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Biodiversity of the Shuswap-South Thompson Region: A Cross-Cultural Overview

by

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Preface

This report developed out of our concern for biodiversity within the Shuswap - South Thompson region, and indications that the region was not receiving adequate attention to conserve its biodiversity, even though its biodiversity rivals that of the Okanagan Valley or southwestern portions of British Columbia. Because of our respective areas of expertise, Robert Hay's in natural history and sustainability and Ken Favrholdt's in local history, Ken was responsible for the maps, sub-sections 1.1 through 1.4, and the historical material in section 3, and Robert was responsible for the remainder of the report. We both were involved in editing and in the preparation of the extensive bibliography. Because both of us have backgrounds in geography and in the issues of aboriginal peoples, we have researched the region's biodiversity from a geographical and historical approach, coupled with a cross-cultural perspective.

The report's first section presents sketches of its environment and history of settlement, as well as an overview of Shuswap people's traditional knowledge on biodiversity. We also review Western (European) people's influences on that knowledge base, such as through disease epidemics, the preemption of land and the suppression of language. The bulk of the report is contained in the second section, which presents the chronological development of knowledge on biodiversity among Western peoples, sub-divided by phyla (e.g. birds, mammals, etc.), so that an understanding can be gained of when detailed knowledge was available. In the third section we examine Western natural resource activities that have impacted biodiversity directly (e.g. forestry, ranching, etc.) to see when this knowledge was applied to lessen environmental impacts.

The conclusion notes that recent attempts to restore and apply aboriginal biodiversity knowledge to resource activities, and to broaden the Western knowledge base within an ecological context, need better coordination if sustainability is to be achieved. Of particular concern are the realms of environmental education and environmental ethics, both of which require attention in the near future. A strategy to conserve and protect the region's biodiversity is therefore demanded that places community and provincial initiatives within an international framework.

The report also provides a detailed reference list, sub-divided by topic. Appendices include species lists by phylum, excluding insects and micro-organisms. Our efforts, although extensive, should be considered as both an overview and a work in progress. For example, more research is needed by other concerned individuals in the region on such areas as resource extraction history (e.g. forestry) and on recording Secwepemc biodiversity knowledge for plants and animals that were seldom utilized directly (i.e. most perching birds, small mammals, bryophytes, lichens, insects and micro-organisms).

We wish to thank the assistance of those on the contact list, provided at the end of the report, for their help in locating many of the regional references. We especially thank those who spent the time to review the report in its draft form, including Dave Low, Dave Moore, Bill Horswill, Doug Brown, Marianne Ignace, Nancy Turner, Sandra Peacock, Rob Cannings and Dave Nagorsen. The Royal B.C. Museum provided a $5000 grant in 1995 to support this research, and we thank Grant Hughes, Director of Curatorial Services, Rob Cannings, and Jim Cosgrove of the RBCM for their help in overseeing our project.

We trust that this report will become a valuable addition to the Living Landscapes Project for the Thompson Okanagan Region, and that a strategy for protecting and conserving biodiversity in the Shuswap - South Thompson region evolves out of our concerns. Comments and queries about our report should be directed to whomever was responsible for that section or sub-section, via either the internet (through the RBCM's Living Landscapes Project, managed by Okanagan University College) or by mail (University College of the Cariboo, Geography, Box 3010, Kamloops, B.C. V2C 5N3).

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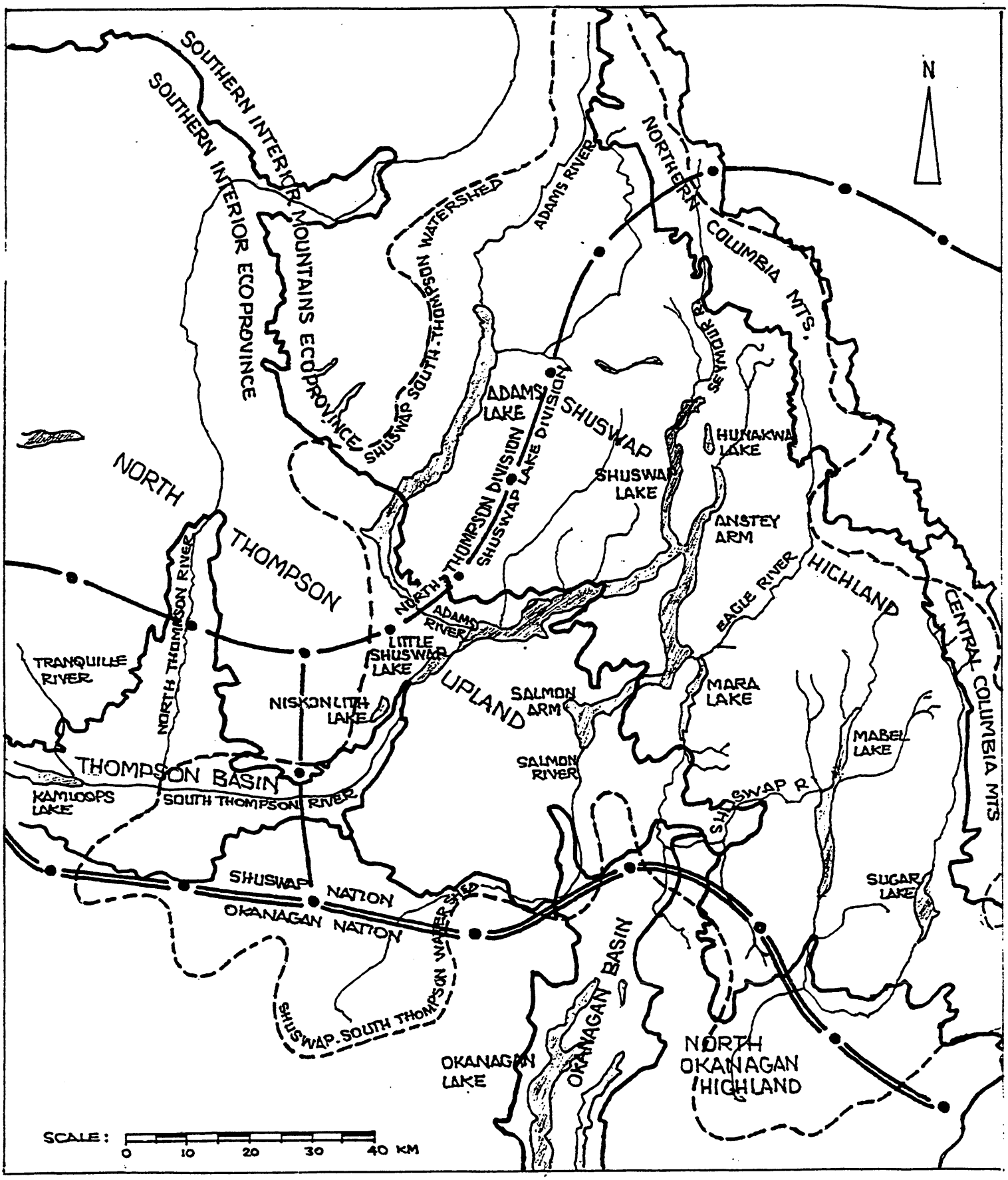

FIGURE 1. STUDY AREA: NATURAL AND ABORIGINAL BOUNDARIES

ABORIGINAL TERRITORIES
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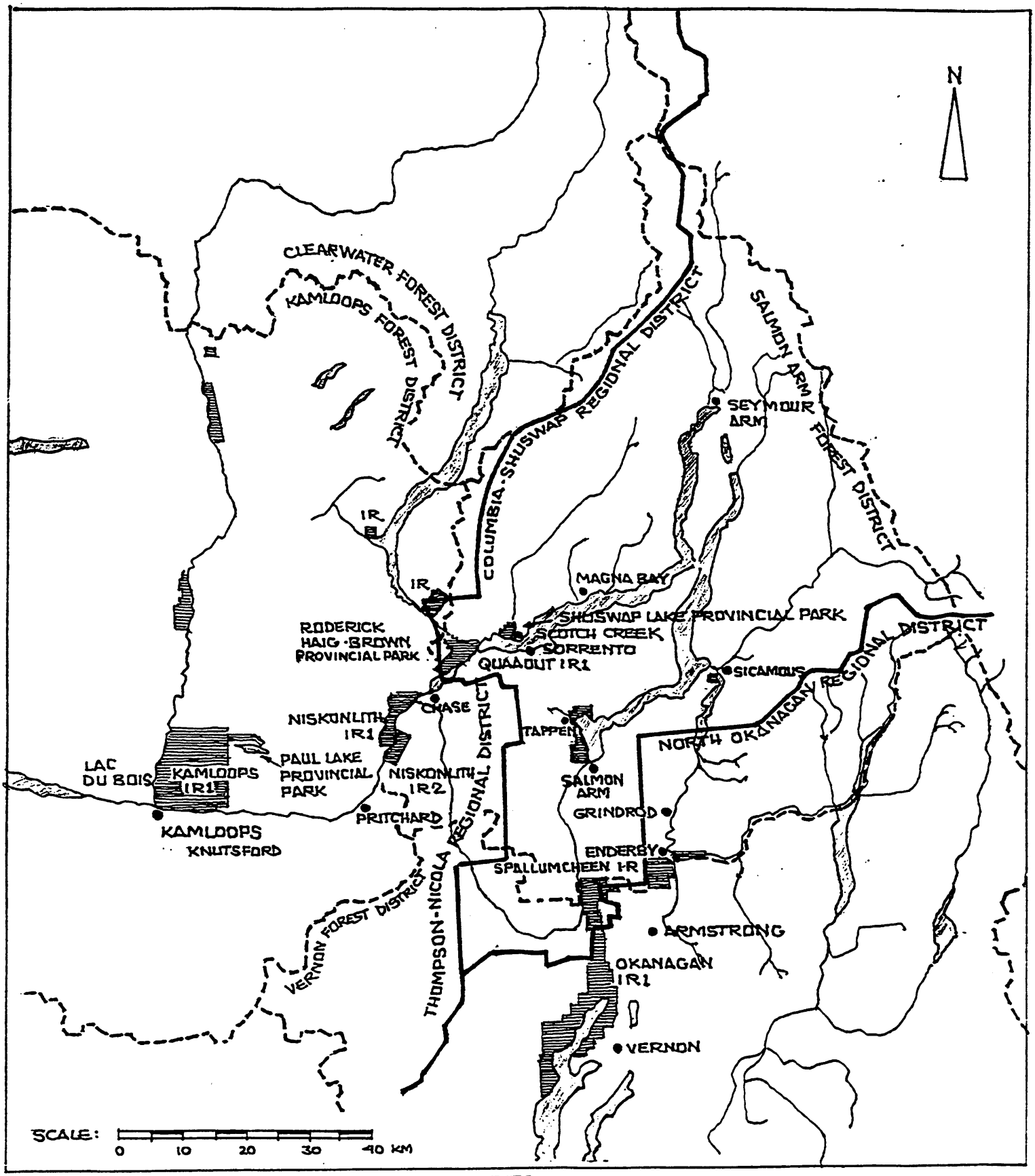

FIGURE 2. STUDY AREA: MODERN BOUNDARIES

REGIONAL DISTRICT BOUNDARIES
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Biodiversity of the Shuswap-South Thompson Region: A Cross-Cultural Overview

1. Introduction

Provincial interest concerning biodiversity has been building over the past 15 years in British Columbia because of three international initiatives: the World Conservation Strategy (1980: see Dasmann 1984); the World Commission on Environment and Development report, entitled *Our Common Future* (1987), which urged the preservation of at least 12 per cent of each ecosystem type to protect biological resources; and, the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, where Canada signed the Convention on Biodiversity (see Biodiversity Convention Office 1995). Managing to conserve biodiversity has therefore become a global concern, and as an environmental issue there are political overtones which are inescapable, particularly regarding policies for biodiversity inventories, natural resource development and relationships with indigenous peoples (see McNeely et al 1990; Westman 1990).

The loss of biodiversity became widely regarded as an international issue in the late 1980s with the publication of Wilson and Peter's book *Biodiversity* (1988; see also Wilson 1989). The potential for such loss had been alluded to previously, but Wilson and others noted some ominous trends, due to tropical deforestation and conversion of the natural landscape to human uses. In fact, humans co-opt through direct and indirect (e.g. farm fields and forest use) consumption up to 31 per cent of terrestrial net primary productivity (Vitousek in Horowitz and Karlin 1995, 130). There are estimated to be at least 20 to 30 million species on earth, of which over 90 per cent are terrestrial; tropical rainforests contain perhaps one-half of this diversity, but these ecosystems have been reduced by 45 per cent through deforestation (Ehrlich and Wilson 1991). The rate of species extinctions has been increasing exponentially of late, and is many times the natural rate, to the point that this episode of mass extinctions could become catastrophic, with a loss of up to one-quarter of the earth's species within the next 50 years (Ehrlich and Wilson 1991). Geologic evidence indicates that the last major period of extinctions was 65 million years ago, at the end of the

dinosaur age (Ehrlich and Wilson 1991). The difference this time is that such mass extinctions are entirely due to human causes.

Continued resource pressures and a changing global climate necessitate risk assessment, decision-making and action to protect biodiversity (even though there is an incomplete data base), with environmental education a key aspect of any such program. We can learn from (traditional) aboriginal cultures which emphasize a greater connection to the earth and a respect for its creatures. A review of biodiversity which attempts to address the concerns expressed at UNCED therefore necessarily investigates the knowledge base on biodiversity (and potential gains from cross-cultural understanding with indigenous peoples), the application of that knowledge, and measures to conserve and protect biodiversity.

To assess the status of biodiversity in a region three components need to be examined: species diversity, genetic diversity and ecosystem diversity (Horowitz and Karlin 1995). Besides threats to species diversity in the tropics, there are also threats to biodiverse ecosystems around the world, of which several are found in British Columbia. With Canada's signing of the Convention on Biological Diversity at the 1992 United Nations Conference on Environment and Development (UNCED), we became committed to a plan to both assess the status of our biodiversity and to ensure adequate protection measures for species, genetic and ecosystem diversity (Taylor 1994; Biodiversity Convention Office 1995). Within British Columbia are an estimated 70 per cent of Canada's native bird and mammal species due to the province's diversity of ecosystems. There are 14 recognized biogeoclimatic zones in B.C., with some of international significance, such as those that lie within west coast temperate rainforests and montane (interior) grasslands.

Most of this report will be concerned with species diversity, yet it must be remembered that the taxonomic knowledge of species has also been evolving over the past 150 years. For example, early reports of birds for B.C. often use a different nomenclature for both common and scientific (Latin) names of species. This knowledge base is continually changing, with for example A.O.U. (American Ornithological Union) checklists for North America periodically "lumping" or "splitting" bird species (see Miller and Scudder 1994); new species are also still being found

through research in little explored areas or phyla of B.C., such as the canopy of coastal rainforests (insects and non-vascular plants), the bryoflora/lichens/macrofungi, and the micro-organisms of soils (Harding and McCullum 1994a).

Genetic diversity is seldom considered a concern by the general public, yet research and protection measures of specific populations of fish species, particularly salmonids which are specific to streams/watersheds, is a major focus of DFO and of the Secwepemc peoples in the study area, such as the rehabilitation of the Deadman River and Adams River steelhead and salmon stocks (see Harvey 1995). Early research on the Kamloops trout was initiated because it was thought to be a new species. Large mammals, such as the cougar, may be threatened by resource and urban development in B.C., whereby only "islands" of natural habitat remain, which can limit the number of animals in a region and therefore the available genepool, weakening the species. B.C.'s Conservation Data Center (CDC) is concerned with identifying and advocating the protection of rare and endangered species and genetic races of species.

There are also migratory species to consider, many of whom may only spend a portion of the year in B.C., such as most of our waterfowl and songbirds. Such species must be managed so that their breeding ranges, migratory staging areas, and wintering grounds are all protected. A recent example of massive poisonings of Swainson's Hawks, an uncommon migrant in the study area, occurred in Argentina, with a potential loss of over 10 per cent of the world population of this hawk in one year. International treaties involving the protection of wetlands through the Ramsar Convention (1975), Migratory Animals Treaty (1979) and the Convention on International Trade in Endangered Species (CITES - 1973), administered by such agencies as the Canadian Wildlife Service (CWS), help toward the protection of species that go beyond B.C.'s borders regularly, as do international inter-agency research efforts. Other agreements, such as the Migratory Birds Convention (1916 - with the U.S.A.), Canada Wildlife Act (1973), the North American Waterfowl Management Plan (NAWMP - 1986), and the Fraser River Estuary Management Programme (FREMP), help with the management of migratory bird populations which spend part of their life cycle in our study area (see Obee 1996).

To conserve and protect biodiversity the assessment of knowledge in a region must involve information from both scientific sources and indigenous (local) experts (Murdoch and Clark 1994). Local knowledge that is unrecorded is often neglected, but it can be vital toward an understanding of long term trends, idiosyncratic phenomena, and how human and natural systems can be linked to achieve sustainability (Dene Cultural Institute 1995). To protect biodiversity, repositories of local knowledge, including community systems, also need protection. Towards this end, naturalists and elders, from both aboriginal and scientific backgrounds in the region, should be consulted and their knowledge recorded, where possible. This approach provides some balance, as scientific knowledge may be incomplete in a rugged land such as British Columbia that has only been recently colonized by Western (European) and other peoples. Of note regarding the existing (recorded) knowledge base is that it has been oriented to particular resource sectors until only recently (and thus to a capitalist, market economy). This orientation makes it difficult to then integrate such knowledge within two complementary perspectives heralded in the 1990s as necessary to our relationship with the environment: ecological systems and sustainability.

Much effort has been devoted in the past few years to documenting the biodiversity of the Okanagan Valley, which rivals the southwestern portion of British Columbia in biodiversity. The region comprising the Kamloops environs and the South Thompson River watershed (including Adams Lake, Shuswap Lake and Mabel Lake) is also very biodiverse, yet this region has received less systematic attention. To gain a good understanding of the present status of biodiversity knowledge for both Western and First Nations Shuswap (Secwepemc) peoples in the Shuswap-South Thompson region of the British Columbia interior, our research has explored three inter-related areas, to ascertain in this region:

1. the development and extent of the knowledge base on biodiversity of the two principal cultures, aboriginal and Western (to present times);
2. the effect each culture has had on the other's biodiversity knowledge since contact; and,
3. the application of biodiversity knowledge within each culture, toward achieving the conservation of biodiversity and sustainability.

Toward these ends, the first section of this report provides an overview of the environmental setting and of the traditional Shuswap way of life and worldview, and then reviews the general effects of European colonization on both Shuswap peoples and the region's biodiversity. Maps are included to present the study area and to contrast traditional Shuswap tribal boundaries with ecosection/ecoprovince boundaries for the study area. This section closes with descriptive sketches of principal population centres in the region, including Indian reserves.

A second section on the accumulation of Western biodiversity knowledge in the study area follows this descriptive and historical material. An account of early naturalist activity is followed by descriptions of animal and plant phyla, presented in sub-sections; notes on a few interesting species close each sub-section.

The third section summarizes the effect of resource use by (primarily) Western peoples in the region on biodiversity, concerning rangelands (and agriculture), forestry and outdoor recreation, noting recent governmental changes to resource management and land use planning. This section closes with an account of aboriginal resource management.

To direct this research toward programs to conserve and protect biodiversity, the fourth section considers our findings in a larger context, pointing out both research gaps and ongoing efforts to improve that knowledge base. The inherent difficulties in assessing biodiversity knowledge from different cultural systems, particularly modern versus indigenous ones, are discussed, as are threats to the study area's biodiversity. Recommendations toward conserving and protecting the study area's biodiversity are listed to provide direction to both governmental and community agencies.

Appended to the report are a number of species lists, organized by phylum, and a bibliography, with some historical references having annotations on their content. A contact list of key persons that we contacted in the preparation of this report is also provided.

1.1 Environmental Setting

The study area is in south-central British Columbia and comprises the entire South Thompson River watershed, part of the larger Fraser River basin. Recognizing that there are often

transitional areas of great biodiversity, such as ecotones and riparian zones, we have considered the boundaries of the study area and included areas that seem to fit naturally into one region. And so the environs adjacent to Kamloops (e.g. Lac du Bois, Knutsford and Paul/Pinantan Lakes) have been added, even though they are not part of the South Thompson watershed, as they were often part of naturalist studies from the mid-1800s, and these environs are integral to activities of Shuswap First Nations that inhabit this watershed (see Map 1). The study area includes the communities of Kamloops to the west, Sicamous to the east and Enderby to the southeast. Enderby lies just north of the natural divide between the Fraser and Columbia river watersheds.

The study area lies within the Shuswap Highland Physiographic Region of the Interior Plateau of British Columbia (Holland 1964, 73), and is bounded on the east by the Monashee (Columbia) Mountains and in the west by the Thompson Plateau. Relief increases in an easterly direction in the study area. Three large lakes are found in valley basins, namely Adams, Shuswap and Mabel lakes. For extended periods during the Pleistocene epoch (2 million to 10,000 before present - BP), the area was covered with ice extending to 2300 metres above sea level (Fulton 1975, 36). During the later Quaternary period there were alternating periods of glaciation. Two glacial periods and an interglacial have occurred within the last 50,000 years (1975, 35). No evidence of *Homo sapiens* has been linked to these earlier periods. During the Holocene period (10,000 BP to the present) there was a warmer and drier period from 8000 to 3000 BP, followed by a cooler, wetter trend 3000 to 2500 BP, becoming coolest about 450 years ago (the Little Ice Age, a time when mountain glaciers reached their maximum extent since the Pleistocene). A gradual warming trend has ensued since that time.

The study area straddles two ecoprovinces: the Southern Interior and the Southern Interior Mountains (see Map 2). The area includes parts of seven ecosections (Demarchi et al in Campbell 1990, Vol. 1, 55-144): Thompson Basin; Shuswap Highland; North Thompson Upland; small portions of North Okanagan Basin; North Okanagan Highlands; North Columbia Mountains; and, Central Columbia Mountains. Climatic regions range from very dry in the western part of the region (Thompson Basin) to very wet in the east along the Columbia Mountains. Seven

biogeoclimatic zones occur within the study area along a vertical axis from the lowest elevation (344 metres) at Kamloops to the highest elevations (2915 metres) at Gordon Horne Peak on the upper Seymour River and Mt. Odin (2972 m) in the southeast.

Biogeoclimatically, the study area includes the following recognized zones (Parish et al 1996): Bunchgrass (BG) in the western part of the basin along the north side of the South Thompson River; a Ponderosa Pine (PP) zone on the south side of the Thompson River; Interior Douglas-fir (IDF) around the west portion of Shuswap Lake; Interior Cedar-hemlock (ICH) in the eastern and northern portions of the Shuswap Lake area; Montane Spruce (MS) and Engelmann Spruce-subalpine Fir (ESSF) in the upland areas; and, Alpine Tundra (AT) at the highest elevations east of Shuswap and Mabel lakes. There are sub-variants for most of these zones, with the vegetation zones reflecting the orographic effect of westerly air flows, resulting in greater precipitation from west to east. Precipitation ranges from 28 cm in the valley bottom at Kamloops to 1240 cm in the ESSF zone; frost free days also vary from 148 days in the lowest zone to only 33 days for ESSF. The climate in valley bottomlands is thus moderated by both the low elevation and radiant heat from the valley sides; due to this latter effect, temperatures in the Kamloops area often are above 35^{o}C in mid-summer.

The study area therefore represents a region with a variety of natural and human settings from highly urbanized to remote wilderness parts. The region is characterized by gently sloping upland plateau areas and broad steep-walled valleys; human activity and permanent population centers have tended to be concentrated along the valley bottomlands and lakesides, with the greatest impacts on the environment until recent times in these areas and adjacent rangelands.

1.2 The Secwepemc (Shuswap) Peoples

The South Thompson-Shuswap Basin is the site of the oldest human remains discovered in the interior of British Columbia, dating from 8600 B.P. at Gore Creek near Pritchard, although paleo-Indians may have inhabited the cordillera much earlier. However, knowledge of the earliest aboriginal inhabitants of the area is incomplete and is only well-described since 4000 BP (see M'Gonigle et al 1992, Appen. 6).

Most of the early knowledge on Shuswap culture derives from ethnographic research conducted in the late 19th and early 20th century, continuing through archaeological studies to the present. Walter Moberly explored the region in 1865 and made some comments on the biota of the Thompson-Shuswap. Alexander Caulfield Anderson, a former HBC Chief Trader also wrote extensively on the flora and fauna of interior British Columbia (1872). George Dawson explored the region for the Geological Survey in the 1870s and 1880s. Dawson (1891) provides a brief ethnography of the Shuswap, but it is fragmentary. He also made geological maps of the Kamloops and Shuswap areas in 1895 and 1898, respectively, where he included much valuable ethnographic information, such as the location of native trails and settlements. Of special interest on his maps is the notation of fish traps (weirs) on many creeks.

It was therefore not until the 1880s that the first ethnographies of the Shuswap were made, long after the traditional lifeways of the Shuswap had been disrupted by Europeans. James Alexander Teit has made the most complete description of the Shuswap culture (1909a). Teit's work provides a reliable and detailed record, although it is incomplete and drawn from only a small number of Secwepemc informants. He identified seven divisions (now termed bands) that make up the ethnolinguistic group known as the Shuswap, part of the Interior Salish language family. There are presently five bands within the South Thompson-Shuswap basin including: Kamloops, Little Shuswap (Squilax), Adams Lake, Neskonlith and Spallumcheen. The natural divide between the Okanagan and Shuswap watersheds just south of Enderby approximates the boundary between the Shuswap and Okanagan Nations.

Archaeological studies have focussed on the valley bottomlands, and usually relate to impact assessments on development affecting specific cultural sites (Sanger 1968; Wilson 1980; Stryd 1981; Arcas Associates 1989) and to inventories (Mohs 1979, 1981; Rousseau and Richards 1985; Richards and Rousseau 1987). Rousseau and Richards (1985) provide a general review on archaeological knowledge in our study area.

Shuswap Lake was used primarily by members of the Shuswap Lake Band and occasionally by those of the Adams Lake Band, both of which were part of a group of closely

related bands that Teit called the "Shuswap Lake Division" (1909:450, 455, 461). Shuswap wintering sites were situated along the principal rivers and lakes. At Shuswap Lake, the villages were located along the lakeshore rather than along a major river (Teit 1909, 461-462; Dawson 1891, 8), close to important salmon fishing stations. At the time of major Euro-Canadian contact the main village for the Shuswap Lake Band was near the mouth of the Adams River with its large salmon runs (Teit 1909, 462). The estimated population in this area during late prehistoric times was only 200 people (Teit 1909, 466).

The seasonal round at Shuswap Lake was typical of the Shuswap way of life. December was largely spent by people inside the winter dwellings, living on stored foods, especially dried salmon and plants. Cold weather prevented hunting except for snowshoe hares and grouse which were available close to the winter village (Alexander 1989, 97). In milder weather, men would go hunting for deer; elk may also have been present (Alexander 1989, 14-16). Salmon migrated up the South Thompson River every year, with a major run occurring every four years. Major runs have, until recently, been in excess of one million fish. Fish generally appear in the river between mid-September and the end of October. Much of the Shuswap protein resource was obtained from salmon, which could be eaten fresh or preserved by drying or smoking. Ice fishing was common (Alexander 1989, 91; Kennedy and Bouchard 1975, 36) for lake trout, Dolly varden, rainbow trout, large-scale sucker, northern squawfish, peamouth chub and burbot (Carl et al 1948). The coldest month was January when outdoor activities generally stopped: hunting was rarely undertaken and ice fishing yielded poor returns.

Shuswap knowledge of plants was (and continues to be) extensive; over 135 species are known to have be utilized in one form or another (Palmer 1975, 29). At least 48 species were recorded as being used for food, 53 species for medicinal purposes, 37 species for technological uses and 22 species for ceremonial use (Ibid: 35; see also Turner et al 1991; M'Gonigle et al 1992, Appen. 6; Parish et al 1996, 20-24). Plant foods were a major part of the diet and were eaten fresh or cooked, and were preserved by baking and drying for the winter months. Plant foods were

often gathered by women and children. Burning was practiced to promote root and berry harvests (Teit 1909, 256; Bouchard and Kennedy 1979; Turner et al 1991).

The basis of Shuswap spirituality was nature and the interconnection of all beings. The earth was seen as an animate being; the lands, animals, plants, and fish were seen as gifts from the Old One, which must be respected, used properly and kept from becoming angry (Teit 1909, 596). Native stories and myths are filled with lessons about how to treat animals, fish, and plants with respect in order to ensure that they would return the following year. The Shuswap lived a semi-nomadic lifestyle, in a seasonal round of fishing, hunting and gathering. Their relationship with the environment extended to a detailed knowledge of plant and animal species. This relationship was disrupted in a number of ways with the coming of Europeans to the region.

1.3 European Impacts on the Environment and the Shuswap Way of Life

Prior to appearance of Europeans in person, diseases and horses and some trade goods had entered the area. Diseases may have penetrated the region from the coast as early as the 1780s; the horse was introduced about the same time via the Okanagan Valley but in small numbers (Teit 1909, 533). The earliest Europeans to settle in the South Thompson - Shuswap Region were fur traders with the Pacific Fur Company and the North West Company. David Stuart of the Pacific Fur Company was the first European to visit Kamloops in 1811; his colleague Alexander Ross returned to establish a fort in 1812. The North West Company entered the area in the same year and also established a fort. The earliest fur trade reports of the area, although scanty, were favourable. However, as early as 1827 there were reports of declining fur-bearing populations and fur traders were concerned that species were becoming rare. Chief Trader Archibald McDonald reported that the beaver were "on the verge of extinction." However there was no apparent attempt at conservation in this area by the Hudson's Bay Company (Johnson 1937).

The fur trade resulted in some changes to the seasonal cycles and economic activities of the Shuswap. More time was spent in trapping, and in exchange the Shuswap acquired new technology: firearms, steel traps, knives, kettles and blankets (see M'Gonigle et al 1992, Appen. 6). Nevertheless, the fur trade is best characterized as a reciprocal relationship from which both the

Shuswap and the European traders benefitted. This relationship was referred to in the memorial to Sir Wilfirid Laurier in 1910:

> They [the fur traders] did not interfere with us or attempt to break up our tribal organizations, laws and customs...Nor did they stop us from catching fish, hunting, etc. They never tried to steal or appropriate our country, nor take our food and life from us.(SNTC 1989, 32).

The traders exerted strong pressure on the Shuswap to trade large quantities of salmon for their own use which undoubtedly had a serious impact on Shuswap livelihood. Throughout the fur trade period, periodic starvation was reported among the Shuswap (Kamloops Journals 1826, 7; 1841, 3).

An unabated fur trade took place in the area until the 1860s, when the first large scale European settlement took place. Three early events dramatically changed Shuswap life and impacted on their social system. The smallpox epidemic of 1862-63 which decimated the Shuswap population, killing over one-third of the people (Teit 1909, 463), was probably carried by miners into the region. The discovery of gold in the Cariboo resulted in a major influx of Euro-Americans into the B.C. interior. Missionaries came to the area in the 1840s, establishing a church in Kamloops by 1869 and a residential school in 1878 (M'Gonigle et al 1992, Appen. 6).

Gold was discovered at Tranquille near Kamloops as early as 1857, although Kamloops was not a major center of the gold rush. Instead, it was on the supply route to the Cariboo and (in 1865) to the Big Bend region of the upper Columbia River, via Shuswap Lake. As the gold rush ended, many miners stayed in the area and began to clear land, put up fences, and establish farms and ranches. At the time British Columbia entered Canadian Confederation in 1871, roads had replaced trails in the study area between the Thompson and Okanagan valleys, townsites had been laid out and land surveys completed. Indian reserves had been established and government systems of pre-emption and land use were in place.

The first ranches in the South Thompson-Shuswap area were established in the 1860s. Although the 1860 Land Ordinance prohibited the pre-emption of Indian villages and fields, this

minimum protection of native rights was ineffectual. Settlers squatted on lands which were not being obviously used by aboriginal peoples for agriculture or forestry. Indian reserves had been established locally by William Cox under instructions of Governor Sir James Douglas of the colonial government in 1862, but by 1865 there was a movement by the new government and Commissioner of Lands and Works Joseph Trutch to reduce the size of these reserves:

> It would be very desirable indeed to get all the lands from the foot of Little Shuswap Lake to Kamloops entirely out of their hands... as the Shuswap River [South Thompson] is likely to be the principal thoroughfare through the colony next summer (British Columbia c1875, 34)

After 1866 the land rights that were extended to settlers were denied to native peoples, and the natives were prohibited from pre-empting land.

Euro-Canadian settlement in the South Thompson Valley began in 1860 near Campbell Creek by Jean Baptiste Leonard, a former HBC fur trader. He was joined by Lewis Campbell in 1862, an American cattle drover, who developed an extensive ranch. Jacob Duck and Alex Pringle established ranches at Monte Creek in 1862; Pringle's ranch has expanded to 3000 acres by 1882. North of the river the Harper Ranch was started in 1862 by brothers Jerome and Thaddeus Harper, also Americans who created a ranch of 4000 acres.

