

Kootenay Region

# BACKGROUND REPORT

January, 2004

DRAFT

for Kokanee Glacier  
Provincial Park



BRITISH  
COLUMBIA

Ministry of  
Water, Land and  
Air Protection

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## Table of Contents

Introduction.....	1
Planning and Management History.....	1
Park Establishment and Legislation.....	1
Management Direction from Land Use Plans.....	1
Natural Values.....	2
Climate.....	2
Physiography.....	2
Geology and Soils.....	5
Water.....	6
Vegetation.....	7
Wildlife.....	11
Fish and aquatic values.....	13
Rare and Endangered Species.....	13
Natural Disturbance.....	16
Cultural Values.....	16
First Nations.....	16
Non-aboriginal.....	17
Outdoor Recreation, Tourism and Economic Values.....	18
Outdoor Recreation Features.....	18
Visual Values.....	19
Outdoor Recreation and Tourism.....	21
Day-use (Peak season).....	21
Multi-day (Peak season).....	21
Winter opportunities.....	22
Historic Features.....	23
Existing Facilities and Services.....	23
Access.....	23
<i>Kokanee Creek Road</i> .....	23
<i>Keen Creek Road</i> .....	23
<i>Woodbury Creek Road</i> .....	24
<i>Lemon Creek Road</i> .....	24
<i>Enterprise Creek Road</i> .....	24
Summary of Park Facilities.....	24
<i>Trailhead Parking</i> .....	24
<i>Shelter Accommodation</i> .....	24
<i>Shelter (Day-Use)</i> .....	25
<i>Campsites</i> .....	25
<i>Trails</i> .....	26
Visitor Activity Areas.....	27
Summer Months (June-September).....	27
Winter Months (December to April).....	29
Park Visitor Profiles.....	29
Visitor Use Trends: Past, Present; Future.....	30
Economic Indicators.....	32
Kokanee Glacier Cabin-Economic Viability.....	32
Kokanee Glacier Cabin: Financial Return to the ACC and Parks and Protected Areas.....	34
Commercial Interests.....	34
Land Tenures, Occupancy Rights and Resource Uses.....	35
Tenures, Rights and Resource Uses in the Protected Area.....	35
Mineral Tenure.....	35
Water Rights.....	35
Park Use Permits.....	36
Hunting/Trapping/Fishing.....	36
First Nations Interests.....	36

Patterns of Land Use Next to the Protected Area.....	37
Guidance from Land Use Plans.....	37
Mining Activity.....	37
Logging Activity.....	37
Commercial Activity.....	38
<i>Backcountry Skiing</i> .....	38
<i>Trapping</i> .....	38
Recreational Activity.....	39
Parks and Protected Areas Operations.....	40
Operation Infrastructure and Facilities.....	40
Kokanee Glacier Cabin.....	40
Other Park Facilities.....	40
Staffing.....	40
Staff Quarters.....	40
Key Management Issues.....	41
References Cited:.....	43
Appendix A. Water Quality Testing.....	47
Appendix B: Fish Stocking History.....	49
Appendix C: Water Licences.....	50
Appendix D: Rare Natural Plant Communities (KLFD/ABFD).....	51
Appendix E: Rare and Endangered Flora (KLFD).....	52
Appendix F: Rare and Endangered Flora (ABFD).....	54
Appendix G: Rare and Endangered Fauna (KLFD/ABFD).....	56
Appendix H: Seasonal Abundance of Birds in BEC zones.....	57
Appendix I: Seasonal Abundance of Amphibians, Reptiles, and Mammals in BEC zones.....	62
Appendix J: Natural Disturbance Types.....	64
Appendix K: Wildlife (Open Season) Hunting.....	65
Figure 1. Day-Use Visitor (High Activity Areas).....	27
Figure 2. Day-Use Visitors (Low-Moderate) Activity Areas.....	28
Figure 3. Campground/Cabin- Visitor Activity Areas.....	28
Figure 4. Park Visitor Origins.....	29
Figure 5. Proportion of Day/Overnight Use (Average between 1983-2001).....	30
Figure 6. Park Visitor Use Comparison (1983-2001).....	30
Figure 7. Comparison of Kokanee Glacier Cabin and Slocan Chief Cabin Accommodations.....	31
Figure 8. Revenue Generation at the Kokanee Glacier Cabin (June to October-2003).....	33
Figure 9. Comparison of Winter/Summer Revenue-2003 at Kokanee Glacier Cabin.....	33
Figure 10. Adjacent Mining Tenure/Claims.....	38
Figure 11. Adjacent Logging (Past and Present).....	39
Table 1. Baseline Thematic Mapping.....	5
Table 2. Summary of BEC Zones.....	7
Table 3. Booking Costs for the Kokanee Glacier Cabin- Winter 2003/2004.....	32
Table 4. Active Park Use Permits.....	36
Map 1. Provincial and Regional Context.....	3
Map 2. Baseline Thematic Mapping.....	4
Map 3. BEC Subzones/Variants.....	8
Map 4. Core Grizzly Bear Habitat.....	15
Map 5. Recreation Facilities and Significant Features.....	20

## DRAFT ONLY-UNDER REVIEW

### Introduction

#### Planning and Management History

A Management Plan for Kokanee Glacier Park and Recreation Area was approved in 1990. A Management Direction Statement was approved for the Kokanee Glacier Park Addition in 1999.

An original background report preceded the Management Plan of 1990, but is now outdated because of park facility additions/removal and boundary changes.

#### Park Establishment and Legislation

Kokanee Park was officially designated on February 6<sup>th</sup>, 1922 and later renamed Kokanee Glacier Provincial Park on June 27, 1924, under the provisions of the *Provincial Parks Act Chapter 187, Revised Statutes of 1911*. On December 14, 1940, the park acquired Class “A” park status. Administrative complications arising from valid mineral claims forced the revision to Class “B” status on June 17, 1965.

In 1987, the government announced a decision to revise the park boundaries and to resolve long standing mineral claims issues in the park. The decisions were based on recommendations of a government appointed advisory committee and the precedent set by the Supreme Court of Canada ruling on mineral claims tenures in Wells Gray Provincial Park. The creation of the Kokanee Glacier Recreation Area incorporated those areas of the park deemed appropriate (at that time) for mineral exploration. Other areas of the park identified as having high recreation potential were also included in the Recreation Area designation.

In 1989, the Class “B” status of the park was upgraded to Class “A” park status. In conjunction with the change in status, no further mineral exploration was permitted within the park except in the designated Kokanee Glacier Recreation Area.

#### Management Direction from Land Use Plans

Under the recommendation of the West Kootenay/Boundary Land Use Plan, Kokanee Glacier Provincial Park was granted Class “A” status on July 12, 1995 under the *Park Amendment Act*. In 1999, under the direction of the Kootenay/Boundary Land Use Plan and Implementation Strategy, an additional 6,203ha. of land, including much of the former Kokanee Glacier Recreation Area, expanded the park to its current 32,035 hectares. The addition reflected the goal to protect key grizzly bear habitat in the Selkirk Mountains.

## Natural Values

### Climate

Kokanee Glacier Provincial Park is located within the Northern Columbia Mountains Ecoregion (Map 1). This rugged, often ice-capped mountain area rises abruptly from the Southern Rocky Mountain Trench to the east. This block of mountains intercepts eastward flowing precipitation, making these the wettest mountains in the interior of the province.

The temperate biotic zone of the park lies within the lower valley bottoms, mainly below 1,600 metres (ASL). The expected number of frost free days is between 100 and 150 with annual precipitation averages over 170cm with snowfall accumulations of 673cm.

From 1600 to 2000 m in elevation, ;precipitation averages 180 cm and snowfall averages 1000 cm.

### Physiography

Kokanee Glacier Provincial Park is situated in the Central Columbia Mountains Ecoregion, an area of high ridges and mountains, but the valleys and trenches are narrow. The park contains high serrated peaks, cirques, hanging valleys and the characteristic U-shaped valleys associated with past periods of active alpine glaciation.

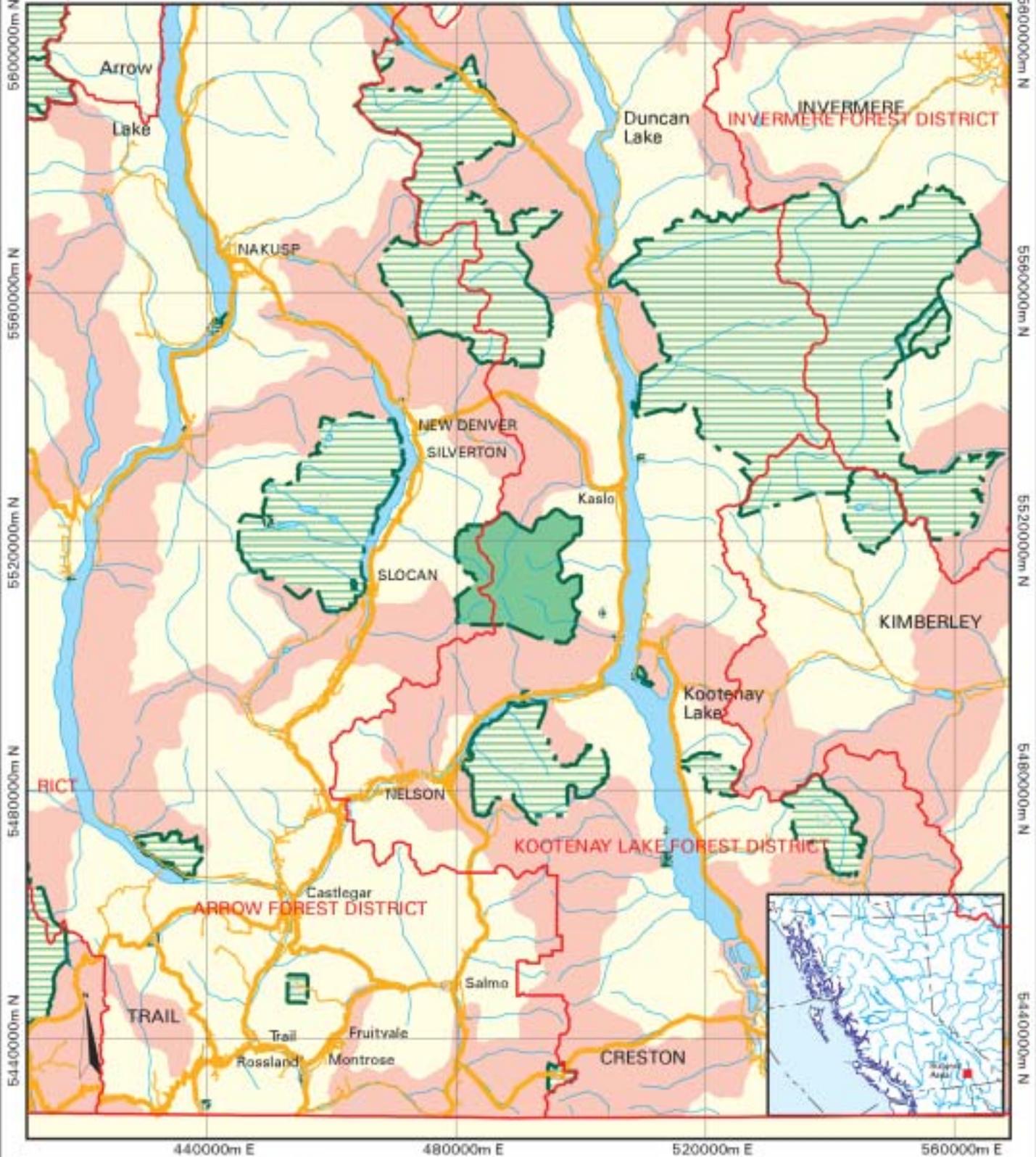
Six glaciers are found within the park. Five of these, Retallack, Caribou, Woodbury, Kane, and Grays individually occupy less than 1km<sup>2</sup>. Kokanee Glacier occupies approximately 4km<sup>2</sup>. Other erosional processes, particularly mass wasting through freeze/thaw action predominates the gradual changing shape of the park landscape.

The highest peaks in the park, Esmeralda, Cond and Kokanee Peak, all slightly over 2,800 metres, form the crest Kokanee Glacier. Other major peaks and ridges are Mt. McQuarrie (northeast corner), Enterprise and White Heather (ridges on the northwest corner), the Sawtooth (northeast of Kokanee Glacier) and the series of mountain ranges along the southwest flank of the park.

Baseline Thematic Mapping (Map 2) for the park indicates that the majority of the park is alpine and old forest, with a moderate percentage of young forests and avalanche paths (Table 1).

