



Section Four

This section of *Develop with Care* describes the objectives, legal requirements, and guidelines for land development near Environmentally Valuable Resources.

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Sandhill Cranes. *Photo: Ian Gould picturebc.ca*

Cover photos: *Sarma Liepens, Leah Ramsey, Trudy Chatwin*



Environmentally Valuable Resources

Many development sites include **Environmentally Valuable Resources**¹ (see [page 2.5](#)) which include all features, sites, and species whose presence enhances the natural biodiversity of the area and support free ecosystem services. For information on the many benefits from Environmentally Valuable Resources, see [Appendix C: Benefits of Environmental Protection](#).

Environmentally Valuable Resources range in size from single trees and small ponds to extensive landscape features and include rare and common habitats, plants, and animals. These resources require special management attention to protect their biological, historical, cultural, or scenic values. This section focuses on guidelines to protect and enhance these resources during urban and rural land development.

4.1 Objectives

Local governments and the development community should meet the following environmental objectives during urban and rural land development where Environmentally Valuable Resources are present.

- ◆ Identify Environmentally Valuable Resources before any change in land use.
- ◆ Avoid development on or near Environmentally Valuable Resources, or find ways to minimize impacts from development.
- ◆ Design the development to protect and enhance ecological values.
- ◆ Restore degraded ecosystems where possible.

Local governments are encouraged to address these objectives within their official community plans and other planning and public consultation processes. Developers should be able to demonstrate to local governments and the public how they are addressing these objectives and incorporating them into all stages (design, construction, and occupation) of their development.

A summary of legislation related to environmental protection during land development is provided in [Appendix A: Summary of Legislation](#).

Bighorn Mountain Estates at Okanagan Falls was in an area identified as rare Antelope-brush grassland, property used by California Bighorn Sheep and other species at risk. The developers avoided the environmentally sensitive areas by clustering development into a disturbed portion of the property (an old gravel pit). Approximately 16 hectares of remaining land was donated to The Land Conservancy. The design incorporates a cattle guard and snake proof barrier fencing to prevent conflicts between domestic pets and wildlife. Residents choose to live there because they can watch nature in their backyards. <http://www.soscp.org/land-use/planning/>

¹ **Highlighted** words are defined in the [Glossary](#).



An **ecosystem** is an ever-changing system of living organisms interacting with the soil, land, water, and nutrients that make up their environment. Ecosystems can be any size—a log, pond, field, or forest, or the earth's biosphere. Ecosystems are commonly described according to their dominant vegetation type, for example, an old-growth forest or grassland ecosystem.

'**Habitat**' is the term used to describe the place where an organism lives, and/or the conditions of that site, including its soil, vegetation, and water, and the food resources it provides. Ecosystems may contain a variety of habitats, such as rotten logs, nest trees, drinking water sources, caves, and talus slopes.

4.2 Environmentally Valuable Resources

More than 30% of B.C.'s threatened or endangered species depend on grasslands for their survival <http://www.bcgrasslands.org/>.

More than 20% of the native grasslands in the Southern Okanagan and 55% within the Central Okanagan Regional District have been lost to urban uses, rural residential development, ranchettes, agriculture and industrial development, transportation and recreational uses. The municipalities of Kelowna, Williams Lake, Oliver and Lillooet have lost more than 80% of their native grasslands. (Wetland Stewardship Partnership 2010)

4.2.1 Terrestrial Habitats and Ecosystems

The [Conservation Data Centre](#) provides information on the status of ecological communities (ecosystems) and species through the [Species and Ecosystems Explorer](#). The types of native ecosystems vary throughout the Province; see [Section 5: Regional Information Packages](#) for region-specific information. Several types of 'ecosystems at risk' in this province are becoming increasingly rare (**Figure 4-1**). There are 335 [Red-](#) and [Blue-listed](#) ecological communities in British Columbia.² Note, however, that a lack of data on the Species and Ecosystems Explorer does not confirm the absence of species and ecosystems at risk. The availability of data is variable throughout the province. Developers and appropriately qualified professionals should include **potential** species occurrences based on habitats and ecosystems present and the **potential** for species and ecosystems at risk to occur in project areas.

Forests over 140 years old exist in all 16 [biogeoclimatic zones](#) and cover 23 million hectares of B.C. However, in three smaller, warmer ecological zones—Coastal Douglas-fir, Bunchgrass, and Ponderosa Pine—the proportion converted to human use (e.g., agriculture, reservoirs, and urban) is much greater, and conservation concerns have emerged. In the Coastal Douglas-fir and Interior Douglas-fir zones, less than 3% of the forests are over 250 years old. Consequently many species dependent on older forest habitats (such as Marbled Murrelet, Northern Goshawk and Spotted Owl) are becoming rare. For more information, see [The State of British Columbia's Forests](#).

There are also many specialized habitats that provide homes for wildlife (**Figure 4-2**).

2 [B.C. Species and Ecosystems Explorer, Nov 2011](#)



Figure 4.1: Sample ecosystems affected by urban and rural development

Grasslands are open landscapes where grasses and forbs are the dominant vegetation. They develop in dry areas where there is not enough precipitation to support forests. This ecosystem type represents less than 1% of the provincial land base and is recognized as one of B.C.'s most threatened ecosystems. Urban development poses the greatest threat to native grasslands since more than 40% of B.C.'s grasslands are privately owned, and development pressure around grassland areas is intense and increasing. For more information on grasslands in British Columbia, see the regional chapters in [Section 5](#) and [Grasslands Protection: A Primer for Local Governments](#).



'Old-growth' forest is defined as Coast region forests that are more than 250 years old, Interior forests that are dominated by lodgepole pine or deciduous species that are more than 120 years old, and all other Interior forests that are more than 140 years old. Old-growth forests contain live and dead trees of various sizes, species, and age classes. These forests also have multi-layered canopies with gaps created by the death of individual trees, and lots of woody debris on the forest floor.

Garry Oak ecosystems areas are some of Canada's most endangered ecosystems. Once common in coastal areas of southwest B.C., less than 5% of these ecosystems remain in a near-natural condition. For more information see [Section 5.4: West Coast Region](#) and [Best Management Practices for Garry Oak & Associated Ecosystems](#).



Photos: Grassland - *Adrian de Groot*; old growth forest and Garry Oak ecosystem - *Judith Cullington*



Figure 4.2: Examples of specialized habitats

<p>Snags provide food and nesting cavities for birds and insects.</p>	<p>Mature, large-limbed trees provide nesting and roosting sites for raptors and herons.</p>	<p>Rotten logs and other woody debris provide shelter and food for birds, snakes, lizards, and small mammals.</p>
<p>Caves are a popular 'hang-out' for bats; larger caves may be used by hibernating bears. Other species such as this Horne Lake Cave Cricket have adapted to this unique habitat.</p>	<p>Talus (scree) slopes provide hiding places and basking sites for reptiles.</p>	<p>Fields that flood in winter are havens for ducks and migrating waterfowl.</p>
<p>Hedges around agricultural fields provide shelter for small birds.</p>	<p>Cliffs and rocky outcrops provide nesting and roosting habitat for Cormorants, Peregrine Falcons and other birds.</p>	<p>Groundwater seepage areas (seeps) and springs provide habitat for water-loving plants and a water supply for wetlands and creeks.</p>

Photos: Cricket - Grant Bracher; Talus - Adrian de Groot; all others - Judith Cullington



Figure 4.3: Examples of aquatic ecosystems		
Features		Functions
<p>Small and seasonal streams are found throughout B.C. They are easily overlooked or altered during development; so special measures may be needed to identify and protect them.</p>		<p>Important habitat for fish and other aquatic life, as well as nutrients to downstream areas. Some fish species, such as Coho Salmon and Cutthroat Trout, overwinter in small streams. Seasonally wet areas can be very important for amphibians.</p>
<p>Wetlands form where the water table is at, near, or above the surface of the ground, or where the land is saturated for long periods such that soil changes and growth of water-tolerant vegetation occur. Some wetlands have water above the surface all year whereas others dry out during the summer.</p>		<ul style="list-style-type: none"> • Clean water • Reduce flooding • Breeding sites for many species • Staging and moulting sites for waterfowl <p>For more information on wetland values, see Wetlands Protection: A Primer for Local Governments.</p>
<p>Vernal (seasonal) pools are uncommon and sensitive habitats. These pools are frequently undervalued because they retain water only temporarily. Some are highly alkaline. For information on creating vernal pools to provide wildlife habitat, see A Guide to Creating Vernal Ponds.</p>		<p>Often home to rare species, especially those which are adapted to the wet/dry cycle.</p>
<p>Lakeshores and coastal shorelines Development activities including the creation of docks, beaches, and beach accesses can have a cumulative impact on the health of lake and coastal shoreline ecosystem. Retention of natural vegetation is especially important for maintaining shoreline stability.</p>		<p>Important for health of lake and coastal areas as well as on fish such as kokanee and char which spawn along lakeshores. Shoreline vegetation provides nesting sites for birds and shade for spawning forage fish. See the Forage Fish fact sheet.</p>
<p>Estuaries are the most ecologically rich and diverse ecosystems in the world! They are partly enclosed coastal bodies of water with one or more streams flowing into it, and with a free connection to the open ocean.</p>		<p>Form a transition zone between river environments and ocean environments and contain high-nutrient waters which are necessary for the survival of many marine organisms. Important rearing habitat for juvenile salmonids. Productive feeding areas for many waterbirds such as Great Blue Herons, ducks, gulls, loons, and grebes.</p>

Photos: From top - Judith Cullington, Brenda Costanzo, Marlene Caskey, Susan Latimer, Ducks Unlimited



4.2.2 Aquatic Ecosystems

Aquatic ecosystems are 'wet' ecosystems (freshwater and salt water) such as watercourses, lakes, ponds, **vernal pools** and **seeps, wetlands, estuaries**, and coastal areas. Some of these sites may be dry during the summer months or frozen in the winter. Aquatic ecosystems are biologically diverse and extremely productive. To maintain the **ecological integrity** of aquatic ecosystems, it is important to maintain their ecological features and functions (**Figure 4-3**).

