

Our Home and



Native Land

Canadian Species of Global Conservation Concern



NatureServe Canada contributes to the conservation of Canada's biodiversity by providing scientific data and expertise about species and ecosystems of conservation concern to support decision-making, research, and education.

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Our Home and Native Land

Canadian Species of Global Conservation Concern

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Note on Captions: For each species, captions state the range in Canada only, as well as the NatureServe global conservation status.

Front Cover

Left to right: *Steller sea lions* (*Eumetopias jubatus*). *Vulnerable (G3)*. *British Columbia*. / Photo by Jared Hobbs.

Golden paintbrush (*Castilleja levisecta*). *Critically imperiled (G1)*. *British Columbia*. / Photo by Leah Ramsay, British Columbia Conservation Data Centre.

Spotted owl (*Strix occidentalis*). *Vulnerable (G3)*. *British Columbia*. / Photo by Jared Hobbs.

Rocky Mountains, Alberta / Photo courtesy of Alberta Parks and Protected Areas.

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* The acronym 'CDC' is used in this report to refer to all NatureServe Canada member programs.

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Above: Wetland along Swamp River, Ontario. Wetlands are essential habitat for many of Canada's most imperiled species. / Photo by Wasyl Bakowsky, Ontario NHIC.

Preface

Canada, with its vast open spaces and long, wild coastline, is often regarded among the countries of the world as a refuge for wild plants and animals, rather than a land where species are threatened with extinction. Yet over the last few decades, increasing concern has been raised about the state of the country's natural ecosystems and the status of its rarest or most vulnerable wild species. Through the 1996 National Accord for the Protection of Species at Risk, federal, provincial and territorial governments committed to ensure that human actions do not contribute to the loss of any species in their jurisdiction. With the *Species at Risk Act* of 2003, the federal government made preventing the extinction of species a national policy, and recognized that all Canadians have a role to play in protecting wildlife (a term that includes animals, plants, and all other wild living creatures).

In response to these growing concerns, several broad assessments of Canada's species and ecosystems have been made. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has reported on the national status of many species of conservation concern. The provincial, territorial, and federal governments have cooperated to produce *Wild Species 2000: The General Status of Species in Canada*. Both COSEWIC and *Wild Species 2000* provide a national perspective and identify wild species in danger of being lost from Canada. A number of assessments analyzing similar issues, but at provincial or regional scales, have also been released.

There has been to date, however, no overview of the status of Canadian wild species in a global context. This report focuses on that context, addressing questions such as how many species in Canada are of conservation concern globally, how important is Canada to their continued existence, and which species are found only in Canada. *Our Home and Native Land* identifies Canadian species that are of global conservation concern, and analyzes them by taxonomic group and by jurisdiction. Species that are of conservation concern at national and provincial/territorial levels, but common or otherwise not threatened elsewhere in the world, are not examined in this report.

This report analyzes Canada's flora and fauna at the full species level. It does not consider subspecies or populations, which are often assessed in the COSEWIC or provincial/territorial listing process, and many of which may also be of global conservation concern (for the reasoning behind this level of analysis, see page 8). Analysis is also restricted to animals and plants that are known well enough to be satisfactorily ranked, and for which summary statistics are meaningful. Most of the data reviewed are for terrestrial vertebrates, freshwater fish, and vascular plants; however, some better-known invertebrate groups are analyzed as well. Far more is known about terrestrial species than marine species; although marine mammals are included in the report, the relatively poorly known marine fish and invertebrates are not.

This report is based primarily on 2003 data from NatureServe and its member programs. NatureServe is an international organization that has assembled status information on thousands of plant and animal species of the Western Hemisphere. Most of this information, including global ranks for species, is available through its web application, NatureServe Explorer (www.natureserve.org/explorer). NatureServe's Canadian affiliate, NatureServe Canada, represents a network of conservation data centres (CDCs) operating in each of the provinces and the Yukon. With one exception, these centres (variously termed conservation data centres, natural heritage information centres, etc.) are government programs that monitor and map rare or threatened species and ecological communities throughout their jurisdictions. The lone exception, the Atlantic Canada CDC, is a non-profit organization that covers the four Atlantic provinces.

Completing this network in Canada requires the establishment of CDCs in the Northwest Territories and Nunavut. In this report, data on species occurrences in the Northwest Territories and Nunavut comes from the central distribution databases of NatureServe, which are populated using published range maps, literature sources, etc. Although some consultation occurred with biologists in Nunavut and the Northwest Territories in the collation of these data, they have not been verified by the jurisdictions.

Global or range-wide information for the Western Hemisphere is collated and maintained in the NatureServe central databases, located in Arlington, Virginia. Global conservation status ranks for species are updated when new information is received regarding status, often as a result of the annual data exchanges between the CDCs and NatureServe. Changes in population or distribution of these species of global conservation concern may result in status rank changes, and an analysis such as this globally-focused report should be repeated regularly with updated ranks to understand Canada's responsibility to its wildlife on the world's stage.

Executive Summary

With its vast open spaces and long, wild coastline, Canada is often seen as a refuge for wild plants and animals, rather than a land where species are threatened with extinction. Yet over the last few decades, increasing concern has been raised about the state of the country's natural ecosystems and the status of its rarest and most vulnerable wild species. This concern culminated in the passage of the Species at Risk Act, which made preventing the extinction of species a national policy and recognized that all Canadians have a stake in protecting our native wildlife.

Although several national assessments of Canadian wildlife have been made, to date there has been no overview of the status of Canadian species in a *global* context. *Our Home and Native Land* focuses on that context, addressing questions such as how many Canadian species are of global conservation concern, how important Canadian habitats are to their continued survival, and which of these species are found only in Canada. The assessment is based primarily on 2003 data from NatureServe and its member programs and was developed by NatureServe Canada, which represents a network of conservation data centres operating in each of the provinces and the Yukon. Our report identifies the Canadian species that are of global conservation concern and analyzes them by taxonomic group and by geographic jurisdiction. The focus is on the best-known groups for which reasonably comprehensive data are available, including terrestrial vertebrates, freshwater fish, vascular plants, marine mammals, and some of the better-known types of invertebrates.

MAJOR FINDINGS

- Of 5,685 native species analyzed in 13 of the best-known groups of plants and animals, 362 species (about 6.4%) are of global conservation concern, meaning that they face a significant risk of extinction.
- More than nine out of every ten species assessed are globally secure, facing no such imminent risk. Because of Canada's northerly location, its total diversity of species is comparatively low, and most of its species have the major part of their range in countries to the south.

- Most Canadian species of global conservation concern are vascular plants (222 species). Because plants represent more than 70% of the species assessed, however, their risk rate is actually slightly lower than the average, at about 6%.
- Three groups have particularly high proportions of species of global conservation concern: freshwater mussels (17.9%), freshwater fish (14.2%), and ferns and fern allies (13.2%). Freshwater habitats such as lakes and streams have been particularly affected by human activities.
- Twenty-eight Canadian species are either presumed or possibly extinct. These include 15 invertebrates, six freshwater fish, four birds, two non-vascular plants, and one flowering plant.
- Sixty-eight species of global conservation concern are endemic to Canada, meaning they are found in no other country. Canada therefore has the exclusive responsibility to protect these species.



Top: American white pelican (*Pelecanus erythrorhynchos*). *Vulnerable* (G3). Ranges from British Columbia east to Ontario. / Photo by Jared Hobbs.

Bottom: Birch Mountains, Alberta / Photo by Drajs Vujnovic, © Alberta Parks and Protected Areas.

- The diversity of species and the levels of risk they face vary considerably across Canada. British Columbia, Ontario, and Québec stand out as the most biologically diverse provinces, with British Columbia and the Yukon having the highest rates of species of global conservation concern. Each province and territory has its own significant set of threatened species and critical areas for conservation.

KEY CONCLUSIONS AND RECOMMENDATIONS

- Protecting species of global conservation concern should be a national priority, and species endemic to Canada constitute a special responsibility.
- Many endangered species do not live in wilderness, but share habitats dominated by humans.
- Lack of knowledge about the distributions and habitat needs of endangered species should be addressed by increased biological inventory and research.

- Habitat destruction remains the leading threat to Canada's ecosystems, but new threats have emerged, including invasive species, wildlife diseases, and changes to ecological processes, such as climate change.
- Ecosystem-based management is an essential approach to conserving species.
- A multi-dimensional approach to conservation is needed, including building a system of protected areas, restoring degraded habitats, proactive environmental planning, and working cooperatively with landowners.

Protecting natural habitats and the plants and animals that depend on them is a continuing challenge worthy of Canada's place in the world. For Canada is not only *our* home and native land; it is theirs.



Top: Auyuittuq National Park, Baffin Island, Nunavut. Although Canada's northern lands have relatively few species in all, a number of them are unique plants found nowhere else on Earth. /Photo by Joyce Gould.

Left: Green-scaled willow (*Salix chlorolepis*). Critically imperiled (G1). Québec. A Québec endemic, this small tree is found only on a single mountaintop of the Gaspé Peninsula. /Photo Fleurbec / Sylvain Lamoureux. Reproduced with the authorisation of the ministère du Développement durable, de l'Environnement et des Parcs du Québec.

Right: Ancient forests, home to some of the world's largest trees, symbolize Canada's Pacific coast and invoke a sense of wonder. Carmanah Walbran Provincial Park, Vancouver Island, British Columbia. /Photo by Jared Hobbs.

Introduction

Throughout Canada's oral and written history, abundant natural resources have supplied our need for food and shelter, fueled the economy, and provided a spiritual and emotional foundation for our society. Canada's national symbol — the maple leaf — pays homage to the immense forests that welcomed and sustained Canada's aboriginal (or native) peoples and early settlers. Even the national currency reflects the bond between Canadians and their wildlife heritage: beaver, caribou, loon, polar bear, snowy owl — all are honoured in our daily transactions.

Although Canada is the second-largest country in the world and the largest in the Western Hemisphere, it has a relatively small population that is clustered mostly along its southern border. In the north, huge expanses of the land remain largely intact and hospitable to wildlife. While the number of different plant and animal species in Canada is relatively modest — owing to its northern latitude and the relatively short time since the last glaciation — what the country may lack in diversity, it makes up for in abundance. Great herds of caribou still roam across the taiga in a wildlife spectacle reminiscent of the plains of Africa, and packs of wolves, ranging over much of the country, still symbolize wilderness to millions of Canadians.

Canada's wildlife does not stop at water's edge. With 244,000 kilometers of coastline along three great oceans — the world's longest — Canada's waters are teeming with marine life. From whales and walrus to recently discovered creatures perched around deep sea vents, the waters off Canada's magnificent coasts harbor a vast array of life.

Yet all is not well with the state of the nation's wild species. Some, such as the great auk (*Pinguinus impennis*) and the deepwater cisco (*Coregonus johanna*) have already disappeared, while others like the Vancouver Island marmot (*Marmota vancouverensis*) survive but are poised at the brink of extinction. Others are declining in the face of large-scale habitat alteration, such as the plowing of the prairies, invasion of exotic species, and the logging of Canada's vast forests, and a new threat, global climate change. Many marine and freshwater species have been overharvested, and others are facing massive ecosystem change as a result of that overharvesting. Migratory species are facing challenges both in Canada and on their wintering grounds to the south.

Our Home and Native Land represents a first effort to consider the condition of Canada's species from a worldwide perspective. By assessing the global conservation status of species in the best known plant and animal groups — 5,685



Above: Porcupine caribou herd on the Yukon north slope. / Photo by Cameron Eckert, NatureServe Yukon.

plants and animals — one can glimpse the status of Canada's wildlife in a global context. From badlands to boreal forests to barrens on the tundra, Canada's natural ecosystems and the wildlife they support are a global treasure. They deserve not only to be recognized by the world at large, but to be appreciated and championed by all Canadians.

CANADA'S BIODIVERSITY

Scientists still have much to learn about life on this planet. Among the most startling gaps in knowledge is a clear understanding of the number of living things on Earth. While one widely used estimate suggests there are as many as 14 million species on Earth (Hammond 1995), fewer than two million species have been studied in sufficient detail to be named and catalogued by scientists. In general, scientists have a reasonably complete inventory of large, conspicuous animals such as mammals and birds, but have a much poorer inventory of smaller animals, plants, and micro-organisms.

Life on this planet tends to be most abundant near the equator, with species richness steadily declining as one moves north and south in latitude (Rosenzweig 1995). This fundamental ecological pattern is largely responsible for the relatively low number of species* in Canada. For instance,

* For the purposes of this report, "species" is used in the restricted sense to designate fully distinct species, not in the broader sense of including subspecies and varieties.

The Great Auk: Lost 'Penguin' of the North Atlantic



Great auk / Illustration
by Donald Gunn.

The original 'penguin,' the flightless great auk (*Pinguinus impennis*), was once widely distributed from Newfoundland to Norway. Even more so than other seabirds, however, great auks concentrated their breeding in only a few colonies. In Canada, they were known to breed at Funk Island and Penguin Island off the coast of Newfoundland, and on Bird Rock off the Magdalen Islands. Non-breeding birds in the northwest Atlantic converged on the Grand Banks. The breeding concentrations, the birds' large size, and their total vulnerability on their breeding islands made them irresistible to hungry sailors and fishermen. Many more were also killed for their feathers, which were used in bedding.

Great auks became scarcer and scarcer, and had all but completely disappeared by the end of the eighteenth century. As the end approached, their rarity dealt them a final blow as they became highly sought after by egg and skin collectors, with specimens regularly bought and sold in the elite auction rooms of London. On June 3, 1844, a group of fishermen, commissioned to hunt for specimens, killed a nesting pair on Eldey Island off Iceland. Although they may have persisted in ones and twos in the vast North Atlantic for a few more years, great auks were never encountered again.

Mexico has approximately 34,000 known native vascular plant species, the United States has 16,000, and Canada has fewer than 4,000. However, this relatively low diversity also means that the ecological impact of the loss of one species in Canada may be considerably higher than the loss of one species in the tropics. Also, Canada has unexpected "biodiversity hotspots" contrary to this latitudinal pattern, as well as a high diversity of non-vascular plants, a little-studied group, within its world-renowned large tracts of boreal forest and tundra.

The distribution patterns of plants and animals across Canada's vast landscape are a response to climate, underlying geology, and a multitude of other ecological, evolutionary, and human-related factors. In particular, the massive Cordilleran and Laurentide ice sheets during the last Wisconsinan glaciation

(about 75,000 to 10,000 years ago) left their enduring legacy by creating a virtual blank slate open for biological colonization. Consequently, most of Canada's flora and fauna consists of species that were able to successfully migrate northward and establish populations in habitats newly available in the wake of these retreating glaciers. Relatively little time, from a geological and evolutionary perspective, has been available for the differentiation of these existing plants and animals into new forms and distinctive species. As a result, from a global perspective, Canada's biota is relatively modest, young, and evolving with most species also found in one or more other countries.

However, 68 of the 362 Canadian species of global conservation concern are *endemic* — meaning unique to

Canada (see Appendix C). Argus (1976) and the IUCN — World Conservation Union (IUCN 1997) have identified 12 centres of plant diversity and endemism in Canada (Table 1). Most of these represent glacial refugia — unglaciated areas where numerous organisms remained throughout glacial periods. Today, some refugia contain relicts of once wide-ranging ancient floras that have mostly vanished, such as Furbish’s lousewort (*Pedicularis furbishiae*), found in New Brunswick (Argus 1976). These refugia were important dispersal points after glaciation, but they were also focal points of evolution. During the period they were isolated, morphologically and physiologically distinct populations sometimes evolved into new species. One such recently-evolved species is the Turnor willow (*Salix turnorii*), which occurs on the south shore of Lake Athabasca in northwestern Saskatchewan.

Evolution and isolation during and since the Pleistocene Epoch have also produced variation within species. For example, the black bears (*Ursus americanus*) of the Queen Charlotte Islands are not the same as those in Newfoundland, and sockeye salmon (*Oncorhynchus nerka*) have evolved numerous ‘landlocked’ forms, each genetically different but collectively termed kokanee. Some of these genetically distinct forms may even be incipient species, but many have not yet been ranked, and none are treated in this report (see *Species Covered By This Report*).

Canada’s landscape also has been influenced by human occupation, starting with aboriginal peoples who used fire to modify habitat and create open areas favourable for wildlife. But since European settlement, human-caused disturbances have increased greatly. Over the past 200 years, vast areas of Canada’s signature eastern forests have been cut and burned.



The prairies were also greatly changed, with most plowed for agricultural land within the first 100 years. Canada’s vast boreal forests are also experiencing major changes because of rapid expansion of large-scale logging in recent decades. Exotic species, intentionally or accidentally brought into Canada, have also impacted Canada’s native species. This interaction of natural and human history has created a tapestry of diversity and conservation concern for Canada’s natural ecosystems and wild species.

Based on many years of research, biologists have identified over 71,000 species in Canada (Mosquin *et al.* 1995). Knowledge of many of these organisms, however, is still very fragmentary, and large numbers of invertebrate and microbial species remain to be discovered and named.

Above: The dunes at Lake Athabasca, which span Alberta and Saskatchewan, are a center of plant endemism and home to dozens of rare plant species. / Photo by Ksenija Vujnovic, © Alberta Parks and Protected Areas.

TABLE 1

MAJOR AREAS OF PLANT ENDEMISM IN CANADA (after Argus 1976, IUCN 1997)

AREA	JURISDICTION
Ellesmere Island	Nunavut
Baffin Island	Nunavut
Central Arctic Islands	Nunavut
Central Yukon	Yukon
Mackenzie Mountains	Northwest Territories, Yukon
Lake Athabasca dunes	Saskatchewan
Queen Charlotte Islands (Gwaii Haanas)	British Columbia
British Columbia (serpentine areas)	British Columbia
Western Newfoundland	Newfoundland and Labrador
Torngat Mountains (serpentine areas)	Québec, Newfoundland and Labrador
Rocky Mountains	Alberta, British Columbia
Gulf of St Lawrence	Québec

Trying to understand and appreciate the biological diversity of a country is difficult when significant and important parts of that biodiversity are not well known (Raven 2001). Our understanding of ecological relationships within complex ecosystems is greatly hampered when some of the smallest, but perhaps most significant, components remain unstudied.

