

# British Columbia's Forests

A GEOGRAPHICAL SNAPSHOT



SEPTEMBER 2003





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# Introduction

Forest managers rely on mapping and inventory data as a way to understand and manage lands and forests. This same technology is now being used to provide factual, geographically referenced information about issues of broad public interest in the forests of British Columbia, Canada.



The following 12 maps offer a glimpse of the nature, use, diversity and sustainability of B.C.'s forests. They describe the province's vast forests, their ecological diversity, the wide range of tree species, and the fact that most lands are owned and managed by the B.C. government. They offer a detailed portrayal of the age of each forested area, showing a large proportion of old growth forest. They show forest development and disturbance, including the effects of logging, wildfire and insect infestations, the watersheds that remain largely unroaded wilderness, and the small portion of the land base that has been converted to agriculture, settlement, or other forms of development. Finally, the maps demonstrate some of the province's key conservation efforts, including parks and protected areas, other designations that conserve important environmental sites, and B.C.'s progress in protecting portions of each of its ecological regions.

These maps are intended to help answer some commonly asked questions, and to promote a greater understanding and appreciation for the lands and forests of British Columbia.

## British Columbia's Forests

People around the world have questions about British Columbia's lands and forests – How much is forested? How much old growth is there, and where is it located? Which areas are being logged? Which are protected? This document helps to answer these questions through a series of detailed maps. It offers a snapshot in time of the province's ever-changing forests, examining the kinds of trees, the age of the forests, the history of natural and human disturbance, protected areas, ownership and more.

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# Forest Land

British Columbia, Canada's western-most province, covers 95 million hectares (235 million acres) – larger than any European country except Russia, and larger than any U.S. state other than Alaska. Only 30 countries in the world are bigger.

B.C. is characterized by its abundant forests, rugged Pacific coastline, mountainous terrain, plateaus, and numerous lakes and rivers.

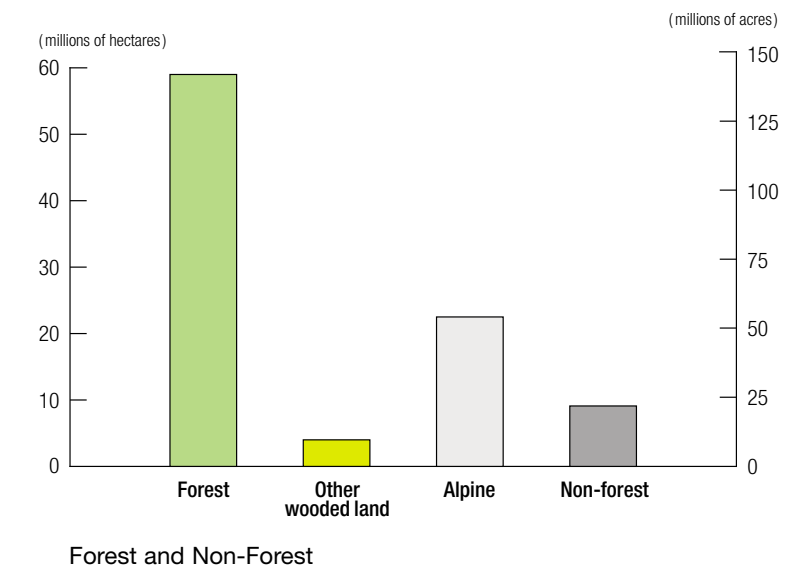
Forests cover close to two-thirds of the province – an area of almost 60 million hectares (149 million acres). These vast forests are at the heart of B.C.'s history and its current way of life. For thousands of years, aboriginal peoples have looked to the forest for shelter, clothing, food, tools and medicine. Today, B.C.'s forests are renowned around the world for their ecological values, their scenic beauty and their importance to recreation and tourism. Forestry is B.C.'s most important industry, supporting one in every seven jobs, accounting for 15 per cent of all economic activity, and contributing to the well being of dozens of communities.

Most of B.C.'s non-forest land is above the tree line in the harsh climate of the high alpine regions. Alpine tundra, rocky peaks, ice and glaciers account for almost one-quarter of B.C.'s land base. Major mountain ranges include the Coast Mountains, and two Interior (non-coastal) ranges: the Rocky and Columbia mountains.

Some parts of B.C. have sparse tree cover, but are not considered forest. These areas meet the United Nations' definition of "other wooded land". Trees cover only five to ten per cent of the land, or are stunted and do not surpass a height of five metres at maturity. These areas, which make up four per cent of the province, are often a transition from forest to non-forest areas.

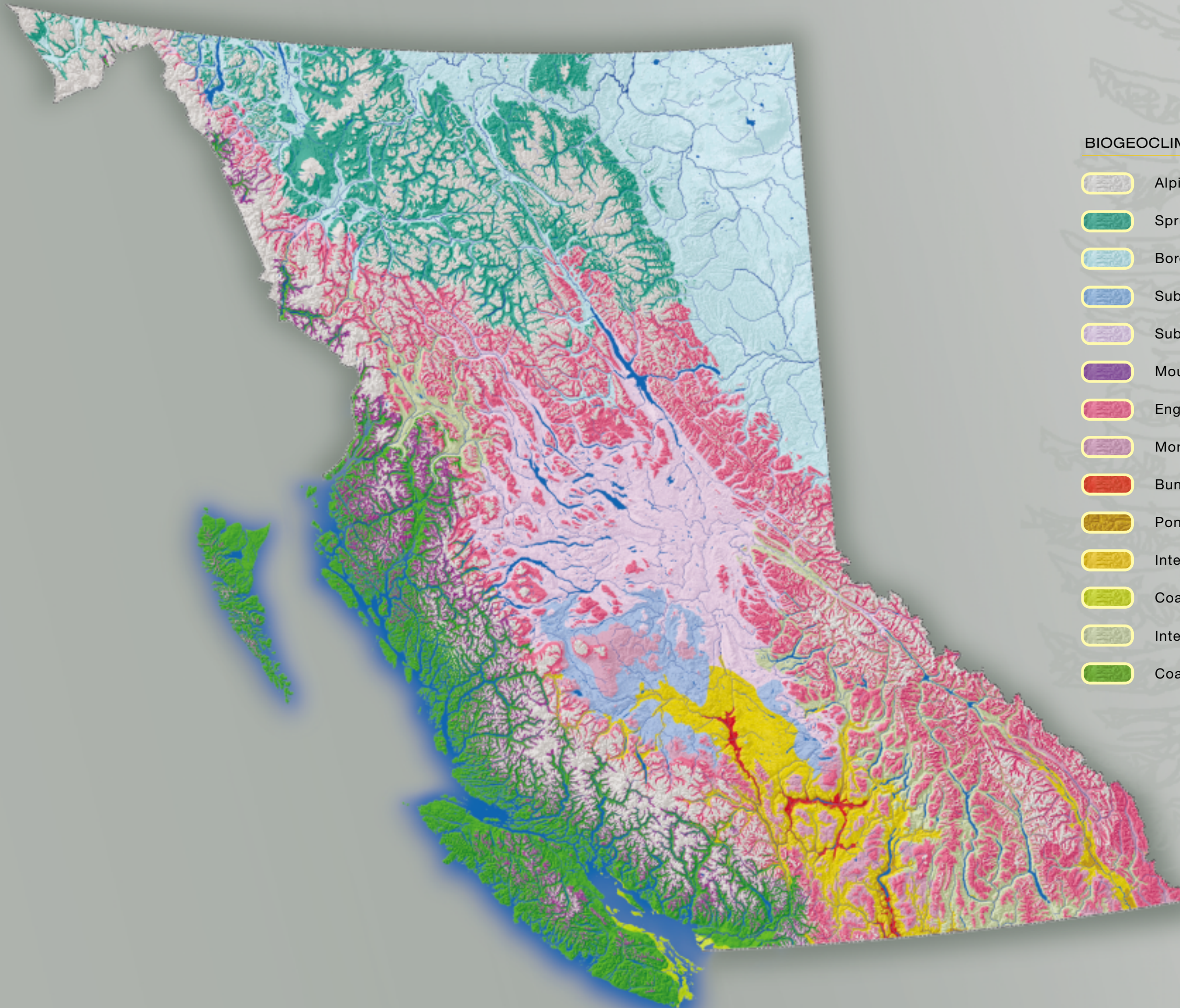
The remainder of the province is non-forest, including naturally unforested lands, and urban and agricultural areas. Naturally non-forested areas account for about eight per cent of the province. These include coastal bogs; the dry grasslands of south-central B.C. where there is some ponderosa pine or Douglas-fir; the wetlands interspersed among the northern boreal forest; and the scrub, grasslands and wetlands found in subalpine regions of the northwest.

Urban and agricultural areas account for less than two per cent of the province. Urban areas include the greater Vancouver and Victoria areas in the extreme southwest of the province, where most of B.C.'s four million residents live. Much of the remaining population is centred around the southern valleys near the U.S. border, such as the cities of Kelowna and Kamloops, and along the Fraser River which flows through much of central B.C.



Forests in west-central B.C., near Burns Lake.





