

Skagit River Watershed

BACKGROUND REPORT

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Ministry of Environment
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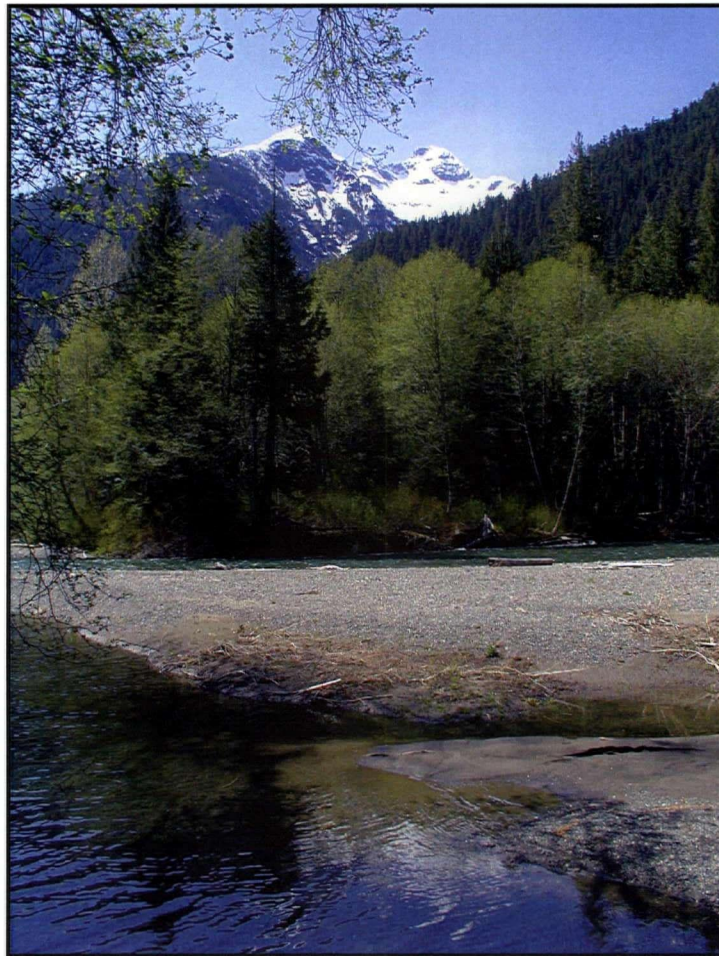


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Skagit River below Silvertip Mountain *

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1.0 INTRODUCTION

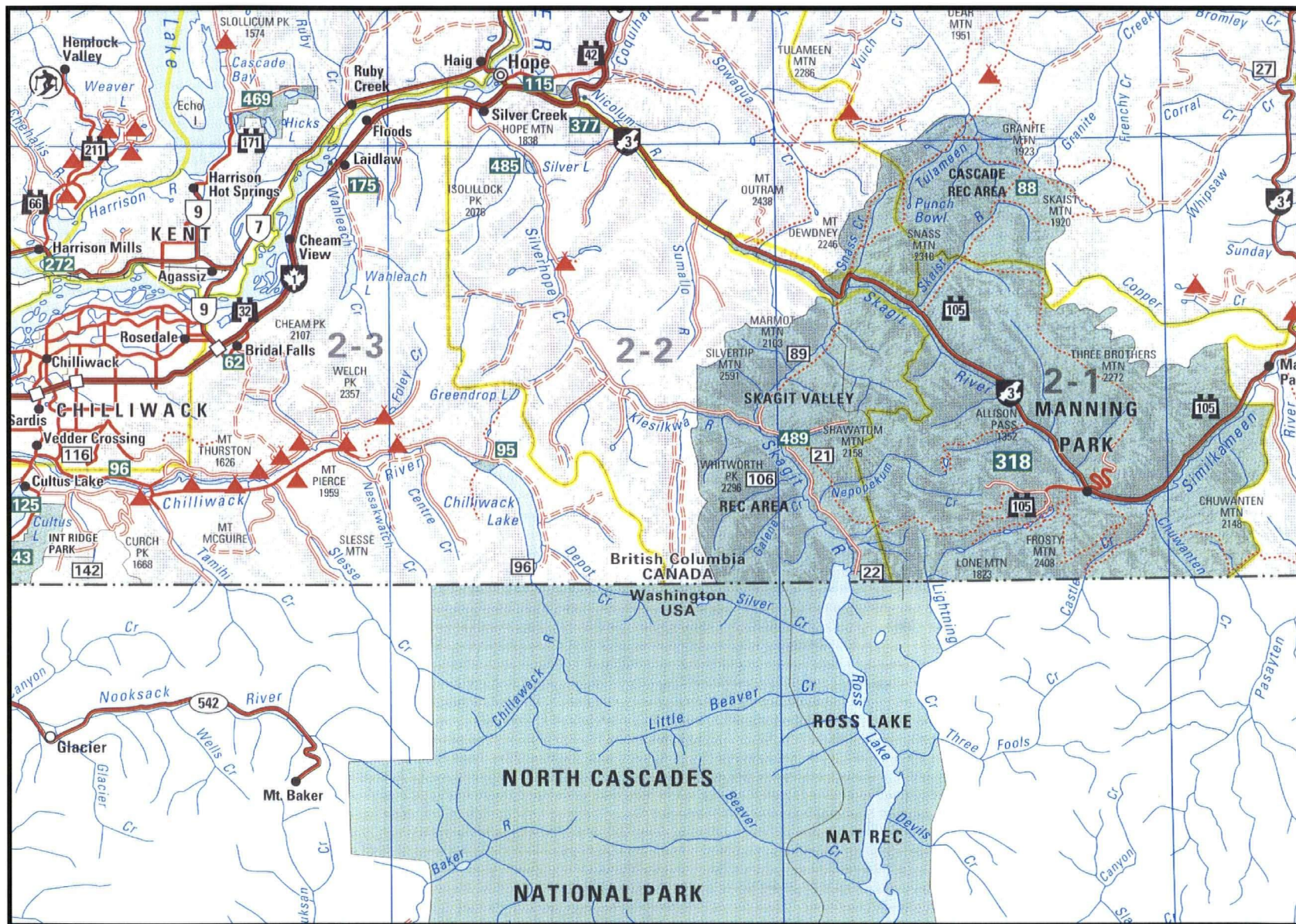
The Skagit River Watershed transcends borders in many ways. It includes one of the largest Protected Areas in North America, bordering North Cascades National Park and Ross Lake Recreation Area in the United States. It is a transition zone from BC's wet coastal climate to its drier interior. It encompasses five of B.C.'s sixteen biogeoclimatic zones and, as a result, has a high level of biological diversity. The Skagit River is the centrepiece of the picturesque Skagit River Valley, and was named one of BC's "Heritage Rivers" in 1996 by the Province of British Columbia. Located 170 km east of Vancouver, it is easily accessible by the Lower Mainland's growing population (*Figure 1*).

Historically the watershed was an important hunting and trading area for coastal and interior First Nations groups such as the Sto:lo and the Nlaka'pmx. The Nooksack and Upper Skagit peoples (from present-day United States) also traded in the area. Later it became a significant area for European and American explorers who followed old trails such as the Skyline and Blackeye, then blazed their own (Whatcom, Dewdney) across the Cascade Mountains to gold fields and areas of settlement. A brief gold rush occurred at Steamboat Mountain in 1910 (present-day Shawatum Mountain). A town sprang up almost overnight, but the mineral claims turned out to be a hoax.

The watershed is not part of the Fraser system; instead, from its headwaters near Allison Pass in the Cascade Mountains, the Skagit River flows west and then south into the United States where it empties into the Pacific Ocean near Mount Vernon, Washington. The Skagit River Watershed in Canada encompasses an area of 99,768 hectares, approximately 70% of which is protected in three provincially protected areas (*Figure 2*). The watershed boundary can be accessed by vehicle on the Hope-Princeton Highway, 20 km east of Hope near the Hope Slide, or on Silver-Skagit Road approximately 29 km south of Hope.

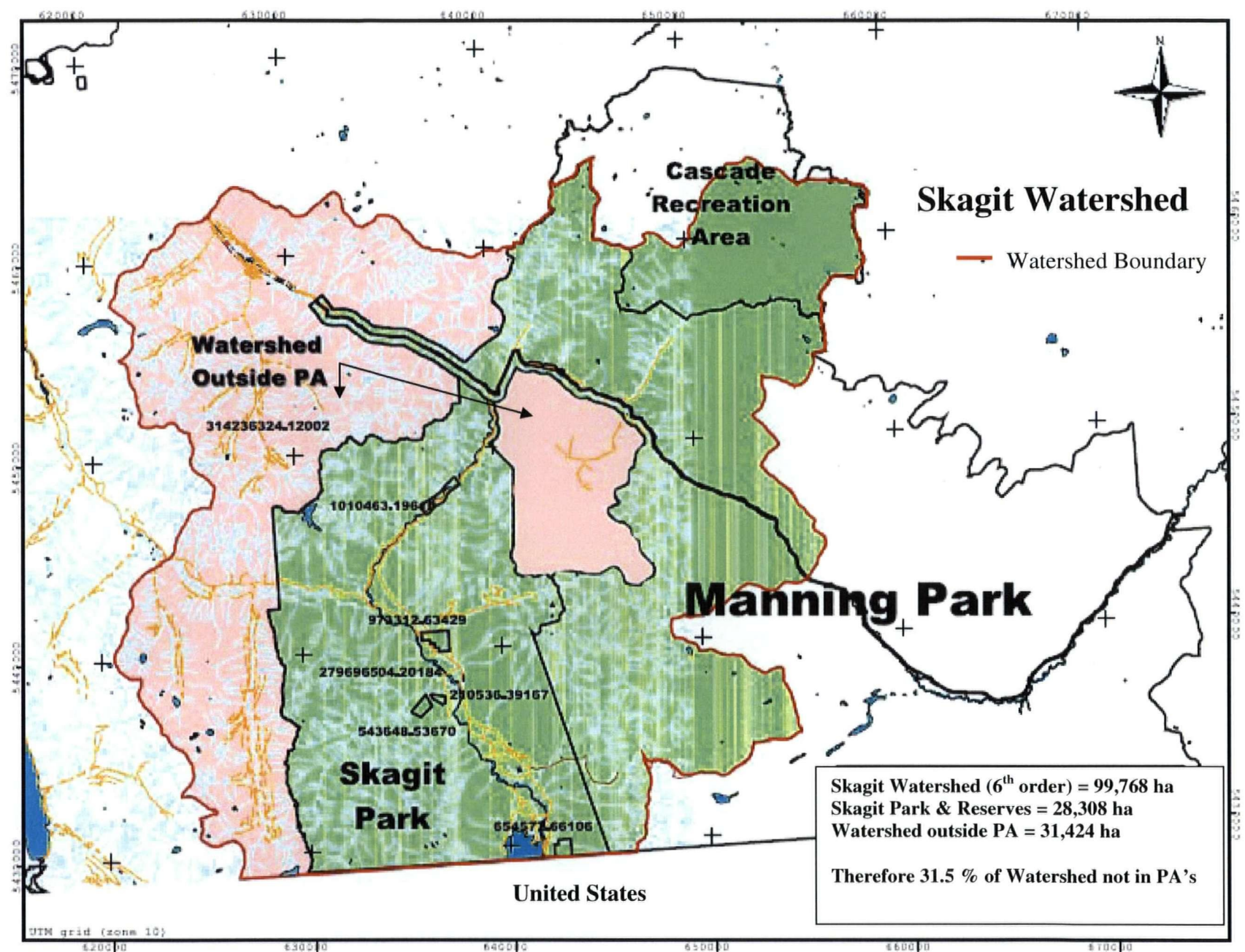
Between 1941 and 1973, three major areas of the watershed were protected under the BC provincial park system; Skagit Valley Provincial Park, E.C. Manning Provincial Park and Cascade Recreation Area. In 1984 the Government of British Columbia signed a treaty with the United States that prevented further expansion of the Ross Lake Reservoir into Canada. Today the watershed attracts a wide variety of users for recreation, research and outdoor education.

The purpose of this report is to provide readers with information on current uses in the Upper Skagit River Watershed (referred to as the "Skagit River Watershed" or "Skagit Watershed" in this report) and is limited in scope to that portion of the watershed that lies within Canada. The report precedes the development of a Fish & Wildlife Management Plan for the Skagit Watershed, which is scheduled to be available in the spring of 2008 by the Ministry of Environment in British Columbia.



BC Road & Recreational Atlas, 2001

Figure 1: Regional Context of the Skagit Watershed.



Ministry of Environment, 2005.

Figure 2: Protected Areas within the Skagit Watershed.

2.0 Cultural and Historical Values

2.1 First Nations

First Nations people have traveled through the North Cascades and the Skagit River Watershed to trade and to meet for thousands of years. Similar to its biophysical values as a transition zone, the Skagit Valley served as a meeting place between the people of the coast and the people of the interior. The Upper Similkameen Band, the Sto:lo, Stuwix (Nicola) and Nlaka'pma (Thompson) have ancestral connections to the area, while groups from the south, the Nooksack and Upper Skagit people, traded and reportedly fought with the Sto:lo and Nlaka'pmx. Coastal products such as dried salmon and oolichan were exchanged with interior products such as dried berries, wild hemp and red-ochre-rock. At the headwaters of the Skagit River in today's Manning Park, the Upper Similkameen lived part of the year trapping and hunting; while the Sto:lo fished and hunted on the lower valley bottom during the summer and fall months.

Despite the lack of detailed archeological/ anthropological studies, more than 100 sites are on record by the archeological branch of BC's Ministry of Agriculture and Tourism. Although few studies have been done at the higher elevations, a huckleberry processing trench associated with trails on prominent ridgelines in the Galene Lakes area has been documented. Archeological excavations and studies in the U.S. North Cascades have uncovered numerous pottery shards made of chert and tools used for hunting and building.

At least three ancient routes established by aboriginal people became fundamental to the Europeans as they arrived to fur-trade, mine and settle: the Skyline Trail (from Lightning Lakes to the Skagit Valley); Blackeye's Trail (from Princeton through the Tulameen to Cascade RA and into Nicolum Creek Valley and Hope); and a trail from the Similkameen valley to the Upper Skagit Valley via Three Brothers Mountain.

The cultural heritage role of the protected areas is to protect and interpret First Nations' traditional use and resources, such as culturally modified trees (CMT) and the history associated with the Dewdney, Hope Pass and Whatcom trails. As well, more information on archaeological sites is necessary before new park management initiatives can move forward.

2.2 Early development

Until the signing of the Oregon Treaty in 1846, establishing the Canada-US border at the 49th parallel, travel through the Skagit by non-natives was limited. With the discovery of gold in the late 1850's, Americans from Whatcom, Washington wanted to reach the Fraser River gold fields. The Whatcom Trail, built by US Army engineer Walter de Lacy followed the Skagit River and Snass Creek and merged with the Dewdney Trail, a variation of the original Hudson's Bay Brigade Trail. Part of today's Skagit River Trail follows a section of the Whatcom trail between Sumallo Grove and 26 Mile Bridge.

Later in 1879 placer gold discoveries in Ruby Creek, a tributary of the Skagit River in Washington State, prompted prospectors to use the Whatcom Trail through the Skagit Valley to reach the diggings. A trail from Chilliwack also lead to the Skagit and the miner's themselves blazed a trail from the International border to Ruby Creek. By August 1880 the mine was abandoned, yet the trail from Hope through the Skagit was now in good condition.