SPECIES COVERED BY THIS REPORT

This report deals with the global conservation status of 5,685 species native to and regularly occurring in Canada. Only 13 groups of plants and animals have been studied sufficiently to allow comprehensive assessments of their global status (Table 2). Species outside these groups are not considered, except in Table 6. These better-known groups include all vertebrates except marine fish, all vascular plants (ferns and fern allies, conifers, and flowering plants), and the better-known invertebrates (freshwater mussels, crayfishes, dragonflies, tiger beetles, and butterflies and skippers). Overall assessment of the global status of species within other invertebrate groups (e.g. mayflies, stoneflies, grasshoppers, and snails) will only be possible after additional inventory and taxonomic classifications are completed.

This report does not attempt to analyze the status of taxa below the level of species (i.e. subspecies or populations), even though these taxa undoubtedly make a key contribution to the genetic and ecological diversity of the Canadian biota, and even though a number of them are listed by COSEWIC and the Species at Risk Act. Although conservation data

TABLE 2
NUMBER OF NATIVE CANADIAN
SPECIES ANALYZED

VERTEBRATES	981
Mammals	196
Birds	477
Reptiles and Turtles	44
Amphibians	45
Freshwater Fishes	219
INVERTEBRATES	568
Freshwater Mussels	56
Crayfishes	9
Butterflies and Skippers	272
Tiger Beetles	35
Dragonflies and Damselflies	196
VASCULAR PLANTS	4136
Ferns and Fern Allies	174
Conifers	34
Flowering Plants	3928
TOTAL	5685



centres routinely list and rank rare or threatened subspecific taxa, there are few, if any, nationally accepted, comprehensive lists of subspecies for most of these groups. It is therefore not feasible to calculate levels of endangerment within groups at this level. If such lists are created, subspecies could be included in future analyses.

The analysis for this report is based on data from the NatureServe central databases and contributions from member programs of the NatureServe Canada network — databases that collectively record information on about 33,000 U.S. and Canadian species. Although some consultation in the collation of these data occurred with biologists in Nunavut and the Northwest Territories, which lack conservation data centres, these data have not been verified by those jurisdictions. In fact, for many groups of animals and plants, accurate, documented checklists of flora and fauna are not readily available for the two territories since their split in 1999; biologists have often created jurisdictional lists based only on generalized range maps, rather than by examining individual distribution records of each species.

INFORMING CONSERVATION: CANADA'S CONSERVATION DATA CENTRES

Protecting and responsibly using Canada's biological resources requires reliable knowledge on which to base decisions. Indeed, governments, universities and natural history museums have amassed a tremendous wealth of knowledge about the identity, distribution, and life histories of the nation's plant and animal species. Historically, this information was not readily available to conservationists, land use planners, and natural resource managers.

Above: Vancouver Island marmot (*Marmota vancouverensis*). Critically imperiled (G1). British Columbia. Found only on Vancouver Island, its total population has declined to fewer than 100 individuals. / Photo by Jared Hobbs.

To meet this need, in 1988 The Nature Conservancy, in partnership with the Nature Conservancy of Canada and provincial governments, began creating a network of Canadian conservation data centres (CDCs), designed to assemble and provide data and expertise to support conservation decision-making. Each CDC represents a single province or territory, with the exception of the Atlantic Canada Conservation Data Centre, which represents the provinces of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Each serves as a clearinghouse for reliable and current scientific information about plants, animals, and ecological communities within its respective province, territory, or region. Unified by a standard approach, staff at these centres identify species and ecological communities of greatest conservation concern; compile, analyze and summarize the best available information on the distribution and status of these species and communities; conduct detailed biological inventories; and make all this information available to a wide range of users.

Eight conservation data centres currently serve all 10 provinces and the Yukon Territory. Planning is underway to extend the network across all of Canada by establishing CDCs in the Northwest Territories and Nunavut. Coordination of the Canadian network is carried out by NatureServe Canada, a national not-for-profit conservation organization, which is the national affiliate of NatureServe, an international non-governmental organization. In addition to the Canadian programs, the NatureServe network includes 53 natural heritage programs in the United States and 15 data centres in Latin America and the Caribbean. NatureServe and NatureServe Canada provide these data centres with scientific and technical support and facilitate national and international data exchange — enabling the network to provide information from local to global scales.

CRITERIA FOR ASSESSING CONSERVATION STATUS

- 1 Number of occurrences
- 2 Number of occurrences with good estimated viability
- 3 Population size
- 4 Range extent
- 5 Area of occupancy
- 6 Long-term population and/or habitat trend
- 7 Short-term population and/or habitat trend
- 8 Threats: scope, severity, and immediacy
- 9 Number of protected occurrences
- 10 Intrinsic vulnerability
- 11 Environmental specificity
- 12 Other considerations

ASSESSING CONSERVATION STATUS

Information about conservation status — how rare or threatened a species or natural community is — is crucial for setting priorities and targeting conservation efforts. NatureServe and its member programs have developed a consistent method for evaluating the health and condition of species and ecological communities. The knowledge and expertise of individuals linked across the network and other scientists in museums, research institutions and government agencies provides local, regional, national, and international perspective to the assessment process. Assessment leads to the designation of a *conservation status rank*, which for



Left: *St. Lawrence aster* (*Symphotrichum laurentianum*). Imperiled (G2). Québec, New Brunswick, Prince Edward Island. Endemic to the Gulf of St. Lawrence region. / Photo by Valerie Godbout.



Right: The native prairie protected at Writing-on-Stone Provincial Park in Alberta provides rich habitat for grassland birds and other wildlife. / Photo courtesy of Alberta Parks and Protected Areas.

Uncommon, Unlucky, Unsolved: The Demise of the Labrador Duck



Labrador duck / Illustration
by Donald Gunn.

The Labrador duck (*Camptorhynchus labradorius*) was a shy, uncommon sea-duck whose demise remains shrouded in mystery. In fact, very little is known about this species, despite the fact that it spent the winters along the seaboard of the northeastern United States. Its breeding range was never delineated; it may have nested along the Labrador coast or even further north, or it may have bred on islands in the Gulf of St. Lawrence. It has been suggested that the decline may have been the result of restricted breeding grounds that were vulnerable to over-harvesting. While Labrador ducks were hunted on their wintering grounds, they were not a particularly popular food item. They may have been specialized feeders, as evidenced by their peculiar, soft-edged bills, and this specialization might be related to their decline.

Already uncommon when first described in 1789, the Labrador duck declined rapidly between 1840 and 1870. The last probable record was one shot on 2 December 1878 near Elmira, New York. Like the species, this specimen has now been lost.

species provides an estimate of extinction risk (Master 1991). Many things can contribute to the decline and ultimate demise of a species. The condition of each species is assessed based on many criteria (*see page 9 sidebar*). Some relate to the biology of the species, such as its inherent rarity or its susceptibility to, or need for, disturbance. Others involve monitoring changes in the numbers or habitat conditions of the species. Because rare species are particularly vulnerable to human-induced threats, natural fluctuations, and disasters, other factors consider the number of different sites at which a species exists, its total population size, and the overall extent and fragmentation of its range. In addition to rarity, population trends — both short and long-term — are extremely important in determining extinction risk since they are a predictor of future conditions. Specific threats, such as habitat loss or fragmentation, competition from alien species, and over-harvesting, are also considered. The scope, severity, and

urgency of these threats are additional factors included in the status assessments.

Conservation status ranks for species, subspecies, varieties, and ecological communities are assigned on a scale from one through five (*Table 3*). Levels range from critically imperiled (1) to secure (5). Listed separately are species known to be extinct (X) or those that are currently missing and may be extinct (H). Species ranked in this latter category (H) are of highest conservation concern, followed by rare species classified as critically imperiled (1), imperiled (2), and vulnerable (3).

Global (G) or range-wide status assessments are augmented by national (N) and provincial/territorial (S) assessments. Infra-specific taxa (subspecies, varieties, and populations) are given an equivalent “T” ranking. For example, the conservation

status ranking for a globally secure plant species would be G5; an imperiled subspecies of the same plant would be ranked G5T2. For this report, however, global assessments are reported only at the full species level.

Combining global, national and provincial/territorial conservation status ranks (e.g., G3N3S3) also provides a useful perspective and different scale for placing risk levels in a geographic context and setting conservation priorities. The Maritime shrew (*Sorex maritimensis*), for example, is a very small mammal found only in Canada. The provinces of New Brunswick and Nova Scotia constitute the global range of this species. Based on current information, biologists regard the Maritime shrew as possibly vulnerable at global (G3) and national (N3) levels, reflecting its provincial conservation status rank of vulnerable (S3) assigned by the Atlantic Canada Conservation Data Centre for both the Nova Scotia and New Brunswick populations of this species.

Conservation status assessments are continually reviewed, refined, and updated to reflect advances in knowledge. CDC specialists rely on the best available information from natural history museum collections, scientific literature, research projects, and knowledgeable observers to determine conservation status. This information is augmented by field inventories targeting species of conservation concern, those for which little information exists, or those only known historically. Indeed, most changes in conservation status ranks reflect an improved scientific understanding of the condition of the species, rather than any real change in its status.

Top: South Chilcotin Mountains, near Darcy, B.C. The Canadian tundra comes alive each summer with alpine flowers such as lupine and Indian paintbrush. / Photo by Jared Hobbs.

Left: Boreal saltwort (*Salicornia borealis*). Critically imperiled (G1). Manitoba and Yukon. This highly restricted species, previously known only from tidal shores near Churchill, Manitoba, was recently discovered as well in the interior of the Yukon Territory. / Photo by Bruce Bennett, NatureServe Yukon.

Right: Maclean's golden-weed (*Stenotus macleanii*). Imperiled (G2). Yukon. This plant and a number of other northern endemic species are found in refugia that remained ice-free during glacial periods. / Photo by Bruce Bennett, NatureServe Yukon.



TABLE 3
NATURESERVE GLOBAL CONSERVATION STATUS RANKS

RANK	CONSERVATION STATUS	DEFINITION
GX	Presumed Extinct	Not located despite intensive searches; virtually no likelihood of rediscovery.
GH	Possibly Extinct	Missing; known only from historical occurrences but still some hope of rediscovery.
G1	Critically Imperiled	At very high risk of extinction due to extreme rarity (often five or fewer populations), steep declines, or other factors.
G2	Imperiled	At high risk of extinction due to very restricted range, few populations (often 20 or fewer), steep declines, or other factors.
G3	Vulnerable	At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	Apparently Secure	Uncommon but not rare; some cause for long-term concern (e.g. widespread declines).
G5	Secure	Common; widespread and abundant.

Planned Poisoning, Unplanned Extinction: The Death of the Dragon Lake Whitefish



Atlantic whitefish (critically imperiled), a closely related species to the Dragon Lake whitefish. / Illustration by Donald Gunn.

The loss of the Dragon Lake whitefish is simply explained: an example of a well-intentioned but poorly considered interference with the environment that led to disaster. Dragon Lake is a moderate-sized, productive lake in the central interior of British Columbia. A few decades ago it was decided that Dragon Lake could support a fine recreational rainbow trout fishery, if only the native fish in it were first eliminated. The lake was duly poisoned, and specimens of the fish killed were taken by ichthyologists to be preserved in research collections. Only later was it discovered that instead of just the common, widespread lake whitefish (*Coregonus clupeaformis*), there had been two species of whitefish living in Dragon Lake. These forms had diverged in their feeding habits, and had diverged in form as well, all since whitefish had arrived in the watershed following the Pleistocene glaciations. Dragon Lake does indeed have a thriving population of rainbow trout now, but its unique whitefish are long gone.

Outside North America, the most widely used system for assessing conservation status is that of the Species Survival Commission (SSC) of IUCN — The World Conservation Union (IUCN 2001). While the status assessment methodologies of NatureServe and the IUCN Red List have evolved on largely separate paths over the past three decades, substantial efforts have been made recently to bring them closer together (Master *et al.* 2003). Only a small fraction of the more than 40,000 North American species and communities whose global conservation status has been evaluated under NatureServe's protocol have so far been assessed using the IUCN Red List methodology. Furthermore, very few Red List assessments have been done at a provincial or territorial level. However, NatureServe's conservation status assessments are 85 to 90% similar to those of IUCN (L. Master pers. comm.). In general, when the same data are used to categorize a species' risk of extinction, NatureServe's assessments are slightly more precautionary and less prone to use a data deficient or equivalent category. This appears due in part to IUCN's greater emphasis on trend information and

NatureServe's greater emphasis on the vulnerability of a small number of populations (Master *et al.* 2000).



Above: Humpback whale (*Megaptera novaeangliae*) in White Bay, Newfoundland. Vulnerable (G3). Widespread. Eleven species of whales and other marine mammals in Canadian waters are of global conservation concern. / Photo by Doug Anions.

The Status of Canada's Species

What do NatureServe's conservation status assessments tell us about the general condition of Canada's native species? Global conservation status ranks were tallied for 13 of the best-known groups of plants and animals, comprising 5,685 species (Table 4). This assessment showed that 90.9% of these species are secure (G5) or apparently secure (G4), and about 6.4% of Canadian species (362 plants and animals) are of global conservation concern or are already extinct (an additional 2.8% of the species are not yet ranked). The 6.4% of species of concern can be divided further: 0.14% are extinct (GX), 0.05% are possibly extinct (GH), 0.8% are critically imperiled (G1), 1.2% are imperiled (G2), and 4.1% are vulnerable (G3) (Table 5). Appendix A lists all Canadian species believed to be extinct (GX), and Appendix B lists all extant Canadian species considered to be of global conservation concern (GH, G1, G2, and G3).

Considering the 13 groups of plants and animals separately reveals some striking differences (Figure 1). For three

groups, a high proportion of their known species are of global conservation concern: freshwater mussels (17.9%), freshwater fishes (14.2%), and ferns and fern allies (13.2%). At the other end of the spectrum, none of Canada's conifers or crayfishes are of global conservation concern. In terms of total numbers, however, flowering plants — with 222 species (5.7%) of global conservation concern — lead all other groups.

Although ensuring the survival of these 362 species may be a formidable challenge, in many ways Canada is fortunate to have relatively few imperiled plants or animals. A comparable assessment in the United States revealed more than 6,000 plant and animal species at risk, representing nearly one-third of American species assessed (Stein *et al.* 2000).

VERTEBRATES

Canada's vertebrates include some of the nation's most emblematic and charismatic creatures, such as polar bears and beluga whales, as well as secretive and seldom seen animals

TABLE 4
GLOBAL CONSERVATION STATUS OF CANADIAN SPECIES

	Presumed Extinct (GX)	Possibly Extinct (GH)	Critically Imperiled (G1)	Imperiled (G2)	Vulnerable (G3)	Apparently Secure (G4)	Secure (G5)	Rank Not Assigned	Total	% of Global Conservation Concern
VERTEBRATES										
Mammals	0	0	3	1	13	41	138	1	196	8.7%
Birds	3	1	4	1	8	48	412	0	477	3.6%
Reptiles and turtles	0	0	0	1	3	4	36	0	44	9.1%
Amphibians	0	0	0	1	0	8	36	0	45	2.2%
Freshwater fishes	5	1	13	0	12	20	165	3	219	14.2%
Vertebrates subtotal	8	2	20	4	36	121	787	3	980	7.1%
INVERTEBRATES										
Freshwater mussels	0	0	2	1	7	15	29	2	56	17.9%
Crayfishes	0	0	0	0	0	0	9	0	9	0.0%
Butterflies and skippers	0	0	2	5	16	38	210	1	272	8.5%
Tiger beetles	0	0	0	1	2	6	26	0	35	8.6%
Dragonflies/damselflies	0	0	0	1	10	30	155	0	196	5.6%
Invertebrates subtotal	0	0	4	8	35	89	429	3	568	8.2%
VASCULAR PLANTS										
Ferns and fern allies	0	0	4	6	13	37	111	3	174	13.2%
Conifers	0	0	0	0	0	4	30	0	34	0.0%
Flowering plants	0	1	20	51	150	840	2718	148	3928	5.7%
Vascular plants subtotal	0	1	24	57	163	881	2859	151	4137	5.9%
TOTAL	8	3	48	69	234	1091	4075	157	5685	6.4%

Rough Waters: Canada's Hard-Hit Freshwater Species



Freshwater Habitat /
Illustration by Donald
Gunn.

From the St. Lawrence River to the Great Lakes, from the Mackenzie River to the uncountable lakes of the far north, Canada's characteristic landscapes are defined as much by bodies of water as by the land itself. It is a sad irony, then, that the species that depend on these lakes, rivers, and streams are even more threatened than their terrestrial counterparts. The two groups with the highest proportion of species of conservation concern are freshwater mussels and fishes. Overall, more than half of all endangered vertebrates live in freshwater.

Several factors are responsible for these alarming levels of risk. First, the productive ecosystems in and around lowland rivers, lakes and wetlands are often among the first habitats altered or eliminated when a region is settled by humans. Second, exotic fish and shellfish have been introduced into many watersheds, often quickly eliminating some of the native species living there and radically altering the local ecosystem. Prime examples of this are the accidental arrivals in the Great Lakes of the parasitic sea lamprey (*Petromyzon marinus*) and zebra mussels (*Dreissena polymorpha*). Examples abound as well for intentional exotic introductions (often preceded by lake poisonings), especially in the case of non-native sport fish.

Third, in some cases, historical over-fishing has had a major impact on native fish populations. In the Great Lakes, the deepwater cisco was hit hard by commercial fishing in the late 1800s, and was then driven to extinction by the introduced sea lamprey. Finally, in the glaciated Canadian landscape where most species are recent immigrants with broad ranges, many freshwater systems are isolated from their neighbouring watersheds. This means that a number of species have very small ranges, and the isolation reduces the opportunity for recolonization in the event of local extirpation. Isolation also creates opportunities for rapid evolution and the formation of new species with very small ranges, such as found among the stickleback fishes of British Columbia.

such as salamanders, frogs, and bats. Overall, 7% of Canada's vertebrate species are of global conservation concern. Freshwater fish have by far the highest risk levels among the vertebrates (31 out of 219 species, or 14.2%), a finding consistent with other indications that freshwater systems are under particular stress across North America (Ricciardi and Rasmussen 1999). Five of the eight Canadian vertebrates presumed extinct are fish; another species is possibly extinct and a further 13 species are classified as critically imperiled.