BIOGEOCLIMATIC ZONES

- Alpine Tundra
- Spruce - Willow - Birch
- Boreal White and Black Spruce
- Sub-Boreal Pine - Spruce
- Sub-Boreal Spruce
- Mountain Hemlock
- Engelmann Spruce - Subalpine Fir
- Montane Spruce
- Bunchgrass
- Ponderosa Pine
- Interior Douglas-fir
- Coastal Douglas-fir
- Interior Cedar - Hemlock
- Coastal Western Hemlock



# Biogeoclimatic Zones

British Columbia is Canada's most ecologically diverse province. It has the country's only temperate desert, near Osoyoos in the far south, and North America's wettest weather station, on the west coast of Vancouver Island. It has temperate rainforests, dry pine forests, boreal forests, alpine tundra, grasslands and more. Historically, this diversity has presented a challenge to resource managers who want their actions to match the needs of each unique ecosystem.

In the 1970s, the B.C. government used research by ecologist Vladimir Krajina from the University of British Columbia to build a classification system that identified climate as the primary factor influencing ecosystem development. Government researchers mapped out 14 broad biogeoclimatic zones with distinct patterns of soil and vegetation, usually characterized by the general tree species that dominates over time.

Foresters and other resource professionals, including ecologists, soil scientists and biologists, use the biogeoclimatic system as a common language to understand the characteristics of each ecosystem and to prescribe appropriate management practices. It allows them to consider ecological variables such as climate, vegetation, terrain and soils for almost any site in B.C., and to manage the area based on its unique ecological character. For example, foresters can use the system to determine appropriate harvesting

techniques and to identify preferred species for reforestation.

Each of B.C.'s biogeoclimatic zones is divided into smaller subzones and variants based on climate conditions. Within each of these, lands are further classified at the site-specific level. For example, a site on a lower slope may have deep, moist soils while a site on a ridge may have shallow soil that drains rapidly.

Much of B.C.'s ecological diversity is a result of its northwest-southeast mountain topography, which has a major influence on climate and vegetation. Hikers on the coast would notice the change as they ascended from the rainforests of the Coastal Western Hemlock zone into Mountain Hemlock on the slopes of the Coast Mountains, and then on to Alpine Tundra, and eventually the drier forest zones on the eastern side of the mountain range. Differences between zones are equally obvious in the Interior, when the Sub-Boreal Spruce zone shifts to the Interior Douglas-fir, for example.

In the Coastal Western Hemlock zone, the abundant rainfall and mild temperatures make this rainforest one of the most productive temperate forests in the world. This contrasts with the hot, dry Ponderosa Pine and Bunchgrass zones of the southern Interior, or the severe cold of the slow-growing Boreal Black and White Spruce zone in the northeast. One of B.C.'s most extensive zones, Englemann Spruce-Subalpine Fir, is found

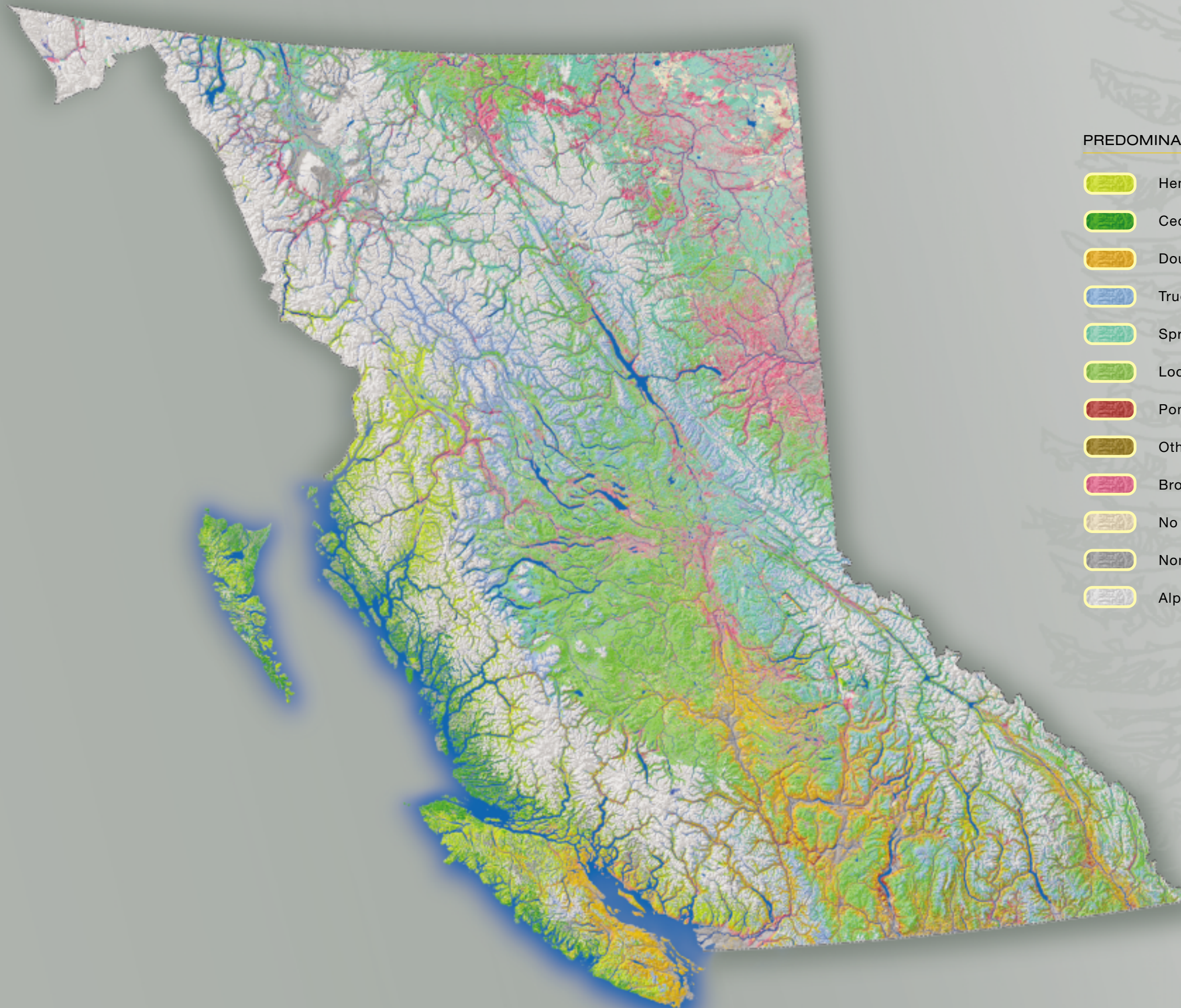
on mountain slopes ranging from northwestern B.C. to the southeast, with characteristic plant species across the zone.

The biogeoclimatic system is being refined constantly, and is becoming more detailed over time, helping to improve the understanding and management of B.C.'s ecological diversity.



Rainforests of the Coastal Western Hemlock zone.





PREDOMINANT SPECIES

- Hemlock
- Cedar
- Douglas-fir
- True Fir
- Spruce
- Lodgepole Pine
- Ponderosa Pine
- Other Conifers
- Broadleaf
- No Species Assigned
- Non-Forest
- Alpine



# Predominant Species

B.C.'s rich forest diversity includes more than 40 different species of native trees, with some of Canada's most interesting and valuable tree species.

Coniferous, or softwood, species such as pine, spruce, fir, hemlock and western redcedar are predominant in close to 90 per cent of B.C.'s forests. Most of the remaining forests are a mix of coniferous and broadleaf, or hardwood, species.

Pure stands of one tree species are not common in nature, so the map identifies the most predominant species in each area. For example, forests identified as predominantly western redcedar likely include western hemlock and Douglas-fir along the south coast, and amabilis fir and spruce on the north coast. Western redcedar is also often found in forests that are mainly hemlock, Douglas-fir, true fir or spruce.

Lodgepole pine and spruce are B.C.'s most common tree species. Lodgepole pine survives in a broader range of ecosystems than any other tree species in the province, especially east of the Coast Mountains. B.C. also has ponderosa pine, found only in the very dry forests of the southern Interior, as well as western white pine and whitebark pine.

Native spruce include white spruce throughout the Interior, Engelmann spruce at high elevations, Sitka spruce along the coast and black spruce in the northern boreal forest.

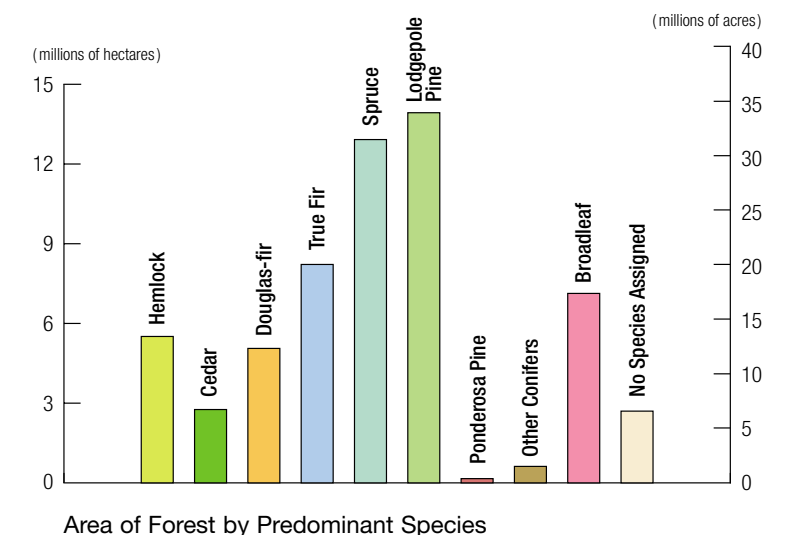
B.C.'s most common true fir is subalpine fir, which grows at high elevations throughout most of the Interior. Amabilis fir can be found on the coast, and grand fir in parts of southern B.C. Despite its name, Douglas-fir is not a fir at all, and its Latin name advertises this fact – *Pseudotsuga* means false hemlock. Douglas-fir grows in both lush coastal forests and in more sparse open Interior forests.