The Canadian Wetland Classification System recognizes five wetland types: bog, fen, marsh, swamp, and shallow water. For information on wetland classification, see [*The Ecology of Wetland Ecosystems*](#).

The 2005 flooding of New Orleans by Hurricane Katrina was caused in part by land clearing, dyking, and development that resulted in the loss of a million acres of wetlands that used to buffer the city from storms.

Most wildlife use wetlands at some point in their life cycle. Wetlands provide critical habitat for many species of amphibians, birds, and fish. Of the 95 species of animals or plants presently classified as Threatened or Endangered in Canada, more than 40 require wetland habitats.

4.2.3 Riparian Ecosystems

Riparian ecosystems are the areas bordering on streams, lakes, wetlands and the coast that link water to land. The complex relationship between streambed, water, soil, trees, shrubs, and understorey directly influences and provides fish and wildlife habitat. Riparian ecosystems are biologically diverse and extremely productive; providing habitat and wildlife corridors for terrestrial and aquatic species.

Important elements of proper functioning riparian ecosystems (**Figure 4-4**) include the following:

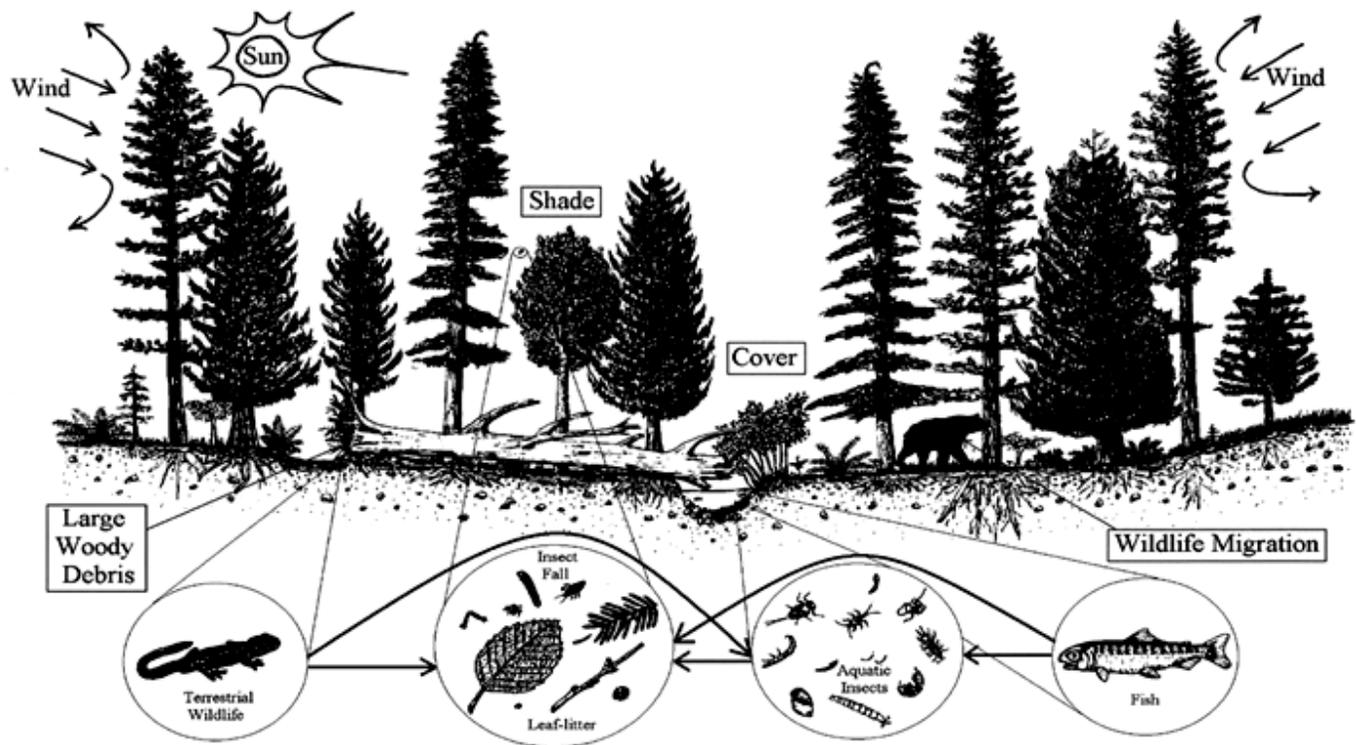
- ◆ The riparian vegetation adjacent to streams. These vegetated communities moderate water temperatures; provide a source of nutrients and organic matter to streams; establish root systems that minimize erosion by stabilizing soils and streambanks; and buffer streams from sedimentation and pollution in surface runoff;
- ◆ The organic debris that falls into the stream or riparian area. This includes leaves, twigs, logs, and root wads, which provide shelter and food sources for fish and other species;
- ◆ The exchange of nutrients between terrestrial and aquatic systems;
- ◆ Side channels, intermittent streams, seasonally wetted adjoining areas, and floodplains;
- ◆ Natural sources of streambed materials;
- ◆ Subsurface flows that allow riparian vegetation to be maintained in permanently or seasonally dry gullies; and
- ◆ Permeable upland surfaces that permit rainwater infiltration, which moderates water volume, timing, and velocity, and maintain sustained water flows in streams, especially during low (base) flow periods.

Riparian ecosystems provide valuable nest sites for many neotropical migrant songbirds and the abundant insects in these areas provide high protein food which songbirds need to raise young in a short period of time.



Figure 4.4: Ways in which healthy riparian areas help maintain healthy fish populations

Source: Scott Barrett, B.C. Ministry of Environment



4.2.4 Coastal Zone Ecosystems

The “coastal zone” is the area where interaction of the sea and land processes occurs; where terrestrial ecosystems meet marine ecosystems and where freshwater mingles with saltwater. It is an area of high biological values used by shorebirds, otter, crab, young salmon, heron, and many, many more species. To maintain these biologically rich and productive places, the coastal zone needs:

- ▲ natural erosion and deposition patterns for continued longshore drift, which keeps the beaches and spits intact;
- ▲ natural vegetation along the backshore for bank stability, shelter and shade (e.g., [forage fish eggs](#)); and
- ▲ drift logs, rocks, vegetation and other natural components washed up by the tides and deposited by streams.

Sea level rise is already having an impact on low-lying coastal and intertidal habitats. Some areas are being flooded, pushing the high-water mark inland while the coastal habitats behind are prevented from migrating inland due to natural or human-made barriers. This creates a

Beaches may be impacted by events far away. Communities along the B.C. coast are experiencing increased beach litter and other tsunami materials from Japan, creating greater clean-up costs to communities and damage to shoreline habitats. Members of the public can get involved in regular beach clean-up events through the [Great Canadian Shoreline Cleanup](#).

The Climate Action Secretariat has developed a British Columbia [King Tide Photo initiative](#), encouraging people from coastal communities to submit pictures showing the effect of extreme high tides. This helps to promote awareness of rising sea levels and potential future impacts.



Section 4: Environmentally Valuable Resources

The South Coast Conservation Project's Coastal Sand Ecosystems Project takes a multi-species approach to addressing habitat degradation of coastal sand ecosystems on the South Coast of B.C. Habitat destruction, invasive plants and human recreational activities are some of the threats identified in the recent [Status Report on Coastal Sand Ecosystems in B.C.](#) and also in other recovery strategies such as the one for the endangered [Contorted-pod Evening Primrose](#).
<http://sccp.ca/projects/coastal-sand-ecosystems-project>

“**coastal squeeze**” that results in the loss of habitats such as mudflats and marshes, which are critical for wildfowl and wading birds. Rising sea levels, in combination with more frequent and intense storm surges, will likely prove particularly catastrophic to shore-nesting birds such as terns. Some foreshore areas will experience greater coastal erosion, threatening existing buildings and infrastructure. Ironically, human efforts to slow erosion in one location often result in increased erosion nearby, as shoreline hardening increases the wave energy and diverts it to neighbouring locations. It is increasingly important to maintain coastal zone ecosystems in their natural states, so that they will have the resiliency to accommodate these stressors with minimal damage to private properties and existing structures.

Coastal ecosystems include sand and gravel beaches, spits and dunes; pebbly/rocky beaches and shorelines; salt marshes; and estuaries, together with accompanying terrestrial cliffs and banks. Each provides different habitat features for use by different species—all are Environmentally Valuable Resources and critical elements in the maintenance of British Columbia's biodiversity. As human communities develop, marine shorelines are increasingly in demand for recreational and other uses.

