UPPER SKAGIT WATERSHED FISH AND WILDLIFE MANAGEMENT PLAN - DRAFT

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March 2008

This document is an unofficial draft. It has not yet received Ministry of Environment approval and is intended only as an information tool for presenting the proposed plan during the public comment period.

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DEFINITIONS

Bioaccumulation: the build up of toxic substances in an animal over time. These are usually organic substances which are stored in the fat tissues of animals. Toxic substances may enter an animal's body through ingestion, respiration, physical contact, etc. Because these substances are stored rather than being removed by the renal system (or are removed more slowly than they are acquired), they accumulate in the animal's body in concentrations that exceed that of the surrounding environment.

Biomagnification: the increase in concentration of toxins moving up the food chain. When organisms low on the food chain bioaccumulate toxins they pass these toxins on to the animals which feed on them. Every time an animal feeds on a contaminated food source it accumulates all of the toxins stored in the body of the other organism. The result is that animals at the top of the food chain can have very high concentrations of toxins in their bodies.

Draw Down: the period of time when the water level in a reservoir is falling. During this time more water is being let out of the reservoir to produce electricity than is entering the reservoir from its tributaries. Draw down may also refer to the difference between the full pool water level and the minimum water level that is reached before the reservoir begins to refill.

Full Pool: the maximum water level in a reservoir.

Habitat Feature: a component of a species' habitat that is critical to its survival and/or reproduction. Examples include den sites, mineral licks, and wildlife trees.

Herpetile: term collectively referring to reptiles and amphibians.

Indicator Species: species whose presence or absence gives a certain indication about the health of an ecosystem. For example, amphibians are sensitive to water pollution and large carnivores require large tracts of land and a stable prey base.

Natal Range: critical habitat that is used by a species during birthing and while rearing young.

Refugia: a habitat feature that provides an animal with protection or relief from a stressor, such as a cool, shaded location on a hot, sunny day (thermal refugia) or a calm pool on a fast flowing river (energetic refugia).

Summer Range: critical habitat that is used by a species during summer.

Top Carnivore/Predator: an animal at the top of the food chain/web in its ecosystem. These animals are not normally preyed upon by other animals as adults. Some, such as bears are omnivores rather than strict carnivores. Top carnivores typically have low densities, large home ranges, and slow reproduction, making them vulnerable to human-caused population declines. Low reproductive rates mean that populations are slow to recover following such an event. An ecosystem that is able to support its top carnivores should have enough space and resources to support its other native species, provided their species-specific habitat features are available.

Trophic Level: the position on a food chain at which an organism feeds. For example, a plant is at the first trophic level; the mouse that feeds on the plant's berries is at the second trophic level; the snake that feeds on the mouse is at the third trophic level, etc.

Winter Range: critical habitat that is used by a species during winter.

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ABBREVIATIONS

FVRD	Fraser Valley Regional District
MEM	Ministry of Energy, Mines and Petroleum Resources (previously Ministry of Energy and Mines)
MOE	Ministry of Environment
MOFR	Ministry of Forests and Range
MOT	Ministry of Transportation
MTSA	Ministry of Tourism, Sport and the Arts
NOCA	North Cascades National Park Service Complex
NPS	US National Park Service
SEEC	Skagit Environmental Endowment Commission
WDFW	Washington Department of Fish and Wildlife

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1.0 INTRODUCTION

This management plan relates to fish and wildlife populations inhabiting the Skagit River watershed of southwestern British Columbia. A brief introduction to the area follows. A more in-depth discussion on the natural and historical features of the watershed can be found in the *Skagit River Watershed Background Report* (Armstrong 2007) and the Appendices of the *Ecosystem Plan for E.C. Manning Provincial Park, Skagit Valley Provincial Park and Cascade Recreation Area* (Summit Environmental Consultants 2003). The *E.C. Manning Provincial Park and Cascade Recreation Area Management Plan* (MOE 2004) and the *Silverdaisy Integrated Management Plan* (MEM *et al.* 1998) also provide good introductory information for the watershed and surrounding region.

1.1 LOCATION AND LAND TENURE

The Skagit River arises near Allison Pass in the Hozameen Range of the North Cascade Mountains of southwestern British Columbia. It flows northwest to its confluence with the south-easterly flowing Sumallo River and then turns southwest to its confluence with the Klesilkwa River and southeast to the US border at 49° N latitude. On the US side of the border, the Skagit passes through a series of three hydroelectric dams and their reservoirs, turns west once more, and becomes the second largest river in Washington State before emptying into Puget Sound near Mount Vernon. The Skagit is an important salmon river below the dams. The three dams are part of the Skagit Hydroelectric Project operated by Seattle City Light, the public utility providing electricity to the city of Seattle, WA. The largest and most northerly reservoir, Ross Lake, floods an area of approximately 194ha of the Skagit Valley in British Columbia when at full pool. The reservoir falls to well south of the Canadian border during winter draw down.

On the Canadian side of the border, the Skagit watershed covers an area of approximately 100,000ha lying about 170km east of Vancouver and 25km southeast of Hope. It is contained mostly (about 70%) within Skagit Valley and E.C. Manning Provincial Parks and Cascade Provincial Recreation Area. Four Ecological Reserves are located within the watershed in Skagit Valley Provincial Park. A smaller portion of the watershed covers crown land outside the provincial protected areas and a small area in the northwest corner is privately owned land (Fig. 1). The watershed north of Ross Dam on the US side of the international boundary is located within Ross Lake National Recreation Area, North Cascades National Park (both part of the North Cascades National Park Service Complex) and the Pasayten Wilderness of the Mount Baker-Snoqualmie National Forest. The Skagit watershed therefore forms an important part of an international complex of contiguous protected wildlands (Fig. 2). It is vital that fish and wildlife management issues be addressed in the context of the watershed and ecosystem as a whole, regardless of borders, and that responses to management issues be coordinated across the various jurisdictions involved.

The Canadian Skagit watershed falls within the jurisdiction of several provincial ministries including the Ministry of Environment, Ministry of Forests and Range,

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Ministry of Energy, Mines and Petroleum Resources, and Ministry of Transportation. Federal interests in the watershed include migratory birds and species listed under the *Species at Risk Act* (SARA). Waterfowl are a joint federal/provincial responsibility. Multiple private enterprises also have stakes in the watershed. These include BC Timber Sales, Cattermole Timber, mineral tenure holders, Sunshine Valley recreational resort community, Emil Anderson Maintenance, Quarry Pacific Industries, hunting and angling guide outfitters, and several traplines. For a more in-depth discussion of land tenures and jurisdictions within the watershed refer to the Skagit River Watershed Background Report (Armstrong 2007).

