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**TECHNICAL SUBCOMMITTEE COMPONENT REPORT**

# Global and Provincial Status of Species in British Columbia

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FOR: **THE BIODIVERSITY BC TECHNICAL SUBCOMMITTEE FOR THE REPORT ON THE STATUS OF BIODIVERSITY IN BC**

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## 1. Species Covered By This Report

This report researched the global and provincial conservation status of 3029 species native to British Columbia. Fourteen groups of plants and animals were included in this analysis that had enough information to assess their conservation status (Table 2). These better-known groups included all the vertebrates except marine fish, all vascular plants (ferns and fern allies, conifers, monocots, and dicots), and the better-known invertebrates (butterflies and skippers, crayfishes, dragonflies and damselflies, freshwater mussels, and tiger beetles). Analysis of other taxonomic groups such as additional invertebrates or inclusion of specific groups such as those from marine habitats will be possible as more information is collected from resource inventories or surveys.

The conservation status of taxa below the level of species (i.e., subspecies, variety, or population) was reviewed but not included as part of this report, even though this level of taxa contributes greatly to the diversity of wildlife within British Columbia. Many at this sublevel in British Columbia are recognized nationally with their listing by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Species at Risk Act (SARA). Exotic species, those that are not native to the province, also were not considered within this document, although the impact of this group on species of conservation concern is perceived by many as significant in British Columbia.

This analysis was similar to that conducted for the document – Our Home and Native Land: Canadian Species of Global Conservation Concern – (Cannings et al. 2005), however this report is specific to the conservation status of species occurring exclusively to British Columbia and is based on data updated to 2006 information accessed through NatureServe and British Columbia Conservation Data Centre databases.

*Table 2*: Number of Native Species in British Columbia Analyzed for Conservation Status

| TAXON GROUP | Number of Species |
|---|---|
| **VERTEBRATES** | **602** |
| Amphibians | 20 |
| Birds | 352 |
| Freshwater Fishes | 85 |
| Mammals | 130 |
| Reptiles and Turtles | 15 |
| **INVERTEBRATES** | **290** |
| Butterflies and Skippers | 180 |
| Crayfishes | 1 |
| Dragonflies and Damselflies | 86 |
| Freshwater Mussels | 6 |
| Tiger Beetles | 17 |
| **VASCULAR PLANTS** | **2137** |
| Ferns and Fern Allies | 111 |
| Conifers | 26 |
| Monocots | 559 |
| Dicots | 1441 |
| **TOTAL** | **3029** |

### 1.1 NatureServe Canada: A Network Of Conservation Data Centres in Canada

Identifying, mapping, and understanding the biodiversity of the landscape is an extraordinary challenge and an essential one for protecting natural heritage. NatureServe strives to develop and provide this vital scientific knowledge to contribute to society and support the natural world. One of the world's foremost biodiversity experts, Edward O. Wilson, acknowledges that NatureServe combines its scientific resources, a commitment to working in partnerships with other institutions, and a strong vision for the future, to provide a foundation for conservation action.

NatureServe Canada provides scientific information about Canada's species and ecosystems to help guide effective conservation targets and natural resource management. A part of the international NatureServe network – an affiliation of 80 independent member programs in the Western Hemisphere (United States, Caribbean, Latin America, South America and Canada), the NatureServe Canada network of Conservation Data Centres is a leading source for reliable information and analysis on the distribution and status of Canada's plants, animals, and ecological communities. NatureServe Canada works in close partnership with key federal and provincial agencies, and international and multi-lateral initiatives concerned with the environment.

NatureServe Canada consists of eight independent Conservation Data Centres (CDCs) covering all ten provinces and the Yukon Territory. Plans are underway to form CDCs in the remaining territories to complete the Canadian network. Most CDCs are part of provincial wildlife agencies, while one (Atlantic Canada) is a private organization serving regional needs. The staff of CDCs include expert field biologists, ecologists, GIS specialists, and information managers. CDCs conduct biological inventories to find and document populations of species, study and classify ecological communities, analyze critical conservation issues, provide customized information products and conservation services, and make their data widely available to the public via the Internet. By using consistent standards and methods for biological inventory and information management, data from each CDC can be combined and analyzed at various scales.

The British Columbia Conservation Data Centre (http://www.env.gov.bc.ca/cdc/) was established in 1991 as a joint project of the Ministry of Environment, the Nature Trust of British Columbia, the Nature Conservancy of Canada and The Nature Conservancy (US). Currently the CDC is housed within the Biodiversity Branch of the B.C. Ministry of Environment. As a member of the NatureServe network, it aims to preserve biodiversity by providing accurate information on species and ecological communities specifically of British Columbia. Access to data is provided by a customized data service or by accessing the BC Species and Ecosystems Explorer on the Internet (http://www.env.gov.bc.ca/atrisk/toolintro.html).

## 2. Assessing Conservation Status

Evaluation of the conservation needs of a species requires a system to assess the degree of risk for the species. NatureServe and its member programs have developed a consistent method for this assessment of conservation status. The process relies on accurate information gathered on species usually through field-related appraisals, as well as the knowledge and expertise of individuals linked across the network and other scientists working in museums, research institutions and government agencies. This level of consultation provides a local, regional, national, and international perspective to the process. The assessment leads to the

designation of a *Conservation Status Rank*, which gives an estimate of extinction risk (Master 1991).

NatureServe has developed a standard set of criteria (Table 3) for the development of a Conservation Status Rank. The criteria help assess the overall condition of each species by reviewing many significant factors such as the number of occurrences, biology, habitat, trends, and threats. Each factor contributes to a score from which the Conservation Status Rank is derived. Since this process relies on accurate information, individuals knowledgeable about a species or with additional information are also consulted. In fact, the ranking process or review of a rank is often conducted at group sessions or workshops to enable the contribution of information and discussion. Modification to a Conservation Status Rank is based on new information resulting from the monitoring of populations, change to habitats, threats, or other changing conditions, usually as a result of research efforts.