The next flurry of prospector activity began in 1910 when US speculators, Greenwalt and Stevens, reported a gold strike near Steamboat Mountain (Shawatum). Three town sites with all the amenities (including the Hope-Steamboat Nugget newspaper) boomed as the region was staked with claims. Despite the hopes for prosperity, the Chief of the Dominion Geological Survey stated Steamboat Mountain was on the edge of a coal formation, not gold. Today the townsites have been completely reclaimed by nature. Further mining discoveries were made at the head of the Silverdaisy Creek in 1934. Evidence of shafts and an aerial tramway still exist.

Henry Whitworth and his five daughters was a notable family in the history of the Valley. The Whitworth Ranch (236 hectares) operated from 1905-1929. He also bought the Cawley Ranch, which later became Chittenden Meadow. A 10-room house built from lumber cleared from the land was maintained by the BC Forest Service until it was removed in the 1950's.

In 1946 the Silver-Skagit Road was completed. The main purpose of the road was for clearing the land for the eventual flooding of the Skagit Valley. Logging operations spread quickly throughout the valley. As well as the logging, hunters and fishermen took advantage of the access into the Skagit. By the 1950's the construction of the Trans-Canada Highway made the Skagit more accessible to Vancouver's booming population.

2.3 History of Protection

In 1906 the Seattle City Light Company began building dams across the Skagit River. Over the following years dams on the U.S. (Diablo, Gorge and Ross) raised the Ross Lake Reservoir to approach the Canadian border. In 1941 formal application to the International Joint Commission authorized Seattle City Light to raise the water behind Ross Lake to 526 m (1725 ft) above sea level (flooding as far up as Silvertip Campground). The project was delayed until the Silver-Skagit Road was constructed in 1946. Finally in 1947 a BC *Skagit Valley Land Act* was passed authorizing the flooding to 526 m by Seattle City Light. Controversy over the compensation for the flooding brewed. By 1967 an Agreement between Seattle and the Province of BC was reached to flood the Skagit Valley to the 526 m contour level for a period of 99 years.

A ground swell of both American and Canadian environmental concerns prompted the ROSS Committee – 'Run Out Skagit Spoilers'. "Curley" Chittenden, originally hired by Seattle City Light to supervise the clearing of the land, soon recognized the significance of the natural values of the valley. He quit and became a leading supporter of the campaign. Gradually over the next 30 years the Skagit Valley was transformed into a region with protected ecological values.

Chronological timeline of Protection in the Skagit:

- 1970 - Skagit River Provincial Park established (1499 ha)
- 1971 - Ross Lake and Skagit River Forest Ecological Reserves established
- 1973 - Skagit River Park cancelled and Skagit Valley Recreation Area established (32,000 ha)
- 1978 - Skagit River Cottonwoods Ecological Reserve established
- 1981 - Skagit River Rhododendrons Ecological Reserve established
- 1984 - Canada-US Treaty signed
- 1984 - Skagit Environmental Endowment Commission (SEEC) established
- 1996 - Skagit Valley 'Class A' Provincial Park (27,948 ha) established from Recreation Area.

In 1984 a Canada-US Treaty relating to the Skagit River and Ross Lake was signed, based on an agreement between the City of Seattle and the Province of BC. The treaty expires in 2066 and stipulates that Seattle City Light cannot raise the level of the Ross Lake Reservoir past the 1602 ft. level. In exchange, the United States receives power from the Seven Mile Dam in Canada (Columbia River) at rates equivalent to what would have resulted from raising the Ross Dam.

The treaty also created the Skagit Environmental Endowment, a fund used for the promotion of the natural, cultural, and recreational values in the watershed. The fund is overseen by a Commission of both Canadian and American representatives who act as advocates for the protection of the Upper Skagit Watershed, an ecologically significant watershed, to be managed cooperatively as a single ecosystem.

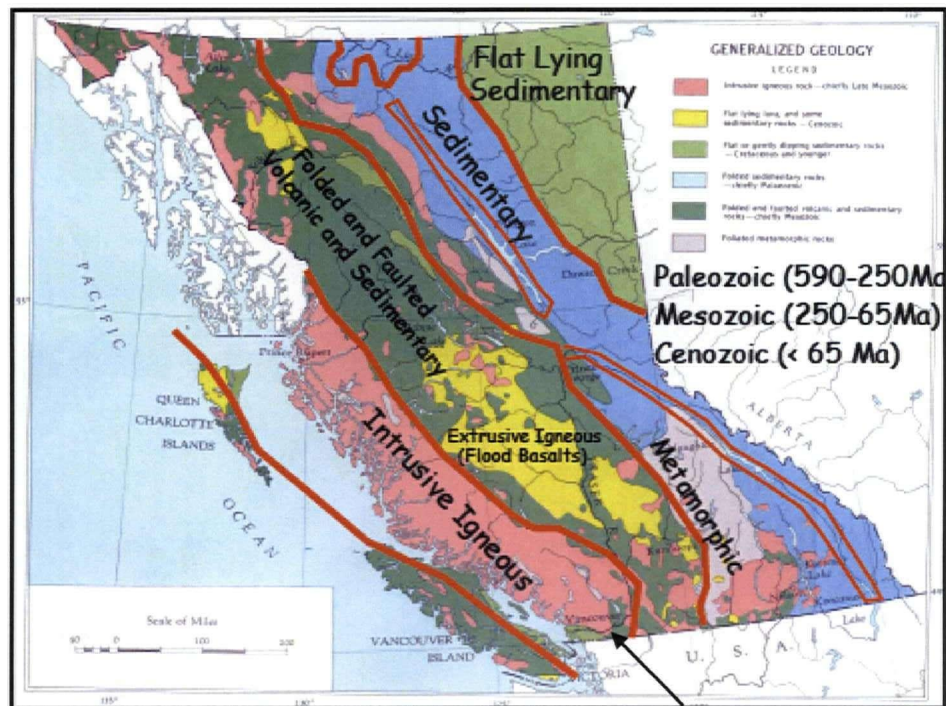
E.C.Manning Provincial Park, adjacent to Skagit Valley Provincial Park, was originally proposed as a park during the great depression of the 1930's, testament to the foresight seen by British Columbians in its eventual creation in 1941. Today both parks represent a significantly large protected area, comprising about three-quarters of the Skagit River Watershed in Canada.

3.0 NATURAL VALUES

3.1 Physiography, Geology and Soils

The Skagit River Watershed lies within the Cascade Mountains, a rugged mountainous region separated from the Fraser Lowland in the west and from the Okanagan Plateau in the east. It is situated in the Eastern Pacific Ranges of the Cascade Mountains, a mountain chain that extends 1,126 km from southwestern BC to northern California. During the Jurassic and Cretaceous periods, processes of uplift, erosion and deposition took place, creating sharp and rugged mountains. Later in the Pleistocene the area was strongly modified by glaciation. The present-day Cascade Mountains were formed around 10 million years ago. The deposition of glacial till and colluvium that can be found on mountain slopes in the area was largely a result of the Fraser Glaciation, the last glaciation in southwestern BC. The broad U-shaped Skagit Valley is a prime example of glacial movement in the region.

The bedrock of the Skagit Watershed is composed of volcanic and sedimentary rock, with a mix of igneous intrusive (*Figure 3*). Chert, limestone and green andesite underlie most of the area. Soils are primarily Humo-ferric Podzols and Dystric Brunisols.



Skagit River Watershed

Figure 3: Location of the Skagit River Watershed within geologic context of BC.

3.2 Climate

Climate in the watershed reflects the transitional nature of the area. In the northwestern parts of the watershed, moderately wet conditions can be found, while closer to the international border in the rainshadow of the Cascade Mountains, relatively dry conditions prevail. The town of Hope, BC has twice the rainfall that Princeton, a town just east of the watershed, has.

Table 1 shows temperatures and precipitation for two weather stations; the *Hope Slide* station is located on the northwestern boundary of the watershed at 673.6m in elevation, while the *Princeton A* station (at 700.4m) is located slightly to the east of the watershed, but reflects similar rainshadow conditions found at Ross Lake. The Princeton station reflects much drier and warmer conditions than the Hope Slide station. Cooler moist air from Pacific systems in the winter and warm moist air in the summer precipitate as they rise across the North Cascade Mountains. Snowfall increases with elevation and is generally heavier in the northern areas of the watershed.

3.3 Hydrology

The hydrology of the Skagit River Watershed is centered around the Skagit River, a sixth order stream, and one of twenty rivers designated as a “Heritage River” in the Province of British Columbia. From its headwaters near Allison Pass in E.C. Manning Provincial Park the Skagit River flows northwesterly and then southeasterly after it receives waters from two of its main tributaries, Snass Creek and the Sumallo River. The Klesilkwa River, another main tributary, joins the Skagit River in a broad valley in the heart of Skagit Valley Provincial Park. From here the river flows in a southerly direction to the international border and the Ross Lake Reservoir.

The Skagit’s length from its headwaters to the Ross Lake Reservoir is approximately 56 km. Snowmelt dominates the flow regime of the river, with peak flows occurring in June or July, and low flows in January or February.

The largest lake in the watershed is the Ross Lake Reservoir, which was created by the construction of the High Ross Dam in the early 1940’s (see Section 6.0). A small part of the reservoir (approx.2 km) spills over the border into Canada for a duration of approximately 3 months in the summer.

Notable subalpine lakes in the watershed, although not large, include Nicomen and Poland lakes in E.C. Manning Provincial Park and the Shawatum and Galene lakes in Skagit Valley Provincial Park. Many small ponds and wetlands occur in the wide valley bottom of the Skagit Valley, providing important habitat for wildlife species.

Table 1: Mean Temperature and Total Precipitation at Hope Slide and Princeton “A” in 2003 and 2004.

Hope Slide Station

	2003	2004	2003	2004
Month	Mean Temperature (°C)	Mean Temperature (°C)	Total Precipitation (mm)	Total Precipitation (mm)
January	0.5	-2.5	148.6	130.2
February	0.7	0.6	46.5	34.3
March	1.4	3.4	211.2	125.7
April	4.8	7.7	79.4	42.8
May	8.7	9.8	42.1	78.0
June	13.6	13.8	26.8	29.2
July	16.0	16.9	6.6	36.2
August	15.6	16.6	18.6	77.6
September	12.7	10.3	32.0	146.2
October	7.8	6.5	347.0	96.8
November	-1.2	2.2	290.0	188.8
December	-1.0	-	88.8	-
Average	6.6	7.7 (no Dec.)		
Sum			1337.6	985.8 (no Dec.)

Mean Temperature and Total Precipitation for Hope Slide in 2003 and 2004.

Princeton “A” Station

	2003	2004	2003	2004
Month	Mean Temperature (°C)	Mean Temperature (°C)	Total Precipitation (mm)	Total Precipitation (mm)
January	-2.3	-5.9	42.6	35.7
February	-1.6	-1.9	6.0	8.4
March	2.2	4.2	48.6	9.0
April	7.1	8.6	25.8	14.0
May	10.6	11.3	16.2	29.4
June	16.2	16.6	25.4	32.4
July	20.1	19.5	0.0	11.0
August	19.0	19.8	6.0	43.2
September	14.9	12.1	10.8	61.4
October	8.6	7.1	97.0	27.6
November	-3.6	2.0	58.0	21.8
December	-5.6	-	10.2	-
Average	7.1	8.4 (no Dec.)		
Sum			346.6	293.9 (no Dec.)

Mean Temperature and Total Precipitation for Princeton A in 2003 and 2004.

Source: Meteorological Service of Canada, 2007.

3.4 Biogeoclimatic Ecosystem Classification (BEC)

Terrestrial ecosystems in British Columbia have been divided into 16 zones (recent changes to the Alpine Tundra zone has resulted in 3 alpine zones). These zones are mostly based on climate, elevation and vegetation. Each zone is named by the predominant tree species within it. The Skagit River Watershed is a transition zone between the moist coastal systems and the drier interior systems. As a result the watershed includes 5 of the 16 biogeoclimatic zones in the province and has a high diversity of plant and wildlife species.

The 5 biogeoclimatic zones found within the watershed are:

Coastal Western Hemlock (CWH)

Mountain Hemlock (MH)

Coast Mountain-heather Alpine (CMA)

Interior Douglas Fir (IDF)

Englemann Spruce Subalpine Fir (ESSF)

The *CWH* is found in lower elevations of the watershed and is the easternmost extension of this zone in British Columbia (Ecosystem Plan, BC Parks, 2003). The *MH* is found at higher elevations above the *CWH* while the *CMA* includes the highest peaks in the area. The *IDF* is found on the valley bottom near the Skagit River and lies in the rainshadow of the Cascade Mountains. The *ESSF* zone is found at higher elevations in the eastern areas of the watershed (*Figure 4*). Subzone variants within the watershed include *CWHms1*, *CWHds1*, *IDFww*, *MHmm2*, *MHmmp2*, *ESSFmw*, and *AT*.



Figure 4: *ESSF* zone on the Skyline Trail above Ross Lake.

3.5 Vegetation

Due to its transitional nature from a temperate coastal environment to a drier and harsher interior regime, the Skagit River Watershed hosts a wide variety of plant species and communities. Cool lush coastal forests of cedar and hemlock on the west side of the watershed give way to drier stands of pine and spruce in the east. Many stands of old-growth have trees more than 250 years old. Ponderosa pine and trembling aspen, species common to the interior of the province are found in meadows on the valley floor near the Skagit River (Chittenden, Whitworth). Pacific rhododendron, which can be found widely in Skagit Valley Provincial Park and in western areas of E.C. Manning Provincial Park, has not been discovered anywhere else on the mainland of BC. Sitka spruce and broadleaf maple, species found more frequently on the coast, are also present in the watershed. A representative sample of forest age distribution can be taken from the table below.

Table 2: Age distribution of forests within the Manning Landscape Unit.

Age	% of Crown Forested Land base
0-60	15.5
61-140	43.2
141-250	24.4
251+	16.9

Source: Manning Landscape Unit, Chilliwack Sustainable Resource Management Plan, 2004.

More than 800 vascular plant species have been identified in the provincial parks of this area (for the full list, see *APPENDICES. Ecosystem Plan: E.C. Manning Provincial Park, Skagit Valley Provincial Park & Cascade Recreation Area, 2003* published by BC Parks and available at the Ministry of Environment's Surrey office 604-582-5200).

The Management Plans of both Skagit Valley Provincial Park and E.C. Manning Provincial Park identify the need to protect sensitive vegetation from adverse impacts of recreational and other land uses. Rare and endangered plant species are listed in *Appendix 6*. Five plant *communities* are also considered rare in the area (CDC, 2007):

- *Lodgepole Pine / Pacific Rhododendron*
- *Douglas-fir- Western Red Cedar / Vine Maple*
- *Douglas-fir-Western Hemlock / Falsebox*
- *Pacific Rhododendron-Western Teaberry / Cladonia*
- *Western Red Cedar- Douglas-fir / Vine Maple*

In Skagit Valley Provincial Park four Ecological Reserves (ER) were established between 1971 and 1981 to preserve plant communities:

- Ross Lake Ecological Reserve (ER # 22) was established in 1971 to preserve an isolated population of Ponderosa Pine. It is 61 hectares in size.
- Skagit River Forest Ecological Reserve (ER # 21) preserves 73 hectares of valley-bottom forest in an area transitional between coastal and interior climatic conditions. It was also established in 1971.
- Skagit River Cottonwoods Ecological Reserve (ER # 89) was established in 1978 and protects a stand of alluvial Black Cottonwood and Western Red Cedar (*Figure 5*). It is 69 hectares.
- Skagit River Rhododendrons Ecological Reserve (ER # 106) was created in 1981 to preserve stands of the rare Pacific Rhododendron in a site 70 hectares in size and unlikely to be disturbed by recreational use.



