



Section Five: Regional Information Packages

Thompson Okanagan Region

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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 5.7-1: Ministry of Forests, Lands and Natural Resource Operations Regions



Cover Photos:

Left: Sagebrush grasslands. *Photo: Brenda Costanzo*
 Centre: Annual Paintbrush. *Photo: Sara Bunge*
 Right: Okanagan developments. *Photo: Susan Latimer*

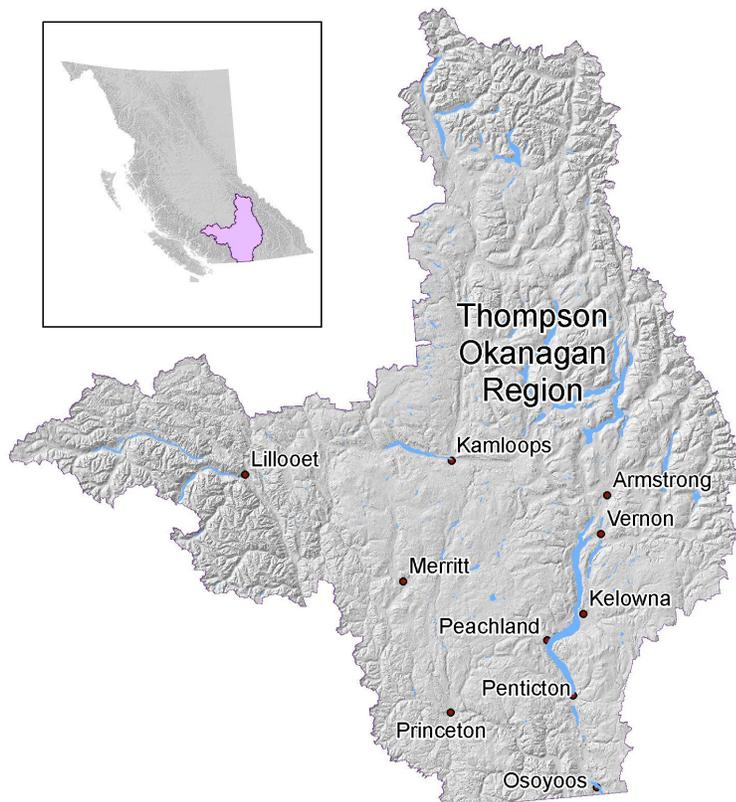


5.7.1 Thompson Okanagan Region

The Thompson Okanagan Region includes two distinct geographic areas.

- ◆ The **Thompson** portion of the region extends from the Fraser River canyon in the west to the Monashee Mountains in the east, and includes the Thompson and Nicola valleys and the Shuswap Lake area (**Figure 5.7-2**). Major communities include Lillooet, Merritt, Kamloops, and Salmon Arm.
- ◆ The **Okanagan Basin** represents the northernmost extension of the western Great Basin of North America. Low annual precipitation, hot summers, and mild winters create a variety of semi-arid habitats. The dry grasslands and open pine forests of the Okanagan act as a vital landscape corridor between the shrub-steppe habitats of the Columbia Basin in Washington and Oregon and the grasslands of the Thompson and Nicola valleys to the north and west.

Figure 5.7-2: Thompson Okanagan Region





5.7.2 Regional Features

The Thompson area (approximately 5,400 km²) is one of the most biophysically diverse regions in the province: and includes Mt. Robson (the highest peak in the Rockies) and Wells Gray provincial parks in the northern part of the region; the North and South Thompson Rivers that merge in Kamloops; the Fraser River in the west; and the Monashee Mountains to the east. The landscape is filled with more than 200 lakes, hills dressed in sage, vast rolling grasslands, tumbleweeds, looming mountains, alpine valleys, roaring rivers, and crashing creeks.

The Okanagan contains nearly 1,200 km² of grassland distributed over the Okanagan and Similkameen valleys (**Figure 5.7-2**); contained within the Southern Okanagan Basin, Northern Okanagan Basin, Northern Okanagan Highland, and Okanagan Ranges ecosections. The Okanagan¹ Basin extends north from the Columbia Plateau in Washington State, going north to the height of land north of Armstrong that separates the Columbia and Fraser River drainages. The Okanagan Basin is one of the most striking physiographic features in the region and contains many major lakes including Osoyoos, Vaseux, Skaha, Okanagan, Wood, Kalamalka, and Swan Lakes.

Biogeoclimatic Zones

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

The Thompson Okanagan Region includes parts of several biogeoclimatic zones (**Figure 5.7-3**). While all of the zones are affected by land development, the low elevation zones are the most at risk. These include the Bunchgrass Zone ([S2-Imperiled](#)), the Ponderosa Pine Zone ([S2/S3-Imperiled/Vulnerable](#)) and the Interior Douglas-fir Zone ([S3-Vulnerable](#)), described below.