Marine shorelines are increasingly in demand for recreational uses.

Photo: Judith Cullington





4.2.5 Species at Risk and Regionally Significant Species

SPECIES AT RISK

Both the federal and provincial governments prepare lists of species that are considered to be 'at risk' of **extirpation** (local extinction).

- ◆ The federal government, through the [Committee on the Status of Endangered Wildlife in Canada](#) (COSEWIC), identifies species that are Extirpated, **Endangered**, **Threatened**, or of **Special Concern** in Canada. British Columbia is home to 95 of these federally-ranked species. Protection for many of these species is provided by the Canadian [Species at Risk Act](#) (SARA).
- ◆ The provincial government also identifies species that are at risk of disappearing from this province. The British Columbia [Conservation Data Centre](#) maintains a list of provincially-ranked species that include [Red-listed](#) species and **ecological communities** (i.e., they are Extirpated, Endangered, or Threatened) and [Blue-listed](#) species and ecological communities (i.e., they are not immediately threatened but their decreasing population size is of concern).

A species may have different 'at-risk' status internationally, federally, and provincially. For example, the Great Basin Spadefoot Toad is designated as globally 'secure' (not at risk). In Canada, however, its numbers are low, so it is listed as Threatened (could become Endangered if no action is taken) by COSEWIC. In British Columbia, the Great Basin Spadefoot is Blue-listed (of concern because of decreasing populations).

The federal and provincial governments and non-government organizations are working to develop [Recovery Strategies](#) and [Action Plans](#) for all federally-listed species at risk. For more information, see the Species at Risk Act [Public Registry](#) and the provincial [Recovery Planning Site](#).

The federal Species at Risk Public Registry provides extensive information on protecting and recovering species at risk, including consultations on species being considered for at-risk status. http://www.sararegistry.gc.ca/default_e.cfm

Coastal populations of the Great Blue Heron are designated as of Special Concern by COSEWIC and are blue-listed in British Columbia. Their nesting habitat is declining due to development pressures and human disturbances. These large wading birds frequent shorelines, wetlands, and some upland areas where they feed on a variety of aquatic life as well as rodents. All Great Blue Heron nest trees are protected (whether in use or not) by Section 34 of the B.C. Wildlife Act. For more information, see the [Herons fact sheet](#) (Appendix G).

Many local governments are participating in the Species and Ecosystems at Risk Local Government Working Group. This group prepared the discussion paper [Working Together to Protect Species at Risk](#).

Extinct: no longer exists anywhere in the world

Extirpated: no longer exists in the specified area

Endangered: could become extirpated if limiting factors are not reversed

Threatened: could become endangered if limiting factors are not reversed

Special Concern: may become a threatened or an endangered species because of a combination of biological characteristics and identified threats

(COSEWIC <http://www.cosewic.gc.ca>).



SIGNIFICANT WILDLIFE

Many species may not be identified as ‘species at risk’ by either the federal or provincial government but could still be locally important. [Section 5: Regional Information Packages](#) provides further information on species that are considered significant in the different regions of British Columbia.

Amphibians and Reptiles

Amphibians (frogs, toads, newts, and salamanders) and reptiles (turtles, lizards, and snakes) play important roles in the ecosystem both as predators and prey. They consume many species that humans consider to be pests, such as insects and rodents, and they provide food for other wildlife including raptors.

Many reptiles and amphibians are decreasing in numbers because they naturally occur in the same areas where we want to live (e.g., relatively flat land with wetlands and floodplains). If their habitats are identified and protected; however, many of these can be compatible with urban and rural environments. For further information, see [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#) and the Fact Sheets ([Appendix G](#)).



Alligator Lizard.

Photo: Christian Engelstoft

Many sites in B.C. have been recognized internationally as Important Bird Areas for their importance to birds. These sites support significant populations of wintering, breeding or migrating birds and are critical to the maintenance of global bird populations. Important Bird Areas is essential for the health of birds and for protecting the environment. See www.ibacanada.ca for more information.

Productive and diverse raptor populations are good indicators of low levels of contaminants in the environment. As long-lived predators, raptors accumulate pesticides, heavy metals, and other contaminants from the prey they have eaten, which can result in reductions to raptor survival and productivity. Such toxins can also have negative long-term effects on people.

Birds

The [Conservation Data Centre](#) lists 347 species and subspecies of birds that have been identified as Red- or Blue-listed in British Columbia.³ All birds are protected while nesting under [Section 34](#) of the Wildlife Act. Subsection 34 (b) provides protection year-round to the nests of the Bald Eagle, Golden Eagle, Peregrine Falcon, Gyrfalcon, Osprey, and Burrowing Owl whether the nests are active or not.

Raptors include eagles, hawks, falcons, ospreys and vultures, which hunt mainly during the day, and owls, which hunt mainly at night or during twilight hours. Many raptor species can co-exist with human developments provided that suitable habitats are available and the birds are not harassed. Detailed information on raptor biology and life histories can be found in [Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia \(2013\)](#) and the Fact Sheets on [Bald Eagles and Ospreys](#) and [Western Screech-owl](#) (Appendix G).

³ As of March 2012.



Passerines include a large variety of songbirds such as sparrows, warblers, flycatchers, vireos, chickadees, wrens, hummingbirds, and thrushes. Passerines of particular conservation concern include the neotropical migratory species⁴ and those which depend on forest interiors and grasslands. They provide an excellent indicator of overall ecological health because of their sensitivity to interactions with humans and changes in habitat. Some sensitive and forest-interior songbird species require large contiguous tracts of intact upland forest that are at least 30–100 ha in size.⁵ Although forested areas that are less than 65 ha tend to provide habitat primarily for edge species, some forest-interior birds may use forest patches as small as 0.8 ha, which suggests that even small forest tracts may be useful in providing migratory habitat for some species.

British Columbia's diverse habitats provide important breeding, migration, and feeding areas for many species of migratory birds. Bird populations have declined throughout western North America over the past 25 years. Since most bird species rely on different habitats for moulting, nesting and overwintering it is important to consider the habitat requirements throughout the life cycle in order to effectively protect different species. For example, farming practices can influence the nesting success of Bobolink in the fields of the southern interior while dog leash bylaws can help reduce disturbance of Brant Geese at estuaries in the spring when they stop during migration to feed on eelgrass. The protection of forests and fields, especially during spring nesting periods, is essential to ensure the long-term viability of bird populations. See **Table 4-2** for least risk timing windows for development activity near bird habitats.

Left - Black Oystercatcher.
Photo: Judith Cullington
Right - Peregrine Falcon.
Photo: Neil Dawe

British Columbia is a major birding destination for birders from across North America and Europe. Almost 75% of the bird species observed in Canada and 50% of the birds observed north of the Mexican border have been found in B.C. because of the diversity of habitats that exist here.

⁴ Neotropical migrants are birds that winter south of the United States/Mexican border, in the tropics of the 'new world'.

⁵ Forest-interior specialists are those species which nest only within the interior of a forest and rarely near or at the forest edge.



Dog leash bylaws can help to protect migrating waterfowl.
Sign; Pintail Ducks.
Photos: Judith Cullington



Badgers are carnivorous mammals that live in the grasslands and dry forests of British Columbia's interior. The badger is listed as Endangered by COSEWIC and is red-listed in B.C. The grasslands and dry forests of the Thompson, Okanagan, Boundary, Nicola, Cariboo, and East Kootenay regions are home to most of the remaining badgers in B.C. A Badger Recovery Team is working to restore self-sustaining populations of badgers in British Columbia (<http://www.badgers.bc.ca/>).

Mammals

There are many mammals which are regionally significant, as discussed in [Section 5: Regional Information Packages](#). These include some of the ungulates (hoofed mammals) which use defined winter ranges, often in valley bottoms (which are also prime areas for rural or urban land development).

Large Carnivores

Carnivores such as bear, wolf and cougar have large territories and range widely in search of food. Multiple generations of these animals tend to utilize the same travel corridors. Disturbance to existing travel corridors may result in human/wildlife conflicts (See [Section 2.8.4](#) and [Section 3.9.3](#)). Coyotes are more adaptable to human settlement and may live wherever food and shelter occur.

Squirrels

B.C.'s native Douglas and Red Squirrels can adapt to some urban encroachment provided that adequate habitat remains for their nesting and feeding. Predation by house pets can be a concern. The non-native Grey Squirrel is an invasive species which aggressively displaces native squirrel populations.

Bats

British Columbia has 16 species of bats, eight of which are currently on the provincial Red and Blue Lists. Under the B.C. [Wildlife Act](#), bats are protected from being killed, wounded, hunted, or transported. Loss of wildlife trees and other roosts in urban and rural areas is contributing to declining populations of bats; as well noise, dust, vibration, or light from human activities can disturb roosting bats.

Bats are nocturnal hunters which are important for controlling moths, beetles, mosquitoes and other flying insects. They may fly long distances from their summer day-roosts to their nightly foraging areas; therefore, linking forested greenspaces between roosting and potential foraging



Bat hibernacula.
Photo: Jenny Balke



Information sources

Many types of environmental information are available online.

