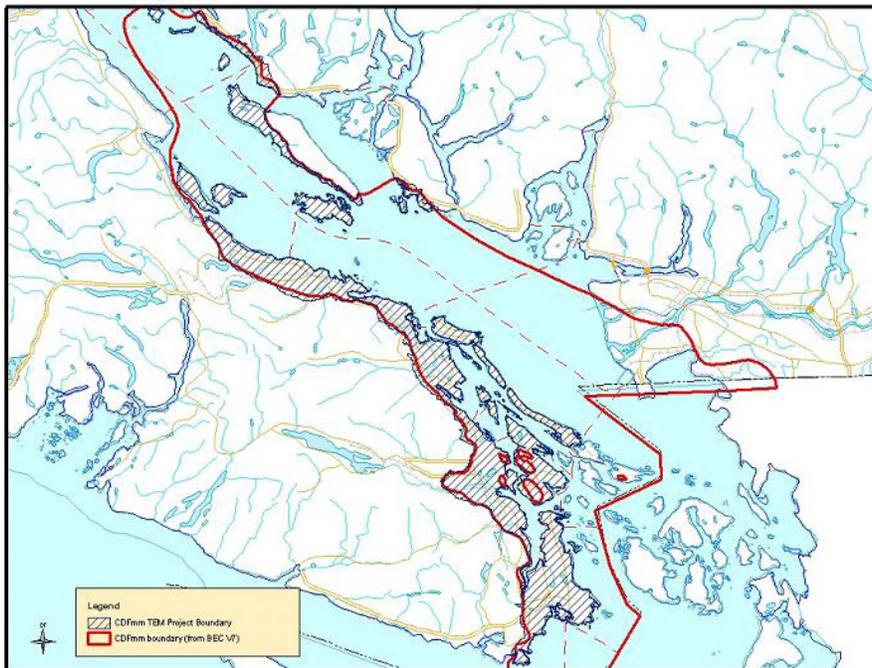
On higher ground, the [Mountain Hemlock](#) biogeoclimatic zone predominates. At lower elevations there are dense, closed-canopy forests; but higher up the forests thin out into alpine meadows. The growing season in this zone is shorter, with colder climates and more snow. The Mountain Hemlock Zone provides habitat for many species such as ptarmigan, Black Tail Deer, Roosevelt Elk, cougar, and Black Bear, especially during the warmer summer months. The [Red-listed](#) Vancouver Island Marmot is found in this zone.

Section 5.8: West Coast Region



The Coastal Douglas-fir Zone is found only in the southwest corner of British Columbia (**Figure 5.8-4**), along the east coast of Vancouver Island, the Gulf Islands and parts of the Lower Mainland. The Coastal Douglas-fir zone contains a wide diversity of ecosystems including woodlands, rocky outcroppings, coastal bluffs and wetlands. In upland areas Douglas-fir are found in association with salal and Oregon grape. Garry Oak and Arbutus grow with the Douglas-fir in rocky outcrop areas, together with other drought-tolerant species such as Baldhip Rose, Snowberry and Oceanspray. Moister areas support Grand Fir, Western Redcedar, and Bigleaf Maple together with Sword Fern, Salmonberry and Trillium as the understory. The mild climate in this zone supports many species that are also typical of Washington and Oregon.

Figure 5.8-4: Coastal Douglas-fir Zone



Coastal Douglas-fir/Dull Oregon Grape ecological community.
Photo: Hans Roemer

The Coastal Douglas-fir Zone is one of the smallest and most endangered biogeoclimatic zones in British Columbia and has the highest number of species at risk per unit area of any zone in B.C. (Holt 2001)



SGang Gwaay.
Photo: Alvin Cober



The Halalt First Nations on Vancouver Island have prepared guidelines to help developers and local governments to plan projects that take their cultural values and customs into account, and to approach each First Nation with respect. Developers and local governments should contact the Halalt (and other First Nations as appropriate to their area) before development planning begins, to identify culturally valuable resources such as burial sites and plants used for medicinal purposes. Contact information for First Nations in British Columbia is provided by the [Ministry of Aboriginal Relations and Reconciliation](#).

First Nations Interests

The natural ecology of this region has changed considerably with European settlement. This continues to have a significant impact on First Nations cultures and traditions. Developers and local governments should always contact First Nations² prior to development planning, to identify sites and features of importance.