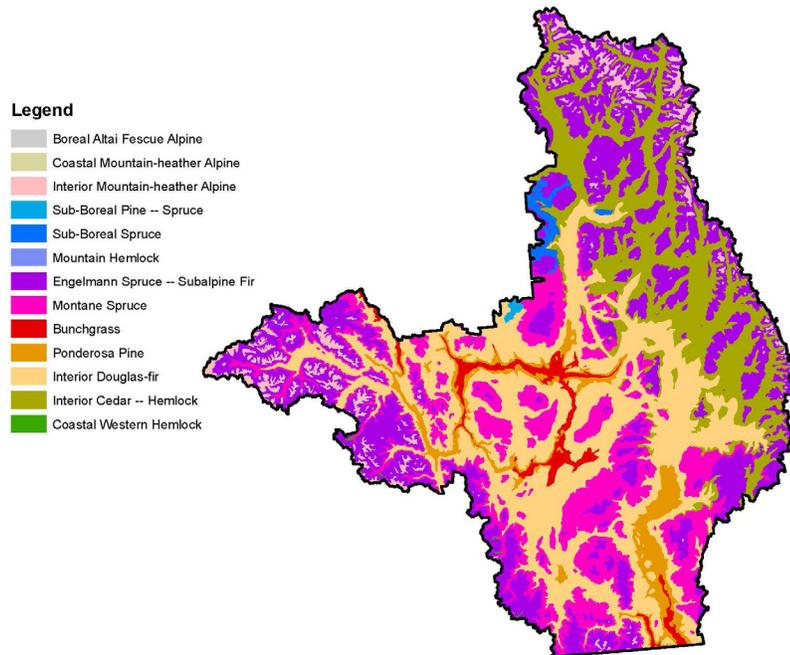
Bunchgrass Zone

The [Bunchgrass Zone](#) extends from river level up to about 900 m elevation. It is located in the Thompson River valley between Kamloops and Spences Bridge, the Nicola River valley, Fraser River valley south of Riske Creek, and the southern Okanagan and Similkameen valleys. This zone is characterized by very warm and dry summers, while most winters are moderately cold. Precipitation is very low. Evaporation rates are high in summer, and drought conditions are common in upland areas from June onwards.

1 Note: In the United States, the spelling Okanogan is used.



Figure 5.7-3: Biogeoclimatic Zones in Thompson Okanagan Region



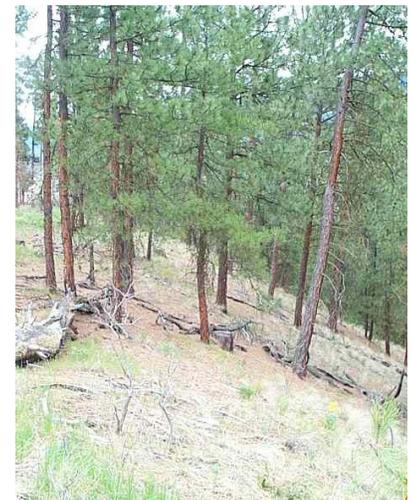
Drought conditions limit tree growth; consequently, grasses form the dominant vegetation. Native grasses include bunchgrasses (particularly Bluebunch Wheatgrass), Needle-and-thread Grass, Junegrass, and Sandberg’s Bluegrass. Sagebrush ecosystems (also called shrub-steppes) often dominate the lower elevations of the zone.

Although the Bunchgrass Zone is one of the smallest zones in British Columbia, its unique mosaic of grassland, shrub-steppe, moist and wet ecosystems, and dry, open forests supports a tremendous diversity of wildlife.

Ponderosa Pine Zone

The [Ponderosa Pine zone](#) (PP) occurs at low elevations (from 335 to 900 m) along the very dry valleys of the region. The PP occurs as a thin band in the bottoms and/or on lower sidewalls of the valleys of the Fraser River in the Lytton-Lillooet area, the lower Thompson, Nicola and Similkameen rivers, and Okanagan Lake. Typically, the PP’s elevation falls between that of the Bunchgrass (BG) and Interior Douglas-fir (IDF) zones.

The PP is the driest and, in summer, the warmest forested zone in British Columbia. The hot, dry summers result in large moisture deficits during the growing season. Winters are cool with light snow cover. The forests of the PP landscape are dominated by Ponderosa Pine. Stands are often very open and park-like with a Ponderosa Pine canopy and an understorey



Ponderosa Pine. Photo: Dave Polster



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dominated by Bluebunch Wheatgrass, forming a mosaic of forest and grassland. Ponderosa Pine is well adapted to fire, and fires have played an important role in the ecology of the zone. Douglas-fir is most common on moist and very moist sites associated with gullies, draws, and streams, but it also occurs as a minor component of drier sites in the northern part of the zone. Trembling Aspen is a dominant component of the dense stands that occur on riparian or seepage sites throughout the zone. Water Birch and Paper Birch are found locally in moisture-receiving sites. Black Cottonwood occurs on floodplains.

Interior Douglas-fir Zone

The [Interior Douglas-fir Zone](#) is characterized by warm, dry summers and cool winters, and is located along most of the major valleys and side drainages within the region. Some parts, such as the Kamloops area, are very dry. This is reflected in the native vegetation, which includes plant such as Pinegrass that survive with only minimal moisture during the growing season. This zone is the second largest in the region, and includes some of the most settled areas.

Grasslands are a prominent feature of this zone, especially in drier areas, and are dominated by Bluebunch Wheatgrass, Junegrass, and fescues.

Forests in this zone are dominated by Douglas-fir with a grassy understorey, usually of Pinegrass. In hotter and drier areas, Ponderosa Pine dominates, while Lodgepole Pine occurs at higher elevations. In this dry zone, low-intensity wildfires would have occurred naturally every

Antelope-brush, riparian oxbow wetland complex – South Okanagan Wildlife Management Area.
Photo: Bryn White





10–20 years and would have removed the understorey and young trees and allowed mature Douglas-firs to survive.

Wetlands also occur in this zone. They are found in depressions, and open water is typically surrounded by cattails, sedges, and bulrushes. Shrubby species such as Red-osier Dogwood occur along riparian areas. Wetlands are especially important for wildlife survival in this dry zone.

5.7.3 Development Concerns

Pressures from Urban Growth and Development

There are many pressures on ecosystems that are directly related to urban and rural population expansion in the region.

- ♦ **Population growth:** The Okanagan area is especially impacted by population growth. Population growth projections for 2001–2031 project significant population increases especially within the Okanagan Basin. Populations are predicted to increase by about 25% in the South Okanagan/Similkameen, 60% in the Central Okanagan, and 35% in the North Okanagan. This will dramatically increase pressures on remaining ecosystems and species at risk within the valley.
- ♦ **Agricultural conversion:** Conversion of grasslands and partially modified grazing land to more intensive agricultural operations and hobby farms is resulting in a loss of grassland habitats.
- ♦ **Recreation and resort developments:** Resort development is increasing in the Okanagan Basin. Much of this includes redevelopment of foreshore areas in both urban and rural settings; however, in recent years, the number of satellite developments have also increased and created impacts on foreshore, grassland, and dry forest areas. These developments often include such things as marinas, beaches, golf course, wineries, and/or small town centres. Additionally, many resort developments promote recreational opportunities such as hiking and mountain biking which can extend the footprint of the development into ecologically significance areas.