In the meantime, upper class British with access to capital had settled in the region. The B.C. Express Stage Line established itself as the primary mode of public transport and, in 1872, extended its lines from Fort Kamloops to the Okanagan (Pawley 1957). In the 1870s the Canadian Pacific Railway settled on the Kicking Horse Pass - Rogers Pass route and along the Eagle River, Shuswap Lake and the Thompson River (Moberly 1885). Railway construction camps (with thousands of Chinese workers) provided a ready market for beef in supply centres like Kamloops. The completion of the CPR in 1885 at Craigellachie, 25 kilometres east of Sicamous, opened up the region to settlement and resource exploitation in a corridor known as the Railway Belt, twenty miles either side of the mainline (Sederberg 1958). Main roads were built prior to World War I,

linking Kamloops, Salmon Arm and Enderby, with traffic increasing along this route by the 1920s.

Jesuit missionaries entered the area in the 1840s and attracted First Nations from many outlying areas to visit Kamloops where a church was established, the predecessor to present St. Joseph's Catholic Church. The Jesuits were short-lived in British Columbia, and were followed by the Oblate Order which continued missionary work in the 1860s, re-establishing St. Joseph's in the 1860s. They also established churches at Squilax (Little Shuswap Lake), Adams Lake (Chase), Spallumcheen (Enderby) and elsewhere. Catholicism, as taught to the Shuswap, had a syncretic effect, dovetailing with traditional Shuswap beliefs of a Supreme Creator. In 1867 the Federal Government, through the B.N.A. Act, formally took on the responsibility for managing Indian lands and Indian peoples. This responsibility included the education of Indian children.

In the 1870s, Indian education thus became a joint venture of church and state. For the Shuswap, the decimation of their language began with the generation of students who entered Indian residential schools, with the government school opening in Kamloops in 1890. The academic subjects listed in the programme of studies outlined by the Department of Indian Affairs in 1894 included English, general knowledge, writing, arithmetic, geography, and ethics. Usually these subjects occupied the students for several hours a day, followed by practical skills such as farming and shoemaking for boys and housekeeping and sewing for girls (Lascelles 1990, 30).

The question of how the loss of native culture was impacted by the residential school system is controversial in the 1990s, especially because the schools were accompanied by abuse on a systemic scale (see Furniss 1992, 1-5). However, a visitor to the Kamloops school in 1897 made the following observation:

> The school draws chldren from a radius of some 125 miles around and from 25 reserves. Indian children are mostly from the Okanagan, Shuswap, Thompson and Lillooet tribes . . The Indians pray and sing in the native tongue and the missionaries see to it that the practice is upheld. (Lascelles 1990, 31)

The Shuswap language was prohibited later, although young people in the summertime would be reunited with their parents and grandparents so that Shuswap language was not completely lost. However, the transfer of specific knowledge about plant and animal resources was reduced. By the last few years of the schools' operation, according to Haig-Brown (1988, 83), "student's coming to school almost all had prior knowledge of English and in some cases had never learned their own language." A typical experience is recounted below:

> When I learned Shuswap, we lived as a total family unit. Previous to 1938, there was not much moving about outside of the reserve area. ...When I came to school... I can see now my father began branching out working away from home; my grandfather went farther away from home...The Shuswap language continued to be spoken whenever they [the family] got together but as we gained more knowledge of English and because of ranching out, [work] in logging camps, they moved gradually to speak more English. And then when we all came home, I could see the switch into English as we started to move through the years . . . (Haig-Brown 1988, 82-83).

It became more and more difficult for the Shuswap to live on hunting, fishing and plant gathering alone. Shuswap families began to cultivate crops, especially potatoes, as an additional food source. By the late nineteenth century their population and spirit were at a low ebb, and they had become dependent on the European economic system for survival.

As early as 1877, elders from the area gave testimony to the Joint Reserve Commission illustrating their concern for traditional resources.

> They know, and say, that if the younger fish are destroyed, and the shoals returning from the sea will be proportionately diminished. That the Indians, with this fact in view, are careful not to destroy, wantonly or wastefully the mature fish, or to impede their passage to the spawning beds. That the barriers they construct in rivers are only to retard the passage of the fish, to enable the Indians to obtain their necessary winter supply, and that these temporary obstructions are thrown open, as necessary, to give passage to the ascending fish. (in Ware 1983, 53)

By 1910 the relationship between the Shuswap and their environment had been severely altered by European intrusion:

> ...the severe restrictions put on us lately by the government re hunting and fishing; the depletion of salmon by overfishing of the whites...In many places we are debarred from ... gathering roots and obtaining wood and water as heretofore. Our people are fined and imprisoned for breaking the game and fish laws and using the same game and fish which we were told would always be ours for food. (SNTC 1989, 35).

Development by ranching, farming, lumbering and mining industries not only restricted Shuswap access to traditional resources but also destroyed some of those hitherto carefully managed resources.

Historical evidence in the study area reveals significant changes over the past century and a half, beginning with the fur trade. Beaver were in decline as early as the 1820s in the Kamloops area, and elk that had once played an important part in Shuswap culture had virtually disappeared by the early 1800s in the lowland areas (see Spalding 1992, 11). Shuswap elder Mary Thomas still remembers the old ways:

> Not one century ago Indians lived by nature ... the Shuswaps roamed the hills, lakes, streams, taking from nature only what they needed to survive. How did the Indians learn to live from nature? Grandparents were the teachers. The grandparents taught the young children how to hunt, fish. (SCES oral history archives, c late 1980s).

She is also part of a revitalization of Shuswap culture ongoing today, described in the conclusion, which is aiding in retaining traditional biodiversity knowledge and applying that knowledge to protect biodiversity, both among Shuswap and European-descent peoples in the region.

1.4 Population and Settlement

The pre-contact population of the Shuswap can only be estimated based on our knowledge of Shuswap lifeways and ecology. The earliest estimates of Shuswap population were made by Hudson's Bay Company traders at Kamloops, based on their knowledge of villages in the region. The estimated population in 1835 was approximately 1100 individuals within the study area (Duff

1964, 41). Teit presents two population estimates, one for the early contact period and one for the early twentieth century when he did his fieldwork. Teit estimated the total Shuswap population to be 7200 in 1850, prior to its decimation due to smallpox. The returns of the Department of Indian Affairs in 1903 and 1906 indicate a population of about 2200 for that period (Teit 1909, 466).

1. Kamloops

The largest urban centre in the study area is Kamloops, established upon an ancient native village by European fur traders in 1812. It became an important center during the gold rush, and developed further with the construction of the C.P.R. in 1885. The city was incorporated in 1893, and by 1911 had grown to 3772 people. By 1921 it had risen to 4487, by 1931 6093 and by 1943 was estimated at 7944 (Balf 1981). Kamloops became the commercial hub of the Thompson Valley, with other communities started along the rail line, such as Salmon Arm and Sicamous.

In 1915 a second transcontinental railway, the Canadian Northern Pacific (now Canadian National) entered the scene and reaffirmed Kamloops' role as a transportation hub. The city also became an important highway junction at the intersection of the Trans-Canada, Yellowhead and Coquihalla highways. As a consequence, Kamloops is an important regional and administrative centre for the interior of the Province. Forestry is still a major industry, with Weyerhaeuser Canada operating a pulp mill and sawmill on the edge of the city at Mission Flats since the 1960s.

Agriculture has traditionally been important to Kamloops. The Hudson's Bay Company initially had a large farm around the fort in the 1840s to cultivate various grains. The first cannery in the area started in 1915 packing tomatoes, but only a small proportion of the produce grown in Kamloops was handled by canneries. Many tomatoes, beans, potatoes, onions and apples were shipped; honey was also of some importance, as was poultry raising. Seed production was a minor industry, tobacco was grown experimentally in 1927, and in 1936 the first hops were grown, continuing as an important crop until the 1960s (Balf 1975).

The population of the City of Kamloops is 67,057 (1991), exerting continuing pressures on the land base. Today 96% of the City's domestic water supply is obtained from the South

Thompson River at an intake within the municipal boundaries. In recent years water quality has been a concern due to sediment in the South Thompson during spring runoff.

2. Chase

Chase was developed as a ranch by Whitfield Chase in 1865. After 1910 the Adams River Lumber Company built a mill that was the third largest in B.C. and the largest in the interior. A hydro-power plant was built on Chase Creek, with water rights on the creek for 320,000 gallons a day. All logging was carried on within a half mile of the shoreline of Adams Lake during the first three years of operation. Most of the logging was done in the winter, with cedar, pine, fir and spruce the prime species cut. They later logged the Adams River watershed, making use of local rivers for driving logs to the sawmill. The Adams River Lumber Company also dammed the lower Adams River to facilitate the transport of logs downstream to Shuswap Lake, destroying the gravel river bed and thus impacting the largest sockeye salmon run in North America, which has only recently been restored. The mill closed in 1925 (Dunn 1986, 91-102).

The Company built the Chase townsite in 1908, and by 1912 the population of Chase was about 500. Agricultural potential had also not been ignored. Several thousand acres in the area were devoted to raising grain, hay, vegetables and fruit. The Chase Central Board of Trade lauded the suitability of the soil and climate for growing different kinds of fruit, such as "northern apples". The present population of the Village of Chase is 2083 (1991), with recent development due to increases in tourism and retirement in the area.

3. Salmon Arm

Salmon Arm was so-named because of the large runs of salmon up the creeks emptying into the lake. Many of the old-timers could remember years when salmon could, without difficulty, be pulled out of the creeks with a pitchfork (Doe 1971, 1). The District of Salmon Arm is closely linked with the agricultural economy of the northern part of the Okanagan Valley. Dairy-farms, poultry farms., fruit-orchards, small-fruit and mixed livestock-crop operations occupy alluvial soils in the valley of the Salmon River and the slopes bordering Salmon Arm (Aitken 1952). Milk

and cheesemaking epitomizes the specialization that has occurred in this area (Wamboldt 1976). Forestry is also important, with several lumber mills in the area.

Tourism is stimulated by the scenic and recreational opoportunities in the area. The Trans-Canada Highway and Canadian Pacific Railway pass through Salmon Arm, and it is the northern gateway to the Okanagan. Several small communities depend to varying degrees on the commercial and distribution facilities found in Salmon Arm. Sicamous to the east is a resort, sawmilling and railway community (see Sederberg 1958); Tappen, Notch Hill, Blind Bay, Sorrento, Squilax and the "North Shore" communities of Celista, Magna Bay, and Anglemont are all small outlying farming and logging settlements with increasing recreational and retirement use (see Celista School 1943; Akrigg 1964). Lakeshore communities cater to tourists during the summer. The population of the District of Salmon Arm is 12,115 (1991) with Sicamous at 1,199.

4. Enderby

Enderby, considered within the Okanagan Valley, is situated on the west bank of the Shuswap River (formerly known as the Spallumcheen). The area was the home of Shuswap Indians who hunted and fished along its banks. In 1866, Alexander Leslie Fortune pre-empted land, becoming the first white settler in the North Okanagan (Jamieson 1976). First known as Steamboat Landing, Enderby was incorporated in 1905, and flourished soon after with the building of a sawmill which employed 200 people, then sagged as the timber mill and grist mills closed in the early 1920s (Walker 1908, 1910; Barnes 1930; Ormsby 1948; Preston 1955). The early ranches had considerable success with wheat and other cereal cultivation. Enderby was an ideal stopping point for steamboats from Kamloops; there was regular service between Fortune's landing and Kamloops through the 1880s. Erratic service continued to Shuswap Lake until 1940 (Balf 1973). The Shuswap and Okanagan Railway was completed from Sicamous via Enderby to Okanagan Landing in 1892, where sternwheelers continued the transportation network within the Okanagan. A canal was planned between Enderby and Okanagan Lake in the 1880s, but the proposal was too costly; the land held in reserve in the area was released for pre-emption instead (Morkill 1954).

Nearby communities include Grindrod (see van Solkema 1968) and several small settlements near Mabel Lake (see Deuling 1973; Simard c1975; Bawtree 1975). River drives from Sugar Lake became annual events, running the logs down to Enderby where they were boomed to be milled (Johnson 1955; Simard c1975). The Adams River and the Shuswap River are the only two areas in British Columbia where log drives were regularly used as part of the operation, with the drives on the Shuswap River lasting from the turn of the century until the 1960s. The present population of the City of Enderby is 2128 (1991) with a rural population of about 6000.

5. Indian Reserves

Several large Indian Reserves and many smaller ones are contained in the study area. For the most part they reflect the persistence of historic aboriginal populations at Kamloops and near Chase, Salmon Arm and Enderby. In all there are 23 reserves within the Shuswap-South Thompson watershed, ranging in size from a few hectares to the largest - Kamloops Indian Reserve #1. The Kamloops Reserve now includes a piece which was formerly pre-empted - Scheidam Flats - heralding the beginnning of negotiations and possible treaties with the government over specific claims and traditional territories.

Number and Acreage of Indian Reserves By Band

Band	Reserves	Hectares
Adams Lake	7	2,886
Kamloops	5	13,249
Little Shuswap	5	3,135
Neskonlith	3	2,787
Spallumcheen	3	3,905
Total	23	25,962

(Source: Dept. of Indian and Northern Affairs Program 1990)

BC Registered Indian Population

	On-reserve	Off-reserve
Kamloops	505	288
Neskonlith	201	289
Adams Lake	371	200
Spallumcheen	284	301
Little Shswap	178	58
Total	797	1136

(Source: Dept. of Indian and Northern Affairs 1996)

Several urban centers are therefore evolving in the study area, primarily based on the agricultural and forest resources nearby, and on the newer developments of tourism, governmental services and retirement to the region. The rate of urbanization within the study area is increasing, with its concomitant impact on biodiversity. Kamloops, with a current population of close to 80,000, is the primary center; it is projected to reach 90,000 soon after the turn of the century. Urban expansion and rural residential pressures are contributing to the removal of some quality agricultural land, principally floodplain or lowland areas, although land in the Agricultural Land Reserve is better protected. The recent initiatives by the B.C. government and other agencies (e.g. the B.C. Protected Areas Strategy - PAS, Fraser Basin Management Program, Kamloops Land and Resource Management Plan process, Federation of B.C. Naturalists "Land for Nature" projects, Ducks Unlimited Interior Wetlands Program, and Salmon Arm foreshore restoration through Nature Trust) are examples of planning processes that recognize the threats of urbanization and industrial forestry.

The evolving urban network within the region is administered by municipal councils and regional districts, the latter providing services and controls to the development of rural areas. Within the study area there are three regional districts: Thompson-Nicola, Columbia-Shuswap, and North Okanagan, generally corresponding to the upper, middle and lower parts of the

watershed. There are also several regional offices of government ministries in the study area which have an interest in biodiversity, as noted in the following section.

2. The Accumulation of Western (European) Biodiversity Knowledge

An international symposium on biological diversity was held at the Royal British Columbia Museum (RBCM) in 1991, mostly dealing with B.C. The proceedings were published in 1993, entitled *Our Living Legacy* and edited by Fenger et al. The B.C. Ministry of Environment also produced a strategic plan in 1991, called *Environment 2001*; one of its sub-plans was a discussion paper on *Managing Wildlife to 2001*. In that detailed paper there was no mention of the term "biodiversity". Provincial activity in biodiversity thus dates from 1992, with a report by the Biodiversity Inventory Task Force of the Resources Inventory Committee (see bibliography by Ronalds 1992), although other activities related to biodiversity concerns had been ongoing for a number of decades.

A thorough review of B.C.'s biodiversity concerns was published in 1994, entitled *Biodiversity in British Columbia, Our Changing Environment*, edited by Harding and McCullum. The Provincial Wildlife Strategy to 2001, released in 1994, however, made maintaining biodiversity its first goal. The Provincial Wildlife Strategy had as two of its five key issues the adequate inventories of species, and an assessment of impacts on species or habitats at risk. These issues are of concern in our study area due to its biodiversity and the history of resource use and urban development. Knowledge of these issues has developed as part of a wide range of research, from soils and ecosystem classifications to particular studies on species/phyla to assessments of resource use impacts.

A classification system of soil landscapes had been devised for B.C. in the 1970s by Valentine et al (1978), with ecosystem units later delineated by Meidinger and Pojar (1991; see Demarchi in Campbell et al 1990, Vol. 1, 57-142), dividing the province into ecoprovinces, ecoregions and then ecosections. Reports on the Southern Interior Ecoprovince for the B.C. Ministries of Environment and Forests, where about one half of our study area lies, began being produced in 1988, including those on birds (Campbell et al; Ritcey et al), mammals (Stevens and

Lofts; Ritcey et al), and amphibians/reptiles (Orchard; Orchard and Harcombe). A biodiversity inventory, based both on ecoregions and biogeoclimatic ecosystem units was begun in the late 1980s in the South Okanagan by members of the Wildlife Branch, Ministry of Environment, Lands and Parks (see Harper et al 1993).

Part of the reason for this inventory is the threat from urban development and resource use to numerous endangered and threatened species in the South Okanagan. Species (and populations of species) with this status have been placed on the B.C. Provincial Red List (endangered or threatened); 64 wildlife species (not including fresh-water fishes) are on this list, with a further 87 on the Blue List (vulnerable); the CWS and the provincial Wildlife Branch are involved in the management of such species (see Stace-Smith et al 1980). In the South Okanagan, an area of high biodiversity, there are 12 mammal species, 20 birds, 4 reptiles and 1 amphibian that are either in the Red or Blue categories (Harper et al 1993). Data for such status reports comes from the national Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and from the provincial Conservation Data Center (CDC), established in 1991, as well as from the RBCM and on-site research (see Harcombe 1993; Munro 1993; Harcombe et al 1994).

In the Cariboo-Chilcotin region, a recent report by Hooper and Pitt (1995) details 9 wildlife species on the Red and 34 on the Blue lists, with both grassland and riparian habitats of concern, even though additional areas will be protected by CORE initiatives (Commission on Resources and Environment - see also Hooper and Savard 1991). These two regions, South Okanagan and Cariboo-Chilcotin, are featured because of their similarity to the South Thompson region of our study area. Many of the same threatened and vulnerable species occur here as well, yet less attention has been paid to this region. Urbanization and resource use are of equal concern, with pressures increasing in the lowland valleys, such as by ginseng production and outdoor recreation. Setting aside the Lac du Bois area from further development in the Kamloops LRMP (Land and Resource Management Plan) has helped, although it was previously managed by a Local Resource Use Plan (LRUP - see Enns and Ryder 1992).

Through B.C.'s Ecological Reserves program (B.C. Parks 1994) and the Protected Areas Strategy, the latter ongoing from 1992, an adequate system of protected areas is being developed in the 1990s so that a diversity of ecosystems are represented, defined by biogeoclimatic zones. The Kamloops LRMP and the Okanagan-Shuswap LRMP which began roundtable discussions in February 1996 will add more areas in the Shuswap basin. The lower zones have been under-represented in the past provincially (Harding and McCullum 1994a; Morrison and Turner 1994), particularly the Bunchgrass (BG) and Ponderosa Pine (PP) zones, of which only 1 per cent was protected prior to CORE (for the Cariboo-Chilcotin region) and Kamloop's LRMP initiatives. Although much of these zones are in private property or are Indian Reserves, and 90 per cent of the zones have been fragmented by roads (Harding and McCullum 1994b, 237), additional protected areas will help conserve a wider range of biodiversity. The PAS further considers the connectivity of representative ecosystems, so that "islands" of natural habitat can be linked to other areas in a system of protected areas.

To enable better-informed management in the future, a brief history of naturalist activities in the study area will be presented for each phylum, followed by a review of the present status of knowledge on the development of biodiversity knowledge (for primarily European-descent/Western peoples) per phylum, including selected species accounts. It must be remembered that having different data bases has made such estimations very difficult; the conclusion will point toward research gaps and potential strategies for filling those gaps by priority phylum/region.

2.1 Naturalist Activities in the Study Area

Because our case study area lies in an interior and rugged portion of B.C., there has been less attention to recording its natural diversity until the past half century as transportation networks improved, with most efforts only spanning the past twenty to thirty years. The first botanist to explore the region was David Douglas in 1833. Unfortunately, any specimens or notes that he made were lost. Douglas, who named the Ponderosa pine, identified many species in his journal of 1825-31 for the lower Columbia River that would have undoubtedly been extant in the Thompson-Shuswap area along the route he followed (Douglas 1914). Early ethnohistorical

accounts of the Shuswap Indians (Secwepemc) were recorded by Franz Boas (1890), George Dawson (1891) and James Teit (1909), which especially built an early knowledge base in ethnobotany. Dawson describes early modes of travel in the study area in the 1870s (see Cole and Lockner 1989); transportation networks were rudimentary until after World War Two, with the opening of provincial highways. Prior to that, there had been cart track "roads" from the mid-1800s (due to the gold rush), water transport via paddle wheelers from the late 1800s to 1940, a railroad from 1885, and a rudimentary road system for some auto traffic from the early 1900s (B.C. Ministry of Transportation and Highways 1980).

Attention for early ornithological and mammal research was focussed in B.C. primarily around the southwest coast, with secondary attention directed to the Okanagan and a few other regions, until almost the 1920s (see Laing 1979; Cannings et al 1987, 45-49; Corley-Smith 1989; Campbell et al 1990, Vol. 1, 15-44). There were some bird specimens collected in the South Thompson-Shuswap region in the 1890s by Kermode, Fannin and others (in RBCM collection), with specimens collected by Clark and Woods in the Kamloops area in 1913-14, Munro in the Shuswap area in 1915-17, McTaggart-Cowan in 1929-41 (in Cowan Vertebrate Museum collection at U.B.C.) and most others from the 1930s onwards. There is also a large collection of birds housed in the Cowan Museum from the Grindrod area (south of Sicamous) by Wynne's efforts from 1916-55. Similarly, Streator began mammal collecting in the Ashcroft-Kamloops area in 1894 as part of the United States biological survey (collections in the U.S. National Museum), while RBCM and Cowan Museum collections date from the early 1900s, with Spencer, McTaggart-Cowan, Guiguet, P.W. Martin, Racey and Ritcey responsible for obtaining most of the specimens; amphibian and reptile collections for these B.C. museums date from the 1930s.

Early province or region-wide accounts include those on <u>birds</u>: Fannin (1891, 1898 - B.C.), Brooks and Swarth (1925 - Birds of B.C.), Taverner (1926 - Birds of Western Canada), Munro (1931), Munro and McTaggart-Cowan (1947, revised 1974 - Birds of B.C.) and Godfrey (1966, 1986 - Birds of Canada); <u>mammals</u>: McTaggart-Cowan and Guiguet (1965, 1975); <u>amphibians</u>: Carl (1943 - B.C.); <u>reptiles</u>: Carl (1944 - B.C.); <u>fresh-water fishes</u>: Carl et al (1948,

1977 - B.C.); alien animals: Carl and Guiguet (1957 - B.C.); and, plants: Henry (1915 - southern B.C.), Anderson (1925 - trees and shrubs), Davidson et al (1926 - B.C. overview), Hardy (1946 - B.C. mushrooms), Eastham (1947 - southern B.C.), and Lyons (1952 - B.C. vascular plants). Many of these were RBCM publications.

Historical reviews of interest to our study area include those on mammals: Spalding (1990 - moose, 1992 - elk, both for B.C.); entomology: McLean (1986 - Kamloops Range Research Station 1928-85); agriculture: Ormsby (1939 - B.C.), Thomas (1976 - B.C. ranching 1858-96), and Wikeem and Lester (1992 - B.C. ranching); forestry: Pearse (1976 - B.C.), Marchak (1983 - B.C.), Gillis and Roach (1986 - B.C. 1912-1939), Wilson (1987-88 - B.C. 1935-85), Peel (1991 - B.C. Forest Resources Commission) and B.C. Ministry of Forests (1994, 267-289); and, fisheries (salmon): Pearse (1982, 1992), Meggs (1991), Roos (1991) and Hume (1994).

A Fish and Game Protection Association was formed in Kamloops in 1918. One of their main activities was making recommendations on closed seasons to permit breeding of game birds and animals, and to watch over the stocking of fishing lakes. For example, in 1927 a flock of bighorn sheep from Banff was released near Squilax in the hope of populating the area for hunting purposes. Whereas their group promoted the shooting of nuisance birds like crows (Balf 1981), amateur naturalists have also been active in the study area for decades, as confirmed through interviews with local naturalists in the Shuswap (Mary-Lou Tapson-Jones, Frank Kime) and Kamloops areas (Geoff Bodman, Rick Howie and Jack Gregson). Most activity has been oriented to birdwatching, with active birders representing only a handful of people in each area for the past 25 years. However, their activities have aided wildlife management locally, as described in the sub-section on birds.

2.2 Plants

As noted previously, there were early ethnobotany reports on the study area by explorers, naturalists and ethnographers. This region has also been part of Pacific Northwest botanical and naturalist studies from the 1920s (e.g. Abrams 1923; Anderson 1925), with several more recent ones of significance (e.g. Hitchcock et al 1955-69 - vascular plants; Hitchcock and Cronquist

1973; Kozloff 1978; Vitt et al 1988 - mosses, lichens and ferns; Lyons and Merilees 1995 - trees, shrubs and flowers). Since the earlier publications on B.C. (up to Lyons 1952), there have been several provincial guides to plants: Clark (1973 - wildflowers), Taylor and MacBryde (1977 - vascular plants), Warrington (1980 - aquatic plants), Burbridge (1989 - wildflowers), Brough (1990 - trees) and Douglas et al (1990-94 - vascular plants). The B.C. Forest Service has recently published a series of guides to the plants of B.C.: MacKinnon et al (1992 - Northern B.C.), Pojar and MacKinnon (1994 - Coastal B.C.) and Parish et al (1996 - Southern Interior). The Canadian Forest Service in Victoria, in conjunction with the B.C. Ministry of Forests, has also produced several guides to the fungi and forest diseases/pests that impact trees (e.g. Lowe 1977; Funk 1981).

The Royal B.C. Museum (RBCM) has published a series of publications on families of plants, with more recent ones having range maps per species: trees and shrubs (Garman 1934, 1973 - no maps); orchids (Szczawinski 1959, 1975 - maps in later edition); heather (Szczawinski 1962, 1975 - maps in later edition); grasses (Hubbard 1969 - no maps); common mosses (Schofield 1969, 1992 - maps in later edition); rose (Taylor 1973); lily (Taylor 1966, 1974 - maps in later edition); pea (Taylor 1974); figwort (Taylor 1974); catkin bearing plants (Brayshaw 1976); common mushrooms (Bandoni and Szczawinski 1976 - no maps); ferns and fern allies (Taylor 1956, 1979 - maps in later edition); sedges (Taylor 1983); and, sunflowers (Douglas 1982, 1995). There are an estimated 2850 species of vascular plants in B.C., as well as 1000 bryophytes (mosses and liverworts), 1600 lichens and over 10,000 species of fungi.

Because both the RBCM and UBC Herbarium plant collections are not yet completely categorized by geographic location per specimen, it is impossible to generate computer lists of plant species for the study area. A survey of threatened plant species by the CDC produced a list of 20 red-listed and another 20 blue-listed specimens from the study area (see appendix). Herbarium plant lists have been developed for this region by the Kamloops Forest District (from the mid-1930s) and the Shuswap Nation for ethnobotany (from the early 1990s). An ethnobotany was written on the adjacent Nicola Valley region by Turner et al (1991), and she and her colleagues are

in the process of compiling a second report for the Shuswap region, begun with Turner and Ignace (1990-94), in collaboration with several Secwepemc elders, including Mary Thomas, a Shuswap elder living in Enderby (Secwepemc Ethnobotany Project for the Secwepemc Cultural Education Society). The recent publication on Southern Interior plants by Parish et al (1996) builds on Ministry of Forests research for the region by Angove (1981 - Kamloops region), Mitchell and Green (1981 - ecosystems of Kamloops Forest Region), Angove and Bancroft (1983 - Southern Interior), and Lloyd et al (1990 - Kamloops Forest Region biogeoclimatic zones).

Naturalist activity in the study area has also produced local plant lists for the Shuswap region (naturalists at Shuswap Lake Provincial Park 1961-73; Tapson-Jones 1972 checklist), Paul Lake Provincial Park (Swift 1976 - includes bird list), Kamloops Forest Region (Lloyd 1989 - unpublished), upper Seymour River (Tapson-Jones and Crowley 1994 - unpublished) and McLaren (Niskonlith Lake late 1980s - unpublished). Specific studies on grassland vegetation has been ongoing in the Kamloops area from the mid-1930s at the Dominion Range Experimental Substation of Agriculture Canada (McLean 1986). Important publications that describe the plant species from these rangeland researchers include: Tisdale 1947 (grasslands), Tisdale and McLean 1957 (Douglas fir zone) and van Ryswyk et al 1966 (vegetation and soils). More recent publications on the Lac du Bois area are by Jakoy (1981 - soils), McLean (1982 - general guide), Lea and Vold (1985 - Dewdrop/Tranquille wildlife habitat) and Enns and Ryder (1992 - Lac du Bois biophysical habitat).

1. Introduced Plants

Researchers at the B.C. Ministry of Forests (Range Management) and the B.C. Ministry of Agriculture and Food are also implementing programs to control noxious weeds such as the diffuse knapweed, spotted knapweed, and hound's-tongue which cause problems to grazing animals. The former two out-compete native grasses and herbaceous leafy plants, and are most common in the Kamloops rangelands; the latter species is poisonous to domestic livestock, and can leave them covered in burrs. Other weeds such as thistles, toadflax, couch grass and cheatgrass are also a problem. Of concern to regional district and Ducks Unlimited staff, two aquatic plant species are

also being controlled in the region: purple loosestrife chokes out native species, while Eurasian water milfoil has colonized large areas of Shuswap Lake and is becoming established just outside the study area in Nicola Lake (see Newroth in Harding et al 1994).

2.3 Birds

Wildlife management has been ongoing in B.C. since the turn of the century. Annual Reports of the Provincial Fish and Game Warden have been published since 1905. However, the orientation of the Fish and Wildlife Branch (now called the Wildlife Branch) has been toward the management of game species, such as upland game birds, waterfowl and ungulates, and toward predator control, which previously included both carnivores and such birds as crows, ravens, jays, magpies, eagles, hawks and owls (in the 1920s and 30s - see Campell et al 1990, Vol. 1, 48). Changes in public attitudes toward wildlife were evident in the responses to the Proposed Wildlife Management Plan for B.C. (1979), with non-consumptive uses for wildlife identified (e.g. wildlife viewing, such as birdwatching), as was planning for preserving diversity (a regional ecosystem classification system was later devised) and more habitat enhancement (the Habitat Conservation Fund was started in 1981 - see Managing Wildlife to 2001). A preliminary non-game bird management plan was drafted by Munro and Peter (1981); populations of such endangered species as the peregrine falcon and (previously) threatened ones as the trumpeter swan were being managed jointly with the CWS from the 1970s. Other recovery programs for endangered species, such as the burrowing owl, were initiated in the early 1980s and later aided by the Recovery of Nationally Endangered Wildlife program (RENEW - 1988).

The CWS was involved in waterfowl census operations in B.C.'s interior from the mid-1960s, as part of the Canada Lands Inventory (CLI) for wildlife capability maps, as was the Wildlife Branch. Ducks Unlimited set up their provincial office in Kamloops in 1973; this later became one of their regional offices, with several habitat assessments for waterfowl conducted in the study area, and some enhancement projects initiated, such as at McQueen Lake and Isobel Lake above the Lac du Bois grasslands, at Chum Lake in the Turtle Valley near Chase, at the Salmon Arm foreshore on Shuswap Lake (from the late 1980s), and most recently at T'kumlups marsh on

the Kamloops Indian Reserve. Ecological Reserves have also been set up since the 1980s along McQueen Creek, at the Tranquille River foreshore and at Mara meadows above Mara Lake. And so, together with provincial parks in the study area and LRMP initiatives (through PAS), habitat is being both protected and restored for wildlife use.

There were a number of Provincial bird reports prior to the 1970s in B.C. (see earlier discussion). Guiguet produced 10 RBCM publications on various bird families from 1954 to 1983 (see Campbell et al 1990, Vol. 1, 21), and Beebe wrote an RBCM guide to the raptors in 1974 (falconiformes). However, it is difficult to access these records by geographic location, since range maps were often not included. The recent project by the RBCM and Environment Canada to produce four volumes on the birds of B.C. (Campbell et al 1990, Vol 1 & 2) has been much more accessible, as range maps of sightings, nest records, occurrences of rarities and other interesting notes are organized per species. The RBCM had earlier published two bibliographies on B.C. ornithology (Campbell et al 1979, 1988) which were instrumental in developing the birds of B.C. volumes.

Detailed accounts of bird species occurrence and distribution for the study area are present from 1916 with J.A. Munro's field notes, followed by the notes of Glenn Ryder (Celista - 1948), Patrick Martin (1951-59), Ed Beacham (Shuswap - 1946-71), Ralph Ritcey (1964-76) and Derek Beacham (Shuswap - 1970-73). The first comprehensive listings of birds became available through records being kept by naturalists at Shuswap Lake Provincial Park from 1961-73. A list of birds for the Paul Lake area was provided by Leckie (1970), and annotated records were kept for a number of species at Paul Lake Provincial Park in 1976 by P. Swift. Other bird surveys in the study area include: Kamloops Christmas Bird Count (from 1971); Shuswap Lake Christmas Bird Count (from 1972); Breeding Bird Surveys (Kamloops - irregularly from 1974, and annually from 1981; Adams Lake from 1989; and, Tappen-Salmon Arm from 1994); South Thompson River/Shuswap Swan Count (from 1974 - see Campbell et al 1990, Vol. 1, 254; Howie 1993); and, the Kamloops Bluebird Nest Box Survey (from 1980).