Mammals, with 8.7% of species of global conservation concern, rank next, largely due to the presence of a number of vulnerable marine mammals in Canadian waters. The northern right whale (*Eubalaena glacialis*) is considered critically imperiled, while another 10 whales, dolphins, and seals are categorized as vulnerable. While birds are the focus of considerable conservation attention, relatively few Canadian bird species (just 17 of 477 species, or 3.6%) are of global conservation concern. Many common birds, however, are experiencing a long-term declining trend in population levels.

Among Canadian reptiles and turtles, only four species are of conservation concern: two eastern snakes — the massasauga (*Sistrurus catenatus*) and the eastern fox snake (*Elaphe gloydi*); one marine turtle, the leatherback (*Dermochelys coriacea*); and one freshwater turtle, the western pond turtle (*Emys marmorata*). Although a recent comprehensive global assessment on amphibians has documented that nearly one-third of species worldwide are threatened with extinction (Young *et al.* 2004), Canadian amphibians remain mostly wide-ranging and secure at the global level. Indeed, just a single Canadian amphibian, the Oregon spotted frog (*Rana pretiosa*), is of global conservation concern. A warning sign, however, is the fact that many other frogs and salamanders are declining over most of their range in Canada.

When the list of vertebrates of conservation concern is divided along terrestrial, marine, and freshwater lines, a striking pattern emerges. Primarily because of the large numbers

of freshwater fish and marine mammals of conservation concern, freshwater and marine species comprise 52.8% and 28.8%, respectively, of the overall list, while species that are primarily terrestrial account for less than 20%.



TABLE 5
SUMMARY OF SPECIES OF GLOBAL CONSERVATION CONCERN

RANK	NUMBER OF SPECIES	PERCENT OF ALL SPECIES
Presumed Extinct (GX)	8	0.14%
Possibly Extinct (GH)	3	0.05%
Critically Imperiled (G1)	48	0.8%
Imperiled (G2)	69	1.2%
Vulnerable (G3)	234	4.1%
TOTAL	362	6.4%

Top: Copper redhorse (*Moxostoma hubbsi*). Critically imperiled (G1). Québec. Restricted to the St. Lawrence River system in Québec. Freshwater fish have the highest levels of risk among Canada's vertebrates. / Photo by Daniel Hatin, MRNF.

Left: Wood frog (*Rana sylvatica*). Secure (G5). Found across Canada and large portions of the U.S., the wood frog ranges farther north than any other North American amphibian. / Photo by Colin D. Jones, Ontario NHIC.

Bottom: Steller sea lion (*Eumetopias jubatus*). Vulnerable (G3). British Columbia. Marine mammals that depend on coastlines and oceans are an important aspect of Canada's biodiversity. / Photo by Jared Hobbs.

Oceans of Trouble: The Decline of Marine Mammals and Birds



Northern right whale
/ Illustration by
Donald Gunn.

“...animals living in the water, especially the sea waters, are protected from the destruction of their species by Man. Their multiplication is so rapid and their means of evading pursuit or traps are so great that there is no likelihood of his being able to destroy the entire species of any of these animals.”

— JEAN BAPTISTE LAMARCK, 1809

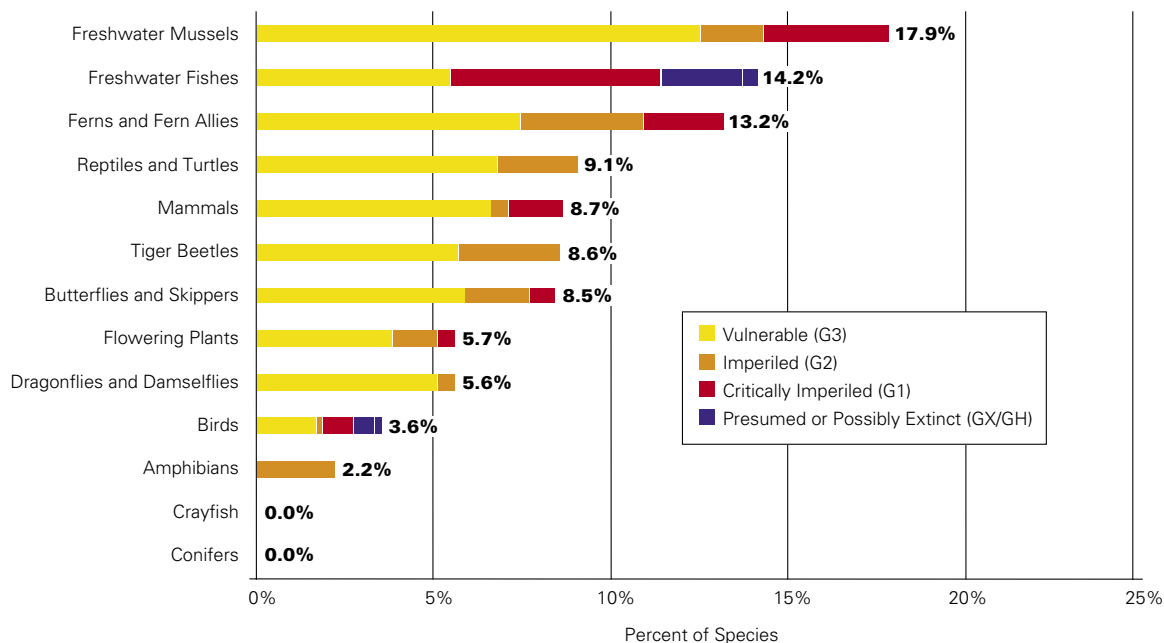
Regrettably, the past two centuries have proven Lamarck terribly wrong. Even without considering saltwater fish, marine species are prominent within the ranks of threatened vertebrates. Indeed, 21 of the 72 vertebrates identified by our analyses, or 28.8%, are marine, including 11 mammals, nine birds, and one sea turtle. Marine mammals in particular have suffered; almost one in four Canadian species are of conservation concern. Whaling, of course, had a tremendous impact over the last two centuries, even into the 1960s. Although the eastern Pacific populations of the grey whale have returned to pre-whaling numbers in the last few decades, some species, like the northern right whale and the eastern Arctic populations of the bowhead, have never recovered and remain critically imperiled. Northern right whales, having been reduced to very small numbers by whaling, now seem to be most threatened by collisions with ships and entanglement in fishing gear. Because female right whales have a single calf only every three to five years, every time a young female is killed accidentally, the ability of the population to recover is set back many years.

Steller sea lions were machine-gunned in the relatively recent past because of their perceived competition with humans for fish, but now have declined even more precipitously as a result of changes or loss in fish stocks in Alaskan waters. These changes themselves are likely the result of over-fishing by humans, changing oceanographic conditions, or some combination of the two. The handful of Canadian breeding colonies, once considered small and peripheral to the heart of the species' range in the Aleutian Islands, now represent one of the few stable populations of Steller sea lions.

Seabirds are inherently more vulnerable than most terrestrial birds because they are more likely to breed in a few very large concentrations. On their once-safe nesting islands, they have been hit hard by introduced predators, whether these are foxes, rats, cats, dogs, or pigs. In the past, over-hunting by humans also caused massive declines of species such as the short-tailed albatross, and the extinction of the great auk. While some recovery has been made with the control of hunting and introduced predators, many species still have numbers that are only a small fraction of their former magnitude. Additionally, the Laysan and short-tailed albatrosses are not only threatened on their nesting islands, but also through bycatch in long-line fisheries.

Oceanographic changes are also implicated in at least short-term declines of a number of seabirds. Even subtle changes in ocean currents can cause critical changes in the timing and occurrence of plankton blooms and the distribution of fish needed for food.

FIGURE 1
PROPORTION OF SPECIES OF GLOBAL CONSERVATION CONCERN BY PLANT AND ANIMAL GROUPS IN CANADA



Data Source: NatureServe central databases, with review by Canadian CDCs. 2005.

INVERTEBRATES

From beetles and butterflies to bivalves and barnacles, invertebrates constitute the largest segment of the Canadian fauna. This incredibly diverse group provides essential ecosystem services ranging from crop pollination to decomposition. Unfortunately, most species and groups of invertebrates are poorly known, and therefore it is currently impossible to provide a comprehensive assessment of the overall conservation status of invertebrates. Nonetheless, enough is known about several invertebrate groups to assess the global status of most, if not all, their member species. Dragonflies and butterflies, for example, have been the focus of a number of inventories, especially in the last 20 years, and the subject of national syntheses. However, the distribution and conservation status of a number of species of dragonflies and butterflies still requires additional research and analysis.

While most butterflies, dragonflies, and tiger beetles appear to be secure, a number of them are clearly of global conservation concern. The decline or disappearance of several invertebrates is tied to the demise of the North American Great Plains. For example, the Dakota skipper (*Hesperia dacotae*) has declined about 99.9% over the past two centuries, and is now restricted to a few fragments of native prairie on the northeastern Great Plains. For somewhat mysterious reasons, the maritime ringlet butterfly (*Coenonympha nipisiquit*) is restricted in its global distribution to four salt marshes around the Baie des Chaleurs of New Brunswick and Québec, with a total area of occupied habitat of less than two square



Top left: Midland clubtail (*Gomphus fraternus*). Secure (G5). Manitoba, Ontario, Québec. While dragonflies are increasingly a focus of conservation inventory, much remains to be learned about their distribution, and many new species are likely to be found. / Photo by Colin D. Jones, Ontario NHIC.

Top right: Swamp milkweed leaf beetle (*Labidomera trimaculata*). Not ranked due to lack of data. Beetles and other insects provide us with essential ecosystem services, but the conservation status of thousands of species remains poorly known, and thousands more species remain unknown to science. / Photo by Colin D. Jones, Ontario NHIC.

Bottom: Ojibway Prairie, Ontario. Prairie habitats across North America have been mostly converted to agriculture. Grasslands are habitat not only for birds and wildflowers, but for invertebrates such as butterflies. / Photo by Mike McMurtry, Ontario NHIC.

kilometers! Most of this area is within the city limits of Bathurst and Beresford, with the concomitant urban problems of pollution and habitat degradation.

As with freshwater fish, a large proportion of freshwater mussels in Canada (10 out of 56 species, or 17.9%) are of global conservation concern, another finding consistent with the known stresses on freshwater ecosystems (Ricciardi and Rasmussen 1999). With the exception of dragonflies, other freshwater invertebrate groups — such as mayflies, stoneflies, and caddisflies — are not well enough known to include in this analysis, although several species of Canadian mayflies are known only from historic records, and thus may be susceptible to extinction (see Table 6).

VASCULAR PLANTS

Plants not only serve as the earth's primary energy source, but also provide the essential structure needed within most terrestrial ecosystems. Vascular plants include flowering herbs, shrubs, trees, and ferns with their allies (horsetails, club mosses, and quillworts). Overall, about 6% of native vascular plants in Canada — 245 species — are regarded of global conservation concern.

Ferns and their allies are a small group of vascular plants, with only 173 species native to Canada. However, about 13% (23 species) are of global conservation concern. It is difficult to know why ferns stand out among other plants, but 14 of the 23 species affected are moonworts or grape ferns in the genus *Botrychium*. Moonworts are often difficult to find and even more difficult to correctly identify. Despite these difficulties, however, most species considered of global conservation concern appear to be genuinely rare.

In addition, 13% of Canadian orchids are of global conservation concern, while the aster, mustard, rose, and grass families also contain large numbers of species on our list. Prominent genera within these families include fleabanes (*Erigeron*), brambles (*Rubus*), and whitlow-grasses (*Draba*).

COMPARING NATIONAL AND GLOBAL ASSESSMENTS

Our Home and Native Land is the first analysis to provide a global perspective for Canadian species. As noted in the Preface, however, other assessments have evaluated Canadian plants and animals from different viewpoints, or have conducted analyses based on additional criteria beyond the species level. Three efforts are of particular significance.

The first, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), is a committee of experts that maintains a national list of species at risk, which is intended to serve as the basis for protection afforded under the new



Top: *Western prairie white-fringed orchid* (*Platanthera praeclara*). Imperiled (G2). Manitoba. Conversion of tallgrass prairie to agriculture throughout the Great Plains has greatly reduced the range of this tall, beautiful wildflower. / Photo by Cary Hamel, Manitoba Conservation Data Centre.

Bottom: *Arnica* (*Arnica lanceolata*). Vulnerable (G3). Québec, New Brunswick. Found along rocky streambanks and wet cliffs. / Photo by Sean Blaney, Atlantic Canada CDC.

federal Species at Risk Act. The second effort, the National General Status Working Group (NGSWG), was established by the Canadian Wildlife Directors after the signing of the 1996 Accord for the Protection of Species at Risk. The NGSWG is responsible for assessments for all species, not just those at risk. The group's first report, *Wild Species 2000: The General Status of Wild Species in Canada*, a provincial, territorial, and federal collaboration, dealt with species in selected taxonomic groups (Canadian Endangered Species Conservation Council 2001). Additional taxonomic groups are currently being evaluated for national general status with results to be released in a second report in 2006. A third national appraisal, *The Nature Audit* from World Wildlife Fund Canada, did not assign status ranks to species, but conducted a species-approach review within ecological regions across Canada and the adjacent United States, and recommended conservation strategies to enhance biodiversity and ecosystem health (World Wildlife Fund Canada 2003).

How does *Our Home and Native Land* differ from these other assessments? A principal distinction is that both COSEWIC and NGSWG document the *national* status of species, while this analysis focuses on the *global* status of Canadian species. As an example, the northern cricket frog (*Acris crepitans*) ranges from Point Pelee in southernmost Ontario across the central and eastern United States to northern Mexico. In Canada, this frog was known only from extreme southwestern Ontario, where it may already have vanished. As a result,

COSEWIC lists the species as endangered in Canada, and *Wild Species 2000* assigned it a national general status of '1', indicating it to be nationally "at risk." NatureServe considers the frog's status not only at the national level, but also at global and provincial/territorial levels. Thus, at both the Canadian (national) and Ontario (provincial) level, the northern cricket frog is regarded as missing and possibly extirpated (NH and SH respectively). Considering the species more broadly, however, the frog remains common across most of its extensive range, and the species is ranked as globally secure (G5).

COSEWIC, *The Nature Audit*, and *Wild Species 2000* each offer a different perspective than the global analysis of this report, and each is a useful tool to help set priorities for assessment and conservation actions in Canada. It is essential to act at a variety of scales to achieve success. Conservation often starts with local protection efforts, whereas recovery priorities and strategies should consider global status. Breadth of coverage is a second key distinction between this assessment and the other analyses. This report covers all native species, both common and rare, within 13 better-known groups of Canadian plants and animals, totaling 5,685 species. *Wild Species 2000* reported on 1,600 species in eight taxonomic groups, with the *Wild Species 2005* report to evaluate many more. COSEWIC focuses only on rare and endangered taxa and as of November 2004 had assessed 648 species, subspecies, and populations within 10 taxonomic groups (COSEWIC 2004). Because COSEWIC's priorities are based on the species' status in Canada, and it lists a species only after a detailed report has been written and assessed, many species (especially vascular plants) that are considered vulnerable or even globally imperiled by NatureServe have not yet been considered by COSEWIC. *The Nature Audit* examined 1,419 species within nine taxonomic groups by ecoregions to assess species and habitat trends. As a result, *Our Home and Native Land* not only provides a global perspective on the status of Canada's wild species, but also includes a much larger number and broader array of species for analysis.

Comparing the general status assessments contained in *Wild Species 2000* and the range-wide assessments offered here provides a unique opportunity to consider the relationship between national and global level assessments of Canadian species. While differences in taxonomic treatments (e.g., what is considered a species versus a subspecies) and inclusion or exclusion of certain groups (e.g., marine turtles were excluded in *Wild Species 2000*) make precise comparisons difficult, the patterns remain interesting. *Wild Species 2000* reported that about 10% of the species assessed are or may be of national conservation concern, with another 13% considered "sensitive." This total of 23% of species believed to be of national conservation concern contrasts with our figure of 6.4% of species considered of global conservation concern.

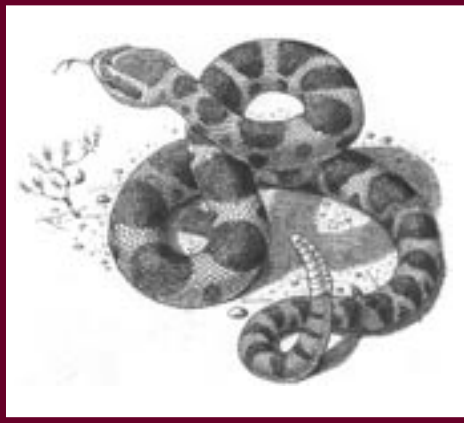
Wild Species 2000 identifies reptiles and turtles as the most vulnerable group* in Canada. Of the 43 native species, 11 are or may be of national conservation concern with another 12 regarded as sensitive, for a total of 23 species of concern — a disturbing 56% of the national reptile and turtle fauna. COSEWIC lists 32 reptiles and turtles at risk, but eight of these are subspecies or populations, resulting in a list of 24 species, including sea turtles, a group not considered by *Wild Species 2000*. A comparison with COSEWIC's overall list regarding proportions of species of conservation concern is not practical, since COSEWIC's deliberations are not complete for most groups.

The Nature Audit reports that reptiles and turtles* have undergone major reductions in abundance since European settlement, with species along Canada's southern boundary and the leatherback sea turtle (*Dermochelys coriacea*) having suffered the greatest decline. In our analysis, only three of Canada's reptiles and turtles — the western pond turtle (*Clemmys marmorata*), leatherback sea turtle (*Dermochelys coriacea*), and massasauga (*Sistrurus catenatus*) — are found to be of global conservation concern. Similarly, 31% of Canadian orchids are considered of national conservation concern or sensitive according to *Wild Species 2000*, and they are identified as one of the groups of greatest concern in *The Nature Audit*. This report finds that 13% of the orchid species occurring in Canada are of global conservation concern. This relationship between national and global status holds true for most of the groups assessed; as one might expect, far fewer Canadian species are of conservation concern globally than nationally.

IUCN — The World Conservation Union is another organization that reviews the status of species worldwide and periodically updates its *Red List of Threatened Species* (IUCN 2004). IUCN prepares conservation status assessments for species, subspecies, varieties, and even selected subpopulations of species. In 1997, IUCN adjusted its criteria to determine each species' relative risk of extinction and is currently re-assessing every species. These revised evaluation criteria for species are very similar to those currently used by NatureServe and COSEWIC (Master 2004). Slight differences, however, do exist as revealed in a comparison of the three ranking systems completed using Canada's reptiles and amphibians (Alvo and Oldham 2000). Consideration of Canada's global standing in relation to other northern countries is difficult at this time due to incompleteness of the re-assessments by IUCN or lack of conservation status assessments completed by the countries themselves.