These pressures produce a number of impacts on shoreline areas, terrestrial ecosystems, water use, and wetlands.



Conversion of grasslands to agricultural uses, Vernon area.
Photo: Marlene Caskey.



The Rocky Mountain Ridged Mussel is found only in the Okanagan watershed and affected by shoreline development.

Photo: Jennifer Heron



Shoreline Development

Much of the urban and recreational development in the region is centered around large lakes and rivers. Impacts include:

- ◆ cumulative effects of riparian vegetation removal;
- ◆ direct and indirect loss of habitat, changes in water quality, and changes in longshore drift;
- ◆ cumulative effects on mussel habitat, rare plants, and high value fish habitat (e.g., shore spawning) from instream works (e.g., development and maintenance of water intakes for domestic and irrigation systems, docks, boat launches, marinas, lakeshore stabilization);
- ◆ trampling of sensitive habitats and spread of noxious weeds due to recreational access to relatively undisturbed and undeveloped shoreline areas; and
- ◆ disturbance of waterfowl during wintering, nesting, and breeding seasons.

General guidelines for shoreline developments are provided in [Section 4: Environmentally Valuable Resources](#).

To address some of the impacts on large lakes foreshore ecosystems, fish and wildlife values in the Okanagan, and to provide guidance for compliance with relevant legislation, the Okanagan Foreshore Protocol was developed. This document identifies the risk to fish and species at risk and their habitats based on specific development activities. This document is to be followed for all works below the high water mark for the following lakes: Mabel, Sugar, Okanagan, Kalamalka, Wood, Skaha, Vaseux, and Osoyoos. The protocol and supportive documentation can be found at <http://www.env.gov.bc.ca/okanagan/esd/ollp/ollp.html>.



Several other Thompson and Okanagan best management practices have been developed to provide guidance to common activities occurring in this region. Below is a list of available documents. They can be found at <http://www.env.gov.bc.ca/wld/BMP/bmpintro.html#third.>

- ◆ Installation and Maintenance of Water Line Intakes
- ◆ Lakeshore stabilization
- ◆ Tree Topping, Limbing and Removal in Riparian Areas
- ◆ [Boat Launch Construction & Maintenance on Lakes](#)

Terrestrial Development

Many of the region's species at risk are found in low-elevation riparian, wetland, grassland, rock outcrop, talus, and open forest habitats. Some of these habitats are located on private land and outside of the Agricultural Land Reserve. Threats to species at risk include

- ◆ the conversion of important habitats to agricultural crop fields (e.g., vineyards);
- ◆ conversion and fragmentation of important habitats due to roads and urban development;
- ◆ reduced fire frequency resulting in forest ingrowth;
- ◆ increasing damage from recreational use (e.g., all-terrain vehicles, mountain bikes, human access);
- ◆ increasing ground disturbance and spread of invasive weeds;
- ◆ predation by pets;
- ◆ unauthorized modifications and filling of grassland wetlands;
- ◆ increasing numbers of 'problem' wildlife and wildlife conflicts; and
- ◆ the cumulative effects of development activities.

Careful planning is essential to avoid such impacts while retaining the tourism values. [Section 3](#) and [Section 4](#) provide ideas on how to minimize the impacts of developments on natural ecosystems. Planning to avoid such impacts by providing zoning and restrictions in sensitive areas is discussed in [Section 2](#).

Many local governments within the region have incorporated Develop Permit Areas which assist in addressing the concerns related to the impacts of terrestrial habitats from urban and rural development. Contact the appropriate local government office before planning your development.



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In addition a lot of inventory for species and ecosystems have been done in the Okanagan and should be used when looking at urban and rural development applications. To access this information go to <http://www.env.gov.bc.ca/okanagan/esd/data.html#wildlife> and <http://a100.gov.bc.ca/pub/siwe/>.

Water Use

Water in the Thompson Okanagan Region is a limited resource that is heavily allocated to agricultural use, the domestic water supply, and the maintenance of minimum stream flows for fisheries and other aquatic environment needs. Increasing water demands due to population growth, coupled with and potential changes in water supply and demand associated with predicted climate change will likely result in further competition for water resources within the region. Communities that rely on reservoirs or streams are already experiencing shortages in drought years, and minimum stream flows are often below conservation needs.

Reduced stream flows due to increasing water removal result in disrupted ecosystem functions and threaten the biodiversity values.

- ◆ Changes in seasonal water flow patterns due to such things as increased impervious surfaces and traditional stormwater systems can also contribute to water loss problems by causing reduced low flows and earlier peak flows. See [Section 2](#) and [Section 3](#) for information on reducing stormwater discharge, and managing groundwater and contamination problems.
- ◆ Groundwater contribution to stream flow can be an important factor in regulating stream temperatures. Similarly, reduced water flows and a loss of shade cause increased water temperatures. Use of water from wells may lower groundwater table levels; affecting inflow into streams.
- ◆ Modification of wetlands can also affect flow regimes, while large withdrawals of groundwater for irrigation and human consumption can cause losses of wetlands and changes in stream flows and lake levels. Drying wetlands impact habitat for many species including Tiger Salamander (Endangered) and Great Basin Spadefoot (Threatened).
- ◆ Water loss and reduced stream flows combined with an increase in pollutants (e.g., non-point and/or permitted discharges) act together to reduce water quality.