Figure 5: Ecological Reserve # 89

3.6 Wildlife

The Skagit River Watershed has an abundance of wildlife species. Some of the more commonly seen animals include Mule Deer (*Figure 5*), coastal Black-tailed Deer, Black Bear, Coyote, Raven and Red Squirrel. Other species such as Grizzly Bear, Cougar, Mountain Goat, Grey Wolf and Wolverine have been recorded in the watershed, but are less readily seen. Larger ungulates such as Moose and Elk have also been reported, although numbers of these species have never been verified.

Over 70 mammal species, 240 bird species, 15 herpetile species, and 8 fish species have been recorded in the Skagit River Watershed area (*Appendix 1-4*). Along the banks of the Skagit River one often sees Great Blue Herons and Belted Kingfishers. In the winter Harlequin ducks can be seen. In the river itself Bull Trout, Dolly Varden and Rainbow Trout exist in healthy numbers due in part to the river's catch and release fishery. The watershed also provides habitat for migratory birds such as the Mountain Bluebird and Trumpeter Swan. From the Silver-Skagit Road and trails within the provincial parks it is quite common to see raptors such as eagles, owls and hawks. Although little is known about the distribution or abundance of amphibians in the watershed, many streams, small ponds and wetlands suggest ample habitat for these species.

In 1998, the Ministry of Environment conducted a Mountain Goat winter range inventory and also participated in developing a forest-cover based Deer Winter Range Management Plan (Freeman, 2001). As well, Spotted Owl inventories have occurred periodically since 1993. To date, themed habitat maps now exist for Grizzly Bear, Mule Deer, Mountain Goat, Tailed Frog, Northern Spotted Owl and Northern Goshawk. Current efforts by the Ministry include a Mountain Goat Winter Range and Goat Natal Range Project. The overall goal of the project is to update and confirm important seasonal Mountain Goat habitats within the Skagit River watershed. Datasets developed through this project will identify and map critical seasonal habitats for Mountain Goats in the watershed to be used as baseline research for future Mountain Goat related studies (B. Jex, Ministry of Environment, pers.comm..2007).

An integrated fish and wildlife management plan currently being developed by the Ministry will have a significant fisheries component to it, with much of the attention being focused on conservation and angler management. Fish and fish habitat information will be collected over the summer of 2007 during a watershed-wide 1:20,000 reconnaissance inventory. As well, an angler study will be undertaken. A public consultation process will follow with the objective of determining public opinion regarding recreational angling values associated with the BC Skagit River (D. Jesson, Ministry of Environment, pers.comm.2007).

3.7 Species at Risk

The Conservation Data Centre (CDC) of BC was established in 1991. It has identified BC's most vulnerable vertebrate animals, vascular plants and ecological communities. These species are placed on Red and Blue lists. The Red list includes any indigenous species or subspecies considered to be extirpated, endangered or threatened in BC. Species on the Blue list are considered to be vulnerable or sensitive to human activities or natural events. Forty-three species known to occur in the Skagit Watershed are listed by the CDC as either Red or Blue (*Appendix 5*).

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the status of species on a federal level. Four primary levels have been established:

- 1) *Endangered* – facing imminent extirpation or extinction
- 2) *Threatened* – likely to become endangered if limiting factors are not reduced
- 3) *Special Concern*- particularly sensitive to human activities or natural events
- 4) *Not at Risk*- evaluated and found not at risk.

COSEWIC lists 11 species that occur in the Skagit Watershed as “*Special Concern*” species. Four are considered “*Endangered*”- Badger, Spotted Owl, Western Screech Owl and White-headed Woodpecker, and 5 are considered to be “*Not at risk*”. A number of key ‘Species at Risk’ have been the focus of the Ministry of Environment for recovery or management in the Skagit River Watershed area:

3.7.1 Grizzly Bear (*Ursus arctos*)

The Grizzly Bear is considered “threatened” in the North Cascades Grizzly Bear Population Unit (GBPU). Fewer than 25 animals are thought to remain in the area, with the possibility of only 5 or 6 reproductive females (Recovery Plan for Grizzly Bears in the North Cascades of British Columbia, 2001). Historically the population of grizzly bears in the North Cascades was much larger. From 1846 to 1851, 425 grizzly hides were taken from the Cascades area (Sullivan, 1983).

The North Cascades Grizzly Bear Recovery Team was formed by BC's Ministry of Environment in 2001. The goal of the recovery plan is to remove the North Cascade's GBPU from threatened status by 2050. This would require a minimum of 150 bears. A number of research and mapping projects have been completed for Grizzly Bear habitat suitability and capability, and for grizzly bear/human conflict. As well, the Ministry has been working closely with U.S. Fish and Wildlife, who are actively pursuing recovery options on the American side of the border.

The Recovery Plan in BC was approved in June 2004, after numerous public forums were held in local communities. Although many concerns were raised, the vast majority of people agreed that grizzlies should remain part of the North Cascades ecosystem (M.Austin, Ministry of Environment, pers.comm.2007).

In 2006 a project in Wells Gray Provincial Park to identify possible bear candidates for relocation, was put on hold. Private and political concerns over this issue remain complicated. The focus of the Recovery Plan now is on outreach programs and access management, with full implementation of the Plan expected in the next few years.

3.7.2 Spotted Owl (*Strix occidentalis*)

The Spotted Owl is Red-listed in the Province of BC and is considered “endangered” by COSEWIC. Many old-growth forests that owls depend on have been logged or lost due to land development. A Spotted Owl management plan was approved in December 2004. Habitat for the owl is managed within several Special Resource Management Zones (SRMZ). Within the SRMZ’s there are activity centers (AC) for one owl pair, which on average covers 3200 hectares. Each AC has some habitat conserved for owl breeding and some areas available for forestry.

In June of 2005, nine Wildlife Habitat Areas (WHA’s) were created under the impetus of the federal *Species at Risk Act*. Two of these areas are located in the Skagit River Watershed; 813 hectares in the Snass-Skagit, and 788 hectares in the Sumallo area. In the provincial parks the Spotted Owl is protected under the *Park Act* and the *Wildlife Act*.

3.7.3 Bull Trout (*Salvelinus confluentus*)

Bull Trout, a provincially blue-listed species, is found in the Skagit River where it has been known to hybridize with Dolly Varden, a similar Char species. Both species have “pure” stocks, but also hybridize (McPhail and Taylor,1995). Again, this demonstrates the coast-interior hybrid nature of the watershed.

In 2001 BC Parks and BC Fisheries initiated the four-year Upper Skagit River Watershed Native Char Project. The objectives of the project included determining bull trout and Dolly Varden char presence and distribution, population size, critical habitats, and individual fish information (Nelson et al.,2002). Results of this study, along with current inventory plans, will help to determine management options for the protection of Bull Trout in the upcoming Fish and Wildlife Plan.



Figure 6: Bull Trout (*Salvelinus confluentus*)

4.0 Tenures, Occupancy Rights and Jurisdiction

4.1 Ministry of Environment (MOE) / BC Parks

The majority of the Skagit Watershed (68,344 hectares) lies within 3 provincially protected areas; Skagit Valley Provincial Park, E.C. Manning Provincial Park and Cascade Recreation Area. BC Parks mission is to protect representative and natural places within the Province's Protected Areas System (PAS) for conservation, outdoor recreation, education and scientific study. The Vision Statements for Skagit Valley, E.C. Manning and Cascade can be seen in *Appendix 6*. The Management Plan for E.C. Manning Park states "tenures have the potential to create impacts on the natural and cultural values and require close cooperative working relationships between the tenure holders, park management and other agencies that have legislative authority for these tenures". The Ministry also governs environmental regulations in areas outside of the protected areas, such as private and Crown land (*Table 3*).

4.2 Gibson Pass Resorts

In Manning Provincial Park, Gibson Pass Resorts owns the ski hill, lodge facilities, a community of staff accommodation and infrastructure including maintenance buildings and self-contained water, sewer and electrical utilities. In 1984 the resort was issued a fifty-year park use permit for the parkland occupied by these facilities and has a 50 year renewal option. There are two areas of parkland under permit, the ski hill and an area on the north and south side of the highway where the lodge complex (south side) and 'community' (north side) are located.

The resort has a major investment in the park and contributes significantly to the recreational amenities available for use by park visitors. As well, Gibson Pass manages facility operations in E.C. Manning Provincial Park, Skagit Valley Provincial Park and Cascade Recreation Area, following Ministry guidelines. They also provide interpretive programs on the natural history of the area in Manning Park.

4.3 Ministry of Forests (MOF)

Under Ministry of Forests jurisdiction a number of forest companies have operated in the Skagit River Watershed. Much of the valley bottom areas were harvested in the 1940's and 50's in the expectation that the valley would be flooded for hydroelectric power. In the 1980's Interfor carried out extensive logging operations in the Maselpalik Creek and Klesilkwa River areas. Today a number of First Nations Bands are considering joint partnerships with other companies for operations in this area. Cattermole Timber of Chilliwack has recently had operations in the Upper Sumallo and Skagit Valley areas. Future operations include Tease Creek, a tributary of the Sumallo. In the Silverdaisy area BC Timber Sales had cutblocks harvested in 2003 and 2004. However, no future harvesting is planned for this area due to the Wildlife Habitat Area (WHA) created for the Spotted Owl (J. Kennah, Timber Sales Manager, BCTS, pers.comm.2007).

Table 3: Tenures, Occupancy Rights and Jurisdiction in the Skagit River Watershed.

Name of Holder	Type	Approximate location
BC Ministry of Environment /BC Parks	Protected Areas, Crown land, private land	Skagit, Manning, Cascade protected areas, Crown land
Various holders	Park Use Permits	Various
Gibson Pass Resorts	PUP, PFO contractor	Skagit, Manning, Cascade
BC Ministry of Forests	Crown land, provincial forest, community forests	Approx. 31% of Skagit watershed
BC Timber Sales	Timber marketing	Silverdaisy, Skagit
Cattermole Timber	Timber licensee	Skagit Valley, Upper Sumallo
BC Ministry of Transportation	Highway right-of-ways, <i>Land Title Act</i> (Sunshine Valley)	Hope-Princeton Highway #3, Silver-Skagit Road, Sunshine Valley
Emil Anderson Maintenance	Highways maintenance contractor	Hope-Princeton Highway #3, Silver-Skagit Road
Fraser Valley Regional District	Regional administration, Sunshine Valley area	Northwestern corner of watershed
TR0202T002	Trapline	Skagit, Manning, Cascade
TR0202T001	Trapline	Maselpanik, Klesilkwa
TR0202T004	Trapline	Upper Sumallo, 18,20 Mi Ck.
1 guide outfitter	Angling Guide Outfitter	Skagit River
2 guide outfitters	Hunting Guide Outfitters	Management Units 2-2, 2-17
Quarry Pacific Industries	Quarry	Skagit Valley
Various (> 150)	Mineral tenures	Mainly Silverdaisy Creek, Norwegian Ck., Klesilkwa R.

4.4 Ministry of Transportation

The Ministry of Transportation (MOT) is responsible for Highway # 3, which transects E.C. Manning Provincial Park. Within the Park, MOT has a gravel pit and maintenance yard. Highway maintenance was contracted out to private contractors in 1989 by the provincial government. Currently Emil Anderson Maintenance holds the contract in the Hope area.

The Silver-Skagit Road between Silver Creek and Ross Lake is also a gazetted highway and is maintained by Emil Anderson (a condition under the Ross Lake treaty).

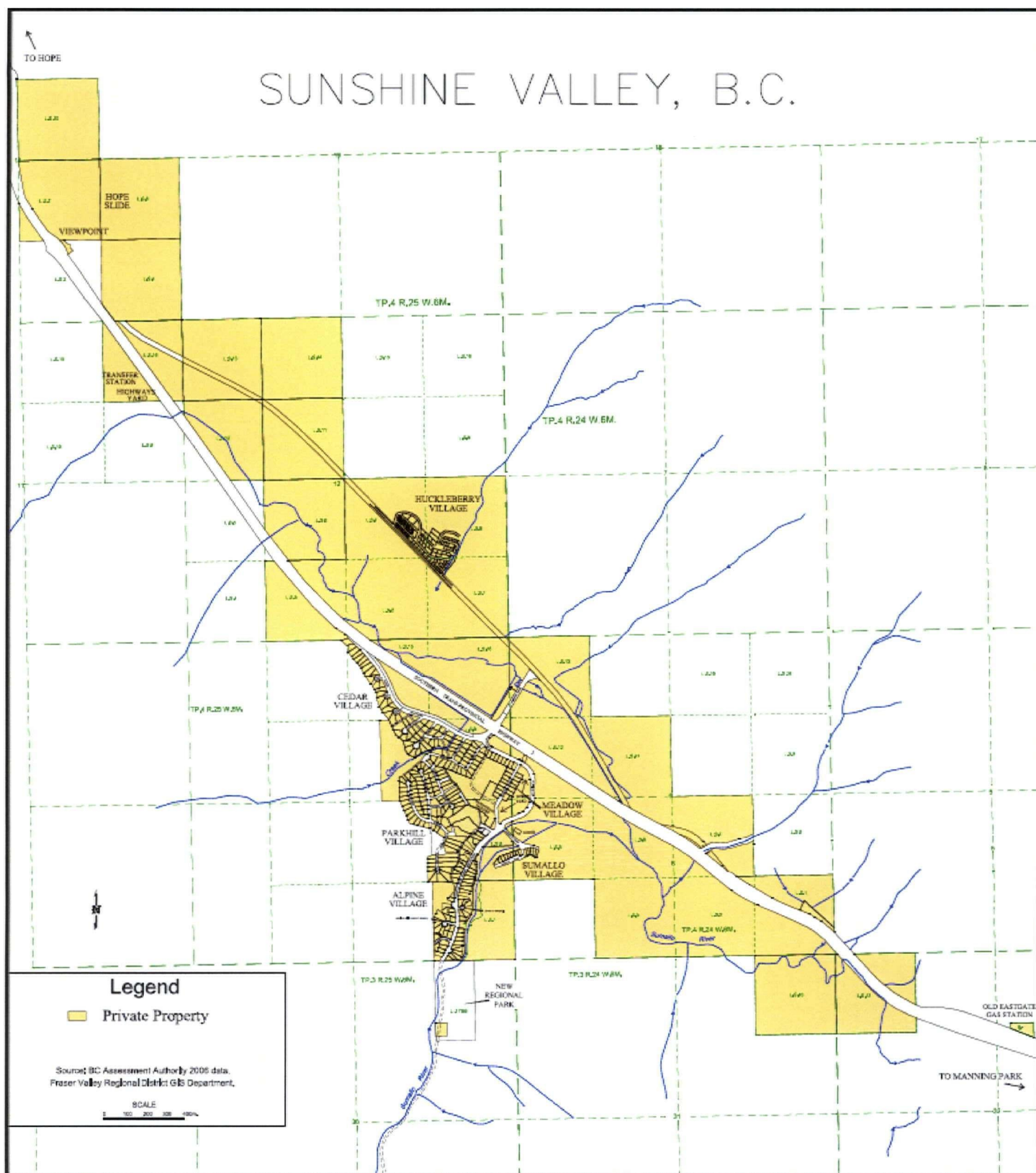
The Ministry of Transportation's jurisdiction also includes the Sunshine Valley area, where the expansion of existing settlement would fall under the *Land Titles Act*. Subdivision improvements or expansions would require the approval of the Ministry.