* In a shakeup of the vertebrate family tree caused by the discovery that birds are the closest living relatives of crocodiles, turtles are now considered to be a separate group from reptiles. In short, if birds are split from crocodiles as a separate class, then it makes sense to split both crocodiles and turtles from the reptiles (Collins and Taggart 2002).

Silenced Rattle: The Assault on the Massasauga



Eastern massasauga
/Illustration by
Donald Gunn.

Your heart rate quickens as a rapid-fire, buzzy rattling alerts you to the presence of an eastern massasauga (*Sistrurus catenatus*) coiled beneath a juniper less than a step away. So cryptic are these small rattlesnakes that silence is often their best defense. Only when pressed do they resort to retaliatory warnings or strikes. Yet despite the improbability of being bitten, concern about human safety has served as a pretense by some to wantonly kill massasaugas in Ontario and parts of the United States. Along with the elimination and fragmentation of prairie and wetland habitat, these attacks have depleted and isolated many populations to the point of imminent extinction.

The four populations that remain in Ontario include both worst-case and best-case conservation scenarios for this species. Among the worst cases: the Ojibway population persists in remnant patches of tallgrass prairie, surrounded by busy roads and residential developments, in suburban Windsor. In a peatland near Port Colborne, the reclusive Wainfleet population copes with a drastically altered water table and alien species that dominate the native plant community — the results of past ditching, draining, and mining for commercial peat. The best cases are the extensive and robust populations of Bruce Peninsula and Georgian Bay. Both exhibit relatively high densities in undisturbed areas and minimally developed cottage country. However, they too are jeopardized by the expansion of road networks and vacation communities that reduce connectivity and sub-divide populations bit by bit. Throughout these regions it is the startling buzz of the massasauga that is so evocative of the vestiges of wild southern Ontario. With limits to growth, sustainable land use, and a bit of luck, perhaps these wildlands and the massasauga itself can survive their rare encounters with humans.

GONE FOREVER: CANADA'S EXTINCT SPECIES

The extinction of any species forever diminishes the nation's natural heritage. From an ecological perspective, extinction results in the permanent loss of a species' ecological function and evolutionary potential. By its very nature, extinction is

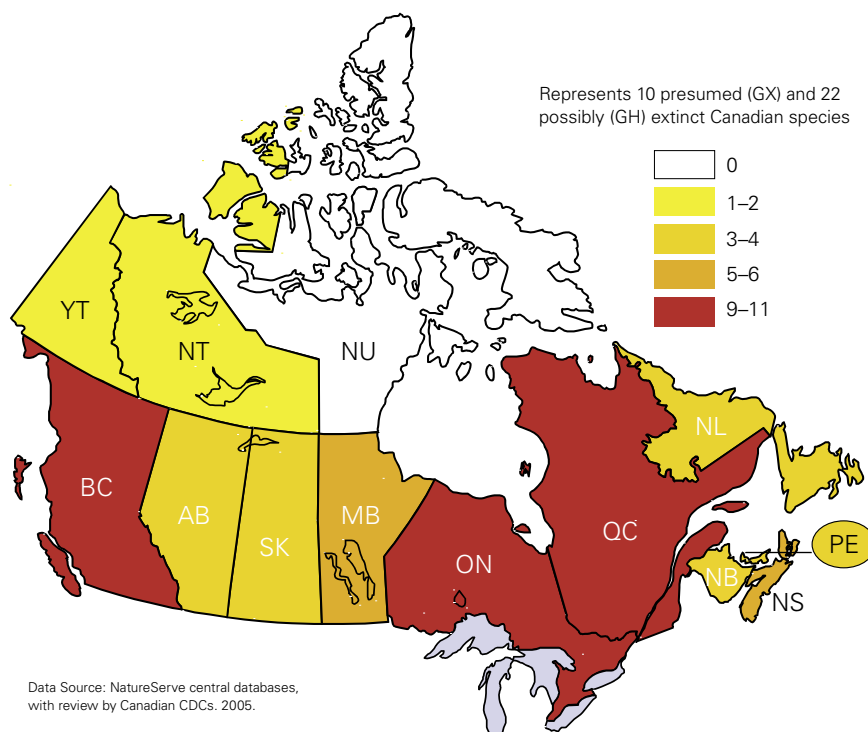
difficult to document; the disappearance of a species must often be deduced from evidence of its absence. Judgment as to when to declare a plant or animal extinct depends upon the species, its habits, range, and size; that is, how easy it would be to find it, were it still alive. In practice, confirmation of extinction is usually based on unsuccessful searches of suitable habitat and long periods without evidence of the species' presence.

When *all* species groups included in NatureServe's databases are considered (not just those selected for analysis in this report), a total of 32 Canadian species are classified as presumed or possibly extinct: 10 are presumed extinct (*Table 6 and Appendix A*) while another 22 are possibly extinct (*Table 6 and Appendix B*). These totals differ from those in Table 4, since this analysis includes groups such as moths, mayflies, and non-vascular plants that are not treated in that table. Certainly some of the species in the 'possibly extinct' category may be rediscovered, especially among the invertebrates, which are poorly inventoried. Many invertebrates are known historically from only one collection and additional efforts have not always been made to relocate them. Nevertheless, this list is undoubtedly conservative, as the listing process requires time, and is based on assessment and knowledge gained from research and monitoring completed by biologists in the field and laboratory. Among vertebrates, freshwater fish and birds have been hardest hit. The only Canadian vascular plant that is possibly extinct is Yukon whitlow-grass (*Draba yukonensis*), a small wildflower known from only one site in the world which has eluded rediscovery for almost 30 years.

TABLE 6
PRESUMED EXTINCT AND POSSIBLY EXTINCT
CANADIAN SPECIES BY TAXONOMIC GROUP

	Presumed Extinct (GX)	Possibly Extinct (GH)	Total
VERTEBRATES			
Mammals	0	0	0
Birds	3	1	4
Reptiles and turtles	0	0	0
Amphibians	0	0	0
Freshwater fishes	5	1	6
Vertebrate total	8	2	10
INVERTEBRATES			
Molluscs	1	1	2
Mayflies	0	7	7
Moths	0	4	4
Other insects	0	6	6
Invertebrate total	1	18	19
VASCULAR PLANTS			
Ferns and fern allies	0	0	0
Conifers	0	0	0
Flowering plants	0	1	1
Vascular plants total	0	1	1
NON-VASCULAR PLANTS			
Mosses	1	0	1
Lichens	0	1	1
Non-vascular plants total	1	1	2
TOTAL	10	22	32

FIGURE 2
EXTINCTIONS ACROSS CANADA



From Abundance to Absence: The Unimaginable Extinction of the Passenger Pigeon



Passenger pigeons /
Illustration by Donald
Gunn.

“The air was literally filled with pigeons; the light of noonday was obscured as by an eclipse; the dung fell in spots, not unlike melting flakes of snow; and the continued buzz of wings had a tendency to lull my senses to repose...pigeons were still passing in undiminished numbers, and continued to do so for three days in succession.”

— JOHN JAMES AUDUBON, THE BIRDS OF AMERICA, VOL. V, 1838.

The story of the passenger pigeon (*Ectopistes migratorius*) is an ecologically horrifying example of truth being stranger than fiction. Who could ever dream up a tale of a species so abundant that it may have been the most numerous bird on the continent, brought to extinction in only a few decades? Originally its incredibly immense flocks had ranged over all of eastern North America, and it bred abundantly as far north as southern Canada. In the mid-1800s, hundreds of thousands were killed annually — in one hunting competition, 30,000 bodies were needed to win! But passenger pigeons produced only one or two chicks per nest; their reproductive potential simply wasn't able to cope with the carnage. In 1870, huge flocks still roamed the countryside, but by 1880 the survivors were scattered. By 1890 few remained.

Even though the huge slaughter thinned the multitudes, however, it seems that it wasn't the passenger pigeon's final undoing. Hunting on a major scale ceased when the flocks thinned and broke up. Forest clearing or exotic diseases have been suggested as contributing factors to the final decline, but it is likely that passenger pigeons needed to live in large flocks to breed successfully.

The last reliable sighting in Canada was at Penetanguishene, Ontario, on 18 May 1902. Martha, the last bird in captivity, lived out her last years in the Cincinnati Zoo alone, and died on 1 September 1914. The forests and woodlands of eastern North America will never be the same.

Geographic Patterns Among Species of Global Conservation Concern

Nature is not limited by lines on a map; national and provincial/territorial boundaries are merely artificial constructs superimposed on ecologically complex landscapes. From the perspectives of both biology and conservation, characterizing the landscape based on provincial and territorial boundaries has serious shortcomings. The great difference in size among jurisdictions is a particularly significant issue, especially with regards to the cluster of relatively small Maritime provinces. Nonetheless, these political divisions are embedded as societal and resource management units in a way that more ecologically sensible subdivisions — whether ecoregions, watersheds, or biomes — are not. Because of the way in which scientific data historically have been gathered, province-based assessments allow us to consider patterns for the broadest array of species, both rare and common.

Assessing biological and ecological conditions is a complex endeavour. Ideally, all species should be considered with respect to their habitat conditions, as well as their ability to function and evolve naturally in the future. Unfortunately, most of the data that would allow this idealized assessment on a province-by-province basis do not exist. Instead,

three characteristics (diversity, conservation concern, and extinctions) were used to measure the biological conditions of Canada’s provinces and territories.

Diversity as used here refers to the number of native species, also known as species “richness.” Species richness is the most prevalent estimate of diversity and provides a simple measure of biological wealth. *Global Conservation Concern* refers to the percentage of a province’s plants and animals that are at increased global conservation concern due to rarity or other factors, and provides a measure of the conservation challenge. In this analysis, this measure includes all species with a NatureServe global conservation status of presumed extinct (GX), possibly extinct (GH), critically imperiled (G1), imperiled (G2), or vulnerable (G3). *Extinctions* refers to the number of Canadian species that are presumed or possibly extinct, thus measuring the amount of diversity already lost. This measure includes only those species that are globally extinct, that is, have disappeared across their entire former range.

To illuminate geographic patterns for these biological measures, diversity and global conservation concern are calculated by province for all vascular plants and vertebrates,

FIGURE 3
PATTERNS OF SPECIES DIVERSITY AND GLOBAL CONSERVATION CONCERN ACROSS CANADA

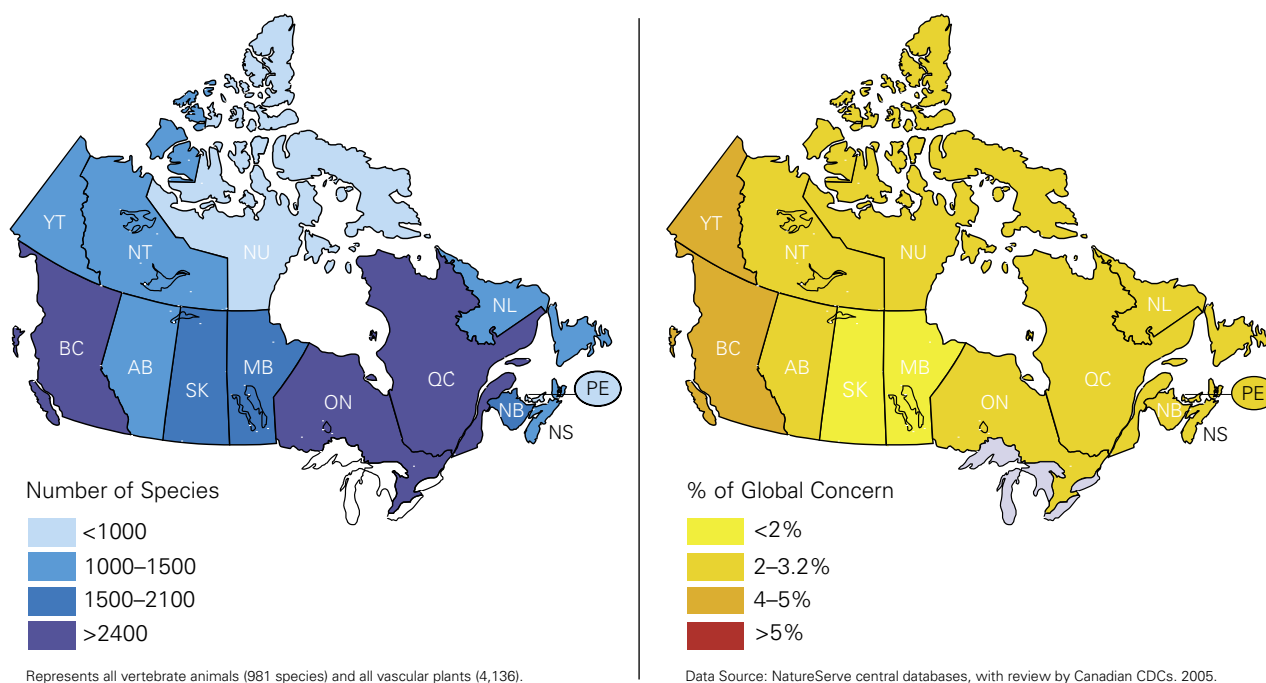


FIGURE 4

PLANT DIVERSITY AND GLOBAL CONSERVATION CONCERN ACROSS CANADA

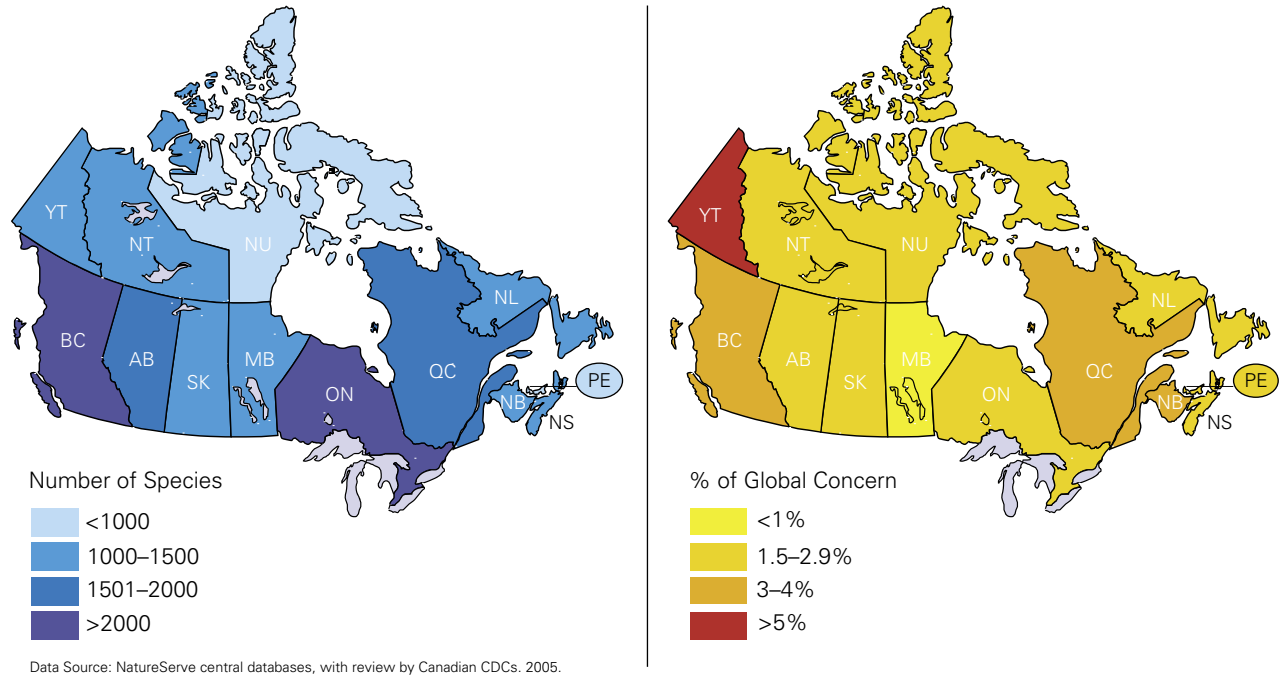
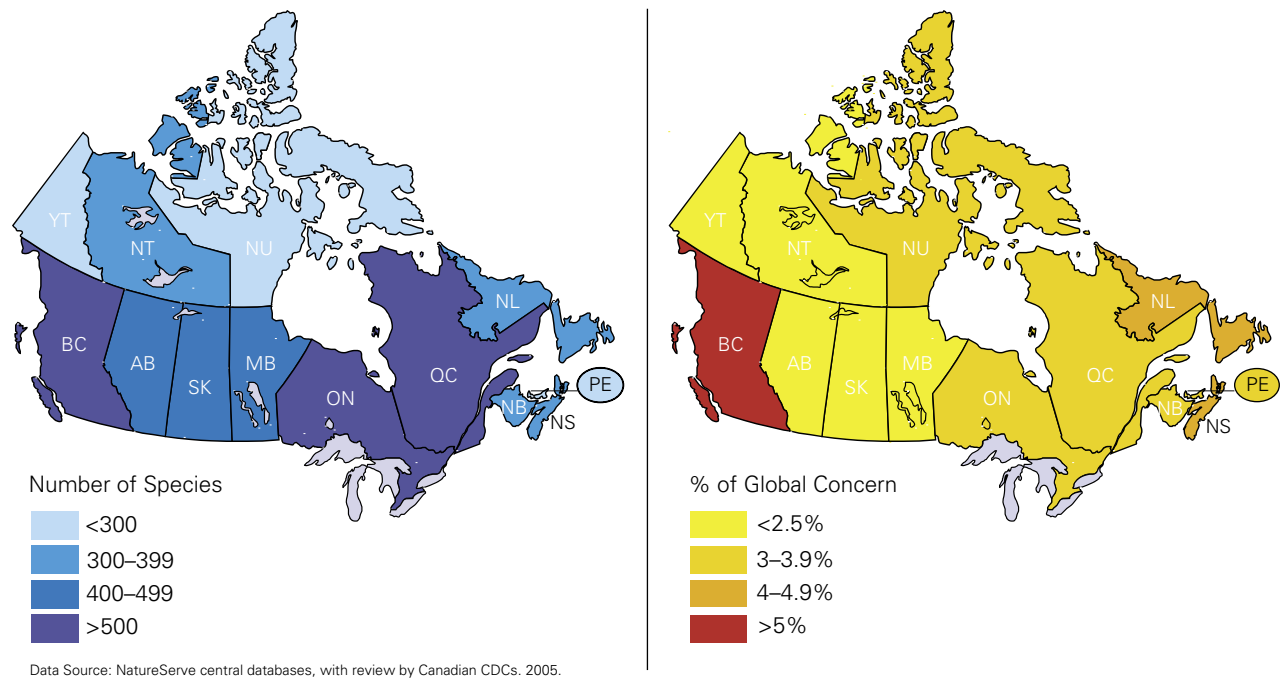


FIGURE 5

VERTEBRATE DIVERSITY AND GLOBAL CONSERVATION CONCERN ACROSS CANADA



the groups of organisms for which these data are most robust. Overall patterns of diversity, global conservation concern, and extinctions are mapped in Figures 2 through 5. British Columbia scores high in diversity, global conservation concern, and extinctions, as does Québec. Ontario also has high diversity and extinctions, but relatively fewer species of global conservation concern. Yukon Territory stands out as a hotspot for species of global conservation concern, and Nova Scotia, while having relatively low overall diversity, has a relatively high number of species of global conservation concern and extinctions. What underlies the patterns seen in these provincial and territorial rankings of biodiversity across Canada's land and seascapes?