Impacts on streams, lakes, and water quality and quantity are a result of upland and near-shore development, climate change, and recreational activities. These impacts include

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- ◆ non-point pollution of lakes and streams from urban storm runoff and agricultural runoff;
- ◆ altered stream hydrology due to increased impervious surface areas associated with urban development;
- ◆ over-licensing of water sources, which can result in a lack of water during drought periods, increased stream temperatures, and/or periods of low or no stream flow;
- ◆ reduced viability of habitats for fish, amphibians, and other aquatic species due to changes in water quality and quantity;
- ◆ destruction of natural stream processes when streams are aggraded, degraded, eroded, relocated, dammed, channelled, culverted, and/or rip-rapped;
- ◆ storage and diversion of water;
- ◆ damage to and destruction of riparian vegetation, which can disrupt natural biological processes and drive water temperatures into the lethal range;
- ◆ removal or scouring of spawning gravel;
- ◆ direct and indirect loss of habitat;
- ◆ excessive siltation due to upstream erosion; and
- ◆ the cumulative effects of development activities.



Shuswap Lake.
Photo: Don Weixl
picturebc.ca



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Balancing in-stream water needs (e.g., for fish, waterfowl, and other wildlife) and out-of-stream uses (e.g., domestic use and irrigation) will likely become increasingly difficult given predicted climate change scenarios such as future summer water shortages. Moving towards more sustainable water management within the region will require proactive planning and management by all parties involved with water management and stewardship. [Naturescaping](#) (using locally adapted native plants for landscaping) can provide an effective solution to limited water supplies. The handbook [Dealing with Drought](#) and the [Drought Information website](#) provide information on dealing with drought.

- Build or retrofit homes and businesses with low-water-use fixtures and appliances.
- Landscape with local native species that are drought tolerant and require little watering.
- Find ways to conserve water as much as possible.

Urban/Wildlife Conflicts

As people move into an area, conflicts with the local wildlife often become more frequent. Deer may be harassed by dogs, and bears are often attracted to fruit trees and garbage dumps, and may then be shot as 'problem' bears. For information on dealing with wildlife conflicts, see [Section 2.8.4](#) and [Section 3.9.2](#).

Deer in apple orchard.
Photo: Eric Simard picturebc.ca





Recreation Impacts

Participation in motorized recreational activities in B.C. has increased dramatically in recent years. However, off-road vehicles (ORVs) have a substantial negative impact upon the habitat and ecosystems. Damage from motorized recreation is increasingly evident particularly in grasslands, streams and wetlands, and alpine areas. Damage occurs from compaction and erosion of soil, destruction of vegetation and litter, disturbance of and stress on wildlife, increased risk of fire, and changes in ground cover affecting soil temperature and moisture. Sensitive environments are also susceptible to the introduction and spread of invasive plants, and to disturbances to native plants and wildlife. Fragile grassland and alpine habitats are extremely susceptible to vehicle damage and may take decades to recover.

Motorized recreation, if not effectively managed, will lead to severe long-term damage to the natural environment. Other effects of ORVs, such as pollution, erosion, sedimentation of streams, and habitat fragmentation and disturbance, will also cause ecological damage. Well-managed motorized recreational activities can help minimize negative impacts to sensitive environments and help foster a stewardship ethic.

Wildfire Hazard

Wildfires are a concern, especially in drier parts of the region. In an effort to 'fireproof' their homes, people may clear out vegetation in a much larger area than required, needlessly destroying wildlife habitat in the process.

For information on reducing wildfire hazards, see [Section 2.8.3](#).

For information and guidance for reducing ORV impacts consult: [Best Management Best Management Practices for Recreational Activities on Grasslands in the Thompson and Okanagan Basins](#).

For information on Backcountry Recreation/Tourism wildlife guidelines, consult: http://www.for.gov.bc.ca/mof/orv/wildlife_guidelines.pdf



5.7.4 Ecosystems at Risk

Grasslands

Grasslands are an important part of British Columbia, both from an ecological and cultural perspective.

Although they represent only 1.5% of the provincial land base, grasslands provide habitat for more than one-third of the province's rare and endangered species. Many of the Red- and Blue-listed species and rare ecological communities in the South Okanagan and Lower Similkameen are associated with grasslands. Many invertebrate species that are unique to the Okanagan are grassland specialists. All of the vertebrate species that have disappeared from this area in the last century were grassland species: Pigmy Short-Horned Lizard, White-Tailed Jackrabbit, Greater Sage-Grouse, Sharp-Tailed Grouse, and Burrowing Owl.

Grasslands, which are recognized as one of B.C.'s most threatened ecosystems, provide valuable places for recreation, education, ranching, and hunting. Increasing pressures on B.C.'s grasslands, such as urban expansion, off-road vehicle (ORV) impacts, invasive weeds, agricultural conversion, grazing, forest encroachment, and the subdivision of grassland for development have resulted in a growing concern for the long-term sustainability of this sensitive ecosystem.

Urban and industrial development in the Okanagan has led to the disappearance of roughly 13,500 ha of the region's grasslands, with over half of this loss occurring around towns and cities in the Northern Okanagan Basin. The municipalities of Kelowna and Vernon, in particular,

Grasslands provide valuable places for recreation.
Photo: Judith Cullington





Grasslands.
Photo: Brenda Costanzo

have experienced a tremendous loss of grasslands. There are also large losses around other Okanagan cities and towns, for example Summerland, Penticton, Okanagan Falls, and Osoyoos all had extensive historical areas of native grassland that are now under pavement. Some towns, such as Armstrong, Keremeos, and Oliver have lost over 95% of their historical grasslands. There is also a significant loss of grasslands to roads and railways.

As the population of the region continues to grow, native grasslands may continue to be lost to urban sprawl. With the increasing market value of land, the number of ranching operations is decreasing while the number of intensive agricultural operations, residential and resort communities, golf courses, and commercial developments is increasing. Private land stewardship may be critical to the preservation of species and viable habitats within the region. This is particularly true in lower elevation areas (Southern and Northern Okanagan Basins) where only a small portion of grasslands habitats are located within Crown or protected areas.