5.8.3 Ecosystems at Risk

Coastal Douglas-fir Zone

The mild climate, gently sloping topography and proximity to coastal zones attracts people as well as wildlife to this area. The Coastal Douglas-fir (CDF) ecosystems are at significant risk from loss and encroachment both during and after urban and rural growth.

Most of the east coast of Vancouver Island is under private ownership, as a result of historical Esquimalt and Nanaimo (E&N) Railway land grants. This means that land use decisions made by local governments and private landowners are especially important in the protection of the remaining ecosystems and species in the Coastal Douglas-fir zone.

Due to forestry activities and land development patterns, mature and old-growth Douglas-fir forests have become rare; less than one percent remains. The [Conservation Data Centre](#) identifies 37 ecological communities as [Red- or Blue-listed](#) in this area. Some [older trees](#) still exist singly or in small groups within urban and rural areas, and these ‘veteran’

² For First Nations contact information, see Ministry of Aboriginal Relations and Reconciliation website (<http://www.gov.bc.ca/arr/services/guide.html>).



trees and pockets of old forest provide critical habitat for many wildlife and plant species.

The ongoing invasion of alien plant and animal species into this zone is a major concern (see **Section 5.8.5**). Invasive plant and animal species are second only to urbanization and other forms of direct land conversion in the threat they pose to natural ecosystems and many species at risk, particularly in the mild climate of the west coast.

Garry Oak and Associated Ecosystems

Garry Oak and associated ecosystems are part of the Coastal Douglas-fir zone. These ecosystems include shady woodlands as well as open meadows with scattered trees. Garry Oak trees are often found in mixed stands with other trees, mainly Arbutus and Douglas-fir. The understory species include spring wildflowers, grasses, mosses, and a variety of shrubs. These ecosystems also support many moss, lichens, and fungi, and are home to a variety of animals which thrive in these unique environments.

Associated ecosystems are highly varied and include rock outcrops and coastal bluffs, maritime meadows and treeless grasslands, along with seasonal wetlands and small pools which disappear during dry weather. Also included are transitional Douglas-fir forests that have an oak component.

As with the other CDF ecosystems, Garry Oak and associated ecosystems are among the most 'at-risk' in Canada. Only an estimated 5% remain in a relatively natural state—most have been lost to urban and rural development. As a result, more than 67 species of Garry Oak ecosystem

Garry Oak and associated ecosystems are some of Canada's most endangered natural areas. Once common in coastal areas of southwest B.C., less than 5% of these ecosystems remain in a near-natural condition. They include woodlands with Garry Oak, arbutus, or Douglas-fir trees, often combined with rock outcrops, wildflower and grassy meadows, coastal bluffs, and seasonal pools. In Canada, Garry Oak and associated ecosystems are found only on southeast Vancouver Island, on the Gulf Islands, and in two isolated areas in the Lower Fraser Valley. They are home to more than 100 species at risk, and as the ecosystems disappear, so do the species they support.

The Garry Oak Ecosystems Recovery Team (GOERT) was formed in 1999 to coordinate efforts to protect and restore Garry Oak and associated ecosystems and the species at risk that inhabit them. GOERT uses an ecosystem-based approach to recovery planning, incorporating the needs of species at risk into ecosystems-scale planning.

For more information, see the GOERT website: www.goert.ca.



Garry Oak ecosystem, Victoria.
Photo: Judith Cullington



Section 5.8: West Coast Region

plants, reptiles, birds, butterflies and other insects are provincially [Red-listed](#), and another 37 species are [Blue-listed](#). More than 50 species are also listed by COSEWIC as nationally endangered. Some species have already been extirpated (i.e., they are no longer found here).

One of the challenges with conserving Garry Oak and associated ecosystems is that people often focus their attention on the trees themselves, and do not consider the importance of protecting the entire ecosystem which includes the other plants, soils and soil micro-organisms, upon which many species rely. In addition, tools such as municipal tree protection bylaws are usually limited to the protection of the mature trees only.

For information on the protection and management of ecosystems at risk, see [Section 2: Community Planning](#), [Section 4: Environmentally Valuable Resources](#) and [Best Management Practices for Garry Oak and Associated Ecosystems](#). The Sensitive Ecosystems Inventory [Conservation Manual](#) also includes specific recommendations for protecting sensitive ecosystems.