Map 1: Context

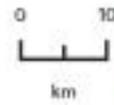
Kokanee Glacier Park



Projection: UTM Zone 11  
Datum: NAD83

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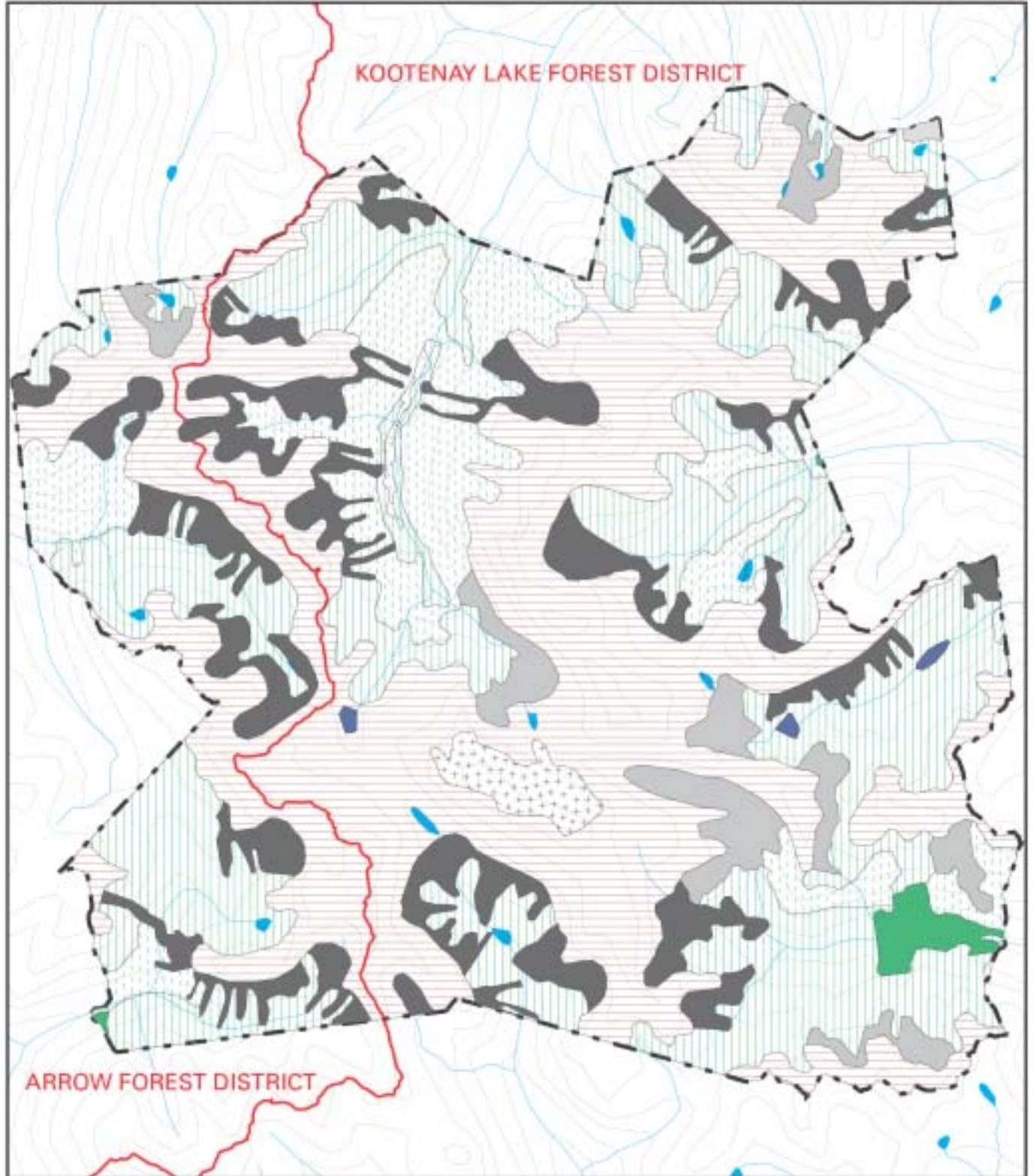
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-  Subject Area
-  Other Protected Areas
-  Connectivity corridors
-  Highway
-  Road
-  Forest District Boundary

Other Provincial Protected Areas

- 1 Lockhart Beach
- 2 Kokanee Creek Park
- 3 Rosebery Park
- 4 Summit Lake Park
- 5 Pilot Bay Park
- 6 Cosby Caves Park
- 7 Syringa Park
- 8 Drawery Point Park
- 9 St. Mary's Alpine Park
- 10 Grohman Narrows Park
- 11 Valhalla Park
- 12 Kootenay Lake Park
- 13 Evans Lake Ecological Reserve
- 14 Purcell Wilderness Conservancy Park
- 15 Lockhart Creek Park
- 16 Kianuko Park
- 17 West Arm Park
- 18 Goat Range Park
- 19 Erie Creek
- 20 Champion Lakes
- 21 Nancy Greene
- 22 King George VI
- 23 Beaver Creek
- 24 Stag Leap
- 25 Linn Creek Ecological Reserve
- 26 McDonald Creek
- 27 Arrow Lakes - Burton
- 28 Arrow Lakes - Farquhar
- 29 Arrow Lakes - Eagle Creek



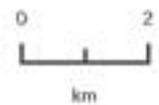
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- Alpine
- Barren Surfaces
- Lakes (over 10ha)
- Glaciers and snow
- Old Forest
- Young Forest

- Recently Logged
- Selectively Logged
- Subalpine Avalanche Chute
- Wetlands
- Recently Burned
- Protected Area Boundary
- Forest District Boundary



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Table 1. Baseline Thematic Mapping

<i>BTM Category</i>	<i>Percentage in Park</i>	<i>Area of Park (ha.)</i>
Alpine	39.2	12513.001
Barren Surfaces	4.4	1393.047
Fresh Water	0.2	50.986
Glaciers and Snow	1.2	374.238
Old Forest	29.7	9468.059
Recently Burned	0.1	27.69
Recently Logged	0.8	270.263
Selectively Logged	0	3.112
Subalpine Avalanche Chutes	12.9	4127.594
Wetlands	0.2	56.397
Young Forest	11.3	3620.592

### Geology and Soils

In common with other Columbia Mountain Ranges such as the Purcells to the east, the Monashees to the west, and the Cariboo mountains to the north, the Selkirk Mountains display a complex array of rock origins and structures. The Kokanee Glacier area, lying within the Slocan Ranges of the Selkirk Mountains, is underlain by Proterozoic and Mesozoic rocks including very resistant quartzites and limestones which comprise some of the highest peaks. Porphyritic granites, part of the Nelson Plutonic Formation (Nelson Batholith), are the most common rocks of the park. Hydrothermal solutions created by heat of magmatic intrusion of the Nelson batholith resulted in the deposition of mineral-rich veins of silver, lead-zinc and limited amounts of gold. Sedimentary rocks originating 405 - 600 million years ago have been folded in complex bands arcing towards the east.

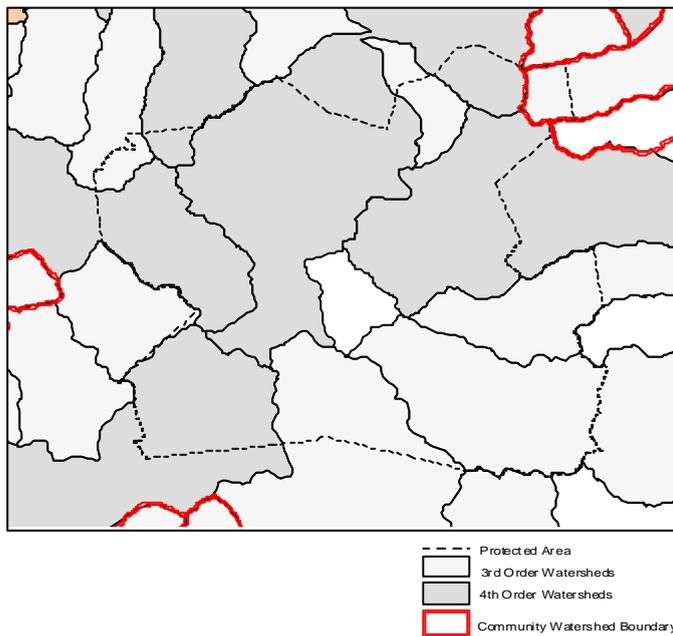
Soils that predominate the lower valley bottoms tend to be humo-ferric podzols which are well drained and generally porous. In the sub-alpine areas of the park, humo-ferric soils also predominate, however, the soils are much shallower than in the lower forest and are developed from colluvium and till materials over bedrock. Areas where slide paths and snowmelt accumulate have typically poor drainage and under such conditions saturated gleysols have developed while brunisols tend to have developed in the alpine meadowlands.

## Water

Eight drainages radiate out from the park; Keen Creek and Silverton Creek drain towards the north, Kokanee Creek to the south, Coffee, Lendrum and Woodbury Creeks empty along the east side, and Enterprise and Lemon Creeks along the west side. Portions of twelve separate watersheds are situated within the park and the three community watersheds<sup>1</sup> about the park boundary (Figure 1). The headwaters of the Bjerkness community watershed<sup>2</sup> is located within the park. Bjerkness Creek originates from a cluster of alpine lakes at the base of Trafalgar Mountain (elev. 2554 m).

Bjerkness Creek is an excellent example of the deeply incised tributary creeks lead from cirqued basins on high ridges which generally parallel the main drainages. The headwaters of most of the drainages in the park and many of the tributary streams contain sub-alpine and alpine lakes and tarns. Kokanee Lake (16.4 ha.) at the headwaters of Kokanee Creek, Kaslo Lake (16.5ha.) at the top end of Keen Creek, Gibsons Lake (12.2 ha.) and a series of other lakes that drain into Lendrum Creek such as Wheeler Lake (15.1 ha.) and Nalmet (17.1 ha.) complement a total of 25 lakes in the park.

**Figure 1. Watersheds and Community Watersheds**



<sup>1</sup> Community Watersheds as defined in Section 41(8) of the Forest Practices Code

<sup>2</sup> Water licences on Bjerkness Creek for domestic consumption have been active since 1994 (Land and Water BC 2004).

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Water quality surveys within the park are lacking. In tandem with fishery surveys conducted from 1974 to 1989 some lakes were assessed for turbidity and chemically analyzed. The results of these tests are included in Appendix 1. Average turbidity of the lakes sampled was 16.75 TDS<sup>3</sup> (Total Dissolved Solids) and pH<sup>4</sup> averaged 6.7.

### Vegetation

A total of seven biogeoclimatic (BEC) subzone/variants are contained within the park (Map 3).

**Table 2. Summary of BEC Zones**

<i>BEC subzone/variant<sup>5</sup></i>	<i>Area of Park (hectares)</i>
ATun (Alpine Tundra) undifferentiated	2610.3
ESSFwc4 (Selkirk Wet Cold Englemann Spruce-Subalpine Fir Variant)	10454.5
ESSFwcp4 (Selkirk Wet Cold Englemann Spruce-Subalpine Fir Parkland)	8384.6
ICHmw2 (Columbia-Shuswap Moist Warm Interior Cedar-Hemlock Variant)	834.6
ICHwk1 (Wells Gray Wet Cool Interior Cedar-Hemlock Variant)	858.5
ESSFwc1 (Columbia Wet Cold Englemann Spruce-Subalpine Fir Variant)	2296.8
ESSFwcw <sup>6</sup> (Woodland-Wet Cold Englemann Spruce-Subalpine Fir Variant)	6465.5

A brief description of each zone follows:

ICHmw2 - The Columbia – Shuswap Moist Warm Interior Cedar – Hemlock Variant occurs between approximately 1200 to 1550m on warm aspects and 1050 to 1450 on cool aspects. This variant is characterized by hot, moist summers and very mild winters with light snowfall. Climax zonal sites have stands of western red-cedar and western hemlock. Recurrent fires have led to a mosaic of climax and seral stands of Douglas-fir, western larch, hybrid white spruce and western red-cedar. The understory of most sites is dominated by feathermosses.

ICHwk1 - The Wells Gray Wet Cool Interior Cedar – Hemlock Variant occurs in the northern part of the Kootenay Lake Forest District. It first appears on cool aspect slopes north of Lardeau from approximately 1450m. This variant is characterized by warm, wet summers and cool winters with moderately heavy snowfall. Climax zonal sites have western red-cedar and western hemlock, while hybrid white spruce is the most common

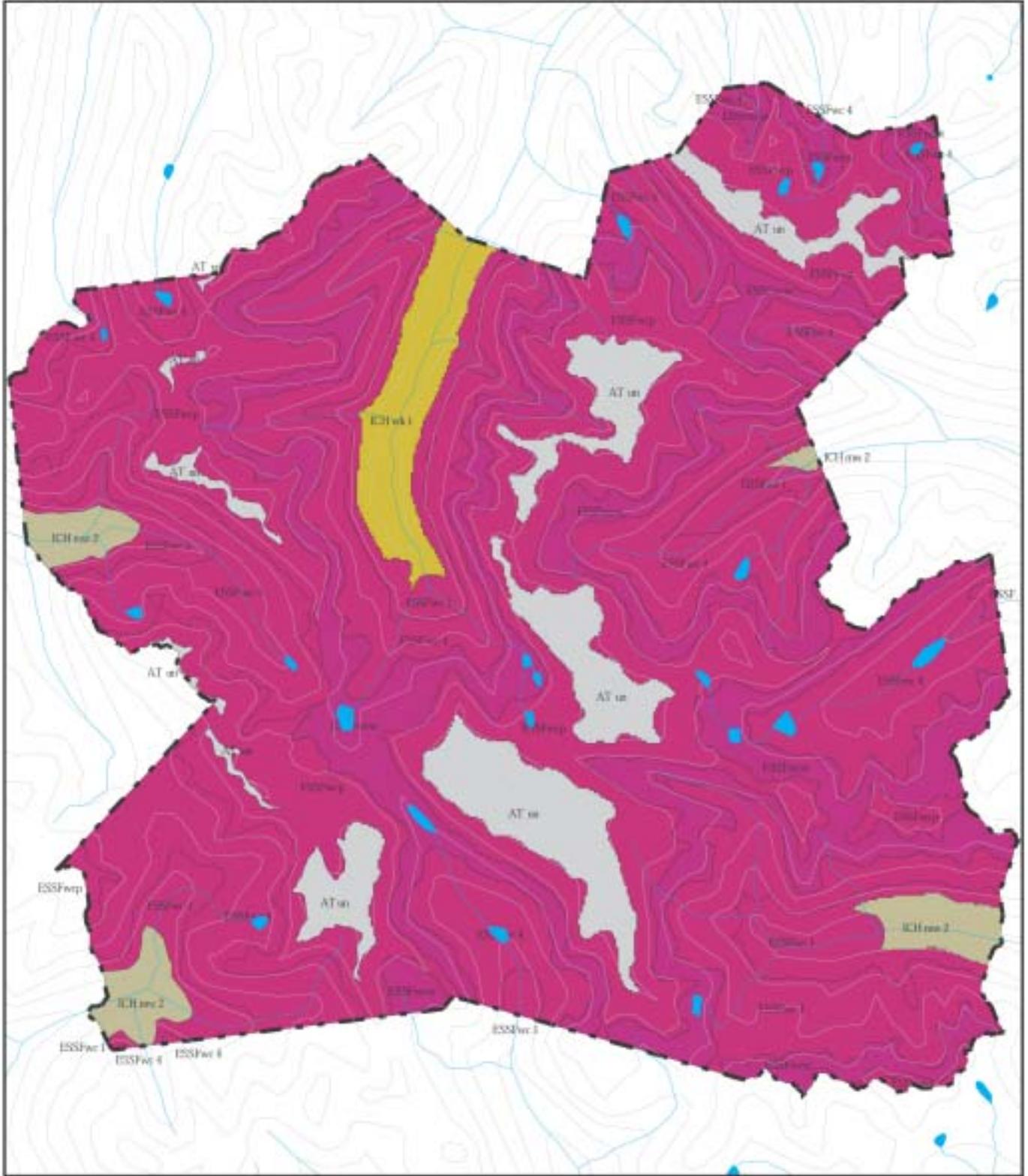
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<sup>3</sup> TDS are comprised of inorganic salts and small amounts of organic matter that are dissolved in water. Drinking water is scientifically ranked as being excellent for consumption (potability) at levels of 300g/mL or less.