An RBCM review of its bird collection listed 148 species for the study area. The Shuswap Naturalists devised a checklist of birds in 1972 for the region from Sicamous and Enderby to the Adams Plateau, listing 244 species. An annotated list was then made up in 1973 for the same region by Richard Cannings, based at Shuswap Lake Provincial Park, with accounts of 168 species. There is also a checklist from the North Okanagan Naturalists that is focussed on the Vernon area, but includes Grindrod-Enderby-Mabel Lake. Tom Jacobson produced an annotated list for the birds of Kamloops in 1974; the boundaries for his region extended from the east side of Shuswap Lake to Cache Creek, and from the north side of Wells Gray Provincial Park to Merritt. His report became the basis for the Kamloops Naturalist Club checklist of birds, produced in 1978 and listing 269 species, of which 16 were accidental in occurrence.

The Shuswap checklist was revised most recently in 1983, listing 248 species. Since that time, another 8 species have been added to the list, bringing the total to 256, of which 17 are accidental; 2 others are listed as hypothetical (143 species have nested in the region). The Kamloops checklist was revised in 1994, with the region made much smaller (from Monte Creek in the east to Walhachin in the west, and from McLure in the north to just south of Merritt). The checklist now shows 295 species; 3 other species have since been added, bringing the total to 298, of which 18 are accidental - 3 other hypotheticals are listed (155 species have nested in the region).

When the two checklists are combined, although the boundaries go beyond our study area (on the Kamloops checklist: Knutsford south to Merritt and Kamloops Lake westward), 311 species are listed, of which 22 are accidental (173 species have nested in the region); a further 5 species are hypothetical. The RBCM and Cowan collections contain specimens for 191 of these species, with 148 species in the former and 164 in the latter; there is also a photo record of the canyon wren, accidental to Kamloops, in the RBCM.

The total for the study area of 311 species compares well to the 312 species listed for the Southern Interior Mountains ecoprovince (eastern Shuswap region) of which 184 are breeding species, and the 330 species for the Southern Interior ecoprovince of which 207 are breeding species (Campbell et al 1990, Vol. 1, 66). The Victoria bird checklist totals 331 species (139

species have nested in the region), of which 55 are accidental and 2 are extirpated (1989); Cannings et al (1987) list 303 of B.C.'s 448 bird species for the Okanagan Valley (193 species have nested in the region), of which 13 are accidental and 2 others extirpated; a further 21 hypothetical species are listed. And so, our study area has a similar diversity of bird species when compared to areas that have a similar size but have undergone more active birding in past decades.

A number of status reports on rare and/or localized bird species in B.C. have been produced by the Wildlife Branch in the past two years. Of interest to our study area are reports on the sharp-tailed grouse (Ritcey 1995), white-headed woodpecker (Cannings 1995c - accidental at Salmon Arm), Williamson's sapsucker (Cooper 1995), white-throated swift (Summers 1995), canyon wren (Cannings 1995a - one at Kamloops in 1968, RBCM photoduplicate file), sage thrasher (Cannings 1995b - casual at Kamloops) and yellow-breasted chat (Cannings 1995d - accidental at Kamloops and Shuswap Lake). Other reports of interest are on forest birds, with recent ones written by Morgan and Wetmore (1986 - riparian habitats), Keisker (1987 - cavity nesting) and Morgan et al (1989 - impacts of logging methods; 1991 - foraging behavior). Of concern as well are reports on threatened and endangered birds in B.C. (Cannings 1994), and songbirds in decline (Harding 1994b).

1. Water Birds

Three species are of interest: the western grebe, great blue heron and Eurasian wigeon. D.A. Munro (1954) reports nesting western grebes near our study area at Swan Lake,Vernon, with nests found from 1933 to 1951. The first recorded nesting colony (9 nests) in the study area was at Salmon Arm on Shuswap Lake in 1962, with 63 nests found in 1964 (Buffam 1964; Stirling 1964; Burger 1991). Up to 75 western grebes are found between April and October on Kamloops Lake, but no nest sites have been confirmed (Burger 1991). In annual breeding surveys from 1991-93, up to 290 adults and 65 young are present at Salmon Arm (Kime and Munro); a few Clark's grebes are observed each summer as well.

Great blue heron nesting colonies have been recorded at Shuswap River near Enderby (up to 20 nests from 1978 - Campbell et al 1990, Vol. 1, 239), and near Kamloops along Paul Creek

and east of Pinantan Lake (Howie - pers. comm.). Mark (1976) notes that such colonies in the southern interior are very restricted. Eurasian wigeon were not noted in the study area by Hasbrouck (1944), in a review of its North American status. Edgell (1984) did a further review of its status, as did Campbell et al (1990, Vol.1, 308-309). The earliest arrival of this species to the study area is listed by Jacobsen (1974) as January 1967; since then, it has become an irregular migrant to the region.

2. Game Birds

Releases of introduced game species include the ring-necked pheasant and chukar. The former was first released in 1923 at Kamloops (Annual Reports, Prov. Fish & Game Warden), with good populations established by the late 1940s in surrounding grasslands (P.W. Martin 1959 - monthly Fish & Wildlife Report). A further 265 birds were released near Kamloops in 1955, and good populations were established in the Salmon Arm area through releases in the mid-1950s (Campbell et al 1990, Vol. 2, 72). There were also 17 chukar released at Kamloops in 1950, with a total of 305 released there by 1955 (Campbell et al 1990, Vol. 2, 68); Demarchi (1962), referring to data from P.W. Martin, tallies 878 Chukar released in the Thompson Valley from 1950-55. A stable population of chukar is still resident around Kamloops. The sharp-tailed grouse maintains a small population in the Lac du Bois grasslands (Ritcey 1995), while the gray partridge, another introduced species, is scarce and irregular.

3. Raptors

Peregrine falcon are transient in the study area in small numbers, while the prairie falcon have nested occasionally, noted in 1962 near Pritchard (Ryder - unpublished notes) and again in 1975 (Campbell et al 1990, Vol. 2, 62). Peregrine and prairie falcon surveys were conducted for the Fish and Wildlife Branch by Nelson (1967) and by van Drimmelen and Sullivan (1976); no active falcon eyries were located then or in a recent survey (Hooper pers. comm.). The flammulated owl was reported near Kamloops in 1935 by Williams and Spencer (1942); after that time it was thought to be a very rare summer resident. Then in the late 1980s additional research by Howie and Ritcey (1987) found the owls to be uncommon near Kamloops in appropriate habitat

(i.e. interior Douglas fir forest of over 80 years old); subsequent research by van Woudenberg (1992) confirmed that status. After becoming extirpated due to agricultural activities, burrowing owls were reintroduced to the southern interior from 1983 (Dunbar 1983; Munro et al 1984; Campbell et al 1990, Vol. 2, 370); locally, there has been a captive-breeding program at the Kamloops Wildlife Park from the early 1990s, for release into grasslands both north and south of the city. The program has met with partial success to date, with a few owls returning to the breeding grounds each spring.

4. Passerines

Two species are profiled due to their interspecific interactions in the study area: the European starling and mountain bluebird. Starlings were first recorded in B.C. in early 1947 at Oliver; by late 1949 flocks had been seen at Vernon and Okanagan Landing (Racey 1950; Cannings et al 1987, 319). By 1952 P. W. Martin recorded starlings at Monte Creek, and in the fall of 1954 flocks of 30 to 40 birds were present in Kamloops (Myres 1958, 21-22). Their numbers had increased to "hundreds of individuals" in Kamloops by 1955, with peak counts of 600-800 over Martin's house in September 1957 (Myres 1958, 24); they were also observed to return to the area in late February 1957 "with the robins and bluebirds" (Huxley in Myres 1958, 25). Cannings et al (1987, 397) report that the most common breeding bird on surveys from 1972-84 around Lavington in the Coldstream Valley was the starling (mean of 120, almost double the next most common species).

As starlings began to over-winter, they were able to out-compete bluebirds for preferred nesting sites. The response in the Kamloops area was for the Kamloops Naturalist Club to establish a number of bluebird nest boxes along outlying country roads. In 1980 there were 161 boxes, which accounted for 251 mountain bluebird eggs, resulting in 137 fledged young; by 1995 there were 358 boxes, with 273 mountain bluebird nests (this includes a second nesting for 80 of the pairs) containing a total of 1301 eggs and 886 fledged young (McLaren - unpublished notes). There were also 14 western bluebird nests, which resulted in 79 eggs and 59 young. And so,

through the diligence and concern of local naturalists, bluebird numbers have rebounded in the Kamloops area following the introduction of the starling over 40 years ago.

2.4 Mammals

There are 143 species of mammals recorded for B.C. Of this number, at least 64 species have been recorded in the study area (RBCM and Cowan specimens - 55 species - 38 in the former and 44 in the latter; 9 others noted in Stevens and Lofts 1988), with the western small-footed myotis also noted by a CDC survey for nearby Walhachin. This number of species may seem low because the provincial total includes marine species.

Mammals have already been partially discussed above under general notes on biodiversity and material on the Wildlife Branch. Additional sources for general mammal information include: Ingles (1965 - Pacific States); Banfield (1974 - Canada); Kritzman (1977 - Pacific Northwest small mammals); Schmidt and Gilbert (1978 - North American big game); Chapman and Feldhammer (1983 - North America); and, van Zyll de Jong (1983, 1985 - Canadian marsupials, insectivores and bats). Other B.C. overviews of mammal species and/or groups have also been published, such as: Sugden (1961 - bighorn sheep); Banci (1982 - wolverines); Rahme et al (1995 - badger). New guides to mammals in B.C. are being produced by the RBCM, with the first one by Nagorsen and Brigham (1993 - bats), insectivores/marsupials in preparation and others to follow.

Preliminary management plans were also drawn up for several groups and/or species by staff of the Wildlife Branch from 1979-85; these included plans for the grizzly bear (revised 1995), black bear, deer, elk, moose, marten, wolf, bighorn sheep, cougar, coyote, lynx, bobcat, muskrat, fox, raccoon, squirrel, beaver and mustelids. Of interest for our study area, Willms et al (1975, 1976) discussed the feeding habits of mule deer near Kamloops (see also Ketter 1994); Antifeau reviewed the significance of arboreal lichen to mountain caribou (1987); Holroyd et al have examined the bats of the dry interior (1994); and, Firman et al further surveyed the bats of the West Shuswap/South Thompson region (1994), since several species occur here, particularly at a roost in Squilax. Most attention of Wildlife Branch staff is still directed toward the big game

species that are commonly hunted in the study area: mule deer, white-tailed deer, moose, bighorn sheep and black bear.

The management of predators, particularly wolves and coyotes, has become a political issue lately, as has fur trapping. When historic records are compared for beaver and marten furs brought to the Kamloops trading post (1826-56; see Johnson 1937) with contemporary records for the Kamloops-Shuswap region (1985-93), current beaver returns are about one-tenth the historic numbers, while marten returns are similar. However, the early records probably included furs from a much larger region (i.e. brought to the trading post), and low values for furs recently have reduced trapping effort. Recent records also indicate that the other species that are commonly trapped include: squirrels, weasels, bobcat, lynx, muskrat and coyote, with fox, fisher, raccoon, wolf, wolverine and otter occasionally caught.

Local naturalist information on mammals seems to be much less available than that on birds. Glenn Ryder noted a wealth of mammal activity in his field notes for the Celista region in January-June 1948. There are also some notes from the naturalists at Shuswap Lake Provincial Park (1962-73) and Paul Lake Provincial Park (1976). The field notes by Fish and Wildlife biologists in the study area, such as by J.A. Munro, P.W. Martin and Ralph Ritcey, focus on game animals, and have not been compiled by species or geographic location. Smaller and more obscure mammals seem to have been neglected by both naturalists and biologists until most recently, with Nagorsen reviewing the status of endangered species in B.C. (1994).

1. Moose and Elk

Spalding, in historical reviews of the moose (1990) and elk (1992) in B.C., notes that elk have seldom been recorded in the region, with a few reports from the Thompson Plateau in the 1800s and Adams Lake area around 1900. There were 25 elk transplanted to the north end of Adams Lake in 1933; this herd increased to 400 within a decade, but declined to only 20 animals by 1976. Low (pers. comm.) attributes the low numbers of elk to winterkill in the 1880s. Moose were first noted by the Eden brothers at the east end of Watch Lake in 1903 (Low pers. comm.), and were again recorded on the Bonaparte Plateau from 1909-1913; their numbers likely have

increased in the study area since then because of the increase in "early successional stages of forest vegetation" due to both forest fires and logging (Spalding 1990, 8). Geoff Bodman, a sheep rancher and naturalist who has lived east of Pinantan Lake since 1965, has a number of historic photographs of hunters with moose kills from the local region, dating from the 1920s-30s era.

2.5 Fishes

Information of the freshwater fishes of the study area is less complete than that of birds and mammals, except for the trout and salmon game fishes. There are only 71 species of such fishes in B.C., including 22 species living in both fresh and salt water during their life cycles (Harding and McCullum 1994, 1). According to Carl et al (1977) there are 25 species in our study area, with the CDC also listing the chiselmouth as a blue list species for Mara Lake; 7 of the less common species are in the RBCM collection. General references to freshwater fishes were published by McPhail and Lindsey (1970 - northwestern Canada and Alaska) and by Scott and Crossman (1973 - Canada); earlier sources include: Evermann et al (1907 - Canadian checklist); and Schrenkeisen (1938 - North America).

Historic notes on B.C. stocks begin with information on game fish, such as Green (1891 - salmon); the Bureau of Provincial Information (1928 - game fish); and, Lindsey et al (1956 - sports fish). More thorough reviews of B.C.'s freshwater fishes are those by Dymond (1936), Carl et al (1948, 1977), Carl (1950) and Northcote and Burwash (1992); Cannings (1992), McPhail (1993), and Peden (1994) detail threats to these species. There are recent books on the biology of the Pacific salmon (Groot and Margolis 1991) and the trout of western North America (Behnke 1992). Information of the water quality of the study area can be found in Brown (1989 - South Thompson watershed); Mah et al (1989 - pulp mill pollution); Dorcey (1991, 1992 - Fraser River Basin); and, Sigma Engineering (1991 - Thompson-Nicola).

The first Federal fisheries regulations were passed in 1878, outlawing fishing practices such as the use of nets, fences and basket traps used by the Shuswap, although these regulations were not strictly enforced until a distinction was made between the aboriginal food fishery and commercial fishing in 1894 (Ward 1983, 17). Alexander Fortune (1910) in his reminiscences

noted that the Shuswap River near Sicamous was barred to salmon migration due to a fish weir. Provincial interest, including that of the Wildlife Branch, focussed on game fishes. Notes on Pacific salmon date from the 1890s, and for trout from the turn of the century. Salmon were historically caught in large numbers along the coast, which caused numerous canneries to be built. However, with the Hell's Gate slide of 1913, there was a decline in the annual sockeye salmon run from an estimated 37 million fish to only 1.5 million (FRAP 1995 - sockeye); since then, a series of fish ladders were built at Hell's Gate (1946-92) and a salmonid enhancement program was launched in 1977 to rebuild stocks through habitat restoration and hatcheries. Similarly, trout stocks have been enhanced through stocking in lakes from the turn of the century, with native freshwater fishes sometimes eradicated by fisheries managers in the process (McPhail 1993; Peden 1994)

1. Salmon

Because the Hell's Gate slide occurred in mid-summer, the fall Adams Lake run of sockeye salmon was spared. This run then became key in restoring Fraser River sockeye to commercially harvestable levels (see International Pacific Salmon Fisheries Commission 1974; Hume 1994). With removal of the Adams Lake splash dam for forestry (in place from 1908-22), and the building of fish ladders, the salmon run rose to 15 million in 1958; similar numbers have been maintained until recent times, when issues of climate change and overfishing reduced the runs in 1994-95 (FRAP 1995). A spawning channel was built at the mouth of the Adams River in 1992, and other runs on the upper Adams River, Salmon River and Shuswap River are being restored as well. The Shuswap River is also famous for the spawning grounds east of Enderby, where coho, spring and sockeye salmon return each year. The Kingfisher Environmental Interpretive Center, located about 25 km east of Enderby on the Shuswap River near Mabel Lake, raises about 250,000 salmon and trout annually.

Research and management of the Pacific salmon was the responsibility of the Pacific Salmon Fisheries Commission from 1937-85 (see history of it by Roos 1991), with this responsibility transferred to DFO in 1985. Several important scientific reports on the salmon

resource of interest to our study area have been produced, including: Thompson (1945 - Hell's Gate); Ward (1956 - South Thompson River sockeye); Gilhousen (1960 - Fraser River sockeye); Ward and Larkin (1964 - Adams River sockeye); Ellis (1977 - salmon management); Brown et al (1979 - salmon stream inventory: Kamloops district); Graham and Russell (1979 - Shuswap Lake salmonids); Russell et al (1980 - Shuswap Lake salmonids); Knapp et al (1982 - Thompson River Basin salmon); Shepherd et al (1986 - salmonid enhancement); Williams et al (1989 - Shuswap sockeye); Northcote and Larkin (1989 - Fraser River salmon); Henderson (1991 - Fraser River Basin salmon); DFO (1992 - fish habitat inventory: Clearwater district); Jantz (1992 - Shuswap River kokanee); and, FRAP (1995 - chinook salmon, sockeye salmon).

Recent studies on Pacific salmon fisheries include those of Pearce (1982, 1992), Fraser (1995), Walters (1995) and Levy et al (1996). Native fishing in the area continues their traditional food fishery. In 1986 Casimir Felix, a local elder, demonstrated fishing to other band members on the Shuswap River near Hupel where spearing was conducted. More details on local fishery initiatives, including co-management with the Secwepemc peoples, will be presented at the end of Section 3.

2. Trout

Much local interest has been focussed on the Kamloops trout, a variety of rainbow trout, although lake trout occurs in Shuswap Lake, dolly varden is found in most rivers and brook trout has been stocked in a few lakes. Kamloops trout was first described in 1892 by Jordan of Stanford University, who received some specimens from Kamloops to identify (see Favrholdt 1984). Research on the local populations of rainbow trout dates from the 1930s, with a number of studies by fisheries biologists at Paul Lake near Kamloops. These studies include those by: Mottley (1932 - Kamloops district; 1933 - Paul Creek and Paul Lake; 1940 - Paul Lake); Larkin et al (1950 - Paul Lake); Clemens (1951 - Kamloops trout); Larkin and Smith (1953 - Paul Lake); Larkin (1954 - Kamloops trout introductions); and, Crossman (1957 - Paul Lake). Mottley's research proved conclusively that what Jordan had called Kamloops trout was genetically a rainbow trout, differing only to the extent that its habitat differed, with their size depending on the

environment. A Kamloops trout transferred from Paul Lake to a barren lake near Lumby resulted in a 24 pound fish within four years (Favrholdt 1984).

There has been a lot of activity of late in both salmonid and trout habitat enhancement. Reports on these activities include: Fisheries Branch (1972 - stream improvement: Paul Creek and Niskonlith Creek); Cartwright (1979 - Thompson steelhead); Grinton et al (1994 - Scotch Creek); Murdoch and Nishiura (1995 - Seymour River watershed); and, Miles (1995 - Salmon River). There are also stocking reports of lakes in the study area at the Wildlife Branch, dating from 1908 and 1909 (Pinantan Lake and Paul Lake), with most introductions being rainbow trout; there have been some introductions at Adams Lake, Shuswap Lake and Niskonlith Lake, with a few into streams as well. In 1922 the Dominion Department of Fisheries built a hatchery on Paul Lake to take advantage of the spawning runs on Paul Creek; however, this hatchery did not last. Productivity studies of local lakes include those by Rawson (1934) and a recent survey initiated by the TNRD (1983) that was extended by the Ministry of Forests and Wildlife Branch in the late 1980s to include recreational capability.

2.6 Reptiles and Amphibians

There are only 19 species of reptiles and another 20 amphibians recorded for B.C. (Harding and McCullum 1994a, 1). Within the study area, 10 species of reptiles and 7 amphibians have been noted, with the Great Basin spadefoot toad the only threatened species (blue-listed). The RBCM and Cowan collections contain specimens of 6 reptile and 5 amphibian species. RBCM handbooks were produced by Carl in 1943 (amphibians) and 1944 (reptiles); these were updated in 1984 by Green and Campbell (amphibians), and by Gregory and Campbell (reptiles), with Green (1992) further revising the amphibians guide. Earlier general guides include: Pope (1939 - turtles of North America); Oliver (1955 - amphibians and reptiles of North America); Stebbins (1966 - western reptiles and amphibians); Leviton (1970 - reptiles and amphibians of North America); and, Smith (1978 - amphibians of North America). Other useful references are those by Cook (1984, 1991 - Canadian amphibians and reptiles) and by Orchard (1984, 1994 - B.C. amphibians and reptiles). A status report on the rattlesnake in B.C. has been produced for

the Wildlife Branch by Charland et al (1993), with others available on the gopher snake and the rare sharp-tailed snake. Local naturalists have also provided some records for the Shuswap region (Shuswap Lake Provincial Park 1961-73; Paul Lake Provincial Park: Swift 1976).

2.7 Insects (and other invertebrates)

There are an estimated 35,000 species of insects in B.C., of which 15,000 have been identified, with an equal number of other invertebrate species. General field guides to the insects of North America are useful to an extent, but review only a limited number of species (e.g. Borror and White 1970). Entomologists in North America tend to work with guides to groups of insects, such as those for two-winged flies (*diptera* - McAlpine 1981); mosquitoes (Carpenter and LaCasse 1955); beetles (Hatch 1953-62, for the Pacific Northwest; Bousquet 1991, for Canada and Alaska); bark beetles (*cerambycidae* - Lindsey 1962); bark lice (*psocoptera* - Mockford 1993); and, forest butterflies and moths (*lepidoptera* - Prentice 1961-65, for Canada). Merrit and Cummins (1978) describe the aquatic insects, and guides to butterflies are available (Scott 1986), including for western North America (Tilden and Smith 1986). Agriculture Canada has also produced a series of 22 guides to the insects and arachnids at the Biosystematics Research Institute, ongoing since 1983.

There have been a few guides produced to describe families of insects in B.C., such as the RBCM publications on mosquitoes by Curtis (1967) and by Belton (1983), as well as one on dragonflies by Cannings and Stuart (1977). Guppy and Shepard (1994) review the status of B.C.'s butterflies and moths, and Smith in Harding et al (1994) notes the problems caused by insect and other micro-organism introductions in B.C. Cannings (1994) has recently discussed endangered terrestrial and freshwater invertebrates. Soil flora and fauna diversity is discussed by Chanway (1993) and Marshall (1993), respectively.

Forest pests have been studied in the region by the staff of the B.C. Ministry of Forests and Forestry Canada; a guide to forest pest organisms in B.C. is available by Finck et al (1982, 1989; see also Wood and van Sickle 1994), as are a number of forest pest leaflets for B.C. through FRDA II (Forest Resource Development Agreement). There are large collections of invertebrates

at Forestry Canada in Victoria (600,000 specimens) and at the RBCM, with many of these from our study area. However, a list of species of insects cannot be compiled geographically due to problems in data bases.

In the study area, the Livestock Insects Laboratory was established at Mission Flats in Kamloops in 1928 by Agriculture Canada under Eric Hearle, who made early field and taxonomic studies of grasshoppers, ticks and mosquitoes. By 1930 Hearle had set up mosquito control programs at Kamloops and Kelowna. In 1935 G.J. Spencer took charge of the Kamloops Laboratory, assisted by Jack Gregson and Ted Moillet, who continued the work started under Hearle. Gregson later became internationally known for his work on tick-borne paralysis. A Field Crop Insects Laboratory was built at Mission Flats in 1938, and in 1949 a Household and Medical Entomology Unit was established at the Kamloops laboratory. Researchers initiated studies on biting flies, fleas, cattle grubs and cattle lice, with notable naturalist/scientists such as Ian McTaggart Cowan conducting research (McLean 1986). Insects that affect crops, such as tuber flea beetles, cut-worms, root maggots, and carrot seed-crop pests, were studied from 1939 to 1971, when all activities of the Entomology Laboratory were terminated (McLean 1986). Topping and Scudder (1977) have also done research on the aquatic insects of Lac du Bois ponds.

3. An Overview of Resource Use in the Study Area

Impacts on the study area's biodiversity become more evident when an overview of resource utilization by (primarily) Western peoples is presented, covering the past century or so. A few notes will first be provided on each of the following: rangelands (and agriculture), forestry (and fire suppression) and outdoor recreation (and the non-consumptive use of wildlife); fisheries were reviewed earlier (salmonids), with trout considered under outdoor recreation. B.C. government policy and procedures on these three topics is summarized in a 1994 Ministry of Forests publication, entitled *Forest, Range & Recreation Resource Analysis*. Recent governmental changes to resource management and land use planning that can help maintain the region's biodiversity are considered at the close of this section. The Shuswap people's traditional approach

to resource use was reviewed in Section 1; recent resource management initiatives are reviewed in the last sub-section of this section.

3.1 Western (European) Approaches to Resource Management

3.1.1 Rangelands (and agriculture)

Wheat was being grown at Kamloops by as early as 1840, with some domesticated animals present to supply the Hudson's Bay Company at Fort Kamloops. Many foreign grasses were also introduced by the fur traders who needed extra forage for horses and cattle. Due to the Cariboo gold rush of 1861, large numbers of cattle and sheep were brought into the B.C. interior, causing the first land ordinances to allow the occupation of 160 acre units (Thomas 1976, 38), with ranchers using the open range as well. Aboriginal peoples were prohibited from preempting lands from the mid-1860s, and were instead allocated small reserves. The Cattle Range Act of 1876, amended in 1888, provided for the use of Crown lands as cattle commons (Thomas, 151-152). Construction of the CPR in the 1880s continued a local demand for meat; by the late 1880s all of the best grazing lands had been pre-empted (Wikeem and Lester 1992). Bunch grass became overgrazed by the late nineteenth century, allowing the spread of big sagebrush. However, it was not until 1889 that ranchers in the Kamloops district formed a "cooperative and protective organization", and this was oriented to the improvement of breeding stock (Thomas, 155). Large tracts of land were held by a small group of settlers (Thomas, 172-173), and it was only due to pressure from increased immigration to the interior that government regulation of the open range became an issue by the turn of the century.

Nearly all the early settlers, even if they later developed large ranches, started with small mixed farms. Grain provided flour for home consumption; mills were established at Tranquille (just west of Kamloops), Kamloops, and Enderby. Orchards were started early at Tranquille and at Shuswap Lake (Chase) with apples dominant; early agricultural fairs displayed about 50 varieties (Salmon Arm and Shuswap Lake Agricultural Association 1921). Whitfield Chase grew currants, raspberries and strawberries. Sheep raising was done by some. In 1897 an agricultural association was formed in Kamloops, and in 1900 a Farmer's Institute was organized.

Experimentation ensued, with alfalfa tried as early as 1910. In 1907 the Kamloops District Fruitgrower's Association was also formed (Balf 1981).

Between 1905 and 1912 large numbers of homesteaders arrived to settle on the local arid hills around Kamloops and tried dry-land farming. Occasionally good crops of wheat were obtained, but by the 1920s grasshopper plagues brought on by droughts forced many settlers to turn to cattle ranching or leave altogether (McLaren and Cartwright 1981; Neave 1972; Rosehill Farmers Institute 1984). Orchard developments were even attempted on lands surrounding some of the larger lakes that were within the Railway Belt (Salmon Arm Board of Trade 1912). In 1910 at the north end of Shuswap Lake a company called Seymour Arm Fruitlands planned an agricultural settlement on 6500 acres near the original 1865 townsite (Seymour Arm Fruitlands Limited 1910). Although initial results were promising, the outbreak of the First World War followed by a severe frost in 1916 destroyed the young fruit trees and ended this experiment (The Bradleys 1970). A similar experiment at Walhachin, west of our study area towards Cache Creek, also ended in failure.

Overgrazing was noted on the rangelands near Kamloops by the turn of the century, prompting the Cattle Ranges Act in 1919. Some activity in the study area toward reducing grazing impacts was evident by the 1930s, such as the establishment of the Dominion Range Experiment Station at Kamloops. However, due to the intervention of World War Two, rangelands were not effectively managed, even though the principles of proper rangeland management were available from the 1930s and local research was ongoing from the late 1940s. It took another thirty years before public concern led to adequate governmental response, when rangelands became an important part of the Ministry of Forests mandate in the new Forests Act of 1978; the establishment of the Integrated Resource Branch of MOF did not come until a decade later (Horton 1994; Wikeem and Lester 1994).

Most of the grasslands of the study area lie within the Interior Douglas fir zone, with only limited areas of bunchgrass and ponderosa pine (Tisdale 1950; Tisdale et al 1954; McLean et al 1964; McLean and Marchand 1968); the lowest zones have also been heavily impacted by

urbanization, linear corridor development (e.g. roads, railways and power lines) and conversion to other agricultural uses, such as market produce (in the 1930s and 40s) and ginseng since 1982. Ginseng thrives in the interior rainshadow region, since the summertime hot, dry weather minimizes the spread of fungi and root rot. The crop takes five years to grow, with the land being unusable for ginseng for upwards of two decades afterwards (Schreiner 1994).

Weed infestation is a problem in the grasslands (Wikeem and Lester 1994; Wikeem et al 1993), particularly knapweed, as is encroachment by big sagebrush due to both overgrazing and fire suppression. There are problems of competition between domesticated and wild foraging species (see Willms et al 1976), and due to a lack of prescribed burning in the Douglas fir zone (Wikeem and Strang 1983; Low and Ritcey 1988; Low 1988), even though this is a fire climax zone, with lodgepole pine being a seral species. Management is also needed to protect the riparian zones of both creeks and marshes from overgrazing, affecting both fishes and breeding birds (Morgan and Lashmar 1993; van Woudenberg 1994; Hooper and Pitt 1995). Effects on some grassland wildlife species have been notable in the western part of the study area, including burrowing owl, sharp-tailed grouse, long-billed curlew, and yellow badger, with recovery/protection plans in place for the owl and grouse.

Five-year forest and range programs were developed by the MOF in 1990 and again in 1995. As part of the Forest Practices Code, guidelines for Range Management and for Riparian Management were produced in late 1995. The FRAP developed the Interior Wetlands Program in 1992 to protect and restore these important habitats for biodiversity, with Ducks Unlimited and the B.C. Conservation Foundation doing resource inventories and wetland rehabilitation projects. The Kamloops LRMP also protected more rangelands in the Lac du Bois area in 1995, and the Okanagan-Shuswap may protect other areas in the near future.

3.1.2 Forestry

Much of B.C.'s early forestry activity was focussed on the coastal temperate forests. In the study area Interior Douglas-fir and ponderosa pine were exploited from the 1860s, with the first sawmill located at the mouth of the Tranquille River in the 1870s. A large mill was built at

Kamloops in 1878, relying on timber floated down the South Thompson from Shuswap Lake. The demand in the 1880s for railroad ties caused the depletion of accessible Douglas-fir at the upper border of the grasslands, with ponderosa pine used to a lesser extent for other purposes such as fencing. The Adams River Lumber Company was formed in 1907, leading to damage to the lower Adams River from a splash dam. Small portable mills were available from the 1920s, allowing further exploitation of mid-elevation forests, including one at Lac du Bois. Forestry on Crown land at higher elevations became the norm after the Second World War; however, it was only in 1972 that interior production exceeded that of the coast (Edgell 1987).

Licenses in the study area were initially controlled through the Railway Belt in the 1880s, or through an amendment to the Land Act in 1887, which allowed the granting of a Special Timber License (Gillis and Roach 1986). The Timber Measurement Act of 1905-06 fostered the B.C. Government's move into "active forest exploitation", and "culminated in the creation of the Forest Branch of the British Columbia Department of Lands" (Gillis and Roach, 81-82). A Royal Commission on Timber and Forestry was held in 1909-11, bringing ideas forward on conservation and the need for a Chief Forester (Gillis and Roach, 85-86). Harvey MacMillan was appointed to this position in 1911, and he was aided in his duties by the Forest Act of 1912, requiring annual reports; however, the previous system of forest licenses was not abolished. Sustained yield management was introduced in 1928, and the Railway Belt lands were taken over by the Province in 1930 (Gillis and Roach, 95-97). It required two additional Royal Commissions by Sloan in 1944 and 1956 to move the Province toward better management of its forest resources, with the Pearse Commission of 1975 pressuring the government further in that direction (Gillis and Roach 1986; Wilson 1987-88). This process was completed by the Forest Resources Commission 1991 report which strongly recommended changes to forest practices to consider other forest values, including what was later termed biodiversity (Peel 1991).

An adequate inventory of B.C.'s forested land base was not begun until 1968, with the upper biogeoclimatic zones not surveyed locally until the mid-1970s. Similarly, fire suppression operations for the region, based out of Kamloops, were not widely utilized until the mid-1960s,

becoming more important as logging extended into the upper elevations. In a recent review of B.C. forestry by Harding (1994a, 249), he refers to Pitt and Hooper's estimate that fire suppression has contributed to an encroachment of Douglas-fir into Ponderosa pine stands, as well as an advance of forests into the grasslands, absorbing up to 30 per cent of this zone. Lodgepole pine was not considered an important resource until later in the 1970s when markets were developed for its use (Edgell 1987). And so, it has only been in the last decade that logging became extensive throughout the study area.