Sensitive ecosystems provide habitat for this Taylor's Checkerspot butterfly.
Photo: Jennifer Heron

Sensitive Ecosystems

The Ministry of Environment and Environment Canada mapped 'sensitive ecosystems' along the central and south east coast of Vancouver Island and adjacent Gulf Islands, primarily within the Coastal Douglas-fir zone. Sensitive Ecosystem categories are generalized groupings of ecosystems that share many characteristics, particularly ecological sensitivities, ecosystem processes, at-risk status, and wildlife habitat values (Ministry of Environment 2006). These rare and fragile ecosystems include seven sensitive ecosystem types: wetland, riparian, older forest, woodland, coastal bluff, terrestrial herbaceous, and sparsely vegetated ecosystems. As part of the [Sensitive Ecosystems Inventory](#), two secondary ecosystem types (older second-growth forests and seasonally flooded fields) were also mapped because of their high biodiversity values. The 1997 Sensitive Ecosystems Inventory (SEI) found that less than 8% of the study area remained in a relatively natural state, and a further 12% had been modified but was still providing important natural values. In other words, human activities had modified 80% of this area to such an extent that the natural ecosystems were no longer present.

Many of the region's species at risk live in the ecosystem types identified in the Sensitive Ecosystem Inventory. Note, however, that this Inventory only mapped sites that were 0.5 hectares or larger, and did not identify many smaller but equally important patches. For example, vernal pools (a type of very small wetland—see [Section 4](#)) provide critical habitat for 25 plant species at risk.



Terrestrial Herbaceous ecosystem.
Photo: Mark Kaarremaa

A subsequent review of the original SEI, known as [Disturbance Mapping](#), has shown that even more ecosystems have been disturbed by development since the original inventory. Over 8,800 ha (11%) of the area occupied by the nine SEI ecosystem types in the early 1990s had been disturbed by 2002. Of the sensitive ecosystems, older forests had the highest rate of loss at 8.6% (915 ha) followed by riparian (4.6%), woodland (2.6%) and wetland (2.0%) ecosystems. The largest area of loss was 7,360 ha (16.4%) in the older second-growth forest category.

These losses are of concern as they represent not only a loss of the ecosystems themselves, but also the species (including species at risk) that these ecosystems supported. Communities are also affected by this loss because these areas contributed to the views and natural capital of communities, as well as providing many ecosystem services such as reducing flood flows and maintaining water quality by removing harmful pollutants.

Table 5.8-2: Loss of ecosystems by SEI sub-unit , early 1990s to 2002

| SEI Sub-unit | Sensitive Ecosystems | | | Other Ecosystems (SG, FS) | | |
|--------------|----------------------|----------------|------------|---------------------------|----------------|-------------|
| | Original SEI (ha) | Loss (ha) | Loss (%) | Original SEI (ha) | Loss (ha) | Loss (%) |
| Capital | 8500.5 | 140.2 | 1.6 | 11080.0 | 865.9 | 7.8 |
| Comox | 8684.8 | 483.6 | 5.6 | 9085.6 | 2649.3 | 29.2 |
| Cowichan | 4416.9 | 205.5 | 4.7 | 4066.5 | 306.4 | 7.5 |
| Islands | 5128.8 | 223.6 | 4.4 | 14751.8 | 1539.3 | 10.4 |
| Nanaimo | 5779.2 | 411.3 | 7.1 | 8685.3 | 2017.5 | 23.2 |
| Total | 32,510.1 | 1,464.2 | 4.5 | 47,669.3 | 7,378.4 | 15.5 |



5.8.4 Regionally Significant Species

Two-thirds of the 341 [provincially-listed](#) species at risk in the West Coast Region are found in urban and rural areas. Many species—particularly those in the Coastal Douglas-fir zone—have had most of their range converted to human use. Other species are naturally rare and live only in specialized habitats. There are also many species that are considered ‘regionally significant’ due to their uniqueness, their degree of rarity, or their close association with the region. Due to its geographic isolation from the B.C. mainland, Haida Gwaii supports a variety of endemic and disjunct species or subspecies. Follow the guidelines in [Section 3](#) and [Section 4](#) to protect regionally significant species, and see [Section 4: Environmentally Valuable Resources](#) for guidelines on protecting species at risk.

Some of the birds that have been extirpated from West Coast Region Garry Oak ecosystems are the Western Bluebird, Western Meadowlark, Streaked Horned Lark, and Lewis’s Woodpecker.

The Canada [Fisheries Act](#) prohibits the destruction or harmful alteration of fish habitat, including the riparian vegetation that surrounds aquatic habitats.