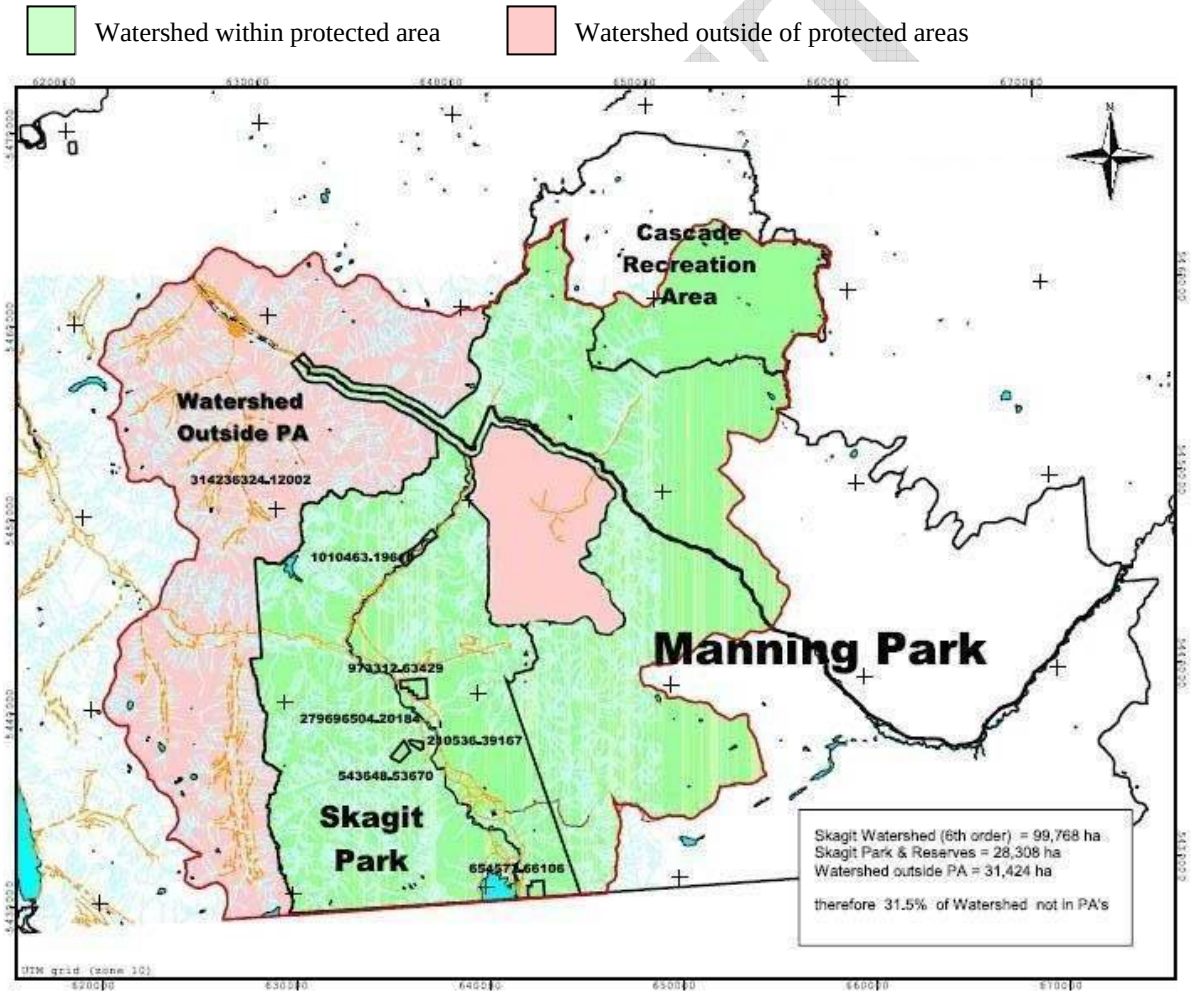

Fig. 1 Skagit River Watershed Protected Areas – includes Ecological Reserves in Skagit Valley Provincial Park

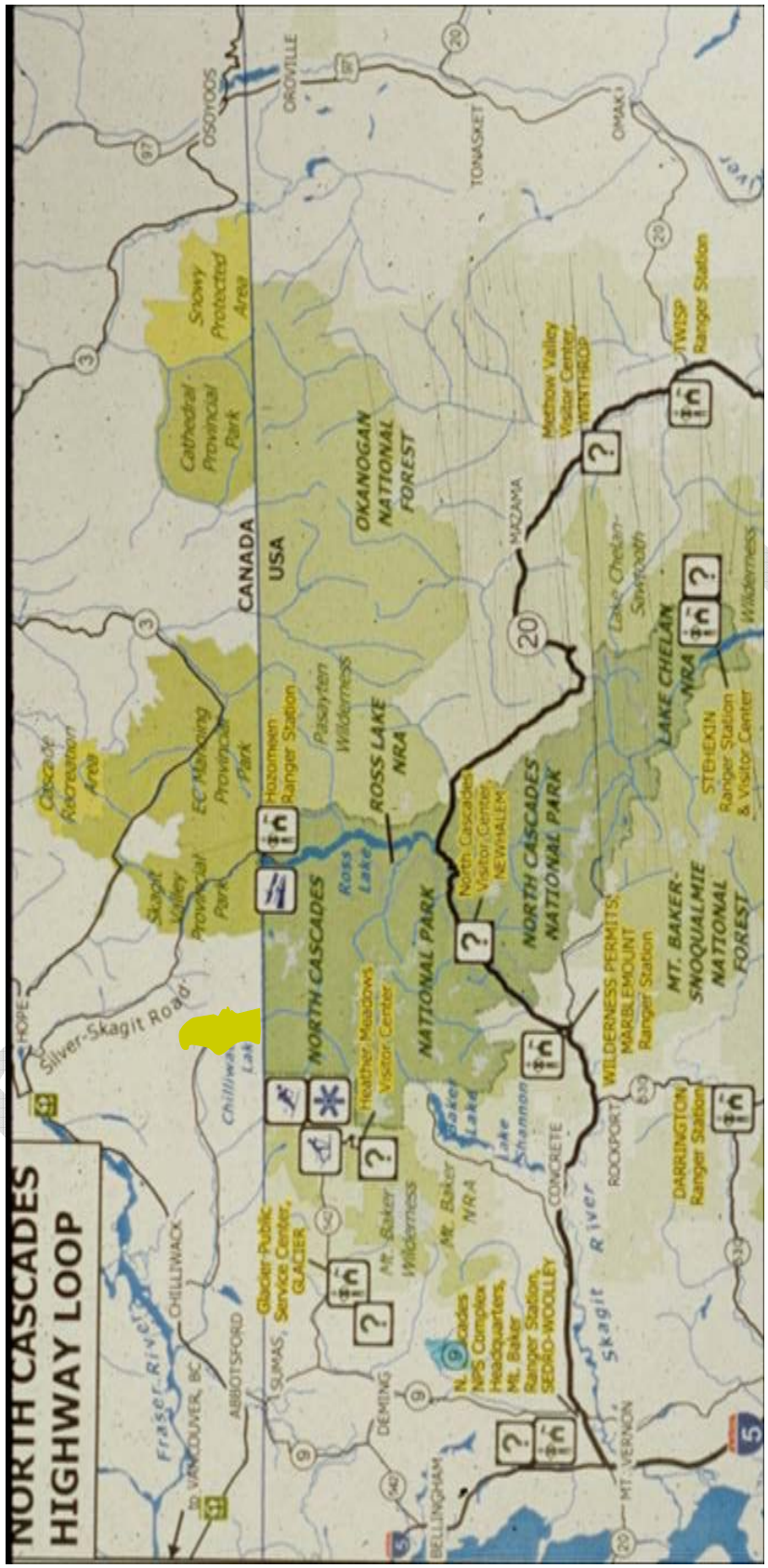

Fig. 2 Cross-border Contiguous Protected Areas

1.2 BIOGEOGRAPHY

The Skagit Valley lies between the wet, moderate climate of the western slopes of the North Cascade Mountains and the dry, more extreme climate of the eastern slopes. The Skagit watershed acts as a transition zone between these two climate types and their associated biological communities. The overlap of eastern and western species, the great variation in elevation from glacier-tipped peaks to low, lush valley bottoms, patches of old-growth and variation in local microclimates result in a rich diversity of wildlife in the watershed. The north-south orientation of the Skagit also allows for species at the northern or southern edges of their ranges to disperse along the valley. Five of British Columbia's sixteen biogeoclimatic zones are found within the Skagit watershed. These are:

Coastal Western Hemlock
Mountain Hemlock
Coast Mountain-heather Alpine
Interior Douglas Fir
Engelmann Spruce Subalpine Fir

The Skagit watershed provides important breeding habitats, feeding grounds, wintering ranges and migration routes for the great variety of wildlife that utilize the area. Approximately 240 species of birds, 70 species of mammals, 15 species of reptiles and amphibians and 8 species of fish have been recorded within the Skagit watershed. Nearly 50 red and blue listed species at risk are known to use the watershed, as well as several species of regional significance.[1]

1.3 HISTORICAL USES OF THE WATERSHED

Evidence of human use of the Skagit watershed dates back at least eight thousand years. Several First Nations have associations with the region, most notably the Sto:lo, the Nlaka'pmx (Thompson), the Upper Similkameen and the Stuwix (Nicola). Various resources were harvested from the watershed and the area was used as a meeting place between coastal and interior peoples to trade goods.

European use of the area began with fur trappers. Prospectors used trails through the Skagit Valley on their way to various gold strikes and other mining sites in the watershed and in the interior of BC and WA from the mid 1800's through the early 1900's. A few attempts were made at ranching in the valley, but were short-lived. The construction of Ross Dam in the 1940's led to the clearing of the valley bottom in preparation for flooding Ross Lake Reservoir in the early 1950's and opened up the watershed to logging

[1] Red listed species are species of the most critical concern in British Columbia. Blue listed species are not of the immediate concern of red listed species, but are particularly vulnerable to declining numbers based on human activities and/or life history patterns. Information on species at risk in British Columbia, including an explanation of the ranking system, can be found on the Ministry of Environment's Endangered Species and Ecosystems website (See Reference section).

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via the Silver-Skagit Road from Hope. The Hope-Princeton Highway (Highway 3), crossing the northern part of the watershed, was completed in 1948. This highway formed an important link between the Fraser Valley and the central interior of the province. These roads also opened the watershed to increased recreational use.

1.4 CURRENT USES OF THE WATERSHED

Today, the principal human use for the majority of the Skagit watershed is recreation. Recreational opportunities are focused in the protected areas managed by BC Parks, but also include areas managed by MTSA, MOFR and FVRD. Recreational uses include hiking, wildlife viewing, camping, fishing, boating, hunting, skiing, horseback riding, snowmobiling and using motorized off-road vehicles.

Timber harvest occurs in the watershed on crown land outside the protected areas. A number of mineral claims also exist in the watershed, with activity concentrated mostly in the Silverdaisy area (the "donut hole" surrounded by Skagit Valley and E.C. Manning Provincial Parks). A granite quarry also operates just outside the entrance to Skagit Valley Provincial Park. There are three traplines located wholly or partially within the watershed and one guide outfitter territory. At the time of writing, one angling guide holds a Park Use Permit to guide on the Skagit River.

The private residential community of Sunshine Valley is located in the northwest corner of the watershed along the Sumallo River. The development ownership has recently changed hands and plans are being made for expansion.