Poised on the western edge of the continent, where the rich, cold waters of the Pacific Ocean meet rugged mountains, British Columbia is the most biologically diverse province in the country, harboring nearly 2,800 native vascular plants and vertebrates. Facing the westerly winds, mountain ranges divide the intricate landscape into climatic stripes of hot and cold, wet and dry. The resulting climatic and topographic diversity translates directly into biological diversity. British Columbia unfortunately also leads in species of global conservation concern, at nearly 7%. Its hotspots include the dry Garry Oak and Douglas-fir woodlands of southern Vancouver Island and the Gulf Islands, home to nine plant species of global conservation concern. The open landscape and favourable climate have made it a prime area for human development — first farms and now rapidly expanding cities and suburbs.

Although the great sea of grass of the North American Great Plains is one of the most altered ecosystems on the planet, paradoxically, its Canadian remnants contain relatively few globally rare species. Those species that do occur, however, either have suffered major reductions in range, are rapidly declining in numbers, such as the mountain plover (*Charadrius montanus*), or have disappeared entirely, such as the black-footed ferret (*Mustela nigripes*). The western prairie fringed orchid (*Platanthera praeclara*), as another example, ranges from southern Manitoba south to Oklahoma, but 90% of its populations are now restricted to the Red River Valley of southern Manitoba and adjacent American states.

Ontario and Québec, both large, predominantly boreal provinces, are enriched in the south by species reaching their northernmost distribution in the Great Lakes and the St. Lawrence regions. The range of these southern species overlaps with the most densely populated regions in Canada, and the places with the most highly-altered natural environment. The Carolinian forest region of southern Ontario, for example, constitutes less than one-quarter of a percent of Canada's area, yet supports nearly one-quarter of its human population. Many of the species of global conservation concern in central Canada, however, are not Carolinian species, but species confined to the Great Lakes or their special shoreline habitats. And although British Columbia has a slightly higher overall diversity of species, Ontario has a much higher diversity of freshwater life forms

than the Pacific province, whether they are dragonflies, crayfish, or fish — and freshwater biota is especially threatened.

Atlantic Canada is noteworthy for its large number of threatened vertebrates — especially marine mammals, birds, and turtles — even though the overall number of vertebrates in the region is relatively low. The sole turtle species found in Newfoundland and Labrador, for example, is the endangered leatherback sea

Top Fidler-Greywillow Wildland Provincial Park in northern Alberta. Taiga habitat constitutes the transition zone between boreal forest and tundra. / Photo by Ksenija Vujnovic, © Alberta Parks and Protected Areas.

Bottom left: Lakeside daisy (*Hymenoxys herbacea*). Imperiled (G2). Ontario. A resident of rocky outcrops of limestone and dolomite. / Photo by Wasyl Bakowsky, Ontario NHIC.

Bottom right: Canada's vast boreal forest is one of the largest intact landscapes in the world and provides essential breeding habitat for millions of migratory songbirds. Newfoundland. / Photo by Marilyn Anions.



Going, Going, Gone? The Fate of the Eskimo Curlew



Eskimo curlew /
Illustration by Donald
Gunn.

“They generally fly in so loose and straggling a manner that it is rare to kill more than half a dozen at a shot. When they wheel, however, in any of their more beautiful evolutions, they close together in a more compact body and offer a more favourable opportunity to the gunner.”
— ELLIOTT COUES, BIRDS OF THE NORTHWEST, 1874

The Eskimo curlew (*Numenius borealis*) once filled the skies of central and eastern North America during its migrations to and from its breeding grounds along the Arctic treeline. Migrating Eskimo curlews are said to have been among the flocks of birds that guided Columbus to the New World in 1492. In doing so, “they unwittingly may have sown the seeds of their own destruction” (Gollop *et al.* 1986). After about 1880, when the passenger pigeon had already declined, spring market hunters in the American Midwest turned to migrant curlews as the next easy source of income. By the turn of the century, very few remained. Hunting certainly decimated their numbers, but Eskimo curlews were also hit simultaneously by massive habitat losses. The prairies they absolutely depended upon during spring migration were converted en masse to agricultural fields, which also sent one of their principal prey species, the Rocky Mountain grasshopper (*Melanoplus spretus*), on its way to probable extinction. Occasional, albeit usually unsubstantiated, sightings offer hope that the curlew still survives; the latest of these was of a bird seen in southwestern Manitoba in May 1996.

turtle (*Dermochelys coriacea*). Newfoundland’s insular nature has also given rise to numerous endemic species, particularly of vascular plants.

The far north, with its great wilderness of forest, taiga, and tundra, is home to some of Canada’s most magnificent wildlife. While overall species diversity is not high, an unusual concentration of rare species is centered in the far north. The Yukon Territory has more vascular plants of global conservation concern than any jurisdiction in the country. When the

Northwest Territories and Nunavut are added to the total, the region accounts for more than one-quarter of Canada’s vascular plants of global concern. Most of these are arctic or subarctic endemics, species whose limited ranges are tied to the five glacial refugia occurring north of 60°N. An example is Yukon whitlow-grass (*Draba yukonensis*), a diminutive mustard relative that is known only from a single site in open country near the town of Haines Junction, Yukon. Even in the absence of current threats, its extraordinarily restricted distribution puts the species at risk.

Threats to Canada's Species

The threats to Canada's rarest species vary among species and from place to place. However, when one looks at the big picture, clear patterns emerge. First, loss or degradation of habitat is part of the picture in almost all endangered species stories. In the prairies, vast grasslands have been converted to wheat fields and other croplands, degrading habitat for the western prairie fringed orchid, the Rocky Mountain grasshopper, and the Eskimo curlew. On the Pacific coast, large-scale timbering of ancient forests has wiped out nesting areas for the marbled murrelet. In southern Ontario, river siltation is choking the underwater habitat of the rayed bean, a freshwater mussel. Across Canada, the greatest areas of habitat loss include the grasslands of the prairies and intermountain regions, the temperate rainforests of the Pacific, the shorelines of the Great Lakes, and the Garry Oak woodlands and meadows of southwestern British Columbia. Forests in eastern Canada were extensively logged prior to 1900, largely before efforts to inventory wildlife had begun; hence the true extent of the loss of unique species there will never be known.

Other forms of habitat degradation can be more subtle, such as the gradual infill of grasslands by forests due to intensive fire suppression beginning in the mid-1800s. In parts of the mountainous West, one-third of the grasslands have been lost in this manner. Climate change also threatens to inexorably alter habitats and affect species unable to adapt quickly

enough. The warming trend is predicted to be particularly great and particularly rapid in Canada's north, where polar bears are increasingly threatened by loss of sea ice, which they depend upon in their hunt for seals.

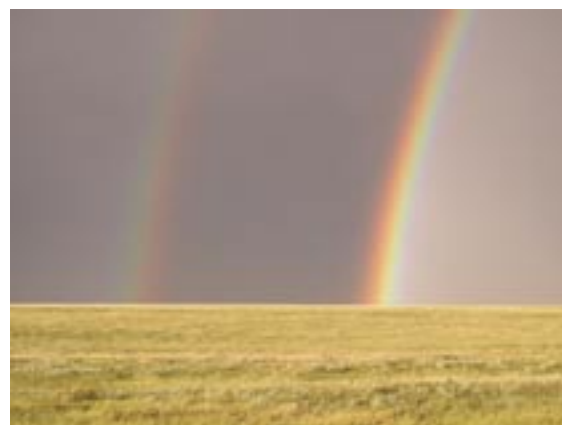
Finally, non-native invasive species are a growing threat to Canada's natural heritage. Thousands of plants and animals that originated elsewhere have found their way to Canada, assisted either intentionally or accidentally by humans. The parasitic sea lamprey (*Petromyzon marinus*) that decimated some of the native fish of the Great Lakes is a prime example, as is the Scotch broom (*Cytisus scoparius*) that is choking the Garry Oak woodlands. Invasive species also come in the form of introduced diseases, such as the West Nile virus and Dutch elm disease.



Top: Timber harvesting in British Columbia. A number of globally rare species depend on intact old-growth forests. / Photo by Jared Hobbs.

Left: Grizzly bear (*Ursus arctos*). Apparently secure (G4). British Columbia, Alberta, Manitoba, Yukon, Northwest Territory, Nunavut. Although still numerous in some areas, wide-ranging mammals like bears and caribou are threatened by fragmentation of their habitats and encroachment by humans. / Photo by Jared Hobbs.

Right: Because of their suitability for agriculture, the prairie grasslands of central Canada are among Canada's most threatened habitats. / Photo by Drajs Vujnovic, © Alberta Parks and Protected Areas.



Great Lakes Ciscoes and Hadley Lake Sticklebacks: Recent Extinctions of Freshwater Fish



Cisco (top) and sticklebacks (bottom) / Illustrations by Donald Gunn.

The immense freshwater system of the Great Lakes was once home to a thriving community of native fish, some of which were found nowhere else in the world. The deepwater and blackfin ciscoes (*Coregonus johanna*e and *C. nigripinnis* respectively) both swam in the dark depths of Lake Huron and Lake Michigan, and were part of a valuable commercial gillnet fishery there as early as 1869.

The blackfin cisco was last seen in Lake Huron in 1923, and disappeared from Lake Michigan after 1969; the deepwater cisco disappeared from both lakes in the early 1950s. The fishery had an initial impact, but the demise of both species was probably sealed in the mid-1930s with the arrival through the Welland Canal of the exotic, parasitic sea lamprey. The combination of this species' depredations, increasing fishing pressure, and increasing chemical pollution of the Great Lakes was too much for these ciscoes. As they became rarer and rarer, the remaining few individuals began hybridizing with more common cisco species and both species disappeared. Following the loss of those two ciscoes, the shortnose cisco (*C. reighardi*) has also apparently vanished from the Great Lakes — it has not been seen since 1985, despite intensive searches.

Another lake extinction, on a much smaller scale, has recently occurred in British Columbia. The Hadley Lake sticklebacks (*Gasterosteus* undescribed species) were probably the latest species to become extinct in Canada. These two small fish species inhabited a small lake on Lasqueti Island, in the middle of Georgia Strait on British Columbia's south coast. At some time in the 1990s, exotic brown bullheads (*Ameiurus nebulosus*) were illegally released into the lake. The bullheads proved to be superb nest predators, and within a very short time the sticklebacks were gone. They had vanished even before they could be scientifically described and named.

Recommendations: Protecting Canada's Natural Inheritance

No single quality measures the wealth of a nation. Rather, prosperity is a combination of many things: the well-being of our people, the quality of life in our communities, the strength of our economy, the health of our environment. Canadians take pride in the country's vast wilderness, clean air and water, and abundant wildlife. Their pride is underscored by the nation's commitment to protecting its environment. As one of the first countries to ratify the Convention on Biological Diversity, Canada is viewed as a world leader on biodiversity issues. More recently, the enactment of the Species at Risk Act has established a clear national commitment to protecting rare species. This report can help to make those commitments into reality by focusing attention on those plants and animals in most danger of extinction — the species of global conservation concern.

The Species at Risk Act and parallel provincial and territorial legislation provide a framework and some resources to help ensure native species are not lost in Canada. The NatureServe Canada network of conservation data centres is collaborating with provincial and territorial governments, the Canadian Wildlife Service, Parks Canada, Agriculture and Agri-Food Canada, the Department of Fisheries and Oceans, and others on these efforts. In this section we provide a series of conclusions and recommendations for protecting species of global conservation concern, covering the areas of priority-setting, information gaps, and management approaches.

Species of global conservation concern are national priorities.

A key finding of this report is that Canada is home to a relatively modest number of species of global conservation concern. This is good news of sorts, but it should also be stressed that because the global ranges of many of these species lie mainly in Canada, protecting them is primarily Canada's responsibility. Clearly, the 362 species of global conservation concern highlighted in this report should become national priorities for protection under the Species at Risk Act and parallel provincial and territorial legislation.

Endemic species are Canada's responsibility.

Canada is home to at least 68 endemic species — species found nowhere else in the world — which are listed in Appendix C. Many more invertebrates and non-vascular plant endemics were not considered in this report. Regardless of their conservation status, it is solely Canada's responsibility to ensure that these unique species are not lost from our ecosystems.

CONCLUSIONS AND RECOMMENDATIONS

- **Species of global conservation concern are national priorities.**
- **Endemic species are Canada's responsibility.**
- **Less-conspicuous species must not be overlooked.**
- **Many endangered species do not live in wilderness, but share habitats dominated by humans.**
- **Lack of knowledge about the distributions and habitat needs of endangered species should be addressed by increased biological inventory and research.**
- **All levels of biological diversity are important.**
- **The nature of threats to species and ecosystems has shifted in recent decades.**
- **Ecosystem-based management is an essential approach to conserving species.**
- **A multi-dimensional approach to conservation is needed, including building a system of protected areas, restoring degraded habitats, proactive environmental planning, and working cooperatively with landowners.**

Less-conspicuous species must not be overlooked.

The broad approach taken by NatureServe status assessments highlights the fact that most of the Canadian species of global conservation concern are not the birds and mammals that command so much conservation attention and resources; rather they are the less-conspicuous freshwater fish, freshwater mussels, and wildflowers. While public interest in charismatic animals like the peregrine falcon and the grizzly bear is understandable and praiseworthy, it should not unduly divert focus and public funds from species that need as much, if not more attention.

Re-Discovery and Recovery: The Tale of Furbish's Lousewort



Furbish's lousewort /
Illustration by Donald
Gunn.

The entire world's population of Furbish's lousewort (*Pedicularis furbishiae*) exists near the water's edge along the Saint John River in northern Maine and northwestern New Brunswick. Restricted to this small geographic region, this member of the snapdragon family illustrates a great tale of conservation action.

Botanist Catherine (Kate) Furbish first recognized this plant as a possible new species while traveling the Saint John River in 1880. By the mid-1940s, only sporadic occurrences were noted, and by 1975 an official report for the United States Congress listed Furbish's lousewort as probably extinct. But the following summer, when the plant was rediscovered during an environmental impact assessment for a proposed hydroelectric dam, it became a focal point of controversy.

The dam project was eventually cancelled on economic grounds, but Furbish's lousewort remained a catalyst for renewed conservation action. Populations have been subsequently found on a few additional sites along the river, but the species exists precariously in a narrow ecological niche as a result of its precise habitat requirements, specialized growth needs, and reproductive characteristics. Threats to its survival continue, but recovery efforts are underway in the form of additional research, documentation and stewardship for this species. Kate Furbish would be pleased.

Endangered species share human-dominated habitats.

Habitats of endangered species are not always in Canada's great northern wilderness; they are often in grasslands, woods, rivers, and streams near large human populations. Although a focus on northern wilderness conservation is valuable, conservation of these smaller, often fragmented habitats is also crucial. Many species of global conservation concern have specialized habitat needs that make them very useful indicators of overall ecosystem health.

Biological inventory and research are major needs.

Much greater investment is needed to understand what plants and animals live in Canada, how they are doing, and where

they are found. More inventory and research, carried out by conservation data centres, conservation groups, universities, natural history museums, and government agencies, would improve status assessments and better inform conservation and development decisions. In particular, completing the NatureServe Canada network by establishing conservation data centres in the Northwest Territories and Nunavut is essential to improve knowledge of Canada's northern biodiversity.

Many rare species do not even make it onto the COSEWIC lists (and thus the Species at Risk Act registry) simply because not enough is known about their distribution or status. At a minimum, strategic investment in inventory and research focused on species designated by COSEWIC as Data Deficient

would be valuable. The global and national ranks assigned by the NatureServe network could provide a far more inclusive list of species for which inventory is a key priority. Detailed inventory not only improves knowledge of the distribution and status of rare species, but is also the best way of removing species from lists of conservation concern, since many species are actually more common than their sparse distribution records indicate.

In addition to improving knowledge regarding the status and distribution of species in the 13 taxonomic groups reported on here, detailed inventories of additional groups would greatly aid in setting conservation priorities. Since aquatic ecosystems are particularly threatened, groups such as mayflies, stoneflies, caddisflies, diving beetles, and marine fish are logical priorities for increased inventory. Grasshoppers make up a relatively well-known group that, if more inventories were done, could inform grassland conservation. However, while species-oriented inventory efforts are important, a habitat-based approach to conservation is still necessary to ensure that all native species have a chance to thrive in Canada.

All levels of biological diversity are important.

Although this report has considered full species only, we recognize that all levels of biological diversity are important. Conservation actions should be informed by knowledge of *all* imperiled plants and animals, including subspecies and distinct populations, as well as knowledge of the best examples of intact ecological systems and communities.

The nature of threats to species and ecosystems has shifted.

For the first century and a half after European settlement, destruction of habitat and direct overharvesting of valuable species were the major threats to Canada's wildlife. While both — and particularly habitat destruction — continue to drive biodiversity loss, in recent years a number of new threats have emerged, including invasive species, wildlife diseases, and changes to ecological processes. Examples of the latter include climate change, suppression of natural fires in fire-dependent ecosystems, and altered hydrology in streams and wetlands. Combating these types of threats and their cumulative impact requires new perspectives and new sets of policy and land management tools.

Ecosystem-based management is essential.