Enos Lake Stickleback
“Few other organisms anywhere have contributed as much to our understanding of how new species form in nature and become different from one another. I would rank their scientific importance with that of the Burgess Shale and a few other outstanding natural phenomenon of BC and Canada” (Dr. Dolf Schluter, University of British Columbia, referring to the Enos Lake stickleback).

Fish

Salmon and Trout

Most salmon and some trout are ‘anadromous’, meaning that they use the ocean for part of their life cycle and return to fresh water to spawn. Some anadromous species are more vulnerable to the impacts of urban/rural development, particularly those that rely on small freshwater streams, like [Cutthroat Trout](#) and [Coho Salmon](#).

As a result of land development and over-fishing, many unique stocks of these species have gone extinct, and others have suffered dramatic decreases. Each stock represents thousands of years of adaptation to a home watershed, and its loss reduces the diversity of the species as a whole. The cumulative loss of fishing opportunities also affects the multi-million dollar sport and commercial fishery. All aquatic and riparian habitats, including estuaries, ephemeral (seasonal) streams, and small streams should be protected as they are important fish habitats.

Coastal Cutthroat Trout are [Blue-listed](#), and several populations (stocks), particularly those on the east coast of Vancouver Island and in the Lower Mainland, are in serious decline. [Steelhead Trout](#) are also decreasing in numbers, as they need healthy watersheds and stable river channels for their spawning and two- to four-year stay as juveniles in fresh water.

In some lakes within the region, there are unique pairs of Stickleback species which have evolved to use adjacent habitats without cross-breeding. One of these pairs, formerly on Lasqueti Island, is now extinct due to the introduction of non-native fish; another pair on Vancouver Island has been disrupted by human activities and urban development and may be extinct. All of these unique stickleback pairs are [Red-listed](#) due to their vulnerability to human disturbance. Other fish species of



concern include the Cowichan Lake Lamprey, Western Brook Lamprey in Courtenay's Morrison Creek, and the Giant Black Stickleback and Charlotte Unarmoured Stickleback on Haida Gwaii. Dolly Varden populations are of concern throughout the region.

Restore it and they will come: Coastal cutthroat and other salmonid species are benefiting from a major initiative to restore estuary habitat at the mouth of the Campbell River. <http://www.campbellriver.ca/your-city-hall/green-city/environmental-protection/campbell-river-estuary/>

Birds

Great Blue Heron

The Pacific (or *fannini*) subspecies of Great Blue Heron is found only on the west coast of North America. Most of the Pacific heron population live along the Strait of Georgia where increasing development pressures and expanding human populations are affecting important nesting and foraging habitats. Bald Eagles are also taking their toll by preying on the nesting birds and their young. Because of its vulnerability to development pressures and disturbances, the Pacific subspecies of Great Blue Heron is listed as [Special Concern](#) under the Canada [Species at Risk Act](#). For more information and guidelines for protection, see the [Fact Sheet on Herons](#) (Appendix G).

Bald Eagle

The Bald Eagle is still a common sight in many parts of the west coast, but the gradual loss of its nesting habitat is affecting the species. In this region, eagles generally nest in large, strong trees that are as tall as or taller than the surrounding trees. In urban and rural areas, nest trees are often veteran Douglas-firs that are at least 150 years old. Although some suitable nest trees remain in coastal urban areas, there is increasing pressure to remove them because of the hazard they may pose to nearby houses.

For more information and guidelines for protection, see the Fact Sheet on [Bald Eagle and Ospreys](#) (Appendix G) and [Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia \(2013\)](#).



The Bald Eagle uses the largest available trees in which it builds its heavy nests.

Photo: Marlene Caskey



Bald Eagle feeding on carcass.

Photo: Judith Cullington



Other Bird Species



Trumpeter Swan.
Photo: Judith Cullington

Birds of interest include those species for which Important Bird Areas (IBAs) have been designated. In 2001, more than 50 IBAs were designated in this region of which 19 are located on Haida Gwaii with others distributed across Vancouver Island and adjacent islands and waters. Many of the IBAs in this region are designated because they support internationally significant seabird breeding colonies for species such as Ancient Murrelet, Cassin's Auklet, Pigeon Guillemot, Rhinoceros Auklet, Common Murre, Leach's Storm Petrel, Fork-tailed Storm-Petrel, as well as Glaucous-winged Gull, Brandt's, Pelagic & Double-crested Cormorants and other marine birds. Other IBAs in this region provide important areas for foraging, staging and overwintering for species such as Marbled Murrelet, Trumpeter Swan, Black Brant, Black Turnstone, Great Blue Heron, Pacific Loon, cormorants, Surf Scoter, Thayer's Gull, Western Grebe, Western Sandpiper and other shorebirds and waterbirds. To find the locations of IBAs and access site information for individual IBAs (e.g., bird species abundance, habitat description and conservation issues), visit www.ibacanada.ca and search the online Map Viewer or the Site Directory.