*Table 3: 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 |

Conservation Status Ranks can apply to species, subspecies, and varieties, as well as ecological communities. A scale from one to five is used to rate various levels of extinction risk (Table 4). Species are also ranked according to their absence, such as extinction/extripation (X), or perceived absence such as species currently missing or historically present (H). The latter rank allows a time period of 50 years since the last observation of a species and where there is still an expectation that it may be rediscovered. Species of highest conservation concern are grouped as those ranked Extirpated (X), Historical (H), Critically Imperiled (1), Imperiled (2), and Vulnerable (3).

Ranks can be applied at various geographic levels: Global or range-wide (G); National or country-wide (N); and Subnational or province/territory-wide (S). The Conservation Status Rank of a species is usually different at each level, although if a species is of global conservation concern it usually is also at the national and subnational levels. Combining the different levels of Conservation Status Ranks provides a useful geographic perspective as well as providing information to target conservation priorities. For example, the Sharp-tailed Snake (*Contia tenuis*) has a Global Conservation Status Rank of G5 indicating its secure status across its entire range; whereas it has a Subnational Conservation Status Rank of S1 to convey its very high risk of imperilment with its occurrence in British Columbia. Since the species only occurs in British

Columbia, it also receives a National Conservation Status Rank of N1 similar to its subnational rank, although for many species in Canada this country-wide rank using NatureServe's assessment has not been completed. Conservation Status Ranks also apply at the infra-specific level involving subspecies, varieties and populations, and are given an equivalent 'T' ranking. This sublevel was not included in this report, which analyzed at the species level only.

*Table 4: Conservation Status Ranks of NatureServe*

| | | |
|---|---|---|
| X | Extinct or Presumed Extirpated | Not located despite intensive searches and no expectation of rediscovery. |
| H | Historical | Possibly extinct or extirpated; known only from historical occurrences but still hope of rediscovery. |
| 1 | Critically Imperiled | At very high risk of extinction due to extreme rarity (often 5 or fewer populations), steep declines or other factors, making the species especially susceptible to extirpation or extinction. |
| 2 | Imperiled | At high risk of extinction due to very restricted range, few populations (often 20 or fewer), steep declines, or other factors. |
| 3 | 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. |
| 4 | Apparently Secure | Uncommon but not rare, and usually widespread in the range. Some cause for long-term concern. |
| 5 | Secure | Common or very common, and widespread and abundant. Not susceptible to extirpation or extinction under current conditions. |
| NR | Not yet Ranked | Rank is not yet assessed. |
| U | Unrankable | Suitable information is not available for ranking. |

## 3. The Status of Species in British Columbia

The focus of this report was Global and Subnational Conservation Status Ranks specifically for species occurring in British Columbia. Ranks of 3029 plants and animals within 14 of the better-known taxonomic groups were analyzed (Tables 5 and 6). The results show that 95.54% of species in British Columbia are secure (G5) or apparently secure (G4) globally, whereas 62.4% are secure (S5) or apparently secure (S4) provincially. The remainder of species occurring in British Columbia are of conservation concern – 4.46% globally (135 species) and 37.6% provincially (1139 species) (Table 7). Within the taxonomic groups, flowering plants (monocots and dicots) have the highest numbers of species both of global and provincial conservation concern, followed by freshwater fishes, mammals, ferns and fern allies, and birds (Table 8). However proportionally, the taxonomic groups that have the highest percentage of species of global conservation concern are freshwater mussels (50%), freshwater fishes (21.18%), reptiles and turtles (13%), and ferns and fern allies (10.81%) (Figure 1). Provincially, the taxonomic groups that have the highest proportion of species of conservation concern are reptiles and turtles (66.67%), ferns and fern allies (55.86%), freshwater mussels (50%), freshwater fishes (45.88%), dicots (45.04%), and amphibians (45%) (Figure 2). Comparison of the two perspectives indicates that overall, those taxonomic groups relying on freshwater ecosystems, high humidity, and/or moist habitats include more species of conservation concern in British Columbia. Appendix A lists all species of global conservation concern residing in British Columbia, and Appendix B lists all species of provincial conservation concern.

*Table 5: Global Conservation Status of Species in British Columbia*

| Taxon Group | GX | GH | G1 | G2 | G3 | G4 | G5 | Rank Not Assigned | TOTAL | % Global Conservation Concern |
|---|---|---|---|---|---|---|---|---|---|---|
| **VERTEBRATES** | **4** | **0** | **16** | **3** | **20** | **62** | **495** | **2** | **602** | **7.14%** |
| Amphibians | 0 | 0 | 0 | 1 | 0 | 7 | 12 | 0 | 20 | 5% |
| Birds | 1 | 0 | 2 | 0 | 7 | 28 | 314 | 0 | 352 | 2.84% |
| Freshwater Fishes | 3 | 0 | 12 | 0 | 3 | 8 | 57 | 2 | 85 | 21.18% |
| Mammals | 0 | 0 | 2 | 1 | 9 | 19 | 99 | 0 | 130 | 9.23% |
| Reptiles and Turtles | 0 | 0 | 0 | 1 | 1 | 0 | 13 | 0 | 15 | 13.33% |
| **INVERTEBRATES** | **0** | **0** | **0** | **1** | **9** | **28** | **251** | **1** | **290** | **3.45%** |
| Butterflies and Skippers | 0 | 0 | 0 | 1 | 5 | 14 | 159 | 1 | 180 | 3.33% |
| Crayfishes | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0% |
| Dragonflies and Damselflies | 0 | 0 | 0 | 0 | 1 | 8 | 77 | 0 | 86 | 1.16% |
| Freshwater Mussels | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 0 | 6 | 50.00% |
| Tiger Beetles | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 0 | 17 | 0% |
| **VASCULAR PLANTS** | **0** | **0** | **3** | **11** | **68** | **463** | **1564** | **28** | **2137** | **3.84%** |
| Ferns and Fern Allies | 0 | 0 | 1 | 4 | 7 | 24 | 73 | 2 | 111 | 10.81% |
| Conifers | 0 | 0 | 0 | 0 | 0 | 4 | 21 | 1 | 26 | 0.00% |
| Monocots | 0 | 0 | 0 | 0 | 12 | 113 | 425 | 9 | 559 | 2.15% |
| Dicots | 0 | 0 | 2 | 7 | 49 | 322 | 1045 | 16 | 1441 | 4.02% |
| **TOTAL** | **4** | **0** | **19** | **15** | **97** | **553** | **2310** | **31** | **3029** | **4.46%** |