Riparian Areas / Wetlands

The [Riparian Areas Regulation](#) (see [Section 4.3.2](#)) applies throughout most of this region. The purpose of the Regulation is to protect the features, functions, and conditions of the riparian zone that are vital in the natural maintenance of stream health and productivity. These vital features, functions, and conditions are numerous and varied and include

- ◆ sources of large organic debris, such as fallen trees and tree roots;
- ◆ areas for stream channel migration;
- ◆ vegetative cover to help moderate water temperature;
- ◆ provision of food, nutrients and organic matter to the stream;
- ◆ stream bank stabilization; and
- ◆ buffers for streams from excessive silt and surface runoff pollution.

Wetlands are a vital component of healthy grassland and dry forest communities of the region. Many support rare and endangered species. While some wetlands are permanent and easily recognizable, others are more temporary. These vernal pools provide habitats for species that are adapted to conditions where water is a temporary feature (e.g., Great Basin Spadefoot toad), as well as seasonal habitats for migratory birds. These ponds may fill only in years of heavy precipitation; consequently, they may not be visible during drought years. Water is property of the Provincial Crown and regulated under the [Water Act](#), which requires approvals or notifications for works in and around water.

See [Section 4](#) for guidelines for protecting aquatic and riparian ecosystems.

For works within the Shuswap Lake watershed, consult the Shuswap Watershed Atlas at: http://cmnbc.ca/atlas_gallery/shuswap-lake-watershed-atlas

South Okanagan-Similkameen Conservation Program

The Okanagan and Similkameen River valleys, with their dry climate and desert-like habitats, comprise one of Canada's areas of greatest species diversity. This area has one of the largest concentrations of species at risk in Canada, and is recognized as one of the country's three most endangered natural systems. It is home to 60 species of plants and animals that are currently listed as nationally Endangered, Threatened, or of Special Concern and one-fifth of all provincially Red-listed species.

The South Okanagan Similkameen Conservation Program is a partnership of fifty organizations working together to maintain the unique natural areas of this region. It supports conservation efforts on maintaining natural ecosystems and their many plant and animal species. For more information, see the Program website <http://www.soscp.org>.

The Okanagan Collaborative Conservation Program (<http://www.okcp.ca/>) is a partnership of organizations and businesses with shared goals, which include maintaining regional biodiversity, protecting Species at Risk, maintaining ecological connectivity throughout the Okanagan Basin, and balancing regional growth with conservation. OCCP is similar to the SOSCP and covers the central and northern portion of the Okanagan Basin.

Both of these organizations can provide conservation information, guidance and assistance for development planning.



Mormon Metalmark.
Photo: Jennifer Heron

5.7.5 Regionally Significant Species and Species at Risk

Many species in this region are at risk because their habitat is threatened by development. Butterflies such as the Behr's Hairstreak and the Mormon Metalmark, birds such as the White-headed Woodpecker, Yellow-breasted Chat, and Spotted Owls, and many plants (Dwarf Woolly-heads, Scarlet Ammaninia, Slender Collomia, Small-Flowered Lipocarpha, Toothcup), animals (Mountain Caribou, Badger and Pallid Bat) and fish (Speckled Dace) are at risk due to urban and rural developments or agricultural expansion on the benches and valley-bottom habitat of these species. Details on these and other species and ecosystems at risk can be found through the B.C. [Species and Ecosystem Explorer](#), [Hectares BC](#) and the [South Okanagan Similkameen Conservation Program](#) list. Developers and Qualified Professionals should identify where potential species and ecosystems at risk may occur based on habitats and ecosystems present in their project areas.

Many species reach their southern or northern range limits in the Okanagan. Populations at the edge of their species' ranges are usually genetically diverse. This genetic diversity is very important to the overall health of species' populations, and is critical to their survival in times of environmental change; it is also an integral part of the biodiversity of the Okanagan Region.

The Okanagan and lower Similkameen have been identified as biodiversity hotspots for richness and rarity. For example, about 190 species of birds breed in the South Okanagan. Additionally, the ranges of many of these species extend into the central and northern parts of the Okanagan Basin.

There are also many species that are not listed as 'at risk', but are considered regionally significant due to their uniqueness, their degree of rarity, or their close association with the region.

Note that a lack of data on the Species Explorer does not confirm the absence of species and ecosystems at risk. The availability of data is variable throughout the region.

The B.C. Conservation Data Centre's Species and Ecosystems Explorer (<http://www.env.gov.bc.ca/wildlife/wsi/siwe.htm>) provides status ranking, location data and informational links for species and ecosystems. The Species Inventory Web Explorer (<http://a100.gov.bc.ca/pub/eswp/search.do>) is a search engine for the additional Species Inventory Database (SPI). These can be used to find wildlife reports and data for Species and Ecosystems at Risk.



Fish

The following species at risk are known to inhabit the Thompson Okanagan Region:

- ◆ Speckled Dace
- ◆ Umatilla Dace
- ◆ Shorthead Sculpin
- ◆ Mottled Sculpin
- ◆ Torrent Sculpin
- ◆ Chiselmouth
- ◆ Mountain Sucker
- ◆ White Sturgeon

Table 5.7-1 lists indigenous species or stocks that are “regionally significant” because of their contributions to genetic diversity, or because they are rare:

Table 5.7-1: Locations of at-risk fish species

Species	Streams /Lakes
Distinct Wild Steelhead Populations	Deadman, Bonaparte, Nicola, Stein, Bridge, Seton, Nahatlatch
Distinct Large Piscivorous Rainbows	Barriere, Eagle, Lower Adams, Scotch, Seymour/McNomee, Adams Lake Stocks, Bonaparte Outlet, Seton Anderson Stocks (Seton Portage and/or Gates Creek) Shuswap Lake
Special Populations of Rainbow Trout	Pennask Creek, Sunset Creek, Loon Creek Inlet and Outlet and Outlet Tributary (Hihium Creek), Mahood River, Upper Nahatlatch
Populations of potentially distinct westslope cutthroat (<i>Oncorhynchus clarki lewisi</i> or <i>Oncorhynchus clarki alpestris</i>)	Crazy Creek upstream of falls, Yard Creek upstream of falls, Wap Creek (Region 8)
Populations of Indigenous Lake Char	Shuswap Lake, Adams Lake, Griffin Lake, Three Valley Lake, Victor Lake, Clan William Lake, Dunn Lake, Mahood Lake, Saskum Lake, Bonaparte (unconfirmed or extinct)
Populations of Indigenous Bull Trout	North Thompson Watershed, Barriere Rivers and Lakes, Dunn Lake, Mud Lake, Lempriere Lake, Upper Adams Watershed, Momich Watershed, Tum Tum Lake, Adams Lake, Momich Lake/Third Momich Lake/Stukemaptan, Sinmax Creek, Scotch Creek, Seymour River, Eagle River, Eagle River, Perry River, Griffin/Three Valley/Victor/Clanwilliam Lakes, South Pass Creek, Mabel Lake, Sugar Lake, Shuswap River, Tribs to Shuswap, Shuswap Lake, Coldwater, Spius, Yalakom Watershed, Nahatlatch Watershed, West Fraser rivers, Bridge Watershed, Kwoiek Watershed, Downton, Carpenter Lake
Kokanee	Shuswap Lake, Bonaparte Lake, Egan Lake, Machete Lake, Young Lake, Nicola Lake, Loon Lake, Adams Lake, Wood Lake, Okanagan lake, Kalamalka Lake
Burbot	Shuswap Lake, Nicola Lake, Lac des Roches
Torrent Sculpin	North Thompson River
Chisel Mouth	Nicola Lake, Vidette Lake, Mara Lake
Mountain Sucker	Thompson River, Similkameen River, Tulameen River
Pygmy Whitefish	Shuswap System, Okanagan System



Fishing in Logan Lake.
Photo: David Young picturebc.ca

Species, such as the [Blue-Listed](#) Bull Trout, Sockeye Salmon, and Kokanee, have been identified as ‘seriously impacted’ or ‘regionally significant’ and have become focal species for protection and recovery efforts.

Headwater areas within the region include a network of small, high-gradient creeks. Flushing rates are high, water levels change rapidly, nutrients are limited, and annual mean temperatures are low. These conditions support slow-growing stream resident (fluvial) rainbow trout or bull trout and few, if any, other native fish species. An exception is the few high-elevation areas in the Similkameen and Shuswap Basins which support Westslope Cutthroat Trout populations. Many of the upper-elevation streams are relatively unspoiled and need protection. Most of the land in the higher areas is Crown land, and impacts there have occurred from forest harvesting, grazing and ORV use.

In the valley bottoms, the networks of small streams combine to form major rivers. These rivers are warmer, more fertile, and more hydraulically diverse than small streams. In the Shuswap and Okanagan Basins, chains of large lakes provide even warmer and more nutrient-rich environments. The major lakes and rivers support a variety of species including Rainbow Trout, Steelhead Trout, Bull Trout, Kokanee, multiple salmon species, and Mountain Whitefish; as well as other indigenous wild fish such as suckers, dace, chub, sculpins, shiners, and Pikeminnow.

The Okanagan River also supports some of the last remaining spawning habitat for Sockeye and Chinook Salmon in the Columbia River system. For more information, see the [Okanagan Lake Action Plan](#).



Birds

Several Important Bird Areas (IBAs) have been designated in the Thompson-Okanagan region: Douglas Lake, South Thompson River, Vaseux Lake, White Lake area, Killoopla Lake area, Osoyoos Oxbows and Chopaka Customs. These sites support various species at risk such as Sage Thrasher, Lewis's Woodpecker, Yellow-breasted Chat, Long-billed Curlew, White-headed Woodpecker and other regionally significant species. To find the locations of IBAs and access site information for individual IBAs (e.g., bird species abundance, habitat description and conservation issues go to 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 Nature Counts (www.naturecounts.ca), a searchable online data warehouse. Information available includes species presence, seasonal abundance, breeding species and other information. See [Appendix D: Sources for Environmental Mapping and Inventory](#) for more details.

Detailed guidelines for protecting amphibians and reptiles during land development are provided in [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia \(2014\)](#).

Many listed amphibians and reptiles live in valley bottom areas which attract development. Unless measures are taken to preserve the specialized habitats of these animals, their numbers will continue to decline.

Amphibians and Reptiles

The Thompson Okanagan Region supports a diversity of reptile and amphibian species. Most amphibians and reptiles are of management concern and several are at risk, including Great Basin Spadefoot, Night Snake, and Western Rattlesnake. Additionally, the northern distribution limit of several North American species occurs in the Okanagan Basin.

Important amphibian and reptile habitats often overlap with prime development sites in the region, however. Many native species of amphibians and reptiles are adversely affected by development-related habitat loss, and some have declined to the point that they are now species at risk. The Pigmy Short-Horned Lizard has been extirpated in the region.

The main threats to reptiles and amphibians are habitat loss and alteration, and draining of wetlands. The dry grasslands, Bunchgrass, Ponderosa Pine and open pine forests used by some species are among the most threatened ecosystems in British Columbia. The rapidly expanding wine industry, agriculture, recreational developments, urban development, and introduced non-native fish are the main threats to natural habitats. Many wetlands have been drained or filled in for urban development, roads, or agricultural purposes. Where waterbodies have been retained, the riparian zones have often been severely degraded, which affects the habitat needs of many species.