Western redcedar is B.C.'s official tree, and has long held great spiritual significance to coastal aboriginal people. It grows in the rich, moist soils along the coast and in B.C.'s Interior rainforest, on the lower slopes of the Columbia and Rocky mountains and, to a limited degree, in the northwest. Yellow cedar is also found in B.C.

The native hemlocks include western hemlock, found along the coast and in the Interior from sea level to mid elevations, and mountain hemlock in subalpine regions. Other native conifers are larch, yew and juniper.

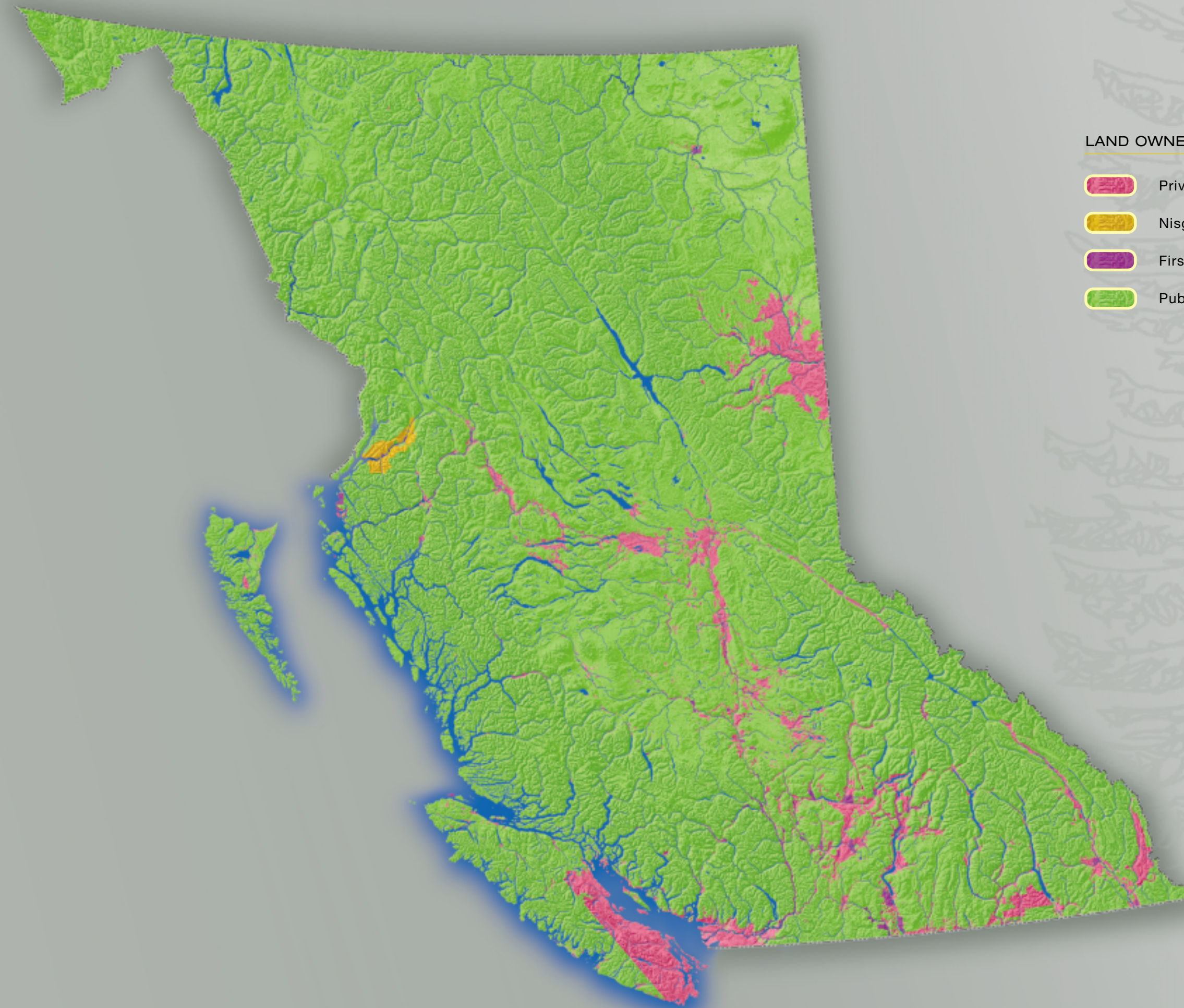
Although broadleaf trees account for only a fraction of B.C.'s native trees, they include some unique species. *Arbutus* is the country's only broadleaf evergreen tree, and bigleaf maple and Garry oak are both found only on North America's Pacific Coast. B.C.'s most common broadleaf species include trembling aspen, alder, cottonwood, balsam poplar, willow, birch and dogwood.

On the coast, the most abundant species with commercial value are hemlock, true fir, western redcedar and Douglas-fir. In the Interior, the most commonly harvested species are spruce, pine and true fir, which are used mainly for dimension lumber.



Western redcedar, B.C.'s official tree, is mostly found in coastal forests.





# LAND OWNERSHIP

- Private Land
- Nisga'a Land
- First Nations Reserves
- Public Land



# Land Ownership

One of the features that distinguishes B.C. from many other jurisdictions is land ownership. About 95 per cent of the province is owned by the B.C. government, and managed on behalf of all British Columbians. These public lands amount to almost 90 million hectares (220 million acres).

Public ownership allows the B.C. government to make decisions about the management and use of land based on social and environmental goals, including managing ecosystems, establishing protected areas, and providing opportunities for outdoor recreation.

B.C. also ensures land is managed for economic benefits, including forest development. By law, harvest levels are set for public forests, and government apportions this allowable annual cut to companies, as well as First Nations, communities and individuals. Loggers must pay fees for the timber they cut, abide by harvesting regulations to ensure sustainability, and assume forest management responsibilities such as operational planning, road-building and reforestation.

B.C.'s private lands total five million hectares (12.4 million acres). On southeastern Vancouver Island, about 850,000 hectares (2.1 million acres) were granted to two local entrepreneurs in 1884 in return for railway construction, and these lands remain

largely managed for timber production. In the Peace River region of the northeast, land was opened up to homesteaders in 1912, attracting settlers from across North America and Europe. Other parcels of private land are mostly found along the routes of the railways that opened up the province's Interior.

The Canadian government owns about 1.1 million hectares (2.7 million acres) of B.C. These lands include national parks, aboriginal reserves and military lands.

B.C. has almost 1,700 aboriginal reserves, set aside for the use and benefit of First Nations. Reserves total about 350,000 hectares (865,000 acres), and range in size from less than one hectare to more than 18,500 hectares.

The Canadian constitution and courts recognize aboriginal rights to land and resources. The B.C. and Canadian governments are working with First Nations to negotiate treaties to clarify aboriginal rights and to bring certainty regarding ownership and use of lands and resources. In May 2000, B.C.'s first modern-day land claims agreement came into effect, including the transfer of nearly 200,000 hectares (494,000 acres) of provincially owned land to the Nisga'a Nation in northwestern B.C.

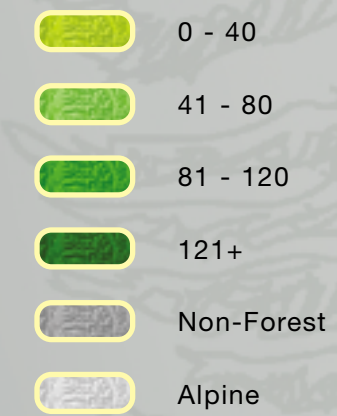


Most of B.C.'s forests are publicly owned.





FOREST AGE





# Forest Age

A mix of forest ages is not only natural, it is essential for the healthy ecosystems needed to support the province's ecological and biological diversity.

Different animal and plant species rely on forests of different ages for habitat. Deer, for example, browse on new growth, which is common in younger forests. Mountain caribou, on the other hand, survive the late winter by feeding almost exclusively on lichens in older trees. An eagle could have a nest in a mature forest and feed on mice and rabbits that live in a young forest nearby.