However, because of the capacity of local sawmills in the study area, which now number over a dozen, negative impacts on the forest resource soon became evident. In the late 1980s a small group of environmentalists formed the Shuswap Eco-watch, producing three newsletters primarily concerned with forestry issues. Jim Cooperman, an environmentalist from the Lee Creek area of Shuswap Lake has been a leader in this group, producing as well the B.C. Environmental Network (BCEN) newsletter quarterly from his home for the past few years. This group recently challenged Ministry of Forests (MOF) estimates of timber supply for the Okanagan Timber Supply Area, desiring a reduction in the Annual Allowable Cut (AAC); however, with the release of the new AAC for 1996, there was no reduction (a review of the Kamloops Timber Supply Area is ongoing). Cooperman has also been a member of the Kamloops LRMP, and is now on the Okanagan-Shuswap LRMP; he hopes that Anstey Arm-Hunakwa Lake in the north Shuswap area will become a protected area through this process, as it contains almost untouched watersheds and a grove of ancient and very large western red cedar, a rare ecosystem in B.C.'s interior.

The MOF has faced pressure to reform its forestry practices in recent years from both international and domestic quarters. The United States, through the threat of countervailing duties, caused the B.C. Government to introduce in 1988 the requirement for Pre-harvest Silviculture Prescriptions (PHSP's) from forest companies, including adequate reforestation plans. Closer to home, due to both the evident impacts of clearcut logging on salmon capability and to demonstrations in 1993 concerning Clayoquot Sound, members of the public clamoured for better forest management practices. International attention to these issues had the potential to affect the

foreign markets for B.C.'s forest products. The Forest Practices Code was developed in 1993-95 to address shortcomings in these practices, particularly for clear cut logging and the disruption of water courses. British Columbia's forestry rules have been recently compared with those of other jurisdictions by both the Westland Resource Group (1995) and by Haddock and Barratt-Brown of the Sierra Legal Defence Fund and Natural Resources Defense Council (1995). Biodiversity, range management and riparian guidelines were produced in B.C. by late 1995, directing Ministry of Forests staff and forest companies to preserve biodiversity where possible.

An old growth strategy has been in development during the 1990s as well, to preserve old growth both in protected areas and through ecosystem management. Of particular interest is the flammulated owl, which could be considered an indicator species for the interior Douglas-fir zone; unless the structure of the ecosystem is maintained through uneven aged management of the forest and through patch or strip logging at the landscape level, the numbers of this small owl will diminish (van Woudenberg 1994). Local foresters are concerned that controversy over the management of this species does not match that of the spotted owl in the northwestern United States.

Because of public pressure and local/provincial initiatives, therefore, a greater degree of biodiversity may yet be retained in the study area in the face of continued resource use for forestry. Integrated management is being implemented more, especially due to the LRMP process, and the public is more aware of other values in the forest besides wood products. However, vigilance is required to ensure that adequate protection of biodiversity occurs - a future issue may well be forest fragmentation, for example - so that the Forest Practices Code and its guidelines are revised (and enforced) as needed. Research through Forest Renewal B.C. funding will be helpful in this regard, with projects already funded in the Sicamous Creek and Opax Mountain areas.

3.1.3 Outdoor Recreation

Tourism has become a major industry in B.C., with much of the attraction B.C.'s "Supernatural" qualities. Revenues for 1989 were $3.9 billion provincially, with these increasing to almost $6.5 billion by 1995. With tourism predicted to increase for the next decade faster than

any other industry, it may soon rival forestry as B.C.'s number one industry (whose revenues annually total approximately $11-13 billion). In the "High Country" region around Kamloops, tourism revenues are approaching $200 million per year. Much of the local tourism interest is directed toward outdoor recreation, with numerous activities possible. Besides several provincial parks in the area and popular activities such as hunting, fishing, skiing and boating, there are now such varied pursuits as white-water rafting, heli-skiing, cattle drives, houseboating, cultural/heritage tours (including with the Shuswap Nation), guide outfitters that specialize in ecotourism, and even balloon trips.

And so, the visitor has an array of options in the region, in all seasons. Kamloops recently held the international fly fishing championships, is noted for its annual cattle drive in July, and is called the "tournament capital" for the number of sports events drawn to its excellent facilities (e.g. 1993 Canada Summer Games; 1995 Memorial Cup ice hockey championships; 1996 Brier curling championships). Many of the people who come to the area for such events, or watch them on television, are then encouraged to sample the outdoor environments of the wider region.

However, there are potential problems associated with such popularity. Curious hikers may disrupt birds and mammals during the nesting/breeding season, and boaters can cause damage to both shoreline habitats and nesting waterbirds by the wake and pollution from their boats. Boaters also help spread noxious weeds, such as the Eurasian milfoil, and bait fish to other lake systems. Almost half of British Columbians are now involved in nature study and wildlife viewing, making this a more common activity than hunting (Wildlife Branch 1991, 24; Ministry of Forests 1994, 179). In the study area there are wildlife viewing sites at the lower Adams River, Lac du Bois and Tranquille meadows.

A 1994 review of ecotourism in B.C. and Alberta for their respective provincial governments noted its increasing importance to hinterland economies (HLA Consultants/ARA Consulting Group). As a response to both the demand and to the fragility of the resource, more parts of B.C. have been designated wilderness areas recently. Although these do not occur in most of our study area, the area north of Shuswap Lake is predominantly rugged mountain wilderness

with little road access. Much of this region may be preserved in this state through the Okanagan-Shuswap LRMP process.

3.2 Aboriginal Approaches to Resource Management

In a historical perspective, the traditional Shuswap way of life utilized a specific range of resources, with most effort devoted to gathering plant species for a variety of uses, supplemented by the hunting of ungulates, waterfowl and salmonids in particular. Other resources were used to a lesser extent; hence, knowledge of such species was more limited. For example, there are several warbler species in the study area during the summer months, as well as difficult to identify *empidonax* flycatchers; knowledge of their habits, let alone identification to species level, was likely of less importance as these small birds were not a prime food source. The activities of other species that are still poorly understood using Western scientific methods, such as insects and soil micro-organisms, would have been of even lesser consequence. However, various songbirds were known for their relationship to other woodland resources, showing the significance of ecological relationships to the Shuswap way of life (Mary Thomas, pers. comm.).

This traditional way of life was disrupted by a variety of forces brought on by European colonization. These forces have included: disease epidemics that decimated the population, so that less of the knowledge base could be passed on easily; missionary activity and residential schools, important because both spirituality and language (in their oral culture) were affected; the pre-emption of hunting, fishing and gathering grounds through the Indian Reserve system; and the development of the welfare state. This latter force caused difficulty through the adoption of children by non-natives (Johnston 1983; MacDonald 1985; Sinclair et al 1991), and through the provision of a different economy that tended to supplant hunting and gathering (Mary Thomas, pers. comm.).

Despite the aforementioned issues for the Shuswap peoples, there have been many recent iniatives to restore and broaden their traditional knowledge base. A "rediscovery program" is available for aboriginal peoples to recover their connections to both culture and nature. More formal educational programs include: language training (public schools and adults); university

degrees, in conjunction with Simon Fraser University, through the SCES (Secwepemc Cultural Educational Society - see annual reports 1989-94); and, field schools to teach archaeology and ethnobotany, based on research projects (e.g. Turner and Ignace 1990-94) and courses offered at both the University College of the Cariboo, Kamloops campus, and Okanagan University College, Salmon Arm campus (with the help of Mary Thomas). The Secwepemc Museum on the Kamloops Reserve has also been developing its indoor exhibits and outdoor heritage park in the 1990s, educating both visitors and aboriginal peoples. Several histories and community profiles from First Nations perspectives have been produced recently, including those by Matthew (1986); Shuswap Nation Tribal Council (1989); Coffey et al (1990); Jack et al (1993); and the Secwepemc Cultural Education Society (1993).

There are several environmental programs in operation at the Shuswap Nation Tribal Council (SNTC) on the Kamloops Reserve, as well as at various Shuswap bands. Resource management is guided by the Shuswap Nation Tribal Council's 1995 policy, entitled "Secwepemc Interests in Land Use and Resource Management", made necessary due to pending land claim submissions (Doug Brown, pers. comm.). Watershed management planning models have been developed for fisheries (Moore 1991) and for an array of natural resources (M'Gonigle et al 1992) for the SNTC. There is also a Native Resource Management Program, which may see further development through Forest Renewal B.C. funding, toward restoration and intensive silviculture practices in forestry (Thomas 1995; Horswill, pers. comm.). Fisheries is an important concern, particularly for salmon management, with salmonid enhancement programs established or proposed at several locations, often in conjunction with DFO or FRAP activities. These include hatcheries, such as on the Deadman River west of the study area by the Skeetchestn Band (see Harvey 1995), and restoration projects, such as on the Salmon River (Shuswap Nation Fisheries Commission 1994-95). The Adams Lake Band recently changed the focus of their land management to promote and preserve wildlife and waterfowl habitat along the foreshore of Shuswap Lake. The Band also owns and operates two campgrounds, Sandy Point and Pierre's Point on Shuswap Lake. The Little Shuswap Band operates the Quaaout Lodge, which opened

recently near Squilax on Little Shuswap Lake. It hosts conferences and helps promote an aboriginal viewpoint.

Key to an understanding of aboriginal resource use is an awareness that this is a living culture that is tied to the surrounding land for both sustenance and spiritual identity. Indigenous peoples have been managing natural resources for millenia; the "natural" ecosystems that were encountered by European explorers had already often been altered through such practices as controlled burning (Deneven 1992). Whereas some believe that, given better technology, the indigenous peoples would have exploited the land and its wildlife beyond recovery, this eventuality is unlikely due to an environmental ethic that respected the earth. As such, these peoples practiced beliefs akin to Leopold's (1949) statements concerning a "land ethic", where people are citizens of a land community.

And so, the maintenance of biodiversity from an aboriginal perspective involves not just principles of sustainability that maintain economic viability, but also an ethic that gives moral value to nature. Similarly, the protection of biodiversity involves preserving local knowledge that is in the service of the community, both the natural and human community together.

4. Conclusion

The accumulation of knowledge related to biodiversity was seen to parallel the development of societal needs for natural resources. As is still often the case, colonists to the region had little knowledge about the environment. Both through design and accident, many resident species were negatively affected in the study area, while new species were introduced to disastrous effect, such as the starling, knapweed and Eurasian milfoil. As Western peoples became dominant in the study area an interesting pattern developed. Initially there was unhindered resource exploitation, which soon went beyond the carrying capacity of the land. Then there was a bureaucratic, regulatory response, often of a belated nature and, at first, ineffective. After continued evidence of resource abuse, coupled with public protest, regulations were tightened and enforced. A substantial lag effect was evident between the time of initial concerns about the resource to the implementation of effective regulation and concern for ecological processes. The final stage is still developing, and

encompasses a vision for the future, with programs being sketched out in the 1990s for sustainable development through the federal Green Plan, B.C.'s *Environment 2001*, national and provincial roundtables on the environment, the Fraser Basin Management Program, and Forest Renewal B.C. And so, resource management that causes less environmental impact is only now in the process of being implemented.

This pattern first occurred in the study area with cattle grazing. It took provincial legislation, the development of a local research station, public pressure and then the attention of both governmental resource managers and concerned ranchers to finally begin to apply the principles of proper range management, almost a century after the issue was identified. Biodiversity knowledge of a type was available prior to this application, being made more extensive and ecological in scope in the past twenty years. Concerns about riparian zones and interior wetlands continue, with programs now in place toward protecting such areas.

The next issue on a wide scale was that of forestry. Again, major impacts occurred first in the late 1800s to lowland forests, with threats to entire forest ecosystems evident in the past two decades as forestry operations extended to higher elevations and technology improved. These threats have come from: overcutting the forest base; fire suppression in fire climax forests (and adjacent grasslands); poor forest practices; and, more recently, concerns about forest fragmentation toward retaining the integrity of forest ecosystems. These problems are <u>in addition</u> to natural events, such as forest fires, pest and disease infestation and climate change. Governmental responses have likewise come recently, due to much public pressure and mounting evidence of problems. The Forest Practices Code (and its guidelines), Forest Renewal B.C., LRMP processes and the Old Growth Strategy together should make a difference in conserving biodiversity, if these programs are fully implemented and then monitored/adjusted for effectiveness.

The issue of the future is outdoor recreation. Its potential as an income generator is enormous, particularly as the traditional resource industries diminish in importance. Its impact on the environment is evident at times, but more subtle influences need to be determined, particularly on wildlife. And yet, through ecotourism and cultural tours an informal environmental education

occurs which could lead toward fewer negative impacts in the future, while providing an enjoyable and memorable experience. The profile of resource "use" for this sector of the economy is therefore much different than that of traditional sectors, which shows how far (Western) relationships with the environment have come in the local region over the past century.

What these examples of resource use in the study area demonstrate is that knowledge of biodiversity was of little concern to most Western peoples managing and using the resources in the region until the resource in question was itself threatened. Only scientific knowledge of the species directly related to resource extraction (e.g. commercial tree species; game fishes, birds and mammals) was gathered at first. This was done per resource sector until more recently, with little thought as to effects on other resources or to the ecosystem in general. Efforts are now underway to broaden this knowledge base, toward an overview of biodiversity, particularly in forest ecosystems, but much research is still needed, as is attention to local knowledge sources.

Little is known about non-vascular plants, insects or soil micro-organisms, yet these species are vital to nutrient cycling. Also, although we may have species lists for the vertebrates, only rudimentary knowledge is available on the populations of some species (e.g. ungulates and game birds), and even less on the interaction between species in ecological communities, particularly long term trends for such communities. Research by those involved in Forest Renewal B.C. projects, such as at Sicamous Creek and Opax Mountain, will be helpful, but a program that investigates grassland, riparian and aquatic environments is needed as well. This should occur on a watershed scale per ecoregion to sample environments both across biogeoclimatic zones and across time, so that base data is both accummulated and integrated on biodiversity; knowledge on how such environments tie into larger global systems must also be gathered.

Even as this knowledge base is building, action is needed to protect biodiversity. This can come about both through formal processes, such as PAS, as implemented through CORE (now completed) and LRMP initiatives, and through developing a wide base of public support for such protection. This latter effort will have a more gradual effect, and can come about through such realms as the school system and public information programs. The emphasis should be on

educating the public on local biodiversity knowledge, bioregional connections and the significance of cultivating a sense of place (see Hay 1988, 1990; Andruss et al 1990), all of which would help toward develop an informed citizenry that cares about the environment. Enhanced cross-cultural understanding with aboriginal peoples would play an important role in such education.

Much interest has been expressed in Canada this decade about the need to learn about traditional models of sustainable development from aboriginal peoples. Recent books describe both the environmental history of aboriginal relationships with the land (Gaffield and Gaffield 1995; Wolf-Keddie 1995) and resource management from an aboriginal perspective (Notzke 1994). Other sources indicate a general need for sustainable knowledge (Murdoch and Clark 1994); for a consideration of the significance of traditional knowledge (Clark 1990; Richardson 1993); and for an assessment of the benefits to be gained by combining the best attributes of a scientific approach with that of an aboriginal approach, toward both understanding about and protecting the environment (Dene Cultural Institute 1995).

There is thus a need to improve the public's knowledge base and to apply that knowledge in a timely manner. No time is left for a lag effect in the development and application of knowledge: vulnerable resources need to be protected now. Utilizing the principles of risk assessment, the protection of biodiverse habitats, not just individual species, needs to be done prior to establishing absolute certainty on the status of biodiversity, using a precautionary approach.

There is currently a question in B.C. whether 12 per cent of each biogeoclimatic zone can or should be protected. This is especially an issue for low elevation, biodiverse zones where other interests such as forestry, ranching or urban development are at the fore. Adequately sized parks and efforts to increase stewardship on private or municipal lands are necessary, as are corridors between parks, buffer zones around them, stewardship initiatives with private land owners (including aboriginal peoples) and international co-operation for migratory species. Without such a system of protected areas, there is not enough breadth in the system to allow for error in the preservation of biodiversity. Our own resource and recreation activities, as well as urban

development, need to be moderated in sensitive habitats such as lowland valleys. The adverse effects from such issues as global warming may be lessened if enough natural habitat remains to absorb some of the impact.

It must be remembered that the entirety of the region's biodiversity is protected more through an effective environmental ethic than through a system of formal parks, enforcement mechanisms and regulations; the latter system tends to "sacrifice" areas outside park boundaries, whereas the former regards nature differently, as part of our community; there is a sacred regard for nature. With an environmental ethic in place it therefore becomes immoral to harm nature and its ecological systems: economic development occurs in a way that causes the least amount of damage to a region's ecology and biodiversity.

Because the Shuswap-South Thompson encompasses such biodiverse habitats and has been neglected to date in comparison to efforts within the Okanagan and southwestern B.C., it is recommended that a strategy to conserve and protect biodiversity in this region be implemented in the near future, to include:

1. a system of protected areas, as well as buffer zones, to protect representative ecosystems;
2. an inventory of biodiversity to identify threatened and endangered species (and genetic races);
3. the development and integration of both local knowledge (particularly aboriginal knowledge) and scientific knowledge on biodiversity; and,
4. the development and implementation of a public education program toward both the conservation of biodiversity and the development of an environmental ethic.

These latter two points have also been recently identified as crucial to protecting biodiversity by both the federal government (Biodiversity Convention Office 1995) and the Fraser Basin Management Program 1996, 61).

As we gain a greater awareness of potential threats to biodiversity, we are realizing that elders and experts in both aboriginal and modern cultures have much to teach us about ecological

inter-relationships and the means to protect the environment, both regulatory and ethical. It is in environmental ethics that Western society requires advances. Otherwise, the problems of the past will likely be repeated in the future, with the environment sacrificed to economic expedience. A greater move toward the co-management of natural areas with aboriginal peoples could permit the cross-fertilization of knowledge bases and practices to enable sustainability, including ethical concerns. The remaining question is whether or not we will learn our lessons to prevent further damage to the rich biodiversity of both this study area and beyond. Since biodiversity is of global importance, this question must be answered in a timely fashion by actions that conserve nature, of which we are a part.

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Section	Species	Common Name
Tree	Abies amabilis	amabilis fir
Tree	Abies grandis	grand fir
Tree	Abies lasiocarpa	subalpine fir
Tree	Betula	
Tree	Betula papyrifera	paper birch
Tree	CORNUS NUTTALLII	
Tree	Larix lyallii	alpine larch
Tree	Larix occidentalis	western larch
Tree	Picea engelmannii	Engelmann spruce
Tree	Picea glauca	white spruce
Tree	Picea glauca x engelmannii	hybrid white spruce
Tree	Picea mariana	black spruce
Tree	Pinus albicaulis	whitebark pine
Tree	Pinus contorta var. latifolia	lodgepole pine
Tree	Pinus flexilis	limber pine
Tree	Pinus monticola	western white pine
Tree	Pinus ponderosa	ponderosa pine/yellow pine
Tree	Populus balsamifera	black cottonwood
Tree	POPULUS BALSAMIFERA SSP. TRICHOCARPA	
Tree	Populus tremuloides	trembling aspen
Tree	Pseudotsuga menziesii	interior Douglas-fir
Tree	Thuja plicata	western redcedar
Tree	Tsuga heterophylla	western hemlock
Tree	Tsuga mertensiana	mountain hemlock
Shrub	Acer glabrum	Douglas maple
Shrub	Alnus crispa	Sitka alder
Shrub	ALNUS INCANA SSP. TENUIFOLIA	
Shrub	ALNUS RUBRA	
Shrub	Alnus tenufolia	mountain alder
Shrub	ALNUS VIRIDIS SSP. FRUTICOSA	
Shrub	ALNUS VIRIDIS SSP. SINUATA	
Shrub	AMBLYSTEGIUM SERPENS	
Shrub	Amelanchier alnifolia	saskatoon
Shrub	Arctostaphylos uva-ursi	kinnikinnick
Shrub	Artemisia tridentata	big sagebrush
Shrub	Artemisia tridentata	Vasey's big sagebrush
Shrub	ARTEMISIA TRIDENTATA SSP. VASEYANA	
Shrub	Artemisia tripartita	threetip sagebrush
Shrub	Betula glandulosa	scrub birch
Shrub	Cassiope mertensiana	white mountain-heather
Shrub	Cassiope tetragona	four-angled mountain-heather
Shrub	Ceanothus sanguineus	redstem ceanothus
Shrub	Ceanothus velutinus	snowbrush
Shrub	Chimaphila umbellata	prince's pine
Shrub	Chrysothamnus nauseosus	common rabbit-brush
Shrub	Chrysothamnus viscidiflorus	green rabbit-brush
Shrub	CLADOTHAMNUS PYROLIFLORUIS	
Shrub	CLEMATIS OCCIDENTALIS SSP. GROSSESERRATA	
Shrub	Conspectus	
Shrub	Conspectus	
Shrub	CORNUS SERICEA	
Shrub	Cornus stolonifera	red-osier dogwood
Shrub	Corylus cornuta	beaked hazelnut
Shrub	CORYLUS CORNUTA SSP. CALIFORNICA	
Shrub	Crataegus columbiana	red hawthorn
Shrub	Crataegus douglasii	black hawthorn
Shrub	Elaeagnus commutata	wolf-willow
Shrub	Empetrum nigrum	crowberry
Shrub	Gaultheria hispidula	creeping-snowberry
Shrub	Gaultheria humifusa	alpine-wintergreen
Shrub	Gaultheria ovatifolia	western tea-berry
Shrub	Holodiscus discolor	ocean-spray
Shrub	Juniperus communis	common juniper
Shrub	JUNIPERUS COMMUNIS SSP. ALPINA	
Shrub	Juniperus scopulorum	Rocky Mountain juniper
Shrub	Kalmia microphylla	bog-laurel
Shrub	KOELERIA MACRANTHA	
Shrub	Ledum glandulosum	trapper's tea
Shrub	Ledum groenlandicum	Labrador tea
Shrub	Linnaea borealis	twinflower
Shrub	Lonicera ciliosa	western trumpet honeysuckle
Shrub	Lonicera dioica	red honeysuckle
Shrub	Lonicera involucrata	black twinberry
Shrub	Lonicera utahensis	Utah honeysuckle
Shrub	Mahonia aquifolium	tall Oregon-grape
Shrub	Mahonia nervosa	dull oregon-grape
Shrub	Menziesia ferruginea	false azalea

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Section	Species	Common Name
Shrub	Oplopanax horridus	devil's club
Shrub	Paxistima myrsinites	falsebox
Shrub	Penstemon fruticosus	
Shrub	Philadelphus lewisii	mock-orange
Shrub	Phyllodoce glanduliflora	yellow mountain-heather
Shrub	Phyllodoce empetriformis	pink mountain-heather
Shrub	Physocarpus malvaceus	ninebark
Shrub	Potentilla fruticosa	shrubby cinquefoil
Shrub	Prunus emarginata	bitter cherry
Shrub	Prunus pensylvanica	pin cherry
Shrub	Prunus virginiana	choke cherry
Shrub	Purshia tridentata	antelope-brush
Shrub	Rhamnus purshiana	cascara
Shrub	Rhododendron albiflorum	white-flowered rhododendron
Shrub	Rhus glabra	sumac
Shrub	Rhus radicans	poison-ivy
Shrub	Ribes bracteosum	stink current
Shrub	Ribes cereum	squaw currant
Shrub	Ribes glandulosum	skunk currant
Shrub	Ribes hudsonianum	wild black currant
Shrub	Ribes lacustre	black gooseberry
Shrub	Ribes laxiflorum	trailing black currant
Shrub	Ribes oxyacanthoides	northern gooseberry
Shrub	Ribes viscosissimum	sticky currant
Shrub	Rosa acicularis	pricky rose
Shrub	Rosa gymnocarpa	baldhip rose
Shrub	Rosa nutkana	Nootka rose
Shrub	Rosa woodsii	prairie rose
Shrub	Rubus arcticus	dwarf nagoonberry
Shrub	Rubus idaeus	red raspberry
Shrub	Rubus parviflorus	thimbleberry
Shrub	Rubus pedatus	five-leaved bramble
Shrub	Rubus pubescens	trailing raspberry
Shrub	Rubus spectabilis	salmonberry
Shrub	SALIX AMYGDALOIDES	
Shrub	Salix arctica	arctic willow
Shrub	Salix barclayi	Barclay's willow
Shrub	Salix barrattiana	Barratt's willow
Shrub	Salix bebbiana	Bebb's willow
Shrub	Salix brachycarpa	short-fruited willow
Shrub	SALIX CANDIDA	
Shrub	Salix exigua	coyote willow
Shrub	Salix geyeriana	Geyer's willow
Shrub	Salix glauca	grey-leaved willow
Shrub	Salix hastata var farrae	Farr's willow
Shrub	SALIX MACCALLIANA	
Shrub	SALIX MACKENZIEANA	
Shrub	Salix planifolia	tea-leaved willow
Shrub	SALIX PSEUDOMONTICOLA	
Shrub	Salix reticulata	netted willow
Shrub	Salix scouleriana	Scouler's willow
Shrub	Salix sitchensis	Sitka willow
Shrub	Sambucus cerulea	blue eldeberry
Shrub	Sambucus racemosa	red elderberry
Shrub	SENECIO CYMBALARIOIDES	
Shrub	Shepherdia canadensis	soopolallie
Shrub	Sorbus scopulina	western mountain-ash
Shrub	Sorbus sitchensis	Sitka mountain-ash
Shrub	SORBUS SITCHENSIS SSP. GRAYI	
Shrub	Spiraea betulifolia	birch-leaved spirea
Shrub	Spiraea densiflora	subalpine spirea
Shrub	Spiraea douglasii	hardhack
Shrub	Spiraea pyramidata	pyramid spirea
Shrub	Symphoricarpos albus	common snowberry
Shrub	SYMPHORICARPOS MOLLIS	
Shrub	Symphoricarpos occidentalis	western snowberry
Shrub	Taxus brevifolia	westen yew
Shrub	TETRADYMIA CANESCENS	
Shrub	Vaccinium alaskaense	Alaskan blueberry
Shrub	Vaccinium caespitosum	dwarf blueberry
Shrub	Vaccinium deliciosum	blue-leaved blueberry
Shrub	Vaccinium gobulare	blue huckleberry
Shrub	Vaccinium membranaceum	black huckleberry
Shrub	Vaccinium myrtilloides	velvet-leaved blueberry
Shrub	Vaccinium myrtillus	
Shrub	Vaccinium ovalifolium	oval-leaved blueberry
Shrub	Vaccinium oxycoccos	bog cranberry
Shrub	Vaccinium parvifolium	red huckleberry

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Section	Species	Common Name
Shrub	Vaccinium scoparium	grouseberry
Shrub	Vaccinium uliginosum	bog blueberry
Shrub	Viburnum edule	highbush-cranberry
Shrub	Viburnum opulus	wild guelder-rose
Herb	Achillea millefolium	yarrow
Herb	Aconitum columbianum	Columbian monkshood
Herb	Aconitum delphiniifolium	mountain monkshood
Herb	Actaea rubra	baneberry
Herb	Adenocaulon bicolor	pathfinder
Herb	Adiantum pedatum	maidenhair fern
Herb	Agoseris aurantiaca	orange agoseris
Herb	Agoseris glauca var daycephala	short-beaked agoseris
Herb	Agoseris lackswitzii	
Herb	Agropyron cristatum	crested wheatgrass
Herb	AGROPYRON PAUCIFLORUM	
Herb	Agropyron repens	quackgrass
Herb	AGROPYRON SMITHII	
Herb	Agropyron spicatum	bluebunch wheatgrass
Herb	Agropyron trachycaulum	slender wheatgrass
Herb	Agrostis alba	redtop
Herb	Agrostis scabra	hair bentgrass
Herb	Agrostis stolonifera	creeping bentgrass
Herb	AGROSTIS THURBERIANA	
Herb	Allium cernuum	nodding onion
Herb	Allium schoenoprasum	wild chives
Herb	ALLOTROPA VIRGATA	
Herb	ALYSSUM ALYSSOIDES	
Herb	Amerorchis rotundifolia	round-leaved orchis
Herb	Amsinckia intermedia	common fiddleneck
Herb	Amsinckia meniesii	small-flowered fiddleneck
Herb	Anaphalis margaritacea	pearly everlasting
Herb	Androsace septentrionalis	fairy candelabra
Herb	ANEMONE DRUMMONDII	
Herb	Anemone multifida	cut-leaf anemone
Herb	Anemone occidentalis	western pasqueflower
Herb	Anemone parviflora	northern anemone
Herb	Anemone patens	prairie crocus
Herb	Angelica arguta	sharptooth angelica
Herb	Angelica genuflexa	kneeling angelica
Herb	Antennaria alpina var media	alpine pussytoes
Herb	Antennaria dimorpha	low pussytoes
Herb	Antennaria lanata	woolly pussytoes
Herb	ANTENNARIA LUZULOIDES	
Herb	Antennaria microphylla	rosy pussytoes
Herb	Antennaria neglecta	field pussytoes
Herb	ANTENNARIA PARVIFOLIA	
Herb	Antennaria pulcherrima	showy pussytoes
Herb	ANTENNARIA PULCHERRIMA SSP. ANAPHALOIDES	
Herb	Antennaria racemosa	racemose pussytoes
Herb	Antennaria umbrinella	umber pussytoes
Herb	Apocynum androsaemifolium	spreading dogbane
Herb	Apocynum cannabinum	hemp dogbane
Herb	Aquilegia flavescens	yellow columbine
Herb	Aquilegia formosa	red columbine
Herb	ARABIS DIVARICARPA	
Herb	Arabis drummondii	Drummonds rockcress
Herb	Arabis glabra	Tower mustard
Herb	ARABIS HIRSUTA	
Herb	Arabis holboellii	Holboell's rockcress
Herb	ARABIS HOLBOELLII VAR. RETROFRACTA	
Herb	Arabis lyalii	Lyall's rockcress
Herb	ARABIS LYALLII	
Herb	Arabis microphylla	littleleaf rockcress
Herb	Arabis nuttallii	Nuttall's rockcress
Herb	ARABIS SPARSIFLORA	
Herb	Aralia nudicaulis	wild sarsaparilla
Herb	Arceuthobium americanum	western dwarf mistletoe
Herb	Arctium lappa	great burdock-intoduced
Herb	Arctium minus	common burdock
Herb	Arenaria capillaris	thread-leaved sandwort
Herb	ARENARIA CAPILLARIS SSP. AMERICANA	
Herb	Arenaria serpyllifolia	thyme-leaved sandwort
Herb	Aristida longiseta	red three-awn
Herb	Arnica amplexicaulis	streambank arnica
Herb	Arnica chamissonis	meadow arnica
Herb	Arnica cordifolia	heart-leaved arnica
Herb	ARNICA DIVERSIFOLIA	

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Section	Species	Common Name
Herb	Arnica fulgens	orange arnica
Herb	Arnica gracilis	high mountain arnica
Herb	Arnica latifolia	mountain arnica
Herb	Arnica parryi	Parry's arnica
Herb	ARTEMISIA ARCTICA SSP ARCTICA	
Herb	Artemisia campestris	northern wormwood
Herb	ARTEMISIA DRACUNCULUS	
Herb	Artemisia frigida	pasture sage
Herb	Artemisia ludoviciana	western mugwort
Herb	ARTEMISIA LUDOVICIANA SSP. CANDICANS	
Herb	Artemisia michauxiana	Michaux's mugwort
Herb	Artemisia norvegica	mountain sagewort
Herb	Aruncus dioicus	goatsbeard
Herb	Asarum caudatum	wild ginger
Herb	Asclepias ovalifolia	oval-leaf milkweed
Herb	Asclepias speciosa	showy milkweed
Herb	Asparagus officinalis	garden asparagus
Herb	ASPLENIUM TRICHOMANES	
Herb	ASTER BOREALIS	
Herb	ASTER CAMPESTRIS	
Herb	Aster ciliolatus	fringed aster
Herb	Aster conspicuus	showy aster
Herb	ASTER ENGELMANNII	
Herb	Aster ericoides spp. pansus	tufted white prairie aster
Herb	Aster falcatus	little grey aster
Herb	Aster foliaceus	leafy aster
Herb	Aster laevis	smooth aster
Herb	Aster occidentalis	western mountain aster
Herb	Aster subspicatus	Douglas's aster
Herb	Astragalus agrestis	field milk-vetch
Herb	Astragalus alpinus	alpine milk-vetch
Herb	Astragalus americanus	American milk-vetch
Herb	ASTRAGALUS BECKWITHII	
Herb	Astragalus canadensis	Canada milk-vetch
Herb	Astragalus collinus	hillside milk-vetch
Herb	ASTRAGALUS FILIPES	
Herb	Astragalus miser	timber milk-vetch
Herb	Astragalus purshii	woollypod milk-vetch
Herb	Astragalus robbinsii	Robbin's milk-vetch
Herb	Astragalus tenellus	pulse milk-vetch
Herb	Athyrium distentifolium	alpine lady fern
Herb	Athyrium filix-femina	lady fern
Herb	Balsamorhiza sagittata	arrow-leaved balsamroot
Herb	Blechnum spicant	deer fern
Herb	Botrychium lunaria	moonwort
Herb	Botrychium mingansense	Mingan moonwort
Herb	Botrychium multifidum	leathery grape fern
Herb	Botrychium pinnatum (boreale)	northwestern moonwort
Herb	Botrychium virginianum	rattlesnake fern
Herb	Brassica campestris	field mustard
Herb	Brodiaea douglasii	Douglas' brodiaea
Herb	Brodiaea coronaria	harvest brodiaea
Herb	Bromus anomalus	nodding brome
Herb	BROMUS CARINATUS VAR. LINEARIS	
Herb	Bromus ciliatus	fringed brome
Herb	Bromus inermis var inermis	smooth brome
Herb	Bromus inermis var pumpellianus	
Herb	BROMUS MOLLIS	
Herb	Bromus tectorum	cheatgrass
Herb	Bromus vulgaris	Columbia brome
Herb	Calamagrostis canadensis	bluejoint
Herb	Calamagrostis purpurascens	purple reedgrass
Herb	Calamagrostis rubescens	pinegrass
Herb	CALAMAGROSTIS SCRIBNERI	
Herb	Calochortus apiculatus	threespot mariposa lily
Herb	Calochortus lyallii	Lyall's mariposa lily
Herb	Calochortus macrocarpus	sagebrush mariposa lily
Herb	Caltha leptosepala	white marsh-marigold
Herb	CALYPOGEJA INTEGRISTIPULA	
Herb	Calypso bulbosa	fairyslipper
Herb	Camelina microcarpa	little-podded falseflax
Herb	Campanula lasiocarpa	mountain harebell
Herb	Campanula rotundifolia	common harebell
Herb	Campanula uniflora	dwarf arctic harebell
Herb	Capsella bursa-pastoris	shepherd's purse
Herb	CARDAMINE CORDIFOLIA	
Herb	Cardamine oligosperma	little western bitter-cress
Herb	Cardamine pennsylvanica	Pennsylvanian bitter-cress