*Table 6: Provincial Conservation Status of Species in British Columbia*

| Taxon Group | SX | SH | S1 | S2 | S3 | S4 | S5 | Rank Not Assigned | TOTAL | % Provincial Conservation Concern |
|---|---|---|---|---|---|---|---|---|---|---|
| **VERTEBRATES** | **8** | **3** | **54** | **40** | **62** | **171** | **191** | **72** | **602** | **27.74%** |
| Amphibians | 0 | 0 | 3 | 2 | 4 | 8 | 3 | 0 | 20 | 45.00% |
| Birds | 3 | 0 | 14 | 19 | 34 | 108 | 118 | 56 | 352 | 19.89% |
| Freshwater Fishes | 3 | 0 | 22 | 5 | 9 | 18 | 23 | 4 | 85 | 45.88% |
| Mammals | 0 | 3 | 12 | 13 | 11 | 34 | 45 | 12 | 130 | 30.00% |
| Reptiles and Turtles | 2 | 0 | 3 | 1 | 4 | 3 | 2 | 0 | 15 | 66.66% |
| **INVERTEBRATES** | **1** | **1** | **12** | **12** | **46** | **63** | **146** | **9** | **290** | **24.83%** |
| Butterflies and Skippers | 1 | 0 | 6 | 7 | 32 | 40 | 90 | 4 | 180 | 25.55% |
| Crayfishes | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0% |
| Dragonflies and Damselflies | 0 | 0 | 4 | 5 | 12 | 17 | 47 | 1 | 86 | 24.42% |
| Freshwater Mussels | 0 | 0 | 1 | 0 | 2 | 2 | 1 | 0 | 6 | 50.00% |
| Tiger Beetles | 0 | 1 | 1 | 0 | 0 | 4 | 7 | 4 | 17 | 11.76% |
| **VASCULAR PLANTS** | **5** | **12** | **186** | **323** | **374** | **570** | **590** | **77** | **2137** | **42.12%** |
| Ferns and Fern Allies | 0 | 1 | 13 | 17 | 31 | 36 | 11 | 2 | 111 | 55.86% |
| Conifers | 0 | 0 | 0 | 1 | 2 | 5 | 17 | 1 | 26 | 11.54% |
| Monocots | 0 | 2 | 31 | 86 | 67 | 190 | 163 | 20 | 559 | 33.27% |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dicots | 5 | 9 | 142 | 219 | 274 | 339 | 399 | 54 | 1441 | 45.04% |
| **TOTAL** | **14** | **16** | **252** | **375** | **482** | **804** | **927** | **158** | **3029** | **37.60%** |

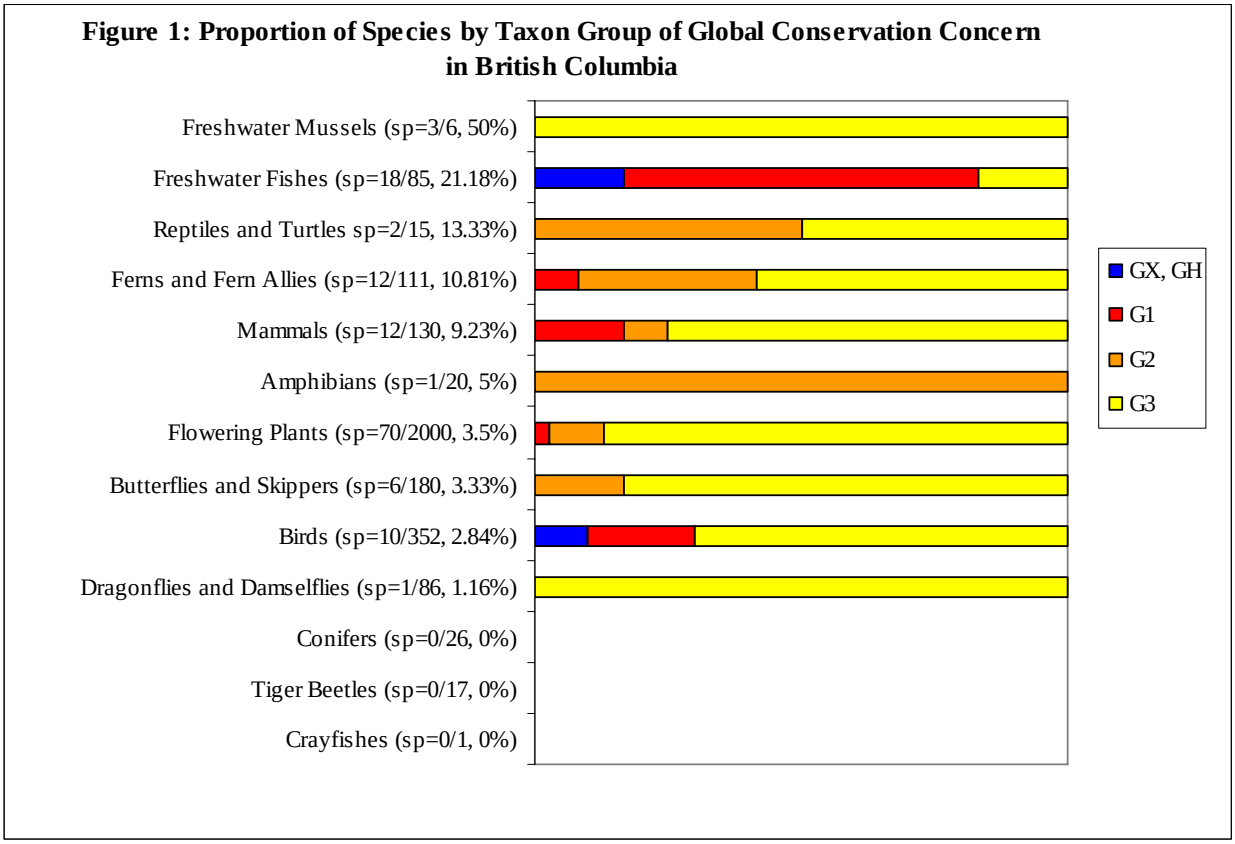
*Table 7: Summary of Species of Global and Provincial Conservation Concern in British Columbia*