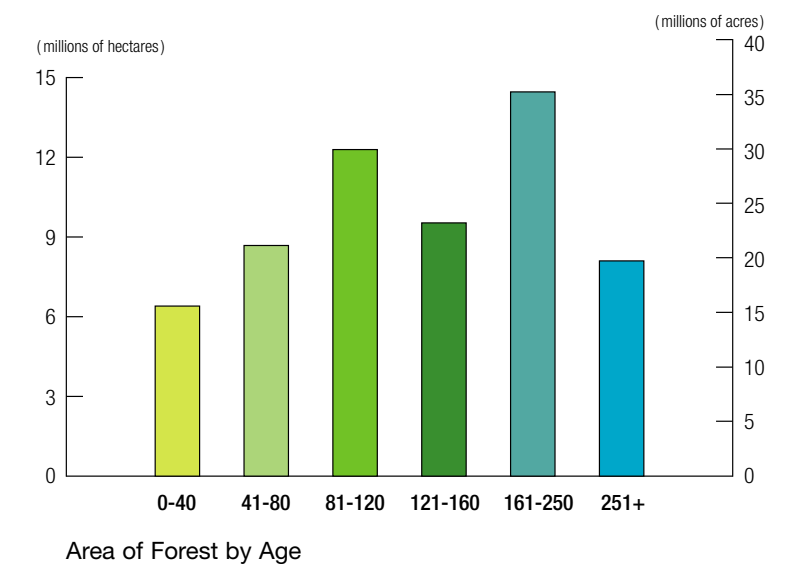
While it is not uncommon to find old trees in younger forests and saplings in old growth forests, the age classes on the map depict the dominant age in each forest.

Each forest moves through a natural cycle as it grows and ages. Depending on the site, this could involve a succession of tree species as well as changes in wildlife and plants. For example, western hemlock, Douglas-fir and western redcedar might compete to establish themselves on a cleared site on southern Vancouver Island. At 15 years, Douglas-fir could predominate; at 50 years, the Douglas-fir could share the site with shade-tolerant western hemlock and western redcedar; after several centuries, the Douglas-fir would mostly die out leaving other conifer species.

At any stage during its development from youth to old age, a forest can be subject to wildfire, insect infestations, blowdowns and other natural events. These impact large or small areas of forest, and in many cases, lead to the establishment of a young forest, and the cycle continues. These natural disturbances produce a mix of forest ages across the province, contributing to ecological diversity and providing different habitats to suit a range of species.

Logging, which began about a century ago, has resulted in the conversion of some older forests to younger forests, which may be harvested in rotations as short as every 60 years. Modern fire fighting has had the opposite result, allowing more forests to reach an older age. Forest managers consider these influences, and strive to produce a natural mix of forest ages across the landscape.

Forty per cent of the province's forests range from 121 to 250 years of age. This includes trees that are considered old growth in the Interior. Another 14 per cent of B.C.'s forests are more than 250 years old. These forests are concentrated along the coast and in the Interior wet belt where there are fewer natural disturbances such as fire and insect infestations.



A black bear in a young forest.





# OLD GROWTH

- Old Growth Forest
- Other Forest
- Non-Forest
- Alpine



# Old Growth

Every type of forest is distinct, and there is no internationally accepted definition of an old growth forest. B.C. scientists have developed a working definition based on the age when the province's different forest ecosystems typically begin to develop old growth characteristics.

B.C.'s coastal forests are considered old growth if trees are more than 250 years old. In the Interior, where trees have a shorter life span and wildfires are more common, old growth is defined as more than 120 years of age for forests dominated by lodgepole pine or broadleaf species, and more than 140 years for all other forests such as Englemann spruce, white spruce and Interior Douglas-fir.

Based on these working definitions, 40 per cent of B.C.'s forests are considered old growth – an area of 25 million hectares (62 million acres). The proportion is higher in the coastal rainforest, where about 55 per cent of the forest – four million hectares (almost 10 million acres) – is old growth.

While characteristics vary according to location and species, old growth forests tend to have more standing dead trees, or snags, and fallen trees than younger forests. The trees are often larger, and the forest canopy is layered, with openings that allow light, encouraging the growth of ferns, berry bushes and mosses.

Large trees and decaying woody materials such as standing dead trees and fallen trees provide nests, dens and food for many birds, mammals and amphibians. Some species depend on old growth forests to survive, such as the marbled murrelet, a coastal bird that nests in moss on the thick branches of old trees.

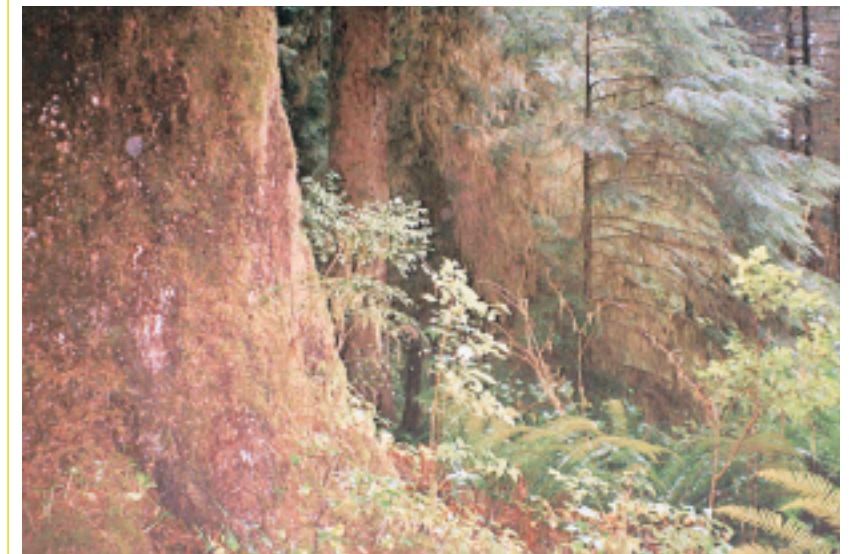
As well as their biological and ecological importance, old growth forests have rich spiritual and cultural values, especially for aboriginal people who hold great respect for the forest. B.C. law protects trees known as culturally modified trees which were altered by First Nations people before 1846 as part of their traditional use of the forest.

B.C. has some of the oldest trees in Canada. In B.C.'s rainforests, for example, there are western redcedar, yellow cedar and mountain hemlock that are more than 1,500 years old. Most of B.C.'s tree species have a much shorter life span.



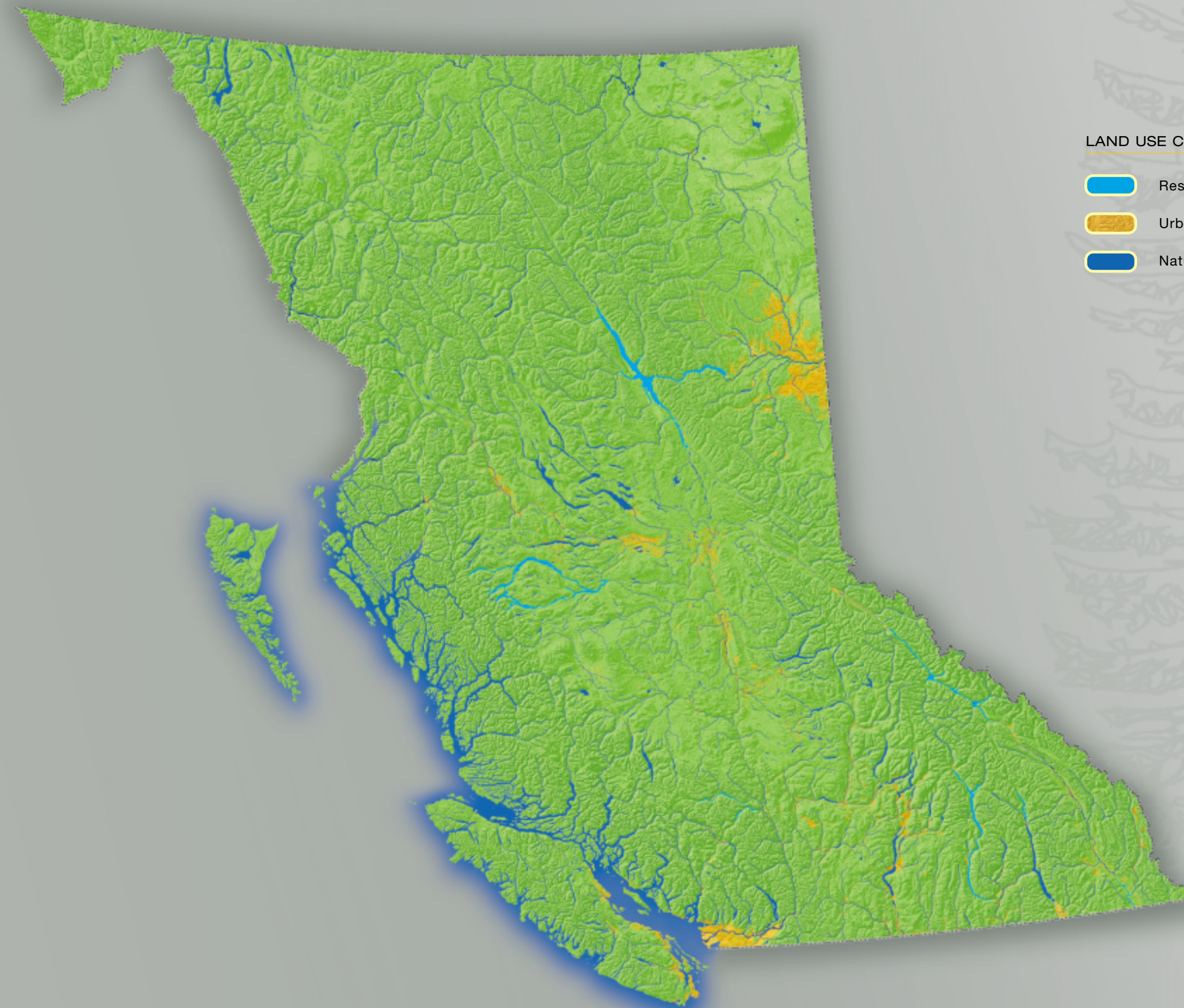
Standing dead trees provide wildlife habitat.