Mammals

The region is home to a variety of mammals ranging in size from the Common Water Shrew to Moose and Grizzly Bear.

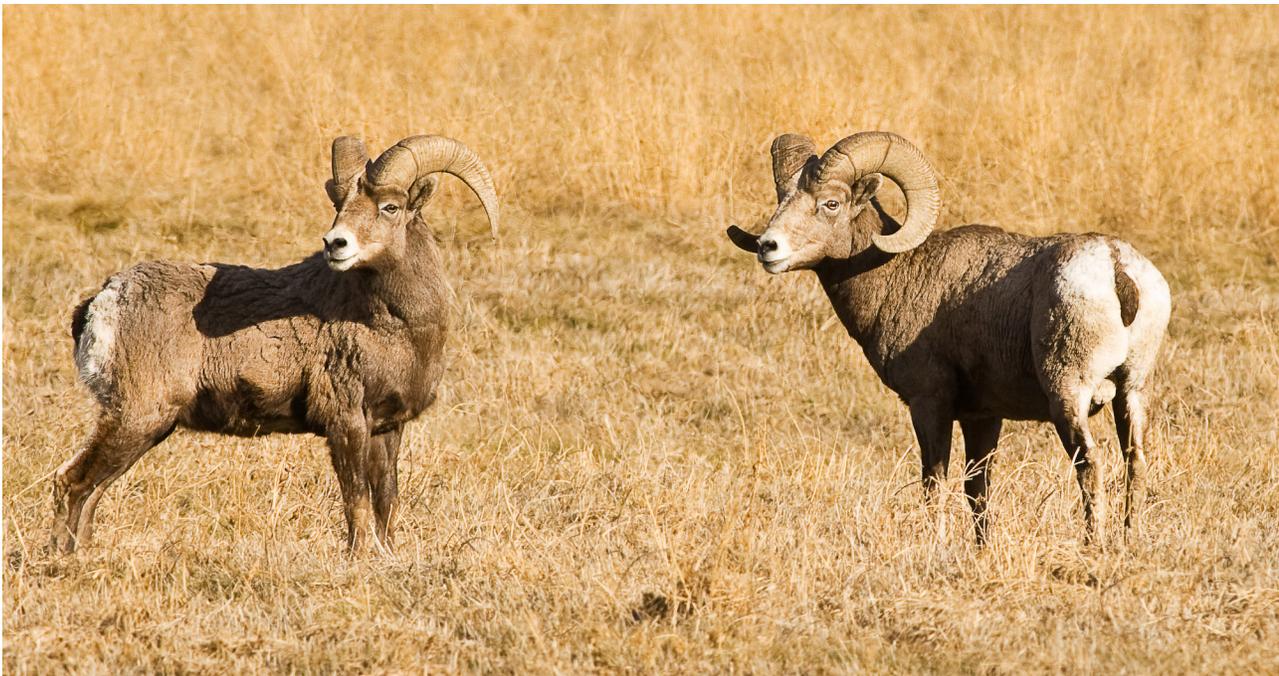
Large predators such as Grizzly Bear, wolves and cougars are common in some parts of the region, while smaller predators such as coyotes and bobcats are common throughout. The region supports a vibrant furbearer population, with Pine Marten, Coyote, Lynx, beaver, and Bobcat as the most common species.

Large mammals such as Bighorn Sheep, deer, elk, and Mountain Goats (as well as their predators) are locally important. Ungulates such as Mule Deer and Moose are important species for First Nations and for recreational harvests. [Section 4](#) discusses best management practices that can be applied to ensure these species continue to be part of this region.

Species such as the California Bighorn Sheep are most at-risk as they are sensitive to human disturbance. They require grasslands near a safe retreat from predators (e.g., cliffs) and wintering habitat in the valley bottoms. This species is [Blue-listed](#) because of its sensitivity to human activities and changes in habitat conditions.

Species inventory information, wildlife reports and data for vertebrates, invertebrates, plants and ecosystems can be obtained at the Conservation Data Centre or Species Inventory Web Explorer (<http://www.env.gov.bc.ca/wildlife/wsi/siwe.htm>).

California Big-horned Sheep.
Photo: Ian Routley picturebc.ca





Branched Phacelia
Photo: Aaron Reid



Plants

There are 250 federally or provincially listed plants (vascular and non-vascular) and one lichen (Cryptic Paw) that occur in the Thompson Okanagan region. The majority of these species are at the northern extent of their North American range in this region, and are therefore found in a limited number of locations. Although some of these species may be naturally rare in B.C., rural and urban development is still one of the main threats to their survival. Several of these species (Scarlet Ammannia, Small-flowered Lipocarpha, Short-rayed Aster and Toothcup) occur along lakeshores and in the past populations have been extirpated due to residential and commercial development.

Other plant species, such as Grand Coulee-owl Clover, which is found on sandy and silty soils in the open shrub-steppe or grassland, is currently under threat due to residential development. Two of the mosses (Nugget Moss, Alkaline Wing-nerved Moss) are also potentially under threat due to urban and highway development, recreational activities and all-terrain vehicle use. Another moss (Columbian Carpet Moss) that occurs in the shrub-steppe and grasslands is threatened by vineyard development. Other threats to vascular and non-vascular plants in this region include: alteration of the natural water fluctuation regime, invasive alien plant species, all-terrain vehicle use, livestock, and recreational activities.



5.7.6 Invasive Alien Species

Invasive alien species are the second greatest threat to biodiversity after habitat loss and degradation. When alien species move in, native species' populations often decrease or may even become extirpated. The total number of plant and animal species may remain the same in an area where invasive alien species have replaced native species, but the integrity and vitality of the natural ecosystem will be altered. For example, invasive alien species can alter forest fire cycles, nutrient cycling, and water flows. They can reduce crop yields and destroy terrestrial and aquatic habitats, and therefore, can have a significant impact on the economy and ecosystems of a region. They can also compete with, and transmit diseases to, native species. For more information on invasive alien species, see the [Weeds BC](#), [Alien Species](#), and [Invasive Species Council of B.C.](#) websites.