| RANK | GLOBAL | | PROVINCIAL | |
|---|---|---|---|---|
| | Number of Species | Percent of All Species | Number of Species | Percent of All Species |
| Extinct or Extirpated (GX, SX) | 4 | 0.13% | 14 | 0.46% |
| Historical (GH, SH) | 0 | 0% | 16 | 0.53% |
| Critically Imperiled (G1, S1) | 19 | 0.63% | 252 | 8.35% |
| Imperiled (G2, S2) | 15 | 0.50% | 375 | 12.38% |
| Vulnerable (G3, S3) | 97 | 3.20% | 482 | 15.91% |
| **Total** | **135** | **4.46%** | **1139** | **37.60%** |

*Table 8: Summary of Taxon Groups of Global and Provincial Conservation Concern in British Columbia*

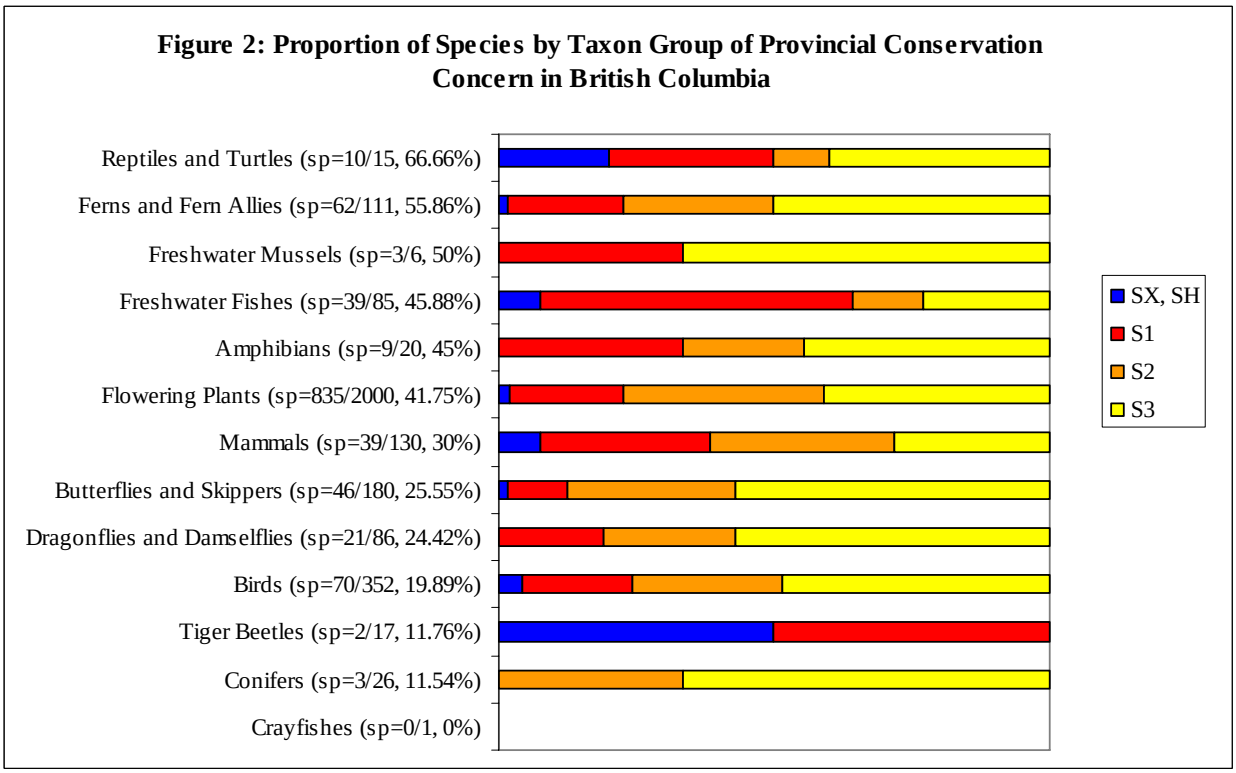
| Taxon Group | G Rank of Conservation Concern | Percent of Total Number Analyzed | S Rank of Conservation Concern | Percent of Total Number Analyzed | Total Analyzed |
|---|---|---|---|---|---|
| **VERTEBRATES** | **43** | **7.14** | **167** | **27.74** | **602** |
| Amphibians | 1 | 5.00 | 9 | 45.00 | 20 |
| Birds | 10 | 2.84 | 70 | 19.89 | 352 |
| Freshwater Fishes | 18 | 21.18 | 39 | 45.88 | 85 |
| Mammals | 12 | 9.23 | 39 | 30.00 | 130 |
| Reptiles and Turtles | 2 | 13.33 | 10 | 66.67 | 15 |
| **INVERTEBRATES** | **10** | **3.45** | **72** | **24.83** | **290** |
| Butterflies and Skippers | 6 | 3.33 | 46 | 25.56 | 180 |
| Crayfishes | 0 | 0.00 | 0 | 0.00 | 1 |
| Dragonflies and Damselflies | 1 | 1.16 | 21 | 24.42 | 86 |
| Freshwater Mussels | 3 | 50.00 | 3 | 50.00 | 6 |
| Tiger Beetles | 0 | 0.00 | 2 | 11.76 | 17 |
| **VASCULAR PLANTS** | **82** | **3.84** | **900** | **42.12** | **2137** |
| Ferns and Fern Allies | 12 | 10.81 | 62 | 55.86 | 111 |
| Conifers | 0 | 0.00 | 3 | 11.54 | 26 |
| Monocots | 12 | 2.15 | 186 | 33.27 | 559 |
| Dicots | 58 | 4.02 | 649 | 45.04 | 1441 |
| **TOTAL** | **135** | **4.46** | **1139** | **37.60** | **3029** |

