

# Biodiversity

IN BRITISH COLUMBIA

*The diversity of life forms, so numerous that we have yet to identify most of them, is the greatest wonder of this planet.*

E.O WILSON, EDITOR  
BIODIVERSITY, 1988



David F. Fraser



Ministry of Environment, Lands and Parks  
Ministry of Forests

British Columbia encompasses **more ecosystems and more species** than any other province in Canada.

British Columbia is the most biologically diverse province or territory in Canada. From the Pacific coast to the heights of the Rocky Mountains, the province encompasses a wide range of ecosystems.

The natural landscape includes coastal rainforests, deluged with over three metres of rainfall annually, and desert-like steppes in the southern interior, where precipitation seldom exceeds 350 mm. British Columbia contains ecosystems, such as the enormous boreal forest, that occur in many other places in the world, as well as highly specialized ecosystems such as the winter-wet, summer-dry mild climates of the Gulf Islands. What is unique to British Columbia is the complicated mixture of these ecosystems across the province. Starting in the 1990s, land- and water-use decisions have focussed on maintaining British Columbia's biological diversity.

David F. Fraser



David F. Fraser

### What is Biodiversity?

Biologists use the term biodiversity to refer to life in all its forms and the habitats and natural processes that support life.

Biodiversity encompasses:

- Genetic diversity, meaning the genetic variation among individuals of the same species;

Living systems provide many services free of charge, such as pollination of plants, including food crops and other commercially important species. Here a **syrphid fly** is pollinating strawberry flowers.



David F. Fraser



David F. Fraser

- Species diversity, meaning the number of different plants, animals, fungi, and simple organisms such as bacteria and protozoa; and
- Ecosystem diversity, which includes the variety of ecosystems and the different ways they function. Ecosystem diversity can include both the organisms and the interactions between them and their environment: for example, fire, climate, decay, and predator-prey relationships.

### The Value of Biodiversity

The health of the planet depends upon conserving biodiversity and sustaining the viability of ecosystems. Ecosystems support all forms of life, moderate climates, filter water and air, conserve soil and nutrients, and control pests. Species provide us with food, building materials, energy, and medicines. They also provide services such as pollination, waste assimilation, and distribution of seeds and nutrients free of charge. Many commercially important breeds of plants and animals exist because of naturally occurring differences in species. Genetic diversity also enables us to breed higher-yield and disease-resistant plants and animals and allows the development or evolution of breeds and races that thrive under a variety of environmental conditions.

The colours of **Red-flowering Currant** vary. These flowers represent the range of colours in a one-hectare patch of forest. One of these varieties has become a commercially available cultivar.



David F. Fraser

In addition, there are ethical concerns involved in making decisions that affect biological diversity. If all life forms have an intrinsic value, as many argue, we have a moral obligation to protect them and ensure that they survive because of their own intrinsic worth, as well as their value to future generations.

### Biodiversity in British Columbia

British Columbia has been endowed with a rich variety of habitats, including forests, grasslands, meadows, wetlands, rivers, and intertidal and subtidal zones. These habitats support 143 species of mammals, 454 birds, 20 amphibians, 19 reptiles, and 450 fish. Invertebrate species probably number between 50,000 and 70,000, including 35,000 species of insects. An estimated 2850



Rich Weir

**Bears and other scavengers** move thousands of tons of nutrient-rich salmon into forest ecosystems each year. Recent research has shown that this input of nutrients is important to forest and river ecosystems, including commercial tree species and salmon fry.

species of vascular plants, 1000 mosses and liverworts, 1600 lichens, 522 attached algae, and well over 10,000 fungi occur in the province.

As scientists and naturalists broaden their investigations, they are constantly discovering new species. However, because this array of species and interactions is so complex, we lack the knowledge to fully understand ecosystems and the way human activities affect the landscape. As research continues, we are finding out more about how humans function within ecosystems.

### Concern for Biodiversity in British Columbia

Many scientists believe we are in a global "biodiversity crisis." They attribute the loss of biodiversity to the loss and degradation of habitats, the invasion of exotic species, over-exploitation of resources, and environmental shifts such as climate changes, pollution and increase in ultra-violet light, and the fragmentation of habitat into segments too small to maintain a full complement of species and processes.

Here are some issues with significant implications for biodiversity in British Columbia.