Road access into the Skagit watershed is still limited to highway 3 and the unpaved Silver-Skagit road. Smaller side roads used for timber and mineral extraction extend from these roadways in some of the unprotected parts of the watershed. Highway 3 continues to be one the main routes from the Fraser Valley into the interior of the province and experiences high traffic volumes at all times of year. The Silver-Skagit road is in fairly good condition and is generally open 3 seasons of the year. During winter much of the road is not maintained and snow usually prevents vehicle traffic. A substantial amount of snowmobile use occurs on the Silver-Skagit road during this time.

2.0 DEVELOPMENT OF THE SKAGIT WATERSHED FISH AND WILDLIFE MANAGEMENT PLAN

Multiple different management plans address fish and wildlife in parts of the Skagit watershed. These plans include the *Ecosystem Plan: E.C. Manning Provincial Park, Skagit Valley Provincial Park & Cascade Recreation Area* (Summit Environmental Consultants 2003); the *Management Plan for E.C. Manning Provincial Park and Cascade Recreation Area* (MOE 2004); the *Silverdaisy Integrated Management Plan*

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(MEM *et al.* 1998); and the *Recovery Plan for Grizzly Bears in the North Cascades of British Columbia* (North Cascades Grizzly Bear Recovery Team 2004). However, no plan addresses the watershed as a whole and parts of the watershed are not currently identified in any of the plans. The Upper Skagit Watershed Fish and Wildlife Management Plan (USWFWMP) strives to integrate the relevant key points from these previous plans and to provide management guidelines for any activities to be initiated within the watershed in British Columbia. Where a large volume of information in another document is directly relevant to the USWFWMP interested readers are given direction to consult the primary source rather than repeating expansive amounts of text. The USWFWMP aims to be a manageable size for easy use while providing references to specific documents for readers that require more detailed information.

This plan is based on information compiled from various scientific reports, MOE surveys and interviews with MOE biologists. A draft plan was presented to interested stakeholders at two public consultation meetings in the winter of 2008. Public stakeholder groups for this plan include conservation organizations, hunter and angler associations, hunting guide outfitters, angling guides, First Nations with ties to the watershed, horseback riding groups, off-road vehicle users, and individual recreationists. The plan focuses on species that are of current management concern in the watershed. It will be reviewed on a regular basis (every 5 years), with the addition of new species and update of the management strategies as required.

Funding for the development of this fish and wildlife management plan was provided by the Skagit Environmental Endowment Commission (SEEC). The Commission and the endowment fund it manages resulted from the 1984 treaty between the US and Canada and agreement between the City of Seattle and the Province of British Columbia to maintain the current height of Ross Dam and area flooded by the Ross Lake Reservoir until 2064.

3.0 MANAGEMENT CONCERNS

Concerns related to fish and wildlife management in the Upper Skagit watershed range from broad concerns which affect multiple species to specific concerns related to the management of individual species or species groups.

3.1 FISHERIES

The Skagit and Sumallo Rivers are popular destinations for anglers in the Lower Mainland of BC. To sustain a quality fishing experience on the Skagit River, while providing access to a variety of user groups, management tools are important to prevent crowding, maintain healthy fish populations and to mitigate conflicts amongst anglers and between anglers and other park users. The wilderness atmosphere of the Skagit River is one of its greatest assets and is an important quality to preserve.

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A catch and release fishery was implemented on the Skagit and Sumallo Rivers in 1992 in response to decreasing catch rates and increasing angler use. This action appeared to result in a significant increase in fish populations and greater angler success (Burrows and Neuman 1995a, Burrows and Neuman 1995b, Scott *et al.* 1995). Rainbow trout (*Oncorhynchus mykiss*) is the most commonly caught fish in both the river and reservoir. Ross Lake Reservoir also supports bull trout (*Salvelinus confluentus*), a species of char listed as Threatened by the U.S. Fish and Wildlife Service and Blue Listed by MOE. The Skagit River supports a second Blue listed char species, Dolly Varden (*Salvelinus malma*), bull trout and bull trout-Dolly Varden hybrids (McPhail and Taylor 1995). There is also historical mention of cutthroat and westslope cutthroat trout in the river. It is possible that small populations of these fish persist in the Skagit or Sumallo, however their presence has not been confirmed since the early 1970s (Neuman 1988, Triton, in preparation). Redside shiners (*Richardsonius balteatus*) are suspected to have been introduced into Ross Lake Reservoir and the population appears to be increasing. It is not known what impact the shiner population is having or will have on the native fish populations. Shiners are known to compete with rainbow trout for food. Some strains of rainbow trout will prey on smaller fish, such as shiners, as adults. At the time of writing, it was not known if the rainbow trout or bull trout in Ross Lake are feeding on the redside shiners.

The trout and char in the Skagit watershed exhibit varied life history strategies. Some trout and char are year-round river residents. Others have an adfluvial life history, meaning they grow and mature in Ross Lake Reservoir and migrate into the Skagit River or other tributaries to spawn (Nelson 2006). These fish may spend many weeks in the river system before returning to the reservoir. In this interconnected system, population numbers in the river may be affected by conditions in the reservoir and vice versa. Ross Lake Reservoir straddles the international border, making coordination between Washington and British Columbia essential for successful management of fish stocks. Past cooperation has standardized fishing regulations on the reservoir, including open season; species catch and size limits; and permissible tackle. Updated fishing regulations are published for British Columbia every year and are available at MOE offices, on the MOE Fish and Wildlife Branch website (see References) and at tackle supply stores.

The fishable parts of the BC Skagit can be divided into three sections (Fig. 3). The “lower section”, the Skagit between Ross Lake Reservoir and Silver Tip Campground in Skagit Valley Provincial Park, is the most popular part of the Skagit for fishing. It can be accessed from Ross Lake and Silver Tip campgrounds, from 6 day-use parking areas and other locations along the Silver-Skagit Road. The “upper section”, from Silver Tip Campground upstream to the confluence with the Sumallo River, is accessed from Silver Tip campground and via the Silver Skagit Trail that runs along the eastern bank of the river. Entrances to the trail are at Sumallo Grove Day Use area, just off Highway 3 in Manning Provincial Park, and at 26 Mile Bridge on the Silver-Skagit Road in Skagit Valley Provincial Park. The third section, comprised of the Sumallo River upstream from its confluence with the Skagit, runs adjacent to Highway 3 and is accessed from multiple pullouts on the side of the highway. The Skagit upstream of its confluence with the Sumallo is not generally fished.

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The varying characteristics of each section of river provide different fishing experiences. The Sumallo has higher angler capacity with a shorter visit time compared to the mainstem Skagit (Scott Resources 2008). The resulting high rate of angler turnover helps to avoid crowding on the Sumallo, although the location beside a busy highway makes the experience of fishing this river quite different from the quiet, secluded experience of the Skagit. The physical attributes of the three sections also differ from one another. The Sumallo is a slower moving, meandering river. The Skagit is a faster flowing river, the upper section being on average considerably narrower than the lower section.