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Section	Species	Common Name
Herb	Carex exsiccata	inflated sedge
Herb	Carex paupercula	poor sedge
Herb	Carex pyrenaica	Pyrenean sedge
Herb	CAREX AENEA	
Herb	Carex albonigra	two-toned sedge
Herb	Carex aquatilis	water sedge
Herb	Carex atherodes	awned sedge
Herb	Carex athrostachya	slender-beaked sedge
Herb	Carex atrosquama	
Herb	Carex bebbii	Bebb's sedge
Herb	Carex bipartita	two-parted sedge
Herb	CAREX BRUNNESCENS SSP. PACIFICA	
Herb	Carex concinna	low northern sedge
Herb	Carex concinnoides	northwestern sedge
Herb	Carex crawfordii	Crawford's sedge
Herb	Carex deweyana	Dewey's sedge
Herb	Carex disperma	soft-leaved sedge
Herb	Carex douglasii	Douglas' sedge
Herb	Carex eleocharis	narrow-leaved sedge
Herb	CAREX FILIFOLIA	
Herb	Carex flava	yellow sedge
Herb	CAREX HOODII	
Herb	CAREX ILLOTA	
Herb	CAREX INTERIOR	
Herb	CAREX LAEVICULMIS	
Herb	Carex lanuginosa	woolly sedge
Herb	Carex lasiocarpa	slender sedge
Herb	CAREX LENTICULARIS	
Herb	CAREX LEPTALEA	
Herb	Carex limosa	shore sedge
Herb	CAREX LIMOSA	
Herb	Carex loliacea	ryegrass sedge
Herb	Carex macrochaeta	large-awned sedge
Herb	Carex media	alpine sedge
Herb	CAREX MERTENSII	
Herb	Carex nardina	spikenard sedge
Herb	Carex nigricans	black alpine sedge
Herb	Carex obtusata	blunt sedge
Herb	CAREX PAUCIFLORA	
Herb	CAREX PAYSONIS	
Herb	Carex peckii	Peck's sedge
Herb	Carex pensylvanica	long-stoloned sedge
Herb	Carex petasata	pasture sedge
Herb	Carex phaeocephala	dunhead sedge
Herb	Carex podocarpa	graceful mountain sedge
Herb	CAREX PRAECEPTORUM	
Herb	Carex praegracilis	clustered field sedge
Herb	Carex praticola	meadow sedge
Herb	CAREX RAYNOLDSII	
Herb	Carex richardsonii	Richardson's sedge
Herb	Carex rossii	Ross' sedge
Herb	Carex rostrata	beaked sedge
Herb	Carex scirpoidea	single-spike sedge
Herb	CAREX SCOPULORUM	
Herb	Carex siccata(foena)	hay sedge
Herb	Carex sitchensis	Sitka sedge
Herb	Carex spectabilis	showy sedge
Herb	Carex synchnocephala	many-headed sedge
Herb	Carex viridula	green sedge
Herb	CASTILLEJA CERVINA	
Herb	Castilleja hispida	harsh paintbrush
Herb	CASTILLEJA LUTESCENS	
Herb	Castilleja miniata	common red paintbrush
Herb	Castilleja parviflora	small-flowered paintbrush
Herb	Castilleja rhexifolia	alpine paintbrush
Herb	Castilleja thompsonii	Thompson's paintbrush
Herb	Centaurea diffusa	diffuse knapweed
Herb	Centaurea maculosa	spotted knapweed
Herb	Cerastium arvense	field chickweed
Herb	Cerastium beeringianum	Bering chickweed
Herb	Cerastium fontanum	mouse-ear chickweed
Herb	Chaenactis alpina	alpine false yarrow
Herb	Chaenactis douglasii	hoary false yarrow
Herb	Chenopodium album	lambsquarters
Herb	Chenopodium capitatum	strawberry-blite
Herb	Chenopodium rubrum	red goosefoot
Herb	CHRYSOSPLENIUM TETRANDUM	
Herb	Cichorium intybus	chicory

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Section	Species	Common Name
Herb	Cicuta bulbifera	bulbous water-hemlock
Herb	Cicuta douglasii	Douglas water-hemlock
Herb	Cinna latifolia	nodding wood-reed
Herb	Circaea alpina	enchanter's nightshade
Herb	CIRCAEA ALPINA SSP. PACIFICA	
Herb	Cirsium arvense	Canada thistle
Herb	Cirsium brevistylum	short-styled thistle
Herb	Cirsium edule	edible thistle
Herb	Cirsium hookerianum	Hooker's thistle
Herb	Cirsium undulatum	wavy-leaved thistle
Herb	Cirsium vulgare	bull thistle
Herb	Claytonia lanceolata	western springbeauty
Herb	Claytonia perfoliata	miner's-lettuce
Herb	Claytonia sibirica	Siberian miner's-lettuce
Herb	Clematis ligusticifolia	white clematis
Herb	Clematis occidentalis	blue clematis
Herb	Clintonia uniflora	queen's cup
Herb	Collinsia parviflora	small-flowered blue-eyed Mary
Herb	Collomia grandiflora	large-flowered collomia
Herb	Collomia linearis	narrow-leaved collomia
Herb	Comandra umbellata	pale comandra
Herb	COMANDRA UMBELLATA SSP. CALIFORNICA	
Herb	Conium maculatum	poison-hemlock
Herb	Coptis trifolia	three-leaved goldthread
Herb	Corallorhiza maculata	spotted coralroot
Herb	CORALLORHIZA MACULATA SSP. MACULATA	
Herb	CORALLORHIZA MACULATA SSP. MERTENSIANA	
Herb	Corallorhiza mertensiana	western coralroot
Herb	Corallorhiza striata	striped coralroot
Herb	Corallorhiza trifida	yellow coralroot
Herb	Cornus canadensis	bunchberry
Herb	Corydalis aurea	golden corydalis
Herb	Corydalis sempervirens	pink corydalis
Herb	Crepis atrabarba	slender hawksbeard
Herb	CREPIS CAPILLARIS	
Herb	Crepis elegans	elegant hawksbeard
Herb	Crepis nana	dwarf hawksbeard
Herb	Crepis occidentalis	western hawksbeard
Herb	Crepis tectorum	annual hawksbeard
Herb	Cryptogramma acrostichoides	parsley fern
Herb	CRYPTOGRAMMA CRISPA	
Herb	Cryptogramma stelleri	slender rock-break
Herb	Cynoglossum officinale	common hound's-tongue
Herb	Cypripedium calceolus	yellow ladyslipper
Herb	Cypripedium montanum	mountain ladyslipper
Herb	Cypripedium passerinum	sparrow's-egg ladyslipper
Herb	Cystopteris fragilis	fragile fern
Herb	Cystopteris montana	mountain bladder-fern
Herb	DODECATHEON DENTATUM	
Herb	Dactylis glomerata	orchardgrass
Herb	DANTHONIA CALIFORNICA	
Herb	DANTHONIA CANADENSIS	
Herb	Danthonia intermedia	timber oatgrass
Herb	DANTHONIA SERICEA	
Herb	Danthonia spicata	poverty oatgrass
Herb	Delphinium bicolor	Montana larkspur
Herb	Delphinium glaucum	tall larkspur
Herb	DELPHINIUM MENZIESII	
Herb	Delphinium nuttallianum	Upland delphinium
Herb	Descurainia pinnata	tansymustrd
Herb	Descurainia richardsonii	Richardson's tansymustard
Herb	Descurainia sophia	flixweed
Herb	DICRANUM ACUTIFOLIUM	
Herb	Disporum hookeri	Hooker's fairybells
Herb	Disporum trachycarpum	rough-fruited fairybells
Herb	Distichlis stricta	alkali saltgrass
Herb	Dodecatheon pulchellum	few-flowered shootingstar
Herb	DODECATHEON PULCHELLUM SSP. PULCHELLUM	
Herb	Draba aurea	golden draba
Herb	DRABA CRASSIFOLIA	
Herb	DRABA DENSIFOLIA	
Herb	Draba incerta	yellowstone draba
Herb	Draba lonchocarpa	lance-fruit draba
Herb	Draba nemorosa	woods draba
Herb	Draba nivalis	snow draba
Herb	Draba oligosperma	few-seeded draba
Herb	Draba paysonii	Payson's draba
Herb	Draba praealta	tall draba

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Section	Species	Common Name
Herb	DRABA PRAEALTA	
Herb	DRABA STENOLOBA	
Herb	Drosera anglica	long-leaved sundew
Herb	Drosera rotundifolia	round-leaved sundew
Herb	Dryas drummondii	yellow mountain-avens
Herb	Dryas octopetala	white mountain-avens
Herb	Dryopteris expansa	spiny wood fern
Herb	DRYOPTERIS ASSIMILIS	
Herb	Dryopteris filix-mas	male fern
Herb	DUZULA WAHLENBERGII	
Herb	Echium vulgare	viper bugloss
Herb	Eleocharis acicularis	needle spike-rush
Herb	Eleocharis palustris	creeping spike-rush
Herb	Eleocharis quinqueflora	few-flowered spike-rush
Herb	ELEOCHARIS ROSTELLATA	
Herb	Elymus cinereus	giant wildrye
Herb	Elymus elymoides	squirreltail
Herb	Elymus glaucus	blue wildrye
Herb	Elymus hirsutus	hairy wildrye
Herb	Elymus innovatus	fuzzy-spiked wildrye
Herb	Epilobium anagallidifolium	alpine willowherb
Herb	Epilobium angustifolium	fireweed
Herb	Epilobium ciliatum	purple-leaved willowherb
Herb	EPILOBIUM GLANDULOSUM	
Herb	Epilobium hornemannii	Hornemann's willowherb
Herb	EPILOBIUM LACTIFLORUM	
Herb	Epilobium latifolium	broad-leaved willowherb
Herb	EPILOBIUM LEPTOCARPUM VAR. MACOUNII	
Herb	Epilobium minutum	small-flowered willowherb
Herb	EPILOBIUM PALUSTRE	
Herb	Equisetum arvense	common horsetail
Herb	EQUISETUM FLUVIATILE	
Herb	Equisetum hyemale	scouring-rush
Herb	Equisetum laevigatum	smooth scouring rush
Herb	Equisetum palustre	swamp horsetail
Herb	Equisetum pratense	meadow horsetail
Herb	Equisetum scirpoides	dwarf-scouring-rush
Herb	Equisetum sylvaticum	wood horsetail
Herb	EQUISETUM SYLVATICUM VAR. SYLVATICUM	
Herb	ERIGERON ACRIS	
Herb	Erigeron aureus	golden daisy
Herb	Erigeron compositus	cut-leaved daisy
Herb	Erigeron corymbosus	long-leaved fleabane
Herb	Erigeron divergens	spreading daisy
Herb	Erigeron filifolius	thread-leaved fleabane
Herb	Erigeron flagellaris	trailing fleabane
Herb	Erigeron linearis	line-leaved fleabane
Herb	Erigeron peregrinus	subalpine daisy
Herb	Erigeron pumilus	shaggy fleabane
Herb	Erigeron speciosus	showy fleabane
Herb	ERIGERON STRIGOSUS	
Herb	Erigeron subtrinervis	triple-nerved daisy
Herb	Eriogonum ovalifolium	cushion buckwheat
Herb	Eriogonum umbellatum	sulphur buckwheat
Herb	ERIOGONUM FLAVUM	
Herb	Eriogonum heracleoides	parsnip-flowered buckwheat
Herb	Eriogonum niveum	snow buckwheat
Herb	Eriophorum angustifolium	narrow-leaved cotton-grass
Herb	Eriophorum chamissonis	Chamisso's cotton-grass
Herb	Eriophorum viridi-carinatum	green-keeled cotton-grass
Herb	Erodium cicutarium	stork's-bill
Herb	EROPHILA VERNA	
Herb	Erysimum cheiranthoides	wormseed mustard
Herb	Erysimum inconspicuum	small wallflower
Herb	Erythronium grandiflorum	glacier lily
Herb	Euphorbia esula	leafy spurge
Herb	Festuca altaica	Altai fescue
Herb	Festuca brachyphylla	alpine fescue
Herb	Festuca campestris	rough fescue
Herb	Festuca idahoensis	Idaho fescue
Herb	Festuca occidentalis	western fescue
Herb	Festuca rubra	red fescue
Herb	Festuca saximontana	Rocky Mountain fescue
Herb	FESTUCA SCABRELLA	
Herb	FESTUCA SUBULATA	
Herb	Fragaria vesca	wood strawberry
Herb	Fragaria virginiana	blue-leaved strawberry
Herb	FRAGARIA VIRGINIANA SSP. GLAUCA	

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Herb	FRAGARIA VIRGINIANA SSP. VIRGINIANA	
Herb	Fritillaria lanceolata	chocolate lily
Herb	Fritillaria pudica	yellow bell
Herb	Gaillardia aristata	brown-eyed Susan
Herb	Galium boreale	northern bedstraw
Herb	Galium trifidum	small bedstraw
Herb	Galium triflorum	sweet-scented bedstraw
Herb	Gentianella amarella	northern gentian
Herb	Gentianella propinqua	four-part gentian
Herb	Geocaulon lividum	bastard toad-flax
Herb	Geranium bicknellii	Bicknell's geranium
Herb	GERANIUM MOLLE	
Herb	Geranium richardsonii	white geranium
Herb	Geranium viscosissimum	sticky geranium
Herb	Geum aleppicum	yellow avens
Herb	Geum macrophyllum	large-leaved avens
Herb	Geum rivale	water avens
Herb	Geum triflorum	old man's whiskers
Herb	GLYCERIA STRIATA	
Herb	Goodyera oblongifolia	rattlesnake-plantain
Herb	GOODYERA OBLONGIFOLIA	
Herb	Goodyera repens	dwarf rattlesnake orchid
Herb	Grindelia squarrosa	curly-cup gumweed
Herb	Gymnocarpium dryopteris	oak fern
Herb	GYMNOCARPIUM DRYOPTERIS VAR. DISJUNCTUM	
Herb	Gypsophila paniculata	baby's breath
Herb	Hackelia floribunda	many-flowered stickseed
Herb	Hackelia micrantha	blue stickseed
Herb	Haplopappus lyallii	Lyall's goldenweed
Herb	Hedysarum boreale	northern hedysarum
Herb	Hedysarum sulphurescens	yellow hedysarum
Herb	HELIANTHELLA UNIFLORA	
Herb	Heracleum lanatum	cow-parsnip
Herb	HERACLEUM SPHONDYLIUM	
Herb	Heterotheca villosa	hairy golden-aster
Herb	HETEROTHECA VILLOSA VAR. HISPIDA	
Herb	Heuchera cylindrica	round-leaved alumroot
Herb	Heuchera glabra	smooth alumroot
Herb	HIERACIUM ALBERTINUM	
Herb	Hieracium albiflorum	white-flowered hawkweed
Herb	Hieracium aurantiacum	orange hawkweed
Herb	HIERACIUM CANADENSE	
Herb	HIERACIUM CYNOGLOSSOIDES	
Herb	Hieracium gracile	slender hawkweed
Herb	Hieracium scouleri	Scouler's hawkweed
Herb	Hieracium umbellatum	narrow-leaved hawkweed
Herb	Hierochloe odorata	sweetgrass
Herb	Hippuris vulgaris	mare's-tail
Herb	Hordeum brachyantherum	meadow barley
Herb	Hordeum jubatum	foxtail barley
Herb	Hydrophyllum capitatum	ballhead waterleaf
Herb	Hypericum formosum	western St. John's-wort
Herb	Hypericum perforatum	common St. John's-wort
Herb	Hypopitys monotropa	pinesap
Herb	Iliamna rivularis	mountain hollyhock
Herb	Ipomopsis aggregata	scarlet gilia
Herb	JUNCUS ARCTICUS SSP. ATER	
Herb	Juncus balticus	Baltic rush
Herb	Juncus castaneus	chestnut rush
Herb	Juncus drummondii	Drummond's rush
Herb	Juncus filiformis	thread rush
Herb	Juncus mertensianus	Merten's rush
Herb	Kobresia myosuroides	Bellard's kobresia
Herb	Kochia scoparia	summer-cypress
Herb	Koeleria cristata	junegrass
Herb	KOELERIA MACRANTHA F. MACRANTHA	
Herb	Lactuca serriola	prickly lettuce
Herb	Lactuca tatarica	blue lettuce
Herb	Lappula echinata	bristly stickseed
Herb	Lappula redowskii	western stickseed
Herb	LAPPULA REDOWSKII SSP. REDOWSKII	
Herb	LAPPULA SQUARROSA	
Herb	Lathyrus nevadensis	purple peavine
Herb	LATHYRUS NEVADENSIS SSP. LANCEOLATUS VAR. PILOSELLUS	
Herb	Lathyrus ochroleucus	creamy pinevine
Herb	Lemna minor	common duckweed
Herb	Lemna trisulca	ivy-leaved duckweed
Herb	Lepidium campestre	field pepper-grass

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Section	Species	Common Name
Herb	Lepidium densiflorum	prairie pepper-grasss
Herb	Leptarrhena pyrolifolia	leatherleaf saxifrage
Herb	Lesquerella douglasii	Columbia bladderpod
Herb	Leucanthemum vulgare	oxeye daisy
Herb	Lewisia pygmaea	alpine lewisia
Herb	Lewisia rediviva	bitterroot
Herb	Ligusticum canbyi	Canby's lovage
Herb	Lilium columbianum	tiger lily
Herb	Lilium philadelphicum	wood lily
Herb	LINANTHUS HARKNESSII	
Herb	LINANTHUS SEPTENTRIONALIS	
Herb	Linaria genistifolia	Dalmatian toadflax
Herb	Linaria vulgaris	butter-and-eggs
Herb	LINNAEA BOREALIS SSP. AMERICANA	
Herb	LINUM LEWISII	
Herb	Linum perenne	wild blue flax
Herb	Listera borealis	northern twayblade
Herb	Listera caurina	northwestern twayblade
Herb	Listera convallarioides	broad-leaved twayblade
Herb	Listera cordata	heart-leaved twayblade
Herb	Lithophragma glabrum	smooth woodland star
Herb	Lithophragma parviflorum	small-flowered woodland star
Herb	Lithospermum arvense	corn gromwell-intoduced
Herb	Lithospermum incisum	yellow gromwell
Herb	Lithospermum ruderale	lemonweed
Herb	Lobelia kalmii	Kalm's lobelia
Herb	LOISELEURIA PROCUMBENS	
Herb	Lolium perenne	perennial ryegrass
Herb	Lomatium ambiguum	swale desert-parsley
Herb	Lomatium dissectum	fern-leaved desert-parsley
Herb	Lomatium geyeri	Geyer's lomatium
Herb	Lomatium macrocarpum	large-fruited desert-parsely
Herb	Lomatium nudicaule	barestem desert-parsley
Herb	Lomatium triternatum	narrow-leaved desert-parsely
Herb	LOMATIUM TRITERNATUM SSP. TRITERNATUM	
Herb	Lotus denticulatus	meadow birds-foot trefoil
Herb	Luetkea pectinata	partridgefoot
Herb	Lupinus arcticus	arctic lupine
Herb	LUPINUS ARCTICUS SSP. CANADENSIS	
Herb	LUPINUS LEPIDUS	
Herb	Lupinus lyallii	dwarf mountain lupine
Herb	Lupinus polyphyllus	large-leaved lupine
Herb	Lupinus sericeus	silky lupine
Herb	Lupinus sulphureus	sulphur lupine
Herb	Luzula arcuata	curved alpine woodrush
Herb	Luzula hitchcockii	smooth woodrush
Herb	Luzula parviflora	small-flowered woodrush
Herb	Luzula piperi	Piper's woodrush
Herb	Luzula spicata	spiked woodrush
Herb	LUZULA WAHLENBERGII	
Herb	Lycopodium alpinum	alpine clubmoss
Herb	Lycopodium annotinum	stiff clubmoss
Herb	Lycopodium clavatum	running clubmoss
Herb	Lycopodium complanatum	ground cedar
Herb	Lycopodium dendroideum	ground-pine
Herb	LYCOPODIUM OBSCURUM	
Herb	Lycopodium selago	fir clubmoss
Herb	Lysichiton americanum	skunk cabbage
Herb	Lysimachia ciliata	fringed loosestrife
Herb	Lysimachia thyrsiflora	tufted loosestrife
Herb	Lythrum salicaria	purple loosestrife
Herb	Maianthemum canadense	wild lily-of-the-valley
Herb	MAIANTHEMUM CANADENSE VAR. INTERIUS	
Herb	Matricaria discoides	pineapple weed
Herb	Matteccia struthiopteris	ostrich fern
Herb	Medicago lupulina	black medic
Herb	Medicago sativa	alfalfa
Herb	Melampyrum lineare	cow-wheat
Herb	MELAMPYRUM LINEARE VAR. LINEARE	
Herb	MELICA SMITHII	
Herb	MELICA SUBULATA	
Herb	Melilotus alba	white sweet-clover
Herb	Melilotus officinalis	yellow sweet-clover
Herb	Mentha arvensis	field mint
Herb	Mentzelia albicaulis	small-flowered evening star
Herb	Mentzelia laevicaulis	blazing -star
Herb	Menyanthes trifoliata	buckbean
Herb	Mertensia longiflora	long-flowered mertensia

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Herb	Mertensia paniculata	tall bluebells
Herb	MICROSERIS NUTANS	
Herb	Microsteris gracilis	pink twink
Herb	Mimulus breweri	Brewer's monkey-flower
Herb	Mimulus floribundus	purple-stemmed monkey flower
Herb	Mimulus guttatus	yellow monkey-flower
Herb	Mimulus lewisii	pink monkey-flower
Herb	Mimulus moschatus	musk-flower
Herb	Mimulus tilingii	mountain monkey-flower
Herb	MINUARTIA NUTTALLII	
Herb	Minuartia obtusiloba	alpine sandwort
Herb	Minuartia rubella	boreal sandwort
Herb	Mitella breweri	Brewer's mitrewort
Herb	Mitella nuda	common mitrewort
Herb	Mitella pentandra	five-stamened mitrewort
Herb	MITELLA TRIFIDA	
Herb	Moehringia lateriflora	blunt-leaved sandwort
Herb	Monarda fistulosa	wild bergamot
Herb	MONARDA MENTHIFOLIA	
Herb	Moneses uniflora	single delight
Herb	Monotropa uniflora	Indian-pipe
Herb	Montia linearis	narrow-leaved montia
Herb	Montia parvifolia	small-leaved montia
Herb	Muhlenbergia richardsonis	mat muhly
Herb	Myosotis alpestris	mountain forget-me-not
Herb	Myosotis laxa	small-flowered forget-me-not
Herb	MYOSOTIS STRICTA	
Herb	MYOSOTIS SYLVATICA	
Herb	Myriophyllum spicatum	northern spiked water-milfoil
Herb	Myriophyllum verticillatum	whorled water-milfoil
Herb	Nuphar lutea	yellow waterlily
Herb	Oenothera biennis	common evening primrose
Herb	Oenothera pallida	pale evening-primrose
Herb	Oenothera villosa	yellow evening-primrose
Herb	Opuntia fragilis	brittle prickly-pear cactus
Herb	Opuntia polyacantha	prickly pear
Herb	Orobanche fasciculata	clustered broom-rape
Herb	Orobanche uniflora	one-flowered cancer-root
Herb	Orthilia secunda	one-sided wintergreen
Herb	Orthocarpus luteus	yellow owl-clover
Herb	Oryzopsis asperifolia	rough-leaved ricegrass
Herb	Oryzopsis micrantha	
Herb	Oryzopsis pungens	short-awned rice-grass
Herb	Osmorhiza chilensis	mountain sweet-cicely
Herb	Osmorhiza depauperata	blunt-fruited sweet-cicely
Herb	Osmorhiza purpurea	purple sweet-cicely
Herb	Oxyria digyna	mountain sorrel
Herb	Oxytropis campestris	field locoweed
Herb	Oxytropis deflexa	pendant-pod locoweed
Herb	Oxytropis sericea	silky locoweed
Herb	Oxytropis splendens	showy locoweed
Herb	PANICUM OLIGOSANTHES	
Herb	Parnassia fimbriata	fringed grass-of-Parnassus
Herb	Parnassia palustris	northern grass-of-Parnassus
Herb	Pedicularis bracteosa	bracted lousewort
Herb	Pedicularis contorta	coil-beaked lousewort
Herb	Pedicularis groenlandica	elephant's-head lousewort
Herb	Pedicularis langsdorfii	Langsdorf's lousewort
Herb	Pedicularis ornithorhyncha	bird's-beak lousewort
Herb	Pedicularis racemosa	sickletop lousewort
Herb	Penstemon confertus	yellow penstemon
Herb	PENSTEMON DAVIDSONII VAR. MENZIESII	
Herb	Penstemon procerus	small-flowered penstemon
Herb	Penstemon pruinosus	Chelan penstemon
Herb	Penstemon richardsonii	Richardson's penstemon
Herb	Penstemon serrulatus	coast penstemon
Herb	Perideridia gairdneri	yampa
Herb	Petasites frigidus	sweet coltsfoot
Herb	PETASITES NIVALIS	
Herb	PETASITES PALMATUS	
Herb	Petasites sagittatus	arrow-leaved coltsfoot
Herb	Phacelia hastata	silverleaf phacelia
Herb	Phacelia heterophylla	diverse-leaved phacelia
Herb	Phacelia linearis	thread-leaved phacelia
Herb	Phacelia sericea	silky phacelia
Herb	Phalaris arundinacea	reed canary grass
Herb	Phleum alpinum	alpine timothy
Herb	Phleum pratense	timothy

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Herb	Phlox caespitosa	tufted phlox
Herb	Phlox diffusa	spreading phlox
Herb	Phlox longifolia	long-leaved phlox
Herb	Pinguicula vulgaris	butterwort
Herb	Plantago major	common plantain
Herb	Plantago patagonica	Indian-wheat
Herb	Platanthera dilatata	white bog-orchid
Herb	PLATANTHERA DILATATA VAR. DILATATA	
Herb	PLATANTHERA DILATATA VAR. LEUCOSTACHYS	
Herb	Platanthera elegans	elegant rein orchid
Herb	Platanthera hyperborea	green-flowered bog-orchid
Herb	Platanthera obtusata	one-leaved rein-orchid
Herb	Platanthera orbiculata	round-leaved rein-orchid
Herb	Platanthera stricta (saccata)	slender rein-orchid
Herb	Platanthera unalascensis	Alaska rein-orchid
Herb	Poa alpina	alpine bluegrass
Herb	Poa arctica	arctic bluegrass
Herb	Poa canbyi	Canby's bluegrass
Herb	Poa compressa	Canada bluegrass
Herb	Poa cusickii	Cusick's bluegrass
Herb	POA CUSICKII VAR. PURPURASCENS	
Herb	POA FENDLERIANA	
Herb	POA GRACILLIMA	
Herb	POA INTERIOR	
Herb	Poa juncifolia	alkali bluegrass
Herb	POA LAXIFLORA	
Herb	POA NERVOSA	
Herb	POA NEVADENSIS	
Herb	Poa palustris	fowl bluegrass
Herb	POA PATTERSONII	
Herb	Poa pratensis	Kentucky bluegrass
Herb	Poa sandbergii	
Herb	Poa secunda	Sanderg / Nevada bluegrass
Herb	Poa wheeleri	Wheeler bluegrass
Herb	POLEMONIUM BOREALE	
Herb	Polemonium elegans	elegant Jacob's-ladder
Herb	Polemonium micranthum	annual Jacob's-ladder
Herb	Polemonium pulcherrimum	showy Jacob's-ladder
Herb	Polygonum bistortoides	American bistort
Herb	POLYGONUM DOUGLASII	
Herb	POLYGONUM LONGISETUM	
Herb	POLYGONUM LONGISETUM	
Herb	POLYGONUM RAMOSISSIMUM	
Herb	Polygonum viviparum	alpine bistort
Herb	Polypodium hesperium	Western licorice fern
Herb	Polystichum braunii	Braun's holly fern
Herb	Polystichum kruckebergii	Kruckeberg's holly fern
Herb	Polystichum lemmonii	Lemmon's holly fern
Herb	Polystichum lonchitis	mountain holly fern
Herb	POLYSTICHUM MUNITUM	
Herb	POTAMOGETON NATANS	
Herb	Potentilla anserina	silverweed
Herb	POTENTILLA ARGUTA	
Herb	Potentilla diversifolia	diverse-leaved cinquefoil
Herb	Potentilla drummondii	Drummond's cinquefoil
Herb	Potentilla glandulosa	sticky cinquefoil
Herb	Potentilla gracilis	graceful cinquefoil
Herb	Potentilla hippiana	woolly cinquefoil
Herb	POTENTILLA HOOKERANA	
Herb	Potentilla norvegica	Norwegian cinquefoil
Herb	POTENTILLA OVINA	
Herb	Potentilla palustris	marsh cinquefoil
Herb	Potentilla pensylvanica	prairie cinquefoil
Herb	Potentilla recta	sulfur cinquefoil
Herb	Potentilla uniflora	one-flowered cinquefoil
Herb	Potentilla villosa	villous cinquefoil
Herb	Prunella vulgaris	self-heal
Herb	Pteridium aquilinum	bracken
Herb	Pterospora andromedea	pinedrops
Herb	Puccinellia nuttalliana	Nuttall's alkaligrass
Herb	PULSATILLA OCCIDENTALIS	
Herb	PULSATILLA PATENS SSP. MULTIFIDA	
Herb	Pyrola asarifolia	pink wintergreen
Herb	PYROLA ASARIFOLIA VAR. PURPUREA	
Herb	Pyrola chlorantha	green wintergreen
Herb	PYROLA DENTATA	
Herb	PYROLA ELLIPTICA	
Herb	Pyrola minor	lesser wintergreen

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Herb	PYROLA PICTA	
Herb	Ranunculus abortivus	kidney-leaved buttercup
Herb	Ranunculus acris	meadow buttercup
Herb	Ranunculus cymbalaria	shore buttercup
Herb	Ranunculus eschscholtzii	subalpine buttercup
Herb	Ranunculus flabellaris	yellow water-buttercup
Herb	Ranunculus flammula	lesser spearwort
Herb	Ranunculus glaberrimus	sagebrush buttercup
Herb	RANUNCULUS GLABERRIMUS VAR. GLABERRIMUS	
Herb	Ranunculus gmelinii	yellow water-buttercup
Herb	Ranunculus macounii	Macoun's buttercup
Herb	Ranunculus occidentalis	western buttercup
Herb	Ranunculus sceleratus	cursed crowfoot
Herb	Ranunculus uncinatus	little buttercup
Herb	RANUNCULUS VERECUNDUS	
Herb	Rhinanthus minor	yellow rattle
Herb	Rorippa palustris	marsh yellow-cress
Herb	RUBUS ARCTICUS SSP. ACAULIS	
Herb	RUBUS CHAMAEMORUS	
Herb	Rumex acetosa	garden sorrel
Herb	Rumex acetosella	sour weed
Herb	Rumex crispus	curled dock
Herb	Sagittaria cuneata	arum-leaved arrowhead
Herb	Sagittaria latifolia	wapato
Herb	SALIX RETICULATA SSP NIVALIS	
Herb	SALSOLA KALI	
Herb	Sanguisorba canadensis	Sitka burnet
Herb	Sanicula marilandica	black sanicle
Herb	SATUREJA DOUGLASII	
Herb	Saxifraga aizoides	evergreen saxifrage
Herb	Saxifraga bronchialis	spotted saxifrage
Herb	SAXIFRAGA BRONCHIALIS SSP. AUSTROMONTANA	
Herb	Saxifraga caespitosa	tufted saxifrage
Herb	Saxifraga cernua	nodding saxifrage
Herb	Saxifraga ferruginea	Alaska saxifrage
Herb	Saxifraga lyallii	red-stemmed saxifrage
Herb	Saxifraga mertensiana	wood saxifrage
Herb	SAXIFRAGA NELSONIANA	
Herb	Saxifraga occidentalis	western saxifrage
Herb	Saxifraga oppositifolia	purple mountain saxifrage
Herb	Schizachne purpurascens	false melic
Herb	SCHOENOCRAMBE LINIFOLIA	
Herb	Scirpus americanus	American bulrush
Herb	Scirpus lacustris	great bulrush
Herb	Scirpus maritimus	alkali bulrush
Herb	Scirpus microcarpus	small-flowered bulrush
Herb	Scirpus nevadensis	Nevada bulrush
Herb	Scolochloa festucacea	sprangle-top
Herb	Scutellaria galericulata	marsh skullcap
Herb	Sedum divergens	spreading stonecrop
Herb	Sedum integrifolium	roseroot
Herb	Sedum lanceolatum	lance-leaved stonecrop
Herb	Sedum stenopetalum	worm-leaved stonecrop
Herb	Selaginella densa	compact selaginella
Herb	Selaginella selaginoides	low selaginella
Herb	Selaginella wallacei	Wallace's selaginella
Herb	Senecio canus	woolly groundsel
Herb	Senecio elmeri	Elmer's butterwwed
Herb	SENECIO FOETIDUS VAR. HYDROPHILOIDES	
Herb	Senecio fremontii	dwarf mountain butterweed
Herb	Senecio indecorus	rayless mountain butterweed
Herb	Senecio integerrimus	western groundsel
Herb	SENECIO INTEGERRIMUS VAR. EXALTATUS	
Herb	Senecio lugens	black-tipped groundsel
Herb	Senecio pauciflorus	rayless apline groundsel
Herb	Senecio pauperculus	Canadian butterweed
Herb	Senecio plattenesis	plains butterweed
Herb	Senecio pseudaureus	streambank butterweed
Herb	Senecio streptanthifolius	Rocky Mountain butterweed
Herb	Senecio triangularis	arrow-leaved groundsel
Herb	Senecio vulgaris	common groundsel
Herb	Sibbaldia procumbens	sibbaldia
Herb	Silene acaulis	moss campion
Herb	Silene alba	white cockle
Herb	Silene douglasii	Douglas' campion
Herb	Silene menziesii	Menzies' campion
Herb	Silene noctiflora	night-flowering catchfly
Herb	Silene parryi	Parry's campion