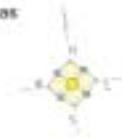
<sup>4</sup> The acidity or alkalinity of water expressed on a scale of 0 (acid) to 14 (alkali), pH 7 is considered neutral.

<sup>5</sup> Based on mapping information supplied by the Ministry of Sustainable Resource Management (2004)

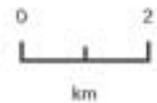
<sup>6</sup> A new classification of ESSF as stated in Trowbridge et al. (2002).



Projection: Albers Equal Areas  
Datum: NAD83



- Alpine Tundra
- Engelmann Spruce - Subalpine
- Interior Cedar - Hemlock
- Interior Cedar - Hemlock
- Protected Area Boundary



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seral species. The wet climate results in widespread occurrence of fern dominated understories (oak fern, spiny wood fern, and lady fern are the most common).

ESSFwc1 - The Columbia Wet Cold Engelmann Spruce – Subalpine Fir Variant occurs between approximately 1500 to 1650m on warm aspects and between 1400 to 1550m on cool aspects in the Selkirk Mountains, north of the West Arm of Kootenay Lake and in the Purcells from Howser Creek north. It is found in a thin band above the ICHmw2 or ICHwk1 and below the ESSFwc4. This variant is characterized by cool, moist summers and cold, wet winters with moderately heavy snowfall. It is a transitional unit between the ICH and ESSF zones. Understories are often dominated by white-flowered rhododendron and black huckleberry, with a wide variety of herb species. Climax zonal stands have Engelmann spruce and subalpine fir with western red-cedar and western hemlock often present as understorey or intermediate trees. Because of a less frequent fire cycle, there are fewer seral stands.

ESSFwc4 - The Selkirk Wet Cold Engelmann Spruce – Subalpine Fir Variant occurs between approximately 1650 to 1850m on warm aspects and between 1550 to 1850m on cool aspects. It is found immediately above the ESSFwc1. This variant is characterized by cool, moist summers and cold, wet winters with moderately heavy snowfall. Climax zonal sites have stands of Engelmann spruce and subalpine fir. Understorey vegetation is dominated by white-flowered rhododendron and black huckleberry. On zonal sites a wide variety of herbs are found often with an abundance of oak fern. Long fire cycles have produced many old growth stands and few seral stands.

ESSFwcu4 - The Upper Selkirk Wet Cold Engelmann Spruce - Subalpine Fir Variant<sup>7</sup> occurs above the elevation border of the ESSFwc4 on the highest forested slopes. It is found between about 1900 to 2100m. Cool, moist summers and very cold winters with heavy snowfall characterize this variant. Mature zonal sites support stands of subalpine fir, Engelmann spruce and subalpine larch. Understorey is often dominated by mountain-heathers. Late lying snow, avalanching, colluvial action, thin soils and frost pocketing create a mosaic of closed forest, scree slopes, avalanche tracks, and permanent meadows.

ESSFwcp4- The Selkirk Wet Cold Engelmann Spruce – Subalpine Fir Parkland Variant occurs between approximately 2100 to 2400 m. It is a transition between the continuous forest and the alpine tundra. This variant is characterized by short, cool, moist summers and long, cold, wet winters with heavy snowfall. Mature zonal sites support patchy stands of Engelmann spruce, subalpine fir and subalpine larch, often in krummholtz stands. Late lying snow, avalanching, colluvial action, thin soils, and frost pocketing create a landscape of scattered tree islands and permanent meadows.

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<sup>7</sup> This is a new subzone/variant not described in Braumandl and Curran (1992). Sourced from: Ministry of Water, Land and Air Protection, Kokanee Glacier Provincial Park Predictive Ecosystems Mapping, Ketcheson et. al (Jan. 2003) 10. GIS mapping contained within this Background Report does not reflect ESSFwcu4.

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ESSFw<sub>cw</sub> - Woodland-Wet Cold Englemann Spruce-Subalpine Fir. This variant has recently<sup>8</sup> been used to classify high elevation ESSF forest. Appending the letter “w” to the two-letter code for “forested” subzones is now standard practice when recognizing and mapping high elevation woodland subzones. The letter **w** represents the area of upper elevation ESSF woodlands (formerly “u”).

AT - The Alpine Tundra Zone occurs at above approximately 2300m in the upper Duncan River to 2500m in the south and is characterized by short, cool, moist summers and long, cold, wet winters with heavy snowfall. The zone encompasses the high, treeless peaks of the Selkirks and Purcell Mountains. Much of this zone is non-vegetated with herb dominated meadows on zonal sites.

Old growth forests (trees averaging over 140 years) occupy approximately 30% of the park, with major concentrations of late seral stage forests in the lower to mid elevations of the park<sup>9</sup>. Most notably, the Coffee, Lemon, Enterprise, Lendrum and upper Klawala drainages retain significant old growth. To a lesser extent, there are pockets of mature forests in the Kokanee Creek and Keen Creek portions of the park. Prior to 2003, the Woodbury drainage had a significant old growth component, but the wildfire in the summer of that year reduced forest cover considerably on south facing aspects of the drainage.

Generally, the forests within the park are considered to be rarely or infrequently disturbed by natural processes or events that largely terminate the existing forest stand and initiate secondary succession (i.e., categorized as NDT 1 and 2)<sup>10</sup>. Likewise, over fifty percent of the park is classified as NDT 5 and consists of alpine and subalpine parkland. As natural disturbances occur in these areas approximately every 200 to 350 years, the park’s old-growth forest ecosystem component is expected to normally remain undisturbed by catastrophic natural processes that result in successional changes.

The steep sided valleys of the park also create a unique stage for mass wasting events. Large snow and mudslides are not uncommon in late winter and in freshet. Some of the positive impacts from slides, avalanches and wildfires is the constant renewing of foraging vegetation for wildlife. Alternatively, such events can cause severe water quality issues such as increased turbidity and blockages of stream flow.

In terms of wildlife suitability, extensive alpine areas (constituting 40% of the park) provide denning areas for grizzly bears while mid-elevation old growth western red-cedar forests provide denning structures for black bears. The multitude of bird species in the park (over sixty individual species confirmed) utilize a mixture of forest stand ages for nesting and foraging, whereas snags provide essential habitat for cavity nesters.

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<sup>8</sup> Trowbridge et. al (2002)

<sup>9</sup> The park spans the administrative boundary of both the Kootenay Lake Forest District and the Arrow Boundary Forest District.

<sup>10</sup> See Appendix J.

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Rare and endangered plant species inventories are lacking within the park. However, one known blue-listed flora species, St. John's-wort has been identified within the park<sup>11</sup>. Pockets of this rare dicot belonging to the mangosteen family have been observed in the wetter montane portions of the park, particularly around Kaslo Lake.

Recent Predictive Ecosystem Mapping of the park has revealed the potential for two listed plant communities existing within the park<sup>12</sup>, but have not been confirmed by an on-site inventory. Predominantly, the listed plant communities (ESSFwc1/00 and ESSFwc4/00) are associated with avalanche chutes and runout zones where beargrass and huckleberries are abundant<sup>13</sup>.

Invasive and non-native weed species have yet to be confirmed within the park, however, spotted knapweed is known to occur outside of the park boundary along Forest Service Roads. A weed inventory of West Kootenay parks in 2002<sup>14</sup> cited nearby Kokanee Creek Provincial Park as having the highest number of weed species surveyed in the West Kootenay. A total of 14 species were identified, with spotted knapweed incorporating a large percentage (67%) of the species found.

### Wildlife

Kokanee Glacier Provincial Park (Wildlife Management Units 4-17 and 4-18) provides both winter and summer habitat for a wide range of animals, from small rodents and birds to large mammal species. Undoubtedly, the park's location at the headwaters of five major creeks makes it a critical hub for the movement and genetic dispersion of numerous species.

One of the highlights of the park are the varied habitat associations accessible as prime bear habitat<sup>15</sup>. **Map 4**). The headwater topography fosters rich riparian habitats for bears while valley sides are lined with avalanche chutes and provide an abundance of berries and other seasonal vegetation. Other staple nourishments for bears are provided by alpine meadows and barren surfaces which allow digging for ground squirrels and corms of avalanche lily. The alpine also provides denning areas for grizzly bears while mid-elevation old western red-cedar forests provide denning structures for black bears. Although it is difficult to estimate with any degree of accuracy the number of grizzlies that use the park annually, scientists have estimated it could be up to 15 or more, including 3-4 nursery groups.

Principle large predator species such as the mountain lion are known to use the uplands of the park, likely seeking shelter and avoidance in the remote broken granite landscape in summer and then moving to valley bottoms in winter. Wolverine (a blue-listed species) occur and may use high elevation cirques in winter as natal denning area. Fisher, a red-

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<sup>11</sup> See Appendix E and F for a complete list of rare and endangered flora.

<sup>12</sup> Subalpine fir / black huckleberry / bear-grass ESSFwc1/00 and Subalpine fir / black huckleberry / bear-grass ESSFwc4/00, ESSFwc1/00 (KLFD and ALFD respectively).

<sup>13</sup> See Appendix D.

<sup>14</sup> Invasive Non-Native Plants in West Kootenay Parks, J. Craig et. al (2002).

<sup>15</sup> Wayne McCrory (RPBio) pers. comm. (2004)

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listed species could potentially occur within the park, but to date no sightings have been reported.

There are low numbers of both mule deer and white-tailed deer owing to more suitable habitat existing outside of the park boundary. Similarly, herds of mountain goats use the park primarily in the isolated ridges above Coffee Pass, Enterprise, Woodbury and Keen Creeks. Both Rocky Mountain bighorn sheep and mountain caribou were once known to use the park, however are now locally extirpated.

Of small mammals, Columbian ground squirrels are numerous in meadows and open slopes, as are pikas and hoary marmots along rock slides and talus slopes.

There have been over sixty separate avian species observed within the park. Commonly, non-migratory birds include spruce and blue grouse, white-tailed ptarmigan, Clark's nutcracker, gray and Stellar's jay, mountain and black-capped chickadees, dark-eyed junco and the varied thrush. Keystone predatory birds such as the bald eagle have also been observed. Rare and endangered birds within the protected area have not yet been studied, but the American bittern and bobolink (both blue-listed) are believed to occur. A complete list of bird species with seasonal abundance can be found in Appendix 9.

To date, no study or inventory of amphibians, reptiles and invertebrates has occurred within the park. However, despite the rugged landscape there is habitat for amphibian species such as the long-toed salamander, western toad, pacific tree frog, spotted frog and the wood frog. Although inventories of the endangered Coeur d'Alene salamander have been limited to lower elevation areas in the West Kootenay, the preferred habitat of cascades over steep cliff faces located in the park could support this species.

At least six reptile species could potentially be found in Kokanee Glacier Provincial Park, including the blue-listed painted turtle. Other more common reptiles such as the western skink, northern alligator lizard, rubber boa, and the common or western garter snake have the possibility of existing in the park.

There are at least four endangered butterfly species, namely the Gillette's checkerspot, eastern tailed blue, Clodius Appolo, *altaurus* subspecies and checkered skipper that have habitat characteristics similar to those found in the park. Likewise, high mountain lakes could support numerous species of the order Odonata (dragonflies)<sup>16</sup>. The rare vivid dancer dragonfly (red-listed) found in high mountain streams of the neighboring Purcell Wilderness Conservancy is normally associated with warm springs. This natural water feature is not found within Kokanee Glacier Provincial Park.

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<sup>16</sup> Species of the order Odonata listed by the Royal British Columbia Museum that occur within the Columbia Basin (small lakes and ponds) *Enallagma ebrium*, *Aeshna canadensis*, *A. eremita*, *A. multicolor*, *A. palmata*, *A. tuberculifera*, *A. umbrosa*, *Cordulia shurtleffi*, *Epithea spinigera*, *Somatochlora albicincta*, *S. cingulata*, *Leucorrhinia glacialis*, *L. hudsonica*, *L. proxima*, *Libellula julia*, *L. lydia* and *Sympetrum vicinum*.

## DRAFT ONLY-UNDER REVIEW

### Fish and aquatic values

Kokanee Glacier Provincial Park contains significant fish spawning and rearing habitat. Sixteen lakes within the park support fish and the majority of the larger lakes were stocked in the late 1970's and early 1980's with westslope cutthroat trout<sup>17</sup>. This species, along with bull trout, which are found predominantly in Keen Creek, Fennel Creek and the lower reaches of Coffee Creek, are both ranked provincially as blue-listed. Other fish species known to occur within streams in the park are mountain whitefish, rainbow trout, slimy sculpin, torrent sculpin and eastern brook trout. The latter is a introduced recreational sport fish that is known to translocate indigenous fishes outside their original native habitat and have been shown to alter the genetic integrity of wild, native faunal assemblages.

Generally, all the fish bearing lakes with Kokanee Glacier Provincial Park (i.e., Kokanee, Kaslo, Sunset, Upper Joker, Nalmet and Gibson) all have inlets or outlets that support, to varying degrees, spawning populations of endangered westslope cutthroat. Anecdotal reports point to most of these lakes containing large numbers of cutthroat trout, but individual fish tend to be small and stunted. This is a direct result of short growing seasons (due to the high altitude of all the lakes); the lakes generally are of low productivity, and there is unrestricted natural recruitment. The Fish and Wildlife Recreation and Allocation Branch is not contemplating study in the park because the fishery is a low management priority.