Species at risk and other wildlife: The Conservation Data Centre’s [Species and Ecosystems Explorer](#) has data on more than 6,000 plants and animals in British Columbia, with information on their conservation status. You may also [request information](#) regarding species of concern for a specific area. You may also find information on rare plants from local forest districts and local governments.

Terrestrial Ecosystem Information: The [website](#) includes information on Terrestrial Ecosystem Mapping (TEM), Predictive Ecosystem Mapping (PEM), Sensitive Ecosystems Inventory (SEI), Bioterrain mapping (TBT), Terrain mapping (TER) (including Terrain Stability Mapping and Landslide Inventory), Soil mapping (SOIL), Wildlife Habitat Ratings (WHR), and Species Distribution Mapping (SDM).

Ecosystems: Information on the development site and adjacent areas may be available through [Sensitive Ecosystem Inventories](#), [Sensitive Habitat Inventory and Mapping](#), and regional websites.

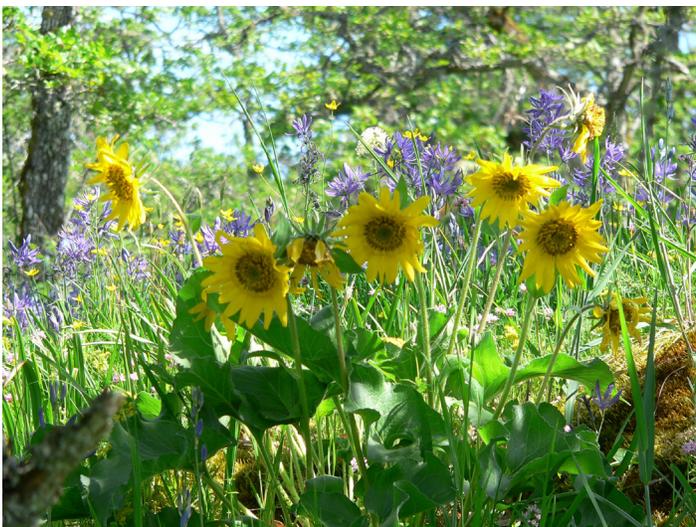
habitat is important. Natural roosting (sleeping) sites are generally located in forests and rock features. Bats will also use human habitats such as attics, outbuildings, barns, municipal or industrial buildings, and spaces under bridges.

Nursing female bats will consume their own weight in insects in a single night.

Plants

As of March 2012, there are 610 Red- and Blue-listed vascular plants in British Columbia. These species occur in a wide range of ecosystems throughout the province. Often rare plants occur in rare or unusual ecosystems such as limestone or karst areas, grasslands, Garry Oak ecosystems, or wetlands. See the Regional Information packages in [Section 5: Regional Information Packages](#) and the provincial [Recovery Planning](#) website for more details regarding the protection of these species. When undertaking a bio-inventory of a site, check the [Conservation Data Centre](#) for occurrences. It is important to consult a botanist with rare plant experience to look for species-at-risk as these plants are most often difficult to identify. Timing of survey is also critical to determine the presence of rare plants in a proposed development area.

Left - Balsamroot and Camas.
 Photo: Trudy Chatwin
 Right - Antelope Brush Grassland.
 Photo: Bryn White





4.3 Guidelines

Following the guidelines below will help protect and preserve Environmentally Valuable Resources occurring on or near a development site. These are in addition to the guidelines provided in [Section 3: Site Development and Management](#).

GATHER DETAILED INFORMATION ON ENVIRONMENTALLY VALUABLE RESOURCES ON AND NEAR THE DEVELOPMENT SITE

If a preliminary site survey (see [Appendix B: Bio-inventory Terms of Reference](#)) or other information suggests that there are (or may be) Environmentally Valuable Resources on or near the proposed development site, conduct detailed site inventories as described in [Appendix B](#). The timing of inventory work is important as some species may be visible or may use the area only at certain times of year, so repeat the inventory in several seasons. Ensure that the detailed site inventory of the site is prepared by **appropriately qualified professionals**.

Provide inventory data relating to species and ecosystems at risk to the [Conservation Data Centre](#).

Avoid development in areas with Environmentally Valuable Resources. Instead, cluster development in less sensitive areas by using density bonus, density averaging, or density transfer provisions. For more information, see [Appendix F: Protection and Conservation Tools](#).

Place a fenced buffer area between any Environmentally Valuable Resources and the development site. Buffers should be of sufficient width with interpretive signs posted to discourage access by humans and their pets into sensitive areas, to reduce invasion by non-native species, and to protect **interior habitats** from degradation. The width of the buffer will depend on its purpose and the sensitivity of the habitat. See **Table 4-1** for buffer width guidelines.

CHECK FOR RECOVERY PLANS FOR IDENTIFIED SPECIES AT RISK

Where species at risk are identified, check the [Species at Risk Act Public Registry](#) and provincial [Recovery Planning](#) website to see if federal or provincial recovery strategies have been completed. Where recovery plans have been completed, contact the appropriate recovery team chairperson to help develop appropriate strategies for land development. If there is no recovery plan, contact the Provincial Ministry of Forests, Lands and Natural Resource Operations regional office for advice.



Some species may only be visible at certain times of year. Sea Blush.
Photo: Judith Cullington

The South Coast Conservation Program has prepared [Local Government Tools Supporting Species and Ecosystems at Risk: A Resource Guide for the South Coast of British Columbia](#) as a resource guide for local governments, decision-makers and those involved in land use stewardship and in the development or implementation of actions that effect species and ecological communities at risk.



4.3.1 Site Planning and Design

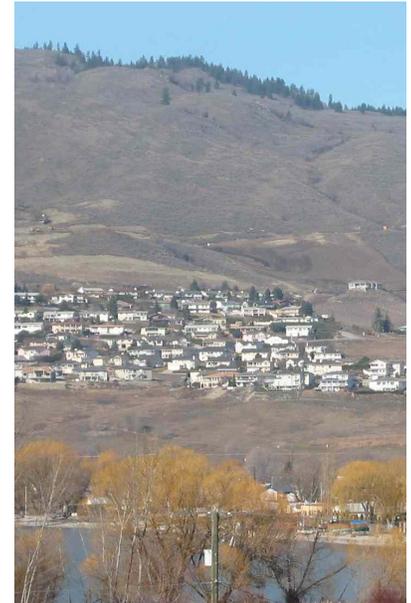
PROTECT ENVIRONMENTALLY VALUABLE RESOURCES

Maintaining intact Environmentally Valuable Resources can add market value to developments.

- Locate developments (including roads and trails) away from Environmentally Valuable Resources wherever possible.
- Work with the local government and Appropriately Qualified Professionals to identify ways to avoid development on those parts of development sites where Environmentally Valuable Resources have been identified (see [Appendix F: Protection and Conservation Tools](#)). Options may include:
 - ▲ conservation covenants;
 - ▲ parkland dedication;
 - ▲ management agreements;
 - ▲ acquisition by the local government or a land trust; and
 - ▲ density transfer or bonusing.
- Take advantage of tax incentives that encourage the protection of Environmentally Valuable Resources. For more information, see [Appendix F](#).
- Design greenspaces to maximize habitat values.
 - ▲ In general, round patches provide better interior habitat, which is critical for native birds that depend on forest interiors for nesting, feeding, and/or protection from predators.
 - ▲ Long strips of habitat along streams provide **wildlife corridors** (see [Section 3.4.1](#)) and habitat for many native species.
- Design developments to retain existing wildlife corridors. This will help maintain wildlife habitats and reduce human/wildlife conflicts.

RETAIN SPECIALIZED HABITATS

- Design the site to retain specialized habitats (see **Section 4.2.1**).
- Protect shrubs, ground cover, and trees. These provide shelter and breeding sites for birds, and cover and food sources for many other wildlife species.
- Create a varied edge to forests along roads and developments by planting vegetation of different heights to produce a closed canopy at the forest edge. This helps reduce wildlife disturbances from noise and pollutants and predation of nests.



Locate developments away from Environmentally Valuable Resources. *Photo: Susan Latimer*

The number of bird species found in an area increases with the amount of vegetated forest cover. The vegetation provides habitat for insects, a primary food source for many songbirds.



Retain specialized habitats.
Left - Mule Deer in wetland.
Photo: Judith Cullington
Right - Sagebrush Grassland.
Photo: Brenda Costanzo

Model Bylaw Provisions for the Protection of Garry Oak and Associated Species and Ecosystems helps local governments to implement legislation, policy, best management practices, and other tools for the protection and restoration of Environmentally Valuable Resources, specifically Garry Oak and Associated Ecosystems and the species at risk. <http://www.goert.ca/>

☑ Protect existing and potential heron nesting habitats that occur within 3–4 km of known foraging areas. (Foraging areas include estuaries, eelgrass beds, tidal flats, freshwater marshes and other wetlands, old fields, river and lake edges, and flooded fields.) Stands of mature deciduous or coniferous trees (isolated from human disturbance) provide the best candidate nesting sites.

☑ Protect vernal pools, seeps and alkaline ponds by retaining the natural hydrological regime of the site, and not allowing grazing to occur near these areas.