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Herb	Silene vulgaris	bladder campion
Herb	Sisymbrium altissimum	tall tumble-mustard
Herb	Sisymbrium loeselii	Loesel's tumble-mustard
Herb	Sisyrinchium idahoense	Idahoe blue-eyed grass
Herb	Sisyrinchium montanum	mountain blue-eyed grass
Herb	Sium suave	water-parsnip
Herb	Smilacina racemosa	false Solomon's-seal
Herb	Smilacina stellata	star-flowered false Solomon's-seal
Herb	Solidago canadensis	Canada goldenrod
Herb	SOLIDAGO CANADENSIS VAR. SALEBROSA	
Herb	Solidago multiradiata	northern goldenrod
Herb	Solidago spathulata	spike-like goldenrod
Herb	SOLIDAGO SPATHULATA SSP. SPATHULATA	
Herb	Sonchus arvensis	perennial sow-thistle
Herb	SONCHUS OLERACEUS	
Herb	Spartina gracilis	alkali cordgrass
Herb	Spiranthes romanzoffiana	ladies' tresses
Herb	Spirodela polyrhiza	great duckweed
Herb	Sporobolus cryptandrus	sand dropseed
Herb	Stellaria calycantha	northern starwort
Herb	Stellaria crispa	crisp starwort
Herb	Stellaria longipes	long-stalked starwort
Herb	Stellaria media	chickweed
Herb	Stenanthium occidentale	mountainbells
Herb	STEPHANOMERIA TENUIFOLIA	
Herb	Stipa comata	needle-and-thread grass
Herb	Stipa curtiseta v. spartea	porcupinegrass
Herb	Stipa hymenoides	Indian rice-grass
Herb	Stipa occidentalis	stiff needlegrass
Herb	Stipa richardsonii	spreading needlegrass
Herb	STIPA SPARTEA	
Herb	Streptopus amplexifolius	clasping twistedstalk
Herb	Streptopus roseus	rosy twistedstalk
Herb	Streptopus streptopoides	small twistedstalk
Herb	STREPTOPUS STREPTOPOIDES VAR. BREVIPES	
Herb	Suaeda depressa	seablite
Herb	Talinum sediforme	Okanagan fameflower
Herb	Tanacetum vulgare	common tansy
Herb	Taraxacum ceratophorum	horned dandelion
Herb	Taraxacum officinale	common dandelion
Herb	Tellima grandiflora	tall fringecup
Herb	Thalictrum occidentale	western meadowrue
Herb	Thalictrum venulosum	veiny meadowrue
Herb	Thelypteris phegopteris	beech fern
Herb	Thlapsi arvense	field penny cress
Herb	Tiarella trifoliata	three-leaved foamflower
Herb	Tiarella unifoliata	one-leaved foamflower
Herb	Tofieldia glutinosa	sticky false asphodel
Herb	TOXICODENDRON RYDBERGII	
Herb	Tragopogon dubius	yellow salsify
Herb	Tragopogon porrifolius	common salsify
Herb	Tragopogon pratensis	meadow salsify
Herb	Trautvetteria caroliniensis	false bugbane
Herb	Trichophorum cespitosum	tufted clubrush
Herb	Trichophurum alpinum	
Herb	TRICOPHORUM CESPITOSUM SSP. CESPITOSUM	
Herb	Trientalis arctica	northern starflower
Herb	TRIENTALIS EUROPAEA	
Herb	TRIENTALIS EUROPAEA SSP. ARCTICA	
Herb	Trientalis lattifolia	broad-leaved starflower
Herb	TRIFOLIUM DUBIUM	
Herb	Trifolium hybridum	Alsike clover
Herb	Trifolium pratense	red clover
Herb	Trifolium repens	white clover
Herb	Triglochin maritimum	seaside arrow-grass
Herb	Triglochin palustre	marsh arrow-grass
Herb	Trillium ovatum	western white trillium
Herb	Trisetum cernuum	tall trisetum
Herb	Trisetum spicatum	spike trisetum
Herb	Trollius laxus	globeflower
Herb	TROLLIUS LAXUS SSP. ALBIFLORUS	
Herb	Typha latifolia	cattail
Herb	Urtica dioica	stinging nettle
Herb	URTICA DIOICA SSP. GRACILIS VAR. LYALLII	
Herb	Utricularia intermedia	flat-leaved bladderwort
Herb	Utricularia minor	lesser bladderwort
Herb	Utricularia vulgaris	greater bladderwort
Herb	Vahlodea atropurpurea	mountain hairgrass

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Herb	Valeriana dioica	marsh valerian
Herb	Valeriana sitchensis	Sitka valerian
Herb	Veratrum viride	Indian hellebore
Herb	Verbascum thapsus	great mullein
Herb	Veronica americana	American brooklime
Herb	VERONICA ANAGALLIS-AQUATICA	
Herb	Veronica cusickii	Cusick's speedwell
Herb	Veronica scutellata	marsh speedwell
Herb	Veronica wormskjoldii	alpine speedwell
Herb	Vicia americana	American vetch
Herb	Vicia sativa	common vetch
Herb	VICIA SATIVA VAR. ANGUSTIFOLIA	
Herb	Viola adunca	early blue violet
Herb	Viola canadensis	Canada violet
Herb	Viola glabella	stream violet
Herb	VIOLA MACLOSKEYI	
Herb	VIOLA MACLOSKEYI SSP. PALLENS	
Herb	Viola nephrophylla	northern bog violet
Herb	Viola orbiculata	round-leaved violet
Herb	Viola palustris	marsh violet
Herb	Viola renifolia	kidney-leaved violet
Herb	Viola sempervirens	trailing yellow violet
Herb	VIOLIA CANADENSIS SSP. RYDBERGII	
Herb	Vulpia octoflora	six-weeks fescue
Herb	Wolfia borealis	water-meal
Herb	Woodsia oregana	Oregon woodsia
Herb	Woodsia scopulina	Rocky Mountain woodsia
Herb	Xerophyllum tenax	bear-grass
Herb	Zigadenus elegans	mountain death-camas
Herb	Zigadenus venenosus	meadow death-camas
liverwort	Cephalozia bicuspidata	slender two-toothed wort
liverwort	Conocephalum conicum	spicy conehead
liverwort	Diplophyllum taxifolium	yellow double leaf wort
liverwort	Marchantia polymorpha	green-tongue liverwort
liverwort	Marsupella emarginata	rusty rock wort
liverwort	Plagiochila asplenioides	cedar-shake wort
liverwort	Porella cordaeana	dull scale feather wort
liverwort	Ptilidium ciliare	orange talus wort
liverwort	Scapania undulata	mitten-leaf water wort
Bryophyte	ACAROSPORA SCHLEICHERI	
Bryophyte	ALECTORIA AMERICANA	
Bryophyte	ALECTORIA CANADENSIS	
Bryophyte	ALECTORIA FREMONTII	
Bryophyte	ALECTORIA GLABRA	
Bryophyte	ALECTORIA IMPLEXA	
Bryophyte	ALECTORIA LANEA	
Bryophyte	ALECTORIA OREGANA	
Bryophyte	ALECTORIA SIMPLICIOR	
Bryophyte	ALECTORIA TENERRINA	
Bryophyte	ALECTORIA TORTUOSA	
Bryophyte	Andreaea byttii	
Bryophyte	Andreaea nivalis	
Bryophyte	Andreaea rupestris	common lantern moss
Bryophyte	ANTITRICHIA CURTIPENDULA	
Bryophyte	APOMETZGERIA PUBESCENS	
Bryophyte	ARTHRORHAPHIS SP.	
Bryophyte	ATRICHUM SELWYNII	
Bryophyte	ATRICHUM UNDULATUM	
Bryophyte	Aulacomnium androgynum	
Bryophyte	Aulacomnium palustre	glow moss
Bryophyte	Barbilophozia barbata	
Bryophyte	BARBILOPHOZIA EUSTEGIA	
Bryophyte	BARBILOPHOZIA FLOERKEI	
Bryophyte	BARBILOPHOZIA KUNZEANA	
Bryophyte	BARBILOPHOZIA LYCOPODIOIDES	
Bryophyte	BARBULA BRACHYPHYLLA	
Bryophyte	BARBULA CONVOLUTA	
Bryophyte	BARBULA EUSTEGIA	
Bryophyte	BARBULA PLATYNEURA	
Bryophyte	Bartramia halleriana	
Bryophyte	Bartramia ithyphylla	
Bryophyte	Bartramia pomiformis	apple moss
Bryophyte	BLEPHAROSTOMA TRICHOPHYLLUM	
Bryophyte	Brachythecium albicans	lawn moss
Bryophyte	BRACHYTHECIUM COLLINUM	

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Bryophyte	BRACHYTHECIUM CURTUM	
Bryophyte	BRACHYTHECIUM ERYTHRORRHIZON	
Bryophyte	BRACHYTHECIUM FRIGIDUM	
Bryophyte	BRACHYTHECIUM HOLZINGERI	
Bryophyte	BRACHYTHECIUM HYLOTAPETUM	
Bryophyte	BRACHYTHECIUM LEIBERGII	
Bryophyte	BRACHYTHECIUM NELSONII	
Bryophyte	BRACHYTHECIUM RIVULARE	
Bryophyte	BRACHYTHECIUM RUTABULUM	
Bryophyte	BRACHYTHECIUM SALEBROSUM	
Bryophyte	BRACHYTHECIUM VELUTINUM	
Bryophyte	BRYOERYTHROPHYLLUM RECURVIROSTRUM	
Bryophyte	Bryum argenteum	silver moss
Bryophyte	BRYUM CAESPITICIUM	
Bryophyte	BRYUM CAPILLARE	
Bryophyte	BUXBAUMIA APHYLLA	
Bryophyte	BUXBAUMIA PIPERI	
Bryophyte	CALLIERGON CORDIFOLIUM	
Bryophyte	CALLIERGON CORDIFOLIUM	
Bryophyte	CALLIERGON CUSPIDATA	
Bryophyte	Calliergon stramineum	straw moss
Bryophyte	Calliergonella cuspidata	
Bryophyte	CALOPLACA SP.	
Bryophyte	CALYPOGEJA MUELLERIANA	
Bryophyte	CALYPOGEJA NEESIANA	
Bryophyte	CALYPOGEJA TRICHOMANIS	
Bryophyte	Campylium stellatum	golden star moss
Bryophyte	CEPHALOZIA CONNIVENS	
Bryophyte	CEPHALOZIA LUNULIFOLIA	
Bryophyte	CEPHALOZIA PLENICEPS	
Bryophyte	CEPHALOZIELLA DIVARICATA	
Bryophyte	Ceratodon purpureus	fire moss
Bryophyte	CETRARIA CANADENSIS	
Bryophyte	CETRARIA PINASTRI	
Bryophyte	CETRARIA SUBALPINA	
Bryophyte	CHILOSCYPHUS PALLESCENS	
Bryophyte	CLADINA SUBMITS	
Bryophyte	CLADONIA APODOCARPIA	
Bryophyte	CLADONIA BACILLARIS	
Bryophyte	CLADONIA BELLIDIFLORA	
Bryophyte	CLADONIA CARASSENSIS	
Bryophyte	CLADONIA CENOTEA	
Bryophyte	CLADONIA COCCIFERA	
Bryophyte	CLADONIA CONIOCRAEA	
Bryophyte	CLADONIA CRISPATA	
Bryophyte	CLADONIA FIMBRIATA	
Bryophyte	CLADONIA FURCATA	
Bryophyte	CLADONIA GONECHA	
Bryophyte	CLADONIA MACILENTA	
Bryophyte	CLADONIA MACROPHYLLODES	
Bryophyte	CLADONIA MULTIFORMIS	
Bryophyte	CLADONIA NEMOXYNA	
Bryophyte	CLADONIA PITYREA	
Bryophyte	CLADONIA POCILLUM	
Bryophyte	CLADONIA POLYDACTYLA	
Bryophyte	CLADONIA SUBFURCATA	
Bryophyte	CLADONIA UNCIALIS	
Bryophyte	CLADONIA VERTICILLATA	
Bryophyte	CLAOPODIUM BOLANDERI	
Bryophyte	Climacium dendroides	palm moss
Bryophyte	COLLEMA TENAX	
Bryophyte	CORNICULARIA DIVERGENS	
Bryophyte	Coscinodon calyptratus	steppe mouse-moss
Bryophyte	Cratoneuron filicinum	spring claw moss
Bryophyte	Depanocladus fluitans	
Bryophyte	DERMATOCARPON SP.	
Bryophyte	DICHODONTIUM PELLUCIDUM	
Bryophyte	DICRANELLA HETEROMALLA	
Bryophyte	Dicranoweisia crispula	yellow-green cushion moss
Bryophyte	Dicranum fuscescens	curly heron's-bill moss
Bryophyte	DICRANUM HOWELLII	
Bryophyte	DICRANUM PALLIDISETUM	
Bryophyte	Dicranum polysetum	wavy-leaved moss
Bryophyte	Dicranum scoparium	broom moss
Bryophyte	DICRANUM SPADICEUM	
Bryophyte	DICRANUM TAURICUM	
Bryophyte	DICRANUM UNDULATUM	
Bryophyte	DIPLOSCHISTES BRYOPHILUS	

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Bryophyte	DIPLOSCHISTES SCRUPOSUS	
Bryophyte	DISTICHIUM CAPILLACEUM	
Bryophyte	Drepanocladus crassicostatus	
Bryophyte	Drepanocladus exannulatus	spring hooked moss
Bryophyte	DREPANOCLADUS FLUITANS	
Bryophyte	DREPANOCLADUS UNCINATUS	
Bryophyte	DRYPTODON PATENS	
Bryophyte	Encalypta vulgaris	common extinguisher moss
Bryophyte	Encalyptra rhaptocarpa	grooved extinguisher moss
Bryophyte	EURHYNCHIUM PULCHELLUM	
Bryophyte	EURHYNCHIUM PULCHELLUM VAR. PULCHELLUM	
Bryophyte	FISSIDENS BRYOIDIES	
Bryophyte	Funaria hygrometrica	cord moss
Bryophyte	GRIMMIA ALPICOLA	
Bryophyte	GRIMMIA APOCARPA	
Bryophyte	GRIMMIA CALYPTRATA	
Bryophyte	Grimmia pulvinata	
Bryophyte	Hedwigia ciliata	Hedwig's rock moss
Bryophyte	HETEROCLADIUM DIMORPHUM	
Bryophyte	Homalothecium aeneum	golden curls moss
Bryophyte	Homalothecium fulgescens	
Bryophyte	HOMALOTHECIUM MEGAPTILUM	
Bryophyte	Homalothecium nevadense	
Bryophyte	HOMALOTHECIUM PINNATIFIDUM	
Bryophyte	Hygrohypnum duriusculum	rigid brook moss
Bryophyte	HYLOCOMIUM PYRENAICUM	
Bryophyte	Hylocomium splendens	step moss
Bryophyte	HYPNUM CALLICHROUM	
Bryophyte	HYPNUM CIRCINALE	
Bryophyte	HYPNUM LINDBERGII	
Bryophyte	HYPNUM PALLESCENS	
Bryophyte	Hypnum revolutum	rusty claw moss
Bryophyte	HYPNUM SUBIMPONENS	
Bryophyte	HYPNUM VAUCHERI	
Bryophyte	HYPOGYMNIA ENTEROMORPHA	
Bryophyte	HYPOGYMNIA PHYSODES	
Bryophyte	HYPOGYMNIA TUBULOSA	
Bryophyte	ICMADOPHILA ERICETORUM	
Bryophyte	ISOPTERYGIUM ELEGANS	
Bryophyte	ISOPTERYGIUM PULCHELLUM	
Bryophyte	ISOTHECIUM SPICULIFERUM	
Bryophyte	LEPIDOZIA REPTANS	
Bryophyte	LEPRARIA INCANA	
Bryophyte	LEPRARIA MEMBRANACEA	
Bryophyte	Leptobryum pyriforme	pear moss
Bryophyte	LESKEELA NERVOSA	
Bryophyte	Leucolepis acanthoneuron	
Bryophyte	LOPHOCOLEA CUSPIDATA	
Bryophyte	LOPHOCOLEA CUSPIDATA	
Bryophyte	LOPHOCOLEA HETEROPHYLLA	
Bryophyte	LOPHOCOLEA HETEROPHYLLA	
Bryophyte	LOPHOCOLEA MINOR	
Bryophyte	LOPHOZIA ALPESTRIS	
Bryophyte	LOPHOZIA EXCISI	
Bryophyte	LOPHOZIA INCISA	
Bryophyte	LOPHOZIA LONGIDENS	
Bryophyte	LOPHOZIA OBTUSA	
Bryophyte	LOPHOZIA VENTRICOSA	
Bryophyte	LOPHOZIA VENTRICOSA VAR. VENTRICOSA	
Bryophyte	LOPHOZIA WENZELII	
Bryophyte	Mnium arizonicum	
Bryophyte	MNIUM BLYTTII	
Bryophyte	MNIUM DRUMMONDII	
Bryophyte	MNIUM GLABRESCENS	
Bryophyte	MNIUM HYMENOPHYLLOIDES	
Bryophyte	MNIUM INSIGNE	
Bryophyte	Mnium medium	
Bryophyte	MNIUM NUDUM	
Bryophyte	MNIUM ORTHORRHYNCHUM	
Bryophyte	MNIUM PSEUDOPUNCTATUM	
Bryophyte	MNIUM PUNCTATUM	
Bryophyte	Mnium rostratum	
Bryophyte	Mnium spinulosum	flapper moss
Bryophyte	NARDIA GEOSCYPHUS	
Bryophyte	NARDIA SCALARIS	
Bryophyte	NEPHROMA BELLUM	
Bryophyte	ORTHOTRICHUM LAEVIGATUM	
Bryophyte	Orthotrichum speciosum	hooded moss

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Bryophyte	PALUDELLA SQUARROSA	
Bryophyte	PANNARIA PEZIZOIDES	
Bryophyte	PARMELIA EXASPERATULA	
Bryophyte	PARMELIA GLABRA	
Bryophyte	PARMELIA HYPOLEUCITES	
Bryophyte	PELLIA NEESIANA	
Bryophyte	PELLIA SP.	
Bryophyte	PELTIGERA SCABROSA	
Bryophyte	PELTIGERA SPURIA	
Bryophyte	PERTUSARIA MULTIPUNCTA	
Bryophyte	PHASCUM CUSPIDATUM	
Bryophyte	Philonotis fontana	seepage apple moss
Bryophyte	PHYSCIA CALLOSA	
Bryophyte	Plagiobryum zierii	
Bryophyte	PLAGIOCHASMA SP.	
Bryophyte	PLAGIOCHILA PORELLOIDES	
Bryophyte	Plagiomnium insigne	
Bryophyte	Plagiomnium medium	trailing leafy moss
Bryophyte	PLAGIOTHECIUM DENTICULATUM	
Bryophyte	PLAGIOTHECIUM LAETUM	
Bryophyte	PLAGIOTHECIUM PILEFERUM	
Bryophyte	PLAGIOTHECIUM SP	
Bryophyte	PLAGIOTHECIUM UNDULATUM	
Bryophyte	Pleurozium schreberi	Schreber's red stem
Bryophyte	POGONATUM ALPINUM	
Bryophyte	POGONATUM CONTORTUM	
Bryophyte	POGONATUM URNIGERUM	
Bryophyte	Pohlia cruda	
Bryophyte	Pohlia nutans	common nodding pohlia
Bryophyte	Pohlia wahlenbergii	
Bryophyte	POLYBLASTIA TRISTICULA	
Bryophyte	Polytrichastrum alpinum	bristly haircap moss
Bryophyte	Polytrichum commune	
Bryophyte	Polytrichum formosum	
Bryophyte	Polytrichum juniperinum	juniper haircap moss
Bryophyte	POLYTRICHUM PALLIDISETUM	
Bryophyte	POLYTRICHUM PILIFERUM	
Bryophyte	POLYTRICHUM SEXANGULARE	
Bryophyte	Polytrichum strictum	
Bryophyte	Pseudoleskea baileyi	rusty mountain heath moss
Bryophyte	PSEUDOLESKEA INCURVATA	
Bryophyte	PSEUDOLESKEA RADICOSA	
Bryophyte	Pseudoleskea stenophylla	
Bryophyte	PSOROMA HYPNORUM	
Bryophyte	PTERIGYNANDRUM FILIFORME	
Bryophyte	PTERYGONEURUM OVATUM	
Bryophyte	Pterygoneurum subsessile	woolly caterpillar moss
Bryophyte	PTILIDIUM CALIFORNICUM	
Bryophyte	PTILIDIUM PULCHERRIMUM	
Bryophyte	Ptilium crista-castrensis	knight's plume
Bryophyte	Pylaisiella polyantha	aspen moss
Bryophyte	Rhacomitrium aciculare	black brook moss
Bryophyte	RHACOMITRIUM CANESCENS	
Bryophyte	Rhacomitrium elongatum	shaggy yellow sand moss
Bryophyte	RHACOMITRIUM HETEROSTICHIUM	
Bryophyte	Rhytidiadelphus loreus	hanging basket moss
Bryophyte	Rhytidiadelphus squarrosus	
Bryophyte	Rhytidiadelphus triquetrus	electrified cat's tail moss
Bryophyte	Rhytidiopsis robusta	pipecleaner moss
Bryophyte	ROELLIA ROELLII	
Bryophyte	Sanionia uncinata	sickle moss
Bryophyte	SCAPANIA AMERICANA	
Bryophyte	SCAPANIA BOLANDERI	
Bryophyte	SCAPANIA IRRIGUA	
Bryophyte	SCAPANIA SUBALPINA	
Bryophyte	SCAPANIA ULIGINOSA	
Bryophyte	Schistidium apocarpum	red-toothed rock moss
Bryophyte	Scleropodium obtusifolium	
Bryophyte	Scouleria aquatica	
Bryophyte	SOLORINA CROCEA	
Bryophyte	SPHAEROPHORUS GLOBOSUS	
Bryophyte	SPHAEROPHORUS GLOBOSUS	
Bryophyte	SPHAGNUM CAPILLACEUM	
Bryophyte	SPHAGNUM COMPACTUM	
Bryophyte	SPHAGNUM FUSCUM	
Bryophyte	SPHAGNUM GIRGENSOHNII	
Bryophyte	SPHAGNUM RECURVUM	
Bryophyte	SPHAGNUM RUSSOWII	

List of Southern Interior Plants*

February 1996

Section	Species	Common Name
Bryophyte	Sphagnum squarrosum	shaggy peat moss
Bryophyte	SPHAGNUM SUBFULVUM	
Bryophyte	Sphagnum warnstorfii	
Bryophyte	SPLACHNUM SPHAERICUM	
Bryophyte	STEREOCAULON GRANDE	
Bryophyte	STEREOCAULON SUBALBICANS	
Bryophyte	STOKESIELLA OREGANA	
Bryophyte	TAYLORIA SERRATA	
Bryophyte	Tetraphis geniculata	
Bryophyte	Tetraphis pellucida	Four-toothed log moss
Bryophyte	Tetraplodon angustatus	
Bryophyte	Tetraplodon mnioides	common dung moss
Bryophyte	Thuidium recognitum	lacy fern moss
Bryophyte	Timmia austriaca	false haircap moss
Bryophyte	TIMMIA MEGAPOLITANA VAR. BAVARICA	
Bryophyte	TIMMIA NORVEGICA	
Bryophyte	TOMENTHYPNUM NITENS	
Bryophyte	TORTELLA TORTUOSA	
Bryophyte	Tortula norvegica	
Bryophyte	TORTULA RURALIFORMIS	
Bryophyte	Tortula ruralis	rusty steppe moss
Bryophyte	TRICHOSTOMOPSIS SP.	
Bryophyte	TRITOMARIA EXSECTA	
Bryophyte	TRITOMARIA EXSECTIFORMIS	
Bryophyte	WEISSIA SP.	

Flowers, Trees, Shrubs and Ferns

of the Shuswap District

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FLOWERS, TREES, SHRUBS and FERNS OF THE SHUSWAP DISTRICT

Compiled by Mary L. Tapson-Jones
Assisted by Mary Coles and Vivian Lindoe

This list will be most useful when used with "Trees, Shrubs and Flowers to know in British Columbia" (1965) by C.P.Lyons. The page numbe: is keyed to this guide the standard reference for the area. Those species without a page number have also been known to occur in the area. Guide books will describe many plants not found in the Shuswap area. This list is t assist in the use of plant guides by indicating those most probably present.

LEGEND

Seasonal Status	Abundance
SP - Spring	C - Common
S - Summer	R - Rare

TREES AND SHRUBS	PAGE
Western White Pine (Pinus monticola)	16
Ponerosa (Yellow) Pine (Pinus ponerosa)	18
Lodgepole Pine (Pinus contorta)	19
Western Larch (Larix occidentalis)	20
White Spruce (Pica glauca)	21
Hemlock (Western) (Tsuga heterophylla)	25
Douglas Fir (Pseudotsuga menziesii)	26
Alpine Fir (Abies lasiocarpa)	27
Western Red Cedar (Thuja plicata)	30
Dwarf Juniper (Juniperus communis)	32
Rocky Mountain Juniper (Juniperus scopulorum)	33
Western Yew (Taxus brevifolia)	34
Trembling Aspen (Populus tremuloides)	35
Black Cottonwood (Populus trichocarpa)	36

TREES AND SHRUBS	PAGE
Pacific Willow (Salix lasiandra)	37
"Sand Bar" Willows (Salix - spp)	37
White Birch (Western) (Betula papyrifera)	38
Black or Water Birch (Betula occidentalis)	39
Mountain Alder (Alnus tenuifolia)	41
Black Hawthorn (Crataegus douglasii)	45
Columbia Hawthorn (Crataegus columbiana)	45
English Hawthorn (Crataegue oxyacantha)	45
Bitter Cherry (Prunus emarginata)	46
Choke Cherry (Prunus virginiana)	47
Douglas Maple (Acer glabrum)	49
Manitoba Maple (Acer negundo)	
Cascara (Rhamnus purshiana)	51
Dwarf Huckleberry (Vaccinium caespitosum)	58
Blue Huckleberry (Vaccinium membranaceum)	88

TREES AND SHRUBS		PAGE
Velvet-leaf Blueberry (Vaccinium myrtilloides)		89
Red Huckleberry (Vaccinium parvifolium)		59
White Moss Heather (Cassiope mertensiana)		59
Red Heather (Phyllodoce empetriformis)		59
Yellow Heather (Phyllodoce glanduliflora)		59
Crowberry (Empetrum nigrum)		60
Flat-Top Spirea (Spiraea lucida)		61
Kinnikinnick (Arctostaphylos Uva-ursi)		61
Twin-Flower (Linnaea borealis)		62
Cranberry (Vaccinium oxycoccus)		62
Snowberry (Gaultheria hispidula)		63
Trailing Rubus (Rubus pedatus)		77
Orange Honeysuckle (Lonicera ciliosa)	R	64
Hardhack (Spiraea douglasii)	C	66
Red-Osier Dogwood (Cornus stolonifera)		

TREES AND SHRUBS		PAGE
Mountain Ash (Sorbus sitchensis)	R	68
Blue-Berry Elder (Sambucus cerulea)	R	69
Red-Berry Elder (Sambucus racemosa)	R	69
Oregon Grape (Berberis nervosa)	R	70
Tall Mahonia (Berberis aquifolium)	C	70
Spreading Dogbane (Apocynum androsaemifolium)	C	71
Shrubby Cinquefoil (Potentilla fruticosa)	C	71
Waxberry (Symphoricarpos albus)	C	72
False Box (Pachistima myrsinites)	C	72
Labrador Tea (Ledum groenlandicum)	R	73
Swamp-Laurel (Kalmia polifolia)	R	74
White Clematis (Clematis ligusticifolia)	R	76
Blue Clematis (Clematis columbiana)	C	76
Orange Honeysuckle (Lonicera ciliosa)	C	77
Black Twinberry (Lonicera involucrata)	R	77

TREES AND SHRUBS		PAGE
Fly Honeysuckle (Lonicera utahensis)	C	
Hazelnut (Corylus californica)	C	79
Goat's Beard (Aruncus sylvester)	R	79
High-Bush Cranberry (Viburnum trilobum)	R	80
Saskatoon Berry (Amelanchier alnifolia)	C	82
Snowbush (Ceanothus velutinus)	C	83
Redstem Ceanothus (Ceanothus sanquineus)	R	83
Soopolallie (Shepherdia canadensis)	C	84
Sumac (Rhus glabra)	C	85
Mock Orange (Philadelphus lewisii)	C	86
Ocean Spray (Holodiscus discolor)	C	86
Thimbleberry (Rubus praviflorus)	C	87
Black Raspberry (Rubus leucedermis)	R	90
Red Raspberry (Rubus idaeus)	C	90
Poison-Ivy (Rhus redicans)	C	91

TREES AND SHRUBS		PAGE
Pasture Wormwood (Artemisia frigida)	C	92
Sagebrush (Artemisia tridentata)	C	93
White Rododendron (Rododendron albiflorum)	C	95
Devil's Club (Oplopanax horridus)	C	97
Wild Rose (Rosa nutkana)	C	97
Dwarf Rose (Rosa gymocarpa)	C	97
Sticky Currant (Ribes viscosissimum)	R	99
Swamp Gooseberry (Ribes lacustre)	R	100
Wild Gooseberry (Ribes - spp)	R	100
Indian Hemp (Apocynum cannibinum)	R	71
FERNS AND CLUB MOSS		
Leathery Grape Fern (Botrychium multifidum)		
Rattlesnake Fren (Botrychium virginianum)		
Lady Fern (Athrim filix-femina)		
Maidenhair (Asplenium trichomanes)	R	

FERNS AND CLUB MOSS		PAGE
Parsley Fern (Cryptogramma crispa)		
Fragile Fern (Cystopteris fragilis)		
Spinywood Fren (Dryopteris austriaca)		
Oak Fern (Gymnocarpus dryopteris)		
Holly Fern (Polystichum lonchitus)		
Pollypod Fern (Polypodium vulgare)		
Bracken Fern (Pteridium aquilinum)		
Long Beech-fern (Thelypteris phegopteris)		
Rocky Mountain Woodsia (Woodsia scopulina)		
Ostrich Fern (Matteuccia struthiopteris)	R	
Ground-cedar (Lycopodium complanatum)	R	
Ground-pine (Lycopodium obscurum)	R	
Shining clubmoss (Lycopodium lucidulum)	R	

FLOWERS - WHITE		PAGE
Varied -leaved Phacelia (Phacelia heterophylla)	S	103
Fringe Cup (Tellima praviflora)	SP C	104
Miner's Lettuce (Montia perfoliata)	S C	104
Spring Beauty (Claytonia lanceolata)	SP C	
Leptarrhena (Leptarrhena - spp)	S C	105
Buckbean (Bogbean) (Menyanthes trifoliata)	SP R	105
Baneberry (Actaca rubra)	SP C	105
Lyall's Saxifrage (Saxifraga lyallii)	S	106
Saxifrage (Saxifraga integrifolia)	SP C	107
Western Trillium (Trillium ovatum)	SP R	108
Bunchberry (Cornus canadensis)	SP C	109
Queen's Cup (Clintonia uniflora)	SP C	109
Rattlesnake Plantain (Goodyera oblongifolia)	S C	109
Oregon Fairy Bells (Disporum oregonum)	SP R	110