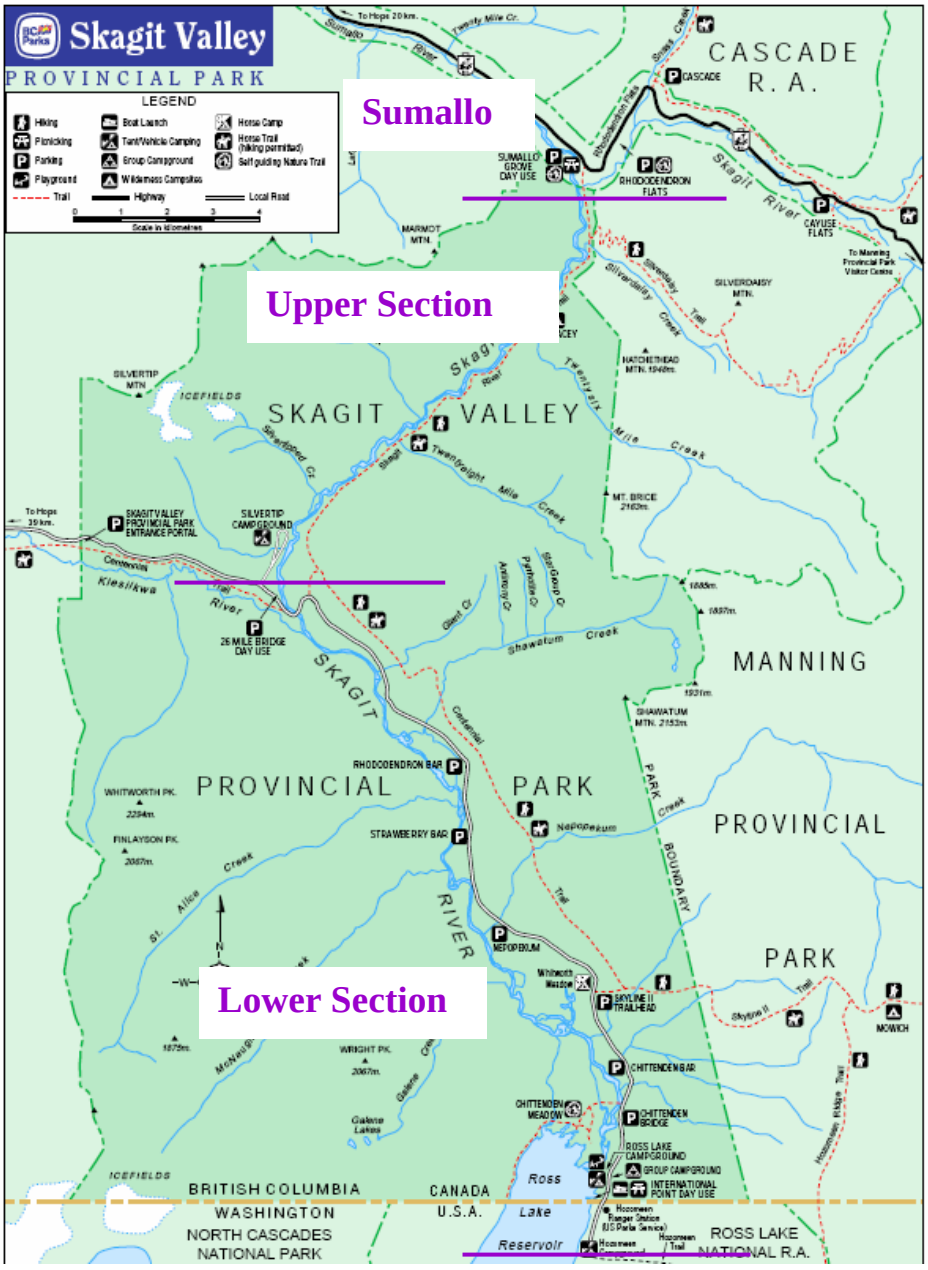

Fig. 3 Division of River Fishing Sections

3.1.1 Fish Population Monitoring

Anecdotal information suggests that fish stocks in the reservoir may be declining. Given the age of the reservoir (just over 50 years) this is not unexpected. When a reservoir is first flooded there is a large release of nutrients into the water from the newly submerged soil and vegetation. Other reservoirs have shown that these nutrients deplete over time and productivity begins to decline (Pers comm. Jesson February 2008). In addition, it is possible that the introduced redside shiners could have a negative impact on the trout and char populations in the reservoir. In the absence of current fish stock assessment data it is difficult to examine how these factors are affecting the trout and char populations. Current population data for the river system is also lacking.

Issue: The current status of the fish stocks in the Sumallo River, Skagit River and Ross Lake Reservoir are unknown, though anecdotal information suggests the populations in the river are relatively stable, while those in the reservoir may be declining.

Strategy 1: Fish stock assessments need to be conducted on the Skagit and Sumallo Rivers and in Ross Lake Reservoir. If possible, surveys should be coordinated with the WDFW and include the Washington side of the reservoir. Scott Resources (2007) recommends that assessments be implemented for five consecutive years to cover a complete rainbow trout life-cycle. Regular monitoring of fish stocks should then be done every 3-5 years.

Strategy 2: Studies should be undertaken to investigate the impacts of the redside shiner population on the trophic level dynamics in Ross Lake.

3.1.2 Reservoir Catch Regulations

Uniform fishing regulations are in place across the international border for Ross Lake Reservoir. The reservoir fishery is a limited kill fishery. As stated above (3.1.1), the native fish in Ross Lake Reservoir are facing a suspected decline in nutrient levels and an expanding population of redside shiners.

Issue: Anecdotal evidence suggests that fish stocks in Ross Lake Reservoir may be declining. Nutrient changes due to reservoir ageing and biological changes from the growing population of redside shiners may be impacting trout and char populations in the lake. Current regulations governing catch limits in the reservoir may be insufficient to protect fish stocks.

Strategy 1: Depending on the findings of a fish stock assessment (3.1.1), fishing regulations may need to be adjusted to better manage the fish stocks in Ross Lake Reservoir. The Washington Department of Fish and Wildlife needs to be consulted if any changes in regulations are considered. Regulations for the reservoir should be kept uniform across the border.

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Strategy 2: Population assessments and creel surveys should be completed at regular intervals in order to monitor trends in the lake. If possible, these studies should be coordinated with efforts on the American side of the border.

3.1.3 Habitat Protection

Fish are dependent upon specific habitats for spawning, rearing, feeding and holding. It is important to ensure that critical fish habitats are protected.

Issue: Protecting trout and char spawning, rearing, feeding and holding habitats.

Strategy: Sweepers and log jams provide important fish habitat and should not be removed from the river unless they represent a significant safety concern. Vegetative cover and woody debris are an important habitat features over holding pools and such cover should not be damaged. Murray and Gaboury (2005) identify important char habitat on the Skagit and any future access development must avoid disturbances to these identified areas.

Possible Future Strategy: Both char species are Blue listed in British Columbia. If it is deemed that human intervention is required to assist the Skagit River populations of Dolly Varden and/or bull trout, Murray and Gaboury's (2005) report provides information for improving char habitat in the river.

3.1.4 Guided Angling

Park Use Permits are required for all commercial ventures which operate within a provincial park. There is currently one angling guide with a Park Use Permit to operate on the Skagit River. After this permit was issued, a moratorium was placed on issuing additional permits until more information could be gathered about angler capacity on the river. Recent interpretation of data in Scott Resources (2008) indicates that current use of the Skagit River appears to be below maximum angler capacity. An overall provincial trend of decreasing angler participation has been documented in recent years (Pers. comm. Jesson February 2008).

Issue: Park Use Permits have not been granted to angling guides wishing to bring clients to fish on the Skagit River. Recent information indicates that there is available capacity on the river to accommodate additional angler days without leading to overcrowding.

Strategy: Based on current capacity data, MOE is considering plans to open the Skagit River to angling guides on a limited trial basis. If such plans are implemented the following conditions will apply:

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- Permits will be issued on a year-to-year basis with no guarantee of renewal pending assessment of how guiding is impacting the overall fishing experience available on the Skagit.
- A limited number of angler days will be available to permitees based on expected available capacity.
- Guiding will be restricted to week days to avoid increased use during busier times on weekends.
- Permits will only be granted to guides who demonstrate responsible practices.
- An angler survey will be conducted to determine how guiding is impacting the experience of anglers on the river
- The permitting process and permit terms may be amended based on information collected during future angler surveys or to protect sections of the river that provide critical habitat for sensitive species such as harlequin ducks.

A proposed process for permit application and allocation of days was in preparation at the time of writing.

3.1.5 Angler Monitoring

The most recent angler survey for the Skagit River was conducted in 2002. This survey only included the Skagit and Sumallo Rivers, not Ross Lake Reservoir. Previous surveys were conducted in 1986, 1990, 1992 and 1994. Angler surveys allow MOE to monitor angler satisfaction, effort and success. This information helps ensure the quality of the angling experience on the Skagit River is maintained, and provides information on fish populations through reporting of species caught and catch rate.

Issue: The most recent angler survey completed in the Skagit watershed was in 2002 and did not include anglers on Ross Lake Reservoir. If the Skagit watershed is opened to guided angling it will be necessary to monitor for changes related to angling guide operations in order to manage for a balanced experience for all users.

Strategy: An angler creel survey needs to be conducted that includes the Skagit and Sumallo Rivers and Ross Lake Reservoir, using past methodologies where applicable. If possible, such surveys should be coordinated with WDFW biologists and conducted concurrently on both sides of the border. Ideally, surveys should be conducted for two consecutive years in order to re-establish base-line data. Surveys should then be repeated every 3-5 years.

3.1.6 River Access

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As described above, access to the lower section of the Skagit River is available from Ross Lake and Silver Tip Campgrounds, several day-use parking areas and a limited number of places from the Silver-Skagit Road. The upper section of the Skagit River is accessed from the Skagit River Trail or Silver Tip Campground and the Sumallo is accessed from Highway 3.

Issue: The locations of access points on the lower section of the Skagit River are not evenly spaced meaning that certain sections of the river may be underutilized by anglers. New access points could help to redistribute anglers and avoid crowding near existing access points. The nature of the access available on the upper section of the Skagit and on the Sumallo precludes any changes to access in these areas.

Possible Strategy: Scott Resources (2008) identifies two possible locations for additional access points on the lower section of the Skagit River. These locations may be developed in the future if the need for new access points arises and funds are available for their development. This project would be subject to an environmental assessment prior to development.

3.1.7 Delineation of Areas with Different Regulations

Fishing regulations vary between Ross Lake Reservoir and the Skagit River. The river is a catch-and-release only fishery, whereas limited retention of rainbow trout is allowed on the reservoir. The Skagit River Cottonwoods Ecological Reserve encompasses a portion of the upper section of the Skagit River. There is no fishing permitted within ecological reserves. It is therefore important for anglers to know when they have crossed the legal boundary between the lake and the river, and where the boundaries of the reserve are located.