Information from several bird monitoring programs coordinated by Bird Studies Canada is also available through a searchable online data warehouse, Nature Counts (www.naturecounts.ca). Information available includes species presence, seasonal abundance, breeding species and other information. See [Appendix D](#) for more details.

Amphibians and Reptiles

Amphibians and reptiles live in valley bottom areas that attract development. Unless measures are taken to preserve the specialized habitats of these species, their numbers will continue to decline.

The Western Toad is the only native amphibian species occurring on Haida Gwaii. Tree frogs and Red-legged Frogs have been introduced to the islands. There are no native reptiles found in the archipelago and the climate is believed to be too cold to support any introduced species.

There are 10 native and three introduced amphibian species (frogs, toads and salamanders) and six native and two introduced reptile species (turtles, lizards and snakes) in the region. Land development is concentrated in the lowlands and near water—areas of high amphibian and reptile use—resulting in some species becoming rare. One species—the Gopher Snake—has been extirpated from the region.

Three species that are typical of the lowlands where urban development is concentrated are the Sharp-tailed Snake, Red-legged Frog, and Northern Alligator Lizard. Refer to [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#) for more information on ways to protect all of the region's species.

Red-legged Frog

The [Red-legged Frog](#) is widespread in moist forested areas throughout the region, where significant amounts of its habitat have been modified into urban and rural areas. In Canada, south western B.C., and the West Coast



Sharp Tailed Snake.
Photo: Christian Engelstoft

Region forms the majority of its range. Red-legged Frogs breed in ponds, wetlands, and some streams. They can use ephemeral (seasonally wetted) wetlands, which is beneficial because these wetlands discourage predators like bullfrogs that require year-round water. The Red-legged Frog is [Blue-listed](#) due to declining numbers related to habitat loss and predation of tadpoles by bullfrogs and salmonids. For more information and guidelines for protection, see the [Fact Sheet on Red-legged Frog](#) (Appendix G).

Sharp-tailed Snake

In Canada, the [Sharp-tailed Snake](#) lives only in the dry Coastal Douglas-fir zone in the southeastern part of the West Coast Region. It prefers to live in Douglas-fir–Arbutus woodlands and along forest edges. Its small population and susceptibility to harm by development make it an endangered species.

The Sharp-tailed Snake is a [Red-listed](#) species whose Canadian range occurs only on the southern Gulf Islands and southeastern Vancouver Island. It is small, harmless, and non-threatening—traits that make it compatible with low-density developments. Sharp-tailed Snakes are very secretive and seldom seen. This species can co-exist with a limited amount of urban or rural development if care is taken to protect its habitat.

Northern Alligator Lizard

The [Northern Alligator Lizard](#) is the largest lizard in Canada, reaching more than 20 cm in length. In general, the Northern Alligator Lizard requires only small areas to live in, making it possible to retain populations in urban and rural areas when its habitat needs are recognized, and predation by cats and dogs is controlled. Vancouver Island populations of Northern Alligator Lizards are under additional pressure because of the introduced European Wall Lizard, which thrives in human-disturbed environments, and may compete with the Alligator Lizard for resources.



Mammals

There are some mammals in the region whose numbers are naturally low or are dropping. These include the Vancouver Island Water Shrew, the Ermine, and the Wolverine. In many cases, adequate taxonomic and inventory documentation has not been carried out to have these species 'listed'.

Vancouver Island Marmot

The Vancouver Island Marmot is found only on Vancouver Island. It differs from other marmot species in behaviour, genetics and ecology and is easily identified by its unique appearance. It is one of the rarest and most endangered mammals in the world, with a wild population of about 25 animals at its lowest level in 2001. Due to an effective recovery plan and partnerships, the wild population had increased to more than 300 by 2011, with further increases projected for the coming years.

Habitat changes over a wide area have potentially affected predator-prey dynamics and marmot dispersal patterns, which is having significant implications on a naturally small population. For more information see <http://www.marmots.org/>.