Fish surveys conducted in several of the lakes in the park (namely Kaslo, Helen Deane, Tanal, Crazy Jane, Sunset, Upper/ Lower Joker, Heather, Wheeler and Kokanee) from 1974 to 1989 detailed the predominance of westslope cutthroat trout<sup>18</sup>. Currently, stream and lake surveys identifying fish abundance and species diversity within the park is lacking, however, surveys funded through FRBC (Forest Renewal British Columbia) in 1997-2000 were conducted on several watersheds outside of the park, namely in Coffee, Keen, Klawala, Kyawats, BenHur and Enterprise Creeks<sup>19</sup>. The surveys provide insight into fish species diversity and richness in streams that emanate from the park.

### Rare and Endangered Species

One blue-listed flora species- western St. John's wort (*Hypericum scouleri ssp.*), two blue-listed mammal species- grizzly bear (*Ursus arctos*) and wolverine (*Gulo gulo luscus*) and two fish species- bull trout (*Salvelinus confluentus*) and westslope cutthroat trout (*Oncorhynchus clarki lewisi*) have been confirmed within the park. Two rare plant communities (ESSFwc1/00 and ESSFwc4/00 Subalpine fir/ black huckleberry/ beargrass) have been identified by Predictive Ecosystem Mapping, but on-site inventory is needed to

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<sup>17</sup> For detailed stocking information see Appendix B.

<sup>18</sup> Fisheries Inventory Summary System (2004).

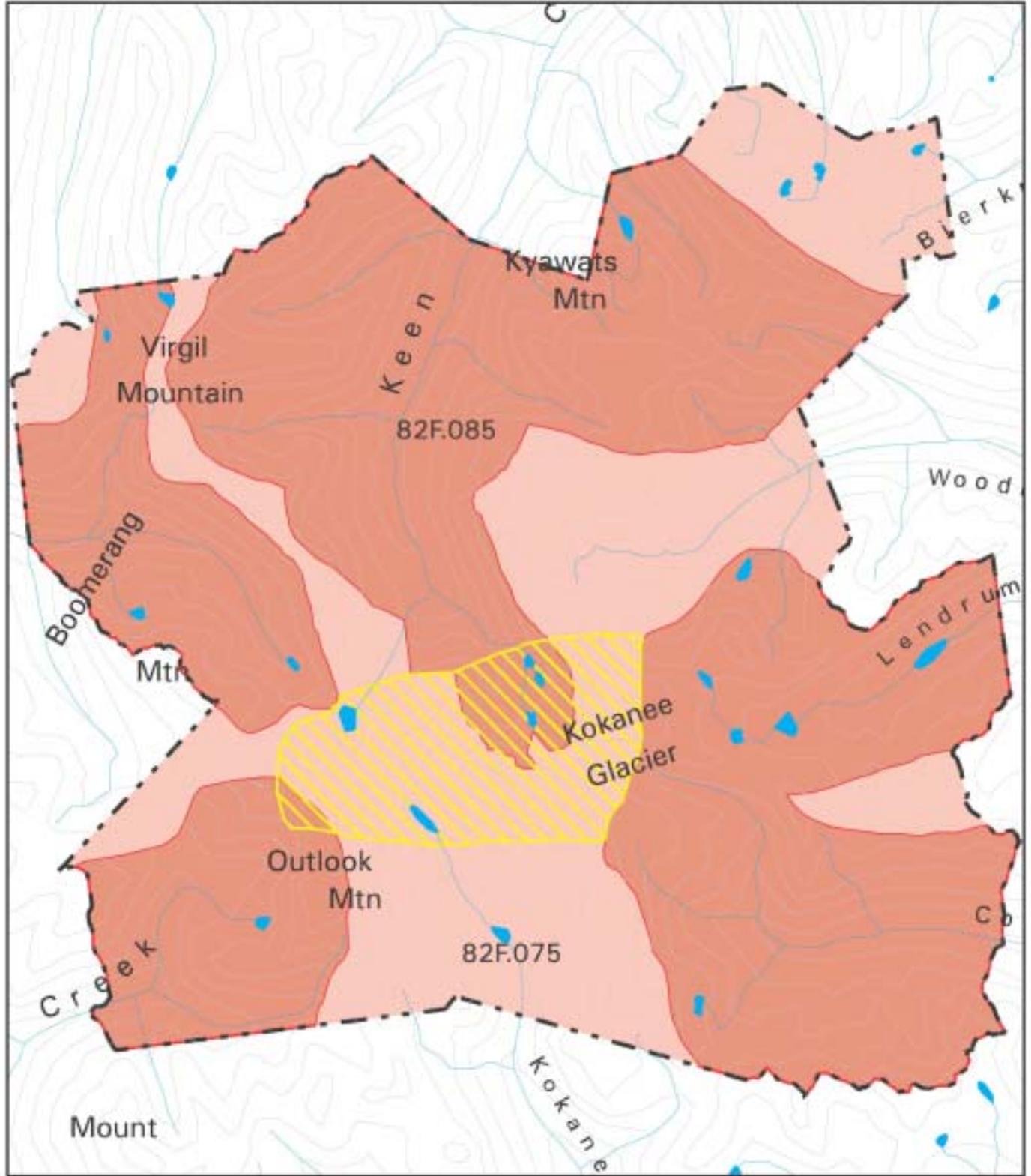
<sup>19</sup> Detailed fish surveys for streams residing outside of the park are available at [http://srmwww.gov.bc.ca/appsdata/acat/html/deploy/acat\\_p\\_report\\_301.html](http://srmwww.gov.bc.ca/appsdata/acat/html/deploy/acat_p_report_301.html). Forest licencees have no obligation to survey waterways outside of their operating areas.

**DRAFT ONLY-UNDER REVIEW**

verify actual existence<sup>20</sup>. Other rare and endangered species strongly suspected to occur within the park (but yet confirmed) have been mentioned in the preceding sections.

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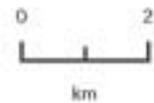
<sup>20</sup> See Appendix D for Rare and Endangered Species/Plant Communities.



Projection: Albers Equal Areas  
Datum: NAD83



- Security Habitat
- Secondary Habitat
- Core Connectivity
- Protected Area Boundary



Produced in Feb 2004 for  
Ministry of Water, Land and  
Air Protection by MSRM, Decision  
Support Services

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### Natural Disturbance

Within historic times, wildfire has played a major role in shaping the forest and landscape features of Kokanee Glacier Provincial Park. A large-scale wildfire in the Slocan Chief area in 1932 burned an extensive area ranging from Kaslo Lake through the upper end of Enterprise Creek and over to the Keen Creek drainage. More recently, a lightning caused wildfire burned approximately 1,500 ha. of the Woodbury drainage in the summer of 2003.

Snow avalanches and mudslides are not uncommon on steeper slopes within the various drainages emanating out of the “core” area of the park. These mass wasting events create a constant resurgence of young vegetation cover. However, slides that occur at greater time intervals are often cataclysmic and remove even the largest trees in their path.

The dominant Natural Disturbance Type<sup>21</sup> in Kokanee Glacier Provincial Park is NDT 5 encompassing 51.80% or 16,526 ha of park land base. NDT 1 encompasses 40.60% or 12,952 ha. and, NDT 2 encompasses 7.6% or 2426 ha..

### Cultural Values

#### First Nations

Kokanee Glacier Provincial Park is situated in the traditional territories of both the Ktunaxa Kinbasket and the Okanagan nations. First Nation's use within the park is not well document and information is scarce on traditional and/or cultural practices that may have occurred within the park. Furthermore, no known archaeological sites have been documented within park boundaries<sup>22</sup>. However, evidence (pictographs, pit house depression, artifacts) of Neolithic culture exists throughout the West Kootenay.

The strategic position of the park at the headwaters of several major creeks and providing habitat supporting a variety of wildlife species strongly indicates that First Nations use is suspected prior to European contact and colonization. For example, The Sinixt<sup>23</sup> and Ktunaxa peoples using the area near the outlet of Kokanee Creek as a seasonal village for food gathering, hunting and fishing grounds is well documented. In addition, a “grease trail” was located from Lemon Creek to the outlet of Duhamel Creek at the West Arm of Kootenay Lake<sup>24</sup>.

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<sup>21</sup> For a detailed description of NDT's see Appendix J.

<sup>22</sup> Registered with the Archeological Registry of BC (MSRM) and classified by Borden code.

<sup>23</sup> Regarded by the government of British Columbia as an extinct cultural group.

<sup>24</sup> Grease trail- an intertribal trade route. Eileen Pearkes, Geography of Memory: Recovering Stories of a Landscape's First People (Nelson: Kutenai House, 2003), 19.

## DRAFT ONLY-UNDER REVIEW

Various landscape features (lakes, creeks, mountains) within the park have been derived from the Ktunenian language. Source word and English language equivalents as follows:

Tanal Lake- rushes

Nilsik Creek - buffalo bull

Kyawats Mountain - grouse

Paupo Mountain - hammer

Natanek Lake - sun

Klawala Creek - grizzly bear

The word *Kokanee* is the Anglicization of a word in the Salishan language (dialect of the Okanagan-Colville First Nations) meaning “red fish” that applies to a landlocked species of sockeye salmon.

### Non-aboriginal

The Kokanee Glacier area has a rich and interesting history of alpine mining beginning as far back as the late 1880's. During the mining boom of nearby Sandon and the Slocan, the mountains surrounding Kokanee Glacier were rapidly and thoroughly explored and by the early 1900's there were many claims staked and small operating mine developments throughout the area of the present-day park. In many seemingly random deposits, the prevalent ore findings were silver, lead, zinc and small amounts of gold.

During the early years of development, transportation was by horse, with the animals normally packing out 90 kg of ore each. When the trails were covered by snow the ore was "rawhided" (hailed on crude rawhide sleds behind a horse). Because of these difficulties, highgrading was common and only the very richest ores were packed out. Adit mining was the predominant technique and at the Revenue and Violet Mines tramway rails and ore cars can still be seen rusting at tunnel entrances. The mountainous terrain often added its own particular difficulties. At one of the claims in Glory Basin the shaft was driven into the face of a bluff and the miners had to be lowered by rope from the cliff top to the mine portal with a 427 m vertical drop below them.

Mineral values in claims throughout the park were extremely variable. They ranged from uneconomic, as in the Snowstorm claim near Kaslo Lake, to extremely rich, such as the Boomerang Mine on Enterprise Creek with a single vein of silver assayed at 110. litres per ton of ore.

Of all the mines begun, only two were really successful: Molly Gibson and the Scranton property. The Scranton Mine, its claim granted in 1906, was worked as recently as 1979, producing gold, silver, lead and zinc from its operation on Pontiac Creek. The Molly Gibson Mine, above Gibson Lake, was in production from 1899 to 1950, yielding a total of 12 oz. gold, 998,626 oz. silver, 4,991,560 lbs. lead and 20,376 lbs. of zinc. During its operating period, Molly Gibson had more than its share of disasters. In 1902 a large snowslide struck the camp, killing several miners and destroying the tramway. A second

## DRAFT ONLY-UNDER REVIEW

snowslide in 1912 – 13 winter hit the tramway again, smashing about 6 kilometres of construction. In 1921 the tramway was once more destroyed, this time by fire. This was perhaps the last straw, as production never regained its former levels and the mine gradually slowed to a shutdown by 1950.

The miners' trails and cabins have become an important part of today's Kokanee Glacier Provincial Park. Trails that were once traveled by laden packhorses are now used by hundreds of hikers every year, while the Slocan Chief Cabin, has become a popular rendezvous point.

The Slocan Chief Cabin has a long and interesting history. Originally constructed in 1896 for use as a base for mining operations in the area, its use and appearance underwent periods of change. Many of the outdoors people from the local area, particularly long-time members of the Kootenay Mountaineering Club, contributed much of their time and labour to maintenance of the cabin for recreation. Time and weather have had a major impact on the structural integrity of the cabin. In the summer of 2003, it was closed for lodgings (replaced by the Kokanee Glacier Cabin). Currently, a renovation project is underway to restore the cabin as a day-use interpretive centre<sup>25</sup>.

The original Woodbury Cabin succumbed to avalanches several decades ago. A new cabin is built (1984) on its original footprint. The Silver Spray Cabin (circa 1910) was replaced by a modern timber frame cabin in 1994.

## Outdoor Recreation, Tourism and Economic Values

### Outdoor Recreation Features

The rugged high elevation mountain characteristics of Kokanee Glacier Provincial Park hold special appeal for backcountry recreation (Map 5). The various road accesses within close proximity to the park's recreation and scenic features in combination with well established trails, cabins and campsites, provide attractive situations for summer day-use and backpacking. The traditional well used areas of the park, the Kokanee Creek drainage and the Slocan Chief in particular, are well suited to capabilities and aspirations of families and inexperienced backcountry recreationists. There are also remote pristine areas of the park offering challenge and attraction for well-equipped wilderness travelers. In addition, the use of the park for winter backcountry skiing has been increasing dramatically over the last two decades.

The primary outdoor recreation features include the following:

- Provincially significant alpine and sub-alpine vegetation: Kokanee Lake meadows, Keen Lake meadows, Lemon Pass and Lendrum Creek headwaters.
- Provincially-significant mountain scenery including Humpback Ridge, Glacier View Peak, Gray's Peak, Trafalgar Mountain and Caribou Ridge.

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<sup>25</sup> The Friends of West Kootenay Parks are conducting the renovation project under the direction of park.