Issue: Current signage denoting the boundary between Ross Lake and the Skagit River is not clear and leaves many anglers uncertain where the boundary lies. The boundaries of the Skagit River Cottonwoods Ecological Reserve are marked on the Skagit River Trail but not on the river.

Strategy: Post easily understood sign(s) in easily seen location(s) at the legal boundary between Ross Lake and the Skagit River. Post signs marking the boundaries of the Cottonwoods Ecological Reserve on both sides of the river where anglers walking along either bank would easily see them. These signs (and the ones along the trail) should include a reminder that fishing is not permitted in the reserve.

3.1.8 Introduced Aquatic Species

Ross Lake Reservoir is a popular destination for fishing and power boating. In most cases, the boats that are used for these activities on the reservoir will also be

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used elsewhere in British Columbia and/or Washington. Across North America there have been numerous exotic aquatic species transferred between bodies of water by unknowing boaters. A well documented example of this is the spread of the zebra mussel in the Great Lakes region and beyond. Various fish species are also frequently introduced intentionally. Redside shiners have already been introduced to Ross Lake Reservoir, possibly as the result of their illegal use as live bait. These small minnows now exist in large numbers in the shallow regions of the lake. It is unknown what effect the shiner population will have on the other fish species inhabiting Ross Lake Reservoir, but evidence from other shiner introductions suggests they may represent significant competition for food. The introduction of non-native species to any ecosystem has the potential to have serious negative impacts on endemic species and the overall balance of the ecosystem.

Issue: The introduction and spread of non-native species to Ross Lake Reservoir and the Skagit River watershed. This is obviously an important cross-border issue, as species introduced to one side of the border will easily disperse across the boundary.

Strategy 1: Thoroughly cleaning boats and motors immediately after they are removed from the water, before moving them to another location, greatly reduces the chances of unintentionally moving aquatic species from one location to another. Signage reminding boaters to always clean their boats and/or an educational pamphlet or other educational material should help prevent unintentional introductions to Ross Lake Reservoir and the connected waterways. Use of live bait is already prohibited by BC and Washington fishing regulators and it is unlawful in BC to transport fish between different bodies of water. Any educational material produced should also discourage intentional fish introductions. MOE has recently developed an exotic species policy which includes a public awareness campaign.

Strategy 2: Monitoring for exotic species should be done on a regular basis so that management tactics can be developed as soon as new species are detected. A "Quick Response Protocol" should be developed jointly between US and BC agencies.

3.2 WATER QUALITY

Highway 3 runs along the Sumallo River and very upper reaches of the Skagit River. The section of highway above the Skagit experiences regular motor vehicle accidents which result in the release of harmful fluids onto the road and the scattering of wreckage. Water in the Skagit is susceptible to contamination by runoff from the highway and debris that enters the river. Salt and chemical snow control agents also enter the rivers from runoff and traffic spray. Organic compounds and heavy metals may contaminate the invertebrate

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food sources of fish, ducks, and other wildlife. Contaminants stored in fat tissues lead to bioaccumulation and biomagnification of these substances higher in the food chain.

Issue: Highway 3 is a source for pollutants to enter the Skagit and Sumallo Rivers. Water contamination can allow toxins to enter the food web and bioaccumulate at higher trophic levels.

Strategy: SEEC is in the process of gathering baseline water quality data. The results of this study are currently in press. Water quality should continue to be monitored on a regular basis.

3.3 ACCESS

Issues related to access have implications for a wide range of wildlife. The types of access available in parts of the Skagit watershed include road vehicles, all terrain vehicles (ATVs), boats, mountain bikes, snowmobiles, equestrian and pedestrian. Road access has the greatest impact on an area, fragmenting habitat, acting as a barrier to some species, creating disturbed corridors for the spread of insects, diseases and exotic species, causing stream sedimentation and facilitating human disturbances and impacts including off-road vehicle use, poaching, and vehicle-related wildlife deaths. While the impact of trails is less significant, soil compaction and erosion, and disturbance of refugia are among the negative effects that trail access can have on some wildlife species. *Access Management in British Columbia: A Provincial Overview* (Hamilton and Wilson 2001) gives a detailed breakdown of the impacts various forms of access can have on wildlife populations and provides an extensive list of research papers related to these issues.

3.3.1 Road Construction

Issue: Logging and mining activities on the crown land outside the protected areas sometimes require building roads to access and remove the desired resources. A number of logging roads already exist in the western portion of crown land. Access roads also exist in the Silverdaisy “donut hole” area.

Strategy: Roads used for resource extraction should be decommissioned and rehabilitated when they are no longer in use. Lockable gates should also be used where appropriate to prevent motorized access to the area by the public. The *Silverdaisy Integrated Management Plan* (MEM *et al.* 1998) already sets out these goals for the Silverdaisy area. Road construction, both size of road and extent of roadways, should be kept to a minimum.

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3.3.2 Trail Construction

Issue: Increased recreational use of the watershed may put pressure on the parks and recreation area to increase the number of trails available for hiking, horseback riding, cross-country skiing, mountain biking, etc.

Strategy: Construction of new trails should be kept to a minimum. Any trails that are built must be carefully routed to avoid important wildlife habitat features such as breeding/nesting sites, denning sites, riparian areas, mineral licks, important feeding areas, roosting/staging sites, thermal refugia, etc for any time of the year when the trail will be used. The *Ecosystem Plan: E.C. Manning Provincial Park, Skagit Valley Provincial Park and Cascade Recreation Area* (Summit Environmental Consultants 2003) details Environmentally Sensitive Areas (ESAs) and Valued Ecosystem Components (VECs[2]) for the protected areas. Jex's (2007) report focuses on mountain goats in the watershed, but also includes observations of important habitat features for other wildlife that were made while conducting the mountain goat surveys. Route planning for new trails should involve proper research using these and any other relevant documents and consultation with an MOE biologist familiar with the Skagit watershed in order to avoid sensitive habitats and critical habitat features.

3.4 WILDLIFE TREES

Wildlife trees are standing dead or dying trees also referred to as snags. These trees provide nesting and roosting sites, food resources and perching sites to a wide variety of birds, mammals and invertebrates. Important features of snags for wildlife include cavities, loose bark, insect populations and bare crowns/branches. Snags are a limited resource in a forest, inspiring competition amongst individuals of both the same and different species for use of the resource. For many species, the properties provided by a snag cannot be replicated or substituted by another habitat component. For theses species, failure to find an appropriate snag means they will not reproduce and may not survive (MOF and MELP 2000, Harris 2001, Stone *et al.* 2002, MOF 2005).

Issue: Snags are a limiting resource for many different species. These trees are also often considered a danger because they are dead or dying and therefore more likely to fall. Park Facility Operators are required to conduct yearly hazard tree assessments in campgrounds and other front-country areas of parks and to remove trees from areas where there is potential for them to cause structural damage or human harm if they were to fall. Snags may also be removed during logging practices.

Strategy 1: Snags should be left standing whenever possible. New structures should not be built in areas where there is a current risk of damage from a falling snag. Any new trail construction should also be a safe distance from existing snags, both for protection of

[2] VECs are important habitat features

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trail-users and to avoid disturbances to the wildlife using the snag. The Ministry of Forests and Range's Forest Practices Branch has a guidance document for wildlife tree retention in the forestry industry available on the Wildlife Tree Committee page of their website (See Reference section).

Strategy 2: Habitat enhancement/restoration can be done by artificially creating snags in safe locations to replace snags that have been removed as hazard trees. Guidelines for creating snags can be found on the website for the California Forest Stewardship Program (See Reference section).

3.5 HARLEQUIN DUCKS (*Histrionicus histrionicus*)

The harlequin duck is a yellow listed S4 species in British Columbia with important breeding habitat located along various fast moving stretches of the Skagit and Sumallo Rivers (Freeman and Goudie 2004). S4 species fall short of the criteria for blue listing, but are experiencing pressures and/or have life history patterns which can make them vulnerable to population declines (see Species Ranking in British Columbia available on the MOE Endangered Species and Ecosystems website for an explanation of species listings). A study conducted between 2000 and 2003 suggests that this population of harlequins may be experiencing a decline in population (Freeman and Goudie 2004). This species can be sensitive to disturbance during the breeding season.

3.5.1 Population Trends

Issue: The Freeman and Goudie (2004) study suggest that the Skagit population of harlequin ducks may be showing signs of decline, however they note that their study was only four years and may not be truly indicative of a long-term trend. Better management practices can be developed with data from a larger time scale.

Strategy: A long-term monitoring project of the harlequin population should be initiated using the standard protocol of Freeman and Goudie (2004) so that data will be easily compared.

3.5.2 Disturbance

Issue: Disturbance of harlequins can have many different negative impacts on their survival and reproduction, including breakdown of pair bonds in spring; disturbing incubation; disturbing feeding and resting patterns; separation of adults from ducklings leaving them more vulnerable to predators; and increasing energetically costly behaviours (e.g. flying). Disturbances may be caused by individuals who are fishing, but especially by unleashed dogs. Though not currently popular on the Skagit, rafting and kayaking would also cause considerable disturbance to harlequins (see below).