- We are losing species. At least four species of



David F. Fraser

The **Vancouver Island Marble** was last seen in British Columbia in 1908. Recent surveys have located a small remnant population in the San Juan Islands in Washington State. Relatively small numbers of butterfly species have become extinct or been extirpated (become locally extinct) in British Columbia since the early 1900s, but a large number of species face extirpation if current trends continue.

*According to recent estimates, ecosystems provide goods and services worth between \$22 trillion and \$74 trillion a year, with an average of over \$45 trillion.\* The global gross national product is around \$25 trillion. If we eliminate species and ecosystems, we will have to do their work . . . and we simply do not have the knowledge or the resources to fulfill their functions.*

*\*Costanza et al. 1997. Nature 387: 253-260*

wcombe photo courtesy Royal British Columbia Museum



David F. Fraser

**A Garry oak stand in the 1890s (left) and a current Garry oak stand (right). The absence of fire and invasion by an alien plant species has decreased diversity in the understory, changed the structure of the plant community, and altered the nutrients in the soil. Scientists are becoming increasingly alarmed about the impact of exotic species on biodiversity, and many now think that they pose an even larger threat to biodiversity than the loss of habitat.**

plants, three freshwater fish, one mammal, three birds, one reptile, three butterflies, one beetle, and a hornwort have disappeared from British Columbia since the early 1900s. Of these species, five occurred nowhere else in the world and are now extinct.

- 103 species of vertebrates are on the Red List (meaning they are designated, or are being considered for designation, as endangered or threatened) and another 97 are on the Blue List (meaning they are considered vulnerable).
- Recently compiled lists indicate that other species are also endangered, including butterflies, dragonflies, and macroalgae.
- Some 634 vascular plant species are rare, and of these, about 170 are candidates for threatened or endangered status.
- In heavily populated areas such as the southwest coast and the southern interior, forest harvesting, agriculture, and invasions of exotic species have eliminated and are threatening many native species and ecosystems. Some ecosystems at high risk include grasslands, antelope brush steppe, old-growth forests, Garry oak meadows, wetlands, estuaries, and salmon streams.

## Global Partnership

The need to conserve biodiversity received international attention at the 1992 United Nations Earth Summit in Rio de Janeiro, Brazil. The result was the Convention on Biological Diversity. This document called for international cooperation aimed at halting the global extinction of animal and plant species. Canada, in cooperation with the provinces, has published the Canadian Biodiversity Strategy as our contribution to meeting “the Rio Convention.” British Columbia’s delegation to the Earth Summit backed Canada’s support for the Rio Convention, and B.C. is also developing its own Strategy for the Conservation of Biological Diversity. This strategy will integrate current initiatives, identify missing components, establish goals, and recommend actions to ensure the long-term conservation of the province’s biodiversity. In the meantime, greater awareness of the need to incorporate biodiversity into decision-making has resulted in changes to management practices and an increase in the number of protected areas in B.C.

## Identifying and Understanding British Columbia’s Biological Diversity

If we are to conserve biological diversity in B.C., land- and water-use decisions must be based on a sound understanding of British Columbia’s ecosystems and processes. Although we have accomplished a large amount of research and cataloging, we do not yet have a complete picture. Land managers need to know the habitat requirements of species, particularly those that are threatened or are of greatest management concern.

- The British Columbia Conservation Data Centre (CDC), a cooperative project of the Ministry of Environment, Lands and Parks and the B.C. Conservation Foundation, as well as other partners, is conducting inventories and compiling information on rare plants, vertebrates, invertebrates, marine organisms, and ecosystems. The CDC makes this information available to developers, land managers, and government agencies so that land-use decisions can take the needs of rare species into account. The work of the CDC has also resulted in a series of publications on the rare organisms of British Columbia.



In recent years, British Columbia's network of protected areas has increased substantially, such as the **Tatshenshini Provincial Park**.

- The Resource Inventory Committee (RIC), comprised of representatives of various ministries, provincial and federal agencies, and First Nations, promotes cooperation among agencies in the development of better resource information. Many species in the province now have inventory programs that use "RIC standards."
- Researchers in the Ministry of Environment, Lands and Parks and the Ministry of Forests are undertaking biodiversity research to increase our understanding of ecosystems processes in natural forests and the effects of

forest practices on biodiversity.

- Research undertaken by the Royal British Columbia Museum, government agencies, private companies, universities, and independent naturalists is adding to our understanding of biodiversity in British Columbia.
  - State of the Environment reports provide a baseline for monitoring environmental conditions, including some aspects of biodiversity.
  - Public education initiatives have ranged from technical training in biodiversity for land managers to the "Backyard Biodiversity and Beyond" program for school children offered through Wild BC.