Protecting habitat and using adaptive ecosystem management are efficient ways to conserve species that are already endangered, as well as to keep additional species from declining to the brink of extinction. An ecosystem-based approach also safeguards the complex ecological inter-relationships, many of which are largely unknown, among the multitude of species within ecosystems. Special efforts should be made to ensure the health of all freshwater systems, from the Great Lakes to small wetlands.

A multi-dimensional approach is needed.

Given the range of emerging threats and the complexities of ecosystem-based management, it is not surprising that effective conservation requires a diverse portfolio of strategies. First, we must design and establish connected networks of protected areas. Next, the protection and recovery of individual endangered species should be a priority. Environmental concerns should be built into ongoing land use planning at all scales, from local to regional. Habitat should be expanded by restoring important places and ecosystems that have been seriously degraded. Each of these efforts should be pursued in cooperation with private landowners and with stewardship by them of local natural resources for the benefit of the community.

Ultimately, success will depend on creating a society that values biodiversity for its inherent value, as well as for the benefits it provides to our economy and well-being. When we come to see every unique species and habitat as a part of our home and native land, then protection of Canada's rich natural heritage becomes our responsibility, and our right.



Top: Red maple-black gum swamp, Ontario. The deciduous Carolinian forest ecosystem, which reaches its northern limit in southern Ontario, is home to an especially diverse flora. / Photo by Wasyl Bakowsky, Ontario NHIC.

Bottom: Race Rocks, an ecological reserve off the southern tip of Vancouver Island in British Columbia, provides protection for marine mammals and sea birds. Maintaining a network of protected areas is an important conservation strategy. / Photo by Jared Hobbs.

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APPENDIX A. PRESUMED EXTINCT SPECIES OF CANADA

SCIENTIFIC NAME	ENGLISH COMMON NAME	FRENCH COMMON NAME	LAST OBSERVED	PROVINCE/TERRITORY
Birds				
<i>Camptorhynchus labradorius</i>	Labrador Duck	Eider de Labrador	1878	NB, NL, NS, PE, QC
<i>Ectopistes migratorius</i>	Passenger Pigeon	Tourte voyageuse	1914	MB, NB, NS, ON, PE, QC, SK
<i>Pinguinus impennis</i>	Great Auk	Grand Pingouin	1844	NB, NL, NS, QC
Fish				
<i>Coregonus johanna</i>	Deepwater Cisco	Cisco de profondeur	1952	ON
<i>Coregonus</i> sp.	Dragon Lake Whitefish	Corégone du lac Dragon	1956	BC
<i>Gasterosteus</i> sp.	Hadley Lake Benthic Stickleback	Épinoche benthique du lac Hadley	1999	BC
<i>Gasterosteus</i> sp.	Hadley Lake Limnetic Stickleback	Épinoche limnétique du lac Hadley	1999	BC
<i>Coregonus nigripinnis</i>	Blackfin Cisco	Cisco à nageoires noires	1969	ON
Freshwater Molluscs				
<i>Lottia alveus</i>	Bowl Limpet	Patelle des zostères	1929	NS, NL, QC
Mosses				
<i>Neomacounia nitida</i>	Macoun's Shining Moss	Macounie luisante	1864	ON

Note. This list does not include the extinct marine mammal *Neovison macrondon*. Until recently, most taxonomists considered this a subspecies of the mink, *Mustela vison*, but it is now considered a distinct species, the sea mink.

APPENDIX B. CANADIAN SPECIES OF GLOBAL CONSERVATION CONCERN

Note 1. See Table 3 for a definition of each global rank. “Range ranks” (e.g. G2G3) are used when uncertainty about the distribution or abundance of a species precludes a more precise rank. In this report’s analysis, the range ranks presented below were rounded to the higher rank (i.e. G2 in the example) or averaged (G2G4 to G3). Ranks followed by a question mark (e.g. G3?) are also uncertain; these were treated as certain for the analysis.

Note 2. The taxonomy (species concepts and species names) of this list is based primarily on 2003 data from the NatureServe central databases, as modified by CDC biologists in cases where more current information was available. In the case of plants, the taxonomy follows, for the most part, Kartesz (1999). A ‘Q’ following a global rank indicates that the taxonomy of the species is uncertain, and a change in the taxonomic status would cause the taxon to be less at risk.

Note 3. The distribution column indicates provinces and territories in which the species is regularly found. In the case of birds, this includes all jurisdictions of regular occurrence (or past regular occurrence, in certain cases), including migration corridors.

GLOBAL RANK	SCIENTIFIC NAME	ENGLISH COMMON NAME	FRENCH COMMON NAME	DISTRIBUTION BY PROVINCE/TERRITORY
Mammals (17)				
G1	<i>Eubalaena glacialis</i>	Northern Right Whale	Baleine noire	BC, NB, NL, NS, PE, QC
G1	<i>Marmota vancouverensis</i>	Vancouver Island Marmot	Marmotte de l’île Vancouver	BC
G1	<i>Mustela nigripes</i>	Black-footed Ferret	Putois d’Amérique	AB, MB, SK
G2G3	<i>Myotis keenii</i>	Keen’s Long-eared Bat	Chauve-souris de Keen	BC
G3	<i>Balaena mysticetus</i>	Bowhead	Baleine boréale	MB, NL, NT, NU, YT
G3	<i>Balaenoptera borealis</i>	Sei Whale	Rorqual boréale	BC, NB, NL, NS, QC
G3	<i>Callorhinus ursinus</i>	Northern Fur Seal	Otarie à fourrure	BC, NU
G3	<i>Eumetopias jubatus</i>	Steller Sea Lion	Otarie de Steller	BC
G3	<i>Megaptera novaeangliae</i>	Humpback Whale	Rorqual à bosse	BC, NB, NL, NS, PE, QC
G3	<i>Mesoplodon stejnegeri</i>	Stejneger’s Beaked Whale	Baleine à bec de Stejneger	BC
G3	<i>Myotis leibii</i>	Eastern Small-footed Myotis	Chauve-souris pygmée	ON, QC
G3	<i>Sorex maritimensis</i>	Maritime Shrew	Musaraigne des Maritimes	NB, NS
G3	<i>Vulpes velox</i>	Swift Fox	Renard véloce	AB, MB, SK
G3Q	<i>Mesoplodon carlhubbsi</i>	Hubbs’s Beaked Whale	Baleine à bec de Hubbs	BC
G3G4	<i>Balaenoptera musculus</i>	Blue Whale	Rorqual bleu	BC, NB, NL, NS, PE, QC
G3G4	<i>Balaenoptera physalus</i>	Fin Whale	Rorqual commun	BC, NL, NS, PE, QC
G3G4	<i>Physeter macrocephalus</i>	Sperm Whale	Cachalot macrocéphale	BC, NB, NL, NS, NU, QC
Birds (14)				
GH	<i>Numenius borealis</i>	Eskimo Curlew	Courlis esquimau	AB, MB, NB, NL, NS, NT, ON, PE, QC, SK
G1	<i>Dendroica kirtlandii</i>	Kirtland’s Warbler	Paruline de Kirtland	ON
G1	<i>Grus americana</i>	Whooping Crane	Grue blanche	AB, MB, NT, NU, ON, SK
G1	<i>Phoebastria albatrus</i>	Short-tailed Albatross	Albatros à queue courte	BC
G1G2Q	<i>Puffinus creatopus</i>	Pink-footed Shearwater	Puffin à pieds roses	BC
G2	<i>Charadrius montanus</i>	Mountain Plover	Pluvier montagnard	AB, SK
G3	<i>Charadrius melodus</i>	Piping Plover	Pluvier siffleur	AB, MB, NB, NL, NS, ON, PE, QC, SK
G3	<i>Pelecanus erythrorhynchos</i>	American White Pelican	Pélican d’Amérique	AB, BC, MB, NT, ON, SK
G3	<i>Phoebastria immutabilis</i>	Laysan Albatross	Albatros de Laysan	BC
G3	<i>Puffinus bulleri</i>	Buller’s Shearwater	Puffin de Buller	BC
G3	<i>Strix occidentalis</i>	Spotted Owl	Chouette tachetée	BC
G3G4	<i>Brachyramphus marmoratus</i>	Marbled Murrelet	Guillemot marbré	BC
G3G4	<i>Puffinus carneipes</i>	Flesh-footed Shearwater	Puffin à pieds pâles	BC
G3G4	<i>Rhodostethia rosea</i>	Ross’s Gull	Mouette rosée	MB, NT, NU, QC
Reptiles and Turtles (4)				
G2	<i>Dermochelys coriacea</i>	Leatherback	Tortue luth	BC, NB, NL, NS, PE, QC
G3G4	<i>Emys marmorata</i>	Western Pond Turtle	Tortue de l’Ouest	BC
G3G4	<i>Sistrurus catenatus</i>	Massasauga	Crotale Massasauga	ON
G3Q	<i>Elaphe gloydi</i>	Eastern Fox Snake	Couleuvre fauve de l’Est	ON
Amphibians (1)				
G2	<i>Rana pretiosa</i>	Oregon Spotted Frog	Grenouille maculée de l’Oregon	BC
Freshwater Fishes (26)				
GH	<i>Coregonus reighardi</i>	Shortnose Cisco	Cisco à museau court	ON
G1	<i>Catostomus</i> sp. 4	Salish Sucker	Meunier de Salish	BC
G1	<i>Coregonus huntsmani</i>	Atlantic Whitefish	Corégone de l’Atlantique	NS
G1	<i>Cottus</i> sp. 2	Cultus Pygmy Sculpin	Chabot pygmée	BC
G1	<i>Gasterosteus</i> sp. 1	Giant Stickleback	Épinoche géante	BC
G1	<i>Gasterosteus</i> sp. 16	Vananda Creek Limnetic Stickleback	Épinoche limnétique du ruisseau Vananda	BC
G1	<i>Gasterosteus</i> sp. 17	Vananda Creek Benthic Stickleback	Épinoche benthique du ruisseau Vananda	BC
G1	<i>Gasterosteus</i> sp. 2	Enos Lake Limnetic Stickleback	Épinoche limnétique du lac Enos	BC
G1	<i>Gasterosteus</i> sp. 3	Enos Lake Benthic Stickleback	Épinoche benthique du lac Enos	BC
G1	<i>Gasterosteus</i> sp. 4	Paxton Lake Limnetic Stickleback	Épinoche limnétique du lac Paxton	BC
G1	<i>Gasterosteus</i> sp. 5	Paxton Lake Benthic Stickleback	Épinoche benthique du lac Paxton	BC
G1	<i>Lampetra macrostoma</i>	Lake Lamprey	Lamproie du lac Cowichan	BC
G1	<i>Moxostoma hubbsi</i>	Copper Redhorse	Chevalier cuivré	QC
G1Q	<i>Spirinchus</i> sp. 1	Pygmy Longfin Smelt	Éperlan d’hiver nain	BC
G3	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Esturgeon à museau court	NB
G3	<i>Acipenser medirostris</i>	Green Sturgeon	Esturgeon vert	BC

GLOBAL RANK	SCIENTIFIC NAME	ENGLISH COMMON NAME	FRENCH COMMON NAME	DISTRIBUTION BY PROVINCE/TERRITORY
G3	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Esturgeon noir	NB, NL, NS, PE, QC
G3	<i>Ammocrypta pellucida</i>	Eastern Sand Darter	Dard de sable	ON, QC
G3	<i>Coregonus kiyi</i>	Kiyi	Kiyi	ON
G3	<i>Coregonus zenithicus</i>	Shortjaw Cisco	Cisco à mâchoires égales	AB, MB, NT, NU, ON, SK
G3	<i>Notropis anogenus</i>	Pugnose Shiner	Méné camus	ON
G3	<i>Noturus stigmosus</i>	Northern Madtom	Chat-fou du Nord	ON
G3	<i>Rhinichthys</i> sp. 4	Nooksack Dace	Naseux de Nooksack	BC
G3	<i>Salvelinus confluentus</i>	Bull Trout		AB, BC, YT
G3G4	<i>Acipenser fulvescens</i>	Lake Sturgeon	Esturgeon jaune	AB, MB, NL, ON, QC, SK
G3G4Q	<i>Osmerus spectrum</i>	Pygmy Smelt	Éperlan nain	QC
Freshwater Molluscs (10)				
G1G2	<i>Alasmidonta heterodon</i>	Dwarf Wedgemussel	Alasmidonte naine	NB
G1G2	<i>Villosa fabalis</i>	Rayed Bean	Villeuse haricot	ON
G2	<i>Epioblasma torulosa</i>	Northern Riffleshell	Dysnomie ventrue jaune	ON
G3	<i>Alasmidonta varicosa</i>	Brook Floater	Alasmidonte	NB, NS
G3	<i>Anodonta californiensis</i>	California Floater		BC
G3	<i>Epioblasma triquetra</i>	Snuffbox	Épioblasme tricolore	ON
G3	<i>Gonidea angulata</i>	Rocky Mountain Ridged Mussel	Gonidée des Rocheuses	BC
G3	<i>Simpsonia ambigua</i>	Mudpuppy Mussel	Mulette du Necturus	ON
G3G4	<i>Anodonta nuttalliana</i>	Winged Floater		BC
G3G4	<i>Lampsilis cariosa</i>	Yellow Lampmussel	Lampsile jaune	NB, NS
Butterflies and Skippers (23)				
G1	<i>Coenonympha nipisiquit</i>	Maritime Ringlet	Satyre fauve des Maritimes	NB, QC
G1?	<i>Colias johanseni</i>	Johansen's Sulphur	Coliade de Johansen	NU
G2	<i>Lycaena dospassosi</i>	Salt Marsh Copper	Cuivré maritime	NB, QC
G2	<i>Oarisma powesheik</i>	Powesheik Skipperling	Hespérie de Poweshiek	MB
G2G3	<i>Callophrys johnsoni</i>	Johnson's Hairstreak		BC
G2G3	<i>Euphydryas gillettii</i>	Gillette's Checkerspot	Damier de Gillette	AB, BC
G2G3	<i>Hesperia dactotae</i>	Dakota Skipper	Hespérie du Dakota	MB, SK
G3	<i>Boloria alberta</i>	Alberta Fritillary		AB, BC
G3	<i>Boloria natazhati</i>	Beringian Fritillary		BC, NT, NU, YT
G3	<i>Callophrys irus</i>	Frosted Elfin	Lutin givré	ON
G3	<i>Euphyes dukesi</i>	Dukes' Skipper		ON
G3	<i>Speyeria idalia</i>	Regal Fritillary		MB, ON, SK
G3G4	<i>Callophrys lanoraieensis</i>	Bog Elfin	Lutin des tourbières	NB, NS, ON, QC
G3G4	<i>Callophrys mossii</i>	Moss' Elfin		AB, BC
G3G4	<i>Colias occidentalis</i>	Western Sulphur		BC
G3G4	<i>Erebia lafontainei</i>	Reddish Alpine		NT, YT
G3G4	<i>Erora laeta</i>	Early Hairstreak	Lutin mystérieux	NB, NS, ON, QC
G3G4	<i>Erynnis martialis</i>	Mottled Dustywing	Hespérie tachetée	MB, ON, QC
G3G4	<i>Hesperia ottoe</i>	Ottoo Skipper		MB, SK
G3G4	<i>Oeneis alpina</i>	Eskimo Arctic		NT, YT
G3G4	<i>Oeneis rosovi</i>	Philip's Arctic		BC, NT, YT
G3G4	<i>Papilio brevicauda</i>	Short-tailed Swallowtail	Papillon queue-courte	NB, NL, NS, QC
G3G4	<i>Pieris virginiana</i>	West Virginia White	Pieride de Virginie	ON, QC
Tiger Beetles (3)				
G2G3	<i>Cicindela marginipennis</i>	A Tiger Beetle		QC
G3	<i>Cicindela ancocisconensis</i>	White Mountain Tiger Beetle	Cicindèle des Appalaches	QC
G3	<i>Cicindela patruela</i>	A Tiger Beetle		MB, ON, QC
Dragonflies and Damselflies (11)				
G2	<i>Neurocordulia michaeli</i>	Broadtailed Shadowdragon		NB
G3	<i>Gomphus ventricosus</i>	Skillet Clubtail	Gomphe ventru	NB, NS, ON, QC
G3	<i>Gomphus viridifrons</i>	Green-faced Clubtail		ON
G3	<i>Ophiogomphus anomalus</i>	Extra-striped Snaketail	Ophiogomphe bariolé	NB, NS, ON, QC
G3	<i>Somatochlora brevicincta</i>	Quebec Emerald	Cordulie de Robert	BC, NB, NL, NS, QC
G3	<i>Stylurus notatus</i>	Elusive Clubtail	Gomphe marqué	MB, ON, QC, SK
G3G4	<i>Aeshna mutata</i>	Spatterdock Darner		ON
G3G4	<i>Enallagma minusculum</i>	Little Bluet		NB, NS, PE
G3G4	<i>Gomphus quadricolor</i>	Rapids Clubtail		ON
G3G4	<i>Ophiogomphus aspersus</i>	Brook Snaketail	Ophiogomphe saupoudré	NB, NS, QC
G3G4	<i>Williamsonia fletcheri</i>	Ebony Boghaunter	Cordulie bistrée	MB, NB, NS, ON, QC, SK
Vascular Plants: Ferns and relatives (23)				
G1	<i>Botrychium acuminatum</i>	Pointed Moonwort	Botryche	ON
G1	<i>Botrychium lineare</i>	Slender Moonwort	Botryche	NB, QC
G1	<i>Botrychium pseudopinnatum</i>	False Northwestern Moonwort	Botryche	ON
G1?	<i>Isoetes prototypus</i>	Prototype Quillwort	Isoète	NB, NS
G2	<i>Adiantum viridimontanum</i>	Green Mountain Maidenhair Fern	Adiante	QC
G2	<i>Botrychium paradoxum</i>	Peculiar Moonwort	Botryche	AB, BC, SK
G2G3	<i>Botrychium ascendens</i>	Upward-lobed Moonwort	Botryche	AB, BC, ON, QC, SK, YT
G2G3	<i>Botrychium pedunculatum</i>	Stalked Moonwort	Botryche	AB, BC, SK
G2G3	<i>Isoetes acadensis</i>	Acadian Quillwort	Isoète à Acadie	NB, NL, NS
G2G3	<i>Polystichum setigerum</i>	Alaska Sword Fern	Polystic d'Alaska	BC
G2G4	<i>Pellaea gastonyi</i>	Cliff-brake	Pelléade	AB, BC, SK
G3	<i>Botrychium crenulatum</i>	Crenulate Moonwort	Botryche	AB, BC
G3	<i>Botrychium montanum</i>	Mountain Moonwort	Botryche	BC
G3	<i>Botrychium mormo</i>	Moonwort	Botryche	QC