**Figure 1: Proportion of Species by Taxon Group of Global Conservation Concern in British Columbia**




sp= the number of species of conservation concern out of the total number of species used in analysis

**Figure 2: Proportion of Species by Taxon Group of Provincial Conservation Concern in British Columbia**




sp= the number of species of conservation concern out of the total number of species used in analysis

### 3.1 VERTEBRATES

Vertebrates of British Columbia included in this report are amphibians, birds, freshwater fishes, mammals, and reptiles and turtles. Overall 602 species were investigated for their conservation status. Globally, 43 species or 7.14% are of conservation concern, whereas provincially 167 species of 27.74% are of conservation concern. Taxonomic groups of vertebrates of highest conservation concern rely on freshwater environments: freshwater fishes (18 species or 21.18% globally, and 39 species or 45.88% provincially); reptiles and turtles (2 species or 13.33% globally, and 10 species or 66.67% provincially); and amphibians (1 species or 5% globally, and 9 species or 45% provincially) (Table 8).

**Amphibians** including salamanders, newts, toads and frogs, comprise 20 species native to British Columbia. Thirteen or 65% of these species have their Canadian distribution in British Columbia, whereas none exist solely in British Columbia for their North American distribution. Seven or 53.85% of these species restricted to B.C. are of provincial conservation concern and one (Oregon Spotted Frog, *Rana pretiosa*), is of global conservation concern. (see Table 9, Appendices C, D, and E)

The greatest majority of species (352 species) within vertebrates present in British Columbia belong to **birds**. Ten species or 2.84% are of global conservation concern, whereas 70 species or 19.89% are of provincial conservation concern (Table 8). The vast majority (7 species or 70%) of birds of global conservation concern rely on the marine environment; whereas the majority (57 species or 81.43%) of provincial conservation concern are terrestrial species. Forty-five species or 12.78% of birds have their sole distribution in British Columbia, of which 14 or 31.11% are of provincial conservation concern. Eight or 57.14% of those species of provincial conservation concern are terrestrial species. Due to the far-reaching nature of birds, no species native to British Columbia has it exclusive North American distribution within the province. (see Table 9, Appendices C, D, E)

Eighty-five species of native **freshwater fishes** were reviewed for conservation status in British Columbia. A considerable number, 35 species or 41.18% are unique to British Columbia for Canada, and the highest amount of all the taxonomic groups studied, 16 species or 45.71%, occur distinct to British Columbia for North America. The majority of these belong to the stickleback or Gasterostediae family, which display a great deal of variation within a small group of fishes. Many of these species are still under study and until they are fully described by scientists are given numbered species names, such as the Giant Stickleback as *Gasterosteus* sp. 1. (see Table 9, Appendices C, D, E)

**Mammals** investigated for this report included 130 species, from both terrestrial and marine environments. Twelve species or 9.23% are of global conservation concern, and 39 species or 30% are of provincial conservation concern (Table 8). Similar to birds, the vast majority (10 species or 83.33%) of mammals of global conservation concern occur in the Pacific Ocean off British Columbia's coastline, whereas the majority (27 species or 69.23 %) of mammals of provincial conservation concern are terrestrial species. Forty-two species or 32.31% have their Canadian distribution only within British Columbia, of which 17 or 40.48% (3 marine and 14 terrestrial) are of provincial conservation concern. One species, both of global and provincial conservation concern (Vancouver Island Marmot, *Marmota vancouverensis*) has its North American distribution only in British Columbia. (see Table 9, Appendices C, D, E)

**Reptiles and turtles** consist of 15 species native to British Columbia. A significant portion, nine species or 60% reside exclusively within British Columbia in Canada, whereas none are

restricted to B.C. for their North American distribution. Six or 66.66% of these species limited to B.C. are of provincial conservation concern and one (Pacific Pond Turtle or Western Pond Turtle, *Actinemys* (*Emys*) *marmorata*) is of global conservation concern but occurs elsewhere in North America. Four of the existing or extant species of conservation concern exclusive to B.C. for Canada are (Sharp-tailed Snake, *Contia tenuis*; Nightsnake, *Hypsiglena torquata*; Western Skink, *Eumeces skiltonianus*; and Western Rattlesnake, *Crotalus oreganus*). (see Table 9, Appendices C, D, E)