4.5 Fraser Valley Regional District

Sunshine Valley is a recreational and rural residential community located 22 km east of Hope in the Skagit River Watershed. The Sumallo River begins in the Cascade Mountains to the south, flows through Sunshine Valley and then joins the Skagit River at Sumallo Grove in Manning Provincial Park. During the 1940's the Canadian government turned the area into a Japanese internment camp called Tashme. Later in 1970 Sunshine Valley Developments Ltd. purchased 1270 acres and created a recreational resort community (*Figure 7*).

In 1977 the Fraser Cheam Regional District established zoning, subdivision control and building inspection services in Sunshine Valley. However, in 1984 the owners voted in favour of de-regulation and removed themselves from Regional District control. Many residents were divided on the merits of private versus regional regulation. In 2005 the Fraser Valley Regional District (FVRD) and the provincial government commissioned a report by MCIP Regional Consulting Ltd. "to provide independent, technical advice to residents and property owners in the Sunshine Valley on the potential effects of the proposal to re-establish community planning, zoning and building inspection services by the regional district in the Sunshine Valley area" (Ferguson, 2005). The issue has yet to be determined.

Sunshine Valley Developments Ltd. recently sold (Feb. '07). The new company now has a range of applications before the provincial government for approval and is interested in expansion. Any expansion, however, must take into consideration the potential natural hazards of the area. MCIP's report outlines at least six areas where geotechnical or flooding hazards exist.



Source: Fraser Valley Regional District, 2005.

Figure 7: Development in the Sunshine Valley area as of 2005.

It was only back on January 9, 1965 when the southwestern slope of Johnson Peak collapsed, sending 47 million cubic metres of debris across the Hope-Princeton Highway in one of the largest landslides in Canadian history (Hope Slide). Currently a geotechnical analysis of the entire area is being carried out by the provincial government.

A great deal of interest has been focused recently on Crown land in the Upper Sumallo River Valley south of Sunshine Village. It is a wilderness area with high natural values and has begun to attract a variety of recreational users. Logging plans also exist for the community forest in the area. The Fraser Valley Regional District has been meeting with the Integrated Land Management Branch (provincial) and has put forth a proposal to create a 13,000 hectare Wilderness Recreation Area that would be managed by the Regional District (*Figure 8*). At the entrance a gatehouse staffed by Park employees would be built, and recreational activities would be regulated in an effort to prevent the kind of land abuses seen in the Chilliwack River Valley (H. Sloan, Planner, FVRD, pers.comm.2007).

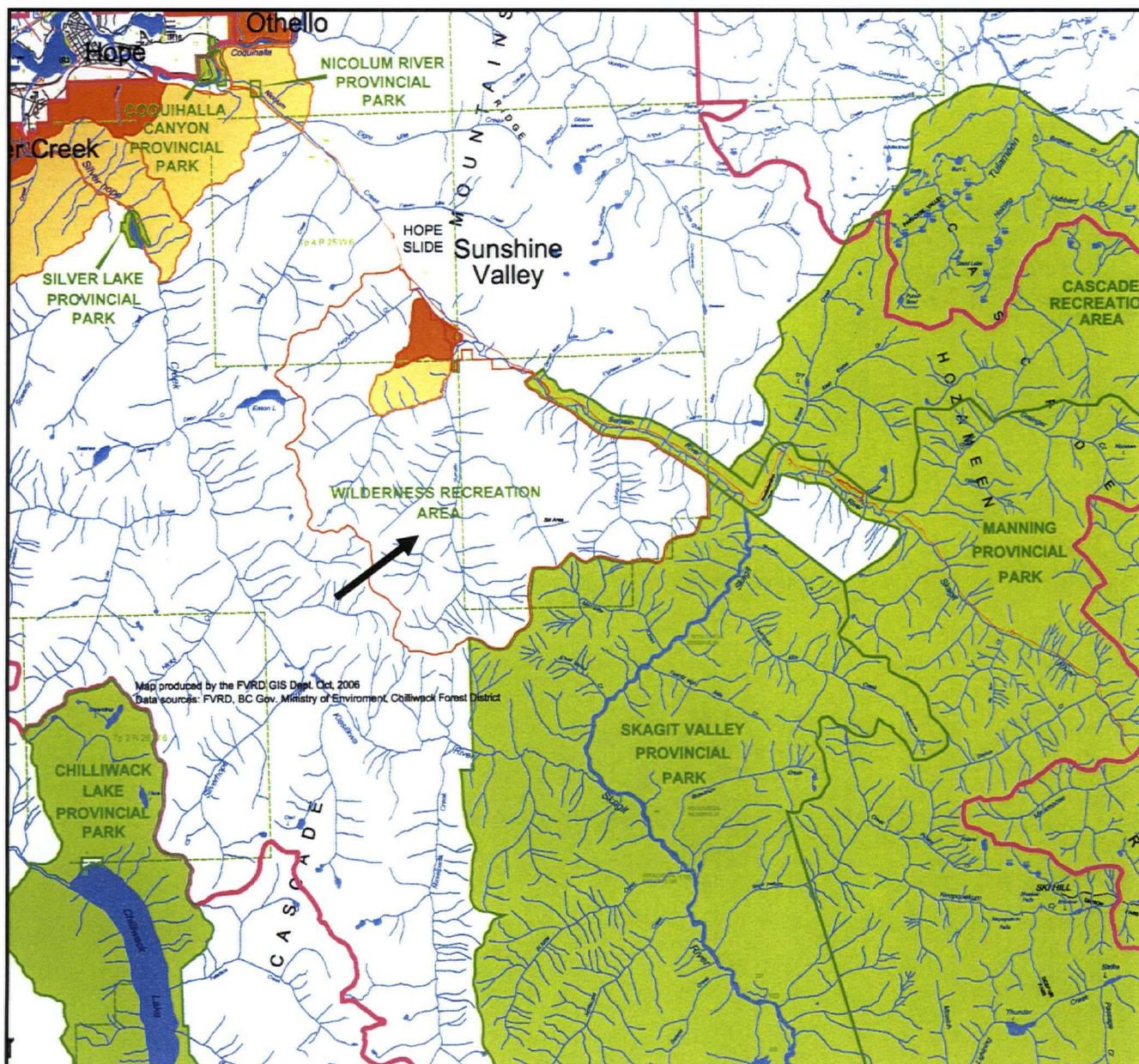
4.6 Mineral Claims and Inholdings

Eight mineral claims and one private property still exist in Skagit Valley Provincial Park in the Galene and Silverdaisy Creek areas. One mineral claim also exists near Rhododendron Flats in E.C. Manning Provincial Park. Management Plans of both parks identify the intent to acquire these mineral claims and the private property as they become available.

In the Silverdaisy Mountain area (an area outside of the protected areas and referred to as the “donut hole”) the search for minerals began as early as 1916. Samples taken in 1923 revealed gold, silver, lead, zinc and copper. Although originally protected within Manning and Skagit Parks, in 1995 approximately 3,500 hectares of land at Silverdaisy and 26 Mile Creeks were removed from Park Act status to allow for mineral exploration and potential development purposes (*Figure 9*). However, the Silverdaisy Integrated Management Plan, 1998, states that this land will revert back to Park status when government agencies determine that mineral exploration and development are complete.

Mining interests are still active today with most of the activity occurring in the Silverdaisy and Norwegian Creek areas. Access to this area is via a gated gravel road from Cayuse Flats and is maintained by the tenure holder, Imperial Metals Corp., who owns the 2,880 hectare Giant Copper property in the Silverdaisy area. This includes Crown granted as well as historically staked claims. Its 2006 drill program targeted the AM Zone and found much higher grades than previously reported. The company plans a substantial drill exploration program for the summer of 2007 (Imperial Metals website, 2007).

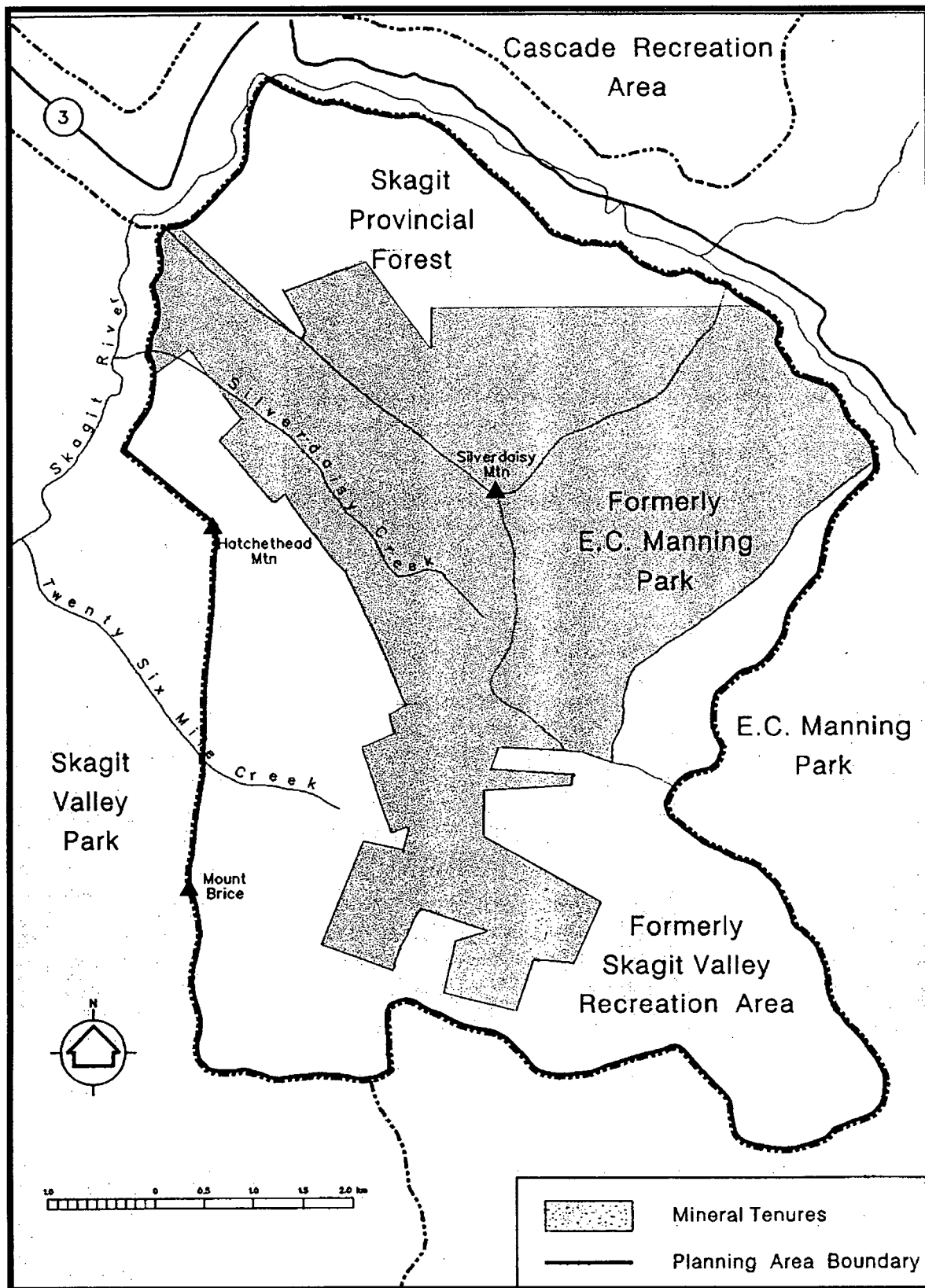
Quarry Pacific Industries operates a granite quarry near the entrance portal to Skagit Valley Provincial Park. Blocks of granite removed for commercial purposes include “Valley Rose” and “Cascade Coral”. A proposal by another company for a quarry in the Sunshine Valley area also exists (H. Sloan, Planner, FVRD, pers.comm.2007).



Not to Scale

Fraser Valley Regional District, 2007 (Park boundaries may not necessarily be accurate).

Figure 8: Proposed Wilderness Recreation Area (WRA) in the Upper Sumallo.



Silverdaisy Integrated Management Plan, October 1998.

Figure 8: Mineral Tenures in the Silverdaisy area.

4.7 Trapping

Three traplines exist within the watershed; TR0202T002 covers most of the 3 protected areas, TR0202T001 covers the Maselpalik Creek and Klesilkwa River area, and TR0202T004 is active in the upper Sumallo River area. Targeted species include marten and bobcat.

4.8 Guide Outfitting

Hunting is allowed in Skagit Valley Provincial Park and the Cascade Recreation Area and is regulated by the Ministry of Environment. Regulations Synopsis for hunting and fishing are provided each year by the Ministry. Two hunting guide-outfitters currently operate within the Skagit watershed boundaries. One fishing guide has a park-use permit and an angling guide licence to operate on the Skagit River.

5.0 RECREATION and TOURISM VALUES

5.1 Recreation

Recreational opportunities within the Skagit River Watershed are centered primarily in the protected areas of both Canada and the United States (*Figure 10*). Manning and Skagit Provincial Parks offer camping, boating, hiking, mountain biking, horseback riding and fishing. The Skagit River has become a destination river for fly-fishers from all over North America. Hunting is permitted in Skagit Valley Park and the Cascade Recreation Area within open seasons. Winter recreation such as skiing, snowshoeing and snowmobiling is available in Manning Park and/or Cascade Recreation Area. Over 250 kilometres of trails exist within Manning and the Cascade R.A., while Skagit Valley has over 70 km. There are 4 campgrounds with 355 sites in Manning and 3 campgrounds with 142 sites in Skagit Valley Park (one of these is a horse-camp with 11 corrals).

The Parks are divided into 5 zones that reflect the intended land use, the degree of human use, and the level of management and development. The Intensive Recreation zone permits high levels of recreation while the Wilderness Conservation zone provides the highest level of protection for natural and cultural values, with minimal human presence.