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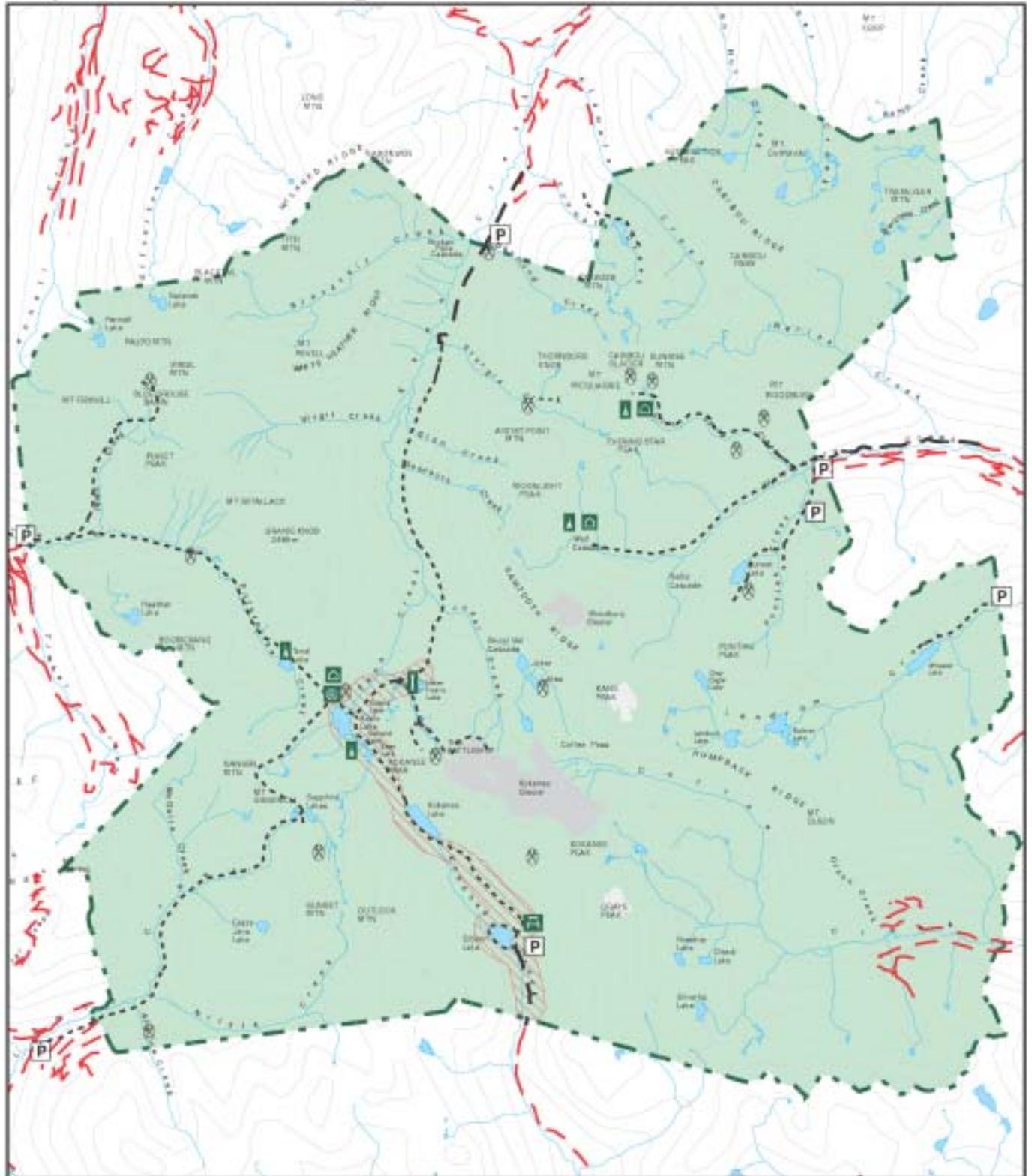
- Provincially significant alpine lakes including Kokanee, Lendrum, Keen, Kaslo, Nalmet and Sapphire Lakes.
- Provincially and regionally significant glacier and glacial landform features exemplified by Kokanee Glacier, Woodbury Glacier and landforms found in the Joker Basin-Coffee Pass area.
- Regionally significant streams, waterfalls and cascades including Kokanee Creek, Keen Creek, Woodbury Creek, Lendrum Creek and Lemon Creek.
- Regionally significant historic recreation features related to past mining activities in the park - Slocan Chief Cabin and trails.

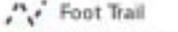
### Visual Values

Kokanee Glacier Provincial Park is renowned as an area of scenic mountain beauty. While the park is dominated by rugged mountains, it presents a surprising diversity of visual resources. The steep-sided mountain valleys provide rich contrasts in texture and colour between old growth forests, avalanche slopes and exposed rock ridges and snowfields of the high peaks.

The Woodbury Fire of 2003 burned an extensive area along the entire trail to the Woodbury Cabin. A smaller section of the Silver Spray Trail was also affected.

Undoubtedly, the recent fire scarred landscape is unlike any other ecosystem in the park. The severity and magnitude of the wild fire resulted in considerable loss of old growth forest and understory vegetation. A unique opportunity exists to understand and appreciate the natural forces that have, and continue to, shape the visual features of Kokanee Glacier Provincial Park. The park portion of the Woodbury Creek drainage will remain closed to the public until safety concerns have been alleviated.



<p>Projection: Albers Equal Areas Datum: NAD83</p> 	 Core Area	 Campsite (Designated)	
	 Gravel Road	 Picnic Shelter	
<p>Produced in Jan 2004 for Ministry of Water, Land and Air Protection by MSRM, Decision Support Services</p>	 Foot Trail	 Ranger Headquarters	<p>This is a visual representation only and should not be used for legal purposes.</p>
	 Forest Service Roads	 Cabin	
	 Point of Interest (Slocan Chief Cabin)	 Parking Area	
	 Protected Area Boundary	 Parking Area	

## DRAFT ONLY-UNDER REVIEW

### Outdoor Recreation and Tourism

#### **Day-use (Peak season)**

Gibson Lake is popular with families with young children, school groups and first time park visitors or tourists. The day use area has a shelter, enclosed cooking area, picnic tables and pit toilets. An easy trail (2.5km) travels around the lake. Fishing is offered and there are great views of the surrounding peaks and old mine workings.

For more experienced and physically fit park users, day hikes from parking areas at Gibson Lake include Kokanee Lake, Kaslo Lake and the Slocan Chief cabin site. Alternative day hikes from parking areas are available from the Keen Creek entrance to Joker Lakes, Woodbury Creek to Sunset Lake or Wheeler Lake, and Enterprise to Tanal Lakes.

Helicopter tours are available through private companies in summer only. These flights are restricted to a small southeastern section of Kokanee Glacier proper and Caribou Ridge.

Helicopter/float plane access to Crazy Jane Lake is also permitted for fishing opportunities.

#### **Multi-day (Peak season)**

The park offers various options for multi-day hikers, backpackers and mountaineers. One of the more popular and less difficult trails within the park is Gibson Lake to the Slocan Chief Cabin. En-route, park visitors are able to view the dramatic shoreline and sparkling indigo depths of Kokanee Lake and the meadow complexes leading to Kaslo Lake. Many multi-day park visitors utilize the overnight facilities at Kaslo Lake (Kokanee Glacier Cabin) in order to explore such areas as Sapphire Lakes, the Slocan Chief Cabin, Helen Deane Lake, and Kalmia Lake. A reservation system is in place for the cabin at Kaslo Lake, placing priority on bed space.

Backpackers and mountaineers accessing from the Woodbury Creek drainage are offered choices of destinations to the headwaters of Woodbury Creek (8km from trailhead) or Silver Spray Creek (7km from trailhead). Overnight cabin accommodation (reservation system similar to the Kokanee Glacier Cabin) and very limited wilderness camping is offered at both locations. Access to these areas allows more seasoned backcountry users with strong route finding skills the opportunity to explore the more rugged mountain features of the northeast section of the park.

The Keen Creek, Enterprise Creek and Lemon Creek drainages all offer trail access into the Kaslo Lake area. Enterprise Creek Trail (10.2 km), Keen Creek Trail (12.5 km), and Lemon Creek Trail (14.3 km) require backpackers to be totally self-sufficient en-route. The Lemon Creek Trail is not maintained and strong route finding skills are required. Travel onto the larger glaciers in the park (i.e., Kokanee, Woodbury, and Caribou) is both

## **DRAFT ONLY-UNDER REVIEW**

rewarding and potentially dangerous. Only experienced mountaineers with proper training and equipment are encouraged to explore these areas.

Grizzly bear movement and foraging affects where and when recreation and tourism opportunities are permitted in habitat sensitive sections of the park. . Seasonal closures (mid-August to early October) of trails leading into the Keen Creek drainage from the Slocan Chief Cabin site are an attempt to reduce human-bear conflict. Areas such as the Joker Lakes basin are not recommended for backcountry travel, in order to allow bears to persist in their own habitat without disruption.

### **Winter opportunities**

Backcountry skiing has become one of the pre-dominant winter recreation activities within Kokanee Glacier Provincial Park. Starting in the early 1960's, groups traveled unassisted into the park and used the Slocan Chief Cabin as a base to explore and ski the basins in the immediate vicinity.

For several years, the Slocan Chief Cabin was maintained by volunteer hut keepers working in conjunction with BC Parks, who checked on the cabin and facilities once a week. In 1989, BC Parks expanded the maintenance program by hiring seasonal summer staff to stay and assume upkeep of the facility in the winter months. In 1992, a private company, Kokanee Glacier Mountaineering Inc., assumed the maintenance and booking responsibilities related to the winter skiing accommodations at the Slocan Chief Cabin. KGMI continued the administration of the "lottery" system originally established by BC Parks, to regulate visitor accommodation at the cabin and provided helicopter flights (to the cabin and return only) for incoming/outgoing guests.

With the advent of reserved winter accommodations for park visitors, complemented by a helicopter taxi service, the popularity of Kokanee Glacier Provincial Park has grown substantially. However, the park is situated in a mountainous area which is highly prone to large natural release avalanches (class 2 or 3 are not uncommon). Eleven avalanche related deaths have occurred in the park since 1990. The new facility on Kaslo Lake (Kokanee Glacier Cabin) was built in 2002/03 to serve both as a educational base for avalanche awareness and to provide overnight accommodation in lieu of the aging Slocan Chief Cabin.

Vehicle access to the park is limited in winter months. Many of the logging roads leading to various trailheads, which are easily accessible in summer months, are not plowed in winter. Helicopter access (regulated by park use permit) is the only viable and safe means to travel into and out of the park from late October to early June.

Hunting in the park is restricted to early winter, with regulations allowing the discharge of firearms from November 1 to November 30, during a lawful game hunting season.

## DRAFT ONLY-UNDER REVIEW

### Historic Features

The Slocan Chief Cabin remains a focal point of visitor attraction within Kokanee Glacier Provincial Park. In 2003, the cabin was closed permanently as an overnight facility because of deteriorating structural integrity and new accommodation services offered at Kaslo Lake (Kokanee Glacier Cabin). In 2004, with funds secured by the Kokanee Glacier Cabin campaign, the over-century old structure will be renovated and subsequently offer self-serve interpretation displays on the mining and cultural history of the park.

Historic remnants of past mining activity are visible in a variety of locations throughout the park in areas such as Joker Lakes, Gibson Lake, Sunset Lake, and headwaters of Silver Spray and Woodbury Creeks. These derelict mining operations pose both safety risks to the public and potential impacts to the ecological integrity of the park (i.e., off-trail use and wildlife habitat disruption). Visitors are encouraged to stay on maintained (designated) trails and observe these historic features from a distance.

### Existing Facilities and Services

#### Access

There are presently six main access roads leading to the park, each oriented to a major drainage system. Road conditions can vary from year to year, but all are usually passable by two-wheel drive vehicles. These roads are maintained by various interests including the Ministry of Water, Land and Air Protection, Ministry of Transportation, Ministry of Forests and private mining and forestry operations.

#### *Kokanee Creek Road*

- This is the most frequently used entrance into the park accessed from Highway 3A. The gravel surface road climbs almost continuously, gaining 1,094 metres in 16 kilometres between Kootenay and Gibson Lakes.

Because of the gravel surface and the steep grade, this road is usually in rough condition. Erosion and avalanche damage during winter and spring are major problems, particularly along the many slide paths past the 11-kilometre point. Road closure dates are dependent on snowfall and spring thaw conditions. Jurisdiction of the road leading up to the park boundary is under the authority of the Ministry of Transportation.

#### *Keen Creek Road*

- The Keen Creek route leaves Highway 31A, 6 kilometres northwest of Kaslo and follows Keen Creek. The first 12.9 kilometres of this road are in fair condition. The road surface is compacted gravel and narrow, with occasional pullouts to allow passing. The remaining 9 kilometres of the road has been subjected to two significant washouts. This section of the road is no longer accessible by car/truck and restricted to foot traffic only. Jurisdiction of the road leading up to the park boundary is under

## DRAFT ONLY-UNDER REVIEW

the authority of the Ministry of Transportation.

### *Woodbury Creek Road*

- The Woodbury Creek road reaches the park via 13 kilometres of gravel road that branches off Highway 31, 9.6 kilometres north of Ainsworth. The road follows Woodbury Creek to the east boundary of the park. This access is poorly maintained and in some years is impassable to low clearance vehicles. Jurisdiction of the road leading up to the park boundary is under the authority of the Ministry of Forests.

### *Lemon Creek Road*

- The Lemon Creek road, which leads off Highway 6 approximately 8 kilometres south of Slocan City, provides access to the southwest corner of the park. The 16 kilometres of gravel road is maintained by the Ministry of Forests Service and Slocan Forest Products and is generally considered in good condition. Jurisdiction of the road leading up to the park boundary is under the authority of the Ministry of Forests.

### *Enterprise Creek Road*

- The Enterprise Creek road, off Highway 6, 1.6 kilometres north of the Enterprise Creekbridge, allows access to the northwestern section of the park. The 12.8 kilometres of gravel road is used by mining and forestry interests and is maintained in generally good condition. Jurisdiction of the road leading up to the park boundary is under the authority of the Ministry of Forests.

## **Summary of Park Facilities**

### *Trailhead Parking*

- Gibson Lake- 50 vehicle capacity, 2 pit toilets, information shelter, picnic shelter, 3 picnic tables, and a car-top boat launch.
- Woodbury Creek- 8 vehicle capacity, 1 pit toilet, and 1 information shelter.
- Keen Creek- 1 pit toilet, and 1 information shelter.
- Enterprise Creek- 6 vehicle capacity and 1 information shelter,
- Lemon Creek- 1 information shelter.

### *Shelter Accommodation*

- Kokanee Glacier Cabin: Sleeps 20 persons in summer, and 12 persons in winter. A 400 m<sup>2</sup>, 1½ story timber frame structure built in 2002/03. It is equipped with dishes, bunk beds with sleeping foams, an electrical and propane cooking system, electrical lighting, heating system (hydro powered with a generator for backup), a backup propane system, a water purification system that utilizes ultra-violet radiation, heated hot water, shower stalls, flush toilets and a on-site sewage treatment plant.