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Strategy: Post signs:

- Dogs on Leash regulation (dogs must be on a leash in provincial parks; the river is within parks) including the rational of protecting wildlife from dogs (and dogs from wildlife), and highlighting the effects of disturbances on ducks.
- Key locations: both ends of the Skagit River Trail (Sumallo Day Use Area, trail entrance on the Silver-Skagit road and Twenty-Six Mile Day Use Area), Silvertip and Ross Lake Campgrounds.
- Boundaries of the Skagit River Cottonwoods Ecological Reserve should be clearly marked on the trail and on the river, noting that no fishing is permitted within the reserve.

Possible Future Strategy: Currently, low angler use of the river early in the season allows ducklings to reach a sufficient size before harlequin families are subjected to the stress of much disturbance (Freeman and Goudie 2004). This situation should be reassessed during future reviews of this plan and additional management strategies employed if necessary, such as delaying the opening of fishing on certain sections of the river (those important to harlequins) or prohibiting dogs on the Skagit River Trail if leash compliance is low. Angling guides could also be restricted from using sections of the river which have important harlequin habitat.

3.5.3 Awareness/Education

Issue: Many members of the public are not aware of the presence of harlequin ducks in the Skagit watershed or of their status and vulnerability to disturbance

Possible Strategy: Designate harlequin viewpoints with interpretive signage and possibly viewing blinds (appropriate locations available in Freeman and Goodie (2004) Map 2 section 4.5). Pair bonding in April-May is an activity that could be encouraged for unobtrusive observations.

3.5.4 Rafting/Kayaking

Possible Future Issue: If rafting or kayaking become popular on the Skagit River these activities would cause considerable disturbance to harlequins. Currently, these are not common activities on the upper Skagit River.

Strategy: Future reviews of this plan and all plans affecting the river (e.g. park management plans) should evaluate the use of the Skagit for rafting and kayaking. If these activities show a marked increase in popularity it may be necessary to restrict rafting and kayaking between April and September. No commercial recreation tenures should be granted for rafting or kayaking.

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The current location and level of use on the Skagit River Trail does not seem to present a problem to harlequins so long as dogs are kept leashed and not permitted to disturb ducks (Freeman and Goudie 2004).

3.6 MOUNTAIN GOATS (*Oreamnos americanus*)

The mountain goat is another S4 listed species in BC. The population found in the Skagit watershed declined significantly following the construction of the Hope-Princeton Highway (Highway 3), likely due to the increased accessibility the roadway gave hunters and poachers. The highway was completed in 1948; the last open season for goat hunting in the area was 1969-70. The mountain goat is a species that lives in extreme conditions and has slow population growth. The Skagit watershed population has not recovered since the legal hunting season in this area was closed nearly forty years ago. At the time of writing a mountain goat winter range plan had been proposed for the Fraser Timber Supply Area and was awaiting approval.

3.6.1 Habitat Protection

Issue: Like many other species that live in extreme environments, mountain goats are constrained by specific life history requirements that limit their usable habitat and make them particularly sensitive to disturbance. Any loss, alteration or disturbance to their habitat can have a significant impact on the long-term persistence of the mountain goat population.

Strategy 1: Jex (2007) has identified mountain goat winter, natal and summer ranges in the Skagit watershed. Any new developments, including trails, or other habitat-altering activities should avoid mountain goat seasonal ranges, especially areas with mineral licks or thermal refugia. Consideration should be given to providing protection for mountain goat seasonal ranges outside the provincial protected areas.

Strategy 2: Where practical, existing recreational trails and facilities located in mountain goat seasonal ranges should be rerouted/relocated. Rock climbing activities should be discouraged within these areas.

3.6.2 Motorized Vehicle Disturbance

Issue: The use of helicopters, snowmobiles and All Terrain Vehicles (ATVs) or other motorized vehicles in mountain goat winter and natal ranges cause significant disturbances to the animals and may reduce their survivorship and reproductive success.

Strategy: Motorized vehicles should not be used within 1.5km of winter range from the end of October through the end of May or within 1.5km of natal ranges

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from the beginning of May through the beginning of July. Aircraft should maintain a 2.0km line-of-sight distance from these critical habitats. Within the protected areas, an operations timing window should be set prohibiting motorized vehicle use in accordance with these parameters and incorporated into the appropriate Park management plans. Locations of known mountain goat ranges are found in Jex (2007).

3.7 GRIZZLY BEARS (*Ursus arctos*)

Grizzly bears are a blue listed species in British Columbia. The North Cascades Grizzly Bear Population Unit, which includes the Skagit River watershed, has a very low population (fewer than 25 animals) and is designated as threatened (the alternative population designation is viable). This population straddles the border into Washington where the species is listed as threatened by the U.S. Fish and Wildlife Service (federal) and endangered by the Washington Department of Fish and Wildlife (state). The *Recovery Plan for Grizzly Bears in the North Cascades of British Columbia* (North Cascades Grizzly Bear Recovery Team 2004) is an extensive document outlining the history of Grizzly Bears in the North Cascades of BC, the reason for their decline, current threats to their population, and a recovery strategy that is currently being implemented. The key management issues addressed in the recovery plan are noted below:

a) access – avoid building roads or trails within 50m of important grizzly habitat

b) disturbance in core areas – there should be no motorized vehicle use in core areas (including helicopter landing) from the beginning of April through the end of October.

c) protecting key habitats – spring habitat for grizzlies is limited in the North Cascades ecosystem and therefore is a conservation priority

d) filling information gaps – the plan lists research priorities and key gaps in information that would assist with improving recovery strategies and plan implementation

e) augmentation and genetic monitoring – augmentation from other populations is required to increase the number and genetic diversity of grizzlies in the North Cascades Population Unit

f) bear/human interactions – preventing bear/human conflicts and human-caused mortality of grizzlies

g) interagency cooperation – successful grizzly recovery in the North Cascades will require a coordinated effort from several BC ministries and U.S. agencies

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Augmentation is currently on hold. The most important issue identified in this recovery plan is managing motorized vehicle access (Tony Hamilton, pers. comm. Jan. 2008). *The Recovery Plan for Grizzly Bears in the North Cascades of British Columbia* (North Cascades Grizzly Bear Recovery Team 2004) should be consulted in the case of any activity or event that may impact grizzly habitat or recovery success in the Skagit River watershed and the Grizzly Bear Recovery Team should be contacted (see Appendix 2) to determine the current status of the plan's direction and implementation.

3.8 SPOTTED OWLS (*Strix occidentalis*)

The Skagit watershed provides critical habitat for the red listed spotted owl. Not only is much of the watershed covered by the mature forest that spotted owls require for breeding success, the low-elevation valley also provides the best genetic link between owls in BC and Washington. The north-south dispersal of these owls is otherwise cut-off by human development/ habitat depletion and high mountain peaks the birds will not cross (Ian Blackburn, pers. comm. Jan. 2008).

Issue: Protection of spotted owl habitat.

Strategy: Most of the appropriate habitat for spotted owls in the Skagit River watershed has already been protected from human-caused degradation, the leading cause of the spotted owl decline. Documents detailing information on spotted owl recovery and management are available on the Species and Ecosystems Explorer page of the MOE Endangered Species and Ecosystems website (see References section). The Spotted Owl Recovery Team should be contacted if there is any concern about an action or event affecting spotted owls.

3.9 OTHER SPECIES AT RISK

The Skagit River watershed provides a home to more than 40 fish and wildlife species at risk. These species may have recovery and/or management plans already in place or such plans may be in progress. Several other documents are available for a number of these species that outline the pressures they face and recommended management practices. The MOE Endangered Species and Ecosystems website has a species search option through the Species and Ecosystems Explorer page that provides links to these documents (see References section). Appendix 3A lists the documents that are available on this website at the time of writing for each of the species at risk found in the Skagit River watershed.

Issue: Many species at risk are found within the Skagit watershed. While not all of the species are individually addressed in this management plan, any of them may be harmed by actions that alter or disturb their habitats.

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Strategy: Before planning any activity with possible impacts on a species at risk the documents available for the species should be obtained and reviewed so this information can be incorporated into the project plans prior to the initiation of an environmental assessment. Species at Risk management must be included in any other plans affecting the Skagit watershed (e.g. park management plans). Because most wildlife species in the Skagit watershed have populations which are contiguous across the international boundary, it is key that species at risk management be coordinated with US agencies, including NPS and WDFW.

3.10 MULE DEER (*Odocoileus hemionus*)

Three subspecies of mule deer exist in British Columbia. Two of these, the mule deer (*Odocoileus hemionus hemionus*) and the Columbian black-tailed deer (*Odocoileus hemionus columbianus*) are found in the Skagit River watershed. Many of the deer in the Skagit watershed are hybrids between mule and Columbia black-tailed deer. Populations of these deer in British Columbia are healthy and they are among the most popular species in the province for hunting. Despite their abundance, deer face the steady encroachment of development on their habitat, especially winter range. Critical deer winter range components include moderate to steep south facing slopes at low elevations (below 1000m) where there is low snow accumulation. Old growth areas are also important where the dense canopy blocks snowfall and reduces ground accumulation.