### 3.2 INVERTEBRATES

Invertebrates are an amazing diverse animal group of which many are poorly known. Only a few selected groups of invertebrates had sufficient information for analysis and were included in this report. Although these groups were selected based on their amount of information, all of these groups require additional research to provide the same level of information as acquired for vertebrates and vascular plants. Overall five groups of invertebrates with 290 species occurring in British Columbia were reviewed for their conservation status. Ten invertebrates or 3.45% are of global conservation concern, whereas 72 species or 24.83% are of provincial conservation concern. Of the invertebrates studied, the majority appear secure but those of highest conservation concern are freshwater mussels (3 species or 50%, globally and provincially); butterflies and skippers (6 species or 3.33% globally, and 46 species or 25.56% provincially); and dragonflies and damselflies (1 species or 1.16% globally, and 21 species or 24.42% provincially). The one native species of crayfish occurring in British Columbia has secure conservation status ranks, both globally and provincially. (Table 8).

**Butterflies and skippers**, comprising 180 native species in British Columbia, were the only groups selected for this report out of numerous groups within butterfly order 'Lepidoptera'. Twenty-five species or 13.89% have their Canadian distribution only in British Columbia, and 12 of these are of provincial conservation concern. One species (Western Spring Azure, *Celastrina echo*) may solely occur in British Columbia for its North American distribution. (see Table 9, Appendices C, D, E)

**Dragonflies and damselflies** belong to the order 'Odonata', which has been the focus of many inventories in recent years. Eighty-six species of dragonflies and damselflies currently known as native to British Columbia were reviewed for conservation status. Eleven species or 12.79% occur exclusively in British Columbia for their Canadian distribution, whereas no species occurs only in B.C. for its North American distribution. Of the 11 species only in B.C., six species or 54.54% are of provincial conservation concern. (see Table 9, Appendices C, D, E)

Only six species of **freshwater mussels** occur in British Columbia and half of these species are both of global and provincial conservation concern. Five species only occur in British Columbia for their Canadian distribution, and no species is exclusive to B.C. for its North American distribution. (see Table 9, Appendices C, D, E)

Although much more study is needed for gathering information on **tiger beetles**, seventeen species native to British Columbia were reviewed for conservation status using the data currently available. Two species (Dark Saltflat Tiger Beetle, *Cicindela parowana*; Audouin's Night-stalking Tiger Beetle, *Omus audouini*) or 11.76% are of provincial conservation concern, whereas no species found presently in B.C. is considered of global conservation concern. Five species only occur in British Columbia for their Canadian distribution. (see Table 9, Appendices C, D, E)

### 3.3 VASCULAR PLANTS

Vascular plants include ferns and fern allies, conifers, and flowering plants – the latter composed of monocots such as grasses and orchids, and dicots such as mustards or roses. Overall, 2137 native vascular plant species occurring in British Columbia were examined for their conservation status. Globally, 82 species or 3.84% are of conservation concern, whereas provincially 900 species or 42.12% are of conservation concern. The plant groups of highest conservation concern, both globally and provincially, are the ferns and fern allies (12 species or 10.81% globally, and 62 species or 55.86% provincially); followed by dicots (58 species or 4.46% globally, and 649 species or 45.04% provincially) (Table 8).

**Ferns and fern allies** have a significant representation of species native to Canada in British Columbia (111 species or 91.274% in 15 families). The largest number of species (29) occur within the wood fern family, Dryopteridaceae; followed by 17 species in the moonwort or grapefern family, Ophioglossaceae; 12 species in the clubmoss family, Lycopodiaceae; and 12 species in the maidenhair fern family, Pteridaceae. Proportionally, the group containing the most species of conservation concern are the moonworts, which although are often diminutive in size seem to be indisputably rare. Twenty-four species of ferns and fern allies occur only in British Columbia for their Canadian distribution of which 18 species or 75% are of conservation concern. One species (Corrupt Spleenwort, *Asplenium adulterinum*) only occurs in this province for its North American distribution. (see Table 9, Appendices C, D, E)

**Conifers** include the majestic coastal trees, which are viewed by many as a signature feature of British Columbia's landscape. Of the 26 conifer species in three plant families reviewed for this report, none are of global conservation concern, although three (Jack Pine, *Pinus banksiana*; Rocky Mountain Juniper, *Juniperus scopulorum*; and Limber Pine, *Pinus flexilis*) are of provincial conservation concern. Five species only grow in British Columbia for their Canadian distribution, however none of these are of conservation concern at the time of this review.

Five hundred and fifty-nine species of **monocots** in 21 plant families were reviewed for their conservation status. A significant proportion of the monocots present in British Columbia, involves the grass-like plants or graminoids (416 species or 74.42%). The greatest number of these (203) belongs to the sedge family (Cyperaceae); followed by 168 species of the grass family (Poaceae); and 45 species of the rush family (Juncaceae). Other important families of monocots in British Columbia are the lily (Liliaceae), orchid (Orchidaceae), and pondweeds (Potamogetonaceae). Ninety-nine species of monocots occur only in British Columbia for their Canadian distribution of which 51 or 51.52% are of conservation concern. No plant within the monocot group has its exclusive occurrence in British Columbia for its North American range. (see Table 9, Appendices C, D, E)