☑ Protect bat roosts from disturbance by humans and by noise, dust, vibration, and light, especially at hibernation sites. In cases where bat colony locations are problematic, provide alternate suitable habitat (such as bat houses, modified building designs, or modified bridge designs) in a more appropriate location. Exclusion of bats from buildings should be initiated only after consultation with a bat professional.

CONSIDER IMPACTS ON NEIGHBOURING SITES

☑ Avoid or mitigate any impacts that the planned development may have on neighbouring Environmentally Valuable Resources. For example, use rainwater management techniques (see [Section 3.7.1](#)) to avoid impacts on downslope wetlands and waterways.

Work with park managers to minimize impacts on neighbouring parks and protected areas.



PROTECT AQUATIC AND RIPARIAN ECOSYSTEMS

- ☑ Ensure that the natural (pre-development) hydrological cycle will be maintained after development. Changes in drainage patterns may impact wildlife or plant species at risk, both on the development site and on adjacent sites. For example, changes to local hydrological flow patterns can change a seasonal wetland into a year-round water feature, which can alter plant species composition and eliminate species that are adapted to summer droughts. The design approaches in the [Water Balance Model](#) and [Stormwater Planning: A Guidebook for British Columbia](#) (Chapters 6 and 7) minimizes ecological and property impacts by designing for the complete spectrum of rainfall events.
- ☑ Build well away from floodplains and allow natural flooding cycles to occur so that flood-dependent ecosystems can persist. Many species depend on the ecosystems that develop in response to natural flooding.
- ☑ Maintain riparian vegetation cover. **Emergent aquatic vegetation**, such as cattails and bulrushes, reduce flow and wave energy thus reducing erosion of shorelines. The roots of shrubby vegetation such as willows, Red-osier Dogwood, and Hardhack also help to stabilize banks and prevent bank erosion.
- ☑ Avoid or reduce the number of stream crossings to minimize impacts on aquatic habitats. Design the subdivision or development layout so that lots do not straddle watercourses and riparian zones. Where stream crossings cannot be avoided, ensure that they provide passage for fish and wildlife. The Forest Practices Code [Fish-stream Crossing Guidebook](#) is a good illustrative resource for designing stream crossings.

The Wetlands Institute offers a seven-day field course where stewardship coordinators, city planners, teachers, First Nations, government staff, non-government organization staff, business leaders, and others come together to learn wetland conservation skills. For information, see http://www.bcwf.net/index.php?option=com_content&view=article&id=90:wetlands-institute&catid=39&Itemid=521.

Tree replacement in riparian areas

Where the [Riparian Areas Regulation](#) is in effect, local governments should have bylaws in place to address tree removal and replacement, generally based on the recommendations of a qualified environmental professional.

The criteria below apply to the replacement of trees that have been authorized for removal under the Fisheries Act, Wildlife Act, or Land Title Act, especially in those parts of the province where local government bylaws do not address riparian protection. Species suitable for replacement will be based on site specific conditions, but should be native.

- 0-151 mm (6") diameter breast height (dbh): 2 replacement trees (min height 1.5 m), or 4 shrubs (for up to 50% of trees being replaced in this range)
- 152-304 mm (12") dbh: 3 replacement trees (min height 1.5 m)
- 305-456 mm (18") dbh: 4 replacement trees (min height 2.0 m)
- 457-609 mm (24") dbh: 6 replacement trees (min height > 2.0 m)
- 610-914 mm (36") dbh: 8 replacement trees (min height > 2.0 m)
- Trees > 914 mm dbh (36") will require individual approval and replacement criteria prior to removal.

Every effort must be made to retain 20% of trees > 304 mm dbh (12") and a minimum height of 3 m as these will serve as wildlife trees.

Riparian areas revegetation guidelines for brownfield sites are available at http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/documents/RAR_revveg_guidebk_sept6_2012_final.pdf.



Figure 4.5: Soil bio-engineering

These photos illustrate the same stream immediately following soil bio-engineering (left), and four months later (centre). The technique used is shown in the diagram (right). Photos: *Dave Polster*



Shoreline vegetation provides habitat for a variety of animals such as dragonflies, which use cattails and bulrushes as they metamorphose from nymphs to adults. Dragonflies are beneficial because they eat mosquitoes, both as nymphs in the water and as free-flying adults.

The City of Kelowna is developing a foreshore development plan based on Sensitive Habitat Information Mapping (SHIM) information and fish sampling data as a means of addressing issues around cumulative foreshore impacts. The end product will allow the City to identify areas of greater or lesser development potential and sites that need higher levels of protection.

- ☑ Fence riparian buffers to discourage access by people and pets.
- ☒ Do NOT fill or drain permanent or seasonally wet areas, as these are important breeding habitat for amphibians. Further guidelines on maintaining amphibian habitat are found in [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#).
- ☒ Do not turn vernal pools into year-round water features. This will change the chemistry of the pool and alter its ecology. Specialized plants species that are adapted to vernal pool habitats will no longer be able to survive, and it will allow new species, such as bullfrogs, to invade.
- ☑ Overlay utility crossings on existing roadways or use directional drilling where possible to minimize the extent of disturbances to riparian vegetation and stream beds.
- ☑ Keep the number of shoreline access points to a minimum. Ensure shoreline accesses, structures and pathways are narrow and constructed in a manner consistent with established Riparian Area Regulation setbacks and Fisheries and Oceans Canada [Measures to Avoid Harm](#). This will also help to minimize impacts on Environmentally Valuable Resources and areas with poor slope stability.
- ☑ Use ‘soft’ options such as soil bio-engineering solutions to address shoreline erosion (**Figure 4-5**). These are often less costly and more environment-friendly than traditional ‘hard’ engineering treatments. Avoid constructing retaining walls—these restrict wildlife access to the waterfront and, unless properly engineered, may fail. For information on soil bio-engineering and streambank restoration, see the [Society for Ecological Restoration](#) website.
- ☑ Consult the [Living by Water](#) organization and [B.C. Lake Stewardship Society](#) for advice on ways to protect and enhance shorelines.



- ☑ Consult the Riparian Areas Regulation-Revegetation Guidelines/ Criteria⁶ for information on riparian revegetation, including plant species selection and site maintenance.
- ☑ Refer to the [Best Management Practices for Lakeshore Stabilization](#) for information on lakeshore stabilization techniques. Some shoreline stabilization techniques can be detrimental to fish, amphibians, and other wildlife, and should be used only where there is evidence of active erosion. The [Marine Guide to Small Boat Moorage](#) and [Best Management Practices for Small Boat Moorage on Lakes](#) also provide useful information on protecting lakeshores.
- ☑ For more information on protecting riparian and aquatic habitats, see:
 - ▲ [Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia](#);
 - ▲ [Stream Stewardship: A Guide for Planners and Developers](#);
 - ▲ [Wetlandkeepers Handbook: A Practical Guide to Wetland Care](#); and
 - ▲ The Wetkit website (<http://www.wetkit.net> or <http://www.WetlandNetwork.ca>).

PROTECT COASTAL ZONE ECOSYSTEMS

Many areas of coastal British Columbia have additional levels of protection because of their significance fish and wildlife values. These levels of protection range from simple *Land Act* designations such as regulated [Wildlife Management Areas](#). If you are considering working within a foreshore environment, it is important to check with [Front Counter BC](#) on the status of the area you wish to work. Depending on the Environmental Designation, in addition to other regulatory permits, you may need to seek a permit under the [Land Act](#) and/or the [Wildlife Act](#).

- ☑ Follow the [Green Shores](#) “soft shores” approach for construction in coastal areas.
- ☑ Locate new buildings well back from unstable slopes and potential future erosion zones. Check with your local government regarding setback requirements, and follow the recommendations from the [Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use](#).
- ☑ Retain natural riparian vegetation on slopes and near the foreshore. If a viewscape is desired, hire a qualified arborist to assess which trees to trim or selectively prune to frame desired views, while retaining slope stability and shade.

⁶ In preparation. See http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/riparian_areas.html.



Green Shores

Green Shores is an approach to coastal design and development issues based on four principles:

- **Coastal Processes:** Preserve the integrity or connectivity of coastal processes
- **Coastal Habitat and Species:** Maintain or enhance habitat diversity and function
- **Water and Sediment Quality:** Address methods to minimize or reduce pollutants to the marine environment.
- **Reduce Impacts on Shorelines:** Reduce cumulative impacts to the coastal environment.

The Green Shores website provides information and case studies for local governments, planners, builders, developers, and residents who live or work near Canada's Pacific Coast. Part of the project will be developing bylaw language for supporting these principles. See the website (<http://www.greenshores.ca/>) for updates.



Sea Stars. Photo: Judith Cullington

Manage stormwater and other pollutants (such as lawn fertilizer and weed killers) so that they do not run off into the marine foreshore. See [Section 3.7.1](#) for more information on rainwater management guidelines.

Check with Fisheries and Oceans Canada and the Ministry of Forests Lands and Natural Resource Operations for authorizations and requirements regarding work proposed below the natural boundary of marine shorelines. If the coastal area is part of a Wildlife Management Area or other conservation area, check to see if additional conditions apply.