The recent acquisition of park land has helped to conserve biodiversity. For some ecosystems, such as this **coastal Douglas-fir** community, the 12 percent target for protected areas cannot be met because less than one percent of the ecosystem remains intact. It is important to complete the protected area system before other ecosystems reach the same imperiled state.

## British Columbia's Commitment to Conserving Biological Diversity

Protecting biodiversity depends on a planning framework that accommodates the following complementary components:

- A network of protected areas and
- The application of integrated resource management principles outside these protected areas. These principles provide a "coarse filter" to ensure the continuation of B.C.'s biodiversity.

In addition to the "coarse filter," we need programs specifically targeted at protecting threatened and endangered species and ecosystems.

### Protected Areas

More than 10 percent of British Columbia's land area is presently protected to help maintain biodiversity. Protected areas range from large wilderness areas to small ecological reserves set aside for the protection of particular species and ecosystems. British Columbia's **Protected Area Strategy** is designed to increase protected areas to 12 percent of the province's land area, based on the needs of representative and rare ecosystems. Three percent of the province has been added to this program in recent years. Protected marine areas also need to be considered.

### Integrated Management

The Protected Area Strategy alone cannot maintain biodiversity. After decades of management decisions that focussed on resource development, ecosystem and biodiversity concerns are influencing more of these decisions today. Programs such as the Forest Practices Code, which includes species provisions for managing for biodiversity; changes to the scope and range of species included under the *Wildlife Act*; and some of the provisions in the *Fish Protection Act* are helping to make biodiversity considerations a larger component of resource management.

## Reintroductions

Of the five mammals extirpated in British Columbia, three (Wood and Plains Bison and Sea Otter) have been successfully reintroduced. Attempts to reintroduce Burrowing Owl are continuing.

## Planning for the Future

In the future, biodiversity planning must be part of everyday business in B.C. Our success, even our survival, depends on planning that recognizes the need to manage for biodiversity. The British Columbia government has initiated a number of environmental management policies directed at conserving biodiversity.

- British Columbia, along with most of the other provinces and territories, signed the **National Accord on the Protection of Species at Risk**. This accord will help guide the development of programs, policy, and legislation to help species at risk.
- The **Forest Practices Code**, through the **Biodiversity Guidebook** and the **Identified Wildlife Strategy** guidebooks, is helping to make biodiversity considerations a fundamental aspect of forest harvesting practices.
- The **Naturescape Program**, initiated through the Ministry of Environment, Lands and Parks and now run through the **Habitat Conservation Trust Fund**, has provided hands-on tools for the public to use in managing their own properties to maintain or enhance biodiversity.

## For more information on Biodiversity in BC

*Biodiversity in British Columbia—our Changing Environment.*

Canadian Wildlife Service, Vancouver B.C. Available from UBC Press.

*The Biodiversity Publications Catalogue* is jointly published by the Ministry of the Environment, Lands and Parks, the Ministry of Forests, and the Royal British Columbia Museum. It lists currently available provincial government publications on biodiversity in British Columbia.

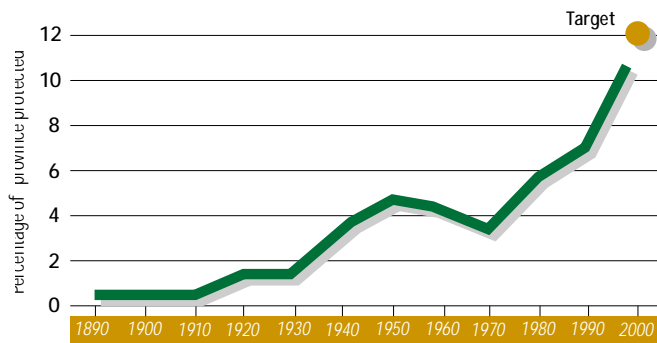
For information on training workshops and teaching kits on Biodiversity, teachers and group leaders can contact Wild BC through the **Habitat Conservation Fund** at <http://www.elp.gov.bc.ca/hctf/wild.htm> or 1-800-387-9853 (in Victoria, call 356-7111).



David F. Fraser

Both **Wood and Plains bison** have been reintroduced into British Columbia.

## Protected Areas in British Columbia



British Columbia is well on the way towards achieving its goal of assigning **12 percent** of its land base to protected area status by 2000.