One thousand four hundred and forty-one species of **dicots** in 88 plant families were reviewed for their conservation status. Large plant families with many species present in British Columbia include the aster (Asteraceae), pea (Fabaceae), mustard (Brassicaceae), rose (Rosaceae), snapdragon (Scrophulariaceae), and buttercup (Ranunculaceae), saxifrage (Saxifragaceae), pink (Caryophyllaceae), willow (Salicaceae), and carrot (Apiaceae) families. This vast group contains 877 species and comprises 60.86% of the flora. In contrast, due to the high floral diversity in British Columbia, many plant families are represented by only one or a few species. Four hundred and thirty-one species of dicots occur only in British Columbia for their Canadian distribution of which 242 or 56.15% are of conservation concern. Five species have their exclusive occurrence in British Columbia for their North American range, of which four are of conservation concern. (see Table 9, Appendices C, D, E)

*Table 9: Species by Taxon Group Unique to British Columbia in Canada and North America*

| Taxon Group | Total Number of Species | | Species of Conservation Concern | |
|---|---|---|---|---|
| | Canada | North America | Canada | North America |
| **VERTEBRATES** | **144** | **17** | **69** | **17** |
| Amphibians | 13 | 0 | 7 | 0 |
| Birds | 45 | 0 | 14 | 0 |
| Freshwater Fishes | 35 | 16 | 25 | 16 |
| Mammals | 42 | 1 | 17 | 1 |
| Reptiles and Turtles | 9 | 0 | 6 | 0 |
| **INVERTEBRATES** | **47** | **1** | **23** | **0** |
| Butterflies and Skippers | 25 | 1 | 12 | 0 |
| Crayfishes | 1 | 0 | 0 | 0 |
| Dragonflies and Damselflies | 11 | 0 | 6 | 0 |
| Freshwater Mussels | 5 | 0 | 3 | 0 |
| Tiger Beetles | 5 | 0 | 2 | 0 |
| **VASCULAR PLANTS** | **559** | **6** | **311** | **5** |
| Ferns and Fern Allies | 24 | 1 | 18 | 1 |
| Conifers | 5 | 0 | 0 | 0 |
| Monocots | 99 | 0 | 51 | 0 |
| Dicots | 431 | 5 | 242 | 4 |
| **TOTAL** | **750** | **24** | **403** | **22** |

## 4. Comparing Assessments

This report investigated the global and provincial perspective of selected taxonomic groups of both flora and fauna native to British Columbia by reviewing their conservation status. These two scales of analysis are possible through the NatureServe system of Conservation Status Ranks. Consideration of the global (G) rank as well as the provincial (S) rank provides an additional information layer for a species which may assist in designating conservation action. For the analysis of NatureServe ranks in this report, species designated with a 'Range Rank' were rounded to the higher rank – e.g. S2S3 is rounded to S2; S2S4 is averaged to S3. Range ranks are given when not enough information is available to score a specific rank and are rounded to the higher rank to safeguard the species. Ranks followed by a questions mark – e.g. S3? are also uncertain but are treated as certain for in analysis.

NatureServe's method of species evaluation is joined by other means of assessment, particularly at the provincial level. A comparison of different provincial assessments allows an opportunity to view the overall picture concluded from different examinations – all with 2006 data (Table 10). Similarities between each are completely expected as S Ranks are developed by the British Columbia Conservation Data Centre (BC CDC) as part of the NatureServe network, and the database and staff expertise at the BC CDC were the sources of information

for each assessment. NatureServe's S Ranks developed by each CDC in the network serve as the root for other means of assessment.

The BC CDC created the BC Status lists of Red, Blue and Yellow to simplify the interpretation of S Ranks. The Red List includes species that have been legally designated as Endangered or Threatened, are extirpated, or are candidates for such designation. The Blue List includes species of concern that are not currently recognized at risk, and the Yellow List includes uncommon, common, and increasing or decreasing species – all species not included on the other lists (BC Conservation Data Centre 2002).

The third provincial ranking exercise was conducted for the general status assessments (GS Ranks) of Wild Species 2005 as agreed by federal and provincial governments under the National Accord for the Protection of Species at Risk. Again the data of the BC CDC was used to fit into similar criteria as that used by NatureServe for its Conservation Status Ranks (Table 3). Provincial general status (GS) ranks were created by staff at the BC CDC and provided to coordinators of various taxonomic groups who submitted the tally to a National General Status Working Group (Canadian Endangered Species Conservation Council 2006). General Status ranks include Extinct, Extirpated, At Risk, May be At Risk, Sensitive, or Secure.

A comparison of the three assessments shows similar results in the percentage of species listed as conservation concern. Vertebrates and invertebrates are rated comparably across each assessment, and differences are minor within the various taxonomic groups. Vascular plants show a wider range of results between the methods of assessment.

Differences among these examinations arise in some cases whether a complete component of a taxonomic group such as marine species was included in the analysis. However other variations are due to the number of species scored within the ranks. The BC Status and General Status ranks are interpreted ranks based on the NatureServe S Ranks and provide a basic perspective of the general well-being of a species. The difference with number of species reported by NatureServe's S Rank assessment is largely due to the rounding of range ranks to the higher rank. Hence a S3S4 range rank would be included in the analysis as a S3 rank. This perspective allows the benefit of the doubt given towards the species, as a '4' rank is still considered uncommon with possible cause for long-term concern (Table 4). Vascular plants have the largest amount of range ranks of any taxonomic group included in this study, which resulted in a greater percentage of provincial conservation concern for the NatureServe S Rank assessment. When the S3S4 range ranks are not included, the NatureServe S Rank assessment for all vascular plants of provincial conservation concern is 26.63%, with the subdivisions: ferns and fern allies 30.63%; conifers 3.85%; monocots 23.26% and dicots 28.04%.