Avoid building smooth, solid seawalls or bank protection works as these interfere with natural erosion and deposition processes and tend to become unstable over time. If foreshore protection is absolutely necessary, hire an expert in soft-shore (green) erosion protection, or follow recommendations in [Green Shores](#). Ensure that you have obtained the necessary permissions from Fisheries and Oceans Canada and/or the Ministry of Forests Lands and Natural Resource Operations.

Avoid using creosote for bridge and dock pilings, as these materials are toxic and can harm fish populations. Where existing pilings are creosoted, use plastic wrap or other techniques to prevent creosote from entering the water.

For more information on protecting coastal habitats, see:

- ▲ [*Coastal Shore Stewardship: A Guide for Planners, Builders and Developers;*](#)
- ▲ [*Shoreline Structures Environmental Design: A Guide for Structures along Estuaries and Large Rivers;*](#)
- ▲ [*Caring for Our Shores: A Handbook for Coastal Landowners in the Strait of Georgia;*](#) and
- ▲ [*Sustainable Approaches to Coastal Design*](#)



4.3.2 Buffers

A **buffer** is an area left in a natural state around a sensitive resource. Its purpose is to provide protection for that resource by reducing the impact of potentially adverse effects from the outside. This can include access by humans and their pets, changes in the wind and temperature, and access by invasive species. Buffers are especially important for species that are sensitive to human activities, including many birds. Buffers help maintain the long-term values—both environmental and economic—of an Environmentally Valuable Resource.

Buffers help protect Environmentally Valuable Resources from encroachment by invasive species and impacts from pets and human activities. Make the buffer as wide as possible to protect the Environmentally Valuable Resources.

CREATE BUFFERS AROUND ENVIRONMENTALLY VALUABLE RESOURCES

☑ Establish buffer areas around Environmentally Valuable Resources. Buffers should be wide enough to protect the ecological integrity of the Environmentally Valuable Resource—including both the habitats and the plants and animals in these ecosystems. **Table 4-1** provides guidance on the width and design of buffers. Work with an appropriately qualified professional, as conditions vary on a site-by-site basis and the appropriate buffer width will depend on its purpose and the sensitivity of the habitat that is to be protected.

The Canadian Wildlife Service provides detailed recommendations for buffer sizes for a variety of bird species (Bezener and Bishop 2005).

☑ Ensure the long term legal protection of buffer areas. Consider a return-to-Crown or donate the land to the local government as a park during land development. On private land, enforce protection of the buffer by establishing a conservation covenant or similar tool. Penalties and requirements for restoration where buffers are damaged can be written into the conservation instrument. See [Appendix F: Protection and Conservation Tools](#) for more information.

☑ Fence the buffer area to discourage access by people and pets, both during and after construction.

☑ Retain natural vegetation in the buffer area, including trees, shrubs, and ground cover.

☑ Retain or carefully prune (e.g., to create views) trees on the outside edge of the buffer to prevent **windthrow** and loss of trees within the buffer. This is particularly important where dense stands of second-growth trees have grown along the edge of the new buffer areas.

☑ For buffers around riparian areas, see **Identify Riparian Setbacks** (page 4-27).



Fence buffer areas.
Photo: Judith Cullington



Target buffer distances for biodiversity conservation

Table 4-1 provides recommended minimum buffer distances for a variety of species and ecosystems. These distances are based on scientific research and professional observation, and are intended to minimize disturbance to the species or ecosystem in question. The target buffer for undeveloped lands is larger than for rural and urban lands. Note that while these buffers have been proposed for development activities, they will apply to other forms of human disturbance such as land clearing and trails.

'Undeveloped' applies to large tracts of previously undeveloped forest or grasslands that are being developed into lots of 5 ha or less. In undeveloped areas, most species have likely had less contact with humans and will be less tolerant of human presence.

'Rural' applies to lots sizes of 1–5 ha that are being further subdivided or developed.

'Urban' applies to lots that are 1 ha or less and are being further subdivided, developed, or modified in some way. In urban areas, buffer widths are smaller because some wildlife species may have developed greater tolerance to human activity, and the high demand for land and/or previous developments may preclude larger buffers.

'Breeding season quiet buffer' is an *additional* buffer distance that should be used where land contouring, construction, or any unusual or sudden loud activities (e.g., blasting, tree felling, chain saws, concrete cutters, large trucks, whistles, fireworks or banging devices) is to take place during the active breeding season. During their breeding season, birds are especially sensitive to noise disturbances and may desert their nests and young. This distance is added to the prescribed buffer. For more information about breeding seasons and timing windows see **Table 4-2** and **Section 4.3.3**.



Killdeer with eggs. Photo: Marlene Caskey



Table 4.1: Target buffer distances

Environmentally Valuable Resource	Measure buffer from:	Target Buffer Distances			
		Undeveloped	Rural	Urban	Breeding season 'quiet' buffer
Raptor nests ¹	The base of the tree; cliff top or base	200–500m	100–200 m	100 m—1.5 tree lengths or 50 m from cliff	100 m or more
Great Blue Heron nests ²	A line drawn around the outer perimeter of all nest trees	300 m	200 m	60 m	200 m
Amphibians ³	The outer perimeter of wetlands under fully saturated conditions	150 m	100 m	30 m	N/A
Reptiles ⁴	Snake hibernacula; prime habitats	150 m	100 m	30 m	N/A
Riparian protection areas along watercourses ⁵	Follow Riparian Areas Regulation methodology				N/A
Wetlands ⁶	The outer perimeter under fully saturated conditions (or at high water)	150 m	100m	30 m	N/A
Other Sensitive Ecosystem Inventory sites ⁷	The outer perimeter	100 m	60 m	30 m	N/A
Parks and protected areas	The outer perimeter	100 m	60 m	30 m	N/A
Large carnivore habitat	Dens, primary feeding areas, and travel corridors	Travel & denning habitat as Appropriately Qualified Professional deems appropriate		N/A	N/A
Moose/elk/bighorn sheep habitat	High use areas—wetlands, winter and summer habitats	500 m	N/A	N/A	N/A
Species at risk		Follow the Recovery Plans or, where not available, an Appropriately Qualified Professional's recommendations for each species			

1 See [Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia \(2013\)](#) for species-specific biology and buffers.

2 Heron Working Group. Ross Vennesland, Ministry of Environment, 2004, pers. comm.

3 Modified from Semlitsch and Bodie (2003). See [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#) for additional species-specific recommendations.

4 Modified from Semlitsch and Bodie (2003). See [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#) for additional species-specific recommendations.

5 Millar et al. (1997). These recommended distances provide protection for a variety of aquatic and riparian species and apply whether or not the watercourse is fish-bearing. The Riparian Areas Regulation (where it applies) focuses on habitat for salmonids, game fish and "regionally significant" fish (MOE Implementation Guidebook, 2006).

6 This includes ephemeral (seasonally dry) wetlands as well as open bodies of water. Modified from Semlitsch and Bodie (2003). See [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#) for additional species-specific recommendations.

7 Where identified regionally.



Table 4.2: Breeding season least risk windows

Section 34 of the Wildlife Act specifically protects birds and their eggs from possession, molestation or destruction; the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons, and burrowing owls year-round; and the nests of all other birds when the birds or their eggs are in the nest. Note that some bird species have multiple broods and may nest outside of this time period.

Species	Least Risk Window
Bald eagle	Sept 1 – Dec 31
Osprey	Sept 15 – March 31
Heron	Sept 15 – January 15
Other raptors	Oct 1 – February 28
Passerines	September 1 – February 28
Mammals	Contact an Appropriately Qualified Professional for local information
Fish	See Water Act Section 9 Timing Windows (note that these vary by Region)



If nesting herons are disturbed the birds may abandon the nests, leaving the eggs and chicks vulnerable to predation by eagles, crows, or ravens. Such disturbances often lead to permanent abandonment of the colony site. In rapidly developing areas, this can lead to the selection of increasingly inferior nesting habitat and exposure to predation.

Photo: Ross Vennesland



IDENTIFY RIPARIAN SETBACKS

Protecting riparian fish habitat, while facilitating urban development that exhibits high standards of environmental stewardship, is a priority for the provincial government. Good quality streamside habitat is essential for ensuring healthy fish populations.

The [Riparian Areas Regulation](#) (RAR) enacted under Section 12 of the *Fish Protection Act* calls on local governments, specifically in the rapidly developing portions of the province, to protect riparian areas during residential, commercial, and industrial development. Under this regulation, proposed activities are subject to a science-based assessment conducted by a **Qualified Environmental Professional** (QEP).

Within the riparian assessment model a QEP is hired by land developers to assess habitat and potential impacts, develop mitigation measures, and avoid impacts of development on fish and fish habitat using a defined methodology. This shifts the cost of assessing appropriate setbacks from development to the land developer, allowing government to focus on monitoring and enforcement within their respective jurisdictions. By conscientiously following the assessment procedure methodology, set out in the Regulation, the QEP and the land developer will have applied due diligence in avoiding a harmful alteration, disruption, or destruction (HADD) of fish riparian habitat. In the event that a HADD cannot be avoided, an application for an authorization, including compensation, must be submitted to Fisheries and Oceans Canada.