Vancouver Island Water Shrew

If you find a shrew swimming in the water, it is probably a Vancouver Island Water Shrew. A distinguishing characteristic is its hairy feet. Little is known of their habitat needs at this time. Although there are only 67 official records of this animal on Vancouver Island it has been identified from Quatsi River in the north through to Veitch Creek near Victoria. This animal depends on aquatic insects, earthworms, snails and slugs and it is believed to inhabit riparian ecosystems.

Plants

Phantom Orchid

The Phantom Orchid or Ghost Orchid is an unusual plant that obtains its nutrients from a fungus rather than through photosynthesis. It is involved in a three-way partnership with a specific family of fungi (the Thelophoraceae) and a (presently unknown) tree species. Both the stem and flowers of this plant are white, giving it a ghostly appearance and its common name. For more information and guidelines for protection, see the [Fact Sheet on Phantom Orchid](#) (Appendix G).



Phantom Orchid.
Photo: Ross Vennesland



Vancouver Island Beggarticks.
Photo: Rose and Brian Klinkenberg

Vancouver Island Beggarticks

Vancouver Island Beggarticks thrives along the edges of ponds, lakes, streams, creeks, channelized watercourses, willow swamps, and other wetlands in places where water levels are high in winter and spring and low in summer. These changing water levels help keep the species' open, silted, habitats suitable for growth. Although this plant is generally found in freshwater areas, it also occurs within the tidal zone along the Fraser River. For more information and guidelines for protection, see the [Fact Sheet on Vancouver Island Beggarticks](#) (Appendix G).

There are many other regionally significant species and species and ecosystems at risk in the West Coast Region. For more information, contact the regional office.

5.8.5 Invasive Alien Species

Modern transportation, commerce and climate change have created many opportunities for plants and animals to spread from their places or origin. Although many species are transported by accident, others are deliberately imported for landscaping, as pets, for agriculture, or for pest control. The majority of imported species do not thrive and spread, but a few become a major problem. Once these invasive species arrive, humans often inadvertently assist their spread by carrying seeds on vehicles and clothing.

Invasive species are causing problems in the many parts of the region. The [Coastal Invasive Species Committee](#) (CISC) was formed in 2006 to address these concerns on Vancouver Island, the Gulf Islands and southern coastal communities. Haida Gwaii is part of the [Northwest Invasive Plant Committee](#) (NWIPC). Information on invasive species can also be found at the [Invasive Species Council of B.C.](#) website.

Invasive alien species can cause extensive damage to native ecosystems. Many species are so widespread and persistent that they can only be controlled through public education and with the long-term involvement of all land stewards.



American Bullfrog.
Photo: W. Leonard



For amphibians and reptiles, the spread of non-native, invasive species is second only to habitat alteration in adversely impacting populations, particularly on southeastern Vancouver Island. Weedy vegetation such as [Purple Loosestrife](#) and [Reed Canary Grass](#) can out-compete native aquatic vegetation around important pond and wetland habitats, removing food sources for native species and changing water flows. The [American Bullfrog](#), originally imported by frog-farmers for its meaty legs and sold as tadpoles through pet shops, has spread along the east coast of Vancouver Island where it preys on native amphibians, ducklings, and other wildlife. Humans help bullfrogs spread by converting seasonal wetlands into year-round ponds, and by moving frogs and tadpoles. See [Section 2.4.4](#) for guidelines on managing invasive species.

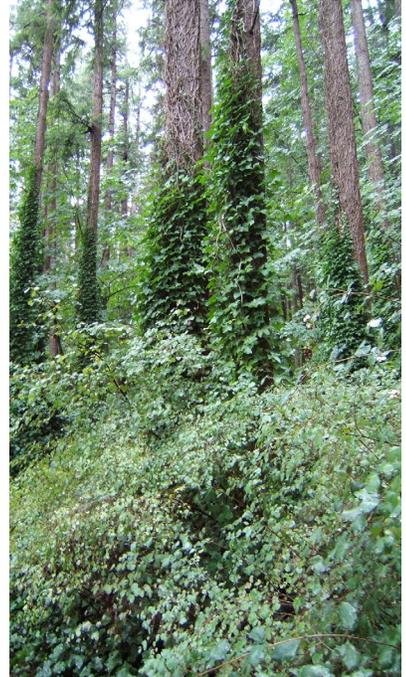
Check the CIPC and NWIPC websites for established lists of priority invasive plants. Some invasive species of concern in the West Coast Region include the following.