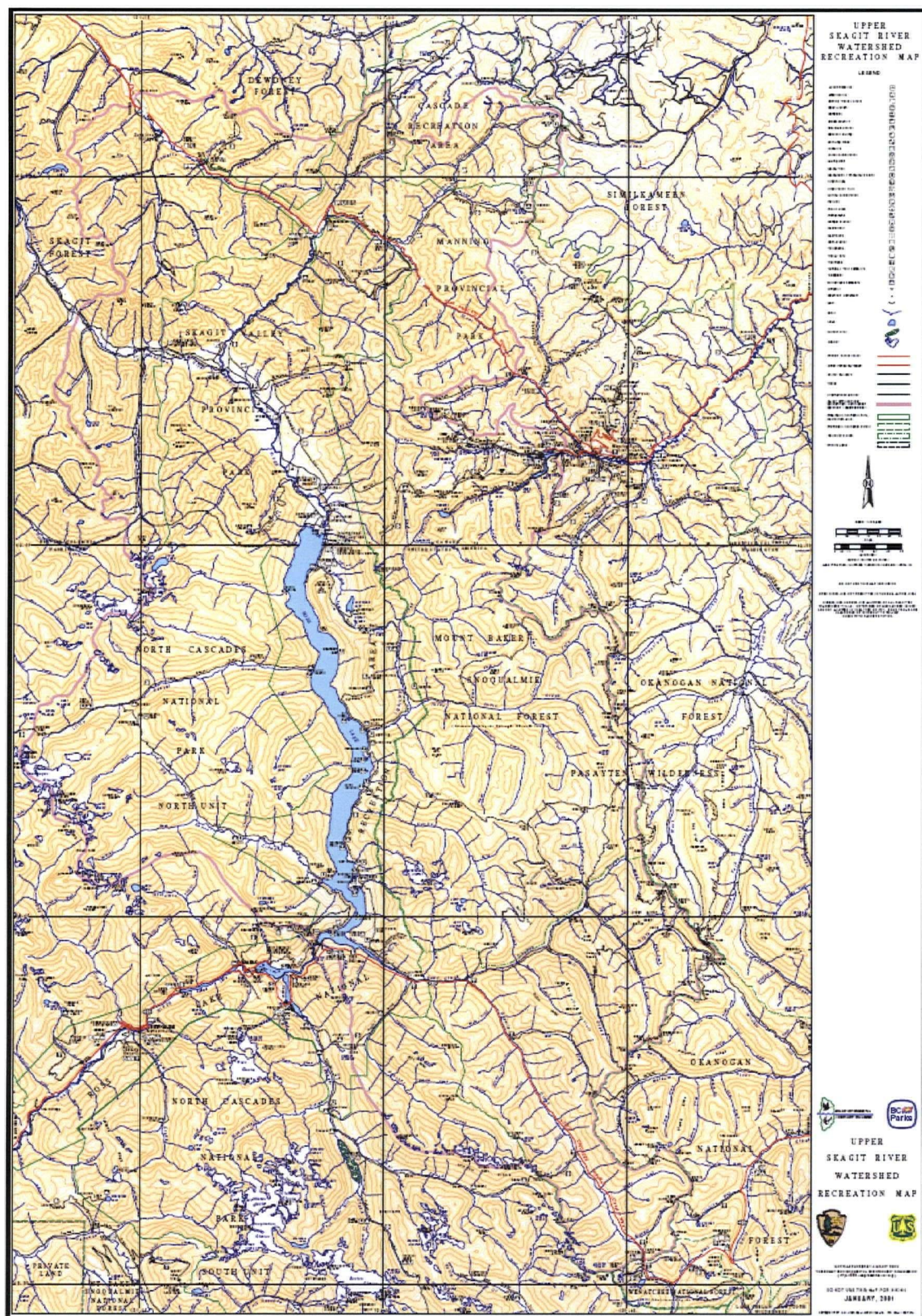
The Intensive Recreation Zone parallels Highway 3 in Manning Park and the Silver-Skagit Rd. in Skagit Valley Park. The zones have been designed to accommodate vehicle –based users. Most facilities, including campgrounds are in this zone. The zone accounts for 3% of Skagit Park and 9.6% of Manning.

The objective of the Natural Environment Zone is to provide backcountry recreation opportunities in a largely undisturbed natural environment. Hiking trails with walk-in campsites are the primary feature of this zone that accounts for 32% of Skagit Valley Park and 27% of Manning and the Cascade Recreation Area.

The Special Feature Zone protects significant natural or cultural features because of their special character, fragility or heritage value. Examples are the historical Whitworth and Chittenden Meadows in Skagit Valley Park and the old-growth stand of fir and cedar at Sumallo Grove in Manning Provincial Park. The zone makes up 0.4% of Manning and 7.5% of Skagit Valley Park.

The Wilderness Recreation Zone provides a remote, undisturbed natural landscape for unassisted backcountry recreation (*Figure 11*). Few facilities exist, low user levels are intended and no motorized activities are allowed. This zone accounts for 56% of Skagit Valley Park, 73% of Manning Park and 80% of Cascade R.A.

The Wilderness Conservation Zone protects a pristine environment where no facilities are permitted and remote wilderness conditions exist. Only non-mechanized means of access are permitted and low user levels are intended. This zone comprises 3.1% of Manning Provincial Park. Although this zone was not included in the Skagit Plan, many areas of the valley are still remote and pristine.



Ministry of Environment, 2001.

Figure 10: Upper Skagit River Watershed Recreation Map (available at MOE, Surrey).



Figure 11: Hiking in the Wilderness Recreation Zone in Manning.

5.2 Tourism

British Columbia's provincial parks provide residents with a wide range of opportunities and also contribute to the economic well-being of the province. In 1999 total expenditures related to the parks were approximately \$533 million, with over 90% of that coming from park visitors. For each dollar invested by the government, there were about \$10 dollars in visitor expenditures (Economic Benefits of BC's Provincial Parks, Ministry of Water, Land & Air Protection, 2001).

Manning Provincial Park is one of the most heavily used parks in British Columbia. Only a two-hour drive from Vancouver, it receives around a quarter of a million visitors every year (Table 4). The Hope-Princeton (#3) Highway bisects the Park, making access to many of the Park's facilities relatively easy. Facilities at Manning Park Lodge include a hotel, restaurant, pub, store, canoe and bike rentals, and horseback riding. Many of the visitors to the Parks also contribute significant revenues to the communities of Hope, Chilliwack and Princeton.

Table 4: Park visitors for Manning and Skagit Provincial Parks, 2002 to 2006.

<i>Provincial Park</i>	2002	2003	2004	2005	2006	5 Yr. Avg.
Manning Provincial Park & Cascade R.A.						
Day-use visitors	271,445	203,243	211,431	213,128	210,176	221,885
Overnight campers	25,074	22,246	21,687	22,071	20,033	22,222
Total	296,519	225,489	233,118	235,199	230,209	244,107
Skagit Valley Provincial Park						
Day-use visitors	5732	11,666	6053	6801	7832	6,407
Overnight campers	3045	2346	2070	2566	3047	2,615
Total	8,777	14,012	8,123	9,367	10,879	10,232

Park Facility Operators (numbers do not necessarily reflect all usage).

6.0 Inventories and Research

Because of its ecological uniqueness, and partly because of the Skagit Environmental Endowment Commission's (SEEC) role as a funding agency, numerous research studies, reports and inventories have been conducted on the Skagit River Watershed. Each year SEEC funds research and planning studies in environmental fields, as well as education, extension, infrastructure, recreation and land acquisition programs. Commissioners are appointed by both the City of Seattle and the Province of British Columbia.

In 2004 SEEC commissioned a comprehensive literature review of past research, in an effort to develop research strategies and priorities in the field of biodiversity and conservation biology in the Upper Skagit River Watershed (upstream of the Ross Dam). A report entitled *Annotated Bibliography of Environmental Research Funded by the Skagit Environmental Endowment Commission and Related Publications* was prepared by David Huggard, Patrick Robinson and John Richardson of the Department of Forest Services at the University of British Columbia. The annotated bibliography includes both SEEC-funded studies and non-SEEC studies in the area. Lists of publications and reports came from multiple sources on both sides of the border, including Seattle City Light, British Columbia and Washington universities, BC Parks, North Cascades National Park, Ministry of Environment, Ministry of Forests, US Forest Service, Washington Department of Fish and Wildlife and from web-based inventories and individual authors.

According to the authors, the bibliography includes 116 SEEC-funded projects, and 122 non-SEEC reports. If tabulated by numbers of fields of study, Fisheries is the highest, followed by Rare and Endangered species, Sensitive species, Game species and Other animals. Few reports of Fire, Plant, and Aquatic Ecology were noted (*Table 5*). Population inventories were the dominant type of study. There are also 24 reports of current cultural issues including user surveys, archeology, geology, extension products and reports of mapping projects that are not included in this table.

Table 5: SEEC-funded studies listed in *Bibliography of Environmental Research*.

	Fisheries	Rare and endangered	Sensitive species	Game species	Other animals	Fire	Plants	Aquatic	Misc	Total
Inventory-population	28	17	7	7			1			60
Inventory-community		4		3	7		4		1	19
Planning	2					5			1	8
Applied research	1		4			1				6
Natural history		2			1			2	1	6
Basic research		5								5
Literature review				1	2					
Total	31	28	11	11	10	6	5	2	3	104

Bibliography of Environmental Research Funded by SEEC and Related Publications, 2004.

A version of the bibliography is now available electronically on the SEEC Website under Research Archives (www.skagiteec.org). The fully annotated bibliography provides a good starting point for obtaining further information, or for seeking the original documents.

The Skagit River Watershed provides a range of ecosystems across the coastal-interior transition making it an ideal area for monitoring long-term environmental change in protected sites. Unprotected sites provide landscapes where studies of habitat fragmentation could be examined (D.Huggard et al, 2004). Clearly a wide range of projects and individual studies have been conducted over the last 20 years in the area. Targeting specific gaps with coordinated research efforts will help contribute to the long-term environmental integrity and values of the Skagit watershed.

As well as funding research projects, SEEC also provides support for outreach programs such as a joint Canadian/U.S. interpretive program and a student/youth program in Skagit Valley Provincial Park and North Cascades National Park (*Figure 12*).



Figure 12: SEEC-funded Student Conservation Association.

7.0 Management Issues

7.1 Coordinated Land Use Planning

In the Province of BC, the Integrated Land Management Bureau (ILMB) is responsible for developing and implementing land use plans. Where plans already exist ILMB works in cooperation with other ministries such as the Ministry of Environment to update and revise plans as necessary. Higher level plans such as Land Resource Management Plans and Sustainable Resource Management Plans have landscape-level components to them. These landscape-level plans may work in conjunction with park management plans and other local or regional plans.

Resource management in the Skagit River Watershed is complex. A web of plans exist for the area. Examples are:

- Skagit Valley Provincial Park Management Plan, 1998.
- E.C. Manning Park and Cascade Recreation Area Management Plan, 2004.
- Chilliwack District Sustainable Resource Management Plan, 2004.
- Silverdaisy Integrated Resource Management Plan, 1998.
- Spotted Owl Management Plan, 2004.
- Recovery Plan for Grizzly Bears, 2001.
- Hope Innovative Forest Practices Agreement.

Compatibility of these plans and coordination between various agencies will be an ongoing challenge in the future. Because most of the Skagit River Watershed is within the protected areas, the Skagit and Manning Park management plans provide an important function in guiding future resource-based decisions. Both management plans identify the need to work with other agencies, including the National Park Service in the United States, Ministry of Forests, Ministry of Transportation and the Skagit Environmental Endowment Commission. Input for these plans has been received from wildlife groups, recreation groups and conservation associations. Public meetings with residents of Chilliwack, Hope, Princeton, Seattle and Vancouver has also aided in the direction management plans should take. However, it should be noted that the Skagit Valley Park Management Plan was completed in 1998, and requires updating. Many of the actions outlined in the plan have not been met, while some of the objectives will have changed over time.

7.2 Ross Lake Reservoir

The Ross Lake reservoir enters Canada at International point (49°00' N, 121°04' W) in Skagit Valley Provincial Park. The Ross Lake campground (BC Parks) is situated on the reservoir and offers a host of recreational opportunities during the peak season, generally July 1st to Labour Day in Canada. The Ross Lake Treaty of 1984 stipulates that the reservoir should be maintained at full pool (1602 ft.) during this period. Depending on snowpack levels and hydroelectric generation by Seattle City Light, the reservoir does not fill into Canada for at

least 8 months of the year. These fluctuations in the level of the reservoir may limit the growth of aquatic vegetation and may also create fish-rearing constraints (Department of Fisheries and Oceans, 1997). Summer heating creates a warm upper layer on the reservoir and may affect the migration of fish species into the Skagit River (D. Jesson, Ministry of Environment, pers.comm.2007). The damming of the Skagit River was the original motivation for the establishment of the Skagit Environmental Endowment, but relatively few studies seem to address the effects of the dam (D. Huggard et al, 2004).

7.3 Natural Factors

7.3.1 Fire

Historically fire was the predominant natural disturbance in the Skagit Valley (Ecosystem Plan, BC Parks, 2003). Frequent fires of low to moderate severity occurred in lower elevations of the valley. Current fire suppression policy has changed the dynamics of the forest. More dense, closed forests exist than did before. A Fire Management Plan for Skagit Valley Park was developed by BC Parks in 1996. It stated that only a small area of the Skagit has been burnt since 1900. Between 1950 and 1997 a total of 236 fires burned in the three protected areas (Blackwell and Coulthard, 2001 in Ecosystem Plan, BC Parks, 2003). In 2000, Blackwell & Associates produced a Fire Management Plan which included fire hazard ratings for Skagit and Manning Parks. Very high hazard ratings existed for two main areas; the eastern side of Manning Park where pine beetle infestation is high, and the west side of the Skagit Valley. Fire management plans for both parks were updated in 2005. Most fires in the Manning/Skagit area are lightning-caused, although the presence of campers often increases the number of fires (Pew and Larson, 2001, in Ecosystem Plan, 2003). In 2006, the Tatoosh fire that began in the United States, crossed the border, and had the potential to force the evacuation of Eastgate, a small community near the eastern border of Manning Park. This demonstrates the need for coordinated responses from government agencies on both sides of the border.

Prescribed fire as a management tool has recently been considered in Manning Park where large fuel loads exist. Under carefully managed conditions, prescribed fire may help reduce fuel loads and the risk of higher intensity fires. In Chittenden meadow in Skagit Valley Park, a prescribed fire was used in 2004 to restore the natural size and composition of the meadow, and to reflect the historical practices of First Nation burning in the area.

7.3.2 Species at Risk

In 2002 the federal *Species at Risk Act* (SARA) was passed requiring mandatory recovery strategies and action plans for endangered or threatened species. Within the Skagit River Watershed species considered the highest priority are; Badger, Grizzly Bear, Mountain Beaver, Wolverine, Lewis's Woodpecker, Spotted Owl, Western Screech Owl, Coastal Tailed Frog, Red-legged Frog and the Monarch Butterfly. Recovery plans already exist for the Northern Spotted Owl and the Grizzly Bear. Species at Risk plans will need to be coordinated with federal agencies and must be incorporated into park management plans.

7.3.3 Invasive Species

Invasive species are the second largest threat to our biodiversity, after direct loss of habitat (Summary Report on Invasive Plant Management in British Columbia 2004/05 and 2005/06, Nov.2005). In 2005 the Invasive Plant Council (IPC) was created and now works with other Ministries to coordinate efforts to reduce the spread of invasive species. Between 2004 and 2006, the province invested \$ 3.9 million on program staffing and direct on-the-ground treatments of invasive plants on Crown land.

In the Skagit Valley an invasive plant species inventory was carried out for the Ministry of Environment in 2006, and during the second stage of the project, invasive species such as Bull Thistle and Burdock were removed. Burdock was the most pervasive species in the valley. Ongoing monitoring as well as annual removal of invasive species will be required (T. McIntosh, 2006). The Ministry of Transportation owns the right-of-way on Silver-Skagit Road and needs to be involved in the project as well.

7.3.4 Pine Beetle

The Mountain Pine Beetle has spread extensively throughout the eastern side of Manning Park (*Figure 13*) adjacent to the Skagit watershed, and has the potential to affect lodgepole pine stands in Skagit Valley. A Mountain Pine Beetle Management Plan was developed for the area in 1998, and in 2002 a Memorandum of Understanding between MOE and MOF was drafted. As the beetle spreads, fuel loads become higher, and the risk of a high intensity fire increases. Management in the Manning area has included pheromone baiting, falling and burning of attacked trees, fuel breaks, tree removal and helicopter logging.