GLOBAL RANK	SCIENTIFIC NAME	ENGLISH COMMON NAME	FRENCH COMMON NAME	DISTRIBUTION BY PROVINCE/TERRITORY
G3	<i>Botrychium pallidum</i>	Pale Moonwort	Botryche pâle	AB, MB, ON, QC, SK
G3	<i>Botrychium rugulosum</i>	Rugulose Grape-fern	Botryche à limbe rugueux	NB, ON, QC
G3	<i>Botrychium spathulatum</i>	Spatulate Moonwort	Botryche à segments spatulés	AB, BC, NB, NS, NT, ON, QC, YT
G3	<i>Cystopteris laurentiana</i>	Laurentian Bladder Fern	Cystoptère laurentienne	NB, NL, NS, ON, QC
G3	<i>Schizaea pusilla</i>	Curly-grass Fern	Schizée naine	NB, NL, NS
G3?	<i>Asplenium adulterinum</i>	Adulterated Spleenwort	Asplénie	BC
G3G4	<i>Botrychium campestre</i>	Prairie Moonwort	Botryche champêtre	AB, NB, ON, QC, SK
G3G4	<i>Botrychium hesperium</i>	Western Moonwort	Botryche	BC, ON, SK
G3G4	<i>Polystichum imbricans</i>	Narrow-leaf Sword Fern	Polystic	BC
Vascular Plants: Flowering Plants (222)				
GH	<i>Draba yukonensis</i>	Yukon Whitlow-grass	Drave du Yukon	YT
G1	<i>Atriplex nudicaulis</i>	Baltic Saltbush	Arroche hâtive	NL, NS
G1	<i>Braya longii</i>	Long's Braya	Braya de Long	NL
G1	<i>Braya pilosa</i>	Hairy Rockcress	Braya	NT
G1	<i>Castilleja levisecta</i>	Golden Paintbrush	Castilléjje dorée	BC
G1	<i>Claytonia ogilviensis</i>	Spring Beautry	Claytonie	YT
G1	<i>Draba kluaneii</i>	Kluane Whitlow-grass	Drave de Kluane	YT
G1	<i>Draba pycnosperma</i>	Dense Whitlow-grass	Drave graines imbriquées	NL, NS, QC
G1	<i>Draba scotteri</i>	Scotter's Whitlow-grass	Drave de Scotter	YT
G1	<i>Potamogeton ogdenii</i>	Ogden's Pondweed	Potamot de Ogden	ON
G1	<i>Puccinellia poacea</i>	Goose Grass	Puccinellie	NT, NU
G1	<i>Salicornia borealis</i>	Boreal Saltwort	Salicorne boréale	MB, YT
G1	<i>Salix chlorolepis</i>	Green-scaled Willow	Saule à bractées vertes	QC
G1?	<i>Puccinellia macra</i>	Bonaventure Island Alkali Grass	Puccinellie	NB, QC
G1Q	<i>Draba kananaskis</i>	Kananaskis Whitlow-grass	Drave de Kananaskis	AB, YT
G1Q	<i>Potamogeton methyensis</i>	Methy Lake Pondweed	Potamot à lac Methy	SK
G1Q	<i>Taraxacum laurentianum</i>	Dandelion	Pissenlit laurentienne	QC
G1?Q	<i>Crataegus perjucunda</i>	A Hawthorn	Aubépine	ON
G1?Q	<i>Potentilla macounii</i>	Macoun's Cinquefoil	Potentille de Macoun	AB
G1?Q	<i>Rubus adenocaulis</i>	A Bramble	Ronce	NS
G1?Q	<i>Rubus emeritus</i>	A Bramble	Ronce	NB
G1G3Q	<i>Crataegus nitidula</i>	Shiny Hawthorn	Aubépine	ON
G1G3Q	<i>Elymus vulpinus</i>	Rydberg's Wild Rye	Élyme	SK
G2	<i>Bidens eatonii</i>	Eaton's Beggar-ticks	Bident de Eaton	NB, QC
G2	<i>Bidens heterodoxa</i>	Connecticut Beggar-ticks	Bident	PE, QC
G2	<i>Braya fernaldii</i>	Fernald's Braya	Braya de Fernald	NL
G2	<i>Carex juniperorum</i>	Juniper Sedge	Carex des Genévriers	ON
G2	<i>Cimicifuga elata</i>	Tall Bugbane		BC
G2	<i>Draba murrayi</i>	Murray's Whitlow-grass	Drave	YT
G2	<i>Draba ogilviensis</i>	Ogilvie Range Whitlow-grass	Drave	NT, YT
G2	<i>Erigeron salishii</i>	Salish Daisy	Vergerette	BC
G2	<i>Erysimum angustatum</i>	Narrow-leaved Wallflower	Vélar à feuilles étroites	YT
G2	<i>Geum peckii</i>	Eastern Mountain Avens	Benoîte de l'Est	NS
G2	<i>Geum schofieldii</i>	Queen Charlotte Avens	Benoîte	BC
G2	<i>Hieracium robinsonii</i>	Robinson's Hawkweed	Épervière de Robinson	NB, NL, NS, QC
G2	<i>Isotria medeoloides</i>	Small Whorled Pogonia	Petite pogonie verticillée	ON
G2	<i>Juncus caesariensis</i>	New Jersey Rush	Jonc du New Jersey	NS
G2	<i>Meconella oregana</i>	White Meconella		BC
G2	<i>Minuartia marcescens</i>	Serpentine Sandwort	Minuartie de la serpentine	NL, QC
G2	<i>Pedicularis furbishiae</i>	Furbish Lousewort	Pédiculaire de Furbish	NB
G2	<i>Platanthera leucophaea</i>	Eastern Prairie White-fringed Orchid	Platanthère blanchâtre de l'Est	ON
G2	<i>Platanthera praeclara</i>	Western Prairie White-fringed Orchid	Platanthère blanchâtre de l'Ouest	MB
G2	<i>Podistera yukonensis</i>	Yukon Podistera		YT
G2	<i>Salix jejuna</i>	Barrens Willow	Saule des landes	NL
G2	<i>Salix raupii</i>	Raup's Willow	Saule de Raup	AB, BC, NT, YT
G2	<i>Salix turnorii</i>	Turnor Willow	Saule de Turnor	SK
G2	<i>Saxifraga gaspensis</i>	Gaspé Saxifrage	Saxifrage de Gaspé	QC
G2	<i>Scirpus longii</i>	Long's Bulrush	Scirpe de Long	NS
G2	<i>Sida hermaphrodita</i>	Virginia Mallow	Mauve	ON
G2	<i>Silene spaldingii</i>	Spalding's Campion	Silène de Spalding	BC
G2	<i>Stenotus macleanii</i>	Maclean's Goldenweed	Sténote de Maclean	YT
G2	<i>Symphotrichum laurentianum</i>	Gulf of St. Lawrence Aster	Aster du golfe Saint-Laurent	NB, NS, QC
G2	<i>Tetraneuris herbacea</i>	Lakeside Daisy		ON
G2?	<i>Crataegus canadensis</i>	Canada's Hawthorn	Aubépine du Canada	QC
G2?	<i>Rubus gulosus</i>	A Bramble	Ronce	NB
G2?	<i>Rubus mananensis</i>	A Bramble	Ronce	NB
G2?	<i>Rubus suppar</i>	A Bramble	Ronce	NB, NS
G2?	<i>Rubus weatherbyi</i>	Weatherby's Dewberry	Ronce de Weatherby	NB, NS
G2?Q	<i>Rubus quaesitus</i>	A Bramble	Ronce	NB, PE
G2Q	<i>Mertensia drummondii</i>	Drummond Bluebell	Mertensia	NU
G2Q	<i>Symphotrichum anticostense</i>	Anticosti Aster	Aster d'Anticosti	NB, QC
G2G3	<i>Castilleja rupicola</i>	Cliff Indian-paintbrush	Castilléjje	BC
G2G3	<i>Cistanthe tweedyi</i>	Tweedy's Bitterroot		BC
G2G3	<i>Deschampsia mackenzieana</i>	Mackenzie Hairgrass	Deschampsie du bassin du Mackenzie	SK
G2G3	<i>Douglasia alaskana</i>	Alaska Rockjasmine		BC, YT
G2G3	<i>Erigeron trifidus</i>	Three-lobed Daisy	Vergerette	AB, BC
G2G3	<i>Ipomopsis minutiflora</i>	Small-flower Standing-cypress		BC

GLOBAL RANK	SCIENTIFIC NAME	ENGLISH COMMON NAME	FRENCH COMMON NAME	DISTRIBUTION BY PROVINCE/TERRITORY
G2G3	<i>Puccinellia bruggemannii</i>	Prince Patrick Alkali Grass	Puccinellie	NU
G2G3	<i>Salix silvicola</i>	Felt-leaf Willow	Saule silvicole	NU, SK
G2G3	<i>Symphotrichum yukonense</i>	Yukon Aster	Aster du Yukon	YT
G2G3	<i>Talinum sediforme</i>	Okanogan Fameflower	Talinum faux-orpin	BC
G2G3Q	<i>Ranunculus turneri</i>	Turner's Butter-cup	Renoncule de Turner	NT, YT
G2G4	<i>Atriplex acadensis</i>	Maritime Saltbush	Arroche à Acadie	NB, NS, PE, QC
G2G4	<i>Atriplex franktonii</i>	Frankton's Saltbush	Arroche de Frankton	NB, NS, PE, QC
G2G4	<i>Claytonia washingtoniana</i>	Washington Springbeauty	Claytonie de Washington	BC
G2G4	<i>Elymus calderi</i>	Calder's Wild Rye	Élyme de Calder	BC, YT
G2G4	<i>Orthocarpus barbatus</i>	Grand Coulee Owl's-clover		BC
G2G4	<i>Puccinellia ambigua</i>	Alberton Alkali Grass	Puccinellie trompeuse	NB, NL, NS, ON, PE, QC
G2G4Q	<i>Crataegus ater</i>	Ater Hawthorn	Aubépine	ON
G2G4Q	<i>Crataegus beata</i>	Dunbar's Hawthorn	Aubépine de Dunbar	ON
G2G4Q	<i>Mitella prostrata</i>	Creeping Bishop's-cap	Mitrelle	QC
G2G4Q	<i>Polygonum raii</i>	Ray's Knotweed	Renouée de Ray	NB, NL, QC
G2G4Q	<i>Rubus signatus</i>	A Bramble	Ronce	ON, QC
G2G4Q	<i>Rubus tardatus</i>	A Bramble	Ronce tardive	NS, ON, PE, QC
G3	<i>Agalinis skinneriana</i>	Skinner's Agalinis	Agalinis de Skinner	ON
G3	<i>Antennaria densifolia</i>	Dense-leaved Antennaria	Antennaire à feuilles dense	NT, YT
G3	<i>Antennaria eucosma</i>	Newfoundland Pussytoes	Antennaire élégante	NL, QC
G3	<i>Aphragmus eschscholtzianus</i>	Eschscholtz's Aleutian-Cress		BC, YT
G3	<i>Arnica lanceolata</i>	New England Arnica	Arnica soyeux	NB, QC
G3	<i>Arnica louiseana</i>	Lake Louise Arnica	Arnica à lac Louise	AB, BC
G3	<i>Bidens amplissima</i>	Vancouver Island Beggar-ticks	Grand bident	BC
G3	<i>Calochortus lyallii</i>	Lyall's Mariposa Lily	Calochorte de Lyall	BC
G3	<i>Carex rufoa</i>	Snowbed Sedge	Carex à écailles rousses	MB, NT, QC
G3	<i>Carex schweinitzii</i>	Schweinitz's Sedge	Carex de Schweinitz	ON
G3	<i>Carex wiegandii</i>	Wiegand's Sedge	Carex de Wiegand	NB, NL, NS, ON, PE, QC
G3	<i>Cirsium hillii</i>	Hill's Thistle	Chardon de Hill	ON
G3	<i>Cirsium pitchei</i>	Pitcher's Thistle	Chardon de Pitcher	ON
G3	<i>Coreopsis rosea</i>	Pink Coreopsis	Coréopsis rose	NS
G3	<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	Cypripède tête-de-bélier	MB, NS, ON, QC, SK
G3	<i>Douglasia arctica</i>	Mackenzie River Douglasia		NT, YT
G3	<i>Douglasia gormanii</i>	Gorman's Douglasia		BC, YT
G3	<i>Draba ruaxes</i>	Rainier Whitlow-grass	Drave	BC, YT
G3	<i>Draba ventosa</i>	Wind River Whitlow-grass	Drave	AB, BC
G3	<i>Enemion savilei</i>	Savile's False Rue-Anemone	Isopyre de Savile	BC
G3	<i>Epipactis gigantea</i>	Giant Helleborine	Épipactis géant	BC
G3	<i>Erigeron lackschewitzii</i>	Front Range Fleabane	Vergerette	AB
G3	<i>Erigeron radicans</i>	Dwarf Fleabane	Vergerette naine	AB, SK
G3	<i>Eriocaulon parkeri</i>	Parker's Pipewort	Ériocaulon de Parker	NB, QC
G3	<i>Euthamia galetorum</i>	Narrow-leaf Fragrant Goldenrod		NS
G3	<i>Glyceria leptostachya</i>	Slender-spiked Manna Grass	Glycérie	BC
G3	<i>Iris lacustris</i>	Dwarf Lake Iris	Iris lacustre	ON
G3	<i>Juncus subtilis</i>	Creeping Rush	Jonc délié	NB, NL, ON, QC
G3	<i>Lesquerella calderi</i>	Calder's Bladder-pod	Lesquerelle de Calder	NT, YT
G3	<i>Ligusticum calderi</i>	Calder's Lovage	Livèche de Calder	BC
G3	<i>Limnanthes macounii</i>	Macoun's Meadowfoam	Limnanthe de Macoun	BC
G3	<i>Listera auriculata</i>	Auricled Twayblade	Listère auriculée	MB, NB, NL, ON, QC
G3	<i>Lupinus kuschei</i>	Yukon Lupine	Lupin de Yukon	BC, YT
G3	<i>Montia bostockii</i>	Bostock's Miner's-lettuce	Montia	BC, YT
G3	<i>Myriophyllum ussuriense</i>	Ussurian Water Milfoil	Myriophylle	BC
G3	<i>Oxytropis huddelsonii</i>	Huddelson's Crazy-weed	Oxtropis	BC, YT
G3	<i>Packera contermina</i>	Northwestern Groundsel	Séneçon	AB, BC
G3	<i>Packera moresbiensis</i>	Queen Charlotte Butterweed	Séneçon	BC
G3	<i>Papaver pygmaeum</i>	Alpine Glacier Poppy	Pavot alpine	AB, BC
G3	<i>Papaver walpolei</i>	Walpole Poppy	Pavot de Walpole	YT
G3	<i>Pedicularis palustris</i>	Marsh Lousewort	Pédiculaire des marais	NL, NS, QC
G3	<i>Phacelia mollis</i>	Coffee Creek Scorpion-weed		BC, YT
G3	<i>Platanthera chorisiana</i>	Choriso Bog-orchid	Platanthère	BC
G3	<i>Poa laxiflora</i>	Loose-flowered Blue Grass	Pâturin	BC
G3	<i>Poa porsildii</i>	Porsild's Blue Grass	Pâturin de Porsild	NT, YT
G3	<i>Polemonium vanbruntiae</i>	Van Brunt's Jacob's Ladder	Polémoine de Van Brunt	NB, QC
G3	<i>Potamogeton hillii</i>	Hill's Pondweed	Potamot de Hill	ON
G3	<i>Potamogeton subsibiricus</i>	Yenisei River Pondweed	Potamot	NT, ON, QC, YT
G3	<i>Puccinellia deschampsoides</i>	Polar Alkali Grass	Puccinellie	MB, NT, NU, QC, YT
G3	<i>Ranunculus allenii</i>	Allen's Buttercup	Renoncule d'Allen	NL, NU, QC
G3	<i>Rorippa calycina</i>	Persistent-sepal Yellow-cress	Rorippa	NT
G3	<i>Sabatia kennedyana</i>	Plymouth Gentian	Sabatie de Kennedy	NS
G3	<i>Saxifraga taylorii</i>	Taylor's Saxifrage	Saxifrage de Taylor	BC
G3	<i>Scirpus ancistrochaetus</i>	Northeastern Bulrush	Scirpe	QC
G3	<i>Sericocarpus rigidus</i>	White-top Aster	Aster rigide	BC
G3	<i>Solidago houghtonii</i>	Houghton's Goldenrod	Verge d'or Houghton	ON
G3	<i>Stellaria alaskana</i>	Alaska Starwort	Stellaire d'Alaska	YT
G3	<i>Stellaria dicranoides</i>	Matted Starwort	Stellaire	YT
G3	<i>Thlaspi arcticum</i>	Arctic Pennycress	Thlaspi	YT
G3?	<i>Artemisia rupestris</i>	Wood's Sagebrush	Armoise de Wood	YT
G3?	<i>Aster paucicapitatus</i>	Olympic Aster	Aster	BC
G3?	<i>Castilleja yukonis</i>	Yukon Indian-paintbrush	Castilléje de Yukon	NT, YT
G3?	<i>Conimitella williamsii</i>	Williams Conimitella		AB