- ◆ [Carpet Burweed](#) is a low growing winter annual plant that sheds seeds that can be painful if stepped on and which rapidly out-competes surrounding vegetation, particularly in open areas such as lawns. This plant can become a serious problem in golf courses, lawns, and grassy or woodland ecosystems. Its spread is being controlled in several parks and public areas however continued efforts are required to educate the public and control the spread of this species.
- ◆ [Knotweed](#) species are bamboo-like shrubs that choke riparian areas, ditches, wetlands and other moist areas. Once established, these species displace native vegetation, rapidly forming monocultures and contributing to erosion and mass wasting along river corridors. Knotweed species are notoriously difficult to control or eradicate. These plants have been a major problem throughout the southwest corner of the province and in the Pacific Northwest, and are rapidly becoming established into moist areas on Vancouver Island and Haida Gwaii. It is commonly found along the Highway 19 corridor and on some river systems, notably Cowichan River, and is now most commonly spread through ditch maintenance and by gardeners.

Section 5.8: West Coast Region



- ◆ [Giant Hogweed](#) is an invader of moist riparian areas. It forms a dense canopy, out-competing native species. This plant has a highly toxic sap that causes severe photo-sensitization, resulting in skin damage that can last for years. It has invaded several areas across the province.
- ◆ [Scotch Broom](#), [Gorse](#), [Himalayan and Evergreen Blackberry](#), and [English Hawthorn](#) are plants that thrive on open and disturbed sites, including roadsides and areas awaiting redevelopment. Repeated hand pulling or mechanical cutting can control or eliminate them from sensitive ecosystems and from disturbed sites that can act as seed banks for more than 50 years!
- ◆ [English and Irish Ivy](#), Laurel-Leaved [Daphne](#) and [English Holly](#) are common landscaping species. They often reseed into native forest and woodland ecosystems and displace native species. Ivy grows around the trunks of trees and shrubs and interferes with nutrients and light requirements, causing decline, breakage and occasionally death of the tree and understorey. Removing ivy is very labour intensive task once this plant becomes established.
- ◆ [Purple Loosestrife](#) is an attractive purple-flowered plant that displaces native species in wetlands, streams, and ditches. It originally was used as a landscaping plant in wet sites.
- ◆ [Orchardgrass](#) is a grass commonly used in grass seed mixtures and for cattle forage. It is the most prolific invasive plant in threatened Garry Oak and associated ecosystems. Grass seed mixes used for lawns and disturbed sites should exclude this species.
- ◆ [Eastern Grey Squirrel](#) is a large grey to black squirrel that is replacing the smaller native Red Squirrel in urban and rural areas and competing with other native species for food in many ecosystems throughout southern Vancouver Island.
- ◆ [North American Opossum](#) is a marsupial that was introduced to Hornby Island in 1986. Its diet includes birds, bird eggs, small mammals and the larvae of many other species, including the Red-listed Edith's Checkerspot (a butterfly). If the opossum spreads to Vancouver Island, it would be difficult to control.



English Ivy can destroy forests.
Photo: Judith Cullington



Opossum.
Photo: Jenny Balke



5.8.6 Useful Sources

General Information

Ministry of Forests, Lands and Natural Resource Operations
West Coast Regional Office
2080 Labieux Road
Nanaimo BC V9T 6J9
Phone: (250) 751-3100
<http://www.for.gov.bc.ca/mof/regdis.htm#wcr>
or <http://www.env.gov.bc.ca/van-island/>

Regional Resources

Access to many sources of inventory information can be found through the EcoCat (Ecosystems Report Catalogue) website <http://www.env.gov.bc.ca/ecocat/>

Regional maps and inventory:

- ◆ Geoscape Nanaimo website <http://web.mala.bc.ca/geoscape/>
- ◆ Geoscape Victoria website <http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R%3D213448>
- ◆ Guthrie, R. and P. Law. 2005. Lakeshore Erosion Hazard Mapping. Ministry of Environment Technical Handbook No. TH 1. December 2005. www.for.gov.bc.ca/hfd/library/documents/bib96705.pdf
- ◆ Sensitive Ecosystems Inventory mapping of East Vancouver Island and the Gulf Islands (http://www.env.gov.bc.ca/sei/van_gulf/ecosystems.html) was first completed in 1997, based on aerial photos taken from 1992 and earlier. A Technical Report documents sensitive ecosystem information in detail, and the Conservation Manual provides information on ways to protect sensitive ecosystems. (http://www.env.gov.bc.ca/sei/van_gulf/publications.html).
- ◆ Sensitive Ecosystems Inventory disturbance mapping was later conducted using 2002 orthophotos (<http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=2124>)
- ◆ Invasive Alien Plant Program and Report A Weed database is used to map, track inventories and treatment projects and is administered by FLNRO <http://www.for.gov.bc.ca/hra/Plants/index.htm>