Issue: Good quality winter range is a limiting factor for deer. Disturbance or alteration of deer winter range can negatively impact deer winter survivorship.

Strategy: Avoid altering or disturbing deer winter range. Identified locations of deer winter range in the Skagit watershed can be found in Jex (2007).

3.11 HUNTING AND TRAPPING

Crown land, Skagit Valley Provincial Park, and Cascade Recreation Area are open for hunting during specified open seasons. Skagit Valley Provincial Park has a shorter hunting season than the rest of M-2, the management unit in which it is located. Several traplines also operate in the watershed. Hunting and trapping regulations are updated yearly and are available from Ministry of Environment offices, on the Ministry's Fish and Wildlife Branch website (see References section), and at hunting supply stores. Guide Outfitters are permitted to operate within the watershed and are subject to species quotas for cougars and black bears. Animals with an open season for hunting or trapping in the Skagit watershed in the 2007/08 season are listed in Appendix 3B. There is currently no open hunting or trapping season for mountain goats, wolves, wolverines, fishers or grizzly bears.

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3.12 INFORMATION GAPS

The population status and habitat use of many wildlife species found in the Skagit watershed is unknown. This includes, among others, some species which are hunted and/or trapped, most species at risk, and most top carnivores and herpetiles, both of which are key indicator species (note that overlap exists between these categories).

Naturally low densities, large home ranges and slow reproduction make top predators vulnerable to population declines. The ability of an ecosystem to support its top carnivores is an indicator of ecosystem health. Wolves (*Canis lupus*) and wolverines (*Gulo gulo*) are two top carnivores found in the Skagit watershed, but information on sightings of these animals is scarce, unsystematic, sometimes unreliable and often very old. Wolves could, and in all probability once did, exist in larger numbers than currently inhabit the North Cascades ecosystem. Recent radio-telemetry work has been done with wolverines south of the border in Washington. At least two of the radio-collared animals have crossed into Canada in Manning Park. There are currently no hunting or trapping seasons for wolves or wolverines in the Skagit watershed.

Open hunting seasons do exist for black bears (*Ursus americanus*) and cougars (*Puma concolor*), two of the other top predators in the watershed. Sightings of black bears are more common than other carnivores and the cougar population in the Skagit is thought to be stable; however, no systematic population inventories have been undertaken for these animals, either.

Other carnivore species with unknown population status in the Skagit watershed include lynx (*Lynx Canadensis*), bobcat (*Lynx rufus*), fisher (*Martes pennanti*), river otter (*Lontra canadensis*), marten (*Martes americana*), mink (*Neovison vison*), red fox (*Vulpes vulpes*) and coyote (*Canis latrans*). Open hunting and/or trapping seasons exist for lynx (Cascade Recreation area only), bobcat, river otter, marten, mink and coyote. The fisher is a blue listed species.

Other hunted or trapped species lacking good population inventories include upland game birds, including the blue listed band-tailed pigeon (*Patagioenas fasciata*), and waterfowl.

A large variety of raptors, the top predators of the sky, are known to use the Skagit watershed. Some of these birds are listed as species at risk and most are sensitive to disturbances around nesting areas. No population estimates have recently been done for most of the raptors found in the Skagit watershed.

Moose (*Alces alces*) and elk (*Cervus canadensis*) are visitors and possibly residents in the Skagit watershed. Both species likely used the watershed in higher numbers in the past, especially prior to the clearing and flooding of the valley bottom for Ross Lake Reservoir. Numbers of these species currently using the Skagit watershed are unknown.

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Amphibian and reptile surveys to monitor species populations and distributions are also lacking in the Skagit watershed. Amphibians and reptiles are another group of important indicator species, sensitive to pollution, climate change and the spread of non-native species. Introduced populations of bull frogs (*Rana catesbeiana*) and green frogs (*Rana clamintans*) are spreading in British Columbia, Washington and elsewhere on the west coast. These species are depleting native amphibian populations through competition and direct predation. Monitoring for the presence and distribution of these non-native frogs is important. Several reptiles and amphibians at risk inhabit the Skagit River watershed, including coastal tailed frogs (*Ascaphus truei*) and red-legged frogs (*Rana aurora*). Pacific giant salamanders (*Dicamptodon tenebrosus*) are known to exist close by in the Chilliwack drainage and it would not be surprising if their presence was detected in the Skagit watershed. The rubber boa, an S4 listed species, is known from the watershed, as well.

Bats are another group of animals in need of better inventories in the Skagit River watershed. Some bat censuses have been done, but more sampling is needed, especially for the at risk species (see Appendix 3A).

Neotropical migrant passerines are birds which breed in northern North America and then migrate as far away as southern South America between breeding seasons. Knowledge of changes in the breeding populations of these birds is important not only with regards to the local watershed, but may be indicative of conditions elsewhere along the birds' migratory paths. Monitoring of neotropical migrants is therefore important as part of large-scale, bicontinental monitoring of these vulnerable species. Inventory and monitoring work of neotropical migrants was initiated in NOCA in 2001 (Siegel *et. al.* 2006).

Issue: It is difficult to make appropriate management decisions for species if their population status is not known.

Strategy: Inventory, monitoring, and habitat use projects are needed for many species in the Skagit watershed, including top carnivores, raptors, herpetiles, bats, waterfowl, game birds, ungulates, furbearers, neotropical migrants and most species at risk. At the time of writing, a wolverine study is planned for the fall of 2008. A moose winter range and winter range mapping project is also planned for 2008. As funding becomes available for inventory and monitoring or habitat use projects, a priority list should be organized based on the most up-to-date information at the time.

3.13 INTERNATIONAL WILDLIFE

As previously noted, most of the fish and wildlife species found in the Canadian Skagit River watershed are contiguous with populations on the American side of the border. The majority of the upper Skagit watershed in Washington State falls within the North Cascades National Park Service Complex. The National Park Service has implemented

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the Natural Resource and Inventory Monitoring Program for NPS lands, and NOCA along with other national parks in Washington State (Mount Rainier, Olympic, and several smaller parks) have formed the North Coast and Cascades Inventory and Monitoring Network. This initiative of species/habitat inventory and monitoring will produce data for the U.S. Skagit watershed that is important on both sides of the border. The Washington Department of Fish and Wildlife also regularly monitors certain species in the Skagit watershed. Most agencies have standard protocols for data gathering, which may differ slightly between different organizations. It would facilitate comparisons and increase the usefulness of data if protocols for collection were harmonized across agencies.

Issue: The North Cascades ecosystem and Skagit River watershed straddle the U.S.-Canada border. Many wildlife species populations are continuous across the border, with individuals regularly moving from one country to the other. Species inventory, monitoring and habitat data need to be shared and easily compared between the Canadian and American parts of the watershed to provide a clear picture of the status of these species. Key movement corridors for wide ranging species such as wolverines and grizzly bears also need to be identified and protected. Coordinated efforts for research undertaken on both sides of the border could reduce redundancy, increase efficiency and facilitate data sharing.

Strategy: Before beginning inventory or monitoring projects in British Columbia, NOCA and WDFW biologists should be contacted to ensure that the methodology used in BC will produce data that is easily integrated with similar data produced in Washington. Regular communication should be maintained between biologists working in the watershed on both sides of the border. This will allow biologists to coordinate and cooperate on studies in such a way as to maximize the data collected and its usefulness. For instance, coordinating the timing of amphibian surveys in BC and Washington would control for variables such as weather that would not be controlled for if comparing data collected in different years. These data would therefore be more useful than if they were collected at different times. Several cross-border meetings involving MOE and multiple US agencies including NPS, WDFW and the US Forest Service took place during the writing of this plan. These meetings are an important step towards integrating research, monitoring and management in the Skagit watershed and other international drainages and will hopefully form the basis for developing greater interagency cooperation.

3.14 HUMAN-WILDLIFE CONFLICT

In all areas where wildlife and humans interact there is the potential for conflict situations to arise. Several provincial park campgrounds exist within the Skagit watershed, as well as opportunities for many other types of wilderness recreation. The private community of Sunshine Valley is also located within the watershed. With the number of people using the watershed it is inevitable that there will be interactions between wildlife and people.

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Issue: Potential for human-wildlife conflicts exist in the Skagit River watershed. These conflicts could be encounters with large carnivores like bears or cougars, or the more common interactions with "nuisance" animals such as raccoons, beavers, bats, skunks, etc.

Strategy 1: The MOE has a Wildlife-Human Conflicts Prevention Strategy which is available on the Conservation Officer Service website (see References section). Encouraging proper bear-proofing of garbage and other attractants around private residences and campgrounds will help reduce the potential for conflicts both with bears and other species of wildlife that become habituated to human food and mineral sources. Discouraging the intentional feeding of wildlife such as deer is also important for keeping wildlife wild and preventing conflicts with humans. Conflicts between humans and wildlife also occur when certain species take up residence in houses and other buildings. Information on excluding bats from buildings can be found on the Bats in Buildings pages of the Bat Conservation International website (see References section).