Every assessment has a unique contribution towards providing a conservation perspective and should be consulted when investigating a species. The value of the NatureServe conservation status system is its ranking hierarchy over geographic scales such as the global and provincial assessments used in this report. Setting conservation priorities for native species in British Columbia should include all sources and scales of information.

*Table 10: Comparison of Species of Conservation Concern in British Columbia by Ranking Method*

(NatureServe = S Ranks; Wild Species 2005 = GS Ranks; BC Gov't = BC Status)

| Taxon Group | Number of Species of Provincial Conservation Concern | | | % Provincial Conservation Concern | | |
|---|---|---|---|---|---|---|
| | S Ranks (X, H, 1, 2, 3) | GS Ranks (0.1, 0.2, 1, 2, 3) | BC Status (Extinct, Red, Blue) | S Ranks (X, H, 1, 2, 3) | GS Ranks (0.1, 0.2, 1, 2, 3) | BC Status (Extinct, Red, Blue) |
| **VERTEBRATES** | **167** | **138** | **164** | **27.74%** | **22.92%** | **27.24%** |
| Amphibians | 9 | 9 | 10 | 45.00% | 50.00% | 45.00% |
| Birds | 70 | 72 | 66 | 19.89% | 20.45% | 18.75% |
| Freshwater Fishes | 39 | 21 | 37 | 45.88% | 24.70%* | 43.53% |
| Mammals | 39 | 25 | 42 | 30.00% | 19.23%** | 32.31% |
| Reptiles and Turtles | 10 | 11 | 9 | 66.66% | 73.33% | 60.00% |
| **INVERTEBRATES** | **72** | **72** | **70** | **24.83%** | **24.83%** | **24.14%** |
| Butterflies and Skippers | 46 | 43 | 46 | 25.55% | 24.57% | 25.55% |
| Crayfishes | 0 | 0 | 0 | 0% | 0% | 0% |
| Dragonflies and Damselflies | 21 | 22 | 21 | 24.42% | 25.58% | 24.42% |
| Freshwater Mussels | 3 | 4 | 3 | 50.00% | 66.66% | 50.00% |
| Tiger Beetles | 2 | 3 | n/a | 11.76% | 18.75% | n/a |
| **VASCULAR PLANTS** | **900** | **803** | **571** | **42.12%** | **37.58%** | **26.72%** |
| Ferns and Fern Allies | 62 | 37 | 34 | 55.86% | 33.33% | 30.63% |
| Conifers | 3 | 2 | 1 | 11.54% | 7.69% | 3.85% |
| Monocots | 186 | 172 | 131 | 33.27% | 30.77% | 23.43% |
| Dicots | 649 | 592 | 405 | 45.04% | 41.08% | 28.11% |
| **TOTAL** | **1139** | **1013** | **805** | **37.60%** | **33.44%** | **26.73%*** ** |

*many freshwater fishes not included

**marine mammals not included

***number of tiger beetles (17) not included in calculation

### 4.1 Extinct and Extirpated Species in British Columbia

The extinction or permanent loss of any species reduces the world's diversity of living organisms and usually has unknown consequences with the interconnectivity of species relationships and functioning ecosystems. British Columbia has the four vertebrates which are considered extinct globally. Three of these (Dragon Lake Whitefish, *Coregonus* sp. 1; Hadley Lake Limnetic Stickleback, *Gasterosteus* sp. 12; Hadley Lake Benthic Stickleback, *Gasterosteus* sp. 13) only occurred within the province and recognition of these distinct species before their disappearance came too late.

Loss of a species from a jurisdiction but has its presence elsewhere is termed: extirpation. Fourteen species (8 vertebrates, 1 invertebrate, 5 vascular plants) are considered extirpated from the province, while 16 species are considered possibly extirpated or historical (3 vertebrates, 1 invertebrate, 12 vascular plants). A large number of these species, 16 or 53.33% only occurred in British Columbia hence their Canadian occurrence is also considered lost. (see Table 11, Appendices F)

*Table 11: Presumed Extinct (X) and Historical (H) Species by Taxon Group*

| Taxon Group | Presumed Extinct (GX) | Historical (GH) | Global Total | Presumed Extirpated (SX) | Historical (SH) | Provincial Total |
|---|---|---|---|---|---|---|
| **VERTEBRATES** | **4** | **0** | **4** | **8** | **3** | **11** |
| Amphibians | 0 | 0 | **0** | 0 | 0 | **0** |
| Birds | 1 | 0 | **1** | 3 | 0 | **3** |
| Freshwater Fishes | 3 | 0 | **3** | 3 | 0 | **3** |
| Mammals | 0 | 0 | **0** | 0 | 3 | **3** |
| Reptiles and Turtles | 0 | 0 | **0** | 2 | 0 | **2** |
| **INVERTEBRATES** | **0** | **0** | **0** | **1** | **1** | **2** |
| Butterflies and Skippers | 0 | 0 | **0** | 1 | 0 | **1** |
| Crayfishes | 0 | 0 | **0** | 0 | 0 | **0** |
| Dragonflies and Damselflies | 0 | 0 | **0** | 0 | 0 | **0** |
| Freshwater Mussels | 0 | 0 | **0** | 0 | 0 | **0** |
| Tiger Beetles | 0 | 0 | **0** | 0 | 1 | **1** |
| **VASCULAR PLANTS** | **0** | **0** | **0** | **5** | **12** | **17** |
| Ferns and Fern Allies | 0 | 0 | **0** | 0 | 1 | **1** |
| Conifers | 0 | 0 | **0** | 0 | 0 | **0** |
| Monocots | 0 | 0 | **0** | 0 | 2 | **2** |
| Dicots | 0 | 0 | **0** | 5 | 9 | **14** |
| **TOTAL** | **4** | **0** | **4** | **14** | **16** | **30** |

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