The Alpine Club of Canada (ACC) operates the cabin under contract in the summer months (June to October). ACC members may reserve the cabin up to one year or 60 days in advance (depending on membership status). Non-members (general public)

## DRAFT ONLY-UNDER REVIEW

may reserve up to 30 days in advance.

Accommodation in winter (December to April) is facilitated by a lottery system and administered through the ACC.

- Silver Spray Cabin: Sleeps 10 persons. This timber frame cabin was built in 1994<sup>26</sup> to replace a former mining cabin that had been on site since the early 1900's. The cabin is heated by a propane heater and a wood stove (wood provided). Propane cooking and lighting is also available. No cookware or dishware is provided. Sleeping is in a loft area on foam pads.

The Alpine Club of Canada (ACC) operates the cabin under contract in the summer months (June to October). ACC members may reserve the cabin up to one year or 60 days in advance (depending on membership status). Non-members (general public) may reserve up to 30 days in advance. Walk-in rates are the same as those who book in advance.

The cabin is unavailable for booking in the winter because of extreme avalanche hazard.

- Woodbury Cabin: Sleeps 8 persons. This wood frame cabin was constructed in 1984. The cabin is heated by a wood stove (wood provided). Propane cooking and lighting is also available. No cookware or dishware is provided. Sleeping is in the loft area.

The Alpine Club of Canada (ACC) operates the cabin under contract in the summer months (June to October). ACC members may reserve the cabin up to one year or 60 days in advance (depending on membership status). Non-members (general public) may reserve up to 30 days in advance. Walk-in rates are the same as those who book in advance.

The cabin is unavailable for booking in the winter because of extreme avalanche hazard.

### *Shelter (Day-Use)*

- Gibson Lake Shelter- A 8mx10m wood frame log shelter located on the southern end of Gibson Lake. There is wood stove (wood provided) and the shelter is furnished with picnic tables.
- Slocan Chief Cabin- Will be made available to the general public in the summer of 2004 as a historic/ interpretation feature.

### *Campsites*

- Kaslo Lake- 10 tent pad sites, 1 information shelter, 2 food caches, grey water pit and 1 pit toilet. Reservations at this site can be made through the ACC. Fifty percent of

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<sup>26</sup> The cabin was constructed largely with the assistance of volunteers (The Friends of West Kootenay Parks).

## DRAFT ONLY-UNDER REVIEW

the site remains open on a first come - first serve basis.

- Tanal Lake- 2 hardened tent sites, 1 food cache, grey water pit, and 1 plastic toilet stool.
- Sapphire Lakes- no designated tent sites, 1 plastic toilet stool, 1 grey water pit and 1 food cache.
- Silver Spray- 2 tent sites and 1 pit toilet.
- Woodbury Creek- 2 sites and 1 pit toilet.

### *Trails*

#### Kokanee Creek Drainage

- Gibson Lake Loop- 2.5 km (1 hr) return loop trail. Easy.
- Gibson Lake to Kokanee Lake- 4 km (2 hrs), 450 m elevation gain. Moderate.
- Kokanee Lake to Kaslo Lake- 3 km (1.5 hrs). Easy.
- Kaslo Lake to Slocan Chief Cabin site- 1.3 km (0.5 hrs). Moderate.

#### Woodbury Creek Drainage

- Woodbury Creek to Silver Spray- 6km (4hrs), 1100 m elevation gain. Steep.
- Woodbury Creek to Sunset Lake- 4.5km (1.5 hrs). Easy.
- Woodbury trailhead to Woodbury Cabin- 8 km (4 hrs), 762 m elevation gain. Moderate.

#### Keen Creek Drainage

- Desmond Creek to Joker Millsite- 7.5 km (3 hrs) Easy
- Joker Millsite to Helen Deane Lake- 3.5 km (2 hrs), 452 m elevation gain. Steep.

#### Enterprise Creek Drainage

- Enterprise Creek to Tanal Lake- 7 km (3 hrs), 500 m elevation gain. Moderate.
- Tanal Lake to Kaslo Lake- 2.5 km (1.5 hrs). Moderate.
- Paupo Creek to Blue Grouse Basin- 6.4 km (3.5 hrs), 700 m elevation gain. Moderate.

#### Lemon Creek Drainage

- Lemon Creek to Sapphire Lakes 10 km (5 hrs), 950 m elevation gain. Difficult to navigate, moderate

## Visitor Activity Areas

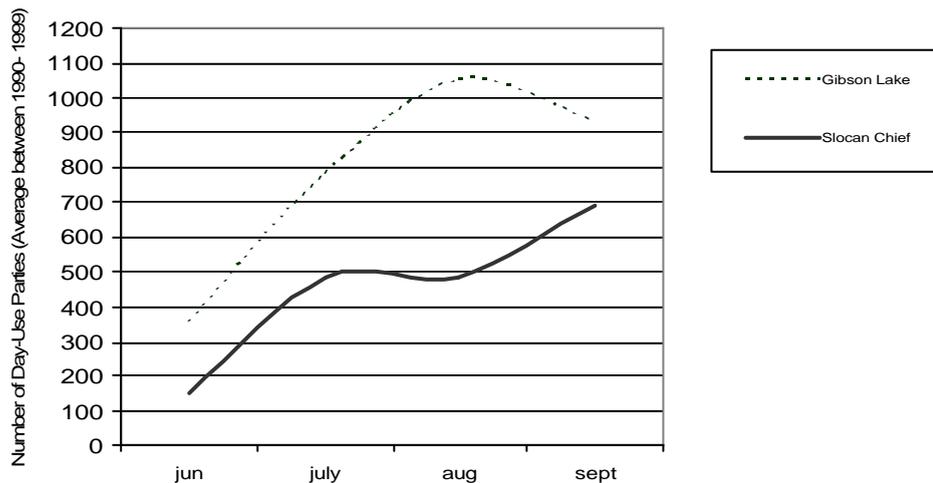
### Summer Months (June -September)

Primary visitor day-use activity areas at Kokanee Glacier Provincial Park are concentrated within the Kokanee Creek drainage up to Kaslo Lake and west to Helen Deane Lake, commonly referred to as the core area of the park (Map 5).

The Woodbury Creek drainage receives a constant number of park visitors in summer, but numbers are much less than in the core area of the park. Camping activity is predominant in both the Woodbury and Silver Spray areas, owing to the cabin facilities present at these locations. Slocan Chief, although once a popular overnight facility had suffered from structural deterioration over the past decade and has now become predominantly a hiking destination for day-use activity in the Kokanee Creek drainage. With the development of overnight accommodation at Kaslo Lake (Kokanee Glacier Cabin), the removal of one campsite (Kalmia Lake) in 2003 and the decommissioning of the accommodation services at Slocan Chief, visitor activity is predicted to shift substantially to the Kokanee Glacier Cabin.

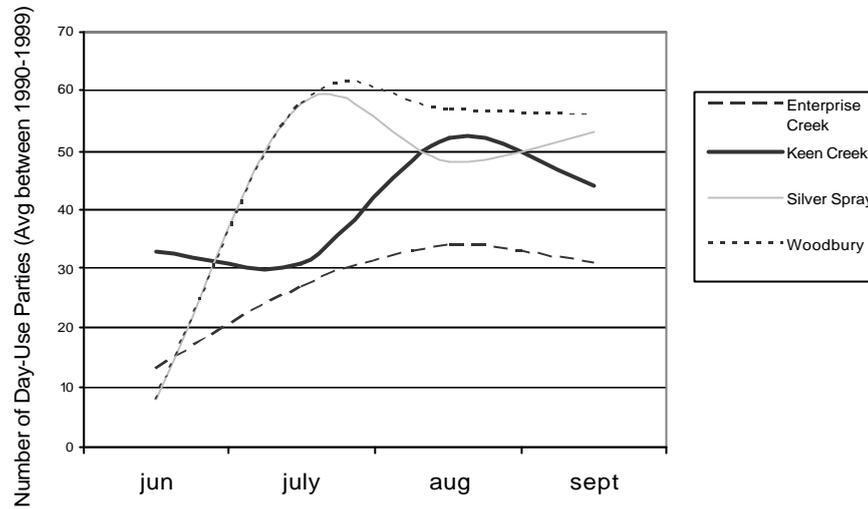
Visitor use data acquired over a decade (from 1990 to 1999) demonstrate visitor activity at two high activity day-use areas, four low-moderate activity day-use areas, and seven campground and cabin site within the park (Figures 1-3). Although the Slocan Chief Cabin no longer serves as an overnight facility, visitor use numbers from the past provide important baseline data. It is speculated that the newly constructed Kokanee Glacier Cabin will either meet or exceed the overnight usage once prevalent at the Slocan Chief Cabin.

Figure 1. Day-Use Visitor (High Activity Areas)

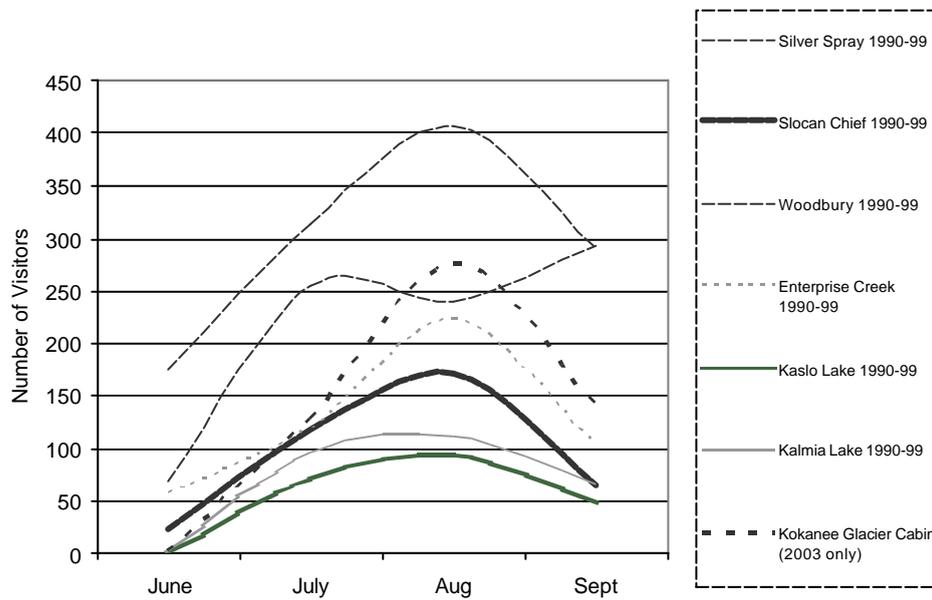


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**Figure 2. Day-Use Visitors (Low-Moderate) Activity Areas**



**Figure 3. Campground/Cabin- Visitor Activity Areas**



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### Winter Months (December to April)

Winter activity has traditionally been limited to the Slocan Chief area and more recently, the Kaslo Lake Area (Kokanee Glacier Cabin). Backcountry skiing in this area, assisted by a heli-taxi service (from outside the park boundary directly to Kaslo Lake), allows unguided parties to access terrain favoured by skiers. Activity in these areas is highly dependant on prevailing snow and avalanche conditions.

### Park Visitor Profiles

The predominant use of the park (via Kokanee Creek access) is by inexperienced hikers or groups with novice members. Other drainages that lead into the core of the park attract a higher proportion of self sufficient, knowledgeable backcountry users.

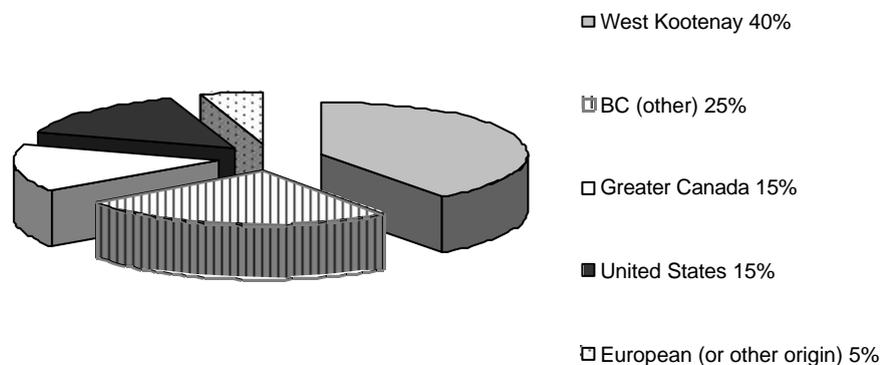
Hiking is the preferred activity, followed by fishing, glacier travel (mountaineering), photography, and wildlife/nature study, all of which occur in summer months.

Winter activities focus more on seasoned backcountry skiers that are equipped for travel in variable snow conditions on untracked trails or on terrain that is susceptible to natural snow releases. Most winter visitors travel in groups and have basic, if not advanced, avalanche training.

The West Kootenay area is the source for a large number of park visitors. Other than local residents, park visitors come from other parts of British Columbia or Canada (Figure 4). . With the advent of guided summer hiking, a large contingent of American or European visitors access the park via guide services from local companies.

It is expected that the amenities and spaciousness of the Kokanee Glacier Cabin will appeal to a different clientele, those seeking more up to date and less rudimentary facilities that were once offered at the Slocan Chief Cabin.

**Figure 4. Park Visitor Origins**



### Visitor Use Trends: Past, Present; Future

Park use has increased steadily over the last 25 years. Statistics taken in 1976, stated 875 parties visited the park. Within 10 years, the number rose to 3,342 parties and in 2000, statistics indicate 6,309 parties visited the park. In summer, day use is prevalent in the park with the remainder of use shared between overnight backpacking and cabin accommodation. In winter, a trace amount of day use occurs because of difficult access. The heli-taxi and cabin services offered in the winter are reservation only (lottery system). This evenly distributes cabin capacity between peak skiing months of December to April, with an average of 124 parties a month (Figure 5 and Figure 6).