FLOWERS - WHITE		PAGE
Rough Fairy Bells (Disporum trachycarpum)	SP C	110
Twisted Stalk (Streptopus amplexifolius)	SP R	110
False Solomon's Seal (Smilacina amplexicaulis)	SP C	110
Star-flowered Solomon's Seal (Smilacina stellata)	SP C	111
Ladies' Tresses (Spianthes romanzoffiana)	SP R	111
White Rein Orchid (Habenaria dilatata)	SP R	111
Northern Twayblade (Listera borealis)	SP R	
Slender-spire Orchid (Habenaria unalascensis)	SP R	
Twayblade Orchid (Liparis loeselii)	SP R	
Indian Pipe (Montropa uniflora)	S R	111
Silver-Green (Adenocaulon bicolor)	S C	112
Cotton Grass (Eriophorum chamissonis)	S	112
Foam Flower (Tiarella unifoliata)	SP C	113
Alumroot (Heuchera glabra)	S C	113

FLOWERS - WHITE		PAGE
Round Leaf Sundew (Drosera rotundifolia)	S R	113
Paddle Leaf Sundew (Drosera anglica)	S R	113
White Eriogonum (Eriogonum heraclcoides)	S	114
Blueleaf Strawberry (Fragaria glauca)	SP	114
White Pussytoes (Antennaria spp.)	S C	114
Pearly Everlasting (Anaphalis margaritacea)	S C	115
Yarrow (Achillea millefolium)	S C	115
Meadow Spirea (Luethea pectinata)	S C	115
Oxeye Daisy (Chrysanthemum leucanthemum)	SP C	116
White Fleabane (Erigeron caespitosus)	S R	116
Drummond's Rockcress (Arabis drummondii)	SP C	117
Globe Anemone (Anemone globesa)	S R	117
Dwarf Mountain Fleabane (Erigeron compositus)	SP C	118
Mountain Lady's Slipper (Cypripedium montanum)	SP R	118

FLOWERS - WHITE			PAGE
Sparrows-egg Lady Slipper (Cypripedium passerinum)	SP	R	118
Night-flowering Catchfly (Silene noctiflora)	SP	C	118
White Marsh Marigold (Caltha leptosepala)	SP		119
Globe Flower (Trollis laxus)	SP		119
Western Anemone (Anemone occidentalis)	SP	C	120
Mountain Valerian (Valeriana stichensis)	S	C	120
Fringed Grass of Parnassus (Parnassis fimbriata)	S	R	120
Water-Parsnip (Sium cicutaefolium)	S		121
Water-Hemlock (Cicuta douglasii)	S		121
Cow Parsnip (Heracleum lanatum)	S	C	122
Water Plantain (Alisma plantago-aquatica)	S		122
Mountain Sandwort (Arenaria boreali)	S		123
Rough Bedstraw (Galium triflorum)	S	C	
Wild Carrot (Queen Anne's Lace) (Daucus carota)	S	C	124

FLOWERS - WHITE			PAGE
Single Delight (Moneses uniflora)	SP	R	128
Loco Weed (Oxytropis campestris)	SP	C	
White Sweet Clover (Melilotus alba)	S	C	
Dutch Clover (Trifolium repens)	S	C	
Western Canada Violet (Viola canadensis)	SP	C	
Wild Morning Glory (Convolvulus)	S	C	
Large Round-leaved Orchid (Habenaria orbiculata)	S	R	
Water Buttercup (Ranunculus aquatilis)	SP		
Water Crowfoot (Ranunculus subrigidus)	S		
Arrowhead (Sagittaria cuneata)	SP	R	

FLOWERS - PINK			
Shooting Star (Peacock) (Dodecatheon spp.)	SP	R	125
Satin Flower (Grass Widows) (Sisyrinchium grandiflorum)	SP	R	125
Monita (Miner's Lettuce) (Monita praviflora)	SP	C	125

FLOWERS - PINK		14. PAGE
Nodding Onion (Allium cernuum)	SP C	126
Filaree (Storksbill) (Erodium cicutarium)	SP C	127
Pipsissewa (Prince's Pipe) (Chimaphila umbellata)	SP C	128
Round-leaved Pyrola (Pyrola elliptica)	SP	128
White-veined Pyrola (Pyrola picta)	SP	128
Large Pyrola (Pyrola asarifolia)	SP	128
Bleeding Heart (Decentra uniflora)	SP R	128
Arctic Raspberry (Rubus articus)	S R	129
Knapweed (Centaurea spp.)	S C	129
Collimia (Collimia grandiflora)	S R	130
Strawberry Blite (Chenopodium capitatum)	S R	130
Red Monkey Flower (Mimulus lewisii)	S	131
Star Flower (Trientalis latifolia)	SP R	131
Upland Star Flower (Trientalis arctica)	SP R	131

FLOWERS - PINK		15. PAGE
Water Knotweed (Polygonum amphibium)	S	131
FLOWERS - RED		
Columbine (Aquilegia formosa)	SP C	132
Wild Tiger Lily (Lilium parviflorum)	S C	132
Indian Paintbrush (Castilleja augustifolia)	SP C	133
Phlox (Phlox longifolia)	SP	134
Rosy Pussytoes (Antennaria rosea)	S C	134
FLOWERS - PINK TO RED		
Three-flowered Avens (Geum triflorum)	SP C	
Skeletonweed (Lygodesmia rostrata)	S R	
Pink Corydalis (Corydalis sempervirens)	S R	
Pink Mallow (Hollyhock) (Iliamna rivularis)	SP C	
Giant Helleborine (Epipactis gigantea)	S R	
Doorweed (Polygonum auculare)	SP C	

FLOWERS - PINK TO RED		PAGE
Houndstongue (Cynoglossum officinale)	S C	
Spiderflower (Beeplant) (Cleome serrulata)	S R	
FLOWERS - YELLOW		
Common Dandelion (Taraxacum major)	S C	
Smooth Agoseris (Agoseris glauca)	SP	135
Common St. Johnswort (Hypericum perforatum)	S	135
Western Buttercup (Ranunculus occidentalis)	SP	136
Sagebrush Buttercup (Ranunculus glaberrimus)	SP C	
Spring Gold (Biscuitroot) (Lomatium vilosum)	SP	136
Narrow-leaved Parsley (Lomatium triternatum)	SP	137
Yellow Violet (Viola glabella)	S R	138
Stonecrop (Sedum ssp.)	SP C	138
Yellow Monkey Flower (Mimulus guttatus)	SP	138

FLOWERS - YELLOW		PA
Lemonweed (Pucoon) (Lithospermum pilosum)	SP C	1
Carrot Leaf (Leptotaenia dissecta)	SP C	1
Cinquefoil (Potentilla milligrana)	SP C	1
Giant Ragwort (Senecio triangularis)	S	1
Slender Hawkweed (Hieracium gracile)	S	1
Gumweed (Grindelia squarrosa)	S R	1
Yellow Bell (Fritillaria pudica)	SP	1
Balsam-Root (Spring Sunflower) (Balsamorhiza sagittata)	SP C	1
Cactus (Opunta fragilus)	S	1
Death Camas (Zigadenus venenous)	SP C	1
Oyster Plant (Salsify) (Tragopogon dubius)	S C	1
Glacier Lily (Snow Lily) (Erythronium grandiflorum)	SP C	1
Contorted Lousewort (Betony) (Pedicularis racemosa)	S C	1
Broad-leaf Arnica (Arnica latifolia)	S C	1

FLOWERS - YELLOW			PAGE
Heart-leaved Arnica (Arnica cordifolia)	S	C	145
Golden Aster (Chrysopsis hispida)	S	R	145
Brown-eyed Susan (Gaillardia aristata)	S	C	145
Large-leaved Avens (Geum marcrophyllum)	SP		146
Tansy (Tanacetum vulgare)	S	C	146
Goldenrod (Solidago canadensis)	S	C	146
Moccasin Flower (Cypripedium parviflorum)	S	R	147
Skunk Cabbage (Lysichiton kamtschatcense)	SP	C	147
Yellow Pond Lily (Nymphaea polysepalum)	SP	C	147
Evening Primrose (Oenothera biennis hookeri)	S		148
Butter and Eggs (Linaria vulgaris)	S	C	148
Great Mullein (Verbascum thapus)	S	C	149
Oval-leaf Alumroot (Heuchera cylindrica)	SP		149
Tufted Loosestrife (Lysimachia ciliata)	S		

FLOWERS - YELLOW			PAGE
Fringed Loosestrife (Lysimachia ciliata)	S		
Common Bladderwort (Utricularia vulgaris)	S		
Blazingstar (Mentzelia lacvicaulis)	S		
Plains Cactus (Opuntia polyacantha)	S		
Black Medick (Clover) (Medicago lupulina)	S	C	
Jewelweed (Impatiens capersis)	S	C	
Beggerticks (Bidens cernua)	S	C	
Evergreen Violet (Viola orbiculata)	SP		
Golden Corydalis (Corydalis aurea)	S	R	
Sow-thistle (Sonchus arvensis)	S		
Wild Pea (Lathyrus ochroleucus)			158
Yellow Sweet Clover (Melilotus officinalis)			
Western Golden Ragweed (Senecio pseudaureus)			145
Mountain Arnica (Arnica fulgens)		R	145

FLOWERS - BLUE			PAGE
Blue-eyed Grass (Sisyrinchium sarmentosum)	S	R	150
Blue-eyed Mary (Collinsia grandiflora)	SP	C	150
Bluebell (Campanula rotundifolia)	S	R	151
Dwarf Lungwart (Mertensia oblongifolia)	SP	R	
Bergamot (Monarda menthaefolia)	S	R	
Vipers Bugeloss (Echium vulgare)	S		
Yerba Buena (Micromeria douglasii)	S	C	
Blue Sailors(Chicory) (Cichorium intybus)	S	C	151
American Brooklime (Veronica americiana)	SP		152
Marsh Skullcap (Scutellaria galericulata)	S	R	152
Delphinium (Larkspur) (Delphinium menziesii)	S	C	153
Mountain Forget-me -not (Myosotis sylvatica)	S		153
Crawling Forget-me-not (Myosotis laxa)	S		
Lupines (Lupinus ssp.)	SP	C	154

FLOWERS - BLUE			PAGE
Blue Jacob's Ladder (Polemonium humile)	S	R	154
Veronica (Alpine Speedwell) (Veronica wormskjoldii)	S	R	154
Self-heal (Prunella vulgaris)	SP	C	155
Blue Swamp Violet (Viola palustris)	SP	R	155
Blue Violet (Viola adunca)	SP	C	155
Thin-leaved Phacelia (Phacelia linearis)	S	C	161
One-flowered Cancer Root (Orobanche uniflora)	SP	C	157

FLOWERS - PURPLE			
Marsh Cinquefoil (Potentilla palustris)	S		140
Calypso (Lady's Slipper) (Calypso bulbosa)	SP	R	158
StripedCoral Root (Coraallhiza striata)	S	R	158
Spotted Coral Root (Coraallorhiza maculata)	S	R	158
Coltsfoot (Petacites speciosa)	SP	C	159
Stinging Nettle (Urtica lyalli)	S	C	

FLOWERS - PURPLE

			PAGE
Canada Mint (Mentha arvensis)	S	C	159
Scouler's Penstemon (Penstemon fruticosis)	SP	C	160
Phacelia (Phacelia linearis)	S	C	161
Ballhead Waterleaf (Hydrophyllum capitatum)	SP	R	161
Meadow Rue (Thalictrum occidentale)	S	R	162
Purple Avens (Water) (Geum rivale)	S	R	
Sticky Geranium (Geranium viscosissimum)	S	R	163
Fireweed (Epilobium angustifolium)	S	C	163
Large Purple Aster (Aster speciosus)	S	C	164
Douglas Aster (Aster douglasii)	S	C	164
Large Purple Fleabane (Erigeron speciosus)	S		164
Mountain Daisy (Erigeron peregrinus)	S	C	164
Bull Thistle (Cirsium lanceolatum)	S	C	165
Canada Thistle (Cirisium arvensis)	S	C	165

FLOWERS - PURPLE

			PAGE
Woolly Thistle (Cirsium undulatum)	S	R	165
Burdock (Articum lappa)	S	C	165
Green-banded Mariposa Lily (Calochortus macrocarpus)	S	R	166
Vetch (Vicia spp.)	S	C	
Purple Pea (Lathyrus navadensis)	SP		157
Mountain Phacelia (Phacelia sericea)	S		157
Little Flowered Penstemon (Penstemon proerus)	SP		160

FLOWERS - BROWN-GREEN

			PAGE
Common Plantain (Plantago major)	S	C	
Green-flowered Bog Orchid (Habenaria hyperborea)	S	R	
Youth-on-age (Tolmiea menziesii)	SP	R	167
Wild Ginger (Asarum caudatum)	SP	R	167
Dragon Sagewort (Artemisia dracunculus)	S	C	168
Cudweed Sagewort (Artemisia ludoviciana)	S	C	168

FLOWERS - BROWN-GREEN			PAGE
Curled Dock (Rumex crispus)	S	C	168
Sheep Sorrel (Rumex acetosella)	S	C	168
Saraaparilla (Aralia nudicaulis	SP	C	169
Chocolate Lily (Fritillaria lanceolate)	SP	C	169
Indian Hellebore (Veratrum viride)	S	C	170
Mountain Death Camas(Green Lily) (Zigadenus elegans)	S	R	170
Cat-tail (Typha latifolia)	SP	C	171
Scouring Rush (Equisetum hyemale)	S	C	171
Common Horsetail (Equisetum arvense)	S	C	171

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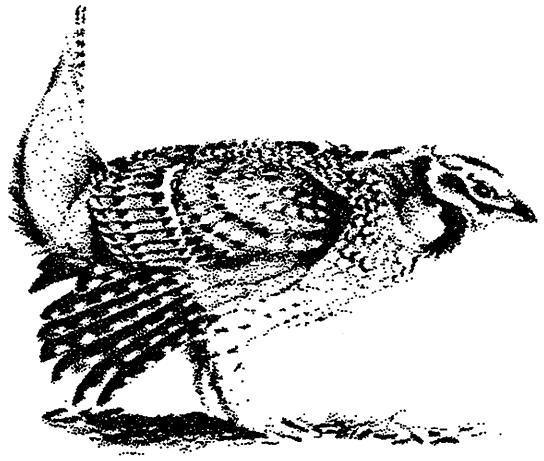
1972

BIRDS
of Kamloops

by
Rick Howie

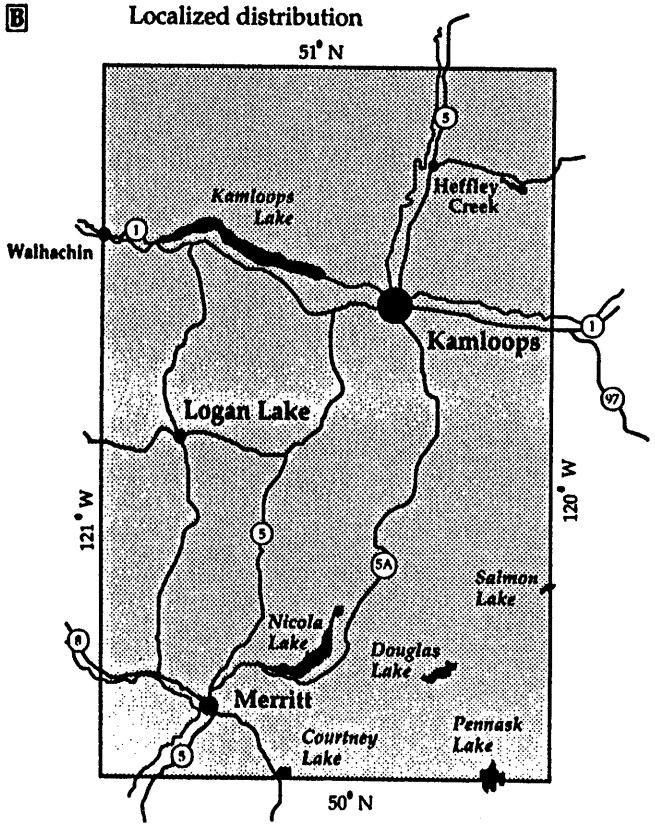
A Checklist



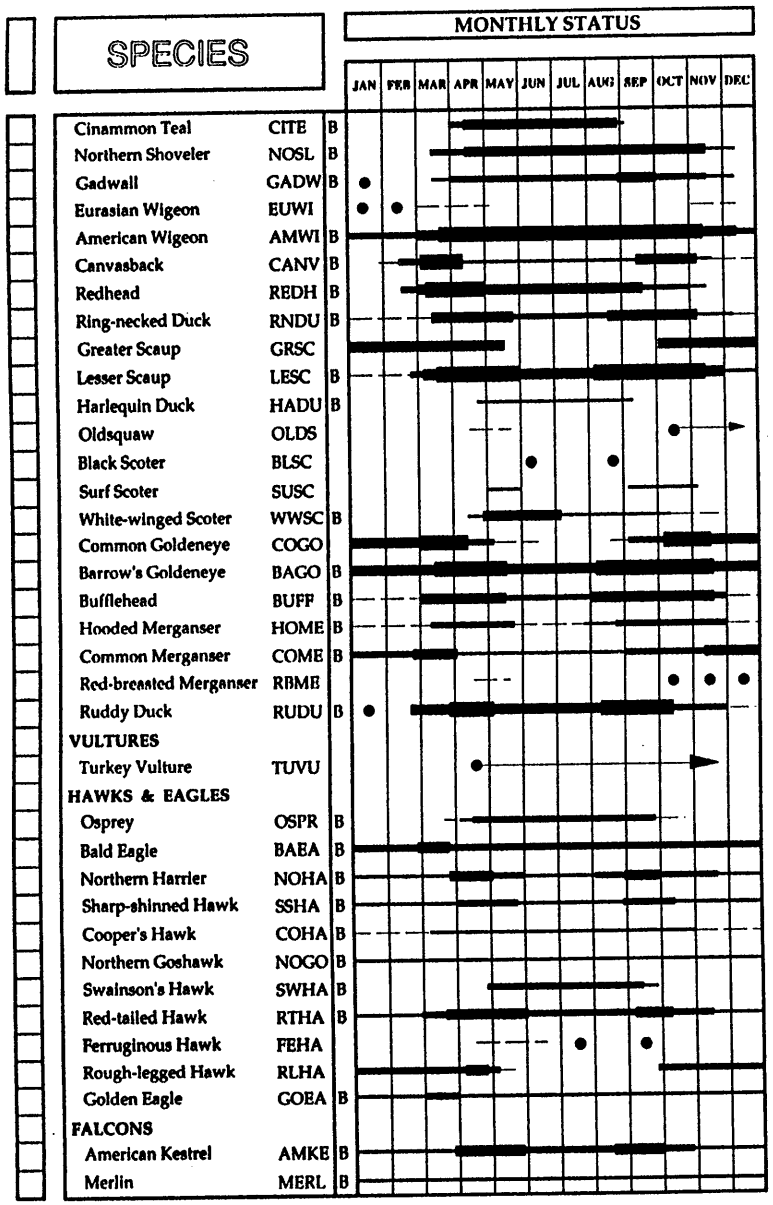
1994

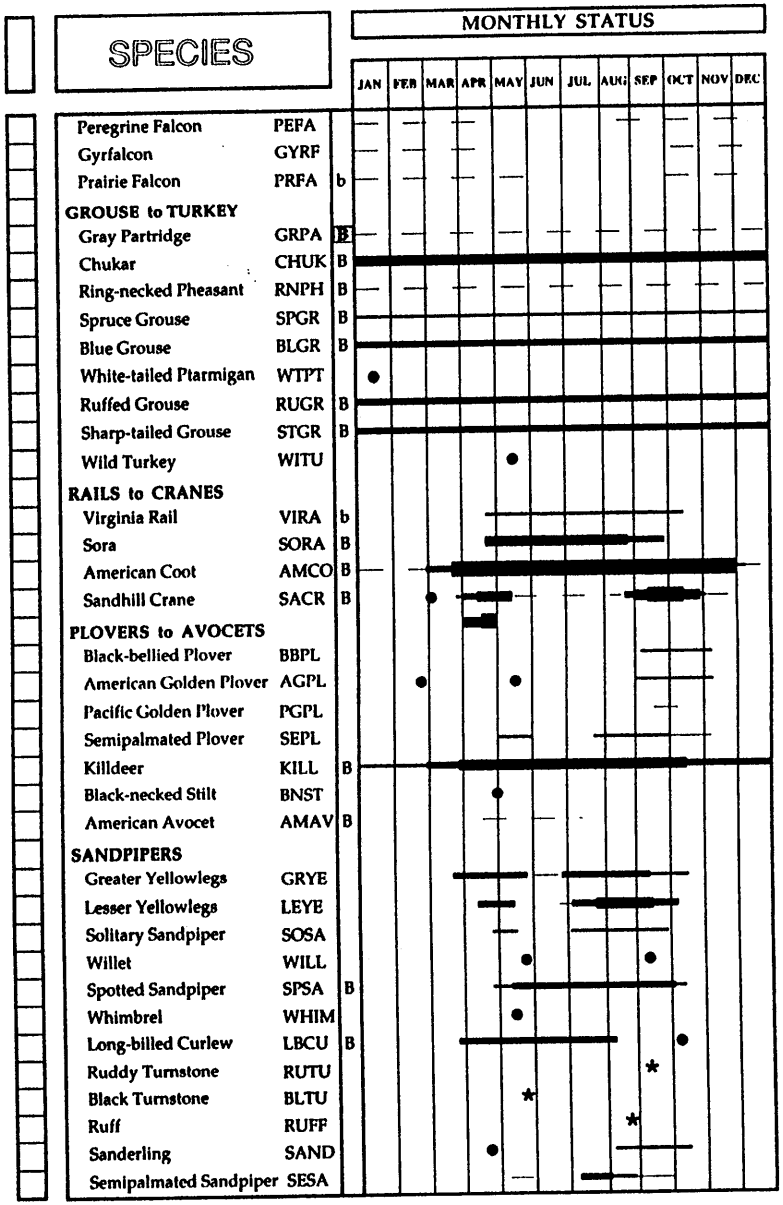
Species Status Symbols

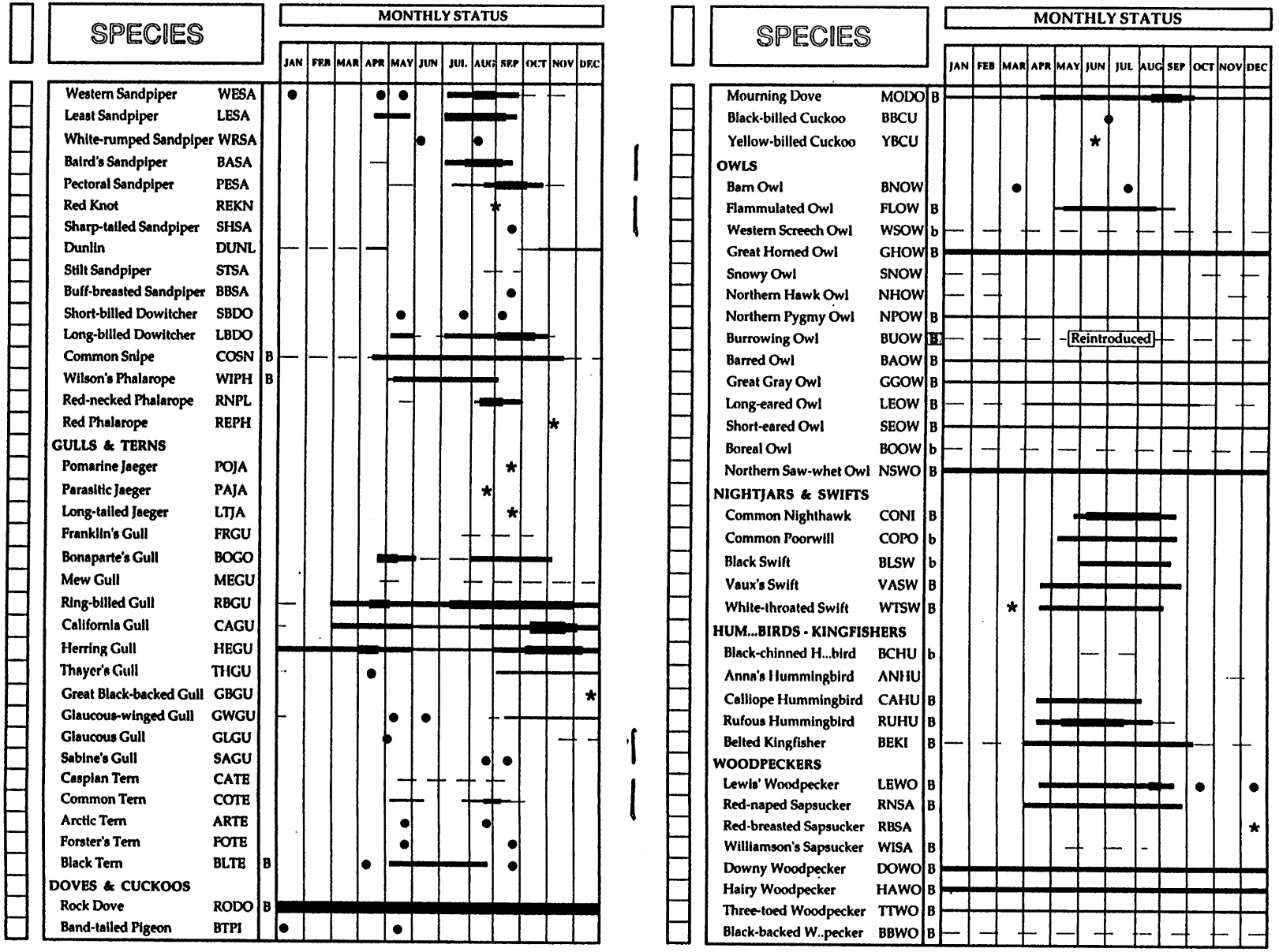
▬▬▬	**Abundant :**	100 or more individuals per day
▬▬▬	**Common :**	21-100 individuals per day
▬▬▬	**Fairly Common :**	6-20 individuals per day
———	**Uncommon :**	1-5 individuals per day
— — —	**Rare :**	1-5 individuals per season
●	**Casual :**	recorded more than once
*	**Accidental :**	recorded once
●→	**Single Bird :**	length of stay
B	Breeds in checklist area	
b	Probably breeds in checklist area	
[B]	Localized distribution	

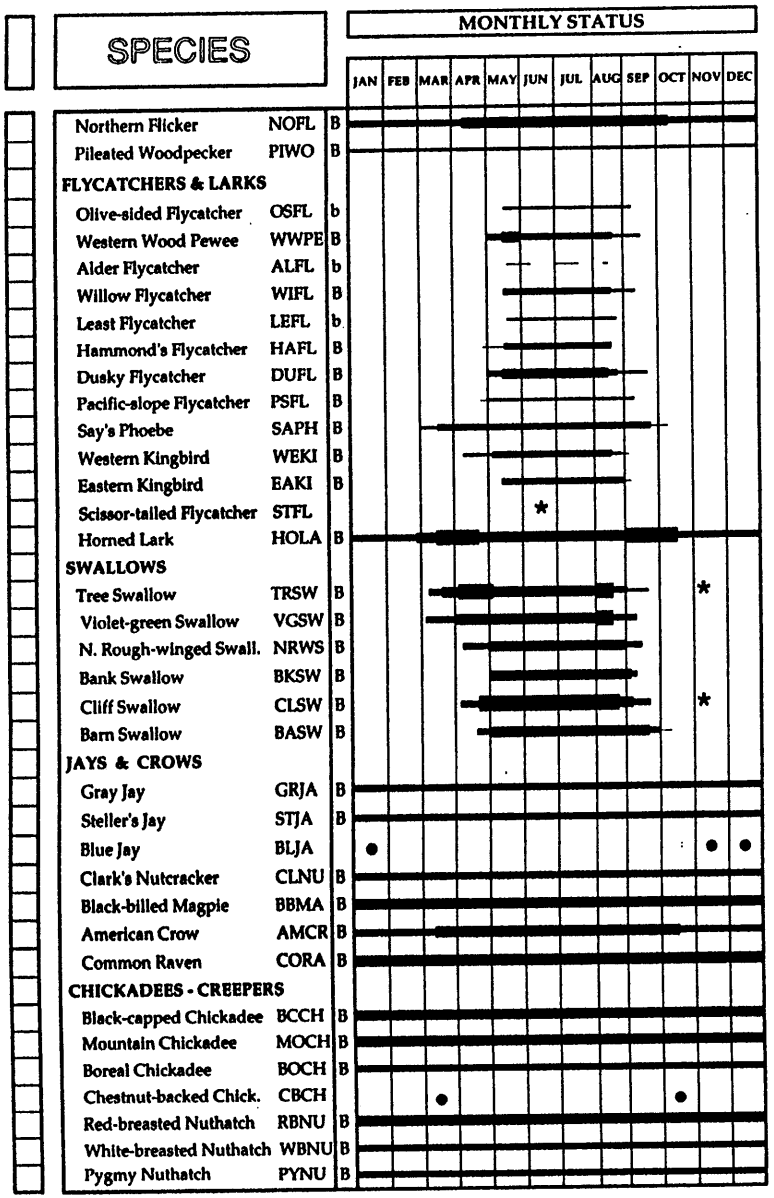


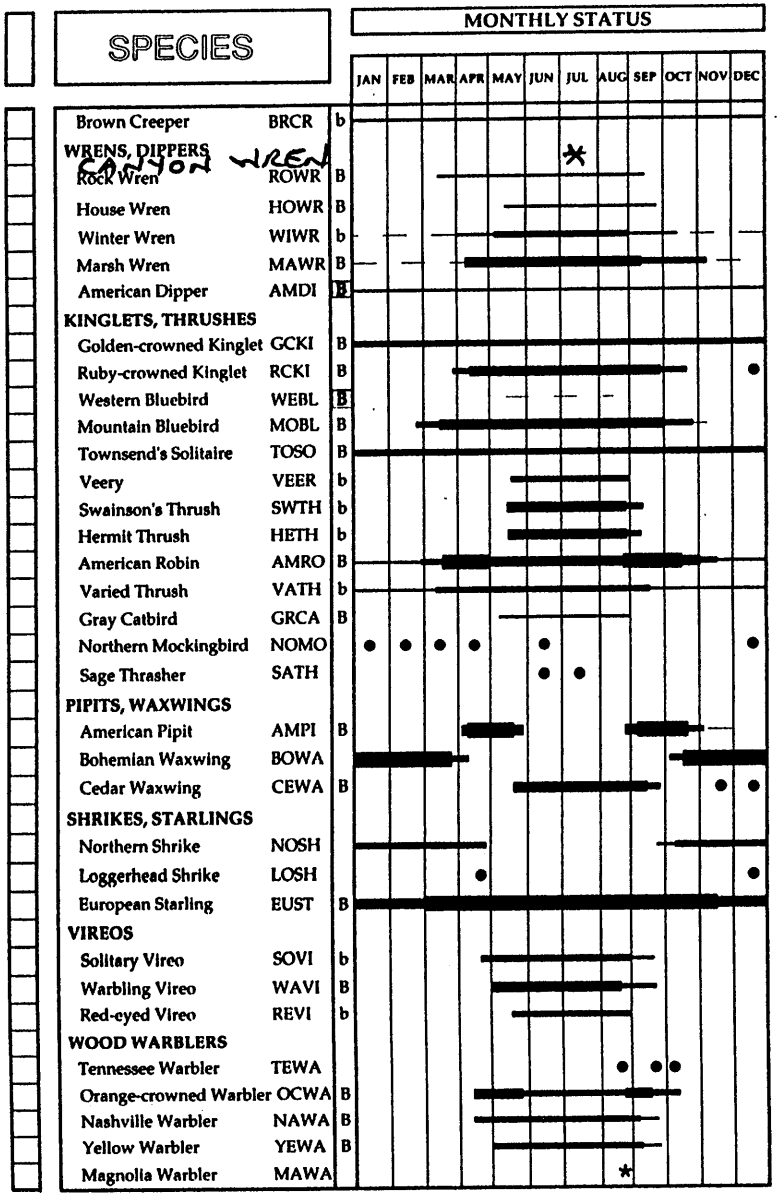
SPECIES			MONTHLY STATUS											
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LOONS														
Red-throated Loon	RTLO			●							●	→●		
Pacific Loon	PALO						●				●	●		
Common Loon	COLO	B												
Yellow-billed Loon	YBLO		●				●			●	→●	→●	→●	→●
GREBES														
Pied-billed Grebe	PBGR	B	—	—	—	—	—	—	—	—	—	—	—	—
Horned Grebe	HOGR	B	—	—	—	▬	▬	—	—	—	▬	▬	▬	—
Red-necked Grebe	RNGR	B	—	—	—	▬	▬	▬	▬	▬	▬	▬	—	—
Eared Grebe	EAGR	B	—	—	—	—	▬	▬	▬	▬	▬	—	—	—
Western Grebe	WEGR		—	—	—	▬	▬	—	—	—	▬	▬	▬	—
PELICANS														
American White Pelican	AWPE					—	—	—		—	—	—		
CORMORANTS														
Dble-crested Cormorant	DCCO						—	—	—	—	—	—		
BITTERNS & HERONS														
American Bittern	AMBI	b					—	—	—	—	—			
Great Blue Heron	GBHE	B			—	—	▬	▬	▬	▬	▬	▬		
Great Egret	GREG						●	●		●				
Cattle Egret	CAEG											●	●	
Green Heron	GRHE									●				
Bl- crowned Night Heron	BCNH							—	—	—				
IBISES														
White-faced Ibis	WFIB						*							
SWANS & GEESE														
Tundra Swan	TUSW		▬	▬	▬	▬	●			●		▬	▬	▬
Trumpeter Swan	TRUS		▬	▬	▬	●		●				▬	▬	▬
Gt. White-fronted Goose	GWFG		—	—	—	—	●				—	—	—	—
Snow Goose	SNGO				—	—	—				—	—		
Ross' Goose	ROGO					●		●						
Brant	BRAN		●					●				●		
Canada Goose	CAGO	B	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
DUCKS														
Wood Duck	WODU	B	●	→●	▬	▬	▬	▬	▬	▬	▬	▬	●	●
Green-winged Teal	GWTE	B			▬	▬	▬	▬	▬	▬	▬	▬		
Common Teal					*									
Mallard	MALL	B	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
Northern Pintail	NOPI	B	—	—	▬	▬	▬	▬	▬	▬	▬	▬	—	—
Blue-winged Teal	BWTE	B				—	▬	▬	▬	▬	▬			