Strategy 2: Wildlife-proof food-storage containers ("bear boxes") should be installed in park campgrounds and especially at backcountry campsites. Signage should be posted in campgrounds, at backcountry campsites and at trailheads reminding park visitors how to avoid conflicts with wildlife. Some signs regarding bears already exist on sign boards in the park campgrounds, but additional signage placed where it will be seen repeatedly by park users would help to remind them of what they can do to keep the park wildlife wild.

3.15 ENFORCEMENT

Successful management of fish and wildlife populations requires that legislation protecting species be supported by adequate monitoring and enforcement of regulation compliance.

Issue: The Skagit River watershed represents one small portion of a large territory currently serviced by Park Rangers and Conservation Officers in the Lower Mainland. Current patrols in the Skagit watershed are limited by capacity and priority.

Strategy: Options for additional enforcement staff should be investigated and where possible allocated to enforce fish and wildlife regulations in the Skagit watershed.

4.0 LOOKING TO THE FUTURE

4.1 PLAN REVIEW

New information that may improve management practices is continually being gathered. At the same time, new management challenges are also regularly brought to light. The Upper Skagit Watershed Fish and Wildlife Management Plan will be reviewed on a five year cycle to ensure that its contents are current and up-to-date. New information that will

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improve the plan may be incorporated at any time if it does not substantially change the plan in such a way that additional public consultations are required. Significant changes that are considered to require immediate action will include a public consultation component.

4.2 NEW/INCREASING PRESSURES ON THE SKAGIT WATERSHED

There will undoubtedly be future changes to the Skagit watershed and surrounding areas that will impact management strategies for fish and wildlife species. There are currently two obvious and important trends whose impacts should be closely monitored:

4.2.1 Increasing Human Population of the Fraser Valley

The Lower Mainland area of British Columbia is experiencing rapid population growth. The proximity of the Skagit watershed to this growing concentration of people is likely to result in increased recreational use of the watershed and an interest in expanding housing and commercial opportunities in Sunshine Valley and possibly elsewhere. Traffic volume on Highway 3 (and to a lesser extent on the Silver-Skagit Road) can also be expected to grow, increasing the probability of vehicular crashes, chemical runoff into waterways, and collisions with wildlife. Increased human presence in the watershed will undoubtedly increase the pressures faced by fish and wildlife species, including habitat loss and alteration, disturbance, and barriers to dispersal. These heightened pressures can be expected to compound management issues, especially for sensitive species. Revisions of this plan will need to deal with managing for increased human use of the watershed.

4.2.2 Climate Change

The impacts of climate change on the Skagit watershed will present a significant challenge for fish and wildlife management. While many consequences of climate change can be predicted in a general sense, the exact timing and manifestation of these effects are impossible to determine at this time. Shrinking glaciers, changes in snow pack and melt timing and changes in precipitation patterns are likely to cause lowered/varied stream flows and warmer water temperatures during summer months. These changes will have serious consequences for fish and amphibian species, especially species dependent cold water like bull trout and on small, cold streams like coastal tailed frogs. Other changes that are likely to occur include changes in vegetation zones, especially along altitudinal and latitudinal gradients; changing moisture levels; differences in wildfire intervals and intensity; and changes in wildlife ranges and distribution. The impacts these changes will have on low-level trophic species like plants and invertebrates may have consequences that will be felt along the entire food chain. Future revisions of this plan will need to address climate change issues with the best available science of the time.

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5.0 REFERENCES

5.1 INTERNET RESOURCES

Bat Conservation International: Bats in Buildings
http://www.batcon.org/home/index.asp?idPage=51&idSubPage=43

California Forest Stewardship Program: Tips for Creating Snags
http://ceres.ca.gov/foreststeward/html/snagtips.html

Ministry of Forests and Range: Forest Practices Branch
http://www.for.gov.bc.ca/hfp/
Wildlife Tree Committee
http://www.for.gov.bc.ca/hfp/values/wildlife/WLT/index.htm

Ministry of Environment: Compliance Division
http://www.env.gov.bc.ca/compliance/
Conservation Officer Service
http://www.env.gov.bc.ca/cos/#
Wildlife-Human Conflicts Prevention Strategy
http://www.env.gov.bc.ca/cos/info/wildlife_human_interaction/index.html

Ministry of Environment: Environmental Stewardship Division
http://www.env.gov.bc.ca/esd/
Ecosystems Branch
http://www.env.gov.bc.ca/wld/index.htm
Endangered Species and Ecosystems
http://www.env.gov.bc.ca/atrisk/
Wildlife Guidelines for Backcountry Tourism/Commercial Recreation
http://www.env.gov.bc.ca/wld/twg/index.html
Fish and Wildlife Branch
http://www.env.gov.bc.ca/fw/index.html

National Park Service
http://www.nps.gov/
North Cascades National Park Service Complex
http://www.nps.gov/noca/
Inventory and Monitoring of Park Natural Resources
http://www1.nature.nps.gov/protectingrestoring/IM/inventoryandmonitoring.htm

Seattle City Light
http://www.seattle.gov/light/
Conservation
http://www.seattle.gov/light/conserve/

Skagit Environmental Endowment Commission
http://www.skagiteec.org/

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Species at Risk Act (SARA)
http://www.sararegistry.gc.ca/default_e.cfm

Sunshine Valley and Silver Tip Ski Resort
http://www.skisilvertip.com/

US Fish and Wildlife Service: Endangered Species Program
http://www.fws.gov/endangered/

Washington Department of Fish and Wildlife
http://wdfw.wa.gov/
Species of Concern
http://wdfw.wa.gov/wlm/diversty/soc/concern.htm

Washington State Department of Natural Resources
http://www.dnr.wa.gov/

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APPENDICIES

APPENDIX 1:
SUMMARY OF MANAGEMENT STRATEGIES REQUIRING ACTION AND FUNDING

Section under construction – not available at this time.

APPENDIX 2:
LIST OF CONTACTS

A) Ministry of Environment Contacts:
B) Contacts in Other BC Ministries:
C) US National Park Service and Washington State Contacts:
D) Other Relevant Contacts:

Section under construction – not available at this time.

APPENDIX 3:
SPECIES LISTS

A) Species at Risk

Scientific Name	Common Name	Status	Publications
Mammals			

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B) Species With Open Hunting/Trapping Seasons

Scientific Name	Common Name	Management Unit	Activity
Odocoileus hemionus	Mule deer	2-2, 2-17, 8-5	Hunting
O. hemionus columbianus	Black-tailed deer	2-2, 2-17, 8-5	Hunting
Odocoileus virginianus	White-tailed deer	8-5	Hunting
Alces alces	Moose	8-5	Hunting
Cervus canadensis	Elk	8-5	Hunting
Ursus americanus	Black bear	2-2, 2-17, 8-5	Hunting
Canis latrans	Coyote	2-2, 2-17, 8-5	Hunting/Trapping
Procyon lotor	Racoon	2-2, 2-17, 8-5	Hunting
Mephitis mephitis	Skunk	2-2, 2-17, 8-5	Hunting/Trapping
Lepus americanus	Snowshoe hare	2-17, 8-5	Hunting
Lynx rufus	Bobcat	2-2, 2-17, 8-5	Hunting/Trapping
Lynx Canadensis	Lynx	8-5	Hunting/Trapping
Puma concolor	Cougar	2-2, 2-17, 8-5	Hunting
Bonasa umbellus	Ruffed grouse	2-2, 2-17, 8-5	Hunting
Dendragapus obscurus	Blue grouse	2-2, 2-17, 8-5	Hunting
Falcipennis canadensis	Spruce grouse	2-2, 2-17, 8-5	Hunting
Lagopus leucura	Ptarmigan	2-2, 2-17	Hunting
Patagioenas fasciata	Band-tailed pigeon	2-2, 2-17	Hunting
Zenaida macroura	Mourning dove	8-5	Hunting
Fulica americana	Coot	2-2, 2-17, 8-5	Hunting
Gallinago delicata	Snipe	2-2, 2-17, 8-5	Hunting
Family Anatidae	ducks	2-2, 2-17, 8-5	Hunting
Branta canadensis	Canada goose	2-2, 2-17, 8-5	Hunting
Anser albifrons	White-fronted goose	8-5	Hunting
Chen caerulescens	Snow goose	8-5	Hunting
Chen rossii	Ross's goose	8-5	Hunting
Castor Canadensis	Beaver	2-2, 2-17, 8-5	Trapping
Ondatra zibethicus	Muskrat	2-2, 2-17, 8-5	Trapping
Vulpes vulpes	Fox	2-2, 2-17	Trapping
Martes americana	Marten	2-2, 2-17, 8-5	Trapping
Neovison vison	Mink	2-2, 2-17, 8-5	Trapping
Lontra canadensis	River otter	2-2, 2-17, 8-5	Trapping
Mustela sp.	Weasel	2-2, 2-17, 8-5	Trapping
	Squirrel	2-2, 2-17, 8-5	Trapping

Open seasons, bag limits, and other regulations can be found in the BC Hunting and Trapping Regulations.

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