Figure 5. Proportion of Day/Overnight Use (Average between 1983-2001)

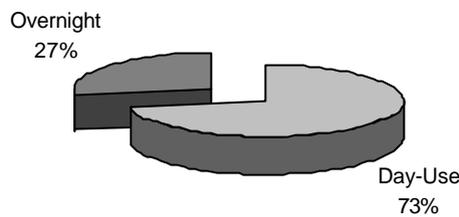
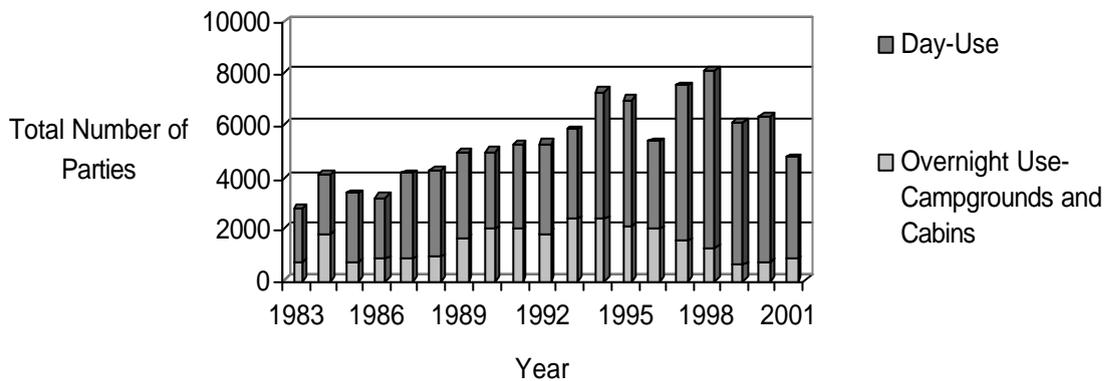


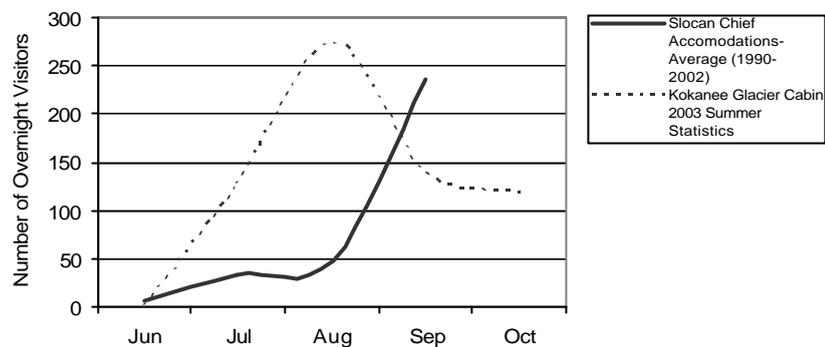
Figure 6. Park Visitor Use Comparison (1983-2001)



## DRAFT ONLY-UNDER REVIEW

With the opening of the Kokanee Glacier Cabin in 2003, and the decommissioning of the overnight facilities at both Kalmia Campground and the Slocan Chief Cabin, it is expected the new facility will become a desirable destination for both day-use and overnight visitors. Statistics from the summer of 2003 already reflect the popularity of the new cabin. Totals for visitor use in the peak summer months of 2003 for the new cabin indicated 662 visitor nights, compared with 326 average visitor nights at the Slocan Chief Cabin for the years between 1990 to 2002. Figure 7 outlines the extreme popularity of the new facility, particularly in August<sup>27</sup>, when compared to the Slocan Chief Cabin.

**Figure 7. Comparison of Kokanee Glacier Cabin and Slocan Chief Cabin Accommodations**



Increased visitor days in the park by the public and commercial guiding interests will likely add stress on existing facilities and services. Carrying capacity targets (specifically in winter) must be re-assessed in order to meet current recreation pressures. For example, winter use of the Kokanee Glacier Cabin is limited to twelve persons per night. Although the facility can accept more overnight visitors (i.e., twenty persons in summer) current accommodation is set to limits established when the Slocan Chief Cabin was in operation. Currently, demand in winter for available cabin space exceeds supply by a factor of 5 to 1.

In summer months, day-use is forecasted to increase because the total number of campsites within the park has been reduced (Kalmia campground closed in 2003) and a greater number of users will travel into the park to view the Kokanee Glacier Cabin and the historical features at the Slocan Chief Cabin site. However, some of the visitor day use may be off-set by an increase in overnight use at the Kokanee Glacier Cabin. It is expected that summer accommodation at the cabin will increase to a point that it will equal, or possibly exceed, overnight use in winter.

A pivotal shift in visitor day-use emanating from the cabin is already apparent. Alpine Club of Canada custodians, resident from June to October, have stated that overnight visitors are increasingly using the new facility to explore day-hiking opportunities within

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<sup>27</sup> Visitor use of the entire parks system in the Kootenays was dramatically reduced because of extensive wildfires in 2003. The figures from Kokanee Glacier Cabin would have in fact been much higher if not for closures of specific areas of the park.

## DRAFT ONLY-UNDER REVIEW

the park (i.e., Sapphire Lakes, Tanal Lakes, Slocan Chief Cabin site, Helen Deane Lake, Joker Lakes etc.).

### Economic Indicators

Kokanee Glacier Provincial Park offers people an alpine environment that is more accessible and more easily enjoyed than most of the other large provincial parks in the southern interior of the province. In the immediate vicinity, both Valhalla Provincial Park and the Purcell Wilderness Conservancy offer perhaps more striking mountain scenery, but in both cases, more limited road access and greater internal ruggedness attract a different clientele than Kokanee Glacier Provincial Park. Kokanee Glacier Provincial Park is expected to continue to be a destination park, particularly for the regional population. In addition, with the construction of the Kokanee Glacier Cabin it is anticipated that a steady increase in demand and use levels will ensue, drawing even more local and non-local visitors.

#### **Kokanee Glacier Cabin-Economic Viability**

In winter, the park offers excellent backcountry skiing opportunities. Although competing with other downhill, heli-skiing, and cat-skiing opportunities in the region, it has no nearby rival in terms of providing first rate accommodation (i.e., Kokanee Glacier Cabin) in a wilderness setting and reputable powder skiing, all at a comparable cost (Table 3).

**Table 3. Fees Charged (1 week) at the Kokanee Glacier Cabin in Winter**

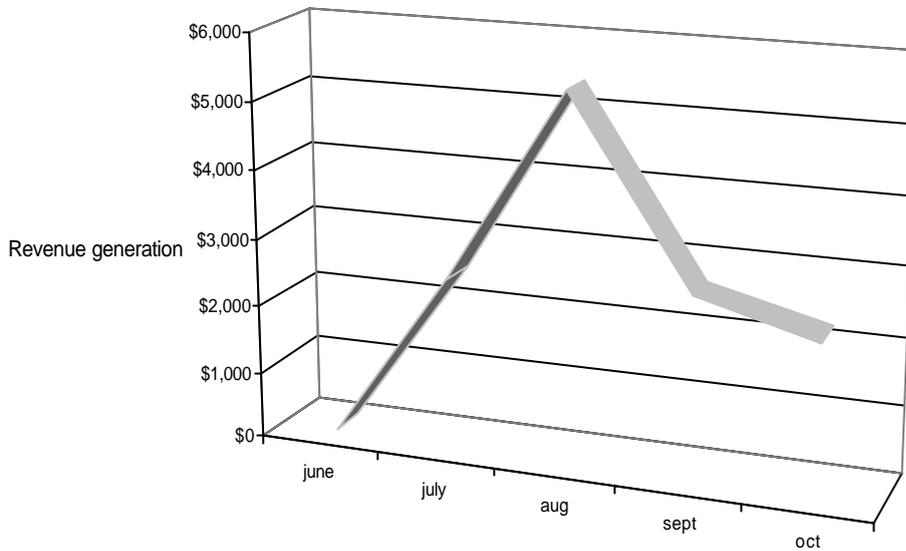
<i>Kokanee Glacier Cabin Booking Costs Winter 2003/2004</i>		
<i>Time of Year</i>	<i>ACC Members</i>	<i>Non-Members</i>
High Season	\$665	\$715
Low Season	\$595	\$645

Currently, fees charged to the general public for use of the Kokanee Glacier Cabin are set to reflect operational costs (maintenance, staffing, etc.) of the facility. The cost of booking (per person) at the Kokanee Glacier Cabin in winter includes helicopter taxi service and accommodation. Summer rates are currently set at \$19.50 (per person) for ACC members and \$21.00 for non-members.

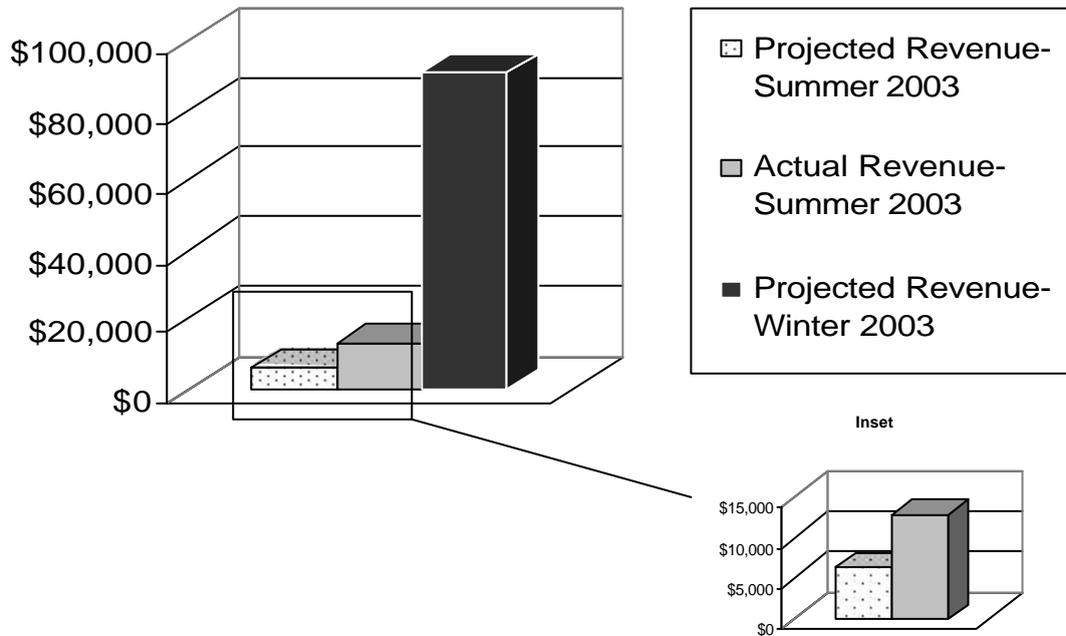
Prior to both summer and winter seasons, the ACC, establishes a projection of visitor use and potential revenue generation of the facility. The summer of 2003 witnessed the first full season of the facility and actual revenue generation for the months of June to October far exceeded projections. However, the majority of revenue for the facility is created in winter months (Figures 8 and 9) and the to date the summer season operates at a deficiency (e.g., total summer expenditures are projected to be approximately \$52,000 and actual revenue of \$12,839).

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**Figure 8. Revenue Generation at the Kokanee Glacier Cabin (June to October -2003)**



**Figure 9. Comparison of Winter/Summer Revenue-2003 at Kokanee Glacier Cabin**



## DRAFT ONLY-UNDER REVIEW

In 2003, it is projected that the total annual operating expenses of the Kokanee Glacier Cabin will be \$98,405. When compared to projected total revenues for the year (\$98,550) this creates almost an equal amount of expenditures (cash-out) and revenue (cash-in).

### **Kokanee Glacier Cabin: Financial Return to the ACC and Parks and Protected Areas**

The Province budgets an annual expenditure (currently \$10,000) on facility upgrades and major maintenance. Parks and Protected Areas (PPA) has the final say on how this money is spent. If the allocated funds are not fully consumed in a particular financial year, then they are carried over and retained by the ACC in a special ACC-Kokanee Glacier Park Facility and Environment Fund<sup>28</sup>. If facility upgrades and/or major maintenance costs exceed the allocated amount then PPA is responsible for the excess costs.

There is an additional operating budget (currently \$14,000). These overhead costs include the ACC reservation system, website, ACC management and operations staff costs, office administration, and financial tracking/marketing rental costs. Any operating costs exceeding the allocated amount is the responsibility of the ACC. Any surplus of the operating budget is split between the ACC and PPA. PPA's share of surplus is held by the ACC in the ACC Kokanee Glacier Park Facility and Environment Fund.

### **Commercial Interests**

The Alpine Club of Canada ([www.alpineclubofcanada.ca](http://www.alpineclubofcanada.ca)) is a not-for-profit organization. It uses the revenue generated from Kokanee Glacier Cabin to increase its membership and continue its role as a leader in education, preservation and public appreciation of Canada's mountain heritage.

The ACC subcontracts its winter field operation/maintenance of the Kokanee Glacier Cabin to a local company, Kokanee Glacier Mountaineering Inc ([www.kokanee-glacier.com](http://www.kokanee-glacier.com)), for an annual amount of \$40,000. From 1989 to 2002, KGMI was in the forefront of winter field operations at the Slokan Chief Cabin.

Tour operators offer various private guiding services within the park in summer months. For example, in 2003, Mountain Trek Fitness Retreat and Health Spa Ltd. ([www.mountaintrek.com](http://www.mountaintrek.com)) toured the park twice per week starting in the last week of June and ending in the first week of October. The costs for eight day tours that incorporate either an overnight or day hikes (normally limited to two clients and one guide) to Kokanee Glacier Provincial Park, is \$3,495.

Discovery Canada Outdoor Adventure ([www.discoverycanada.ca](http://www.discoverycanada.ca)) offers the "Silver Spray Traverse" (five days of cabin to cabin hiking within Kokanee Glacier Provincial Park) for \$1325 or the "Kootenay High Camp" (three days of alpine hiking) for \$525. Day hikes to Kaslo Lake or Woodbury Hut cost \$75. The estimated number of client

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<sup>28</sup> A special fund retained by the ACC.

## DRAFT ONLY-UNDER REVIEW

days within the park is thirty (an average of five clients on each trip), with over half of clients originating from the United States. Currently, this operator spends up to 30% of its total client days within provincial parks (70% in Kokanee Glacier and 30% in the Purcell Wilderness Conservancy).

The North West Academy of Sandpoint Idaho offers outdoor education experiences for youth between the ages of 12 to 17 years of age<sup>29</sup>. Average group size is six, with up to three staff (instructors) present. In 2002, the North West Academy visited the park on four separate occasions for 9 day intervals between early October and mid November. Tuition for their programs range from \$4,800 to \$5,700 US.