A birch or poplar tree is old at 60 years; lodgepole pine usually lives about 125 to 150 years; subalpine fir and white spruce 200 to 300 years; Englemann spruce about 300 to 400 years, and Douglas-fir about 300 in the Interior and 500 on the coast.

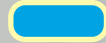




Old growth coastal rainforest.





#### LAND USE CONVERSION

-  Reservoirs
-  Urban, Agriculture, and Mining
-  Natural Lakes



# Land Use Conversion

In most areas of the world, a large portion of land has been converted to farmland, settlement or other forms of development. This is not the case in B.C.

Ninety-eight per cent of the province's land has never been converted, and remains as forest, grassland, lakes and other natural areas. For example, while some forests have been logged and reforested, only a small portion has ever been permanently converted to other uses such as farms and urban development. That means that B.C. has roughly the same amount of forest as it did before European settlement.

Only about two per cent of B.C.'s land base has been converted from its natural state to other uses over time. This land – which was once forest, grasslands and other areas – is now farmland, urban areas, hydroelectric reservoirs, mines and recreational developments.

In total, 1.4 million hectares (3.5 million acres) have been converted to agriculture. B.C. produces a greater variety of agricultural products over a wider range of geographic and climatic conditions than any other area in Canada. The flat, fertile Fraser Valley east of Vancouver has almost half of B.C.'s farms, producing dairy and other products. In the northeast Peace Region, farms and ranches were carved out of boreal forest and brush nearly a century ago. The Okanagan Valley near Kelowna is famous for its orchards and vineyards. Other agricultural regions include the

Bulkley Valley in the northwest, and the Creston Valley in the far south, as well as cattle ranches in the southern Interior.

Cities and towns occupy roughly 375,000 hectares (926,000 acres) of the province. Greater Vancouver, home to half of B.C.'s four million residents, was once a dense forest of Douglas-fir, western redcedar and western hemlock. Other urban areas include Victoria, development along the southeast coast of Vancouver Island, and cities and towns along rail lines and highways through the rest of the province.

The development of B.C.'s reservoirs flooded natural lakes, forests and non-forest lands. B.C.'s reservoirs occupy 370,000 hectares (914,000 acres), with hydro-electric generation producing 90 per cent of the province's power. In the north, the WAC Bennett Dam, built in 1968, flooded spruce forests near Mackenzie to create Williston Reservoir, the second-largest reservoir in North America with a surface area of 177,300 hectares (438,000 acres).

Mining, which affects about 60,000 hectares (148,000 acres), has been part of B.C.'s history since the late 1850s when a gold rush opened up the Interior of the province, and coal mines were being developed on Vancouver Island. Today, mining is a major contributor to the economy, producing copper, gold, silver, lead, zinc, molybdenum, coal and industrial minerals.

Recreational uses such as ski resorts and golf courses have resulted in the conversion of a little more than 25,000 hectares (62,000 acres).

	Millions of Hectares	Millions of Acres
Agriculture	1.36	3.36
Urban	0.38	0.93
Reservoirs	0.37	0.91
Mining	0.06	0.14
Recreation	0.03	0.07
<b>TOTAL</b>	<b>2.19</b>	<b>5.41</b>

Area Converted

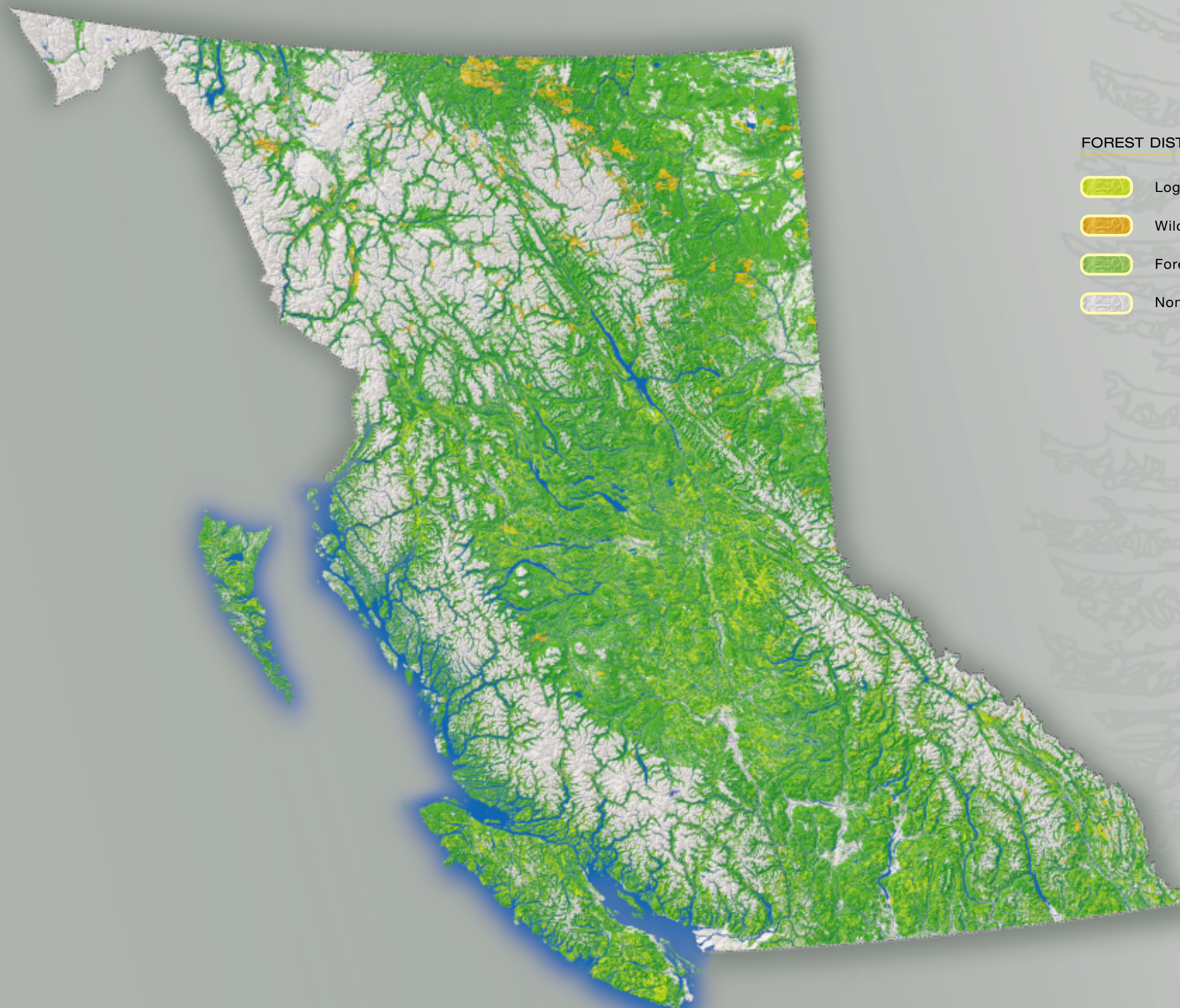


Agricultural land at Vaseux Lake in the Okanagan.



FOREST DISTURBANCE - 20 YEAR PERIOD

- Logging
- Wildfire
- Forest
- Non-Forest and Alpine





# Forest Disturbance – 20 Year Period

Ever since B.C.'s forests came into existence, they have been changing as a result of wildfire, insect infestations, disease, windstorms and avalanches. This map shows some of the major disturbances during a recent 20-year period.

Insect infestations cause the most damage to forests, but their impact is not shown on the map because the infested trees remain standing, and are generally not captured in forest inventory aerial surveys. Also, infested areas are often harvested (and reforested) to salvage dead trees or to prevent the spread of the infestation.

The impact of insects varies widely from year to year. Over the 20-year period covered on the map, insects affected an average of 670,000 hectares (1.6 million acres) annually, ranging from a low of 213,000 hectares in one year, to a high of 1.5 million hectares in another. B.C.'s largest known infestation is now under way, and so far 1.9 million hectares (4.7 million acres) of pine forest in the north-central Interior have been affected by mountain pine beetle.

Wildfire is a frequent natural occurrence in most of B.C.'s forests. The largest fires tend to occur in the northern boreal forest because of the flat, rolling terrain and shifting winds; the even-aged spruce and pine forests resulting from earlier fires provide a homogenous fuel that burns easily.