GLOBAL RANK	SCIENTIFIC NAME	ENGLISH COMMON NAME	FRENCH COMMON NAME	DISTRIBUTION BY PROVINCE/TERRITORY
G3?	<i>Crataegus suborbiculata</i>	Caughuawaga Hawthorn	Aubépine suborbiculaire	NB, ON, QC
G3?	<i>Draba subcapitata</i>	Ellesmereland Whitlow-grass	Drave	NU
G3?	<i>Erigeron leibergii</i>	Leiberg's Fleabane	Vergerette	BC
G3?	<i>Hackelia ciliata</i>	Okanogan Stickseed	Hackélia	BC
G3?	<i>Halimolobos mollis</i>	Soft Rockcress	Halimolobos	BC, NT, NU, YT
G3?	<i>Halimolobos whitedii</i>	Whited's Rockcress	Halimolobos	BC
G3?	<i>Juncus kelloggii</i>	Kellogg's Rush	Jonc de Kellogg	BC
G3?	<i>Leucophysalis grandiflora</i>	Large-flowered Ground-cherry	Leucophysalis à grandes fleurs	AB, MB, ON, QC, SK
G3?	<i>Lomatium brandegeei</i>	Brandegee Desert-parsley		BC
G3?	<i>Orthocarpus bracteosus</i>	Rosy Owl's-clover		BC
G3?	<i>Parrya arctica</i>	Arctic False-wallflower		NT, NU
G3?	<i>Phlox sibirica</i>	Siberian Phlox	Phlox	NT, YT
G3?	<i>Physostegia ledinghamii</i>	Ledingham's Physostegia	Physostégie	AB, MB, NT, SK
G3?	<i>Poa nervosa</i>	Hooker's Blue Grass	Pâturin	BC, SK
G3?	<i>Puccinellia laurentiana</i>	Tracadigash Mountain Alkali Grass	Puccinellie	NB, PE, QC
G3?	<i>Rubus particeps</i>	A Bramble	Ronce	NB
G3?	<i>Rubus uvidus</i>	A Bramble	Ronce	QC
G3?	<i>Stellaria americana</i>	American Stitchwort	Stellaire d'Amérique	AB
G3Q	<i>Arenaria longipedunculata</i>	Low Sandwort	Sablina à long pédoncule	AB, BC, YT
G3Q	<i>Chenopodium foggii</i>	Fogg's Goosefoot	Chénopode de Fogg	ON, QC
G3Q	<i>Scirpus rollandii</i>	Rolland's Bulrush	Scirpe de Rolland	SK
G3Q	<i>Taraxacum carneocoloratum</i>	Pink Dandelion	Pissenlit rose	YT
G3?Q	<i>Rubus arcuans</i>	A Bramble	Ronce	QC, NS, PE
G3?Q	<i>Rubus fraternalis</i>	A Bramble	Ronce	QC
G3?Q	<i>Rubus ortivus</i>	A Bramble	Ronce	NS, PE
G3?Q	<i>Rubus severus</i>	A Bramble	Ronce	NS
G3?Q	<i>Rubus trifrons</i>	Trifoliolate Dewberry	Ronce à trois folioles	NS, ON, QC
G3G4	<i>Anemone multiceps</i>	Porcupine River Thimble-weed	Anémone	YT
G3G4	<i>Astragalus nutzotiniensis</i>	A Milk-vetch	Astragale	BC, YT
G3G4	<i>Carex interrupta</i>	Green-fruited Sedge	Carex	BC
G3G4	<i>Chenopodium subglabrum</i>	Smooth Goosefoot	Chénopode glabre	AB, MB, SK
G3G4	<i>Chrysosplenium iowense</i>	Iowa Golden-saxifrage	Dorine	AB, BC, MB, SK
G3G4	<i>Claytonia scammaniana</i>	Scamman's Springbeauty	Claytonie	YT
G3G4	<i>Corispermum ochotense</i>	Okhotian Bugseed		YT
G3G4	<i>Crataegus lumaria</i>	A Hawthorn	Aubépine	ON
G3G4	<i>Delphinium glareosum</i>	Rockslide Larkspur		BC
G3G4	<i>Draba macounii</i>	Macoun's Whitlow-grass	Drave	AB, BC, NT, YT
G3G4	<i>Draba porsildii</i>	Porsild's Whitlow-grass	Drave	AB, BC, NT, YT
G3G4	<i>Draba stenopetala</i>	Anadyr Whitlow-grass	Drave	BC, YT
G3G4	<i>Eleocharis nitida</i>	Slender Spike-rush	Éléocharide brillante	NL, NS, ON, PE, QC, SK
G3G4	<i>Elymus hyperarcticus</i>	Arctic Wild Rye	Élyme	YT
G3G4	<i>Erigeron hyperboreus</i>	Boreal Fleabane	Vergerette	YT
G3G4	<i>Erigeron lanatus</i>	Woolly Fleabane	Vergerette	AB, BC
G3G4	<i>Erigeron yukonensis</i>	Yukon Fleabane	Vergerette	NT, NU, YT
G3G4	<i>Eritrichium splendens</i>	Showy Forget-me-not		NT, YT
G3G4	<i>Impatiens ecalcarata</i>	Spurless Touch-me-not	Impatiente	BC
G3G4	<i>Juglans cinerea</i>	Butternut	Noyer cendré	NB, ON, QC
G3G4	<i>Lomatium dissectum</i>	Fern-leaved Desert-parsley		AB, BC
G3G4	<i>Lupinus minimus</i>	Kettle Falls Lupine	Lupin	AB
G3G4	<i>Minuartia yukonensis</i>	Yukon Sandwort	Minuartie de Yukon	BC, NT, YT
G3G4	<i>Montia howellii</i>	Howell's Miner's-lettuce	Montia	BC
G3G4	<i>Oxytropis scammaniana</i>	Scamman's Crazy-weed	Oxtropis	BC, NT, YT
G3G4	<i>Panax quinquefolius</i>	American Ginseng	Ginseng à cinq feuilles	ON, QC
G3G4	<i>Papaver alboroseum</i>	Pale Poppy	Pavot pâle	BC, YT
G3G4	<i>Phacelia lyallii</i>	Lyall Phacelia		AB, BC
G3G4	<i>Piperia candida</i>	White Piperia		BC
G3G4	<i>Poa hartzii</i>	Hartz Blue Grass	Pâturin de Hartz	NT, NU, QC
G3G4	<i>Polygonum boreale</i>	Northern Knotweed	Renouée boréale	MB, NL, QC
G3G4	<i>Prenanthes sagittata</i>	Arrow-leaf Rattlesnake-root	Prenanthe	AB, BC
G3G4	<i>Salix tweedyi</i>	Tweedy's Willow	Saule de Tweedy	BC
G3G4	<i>Sanguisorba menziesii</i>	Menzies' Burnet	Sanguisorbe de Menzie	BC
G3G4	<i>Saxifraga redofskii</i>	Saxifrage	Saxifrage	NT
G3G4	<i>Saxifraga spicata</i>	Spiked Saxifrage	Saxifrage	YT
G3G4	<i>Saxifraga stellaris</i>	Starry Saxifrage	Saxifrage étoilée	NL, NU
G3G4	<i>Sidalcea hendersonii</i>	Henderson Mallow	Mauve	BC
G3G4	<i>Sisyrinchium californicum</i>	Golden Blue-eyed-grass	Bermudienne	BC
G3G4	<i>Sisyrinchium septentrionale</i>	Blue-eyed-grass	Bermudienne	AB, BC, SK
G3G4	<i>Synthyris borealis</i>	Alaska Kitten-tail		NT, YT
G3G4	<i>Trifolium dichotomum</i>	Macrae's Clover	Tréfle	BC
G3G4	<i>Triphora trianthophora</i>	Nodding Pogonia	Triphore penché	ON
G3G4Q	<i>Atriplex alaskensis</i>	Alaska Orache	Arroche	BC, YT
G3G4Q	<i>Betula minor</i>	Dwarf White Birch	Bouleau mineur	NB, NL, ON, QC
G3G4Q	<i>Crataegus apiomorpha</i>	Pear-shaped Hawthorn	Aubépine	ON
G3G4Q	<i>Festuca frederikseniae</i>	Viviparous Fescue	Fétuque de Frederiksen	NL, QC
G3G4Q	<i>Malaxis diphyllus</i>	Aleutian Adder's-mouth	Malaxis	BC

APPENDIX C.

SPECIES OF GLOBAL CONSERVATION CONCERN ENDEMIC TO CANADA

GLOBAL RANK	SCIENTIFIC NAME	ENGLISH COMMON NAME	FRENCH COMMON NAME	DISTRIBUTION BY PROVINCE/TERRITORY
Mammals (2)				
G1	<i>Marmota vancouverensis</i>	Vancouver Island Marmot	Marmotte de l'île Vancouver	BC
G3	<i>Sorex maritimensis</i>	Maritime Shrew	Musaraigne des Maritimes	NB, NS
Freshwater Fishes (15)				
GX	<i>Coregonus</i> species 1	Dragon Lake Whitefish	Corégone du lac Dragon	BC
GX	<i>Gasterosteus</i> sp. 12	Hadley Lake Limnetic Stickleback	Épinoche limnétique du lac Hadley	BC
GX	<i>Gasterosteus</i> sp. 13	Hadley Lake Benthic Stickleback	Épinoche benthique du lac Hadley	BC
G1	<i>Coregonus huntsmani</i>	Atlantic Whitefish	Corégone de l'Atlantique	NS
G1	<i>Cottus</i> sp. 2	Cultus Pygmy Sculpin	Chabot pygmée	BC
G1	<i>Gasterosteus</i> sp. 1	Giant Stickleback	Épinoche géante	BC
G1	<i>Gasterosteus</i> sp. 16	Vananda Creek Limnetic Stickleback	Épinoche limnétique du ruisseau Vananda	BC
G1	<i>Gasterosteus</i> sp. 17	Vananda Creek Benthic Stickleback	Épinoche benthique du ruisseau Vananda	BC
G1	<i>Gasterosteus</i> sp. 2	Enos Lake Limnetic Stickleback	Épinoche limnétique du lac Enos	BC
G1	<i>Gasterosteus</i> sp. 3	Enos Lake Benthic Stickleback	Épinoche benthique du lac Enos	BC
G1	<i>Gasterosteus</i> sp. 4	Paxton Lake Limnetic Stickleback	Épinoche limnétique du lac Paxton	BC
G1	<i>Gasterosteus</i> sp. 5	Paxton Lake Benthic Stickleback	Épinoche benthique du lac Paxton	BC
G1	<i>Lampetra macrostoma</i>	Lake Lamprey	Lamproie du lac Cowichan	BC
G1	<i>Moxostoma hubbsi</i>	Copper Redhorse	Chevalier cuivré	QC
G1Q	<i>Spirinchus</i> sp. 1	Pygmy Longfin Smelt	Éperlan d'hiver nain	BC
Butterflies (5)				
G1	<i>Coenonympha nipisiquit</i>	Maritime Ringlet	Satyre fauve des Maritimes	NB, QC
G1?	<i>Colias johanseni</i>	Johansen's Sulphur	Coliade de Johansen	NU
G2	<i>Lycaena dospassosi</i>	Salt Marsh Copper	Cuivré maritime	NB, QC
G3	<i>Boloria natazhati</i>	Beringian Fritillary		BC, NT, NU, YT
G3G4	<i>Papilio brevicauda</i>	Short-tailed Swallowtail	Papillon queue-courte	NB, NL, NS, QC
Vascular Plants: Ferns and relatives (1)				
G1	<i>Botrychium pseudopinnatum</i>	False Northwestern Moonwort	Botryche	ON
Vascular Plants: Flowering Plants (45)				
GH	<i>Draba yukonensis</i>	Yukon Whitlow-grass	Drave du Yukon	YT
G1	<i>Atriplex nudicaulis</i>	Baltic Saltbush	Arroche hâtive	NL, NS
G1	<i>Braya longii</i>	Long's Braya	Braya de Long	NL
G1	<i>Braya pilosa</i>	Hairy Rockcress	Braya	NT
G1	<i>Claytonia ogilviensis</i>	Spring Beauty	Claytonie	YT
G1	<i>Draba kluae</i>	Kluane Whitlow-grass	Drave de Kluane	YT
G1	<i>Draba pycnosperma</i>	Dense Whitlow-grass	Drave graines imbriquées	NL, NS, QC
G1	<i>Draba scotteri</i>	Scotter's Whitlow-grass	Drave de Scotter	YT
G1	<i>Puccinellia poacea</i>	Goose Grass	Puccinellie	NT, NU
G1	<i>Salicornia borealis</i>	Boreal Saltwort	Salicorne boréale	MB, YT
G1	<i>Salix chlorolepis</i>	Green-scaled Willow	Saule à bractée vertes	QC
G1?	<i>Puccinellia macra</i>	Bonaventure Island Alkali Grass	Puccinellie	NB, QC
G1?Q	<i>Rubus adenocaulis</i>	A Bramble	Ronce	NS
G1?Q	<i>Rubus emeritus</i>	A Bramble	Ronce	NB
G1Q	<i>Potamogeton methyensis</i>	Methy Lake Pondweed	Potamot à lac Methy	SK
G2	<i>Braya fernaldii</i>	Fernald's Braya	Braya de Fernald	NL
G2	<i>Geum schofieldii</i>	Queen Charlotte Avens	Benoîte	BC
G2	<i>Salix jejuna</i>	Barrens Willow	Saule des landes	NL
G2	<i>Salix raupii</i>	Raup's Willow	Saule de Raup	AB, BC, NT, YT
G2	<i>Salix turnorii</i>	Turnor Willow	Saule de Turnor	SK
G2	<i>Saxifraga gaspensis</i>	Gaspé Saxifrage	Saxifrage de Gaspé	QC
G2	<i>Stenotus macleanii</i>	Maclean's Goldenweed	Sténote de Maclean	YT
G2	<i>Symphotrichum laurentianum</i>	Gulf of St. Lawrence Aster	Aster du golfe Saint-Laurent	NB, NS, QC
G2?	<i>Crataegus canadensis</i>	Canada's Hawthorn	Aubépine du Canada	QC
G2?	<i>Rubus suppar</i>	A Bramble	Ronce	NB, NS
G2?	<i>Rubus weatherbyi</i>	Weatherby's Dewberry	Ronce de Weatherby	NB, NS
G2?Q	<i>Rubus quaesitus</i>	A Bramble	Ronce	NB, PE
G2G3	<i>Deschampsia mackenzieana</i>	Mackenzie Hairgrass	Deschampsie du bassin du Mackenzie	SK
G2G3	<i>Puccinellia bruggemannii</i>	Prince Patrick Alkali Grass	Puccinellie	NU
G2G3	<i>Salix silicicola</i>	Felt-leaf Willow	Saule silicicole	NU, SK
G2G4	<i>Atriplex franktonii</i>	Frankton's Saltbush	Arroche de Frankton	NB, NS, PE, QC
G2G4	<i>Puccinellia ambigua</i>	Alberton Alkali Grass	Puccinellie trompeuse	NB, NL, NS, ON, PE, QC
G3	<i>Antennaria eucosma</i>	Newfoundland Pussytoes	Antennaire élégante	NL, QC
G3	<i>Arnica louiseana</i>	Lake Louise Arnica	Arnica à lac Louise	AB, BC
G3	<i>Bidens amplissima</i>	Vancouver Island Beggar-ticks	Grand bident	BC
G3	<i>Carex rufo</i>	Snowbed Sedge	Carex à écailles rousses	MB, NT, QC
G3	<i>Enemion savilei</i>	Savile's False Rue-Anemone	Isopyre de Savile	BC
G3	<i>Pedicularis palustris</i>	Marsh Lousewort	Pédiculaire des marais	NL, NS, QC
G3	<i>Puccinellia deschampsoides</i>	Polar Alkali Grass	Puccinellie	MB, NT, NU, QC, YT
G3	<i>Ranunculus allenii</i>	Allen's Buttercup	Renoncule d'Allen	NL, NU, QC
G3	<i>Saxifraga taylorii</i>	Taylor's Saxifrage	Saxifrage de Taylor	BC
G3?	<i>Draba subcapitata</i>	Ellesmere Island Whitlow-grass	Drave	NU
G3?	<i>Parrya arctica</i>	Arctic False-wallflower		NT, NU
G3?	<i>Puccinellia laurentiana</i>	Tracadigash Mountain Alkali Grass	Puccinellie	NB, PE, QC
G3G4	<i>Saxifraga stellaris</i>	Starry Saxifrage	Saxifrage étoilée	NL, NU
G3G4Q	<i>Festuca frederikseniae</i>	Viviparous Fescue	Fétuque de Frederiksen	NL, QC

CANADIAN CONSERVATION DATA CENTRES

Alberta Natural Heritage Information Centre

Alberta Community Development
Parks and Protected Areas Division
2nd Floor, Oxbridge Place
9820-106 Street
Edmonton, Alberta T5K 2J6
780-427-0350
www.cd.gov.alb.ca/preserving/parks/anhic/

Atlantic Canada Conservation Data Centre

P.O. Box 6416
146 Main Street
Mount Allison University
Sackville, New Brunswick E4L 1G6
www.accdc.com

British Columbia Conservation Data Centre

Biodiversity Branch
Ministry of Environment
P.O. Box 9358
Station Provincial Government
Victoria, British Columbia V8W 9M2
250-356-0928
<http://srmwww.gov.bc.ca/cdc/>

Manitoba Conservation Data Centre

Biodiversity Conservation Section
Wildlife and Ecosystem Protection Branch
Manitoba Conservation
P.O. Box 24 (200 Saulteaux Crescent)
Winnipeg, Manitoba R3J 3W3
204-945-7743
<http://web2.gov.mb.ca/conservation/cdc/>

Ontario Natural Heritage Information Centre

Ministry of Natural Resources
P.O. Box 7000 (300 Water Street, 2nd Floor, North Tower)
Peterborough, Ontario K9J 8M5
705-755-2159
www.mnr.gov.on.ca/MNR/nhic/nhic.cfm

Centre de données sur le patrimoine naturel du Québec

Flora/Flore
Ministère du Développement durable, de l'Environnement
et des Parcs du Québec
Edifice Marie-Guyart, 4e étage, Bte 21
675 René-Lévesque Est, Québec, Québec G1R 5V7
418-521-3907 x4794
www.cdpmq.gouv.qc.ca/biodiversite/centre.htm

Fauna/Faune

Ministère des Ressources naturelles et de la Faune du Québec
Direction du développement de la faune
Edifice Marie-Guyart, 11e étage, Bte 92
675 René-Lévesque Est, Québec, Québec G1R 5V7
418-521-3875 x4915
www.cdpmq.gouv.qc.ca

Saskatchewan Conservation Data Centre

Resource Stewardship Branch
Saskatchewan Environment
3211 Albert Street
Regina, Saskatchewan S4S 5W6
306-787-7196
www.biodiversity.sk.ca

NatureServe Yukon

Fish and Wildlife Branch
Yukon Department of the Environment
P.O. Box 2703
Whitehorse, Yukon Y1A 2C6
867-667-3684
www.environmentyukon.gov.yk.ca

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