Figure 13: Pine beetle kill in Manning Provincial Park, 2003.

7.3.5 Climate Change

Significant evidence exists today to suggest that greenhouse gases in the atmosphere will result in climate changes. British Columbia will likely experience warmer temperatures throughout the year with wetter winters, earlier springs, and a later start to the wet season on the coast in the fall (Taylor, 1997 in Ecosystem Plan, BC Parks, 2003). The Ecosystem Plan, 2003 continues to say “analysis of streamflow records found reduced flows in spring and fall, and higher flows in the winter. These results suggest that climates in the study area may be changing, which could eventually have ecological implications, including potential for increased frequency of forest fires, shifts in ecosystem boundaries, and lower stream, lake, and wetland water levels in late summer.”

In the North Cascades Mountains scientists have observed the retreat of glaciers for years (*Figure 14*). Between 1984 and 2005, North Cascades glaciers have lost on average more than 9.5m thickness and 20-40% of their volume (M.S. Pelto, 2006).

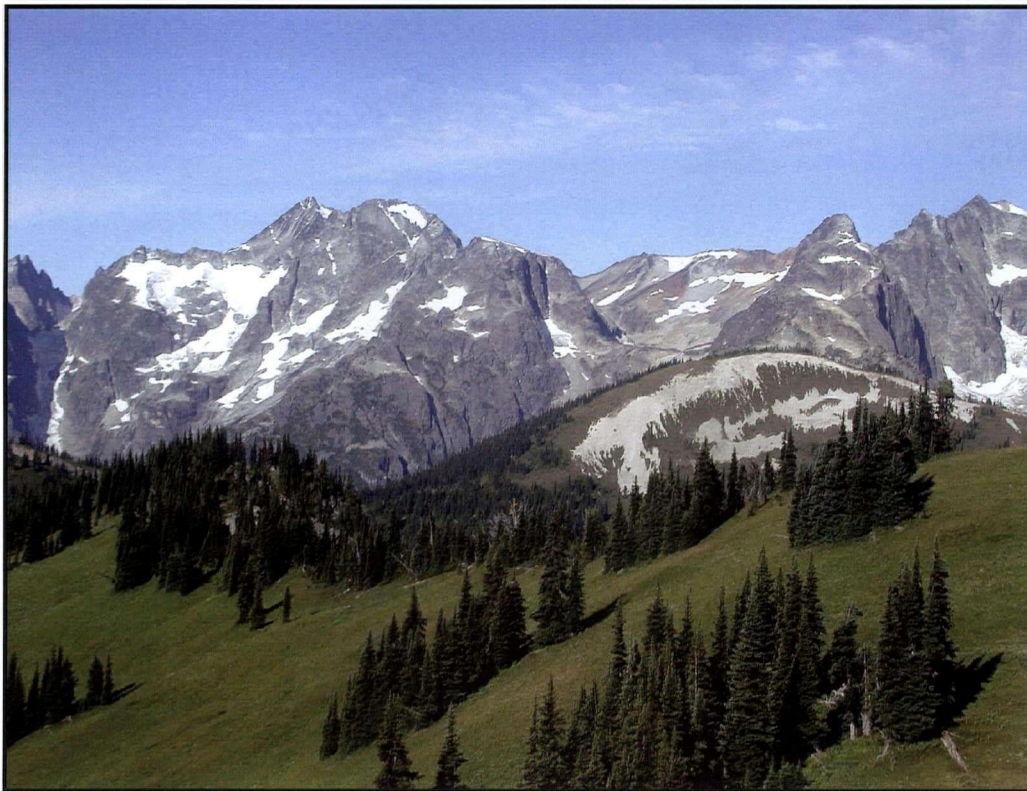


Figure 14: North Cascade glaciers from the Galene Lakes area, 2005.

7.3.6 West Nile Virus

West Nile Virus (WNV) has been spreading rapidly across North America and has reached Washington State. Although no cases have been reported in BC, it is expected this will soon change. WNV is a mosquito-borne virus predominately carried by the *Culex pipiens* (Northern House) mosquito. Dead birds, especially corvids (crows, ravens, jays, magpies) are often the first sign of an infected area. These birds should be reported to local health authorities (in the Skagit, Fraser Health 1-888-WNV-LINE). However, it should be noted that less than 1% of people who become infected with the virus will get severely ill (Fraser Health Authority, BC, 2007).

Frequent visitors to the Ross Lake campground in Skagit Valley Park are aware of the high mosquito populations due to the surrounding wetland breeding areas. Normal precautions such as using bug repellent and wearing long clothing should be taken. A mosquito control program has not been implemented at this time.

7.4 Adjacent Land Uses

Adjacent land uses to the Skagit River Watershed have the potential to compromise the ecological integrity of the area. Timber harvesting, road building, livestock grazing, mining, and recreational use are some human activities that can have negative impacts on wilderness areas.

Fortunately much of the land adjacent to the Skagit River Watershed is protected in both Canada and the United States. The eastern part of Manning Park, North Cascades National Park in the south and the Cascade Recreation Area in the north all provide relative buffers to the watershed. The Cascade Recreation Area is only a "Class C" protected area, however, and many uses that can potentially impact the watershed are allowed to exist (cattle grazing, mining, snowmobiling). As well, portions of the watershed in the west are currently available for timber harvesting and mining.

Areas of concern:

Some activities adjacent to and within the Skagit River Watershed include:

- Road access in the Whipsaw-Tulameen, Podunk, Granite Mountain, Maselpanik and Silverhope areas
- Logging in the Copper Creek, Sumallo, Maselpanik, Silverhope, and 18/20 Mile Creek areas
- Future gas pipeline expansion in Manning Park's "panhandle" area
- Mining exploration and extraction in the Silverdaisy Mountain area
- Fluctuations of the Ross Lake Reservoir
- Development in the Sunshine Valley area.

7.5 Conservation

The primary role of the protected areas in BC is to conserve natural, cultural and recreational values. With increasing population in BC's Lower Mainland there will be a growing demand for more facilities and recreational opportunities in the protected areas of the Skagit River Watershed. Management plans will have to address increasing pressure for access to remote and unspoiled areas. However, there is a limit to the amount of development the protected areas can accommodate without affecting conservation and recreation values. The Manning Park Management Plan states "inappropriate access can endanger the natural, cultural and recreational values that users seek. It is critical to manage the access within and to the protected areas to protect these values." For example, the decision to leave Silver-Skagit Road unpaved may in fact help to maintain the experience and atmosphere of the Skagit Valley, while protecting ecological values.

The new 'Species at Risk Act' requires that government agencies develop plans to identify critical habitat for threatened or endangered species. Partnerships between agencies such as BC Parks, SEEC, and the U.S. National Park System will be instrumental to developing plans for the protection of species at risk in the Skagit watershed. Impacts of Park management initiatives such as insect pest and fuel management on Species at Risk must be assessed (Ecosystem Plan, 2003).

Invasive plant species pose a significant threat to wilderness and the protected areas by their direct and indirect impacts to native species. The Skagit Valley Provincial Park does not have a serious invasive plant problem at present (McIntosh, 2006). However, continual monitoring and annual treatment will be necessary to prevent the propagation of alien species.

Fire management has become a primary focus of government agencies in BC. Because fire disturbance is such a key ecological process in the Skagit watershed, fire suppression has altered species distribution and habitat composition. Prescribed fire is now considered necessary to maintain the 'naturalness' of certain areas within the watershed. The use of prescribed fire and the ability to allow wildfires to burn under controlled circumstances will need to be incorporated into management plans for the watershed.

Protected wilderness areas are often surrounded by lands that are more intensely developed and used for human purposes such as timber cutting, livestock grazing and mechanized recreation. Approximately 30% of the Skagit River Watershed in Canada is not protected within parks. Cooperative efforts on the part of resource users to protect the natural and cultural values that exist within the area must be promoted and maintained. Identifying external and internal threats to the ecological integrity of the watershed and creating binding agreements between agencies to deal with these threats will be a key part of management in the future.

8.0 Communications

Communicating information about the Skagit River Watershed is an important part of the management planning process. Increased public awareness provides support for protection of the natural and cultural values that exist in the area.

Data for a fish and wildlife management plan for the Skagit Watershed are currently being collected, with a draft plan expected in the fall of 2007. Completion of the full plan is scheduled for the summer of 2008. Public consultations are likely to be held in Hope, Chilliwack and Vancouver in the summer of 2007. As well, input from other agencies will continue to be received through this period. A Fish and Wildlife plan in North Cascades National Park is also being developed and may have links with the Ministry of Environment's plan in the future.

Inquiries regarding the fish and wildlife plan or the Skagit Watershed in general can be directed to the Ministry of Environment in Surrey (604-582-5200) or to Tom.Blackbird@gov.bc.ca. A list of websites with resource-based information on the Skagit is available in *Appendix 7* of this report.

9.0 References

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10.0 APPENDICES

Appendix 1: Mammal species known to occur in E.C. Manning Provincial Park, Cascade Recreation Area and Skagit Valley Provincial Park.

Appendix 2: Bird Species known to occur in E.C. Manning Provincial Park, Cascade Recreation Area and Skagit Valley Provincial Park.

Appendix 3: Amphibian and reptile species known to occur in E.C. Manning Provincial Park, Cascade Recreation Area and Skagit Valley Provincial Park.

Appendix 4: Fish Species for Lakes and Streams in the Skagit River Watershed.

Appendix 5: Species at Risk in the Skagit River Watershed.

Appendix 6: Park Vision Statements.

Appendix 7: Resource-based websites.

**APPENDIX 1: Mammal species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park.**

COMMON NAME	SCIENTIFIC NAME	ABUNDANCE
Shrews and Shrew-Moles		
Common Shrew	<i>Sorex cinereus</i>	Com
Dusky Shrew	<i>Sorex monticolus</i>	Com
Shrew-Mole	<i>Neurotrichus gibbsii</i>	Unc
Trowbridge's Shrew	<i>Sorex trowbridgii</i>	Occ
Vagrant Shrew	<i>Sorex vagrans</i>	Com
Water Shrew	<i>Sorex palustris</i>	Com
Bats		
Big Brown Bat	<i>Eptesicus fuscus</i>	Unc
California Myotis	<i>Myotis californicus</i>	Unc
Hoary Bat	<i>Lasiurus cinereus</i>	Unc
Little Brown Myotis	<i>Myotis lucifugus</i>	Com
Long-legged Myotis	<i>Myotis volans</i>	Unc
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Unc
Townsend's big-eared Bat	<i>Corynorhinus townsendii</i>	Rar
Western Long-eared Myotis	<i>Myotis evotis</i>	Unc
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	Unc
Western Red Bat	<i>Lasiurus blossevillei</i>	Occ
Yuma Myotis	<i>Myotis yumanensis</i>	Unc
Hares and Pikas		
Common Pika	<i>Ochotona princeps</i>	Com
Snowshoe Hare	<i>Lepus americana</i>	Com
Small Rodents		
Black Rat	<i>Rattus rattus</i>	Unc
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	Com
Columbian Mouse	<i>Peromyscus oreas</i>	Com
Creeping Vole	<i>Microtis oregoni</i>	Com
Deer Mouse	<i>Peromyscus maniculatus</i>	Com
Heather Vole	<i>Phenacomys intermedius</i>	Unc
Long-tailed Vole	<i>Microtis longicaudus</i>	Com
Meadow Vole	<i>Microtis pennsylvanicus</i>	Unc
Mountain Beaver	<i>Aplodontia rufa ssp. raineri</i>	Com
Northern Bog Lemming	<i>Synaptomys borealis</i>	Unc
Northern Pocket Gopher	<i>Thomomys talpoides</i>	Unc
Pacific Jumping Mouse	<i>Zapus trinotatus</i>	Unc
Southern Red-backed Vole	<i>Clethrionomys gapperi</i>	Com
Townsend's vole	<i>Microtis townsendii</i>	Rar
Water Vole	<i>Microtis richardsoni</i>	Unc
Western Jumping Mouse	<i>Zapus princeps</i>	Unc

**APPENDIX 1: Mammal species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

Squirrels, Chipmunks and Marmots		
Cascade Golden-mantled Groundsquirrel	<i>Spermophilus saturatus</i>	Unc
Columbian Ground Squirrel	<i>Spermophilus columbianus</i>	Unc
Douglas' Squirrel	<i>Tamiasciurus douglasii</i>	Com
Hoary Marmot	<i>Marmota caligata</i>	Unc
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	Com
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Com
Townsend's Chipmunk	<i>Tamias townsendii</i>	Com
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	Unc
Yellow-pine Chipmunk	<i>Tamias amoenus</i>	Com
Large Rodents		
Beaver	<i>Castor canadensis</i>	Com
Muskrat	<i>Ondatra zibethicus</i>	Unc
Porcupine	<i>Erethizon dorsatum</i>	Unc
Dogs		
Coyote	<i>Canis latrans</i>	Com
Gray Wolf	<i>Canis lupus</i>	Unc
Red Fox	<i>Vulpes vulpes</i>	Rar
Bears and Raccoons		
American Black Bear	<i>Ursus americanus</i>	Com
Grizzly Bear	<i>Ursus arctos</i>	Rar
Raccoon	<i>Procyon lotor</i>	Unc
Mustelids		
Ermine	<i>Mustela erminea</i>	Com
Fisher	<i>Martes pennanti</i>	Rar
Long-tailed Weasel	<i>Mustela frenata</i>	Com
Marten	<i>Martes americana</i>	Unc
Mink	<i>Mustela vison</i>	Unc
River Otter	<i>Lontra canadensis</i>	Rar
Spotted Skunk	<i>Spilogale putorius</i>	Rar
Striped Skunk	<i>Mephitis mephitis</i>	Unc
Wolverine	<i>Gulo gulo</i>	Rar
Yellow Badger	<i>Taxus taxidea</i>	Occ
Cats		
Bobcat	<i>Lynx rufus</i>	Unc
Cougar	<i>Felis concolor</i>	Unc
Lynx	<i>Lynx canadensis</i>	Unc

**APPENDIX 1: Mammal species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

COMMON NAME	SCIENTIFIC NAME	ABUNDANCE
Ungulates		
California Bighorn Sheep	<i>Ovis canadensis californiana</i>	Occ
Black-tailed Deer	<i>Odocoileus hemionus columbianus</i>	Com
Elk	<i>Cervus elaphus</i>	Unc
Moose	<i>Alces alces</i>	Rar
Mountain Goat	<i>Oreamnos americanus</i>	Unc
Mule Deer	<i>Odocoileus hemionus hemionus</i>	Com
Woodland Caribou	<i>Rangifer tarandus</i>	Occ

Ecosystem Plan, BC Parks, 2003. (Com=common Unc=uncommon Occ=occasional Rar=rare)

**APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park.**

COMMON NAME	SCIENTIFIC NAME	STATUS
Loons and Grebes		
Common Loon	<i>Gavia immer</i>	UncSuRes
Eared Grebe	<i>Podiceps nigricollis</i>	OccMig
Horned Grebe	<i>Podiceps auritus</i>	RarMig
Pacific Loon	<i>Gavia arctica</i>	OccVis
Pied-billed Grebe	<i>Podilymbus podiceps</i>	RarMig
Red-necked Grebe	<i>Podiceps grisegena</i>	RarMig
Western Grebe	<i>Aechmophorus occidentalis</i>	UncMig
Hérons and Pelicans		
American White Pelican	<i>Pelecanus erythrorhynchos</i>	OccMig
Great Blue Heron	<i>Ardea herodias</i>	RarSuRes
Green Heron	<i>Butorides virescens</i>	OccSuVis
Swans and Geese		
Canada Goose	<i>Branta canadensis</i>	ComSuRes
Greater White-fronted Goose	<i>Anser albifrons</i>	OccMig
Snow Goose	<i>Chen caerulescens</i>	OccMig
Trumpeter Swan	<i>Cygnus buccinator</i>	OccMig
Tundra Swan	<i>Cygnus columbianus</i>	OccMig
Dabbling Ducks		
American Wigeon	<i>Anas americana</i>	UncMig
Blue-winged Teal	<i>Anas discors</i>	RarMig
Cinnamon teal	<i>Anas cyanoptera</i>	RarMig
Green-winged Teal	<i>Anas crecca</i>	UncRes
Mallard	<i>Anas platyrhynchos</i>	ComSuRes
Northern Pintail	<i>Anas acuta</i>	UncMig
Northern Shoveler	<i>Anas clypeata</i>	RarMig
Diving Ducks		
Barrow's Goldeneye	<i>Bucephala islandica</i>	UncSuRes
Bufflehead	<i>Bucephala albeola</i>	UncWiRes
Canvasback	<i>Aythya valisineria</i>	OccMig
Common Goldeneye	<i>Bucephala clangula</i>	UncRes
Greater Scaup	<i>Aythya marila</i>	UncMig
Harlequin Duck	<i>Histrionicus histrionicus</i>	UncSuRes
Lesser Scaup	<i>Aythya affinis</i>	UncMig
Oldsquaw	<i>Clangula hyemalis</i>	RarMig

**APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

COMMON NAME	SCIENTIFIC NAME	STATUS
Redhead	<i>Aythya americana</i>	OccMig
Ring-necked Duck	<i>Aythya collaris</i>	OccMig
Ruddy Duck	<i>Oxyura jamaicensis</i>	OccMig
Surf Scoter	<i>Melanitta perspicillata</i>	OccMig
White-winged Scoter	<i>Melanitta fusca</i>	OccMig
Mergansers		
Common Merganser	<i>Mergus merganser</i>	ComSuRes
Hooded Merganser	<i>Lophodytes cucullatus</i>	RarMig
Red-breasted merganser	<i>Mergus serrator</i>	OccMig
Vultures, Eagles and Ospreys		
Bald Eagle	<i>Haliaeetus leucocephalus</i>	UncSuRes
Golden Eagle	<i>Aquila chrysaetos</i>	RarSuRes
Osprey	<i>Pandion haliaetus</i>	UncSuRes
Turkey Vulture	<i>Cathartes aura</i>	RarVis
Hawks		
Cooper's Hawk	<i>Accipiter cooperii</i>	UncRes
Northern Goshawk	<i>Accipiter gentilis</i>	UncRes
Northern Harrier	<i>Circus cyaneus</i>	RarMig
Red-tailed Hawk	<i>Buteo jamaicensis</i>	UncRes
Rough-legged Hawk	<i>Buteo lagopus</i>	RarMig
Sharp-shinned Hawk	<i>Accipiter striatus</i>	UncRes
Swainson's Hawk	<i>Buteo swainsoni</i>	RarMig
Falcons		
American Kestrel	<i>Falco sparverius</i>	UncSuRes
Merlin	<i>Falco columbarius</i>	RarSuRes
Peregrine Falcon	<i>Falco peregrinus</i>	RarRes
Prairie Falcon	<i>Falco mexicanus</i>	RarMig
Grouse and Ptarmigan		
Blue Grouse	<i>Dendragapus obscurus</i>	ComRes
Rock Ptarmigan	<i>Lagopus mutus</i>	OccVis
Ruffed Grouse	<i>Bonasa umbellus</i>	UncRes
Spruce Grouse	<i>Dendragapus canadensis</i>	ComRes
White-tailed Ptarmigan	<i>Lagopus leucurus</i>	UncRes
Rails, Coots and Cranes		
American Coot	<i>Fulica americana</i>	RarMig
Sandhill Crane	<i>Grus canadensis</i>	OccMig
Sora	<i>Porzana carolina</i>	RarSuRes
Virginia Rail	<i>Rallus limicola</i>	RarSuRes

**APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

COMMON NAME	SCIENTIFIC NAME	STATUS
Plovers		
American Golden-Plover	<i>Pluvialis fulva</i>	OccMig
Killdeer	<i>Charadrius vociferus</i>	UncSuRes
Semipalmated Plover	<i>Charadrius semipalmatus</i>	OccMig
Sandpipers		
Baird's Sandpiper	<i>Calidris bairdii</i>	RarMig
Greater Yellowlegs	<i>Tringa melanoleuca</i>	RarMig
Least Sandpiper	<i>Calidris minutilla</i>	RarMig
Lesser Yellowlegs	<i>Tringa flavipes</i>	RarMig
Long-billed Curlew	<i>Numenius americanus</i>	OccMig
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	OccMig
Pectoral Sandpiper	<i>Calidris melanotos</i>	OccMig
Red Phalarope	<i>Phalaropus fulicaria</i>	OccVis
Red-necked Phalarope	<i>Phalaropus lobatus</i>	RarMig
Semipalmated Sandpiper	<i>Calidris semipalmatus</i>	OccMig
Solitary Sandpiper	<i>Tringa solitaria</i>	UncMig
Spotted Sandpiper	<i>Actitis macularia</i>	ComSuRes
Western Sandpiper	<i>Calidris mauri</i>	RarMig
Wilson's Phalarope	<i>Phalaropus tricolor</i>	RarMig
Wilson's Snipe	<i>Gallinago delicata</i>	RarSuRes
Gulls and Terns		
Arctic Tern	<i>Sterna paradisaea</i>	OccVis
Bonaparte's Gull	<i>Larus philadelphia</i>	RarMig
California Gull	<i>Larus californicus</i>	RarSuVis
Common Tern	<i>Sterna hirundo</i>	RarMig
Franklin's Gull	<i>Larus pipixcan</i>	OccVis
Glaucous-winged Gull	<i>Larus glaucescens</i>	OccVis
Herring Gull	<i>Larus argentatus</i>	RarVis
Mew Gull	<i>Larus canus</i>	OccMig
Ring-billed Gull	<i>Larus delawarensis</i>	OccRes
Doves		
Band-tailed Pigeon	<i>Columba fasciata</i>	RarSuRes
Mourning Dove	<i>Zenaida macroura</i>	UncSuRes
Rock Dove	<i>Columba livia</i>	CasVis
Owls		
Barn Owl	<i>Tyto alba</i>	OccRes
Barred Owl	<i>Strix varia</i>	RarRes
Boreal Owl	<i>Aegolius funereus</i>	RarWiRes
Great Horned Owl	<i>Bubo virginianus</i>	UncRes

**APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

COMMON NAME	SCIENTIFIC NAME	STATUS
Long-eared Owl	<i>Asio otus</i>	RarSuVis
Northern Hawk-Owl	<i>Surnia ulula</i>	RarVis
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	RarRes
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	UncRes
Short-eared Owl	<i>Asio flammeus</i>	OccMig
Spotted Owl	<i>Strix occidentalis</i>	RarRes
Western Screech-Owl	<i>Otus kennicottii</i>	RarRes
Goatsuckers		
Common Nighthawk	<i>Chordeiles minor</i>	ComSuRes
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	OccSuRes
Swifts		
Black Swift	<i>Cypseloides niger</i>	UncSuRes
Vaux's Swift	<i>Chaetura vauxi</i>	UncSuRes
Hummingbirds		
Anna's Hummingbird	<i>Calypte anna</i>	OccSuRes
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	OccSuVis
Calliope Hummingbird	<i>Stellula calliope</i>	UncSuRes
Costa's Hummingbird Accidental	<i>Calypte costae</i>	
Rufous Hummingbird	<i>Selasphorus rufus</i>	ComSuRes
Kingfishers		
Belted Kingfisher	<i>Ceryle alcyon</i>	UncRes
Woodpeckers		
Black-backed Woodpecker	<i>Picoides arcticus</i>	RarRes
Downy Woodpecker	<i>Picoides pubescens</i>	UncRes
Hairy Woodpecker	<i>Picoides villosus</i>	UncRes
Lewis' Woodpecker	<i>Melanerpes lewis</i>	RarSuVis
Northern Flicker	<i>Colaptes auratus</i>	ComSuRes
Pileated Woodpecker	<i>Dryocopus pileatus</i>	UncRes
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	UncRes
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	ComSuRes
Three-toed Woodpecker	<i>Picoides tridactylus</i>	UncRes
White-headed Woodpecker	<i>Dendrocopos albolarvatus</i>	OccVis
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>	RarSuRes
Flycatchers		
Alder Flycatcher	<i>Empidonax alnorum</i>	OccSuRes
Dusky Flycatcher	<i>Empidonax oberholseri</i>	ComSuRes
Eastern Kingbird	<i>Tyrannus tyrannus</i>	RarSuVis
Hammond's Flycatcher	<i>Empidonax hammondii</i>	ComSuRes
Least Flycatcher	<i>Empidonax minimus</i>	OccSuVis
Olive-sided Flycatcher	<i>Contopus borealis</i>	ComSuRes

**APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

COMMON NAME	SCIENTIFIC NAME	STATUS
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	UncSuRes
Say's Phoebe	<i>Sayornis saya</i>	OccSuRes
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	
Western Kingbird	<i>Tyrannus verticalis</i>	OccSuVis
Western Wood-Pewee	<i>Contopus sordidulus</i>	ComSuRes
Willow Flycatcher	<i>Empidonax traillii</i>	UncSuRes
Larks		
Horned Lark	<i>Eremophila alpestris</i>	ComSuRes
Swallows		
Bank Swallow	<i>Riparia riparia</i>	RarSuRes
Barn Swallow	<i>Hirundo rustica</i>	ComSuRes
Cliff Swallow	<i>Hirundo pyrrhonota</i>	UncSuRes
Northern Rough-wing Swallow	<i>Stelgidopteryx serripennis</i>	UncSuRes
Tree Swallow	<i>Tachycineta bicolor</i>	ComSuRes
Violet-green Swallow	<i>Tachycineta thalassina</i>	ComSuRes
Jays, Crows and Ravens		
American Crow	<i>Corvus brachyrhynchos</i>	ComRes
Black-billed Magpie	<i>Pica pica</i>	RarVis
Clark's Nutcracker	<i>Nucifraga columbiana</i>	ComRes
Common Raven	<i>Corvus corax</i>	ComRes
Gray Jay	<i>Perisoreus canadensis</i>	ComRes
Northwestern Crow	<i>Corvus caurinus</i>	OccVis
Steller's Jay	<i>Cyanocitta stelleri</i>	ComRes
Chickadees and Bushtits		
Black-capped Chickadee	<i>Parus atricapillus</i>	ComRes
Boreal Chickadee	<i>Parus hudsonicus</i>	ComRes
Chestnut-backed Chickadee	<i>Parus rufescens</i>	ComRes
Mountain Chickadee	<i>Parus gambeli</i>	ComRes
Nuthatches and Creepers		
Brown Creeper	<i>Certhia americana</i>	UncRes
Pygmy Nuthatch	<i>Sitta pygmaea</i>	OccVis
Red-breasted Nuthatch	<i>Sitta canadensis</i>	ComRes
White-breasted Nuthatch	<i>Sitta carolinensis</i>	RarVis
Wrens and Dippers		
American Dipper	<i>Cinclus mexicanus</i>	UncRes
Bewick's Wren	<i>Thryomanes bewickii</i>	RarSuVis
House Wren	<i>Troglodytes aedon</i>	OccMig
Rock Wren	<i>Salpinctes obsoletus</i>	RarVis
Winter Wren	<i>Troglodytes troglodytes</i>	ComRes
Kinglets		
Golden-crowned Kinglet	<i>Regulus satrapa</i>	ComRes

**APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

COMMON NAME	SCIENTIFIC NAME	STATUS
Ruby-crowned Kinglet	<i>Regulus calendula</i>	UncSuRes
Thrushes		
American Robin	<i>Turdus migratorius</i>	ComSuRes
Hermit Thrush	<i>Catharus guttatus</i>	ComSuRes
Mountain Bluebird	<i>Sialia currucoides</i>	UncSuRes
Swainson's Thrush	<i>Catharus ustulatus</i>	ComSuRes
Townsend's Solitaire	<i>Myadestes townsendii</i>	UncSuRes
Varied Thrush	<i>Ixoreus naevius</i>	ComSuRes
Veery	<i>Catharus fuscescens</i>	UncSuRes
Western Bluebird	<i>Sialia mexicana</i>	RarSuVis
Mimic Thrushes		
Gray Catbird	<i>Dumetella carolinensis</i>	OccSuVis
Pipits		
American Pipit	<i>Anthus rubescens</i>	UncSuRes
Waxwings		
Bohemian Waxwing	<i>Bombycilla garrulus</i>	RarSuRes
Cedar Waxwing	<i>Bombycilla cedrorum</i>	ComSuRes
Shrikes and Starlings		
European Starling	<i>Sturnus vulgaris</i>	ComRes
Loggerhead Shrike	<i>Lanius ludovicianus</i>	OccSuVis
Northern Shrike	<i>Lanius excubitor</i>	RarMig
Vireos		
Cassin's Vireo	<i>Vireo solitarius</i>	UncSuRes
Hutton's Vireo	<i>Vireo huttoni</i>	OccSuVis
Red-eyed Vireo	<i>Vireo olivaceus</i>	RarSuRes
Warbling Vireo	<i>Vireo gilvus</i>	UncSuRes
Warblers		
American Redstart	<i>Setophaga ruticilla</i>	RarSuRes
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	RarSuRes
Common Yellowthroat	<i>Geothlypis trichas</i>	ComSuRes
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	UncSuRes
Magnolia Warbler	<i>Dendroica magnolia</i>	RarMig
Nashville Warbler	<i>Vermivora ruficapilla</i>	RarSuRes
Northern Waterthrush	<i>Seiurus noveboracensis</i>	OccSuRes
Orange-crowned Warbler	<i>Vermivora celata</i>	RarSuRes
Tennessee Warbler	<i>Vermivora peregrina</i>	OccMig
Townsend's Warbler	<i>Dendroica townsendii</i>	ComSuRes
Wilson's Warbler	<i>Wilsonia pusilla</i>	UncSuRes
Yellow Warbler	<i>Dendroica petechia</i>	UncSuRes
Yellow-rumped Warbler	<i>Dendroica coronata</i>	ComSuRes

**APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).**

COMMON NAME	SCIENTIFIC NAME	STATUS
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	UncSuRes
Bobolink	<i>Dolichonyx oryzivorus</i>	OccSuVis
Chipping Sparrow	<i>Spizella passerina</i>	ComSuRes
Dark-eyed Junco	<i>Junco hyemalis</i>	ComRes
Fox Sparrow	<i>Passerella iliaca</i>	UncSuRes
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	UncMig
Harris' Sparrow	<i>Zonotrichia querula</i>	OccMig
Lapland Longspur	<i>Calcarius lapponicus</i>	RarMig
Lark Sparrow	<i>Chondestes grammacus</i>	OccMig
Lazuli Bunting	<i>Passerina amoena</i>	OccSuRes
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	UncSuRes
Savannah Sparrow	<i>Passerculus sandwichensis</i>	UncSuRes
Snow Bunting	<i>Plectrophenax nivalis</i>	OccMig
Song Sparrow	<i>Melospiza melodia</i>	ComRes
Spotted Towhee	<i>Pipilo macularia</i>	UncSuRes
Vesper Sparrow	<i>Pooecetes gramineus</i>	RarSuRes
Western Tanager	<i>Piranga ludoviciana</i>	ComSuRes
White-crowned Sparrow	<i>Zonotrichia atricapilla</i>	UncSuRes
Blackbirds		
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	RarSuRes
Brown-headed Cowbird	<i>Molothrus ater</i>	UncSuRes
Bullock's Oriole	<i>Icterus galbula</i>	OccSuRes
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	ComSuRes
Western Meadowlark	<i>Sturnella neglecta</i>	RarSuVis
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	RarSuRes
Sparrows		
American Tree Sparrow	<i>Spizella arborea</i>	OccMig

APPENDIX 2: Bird Species known to occur in E.C. Manning Provincial Park,
Cascade Recreation Area and Skagit Valley Provincial Park (cont'd).