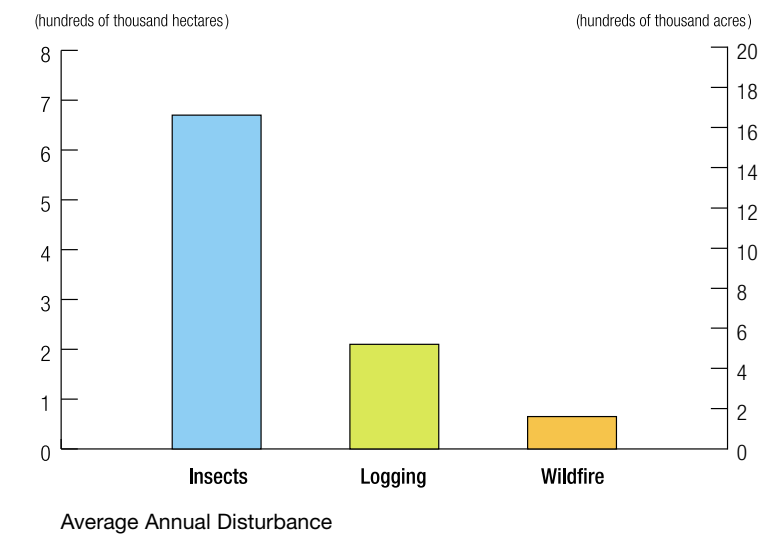
Fire helps to renew forest ecosystems. Lodgepole pine needs fire or heat to release its seeds from cones that are protected by a seal of pitch. Douglas-fir, ponderosa pine and western larch have thick bark so they can survive surface fires that clean out competing vegetation.

Before fire suppression was introduced in 1905, fires likely burned, on average, more than 500,000 hectares (1.2 million acres) of forest each year. Today, the annual impact is much lower; however, numbers can fluctuate widely. During the 20-year period covered on the map, fires burned an average of 65,000 hectares (161,000 acres) a year, ranging from a low of 3,800 hectares in one year, to a high of 348,000 hectares in another.

Unlike fire and insect infestations, the amount of forest logged is fairly consistent. During the 20-year period covered on the map, an average of 210,000 hectares (519,000 acres) was logged annually – slightly higher than current harvest levels of about 195,000 hectares (482,000 acres).

Logging occurs in less than one-third of one per cent of B.C.'s forests each year. The province's chief forester sets harvest levels, and logging takes place in accordance with a comprehensive set of regulations to protect fisheries, wildlife, biodiversity, old growth, water and other values.

Soon after public land is logged, it is reforested with species suited to local ecological conditions to maintain natural diversity.



Recent logging on the coast.





#### ROAD DENSITY BY WATERSHED

- Less than 0.1 km of road per km<sup>2</sup>
- 0.1 - 0.69 km of road per km<sup>2</sup>
- 0.7 - 1.99 km of road per km<sup>2</sup>
- 2.0 km and greater of road per km<sup>2</sup>



# Road Density By Watershed

One way to gauge the wilderness quality of an area is to measure the number of roads. Road density is an indication of the influence of human activity on an area, and the state of its wildlife populations and natural processes. This map displays the road density in more than 18,000 watersheds (areas that drain into a stream, lake or other watersystem), averaging about 5,000 hectares (12,000 acres) each.

B.C.'s road density is relatively low compared to most jurisdictions. Three-quarters of the province fits into the two least-roaded categories, and these watersheds would therefore have wilderness or near-wilderness qualities. Most of these meet the strictest category, having less than one-tenth of a kilometre of road for every square kilometre of land (0.16 miles of road per square mile). Only a small portion of the province – less than three per cent – fits within the most heavily-roaded category of two kilometres or more road per square kilometre of land (3.2 miles or more road per square mile).

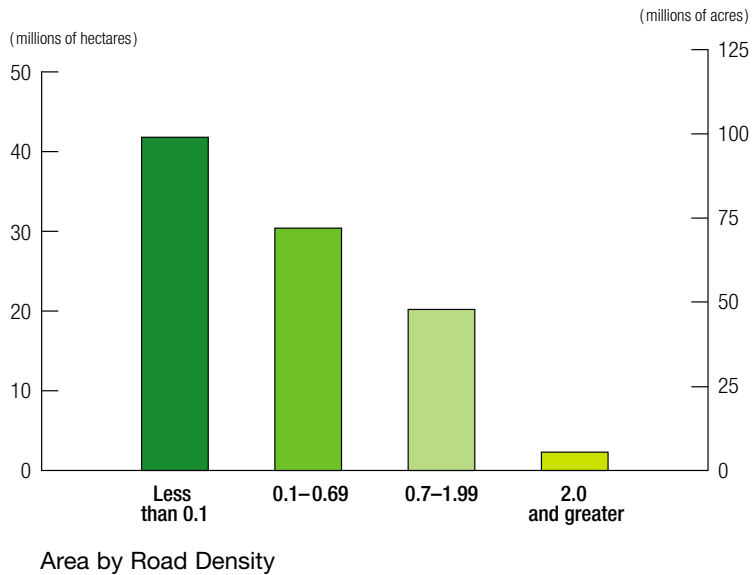
Research into road density within ecological regions has found similar results. In almost half of ecosections, more than 60 per cent of the area is free from the influence of roads or seismic lines (used for oil and gas exploration). About one-third of ecosections are more than 80 per cent road-free.

Both roaded and unroaded areas are important in a province such as B.C. Roads provide much-needed

access for people to use and enjoy the natural environment and resources, contributing to economic growth, and providing access for recreation opportunities such as camping and hiking. On the other hand, unroaded areas are important for wildlife, as roads may fragment habitat, and increase hunting and fishing pressure. Undeveloped areas also offer backcountry recreation in wilderness-like surroundings to meet the growing interest in wilderness tourism.

Some wildlife species are particularly vulnerable to roads. Grizzly bears, for example, range over hundreds of kilometres, and are especially sensitive to disturbances. Studies have found that in some areas of B.C., grizzly bear populations may start to decline when road density reaches 0.4 kilometres per square kilometre, depending on the amount and type of traffic. The impact on bull trout may begin at 0.1 to 1.31 km/km<sup>2</sup>, on elk at 0.62 km/km<sup>2</sup>, and on black bears at about 1.25 km/km<sup>2</sup>. Efforts to reduce the impact of roads include restricting road access, dismantling roads that are no longer needed, and increased use of helicopter logging which reduces the amount of road construction.

An estimated three-quarters of B.C.'s roads are used for resource development and recreation, and tend to have less traffic or more seasonal use than main and secondary highways, which account for the remaining one-quarter of roads.



Grizzly bears are sensitive to disturbances such as roads.





#### PROTECTED AREAS

- Protected Forest
- Protected Non-Forest
- Proposed Protection Areas - Forest
- Proposed Protection Areas - Non-Forest



# Protected Areas

B.C.'s parks and protected areas cover more than 12 per cent of the land base, or about 12 million hectares (30 million acres) — almost the size of New York State, or larger than Austria and the Netherlands combined.

B.C. has more than 800 protected areas set aside to protect representative examples of the province's natural diversity and cultural heritage. These areas serve as scientific benchmarks to further our understanding of the natural world. They act as nature preserves to protect wildlife habitat and important sites, including fragile sites and endangered species habitat. They also serve as places for education, inspiration and recreation.

No commercial timber harvesting or industrial development is allowed in B.C.'s protected areas. Virtually all of B.C.'s protected areas are classified as categories I to III — the strictest of the six categories recognized by the World Conservation Union (IUCN). This recognizes lands managed for purposes such as ecological monitoring, scientific research, wilderness preservation and ecosystem protection.

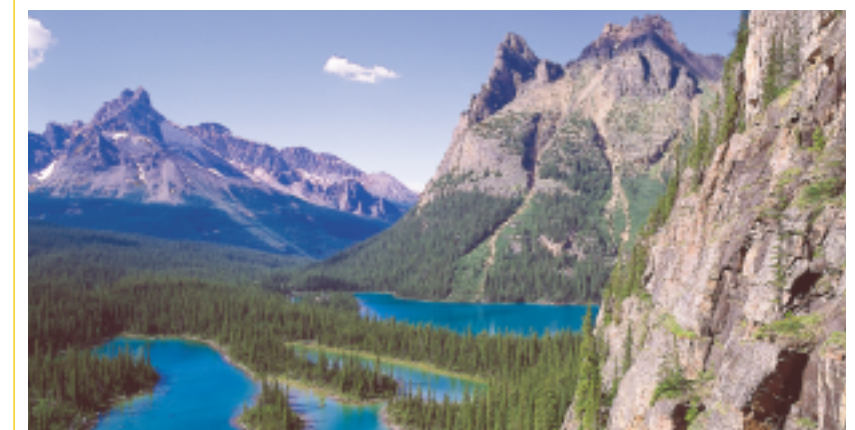
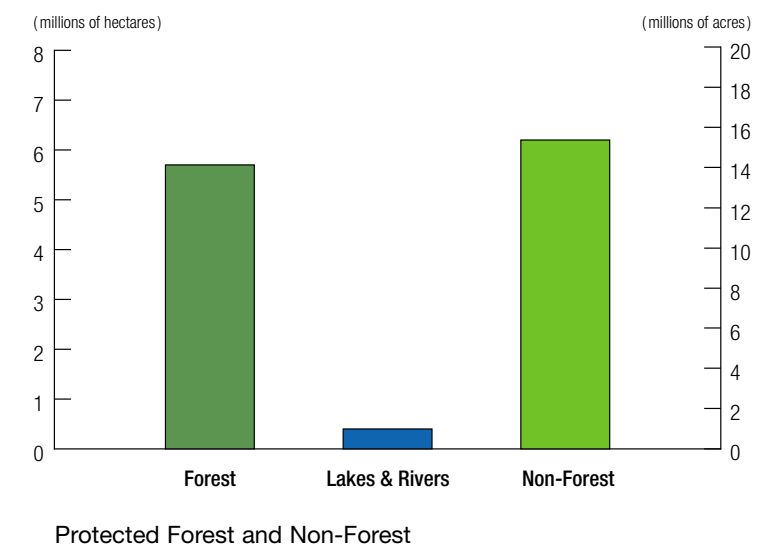
Roughly half of B.C.'s protected areas are a direct outcome of recent land use planning. Since 1992, communities, resource industries, conservation groups, First Nations, recreation groups, and others have worked together to identify which lands should be protected, and which should be available for other uses.