Information on the Southern Interior Weed Management Committee can be found at <http://www.siwmc.ca/>

For information on preventing the spread of Eurasian milfoil, see <http://www.env.gov.bc.ca/wat/wq/brochures/milfoil.html>.

Invasive species that are common in the Thompson Okanagan Region include Knapweed and Blueweed. For guidelines on the control of invasive species, see [Section 2.4.4](#). For more information on invasive species, see the [Alien Species](#) website and the [Noxious Weeds](#) website.

Ground disturbance associated with land development activities, recreational activities, and forest fires all increase the potential for establishment of alien invasive species.

5.7.7 Useful Sources

General Information

Ministry of Forests, Lands, and Natural Resource Operations
Regional Office (Thompson)
1259 Dalhousie Drive
Kamloops BC V2C 5Z5
Phone: (250) 371-6200
<http://www.env.gov.bc.ca/thompson/>

Ministry of Forests, Lands, and Natural Resource Operations
Regional Office (Okanagan)
102 Industrial Place
Penticton B.C. V2A 7C8
Phone: (877) 356-2029
<http://www.env.gov.bc.ca/okanagan/index.html>



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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 best management practices documents are available from <http://www.env.gov.bc.ca/wld/BMP/bmpintro.html#third>

Ministry of Agriculture and Lands fact sheets <http://www.al.gov.bc.ca/resmgmt/fppa/refguide/intro.htm>

Noxious weeds website (Kamloops Forest District) <http://www.for.gov.bc.ca/dka/NoxiousWeeds.htm>

Development around Water

Best Management Practices for Lakeshore Stabilization http://www.env.gov.bc.ca/wld/documents/bmp/BMPLakeshoreStabilization_WorkingDraft.pdf when planning developments on or near shorelines. This will help prevent erosion and maintain riparian habitats.

Water Act, Section 9 Approvals and Notifications for “Changes In and About a Stream http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/, information on Water Act notifications and appropriate timing windows

Standards and Best Practices for Instream Works <http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

Best Management Practices for Stream Crossings <http://www.dfo-mpo.gc.ca/Library/266115.pdf> for developments that will cross streams.

Best Management Practices for Installation and Maintenance of Water Line Intakes http://www.env.gov.bc.ca/okanagan/documents/BMPIntakes_WorkingDraft.pdf. These guidelines will help ensure that construction is in compliance with federal and provincial legislation and avoids lethal consequences for fish and other aquatic wildlife.

Best Management Practices for Hazard Tree and Non-hazard Tree Limbing, Topping or Removal http://www.env.gov.bc.ca/okanagan/documents/HazardTree_26May_09.pdf for information on appropriate tree management in riparian areas.

For works within the Shuswap Lake watershed, consult the Shuswap Watershed Atlas at: http://cmnbc.ca/atlas_gallery/shuswap-lake-watershed-atlas



Maps and inventory

The regional ecosystems website (<http://www.env.gov.bc.ca/okanagan/esd/ecosystems.html>) provides an index to mapping that is available in the Okanagan Region.

The regional wildlife website (<http://www.env.gov.bc.ca/okanagan/index.html>) provides a listing of wildlife-related materials (including Habitat Atlas for Wildlife at Risk: South Okanagan and Lower Similkameen).

The regional fish website (<http://www.env.gov.bc.ca/okanagan/esd/fisheries.html>) presents regional fisheries information.

The regional environmental protection website (http://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/index.html) provides access to regional flood protection information.

Habitat Atlas for Wildlife at Risk: South Okanagan and Lower Similkameen www.env.gov.bc.ca/wld/documents/so03ethier.pdf

BC Species and Ecosystems Explorer <http://www.env.gov.bc.ca/atrisk/toolintro.html>

BC Species Inventory Web Explorer <http://www.env.gov.bc.ca/wildlife/wsi/siwe.htm>

Regional Best Management Practices http://www.env.gov.bc.ca/wld/BMP/bmpintro.html#third_

Okanagan Large Lakes Protocol <http://www.env.gov.bc.ca/okanagan/esd/ollp/ollp.html>

Aquifers in British Columbia: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/aquifers/

Query the Aquifer Database http://www.env.gov.bc.ca/wsd/data_searches/wells/index.html

Aquifers and Water Wells in BC http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/aquifers/Aq_Classification/Aq_Class.html

Guide to Using the BC Aquifer Classification Maps for the Protection and Management of Ground Water http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/aquifers/reports/aquifer_maps.pdf

Drought Monitoring <http://www.livingwatersmart.ca/drought/>

Water information <http://www.env.gov.bc.ca/wsd/>

Community Mapping Network <http://www.cmnbc.ca/> (information on Sensitive Habitat Inventory and Mapping [SHIM]; Sensitive Ecosystems Inventory [SEI]; and the North Okanagan home page)



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Other References

Allan Brooks Nature Centre Stewardship Program <http://www.abnc.ca/index.php/stewardship/>

Grasslands Conservation Council of British Columbia <http://www.bcgrasslands.org>

Okanagan Lake Action Plan website www.env.gov.bc.ca/okanagan/esd/olap.html

Regional District of the Central Okanagan best practices <https://www.regionaldistrict.com/services/planning-section/environmental-planning/information/best-management-practices.aspx>

South Okanagan-Similkameen Conservation Program <http://www.soscp.org/>

Okanagan Collaborative Conservation Program <http://okcp.ca/>

Summit Environmental Consultants. 2004. Trepanier landscape unit water management plan final report. Report prepared for Regional District of Central Okanagan and Ministry of Sustainable Resource Management, June 2004. <http://www.waterbucket.ca/okw/sites/wbcokw/documents/media/27.pdf>

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>