Finches		
American Goldfinch	<i>Carduelis tristis</i>	RarSuRes
Cassin's Finch	<i>Carpodacus cassinii</i>	ComSuRes
Common Redpoll	<i>Carduelis flammea</i>	UncWiRes
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	UncRes
Pine Grosbeak	<i>Pinicola enucleator</i>	ComRes
Pine Siskin	<i>Carduelis pinus</i>	ComRes
Purple Finch	<i>Carpodacus purpureus</i>	UncRes
Red Crossbill	<i>Loxia curvirostra</i>	UncRes
Gray-crowned Rosy Finch	<i>Leucosticte tephrocotis</i>	UncSuRes
White-winged Crossbill	<i>Loxia leucoptera</i>	OccRes
Old World Sparrows		
House Sparrow	<i>Passer domesticus</i>	RarRes

Com=common Unc=uncommon Rar=rare Occ=occasional Res=resident Su=summer Wi=winter Vis=visitor Mig=migration
Ecosystem Plan, BC Parks, 2003. Conservation Data Centre, MOE, 2007.

APPENDIX 3: Amphibian and reptile species known to occur in E.C. Manning Provincial Park, Cascade Recreation Area and Skagit Valley Provincial Park.

COMMON NAME	SCIENTIFIC NAME	ABUNDANCE
AMPHIBIANS		
Salamanders		
Ensatina	<i>Ensatina eschscholtzii</i>	Unc
Long-toed Salamander	<i>Ambystoma macrodactylum</i>	Unc
Northwestern Salamander	<i>Ambystoma gracile</i>	Rar
Rough-skinned Newt	<i>Taricha glandulosa</i>	Occ
Frogs and Toads		
B Coastal Tailed Frog	<i>Ascaphus truei</i>	Com
Columbian Spotted Frog	<i>Rana luteiventris</i>	Com
Pacific Treefrog	<i>Hyla regilla</i>	Com
Red-legged Frog	<i>Rana aurora</i>	Com
Western Toad	<i>Bufo boreas</i>	Com
REPTILES		
Lizards		
Northern Alligator Lizard	<i>Elgaria coerulea</i>	Com
Western Skink	<i>Eumeces skiltonianus</i>	Occ
Snakes		
Common Garter Snake	<i>Thamnophis sirtalis</i>	Unc
Northwestern Garter Snake	<i>Thamnophis ordinoides</i>	Com
Rubber Boa	<i>Charina bottae</i>	Rar
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	Com

Com=common Unc=uncommon Rar=rare Occ=occasional

Sources: Conservation Data Centre, MOE, 2007. Ecosystem Plan, BC Parks, 2003.

APPENDIX 4 : Fish Species for Lakes and Streams in the Skagit River watershed.

Species	Skagit River	Klesilkwa River	Sumallo River	Snass Creek	Shawatum Creek	Poland Lake	Nicomen Lake	Ross Lake
Salmonids								
Rainbow Trout <i>Oncorhynchus mykiss</i>	X	X	X			X	X	X
Bull Trout <i>Salvelinus confluentus</i>	+		+					
Dolly Varden <i>Salvelinus malma</i>	X	X	X					X
Westslope Cutthroat Trout <i>Oncorhynchus clarki lewisi</i>	X							X
Cutthroat Trout <i>Oncorhynchus clarki</i>	+		+					X
Brook Trout <i>Salvelinus fontinalis</i>	+		+	+				X
Minnows								
Pearl Dace <i>Margariscus margarita</i>					+			
Red-sided Shiner <i>Richardsonius balteatus</i>								+

Sources: FISS, 2007. Ecosystem Plan, BC Parks, 2003.

X Species listed in FISS tables
+ Species listed in other sources

Note: Many fish species in the Skagit River watershed have yet to be identified as "qualified species". Ongoing inventories, including those prepared for the Skagit River Watershed Fish & Wildlife Management Plan, will add to the database.

APPENDIX 5: Species at Risk in the Skagit River Watershed.

Common Name	Scientific Name	Status	COSEWIC
MAMMALS			
Badger	<i>Taxidea taxus</i>	Red	Endangered
Western Red Bat	<i>Lasiurus blossevillii</i>	Red	
Fisher	<i>Martes pennanti</i>	Blue	
Grizzly Bear	<i>Ursus arctos</i>	Blue	Special Concern
Wolverine	<i>Gulo gulo</i>	Blue	Special Concern
Cascade Mantled Ground Squirrel	<i>Spermophilus saturatus</i>	Blue	Not at Risk
Mountain Beaver	<i>Aplodontia rufa</i> ssp. <i>raineri</i>	Blue	Special Concern
Woodland Caribou	<i>Rangifer taradus</i>	Blue	Threatened
California Bighorn Sheep	<i>Ovis Canadensis</i> ssp. <i>californiana</i>	Blue	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Blue	
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	Blue	
Trowbridge's Shrew	<i>Sorex trowbridgii</i>	Blue	
BIRDS			
Spotted Owl	<i>Strix occidentalis</i>	Red	Endangered
Peregrine Falcon	<i>Falco peregrinus</i> ssp. <i>anatum</i>	Red	Threatened
Prairie Falcon	<i>Falco mexicanus</i>	Red	Not at Risk
Swainson's Hawk	<i>Buteo swainsoni</i>	Red	
Western Grebe	<i>Aechmophorous occidenalis</i>	Red	
Lark Sparrow	<i>Chondestes grammacus</i>	Red	
Western Screech Owl	<i>Otus kennicottii</i>	Red	Endangered
White-headed Woodpecker	<i>Aechmophorus occidentalis</i>	Red	Endangered
Great Blue Heron	<i>Ardea herodias</i>	Blue	Special Concern
Green Heron	<i>Butorides virescens</i>	Blue	
Short-eared Owl	<i>Asio flammeus</i>	Blue	Special Concern
Barn Owl	<i>Tyto alba</i>	Blue	Special Concern
Lewis' Woodpecker	<i>Melanerpes lewis</i>	Blue	Special Concern
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>	Blue	
Trumpeter Swan	<i>Cygnus buccinator</i>	Blue	Not at Risk
Surf Scoter	<i>Melanitta perspicillata</i>	Blue	
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Blue	
Sandhill Crane	<i>Grus canadensis</i>	Blue	Not at Risk
Long-tailed Duck	<i>Clangula hyemalis</i>	Blue	
Long-billed Curlew	<i>Numenius americanus</i>	Blue	Special Concern
California Gull	<i>Larus californicus</i>	Blue	
Band-tailed Pigeon	<i>Columba fasiata</i>	Blue	
American White Pelican	<i>Pelecanus erythrorhynchos</i>	Blue	Not at Risk
Bobolink	<i>Dolichonyx oryzivorus</i>	Blue	

APPENDIX 5: Species at Risk in the Skagit Watershed (continued).

Common Name	Scientific Name	Status	COSEWIC
AMPHIBIANS			
Coastal Tailed Frog	<i>Ascaphus truei</i>	Blue	Special Concern
Red-legged Frog	<i>Rana aurora</i>	Blue	Special Concern
REPTILES			
Painted Turtle	<i>Chrysemys picta</i>	Blue	
FISH			
Bull Trout	<i>Salvelinus confluentus</i>	Blue	
Dolly Varden	<i>Salvelinus malma</i>	Blue	
Cutthroat Trout	<i>Oncorhynchus clarki</i>	Blue	
Westslope Cutthroat Trout	<i>Oncorhynchus clarki ssp. lewisi</i>	Blue	
BUTTERFLIES			
Indra Swallowtail	<i>Pipilio indra</i>	Red	
Monarch	<i>Danaus plexippus</i>	Blue	Special Concern
Great Arctic	<i>Oeneis nevadensis</i>	Blue	
Hoffman's Checkerspot	<i>Charidryas hoffmannii</i>	Blue	
Propertius Duskywing	<i>Erynnis propertius</i>	Blue	
Western Sulphur	<i>Colias occidentalis</i>	Blue	

APPENDIX 5: Species at Risk in the Skagit River Watershed (continued).

Common Name	Scientific Name	Status	COSEWIC
PLANTS			
Drummond's Anemone	<i>Anemone drummondii</i> var. <i>drummondii</i>	Blue	
Narrow-leaved Brickellia	<i>Brickellia oblongifolia</i> ssp. <i>oblongifolia</i>	Red	
Silvercrown	<i>Cacaliopsis nardosmia</i>	Red	
Two-edged Water- Starwort	<i>Callitriche heterophylla</i> ssp. <i>heterophylla</i>	Blue	
Rocky Mountain Sedge	<i>Carex saximontana</i>	Blue	
Cliff Paintbrush	<i>Castilleja rupicola</i>	Red	
Lace Fern	<i>Cheilanthes gracillima</i>	Blue	
Tall Bugbane	<i>Cimicifuga elata</i>	Red	Endangered
Slender Hawksbeard	<i>Crepis atribarba</i> ssp. <i>atribarba</i>	Red	
Steer's Head	<i>Dicentra uniflora</i>	Blue	
Lance-fruited Draba	<i>Draba lonchocarpa</i> var. <i>thompsonii</i>	Blue	
Elmera	<i>Elmera racemosa</i> var. <i>racemosa</i>	Blue	
Smooth Willowherb	<i>Epilobium glaberrimum</i> ssp. <i>fastigiatum</i>	Blue	
Hall's Willowherb	<i>Epilobium halleanum</i>	Blue	
Small-flowered Willowherb	<i>Epilobium leptocarpum</i>	Blue	
Hairy-stemmed Willowherb	<i>Epilobium mirabile</i>	Blue	
Dwarf Groundsmoke	<i>Gayophytum humile</i>	Blue	
Regel's Rush	<i>Juncus regelii</i>	Blue	
Tweedy's lewisia	<i>Lewisia tweedyi</i>	Red	
Brandegee's Lomatium	<i>Lomatium brandegei</i>	Blue	
Silvery Lupine	<i>Lupinus argenteus</i> var. <i>laxiflorus</i>	Red	
Oniongrass	<i>Melica bulbosa</i> var. <i>bulbosa</i>	Red	
Leafy Mitrewort	<i>Mitella caulescens</i>	Blue	
Fragrant White Rein Orchid	<i>Platanthera dilatata</i> var. <i>albiflora</i>	Blue	
Elegant Jacob's Ladder	<i>Polemonium elegans</i>	Blue	
Sawatch Knotweed	<i>Polygonum douglasii</i> ssp. <i>johnstonii</i>	Blue	
Kruckeberg's Holly Fern	<i>Polystichum kruckebergii</i>	Blue	
Dwarf Bramble	<i>Rubus lasiococcus</i>	Blue	
Lance-leaved Figwort	<i>Scrophularia lanceolata</i>	Blue	
Short-fruited Smelowskia	<i>Smelowskia ovalis</i>	Blue	
Blunt-sepaled Starwort	<i>Stellaria obtusa</i>	Blue	
Umbellate Starwort	<i>Stellaria umbellata</i>	Blue	
Purple-marked Yellow Violet	<i>Viola purpurea</i> var. <i>venosa</i>	Blue	

Sources: Conservation Data Centre, Fish Information System Summary, Ministry of Environment, 2007; Committee on the Status of Endangered Wildlife in Canada, 2007; Ecosystem Plan, BC Parks, 2003.

APPENDIX 6: Vision Statements of the Parks

From: Management Plan. November, 2004 for E.C. Manning Provincial Park and Cascade Recreation Area.

E. C. Manning Park has significant conservation and recreation values that will continue to draw large numbers of tourists and residents, particularly from the southwestern part of the province. The park will be managed to protect its natural values and provide a range of all-season intensive and backcountry recreation opportunities on a long-term sustainable basis. Management emphasis will increasingly be on protecting conservation values. Much of the park's recreation potential has been realized. Demand will continue to grow placing increasing pressure to expand facilities or to introduce new opportunities. Future expansion will be evaluated in terms of its environmental impact, sustainability and cost/benefit to the park and limited to that which has little impact on existing use and poses no serious threat to the conservation values. Visitor capacity limits, innovative management techniques and appropriately developed facilities will be needed to ensure use does not exceed physical carrying capacity, particularly in the backcountry. The Cascade Recreation Area continues to be managed as a remote wilderness area with limited facilities requiring the user to be self-reliant as much as possible. Its significant conservation and recreation values have resulted in its reclassification to Class A park status.

From: Management Plan. January, 1998 for Skagit Valley Provincial Park

As part of an overall international park initiative in the Cascade Mountains, Skagit Valley Provincial Park will preserve and present the natural, scenic and historic features of the area as well as provide recreation opportunities that complement those opportunities, existing and planned, provided by North Cascades National Park, Ross Lake National Recreation Area in the United States of America and E.C. Manning Provincial Park and the Cascades Recreation Area in Canada. Park management will focus on cooperation between BC Parks and the United States National Park Service as well as First Nations, other agencies, non-government organizations and the public in an attempt to showcase the long history and significance of the park.

APPENDIX 7: Resource-based websites

Archeology www.tsa.gov.bc.ca/archaeology

BC Government Publications www.publications.gov.bc.ca

BC Land Title and Survey www.ltsa.ca

BC Parks www.env.gov.bc.ca/bcparks

Conservation Data Centre www.env.gov.bc.ca/cdc

Fish Information www.pisces.env.gov.bc.ca

Fisheries Inventory www.env.gov.bc.ca/fish

Integrated Land Management Bureau www.gov.bc.ca/bvprd/

Land and Resource Data Warehouse www.lrd.ca

Land Use Planning www.gov.bc.ca/lup

Manning Park Lodge www.manningpark.com

Ministry of Agriculture and Lands www.gov.bc.ca/bvnd/bc

Ministry of Environment ES www.env.gov.bc.ca

Ministry of Forests Library www.for.gov.bc.ca/hfd/library

Natural Resource Information Network www.nrin.org

North Cascades National Park www.nps.gov.noca.nat.htm

Park Facility Operators Society www.gocampingbc.ca.com

Seattle City Light www.seattle.gov/light/environment

Sensitive Ecosystems Inventories www.env.gov.bc.ca/sei

Skagit Environmental Endowment Commission www.skagiteec.org

Wildlife Habitat Areas www.env.gov.bc.ca/wld/frpa/iwms/wha.html