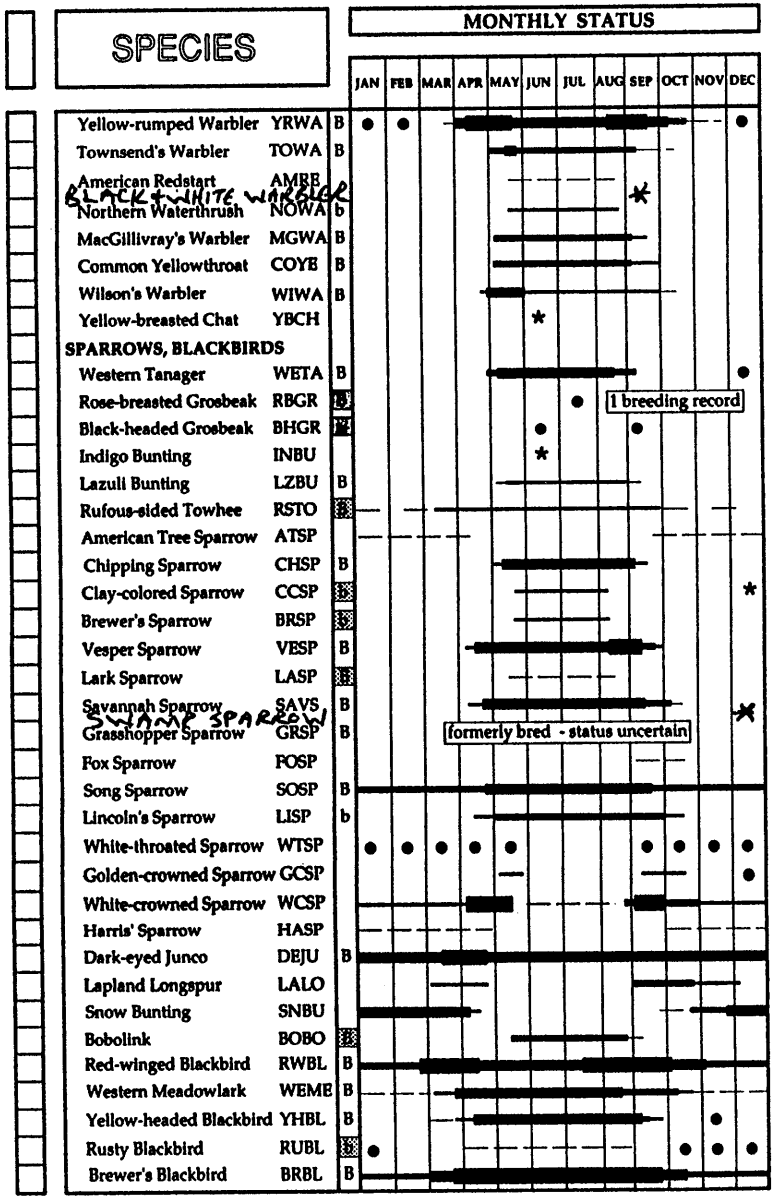

SPECIES
MONTHLY STATUS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Cinammon Teal CITE B
Northern Shoveler NOSL B
Gadwall GADW B
Eurasian Wigeon EUWI
American Wigeon AMWI B
Canvasback CANV B
Redhead REDH B
Ring-necked Duck RNDU B
Greater Scaup GRSC
Lesser Scaup LESC B
Harlequin Duck HADU B
Oldsquaw OLDS
Black Scoter BLSC
Surf Scoter SUSC
White-winged Scoter WWSC B
Common Goldeneye COGO
Barrow's Goldeneye BAGO B
Bufflehead BUFF B
Hooded Merganser HOME B
Common Merganser COME B
Red-breasted Merganser RBME
Ruddy Duck RUDU B
VULTURES
Turkey Vulture TUVU
HAWKS & EAGLES
Osprey OSPR B
Bald Eagle BAEA B
Northern Harrier NOHA B
Sharp-shinned Hawk SSHA B
Cooper's Hawk COHA B
Northern Goshawk NOGO B
Swainson's Hawk SWHA B
Red-tailed Hawk RTHA B
Ferruginous Hawk FEHA
Rough-legged Hawk RLHA
Golden Eagle GOEA B
FALCONS
American Kestrel AMKE B
Merlin MERL B

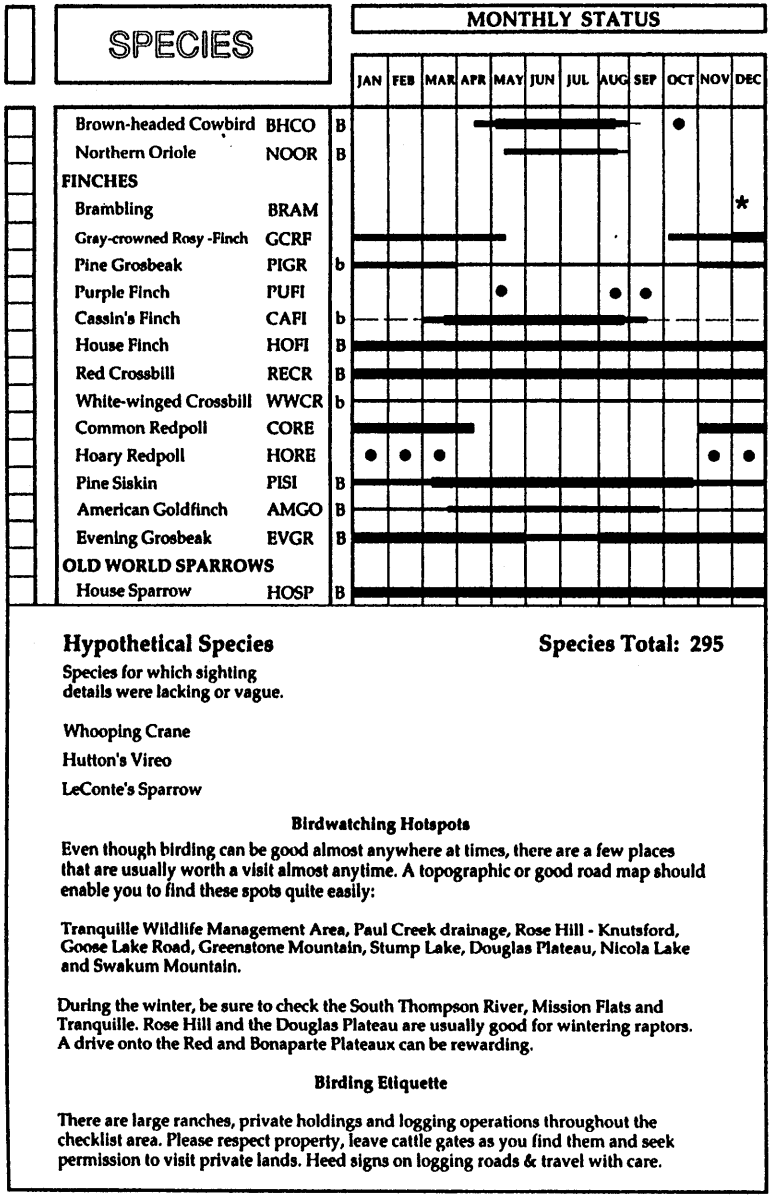

SPECIES
MONTHLY STATUS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Peregrine Falcon PEFA
Gyrfalcon GYRF
Prairie Falcon PRFA b
GROUSE to TURKEY
Gray Partridge GRPA B
Chukar CHUK B
Ring-necked Pheasant RNPH B
Spruce Grouse SPGR B
Blue Grouse BLGR B
White-tailed Ptarmigan WTPT
Ruffed Grouse RUGR B
Sharp-tailed Grouse STGR B
Wild Turkey WITU
RAILS to CRANES
Virginia Rail VIRA b
Sora SORA B
American Coot AMCO B
Sandhill Crane SACR B
PLOVERS to AVOCETS
Black-bellied Plover BBPL
American Golden Plover AGPL
Pacific Golden Plover PGPL
Semipalmated Plover SEPL
Killdeer KILL B
Black-necked Stilt BNST
American Avocet AMAV B
SANDPIPERS
Greater Yellowlegs GRYE
Lesser Yellowlegs LEYE
Solitary Sandpiper SOSA
Willet WILL
Spotted Sandpiper SPSA B
Whimbrel WHIM
Long-billed Curlew LBCU B
Ruddy Turnstone RUTU
Black Turnstone BLTU
Ruff RUFF
Sanderling SAND
Semipalmated Sandpiper SESA


SPECIES
MONTHLY STATUS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Western Sandpiper WESA
Least Sandpiper LESA
White-rumped Sandpiper WRSA
Baird's Sandpiper BASA
Pectoral Sandpiper PESA
Red Knot REKN
Sharp-tailed Sandpiper SHSA
Dunlin DUNL
Stilt Sandpiper STSA
Buff-breasted Sandpiper BBSA
Short-billed Dowitcher SBDO
Long-billed Dowitcher LBDO
Common Snipe COSN B
Wilson's Phalarope WIPH B
Red-necked Phalarope RNPL
Red Phalarope REPH
GULLS & TERNS
Pomarine Jaeger POJA
Parasitic Jaeger PAJA
Long-tailed Jaeger LTJA
Franklin's Gull FRGU
Bonaparte's Gull BOGO
Mew Gull MEGU
Ring-billed Gull RBGU
California Gull CAGU
Herring Gull HEGU
Thayer's Gull THGU
Great Black-backed Gull GBGU
Glaucous-winged Gull GWGU
Glaucous Gull GLGU
Sabine's Gull SAGU
Caspian Tern CATE
Common Tern COTE
Arctic Tern ARTE
Forster's Tern FOTE
Black Tern BLTE B
DOVES & CUCKOOS
Rock Dove RODO B
Band-tailed Pigeon BTPI
SPECIES
MONTHLY STATUS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Mourning Dove MODO B
Black-billed Cuckoo BBCU
Yellow-billed Cuckoo YBCU
OWLS
Barn Owl BNOW
Flammulated Owl FLOW B
Western Screech Owl WSOW b
Great Horned Owl GHOW B
Snowy Owl SNOW
Northern Hawk Owl NHOW
Northern Pygmy Owl NPOW B
Burrowing Owl BUOW B
Reintroduced
Barred Owl BAOW B
Great Gray Owl GGOW B
Long-eared Owl LEOW B
Short-eared Owl SEOW B
Boreal Owl BOOW b
Northern Saw-whet Owl NSWO B
NIGHTJARS & SWIFTS
Common Nighthawk CONI B
Common Poorwill COPO b
Black Swift BLSW b
Vaux's Swift VASW B
White-throated Swift WTSW B
HUM...BIRDS - KINGFISHERS
Black-chinned H...bird BCHU b
Anna's Hummingbird ANHU
Calliope Hummingbird CAHU B
Rufous Hummingbird RUHU B
Belted Kingfisher BEKI B
WOODPECKERS
Lewis' Woodpecker LEWO B
Red-naped Sapsucker RNSA B
Red-breasted Sapsucker RBSA
Williamson's Sapsucker WISA B
Downy Woodpecker DOWO B
Hairy Woodpecker HAWO B
Three-toed Woodpecker TTWO B
Black-backed W..pecker BBWO B


SPECIES
MONTHLY STATUS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Northern Flicker NOFL B
Pileated Woodpecker PIWO B
FLYCATCHERS & LARKS
Olive-sided Flycatcher OSFL b
Western Wood Pewee WWPE B
Alder Flycatcher ALFL b
Willow Flycatcher WIFL B
Least Flycatcher LEFL b
Hammond's Flycatcher HAFL B
Dusky Flycatcher DUFL B
Pacific-slope Flycatcher PSFL B
Say's Phoebe SAPH B
Western Kingbird WEKI B
Eastern Kingbird EAKI B
Scissor-tailed Flycatcher STFL
Horned Lark HOLA B
SWALLOWS
Tree Swallow TRSW B
Violet-green Swallow VGSW B
N. Rough-winged Swall. NRWS B
Bank Swallow BKSW B
Cliff Swallow CLSW B
Barn Swallow BASW B
JAYS & CROWS
Gray Jay GRJA B
Steller's Jay STJA B
Blue Jay BLJA
Clark's Nutcracker CLNU B
Black-billed Magpie BBMA B
American Crow AMCR B
Common Raven CORA B
CHICKADEES - CREEPERS
Black-capped Chickadee BCCH B
Mountain Chickadee MOCH B
Boreal Chickadee BOCH B
Chestnut-backed Chick. CBCH
Red-breasted Nuthatch RBNU B
White-breasted Nuthatch WBNU B
Pygmy Nuthatch PYNU B


SPECIES
MONTHLY STATUS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Brown Creeper BRCR b
WRENS, DIPPERS
CANYON WREN
Rock Wren ROWR B
House Wren HOWR B
Winter Wren WIWR b
Marsh Wren MAWR B
American Dipper AMDI B
KINGLETS, THRUSHES
Golden-crowned Kinglet GCKI B
Ruby-crowned Kinglet RCKI B
Western Bluebird WEBL B
Mountain Bluebird MOBL B
Townsend's Solitaire TOSO B
Veery VEER b
Swainson's Thrush SWTH b
Hermit Thrush HETH b
American Robin AMRO B
Varied Thrush VATH b
Gray Catbird GRCA B
Northern Mockingbird NOMO
Sage Thrasher SATH
PIPITS, WAXWINGS
American Pipit AMPI B
Bohemian Waxwing BOWA
Cedar Waxwing CEWA B
SHRIKES, STARLINGS
Northern Shrike NOSH
Loggerhead Shrike LOSH
European Starling EUST B
VIREOS
Solitary Vireo SOVI b
Warbling Vireo WAVI B
Red-eyed Vireo REVI b
WOOD WARBLERS
Tennessee Warbler TEWA
Orange-crowned Warbler OCWA B
Nashville Warbler NAWA B
Yellow Warbler YEWA B
Magnolia Warbler MAWA





Hypothetical Species

Species for which sighting details were lacking or vague.

Whooping Crane

Hutton's Vireo

LeConte's Sparrow

Species Total: 295

Birdwatching Hotspots

Even though birding can be good almost anywhere at times, there are a few places that are usually worth a visit almost anytime. A topographic or good road map should enable you to find these spots quite easily:

Tranquille Wildlife Management Area, Paul Creek drainage, Rose Hill - Knutsford, Goose Lake Road, Greenstone Mountain, Stump Lake, Douglas Plateau, Nicola Lake and Swakum Mountain.

During the winter, be sure to check the South Thompson River, Mission Flats and Tranquille. Rose Hill and the Douglas Plateau are usually good for wintering raptors. A drive onto the Red and Bonaparte Plateaux can be rewarding.

Birding Etiquette

There are large ranches, private holdings and logging operations throughout the checklist area. Please respect property, leave cattle gates as you find them and seek permission to visit private lands. Heed signs on logging roads & travel with care.

Notes

Location _____

Date _____ Time _____

Weather _____

Observer(s) _____

Daily Totals Species_____ Individuals_____

Sightings Welcomed

Persons wishing to add to the data base for Kamloops birds & to improve the next edition of this checklist should contact:
Rick Howie, S15 C48, RR#3, Kamloops B.C. , V2C 5K1.

Acknowledgements

Many thanks to the following people who proofread the manuscript, provided comments or added sightings to improve the checklist: ***Dick Cannings, Wayne Campbell, Doug Jury, Dave Low, Eric McAlary, Ralph Ritcey, Syd Roberts, & David Stirling.*** Permission to use the grouse art on the cover was granted by Michael Hames.
Encouragement from the Kamloops Naturalists Club was most welcome.

Earlier versions of a Kamloops checklist by Tom Jacobson provided a sound basis for this current version.
Computer assistance by Chuck Bishop & image setting by Mike Rimmer.

CHECK-LIST OF THE BIRDS *of the* SHUSWAP LAKES REGION

Third Edition, June, 1983

This list comprises all species (248) which have been definitely identified for the area Sicamous to Shuswap and Enderby to the Adams Plateau. In addition there are ten species enclosed in parentheses () which due to their normal range are considered to be accidental and not expected to occur again.
Species marked * are known to have nested in the area.

The abundance and seasonal occurrence of each species is indicated by letters as follows:

Abundance

c — Common —
f — Fairly common -
u — Uncommon —
r — Rare —

Seasonal Occurrence

R — Resident, found all year
S — Summer resident or visitor
W — Winter visitor
M — Migrant, spring and/or fall

(*) = NEW NESTING (VS. KAML-LIST)

	Common Loon*	uS
	(Yellow-billed Loon)	
	Arctic Loon	uM
	Red-throated Loon	rM
	Red-necked Grebe*	fS
	Horned Grebe*	uS
	Eared Grebe	uM
	Western Grebe*	cS
	Pied-billed Grebe*	uS
	(CLARK'S GREBE) X	
	White Pelican	rM
	Great Blue Heron	uS
	(Cattle Egret)	
	American Bittern	rS

	Whistling Swan	fW
	Trumpeter Swan	uW
	Canada Goose*	cM fS
	Snow Goose*	uM
	Ross's Goose	rM

	Mallard*	cW fS
	Gadwall*	fS
	Pintail	uM
	Green-winged Teal*	fS
	Blue-winged Teal*	cS
	Cinnamon Teal*	uS
	American Widgeon*	fW cS
	Shoveler*	uS
	Wood Duck*	uS
	Redhead	fM
	Ring-necked Duck*	uS
	Canvasback	uM
	Greater Scaup	cW
	Lesser Scaup*	fS
	Common Goldeneye	fW uS
	Barrow's Goldeneye*	fW fS
	Bufflehead	fM
	Old Squaw	rM
	Harlequin Duck*	uS
	White-winged Scoter	uM
	Surf Scoter	rM
	Ruddy Duck*	uS
	Hooded Merganser*	fS
	Common Merganser	uW cS
	Red-breasted Merganser	rM

	Turkey Vulture	uS
	Goshawk*	uR
	Sharp-shinned Hawk*	uS
	Cooper's Hawk*	uS

	Red-tailed Hawk*	fS
	Swainson's Hawk*	uS
	Rough-legged Hawk	uM
	(Ferruginous Hawk)	
	Golden Eagle*	rR
	Bald Eagle	uW rR
	Marsh Hawk*	uS
	Osprey*	uS
	Prairie Falcon	rM
	Peregrine Falcon	rM
	Merlin*	uS
	Kestrel*	fS

	Blue Grouse*	uR
	Spruce Grouse*	uR
	Ruffed Grouse*	fR
	White-tailed Ptarmigan*	uR
	Sharp-tailed Grouse*	rS
	Gray Partridge*	rR
	California Quail*	rR
	Ring-necked Pheasant*	cR
	WILD TURKEY	

	Sandhill Crane	uM
	Virginia Rail*	uS
	Sora*	uS
	American Coot*	cS

	Semipalmated Plover	uM
	Killdeer*	cS
	Golden Plover	rM
	Black-bellied Plover	uM
	Ruddy Turnstone	rM

	Common Snipe*	fS
	Long-billed Curlew*	uS
	Upland Plover	rM
	Spotted Sandpiper*	fS
	Solitary Sandpiper	uM
	Greater Yellowlegs	fM
	Lesser Yellowlegs	cM
	Pectoral Sandpiper	cM
	Baird's Sandpiper	fM
	Least Sandpiper	cM
	Dunlin	rM
	Long-billed Dowitcher	cM
	Stilt Sandpiper	rM
	Semipalmated Sandpiper	cM
	Western Sandpiper	cM
	(Hudsonian Godwit) †	
	Sanderling	uM
	(Avocet)	
	(SHORT-BILLED DOWITCHER)	

	Wilson's Phalarope*	uS
	Northern Phalarope	cM

	Parasite Jaeger	rM
	Long-tailed Jaeger	rM
	Glaucous Gull	rW
	Glaucous-winged Gull	rM
	Herring Gull	uW cM
	Thayer's Gull	rM
	California Gull	fM
	Ring-billed Gull X	cM
	Franklin's Gull	rM
	Bonaparte's Gull	fM
	Sabine's Gull	rM
	Forster's Tern	r
	Common Tern	fM
	Black Tern	uM
	(ICELAND GULL) X	

	(Band-tailed Pigeon)	
	Mourning Dove*	cS

	(Barn Owl)	
	Screech Owl	uS
	Great Horned Owl*	uR
	Snowy Owl	uW
	Hawk Owl	rW
	Pygmy Owl*	uR
	Burrowing Owl*	rS
	Barred Owl*	rR
	Great Gray Owl	rR
	Long-eared Owl*	uR
	Short-eared Owl*	uS
	Boreal Owl	rW
	Saw-whet Owl*	rR
	MYP- (FLAMMULATED OWL)	
	Poorwill	rS
	Common Nighthawk*	fS
	Black Swift	uS
	Vaux's Swift*	uS
	White-throated Swift*	uS
	Black-chinned Hummingbird*	rS
	Rufous Hummingbird*	fS
	Calliope Hummingbird*	uS
	Belted Kingfisher*	uS
	(ANNA'S HUMMINGBIRD)	

	Common Flicker*	cR
	Pileated Woodpecker*	uR
	Lewis's Woodpecker*	uS
	~~Yellow-bellied Sapsucker*~~	fS
	RED-NAPED SAPSUCKER X	

	Hairy Woodpecker*	uR
	Downy Woodpecker*	uR
	(White-headed Woodpecker) X	
	Black-backed Woodpecker*	uR
	Northern 3-toed Woodpecker	uR

	(Scissor-tailed Flycatcher) + KAML	
	Eastern Kingbird*	fS
	Western Kingbird*	fS
	(Ash-throated Flycatcher) X	
	Say's Phoebe*	uS
	~~Traill's Flycatcher*~~	fS
	Least Flycatcher	rS
	Hammond's Flycatcher	uS
	Dusky Flycatcher*	fS
	Western Flycatcher	rS
	Western Wood Pewee*	fS
	Olive-sided Flycatcher*	uS

	Horned Lark	uM
	Violet-green Swallow*	cS
	Tree Swallow*	cS
	Bank Swallow*	cS
	Rough-winged Swallow*	fS
	Barn Swallow*	fS
	Cliff Swallow	uS

	Gray (Canada) Jay*	uR
	Stellar's Jay*	uR
	Black-billed Magpie	fS
	Common Raven*	fS
	Common Crow*	cS
	Clark's Nutcracker*	uR

	Black-capped Chickadee*	cR
	Mountain Chickadee*	fR
	Boreal Chickadee*	uR
	Chestnut-backed Chickadee	rR
	(Common Bushtit) X	
	White-breasted Nuthatch*	rR
	Red-breasted Nuthatch*	fR
	Pygmy Nuthatch*	rR
	Brown Creeper*	uR

	American Dipper*	uR
	House Wren*	rS
	Winter Wren*	rR
	Rock Wren	rS
	Long-billed Marsh Wren*	rS
	Catbird*	S

	Mocking Bird	r
	American Robin*	cS
	Varied Thrush*	uS
	Hermit Thrush	fS
	Swainson's Thrush*	fS
	Gray-cheeked Thrush	rM
	Veery*	fS
	Western Bluebird*	uS
	Mountain Bluebird*	fS
	Townsend's Solitaire*	uR

	Golden-crowned Kinglet*	uS
	Ruby-crowned Kinglet*	uS
	Water Pipit*	cM uS
	Bohemian Waxwing	fW
	Cedar Waxwing*	uS
	Northern Shrike	uW
	Loggerhead Shrike	rM
	Common Starling*	cS

	Solitary Vireo*	uS
	Red-eyed Vireo*	cS
	Warbling Vireo*	uS
	Black & White Warbler	rM
	Orange-crowned Warbler	uM
	Nashville Warbler*	uS
	Yellow Warbler*	fS
	Myrtle Warbler	rM
	Audubon's Warbler*	fS
	Townsend's Warbler*	uS
	Northern Waterthrush	uM
	MacGillivray's Warbler*	uS
	Yellow-breasted Chat	rS
	Wilson's Warbler	uM
	Common Yellowthroat*	uS
	American Redstart*	fS
	House Sparrow*	cR
	Bobolink*	rS
	Western Meadowlark*	fS

	Yellow-headed Blackbird*	uS
	Red-winged Blackbird*	cS
	Northern Oriole*	fS
	Rusty Blackbird	uM
	Brewer's Blackbird*	cS
	Common Grackle	rM
	Brown-headed Cowbird*	fS
	Western Tanager*	fS
	Black-headed Grosbeak	rS
	Lazuli Bunting*	fS
	Evening Grosbeak*	fW uS
	Cassin's Finch*	uS
	House Finch	cR
	Pine Grosbeak*	uR
	Gray-crown Rosy Finch*	uS
	Hoary Redpoll	rW
	Common Redpoll	cW
	Pine Siskin*	fR
	American Goldfinch*	fS
	Red Crossbill*	fR
	White-winged Crossbill	uW
	Rufous-sided Towhee*	uS
	Savannah Sparrow*	cS
	Vesper Sparrow*	cS
	Lark Sparrow	rS
	Dark-eyed Junco	cR
	Tree Sparrow	uM
	Chipping Sparrow*	cS
	Harris's Sparrow	rM
	White-crowned Sparrow	fM
	Golden-crowned Sparrow	uM
	White-throated Sparrow	rW
	Fox Sparrow	uM
	Lincoln's Sparrow	uM
	Song Sparrow*	cR
	Lapland Longspur	uM
	Snow Bunting	uW

SWAMP SPARROW

HYP- CONNECTICUT WARBLER

(SIBERIAN ACCENTOR)

? E. PHOEBE

? BLACKPOLL WARBLER

247 - REGULAR
+ 11 - ACC
+ 2 - HYPOTH.

142 SPP - LEGGED

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List of Mammals in Study Area

(based on RBCM, Cowan Vertebrate Museum, CDC, McTaggart-Cowan & Guiguet 1965, Stevens and Lofts 1988, and Nagorsen & Brigham 1993 records)

masked shrew

vagrant shrew

dusky shrew

water shrew

little brown myotis

Yuma myotis

long-eared myotis

fringed myotis

long-legged myotis

California myotis

western small-footed myotis

silver-haired bat

big brown bat

hoary bat

Townsend's big-eared bat

pika

snowshoe hare

yellow-pine chipmunk

least chipmunk

yellow-bellied marmot

hoary marmot

Columbian ground squirrel

red squirrel

northern flying squirrel

northern pocket gopher

great basin pocket mouse

beaver

deer mouse

bushy-tailed woodrat

southern red-backed vole

heather vole

meadow vole

montane vole

long-tailed vole

water vole

muskrat

northern bog lemming

meadow jumping mouse

porcupine

gray wolf

coyote

red fox

black bear

grizzly bear

raccoon

marten

fisher

ermine

short-tailed weasel

mink

wolverine

badger

striped skunk

river otter

cougar

lynx

bobcat

elk

mule deer

white-tailed deer

moose

mountain goat

bighorn sheep

mountain caribou

List of Fishes in Study Area (based on RBCM, CDC & Carl et al 1977 records)

Pacific lamprey

pygmy whitefish

lake whitefish

lake trout

dolly varden

brook trout

rainbow trout (includes steelhead trout and Kamloops trout)

pink salmon

coho salmon

chinook salmon

sockeye salmon (includes kokanee)

largescale sucker

bridgelip sucker

northern mountain sucker

carp

goldfish

redside shiner

northern squawfish

peamouth chub

lake chub

leopard dace

longnose dace

prickly sculpin

torrent sculpin

slimy sculpin

chiselmouth

List of Amphibians and Reptiles in Study Area

(based on RBCM, Cowan Vertebrate Museum, CDC, Gregory & Campbell 1984, and Green and Campbell 1992 records)

1. Amphibians

long-toed salamander

tailed frog

great basin spadefoot toad

western toad

Pacific tree frog

spotted frog

wood frog

2. Reptiles

painted turtle

western skink

northern alligator lizard

rubber boa

sharptail snake

racer

gopher snake

common garter snake

western terrestrial garter snake

western rattlesnake

List of Persons Contacted

Christine Adkins	Acting Curator, Cowan Vertebrate Museum, Univ. of B.C., Vancouver
Rob Bison	Fisheries Biologist, Min. of Envir., Lands & Parks, Kamloops
Geoff Bodman	Sheep rancher, Pinantan Lake
Dr. Doug Brown	Tribal Director, Shuswap Nation Tribal Council, Kamloops
Rob Butler	Wildlife Biologist, Can. Wildlife Service, Delta
Dr. Brenda Callan	Mycologist, Canadian Forest Service, Victoria
Wayne Campbell	Wildlife Biologist and Editor of *The Birds of B.C.*, Min. of Envir. Lands & Parks, Victoria
Rob Cannings	Entomology Curator, Royal B.C. Museum, Victoria
Jim Cooperman	Consultant and Editor of *B.C. Environmental Report*, Chase
Jim Cosgrove	Royal B.C. Museum, Victoria
Joan Cowan	Curator, Enderby and District Museum
Dr. Tom Dickinson	Biology Dept., Univ. College of the Cariboo, Kamloops
Jack Gregson	Entomologist, Agriculture Canada, Kamloops (retired)
Chris Harris	Consulting naturalist, Vancouver
Ed Heenan	Biologist, Ducks Unlimited, Kamloops
Bill Horswill	Forestry Director, Shuswap Nation Tribal Council, Kamloops
Dr. Russ Horton	Range Ecologist, Research Branch, Min. of Forests, Kamlooops
Rick Howie	Habitat Biologist, Min. of Envir., Lands & Parks, Kamloops
Grant Hughes	Director of Curatorial Services, Royal B.C. Museum, Victoria
Dr. Lee Humble	Entomologist, Canadian Forest Service, Victoria
Dr. Marianne Ignace	Program Coordinator, Shuswap Cultural Education Society, Kamloops
Bernie Ivancoe	Receation Forester, Min. of Forests Regional Office, Kamloops
Mona Jules	Language Programs, Shuswap Nation Tribal Council, Kamloops

Leslie Kennes	Royal B.C. Museum, Victoria
Kurt Kier	Wildlife Biologist, Min. of Envir., Lands & Parks, Kamloops
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Dave Low	Wildlife Biologist, Min. of Envir., Lands & Parks, Kamloops
Dennis Lloyd	Regional Ecologist, Min. of Forests Regional Office, Kamloops
Andy MacKinnon	Forester, Research Branch, Min. of Forests, Victoria
Karen McLaren	Botanist, Kamloops Naturalist Club
Mike McNall	Ornithology Curator, Royal B.C. Museum, Victoria
Bernadette Manuel	Museum Coordinator, Secwepemc Museum & Archives, Kamloops
Patrick Matthew	Thompson Area Manager, Fisheries Resource Management Section, Shuswap Nation Tribal Council, Kamloops
Dave Moore	Director, Fisheries Resource Management Section, Shuswap Nation Tribal Council, Kamloops
Ken Morgan	Biologist, Can. Wildlife Service, Institute of Ocean Sciences, Sidney
Dave Nagorsen	Mammals Curator, Royal B.C. Museum, Victoria
Sandra Peacock	Doctoral Fellow, Envir. Studies, Univ. of Victoria
Alex Peden	Fisheries Curator, Royal B.C. Museum, Victoria
George Powell	Range Ecologist, Research Branch, Min. of Forests, Kamlooops
Dr. Dee Quinton	Research Scientist, Agriculture Canada, Kamloops
Ralph Ritcey	Wildlife Biologist, Min. of Envir., Lands & Parks, Kamloops (retired)
Barry Rosenberger	Manager, Dept. of Fisheries & Oceans, Kamloops
Marge Sidney	Fisheries Biologist, Min. of Envir., Lands & Parks, Kamloops

Mary-Lou Tapsen-Jones	Botanist and naturalist, Salmon Arm
Mary Thomas	Secwepemc elder, Niskonlith Band, Enderby
Joe Thomas	Native Resource Management Program Coordinator, Shuswap Nation Tribal Council, Kamloops
Dr. Nancy Turner	Envir. Studies, Univ. of Victoria
Astrid van Woudenberg	Biologist, B.C. Conservation Foundation, Kamloops
Dr. Brian Wikeem	Noxious Weed Biocontrol Officer, Silviculture Practices Branch, Min. of Forests, Kamlooops