At the time of this report, land use planning is nearing completion in coastal areas, and will result in additional protected areas. Proposed protection areas, identified in the preliminary land use plan for the Central Coast, are off-limits to logging to conserve ecological values until final land use decisions are made.

B.C.'s protected areas system has expanded dramatically over the past few decades — from three per cent of the land base protected in 1970, to about six per cent in 1991, and more than 12 percent today. The amount of forest in protected areas (including proposed areas on the Central Coast) has almost doubled over the past decade to 5.7 million hectares (14 million acres). That includes 3.7 million hectares (9.1 million acres) of old growth, which in turn includes 920,000 hectares (2.2 million acres) in coastal or Interior rainforests.

Many of B.C.'s protected areas are of national and international significance. Tatshenshini-Alsek Park in northwestern B.C., along with adjacent parks in Alaska and the Yukon, form the world's largest international protected area, and this has been designated a World Heritage Site. International recognition has also been given to parks in the Rocky Mountains, and on the Queen Charlotte Islands (also known as Haida Gwaii). More than 25 parks are greater than 100,000 hectares (247,000 acres), helping to preserve wilderness and




wildlife. B.C.'s largest park, Tweedsmuir, in west-central B.C., is 990,000 hectares (2.4 million acres), and includes areas of pristine wilderness. Kitlope Heritage Conservancy is the largest protected intact coastal temperate rainforest in the world. Other protected areas include the Khutzeymateen Grizzly Bear Sanctuary, and sites protecting the rare desert habitat of the southern Interior.



Yoho Park, a World Heritage Site in the Rocky Mountains.



PROTECTED AREAS and  
SPECIAL MANAGEMENT ZONES

-  Protected Areas
-  Proposed Protection Areas
-  Special Management Zones





# *Protected Areas and Special Management Zones*

As well as leading to protected areas, land use planning has resulted in the creation of special management zones where natural, cultural and recreational values take precedence over development. About 14 per cent of the province has been designated for special management – an area of almost 14 million hectares (34 million acres).

Special management zones serve an important role in conserving important wildlife habitat and areas with sensitive or significant values. They are often adjacent to protected areas, offering further protection for those natural features. Many also provide wildlife travel corridors, and help reduce the risk of isolating or fragmenting ecosystems. They are generally undeveloped, with few roads.

While special management zones are not considered protected by B.C.'s standards, many have management objectives or standards that are comparable to protected area categories IV and VI of the World Conservation Union's (IUCN) classification system. Each special management zone is managed to conserve the specific features that led to its designation, so standards can vary widely between different zones. For example, while most areas will allow some resource development, there are a few where logging is prohibited.

In the north, more than 4.5 million hectares (11 million acres) of special management zones are inter-

spersed with 1.7 million hectares (four million acres) of protected areas in the Muskwa-Kechika region. This massive region is often called North America's Serengeti because of its outstanding wildlife, including intact predator-prey systems. These special management zones are carefully managed to ensure that logging, mineral exploration and oil and gas exploration are sensitive to wildlife and environmental values. This has included detailed management plans to address all resource values, a multi-stakeholder advisory board, a trust fund to support conservation efforts, and cooperative agreements with aboriginal people.

In the Robson Valley region of east-central B.C., a quarter of the land base is in special management zones, conserving habitat for grizzly bears, mountain goats and woodland caribou, as well as protecting old growth forests, domestic water quality, scenic values and biodiversity.

In addition to protected areas and special management zones, B.C. has several other designations that help to conserve natural values in forests. This includes Wildlife Management Areas, Wildlife Habitat Areas for species at risk, Ungulate Winter Ranges for species such as caribou, Community Watersheds, Scenic Areas, Recreation Sites and Trails, Riparian (streamside) Management Areas, Lakeshore Manage-

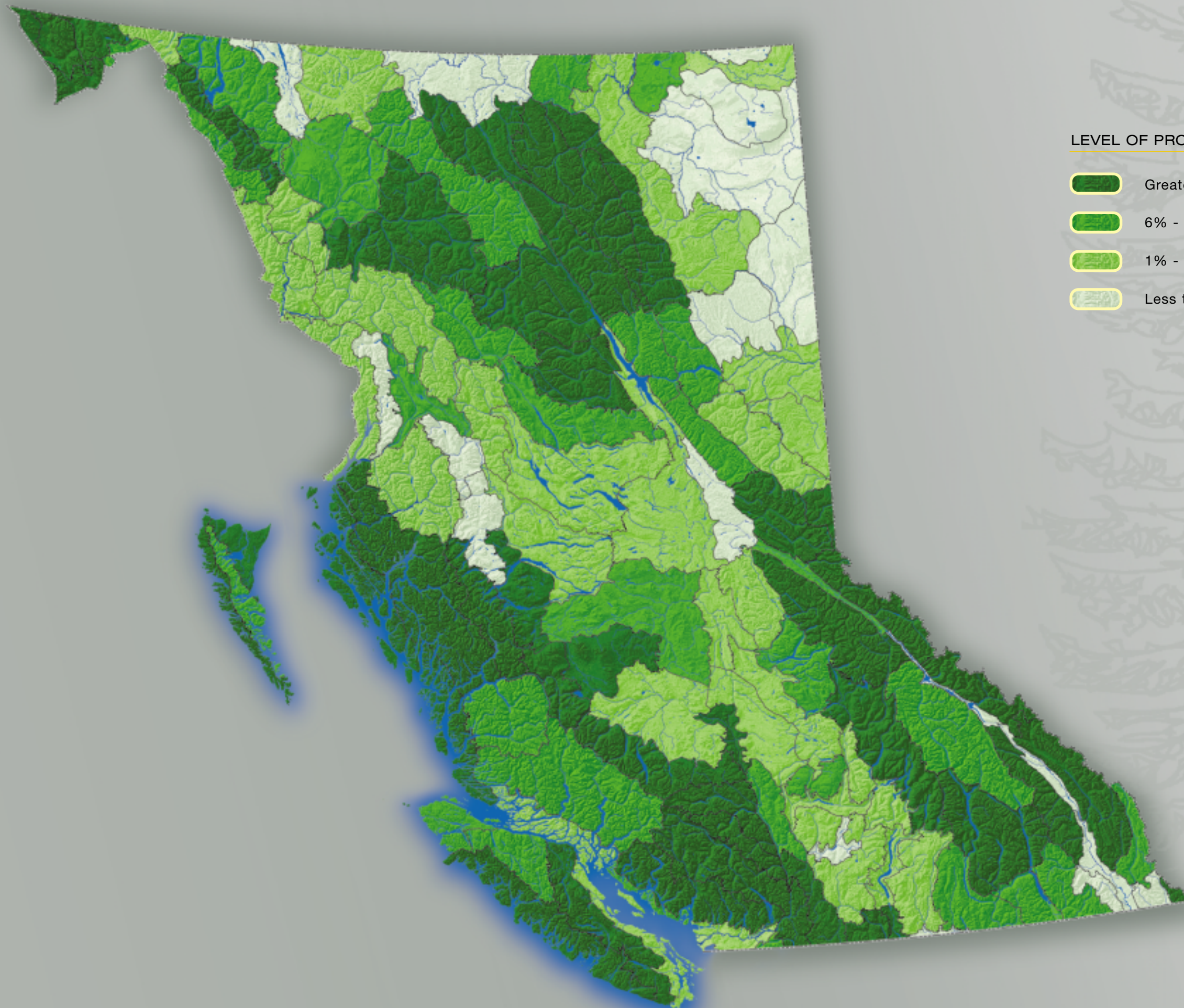
ment Zones, and Old Growth Management Areas. These designations are linked with forest practices regulations to conserve natural values.

In all public forests, harvest plans and practices must address the values found in the area. This might mean protecting cultural heritage values, conserving important wildlife habitat, or ensuring that forest development provides for the safe passage of fish. In some cases, this would involve the creation of reserves where logging would be prohibited, such as along large fish-bearing streams.



Protected areas and special management zones conserve large areas of the Muskwa Kechika, in the Northern Rockies.





LEVEL OF PROTECTION BY ECOSECTION

- Greater than 12% Protected
- 6% - 12% Protected
- 1% - 6% Protected
- Less than 1% Protected



## *Level of Protection by Ecoregion*

B.C.'s commitment to biodiversity conservation is reflected in its approach to the establishment of protected areas.

In protecting more than 12 per cent of the overall land base, B.C. has made an effort to protect representative examples of the province's ecological diversity. The goal has been to protect portions of each ecosystem and its characteristic habitats, animals, plants, landforms, and cultural and recreation values.