The RAR provides for the protection of the features, functions, and conditions that are vital in the natural maintenance of stream health and productivity. The main functions addressed in the RAR assessment include:

- ♦ the role of riparian vegetation in providing wood for in stream channel and fish habitat structure;
- ♦ the role of rooted vegetation in stabilizing stream banks; and
- ♦ the role of site vegetation in providing shade and maintaining stream water temperature, in providing food and nutrients for fish, and in filtering sediment.

The assessment also describes specific measures necessary to maintain the integrity of the Streamside Protection and Enhancement Area (SPEA) and to ensure these functions will be protected from proposed development.

The Riparian Areas Regulation applies only to local governments located in southwestern B.C. and the Southern Interior, as these are the regions of the province that were seen to be experiencing the most rapid urban growth at the time the regulation was passed. This includes the following regional districts and all municipalities within them: Capital, Central Okanagan, Columbia-Shuswap, Comox-Strathcona, Cowichan Valley, Fraser Valley, Greater Vancouver (except the City of Vancouver), Nanaimo, North Okanagan, Okanagan-Similkameen, Powell River, Squamish-Lillooet, Sunshine Coast, Thompson-Nicola, and the Trust Area under the Islands Trust Act. The regulation does not apply to agriculture, mining, or forestry-related land uses, nor does it apply to salt water ecosystems (such as coastal areas and estuaries).



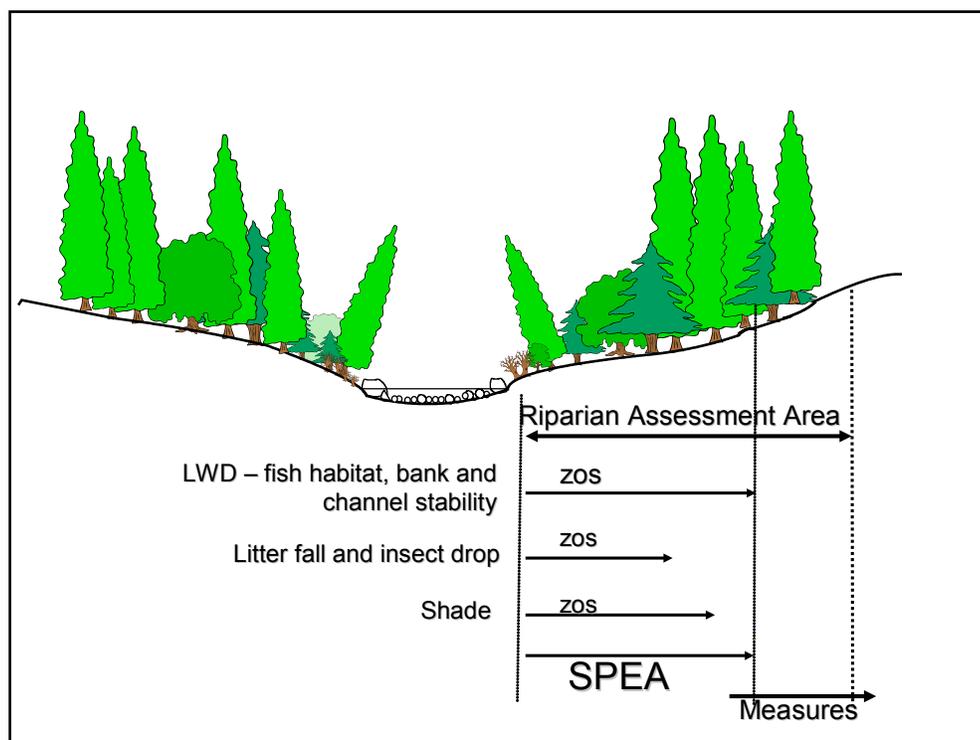
Section 4: Environmentally Valuable Resources

- ☑ Determine the riparian assessment area by following the [RAR Assessment Methods](#) and illustration in **Figure 4-6**. The assessment is based on the best available science with respect to riparian habitats. Results are clear, measurable and repeatable and do not rely exclusively on default setbacks.
- ☑ When establishing riparian buffers, consider the needs of all species and not just fish. For example, SPEAs established using the Riparian Areas Regulation methodology, focus on the needs of salmon and trout and may not adequately protect other species such as amphibians, birds, and small mammals. An appropriately qualified professional can provide site-specific advice to address protection of these resources during and after development. The appropriate buffer width will depend on its purpose and the sensitivity of the habitat that is to be protected.
- ☑ For more information, see the [Riparian Areas Regulation](#) website.

Figure 4.6: Illustration of the Riparian Assessment Area, Zones of Sensitivity (ZOS), Stream Protection and Enhancement Area (SPEA) and Measures

The Assessment area is a 30 m wide corridor on both sides of a stream, measured from the high water mark, or, for a ravine that is less than 60 m wide, from the top of the ravine to a spot 30 m beyond the top of the ravine, or for a ravine that is more than 60 m wide, a strip that is 10 m wide from the top of the ravine.*

** Note that for the purposes of the RAR, the term 'stream' refers to a watercourse (wet or dry); a pond, lake, river, creek, or brook; or a ditch, spring, or wetland that is connected by surface flow to any other stream that provides fish habitat.*



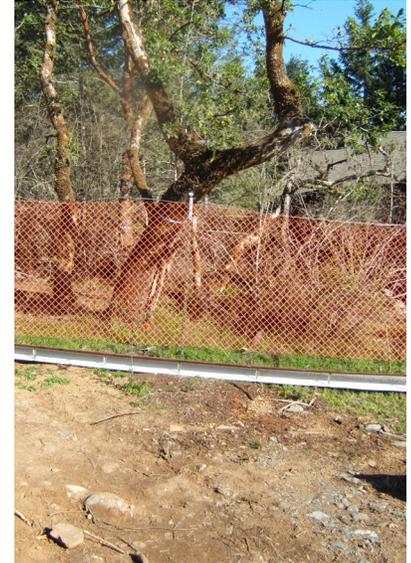


4.3.3 Protection During Development

The potential for damage to species and ecosystems is highest during construction. Following these guidelines will reduce the likelihood of violations of environmental legislation.

AVOID DISTURBING ENVIRONMENTALLY VALUABLE RESOURCES DURING DEVELOPMENT

- ☑ Use the services of an appropriately qualified **environmental monitor** during construction. This can result in considerable cost and time savings and reduced liability by ensuring that regulatory requirements are met. It also minimizes the possibility that remedial work might be required. Many local governments require environmental monitors to be on site during construction.
- ☑ Ensure that site workers are aware of the location of Environmentally Valuable Resources and the guidelines for their protection.
- ☑ Identify Environmentally Valuable Resources and buffers (the protection area) in the field by clearly marking these areas with high-visibility protective fencing (such as snow fences or similar material). Protect important trees, including their drip line (root zone) from compaction and other root damage.
- ☑ Post a site map of Environmentally Valuable Resources at the entrance to the worksite where workers are sure to see it.
- ☑ Use information signs and other means to explain the importance of the protection measures being used and the need to avoid any activity (such as storage of construction materials or refuelling) near Environmentally Valuable Resources.
- ☑ Prevent damage to the Environmentally Valuable Resource and buffer area.
 - ▲ Do not top healthy trees. Topping trees causes them to develop multiple leaders, and may introduce disease, which leads to premature mortality of the tree and increases overhead hazards.
 - ▲ If water views are desired on lake or stream shores, an appropriately qualified professional should be consulted to explore selective or spiral pruning options. This will allow the bank-stabilizing root systems to continue to grow and provide erosion protection.
 - ▲ Avoid damage to vegetation and root systems from machinery being used on the development site.
 - ▲ Do not allow fill or construction materials to encroach into the fenced area.
 - ▲ Prevent all unauthorized access within the fenced area.



Fence off Environmentally Valuable Resources during construction.

Photo: Judith Cullington



Maintain snags and large woody debris. Photos: Marlene Caskey, Judith Cullington

Minimize the risk of bird mortality from collisions with windows and clear panel railings on sundecks. Use tinted films or apply decals generously to windows or clear panels of buildings that are in areas adjacent to good raptor habitat. Also relocate bird feeding stations away from windows and decks.

- ☑ Protect wildlife habitat within the Environmentally Valuable Resource and buffer area:
 - ⤴ Leave all native vegetation, including ground cover, within the protection area. Plant roots hold the soil in place and prevent excessive erosion; they also provide habitat for a variety of important organisms.
 - ⤴ Maintain snags and large pieces of woody debris. Rotting logs and other woody debris provide critical habitat for many species, and they recycle nutrients back into the soil.
 - ⤴ Maintain wildlife trees. If trees have been designated as a hazard, modify work areas to avoid the danger zone, or consider high stumping the trees at 3–5 m (or higher) to retain some wildlife values. Where wildlife trees cannot be modified safely, they should be felled and left lying as coarse woody debris. Note: although a certified hazard tree assessor is the only qualified professional who can assess danger trees, this person may not be sensitive to wildlife or other environmental values. For more information, see [Best Management Practices for Hazard Tree and Non-Hazard Tree Limbing, Topping or Removal](#).
 - ⤴ Do not allow felled trees to be dragged through the buffer area.
- ☑ Where work is being undertaken in or near aquatic ecosystems, ensure the measures outlined in the [Standards and Best Practices for Instream Works](#) or [Riparian Area Regulation assessment report measures](#) are followed.
- ☑ Dispose of construction waste and garbage in designated areas, far from wetlands and other Environmentally Valuable Resources.
- ☑ Keep all fuelling stations and mobile fuelling equipment well away (30 m or more) from Environmentally Valuable Resources. Where there are aquatic and riparian ecosystems, use secondary containment around fuelling areas to prevent contamination from spills and leaks.