Section 5.8: West Coast Region



- ◆ North Island - Central Coast District Maps and Reports (http://www.env.gov.bc.ca/cariboo/env_stewardship/ecosystems/central_coast/index.html) includes
 - ▲ Forest Practices Code Strategic Level Maps
 - ▲ Biodiversity Maps
 - ▲ Ungulate Winter Range Maps & Habitat Maps
 - ▲ Grizzly Bears
 - ▲ Marbled Murrelet
 - ▲ Ecosystems Maps
 - ▲ Estuaries Maps
 - ▲ Reports

Some useful local sources are:

- ◆ Alberni Clayoquot Regional District 'Alberni Valley Stream Atlas'. For information, contact the regional district planning department (phone 250-720-2700 or e-mail mailbox@acrd.bc.ca).
- ◆ Capital Regional District Natural Areas Atlas and Harbours Atlas (<http://crdatlas.ca/>)
- ◆ City of Nanaimo Habitat Atlas <http://enviro.nanaimo.ca/>
- ◆ Comox-Strathcona Sensitive Habitat Atlas: A sample map is available (<http://www.shim.bc.ca/atlas/comxsamp.htm>), or go straight to an Interactive Map (<http://www.shim.bc.ca/atlas/comxidx.htm>)
- ◆ Cowichan Valley Watershed Atlas http://www.cmnbc.ca/atlas_gallery/cowichan-valley-watershed-atlas
- ◆ Islands Trust/Islands Trust Fund Ecosystem Mapping Project <http://www.islandstrust.bc.ca/maps/trust-area-mapping/ecosystem-mapping.aspx>
- ◆ Regional District of Nanaimo Environmentally Sensitive Areas Atlas: A sample map is available (<http://www.shim.bc.ca/atlas/namosamp.htm>), and more information is available from the planning department (<http://www.rdn.bc.ca/cms.asp?wpID=264>).
- ◆ Saanich Environmentally Significant Areas: A sample map is available (<http://www.shim.bc.ca/atlas/saansamp.htm>), and more information is available from the planning office or regional libraries (<http://www.saanich.ca/living/natural/esaatlas.html>).



Invasive Species

Coastal Invasive Species Committee <http://www.coastalisc.com/>

Garry Oak Ecosystems Recovery Team. Invasive Species in Garry Oak and Associated Ecosystems in B.C. www.goert.ca/invasive

Sensitive Ecosystems Inventory Information:

- ◆ AXYS Environmental Consulting Ltd. 2005. Redigitizing of Sensitive Ecosystems Inventory Polygons to exclude disturbed areas. Summary Report to Canadian Wildlife Service. Revised June 2005. http://www.env.gov.bc.ca/sei/van_gulf/publications.html
- ◆ Caskey, M. and M. Henigman. 2001. Audit of Selected Polygons of the Sensitive Ecosystems Inventory of East Vancouver Island and the Gulf Islands, 1999 – 2001: Summary Report. <http://www.env.gov.bc.ca/van-island/pa/pdf/seiauditfinal0902s.pdf>
- ◆ Sensitive Ecosystems Inventory website <http://www.env.gov.bc.ca/sei/index.html>
- ◆ Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands 1993-1997. Volume 1: Methodology, Ecological Descriptions and Results http://www.env.gov.bc.ca/sei/van_gulf/publications.html
- ◆ Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands 1993-1997. Volume 2: Conservation Manual http://www.env.gov.bc.ca/sei/van_gulf/publications.html
- ◆ Sensitive Ecosystems Inventory mapping http://www.env.gov.bc.ca/sei/van_gulf/publications.html
- ◆ Sensitive Ecosystems Inventory disturbance mapping http://www.env.gov.bc.ca/sei/van_gulf/publications.html

Climate Change

For information on regional projections for climate change see the Pacific Climate Impacts Consortium's Plan2Adapt tool <http://pacificclimate.org/tools-and-data/plan2adapt>