This map shows the level of protection in B.C.'s terrestrial ecoregions — areas with distinct climate, ecological features, and plant and animal communities. Ecoregions are part of a classification system that provides a common reference point for wildlife biologists, similar to the way the biogeoclimatic system is used primarily by foresters.

Protecting portions of each ecoregion helps ensure that the protected areas system represents the natural diversity of the province. It ensures that ecologically significant areas are permanently preserved in their natural state, benefiting future generations, and helping to further our understanding of natural processes.

There have been sharp increases in the percentage of protected land in B.C.'s ecoregions. In 1991, only 17 of B.C.'s 132 terrestrial ecoregions had more than 12 per cent of their total area protected; by 2002, 45 had achieved this high level of protection

Conversely, 76 ecoregions had less than one per cent of their total area protected in 1991; this dropped to 21 by 2002.

The level of ecoregion protection on the coast is expected to increase as a result of cooperative land use planning now taking place on the Central Coast, North Coast and Queen Charlotte Islands (Haida Gwaii). The map includes the proposed protection areas on the Central Coast, identified in the preliminary land use plan, where logging is prohibited until final land use decisions have been reached.

Ecoregions with the highest level of protection include those containing some of B.C.'s largest parks, such as Northern Rocky Mountains and Spatsizi Plateau Wilderness in the north, Tweedsmuir and Wells Gray in the Interior, Strathcona on Vancouver Island, and Garibaldi near Vancouver. Three ecoregions in the far northwest where Tatshenshini-Alsek provincial park is located have from 67 to 100 per cent of their area protected.

There tends to be less protection in areas where more of the land is privately owned. That includes the Peace Lowland in the northeast, the Bulkley Ranges and McGregor Plateau in the central Interior; and the Southern Okanagan Highland, Nicola Basin and Northern Flathead Valley in the south. In some areas,

low levels of protection are adjacent to high levels of protection; in the northeast, for example, local residents and stakeholders advocated high levels of protection in the ecologically significant Northern Rockies area, while maintaining resource development opportunities in some other ecoregions.



Tatshenshini-Alsek Park, in the northwestern corner of B.C.



# Technical Appendix

*This appendix provides technical information about the production of the maps in this publication, including data sources and definitions.*

## Data Sources

The primary data source for the majority of the maps is the Seamless Forest Cover Inventory, a large spatial database with detailed information on B.C.'s forests. This inventory was assembled over the past two years from four spatial databases described below. The first three are interpreted from air photos, calibrated with ground samples, and mapped at 1:20,000 scale (it requires about 7,000 map sheets to cover B.C. at this scale). Unless specified otherwise, databases are maintained by the B.C. government.

The Timber Supply Area (TSA) Inventory covers more than 90% of the province, providing information on forest attributes (species, ages, volumes, ownership, etc.) and non-forest areas (lakes, urban areas, etc.). The Tree Farm Licence (TFL) Inventory, consisting of data maintained by forest companies holding tree farm licences, was used for 6% of the province.

Information is similar to the TSA inventory; however, the quantity and quality of data, such as updating for harvesting or burns, varies between TFLs. The Park Inventory covers 2% of the province (part or all of 11 of B.C.'s parks), and is similar to, but more generalized, than the other inventories.

These inventories are based on aerial photography and field work from the 1960s to the 1990s for the TSA and TFL inventories, and the 1950s for the Park Inventory. Inventory data was updated for

disturbances (burns, harvesting and insect infestations) in the late 1990s and 2000 for the TSA Inventory, between 1993 and 1997 for the TFL Inventory, and in the early 1990s for the Park Inventory. Tree ages were projected to January 2000 for the TSA inventory, and January 1999 for the TFL and Park inventories. Species composition of forests changes over time, but this ecological succession is not modelled in the projection.

A Proxy Inventory, based on Baseline Thematic Mapping (BTM), a more generalized database, and biogeoclimatic ecosystem classification (BEC), was used for the remaining 2% of the province not covered by the TSA, TFL and Park inventories. This inventory is comprised largely of private land and a few protected areas. The BTM database, which was compiled from Landsat satellite imagery from the early 1990s, consists of 20 generalized land use and land cover classes covering the province.

## Forest Land

The definitions of "forest" and "other wooded land" used to create this map are based on the temperate and boreal forest contribution, by the United Nations Economic Commission for Europe and the Food and Agriculture Organization of the United Nations, to the Global Forest Resources Assessment 2000. Forest is defined as an area greater than half a hectare where the crowns of the trees cover more than 10% of the area, and trees are able to reach a minimum height of five metres at maturity. Young forests that do not meet these criteria due to natural or human

disturbance but which can be expected to eventually meet the criteria are also considered forest. Other publications have used less restrictive definitions of forest, and therefore reported slightly larger areas of forest in B.C.

## Predominant Species

Forest cover inventories identify up to six different tree species within a forest stand. To produce this map, the species with the highest percentage composition was considered predominant. For older forest stands, the predominant species was based on the species with the highest volume. For younger stands, it was based on the species with the highest number of individual trees.

For the 1.4 million hectares of forest in the Proxy Inventory, predominant species were based on BTM and BEC information. The most frequently occurring leading species in a BEC subzone and variant, as observed by age class in the TSA, TFL and Park inventories, was applied to forest areas, by age class, in the BTM database.

Areas on the map identified as "no species assigned" had young forests of undetermined species at the time of inventory.

## Forest Age and Old Growth

Forest age was based on projected age for the TSA, TFL and Park inventories. For the 1.4 million hectares of forest in the Proxy Inventory, the BTM database was used to determine forest age. For the Forest Age map, BTM areas classed as recently logged or burned (in



approximately the past 20 years) were included in the 0 - 40 year age class; BTM areas classed as young forest (21 – 140 years) were included in the 41 – 80 year category; BTM areas of old forest (more than 140 years) were included in the 121 + year category. For the Old Growth map, BTM areas classified as forest more than 140 years old were considered old growth.

#### **Land Use Conversion**

This map was largely based on BTM land cover classes, which include urban areas, agricultural, mixed agricultural and residential, mining and recreation. Road networks existing outside these land use conversion categories were not included in the analysis.

#### **Forest Disturbance – 20 Year Period**

This map shows disturbances over a 20-year period from 1975 to 1995. This 20-year period represents the most recent province-wide analysis of disturbances, and was based on the BTM database.

#### **Road Density by Watershed**

This map was developed using Watersheds B.C., a statistical and mapping tool for the province's watersheds. Road density information was calculated using the 1:20,000 road network information from the Terrain Resource Information Management database, and summarized at the watershed level. Other publications have used groupings of watersheds rather than individual watersheds, and have therefore reported different numbers for each road density category.

#### **Protected Areas**

This map includes provincial protected area designations (ecological reserves, parks, etc.) and national parks, but not regional or municipal parks or wildlife management areas.

Protected forest and non-forest categories were determined based on the definition of forest land described above. Other publications have used different definitions, and have therefore produced slightly different results.

#### **Level of Protection by Ecosession**

The number of ecosessions in B.C. has expanded over the years due to advances in scientific understanding and mapping. This map is based on the current classification of ecosystems, which includes 132 ecosessions that are either terrestrial or a mix of terrestrial and saltwater areas. Other publications have used older classifications of ecosystems, and therefore reported different numbers of ecosessions in each category of protection.

At least 11 of the ecosessions shown on the map have areas of saltwater as well as land. The level of ecosession protection is based on the percentage of land protected as a percentage of the overall amount of land in the ecosession.

Some ecosessions extend beyond the province's borders, and in some cases, only a small portion of the ecosession occurs in B.C. The map shows the percentage of protection in the portion of the ecosession found in the province.

#### **For more information**

*Interactive version of the maps in this document:*

<http://www.bcforestinformation.com/maps/frames.htm>

*B.C.'s forests and their management:*

[www.growingtogether.ca](http://www.growingtogether.ca)

[www.bcforestinformation.com](http://www.bcforestinformation.com)

*Biogeoclimatic System:*

<http://www.for.gov.bc.ca/hre/becweb/index.htm>

*Tree species:*

<http://www.for.gov.bc.ca/hfd/library/documents/treebook/>

*Setting annual harvest levels:*

<http://www.for.gov.bc.ca/hts/>

*Fire protection:*

<http://www.for.gov.bc.ca/protect/>

*Mountain pine beetle infestation:*

[http://www.for.gov.bc.ca/hfp/bark\\_beetles/](http://www.for.gov.bc.ca/hfp/bark_beetles/)

*B.C. parks:*

<http://wlapwww.gov.bc.ca/bcparks/>

*Central Coast land use planning:*

<http://www.growingtogether.ca/centralcoast/index.htm>

*Special Management Zones:*

<http://srnwww.gov.bc.ca/rmd/smz/index.htm>

*Environmental Trends 2002 report:*

<http://wlapwww.gov.bc.ca/soerpt/>

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BRITISH COLUMBIA'S APPROACH

CONSERVE VAST AREAS OF FORESTS

BALANCE ENVIRONMENTAL, ECONOMIC AND SOCIAL VALUES

INVOLVE BRITISH COLUMBIANS IN DECISION-MAKING

STRIVE FOR CONTINUAL IMPROVEMENT IN FOREST MANAGEMENT

WELCOME INDEPENDENT OBSERVATION