SCHEDULE CONSTRUCTION ACTIVITIES TO AVOID SENSITIVE TIME PERIODS

Some species are more tolerant of disruption during certain seasons. The application of ‘timing windows’ or ‘least risk windows’ allows development to proceed when the impacts on local plants and animals will be minimized. Timing windows have been developed for many ecosystems and species in British Columbia, including fish and aquatic habitats, and for sensitive nesting periods for birds, mating and denning times for animals, and flowering and seed set periods for many ecological communities. Least risk windows for bird and some other species are shown in **Table 4-2**.

- ☑ Schedule disruptive construction activities (clearing, blasting, etc.) so that sensitive periods such as nesting, spawning, hibernating, migration, flowering and seed set, and butterfly egg laying and larval rearing are avoided.
- ☑ For information regarding timing of egg laying, fledging and compatibility of raptor species to land development activities, see [Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia \(2013\)](#).
- ☑ Follow prescribed timing windows for construction in and around watercourses. For local information see [Approvals and Notifications for “Changes In and About a Stream.”](#) In some years, weather conditions (such as dry or early spring weather) may allow some works to begin sooner or end later than the normal timing window dictates. This can be a significant advantage for projects with tight schedules.

PROTECT WATER QUALITY DURING CONSTRUCTION

- ☑ Obtain all necessary *Water Act* [Approvals and Notifications](#) before working in or around water, and check local government bylaws and permitting processes for additional local restrictions and requirements.
- ☑ Prevent the movement of sediment and other deleterious substances into riparian areas and/or aquatic ecosystems. Failure to do so may result in legal charges or an Inspector’s Order under the [Fisheries Act](#) and the [Environmental Management Act](#). For more information, see the [Water Quality Municipal Guidelines for Construction Design](#) website.
- ☑ Use erosion and sediment control techniques (see [Section 3.7.3: Erosion and Sediment Control](#)) to prevent silt-laden waters from entering into nearby streams, wetlands, and other aquatic ecosystems.
- ☑ Review and follow Fisheries and Oceans Canada’s [Projects Near Water](#) process to determine what level of review is needed. There are specific statements for a variety of activities including road crossings, crossings by lines, and shoreline activities.



Obtain *Water Act* approvals before working in or around water.
Photo: Dave Polster



Section 4: Environmentally Valuable Resources

- ☑ Wash fresh concrete and concrete equipment well away from riparian areas and aquatic ecosystems, and keep the contaminated runoff out of stormwater systems that connect to these areas.
- ☒ Do not allow fill or construction material to encroach into riparian areas.
- ☒ Do not use pesticides or other toxins in or near riparian areas. Amphibians and reptiles are especially sensitive to these chemicals.
- ☑ For more information, see [Standards and Best Practices for Instream Works](#) (Section 7.9: Standards and Best Practices for Other Types of Works Requiring Water Act Approval).

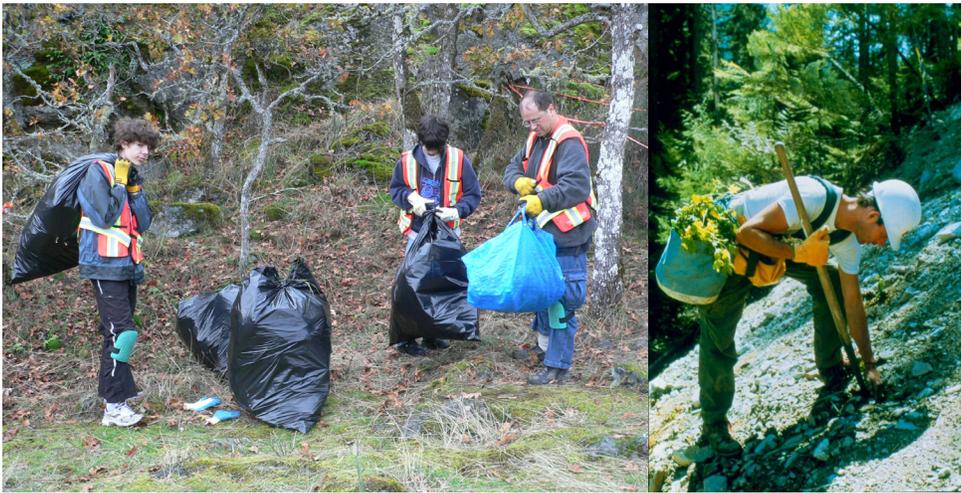
LIMIT ACCESS TO ENVIRONMENTALLY VALUABLE RESOURCES

- ☑ Erect permanent fencing around Environmentally Valuable Resources and buffer areas to limit access to them. Simple fencing, such as split rail, can define environmentally sensitive features and inhibit human and dog access while allowing small animals to pass through.

DESIGN CAREFULLY FOR RECREATIONAL USE

Poorly designed recreational accesses may damage the features that the area was set aside to protect. Additionally, some species do not tolerate human presence. It could also be dangerous, for example, if a trail were to be built next to a rattlesnake hibernaculum.

- ☑ Refer to [Access Near Aquatic Areas](#) for information on the design of trails near riparian, wetland, or aquatic areas. This publication also contains useful advice on designing trails in other sensitive areas.
- ☑ See [Best Management Practices for Recreational Activities on Grasslands in the Thompson and Okanagan Basins](#) for additional information on protecting sensitive grasslands.
- ☒ Avoid or minimize trail construction near Environmentally Valuable Resources. Species such as Great Blue Herons may abandon their nest sites if trails and human disturbances are too close to their nesting colonies.
- ☑ Where trails are required, design the trail system to minimize impacts on Environmentally Valuable Resources. For example, trampling can eliminate plants. Set up natural barriers to keep people on the trail and avoid habitat **fragmentation**.
- ☑ Locate trails away from the shoreline and outside established Riparian Area Regulation setbacks, and provide only a minimal number of access points to the water.



Work with professionals to remove invasives and re-plant with native species.

Photos: Trudy Chatwin, Dave Polster

- ☒ Avoid crossing wetlands. If a crossing is unavoidable, use pilings or boardwalks to cross wetlands rather than placing fill in these areas. A crossing will fragment the wetland and permanently alter flow regimes to downstream fish resources. It may also cause some shy species to desert the area.
- ☑ Use signage and other educational tools to inform people about the ecological importance of Environmentally Valuable Resources.
- ☑ Require that dogs be leashed when in sensitive habitats to prevent them from chasing birds or other wildlife; disturbing fish spawning areas, heron rookeries, ground nests or habitats with species at risk; or trampling sensitive plants.

4.3.4 Restoration of Disturbed Areas

DEVELOP AND IMPLEMENT A RESTORATION PLAN

- ☑ If an Environmentally Valuable Resource is already disturbed, hire an appropriately qualified professional to prepare and implement a restoration plan that is appropriate for the ecology of the site.

RESTORE AND ENHANCE HABITAT FEATURES

- ☑ Restore habitats where natural vegetation has been removed or altered by planting native species of trees, shrubs, and grasses and by controlling invasive plants. Creation of shrub thickets and hedgerows provides food and shelter for many bird species and feeding habitat for some raptors.
- ☑ Enhance or restore the vegetation in riparian areas where clearing has occurred. Appropriately qualified professionals can provide advice on which suitable locally adapted native species to use and planting patterns that are appropriate for local ecosystems, climates, and ecosystems.

Designing and Implementing Ecosystem Connectivity in the Okanagan provides an introductory guidance to planners and land managers on the important components of connectivity. Available from <http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42389>



Section 4: Environmentally Valuable Resources

- ☑ Where permanent structures (e.g., sheds, buildings) have been removed from riparian areas, reclaim and restore the streamside area.
- ☑ Enhance raptor habitats by:
 - ▲ Replacing raptor nest sites that are damaged or lost, or adding nesting sites where natural sites are limited. This may involve erecting nest boxes for owls or nesting platforms for ospreys, or selectively pruning branches or tops of mature trees to make them more attractive to bald eagles and other raptors;
 - ▲ Providing artificial perches such as poles and platforms if natural perches are lacking; and
 - ▲ Maintaining an area of uncut grass near forest edges to increase prey abundance for various wildlife species.



Reclaim and restore wetland and riparian areas.

Photo: Judith Cullington

- ☑ Consider the consequences of beaver activities when restoring wetlands; beavers may remove replanted materials or create dams that change water levels. If beaver activity may pose a problem, consider redesigning the project, or providing fencing to keep beavers out of the restored area. For more information, see [Approvals and Notifications for "Changes In and About a Stream"](#); [Standards and Best Practices for Instream Works](#) (Section 7.6: Standards and Best Practices: Beaver and Beaver Dam Management).
- ☑ For more information on aquatic and riparian restoration, see [Streamline; Restoring Wetlands in Washington: A Guidebook for Wetland Restoration, Planning & Implementation](#); and various publications on watershed restoration at http://www.env.gov.bc.ca/cariboo/env_stewardship/wrp/reports.html.