Explore Holidays conducts guided tours strictly for day use outings as part of a fully guided tour of the West Kootenay. Average group size is seven. Costs per tour range from X dollars to X dollars.

Helicopter scenic tours are becoming more popular in the park. Currently, two operators (High Terrain Helicopters- [www.highterrainhelitours.com](http://www.highterrainhelitours.com) and Kootenay Helicopters- [kokaneehelicopters.nelson@telus.net](mailto:kokaneehelicopters.nelson@telus.net)) offer trips focused on aerial viewing of Kokanee Glacier and the new Kokanee Glacier Cabin. Prices start at \$139 per person or \$600 per group (dependant on size of group/helicopter). Fly-in access to Crazy Jane Lake is also offered, but to date has not been a preferred destination by tourists.

Currently, there are no applications for further commercial backcountry operations within the park. However, two of the aforementioned businesses, Mountain Trek Fitness Retreat and Health Spa Ltd. and Discovery Canada have applied for recreation permits on Crown Forest recreation trails just outside of the park<sup>30</sup>.

## Land Tenures, Occupancy Rights and Resource Uses

### Tenures, Rights and Resource Uses in the Protected Area

#### Mineral Tenure

In 1988, within the former park boundaries, there were 58 mineral claims involving 15 independent owners. To date, there are no longer any active mineral claims/tenures within the park.

#### Water Rights

Conditional water licences are held by the Ministry of Water, Land and Air Protection (WLAP) for the diversion and use of water (0.9 ft<sup>3</sup>/sec) for power generation (commercial) from Keen Creek and for the detention/regulation of Gibson Lake to enhance recreational values. Another five water licences are held within the park and described in Appendix 3.

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<sup>29</sup> Adolescents in the ASCENT therapeutic adventure program are 13 to 17 years old, typically engaged in defiant behavior or "out of control" due to emotional, learning, and/or behavioral issues.

<sup>30</sup> Land and Water BC pers. comm. (2004)

## DRAFT ONLY-UNDER REVIEW

### Park Use Permits

There are currently seven park use permits issued for the park (Table 4).

**Table 4. Active Park Use Permits**

Permittee	Permit Number	Purpose	Expiry Date
Alpine Club of Canada	KO0310242	Cabin Accommodation	05/05/31
High Terrain Helicopters	KO9710095	Helicopter Use	07/08/31
Mountain Trek Fitness Retreat and Health Spa Ltd.	KO9710100	Recreational Guiding	04/03/31
Discovery Canada Outdoor Adventure	KO9710105	Recreational Guiding	04/05/31
Kokanee Helicopters Inc.	KO9710111	Helicopter Use	04/11/30
Explore Holidays Inc.	KO9810142	Recreational Guiding	04/03/31
Northwest Academy	KO9810156	Recreational Guiding	03/12/31

### Hunting/Trapping/Fishing

Hunting is allowed only during the lawful game season (November 1<sup>st</sup> to 30<sup>th</sup>)<sup>31</sup>. Limited Entry Hunting (LEH) for mountain goats also occurs within the park<sup>32</sup>. LEH for spring grizzly bear hunting does not coincide with the period of open hunting in the park. However, grizzly bear hunting can occur immediately outside of the park in MU 4-17 between April 1<sup>st</sup> and June 5<sup>th</sup>.

There is no trapping permitted in the park or guide outfitters (or territory) within the park.

Fishing within the park falls under the jurisdiction of the Provincial Fisheries Regulations. Angling efforts are concentrated primarily in the larger more accessible lakes in the park, such as Kaslo, Sunset, Gibson, Joker (Upper and Lower), Crazy Jane. Streams along the periphery of the park, particularly Keen Creek are most favored by recreational fishers. There is no fishing permitted in Lemon Creek and Silverton Creek (MU 4-17). To date, there are no commercially guided fishing permits issued in the park. Angler's primarily land westslope cutthroat trout measuring no more than 30 cm in length. Bull trout is caught occasionally in Keen Creek.

### First Nations Interests

Two First Nations tribal councils (Ktunaxa/Kinbasket and Shuswap) have included Kokanee Glacier Provincial Park within their asserted traditional territory<sup>33</sup>. Comment

<sup>31</sup> See Appendix K for a complete list of wildlife species that can be hunted within the park.

<sup>32</sup> As indicated in LEH 2003/04 synopsis 4-17 (Zone B).

<sup>33</sup> Another group known as the Sinixt Nation has also asserted that the park is in their traditional territory, but the governments of Canada and British Columbia have not recognized their claim.

## DRAFT ONLY-UNDER REVIEW

and suggestions with respect to key management themes and issues have provided both agencies insight to future management goals for the protected area.

### Patterns of Land Use Next to the Protected Area

#### **Guidance from Land Use Plans**

The land base outside Kokanee Glacier Provincial Park is within the jurisdiction and governing principles of the West Kootenay/Boundary Land Use Plan, the Kootenay/Boundary Land Use Plan Implementation Strategy and the Kootenay/Boundary Higher Level Plan Order, which identifies legal objectives for forestry operations. Within the context of this land use framework, there are specific guidelines as to what resource activity, recreational opportunities, and other development may exist.

These plans set primary objectives for future land use which include the maintenance of both connectivity corridors (for seasonal migration of ungulates and grizzly bears) and the integrity of alpine environments that are present in Kokanee Glacier Provincial Park and the surrounding region.

#### **Mining Activity**

Mining activity (mineral claims, crown grants, mining leases) are prevalent along the park boundary in both Crusader Creek and Keen Creek drainages. Mineral tenure is also concentrated in the Lendrum Creek and Enterprise Creek drainage, but in these areas immediate adjacency to the park is not as pronounced (Figure 10).

#### **Logging Activity**

Three sides of the park lie within the Kootenay Lake Forest District (KLFD), with the western boundary of the park residing in the Arrow Lake Forest District (ALFD). There are three principle forest licencees operating along the park perimeter; Meadow Creek Cedar (eastern boundary), Slocan Forest Products (northern and western boundary), and the Small Business Enterprise Program (southern boundary).

Within the last 50 years, extensive areas outside of the park (and select areas of the former Kokanee Glacier Recreation Area) have been logged. Future logging appears to be concentrated further from park boundaries (Figure 11). The Woodbury fire of 2003 created an opportunity for the licencee (Meadow Creek Cedar) to salvage fire affected stands immediate outside the park<sup>34</sup>.

To date, in the ALFD there are two cutblocks approved that are on the western boundary of the park. In Enterprise Creek (515-004) and in Lemon Creek (403-6). The tenure holder is Slocan Forests Products.

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<sup>34</sup> Wildfire logging of Woodbury drainage adjacent to the park is not reflected in Figure 11.

## Commercial Activity

### *Backcountry Skiing*

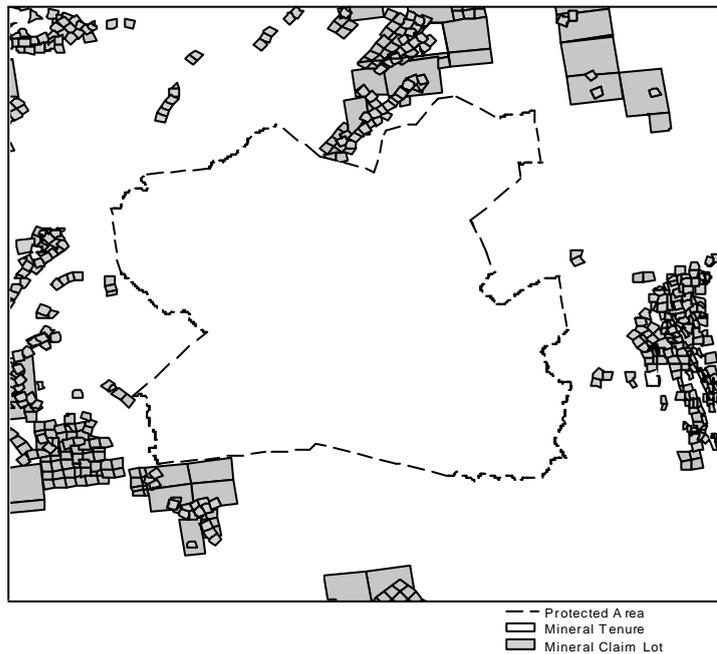
Currently, there are 2 commercial businesses offering winter related activities within several kilometres of the park boundary. Baldface Lodge carries out snowcat skiing at the headwaters of Baldface Creek (approximately 9 km southwest of the Lemon Creek trailhead). Kootenay Mountain Huts operates a helicopter access/ski touring destination cabin on Mt. Carlyle (approximately 5 km from the northern boundary of the park). Land and Water British Columbia Inc. is the governing agency with respect to future commercial proposals outside Kokanee Glacier Provincial Park. All referrals for such commercial activities must be announced publicly and then undergo a review process.

### *Trapping*

The following are trapping territories that border the park (but not contained within): TR0417T004, TR0418T005, TR0418T006, TR0418T004, TR0418T003, TR417T002.

There are 6 active trap line cabins within a 7 km radius of the park (the closest is 0.5 km from the park boundary).

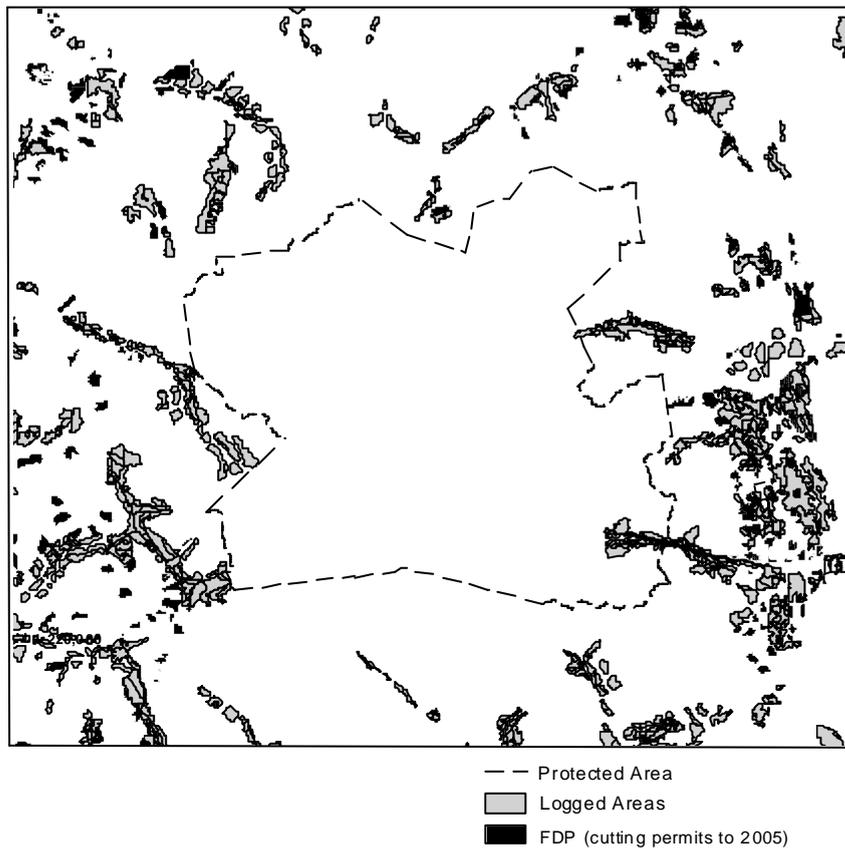
**Figure 10. Adjacent Mining Tenure/Claims**



### Recreational Activity

A network of logging and mining roads have created access points along (and at times penetrating) the park boundary. The highest concentration of roads are in the Enterprise/Lemon/Keen Creek areas. The majority of these roads have been decommissioned after logging/mining activities or succumbed to washouts and disrepair. However, all wheel drive trucks, all-terrain vehicles, snowmobiles, and mountain bike access occurs in many of these areas. The Keen Creek drainage has become a favoured destination by residents of the Kaslo area. A consultant report<sup>35</sup> outlined resident's desire to expand recreational opportunities in the Keen Creek and Joker Lakes area, focusing primarily on allowing vehicle access. Currently, park regulations prohibit mechanized travel within the park.

Figure 11. Adjacent Logging (Past and Present)



<sup>35</sup> Appropriate Forest Services. Keen Creek Road and Trail Assessment and Evaluation (2002).

## Parks and Protected Areas Operations

### Operation Infrastructure and Facilities

#### **Kokanee Glacier Cabin**

The Kokanee Glacier Cabin has several out-buildings that are essential to its effective operation. A powerhouse station is located on Keen Creek, approximately 2 km from the cabin. The structure contains a hydro-electric turbine that generates power for the cabin facility. The turbine is fed by two 36-centimetre penstocks. The penstocks are 366 metres in length and drop 73 vertical metres from Kaslo Lake. The turbine operates an electric motor, which in turn generates 12 Kilowatts of power. The power line travels back up to the cabin and is regulated by a priority load system.

A 6500-Watt backup generator is located in a out-building immediately adjacent to the main entrance to the cabin. Should the electric-turbine system fail, the generator will provide enough power to run the sewage treatment facility, water filtration system, and the electrical lighting for the cabin. A back-up propane storage provides heat in the event of electric-turbine failure. The out-building containing the back-up generator also serves as a barrel toilet outhouse (in the event that the sewer treatment capacity of the cabin malfunctions or is overloaded)..

#### **Other Park Facilities**

A private contractor (ACC) maintains the day-use facilities (garbage collection, pit-toilet etc.) at Gibson Lake.

There are three designated helicopter landing pads in the park located at; Kokanee Glacier Cabin (used also in winter by the ACC to facilitate heli-taxi service), Woodbury Cabin and Silver Spray Cabin.

#### **Staffing**

Kokanee Glacier Provincial Park is patrolled by BC Park rangers in summer months, but no BC Parks staff is permanently stationed in the park. Ranger patrols and operations are normally between mid June to the first week of September. Senior ranger staff assist existing backcountry rangers on a as-needed basis.

There are no backcountry rangers present within the park in winter months (November to April). The winter operations of the Kokanee Glacier Cabin are under contract to the Alpine Club of Canada.

#### **Staff Quarters**

Ranger staff in summer are housed within the Kokanee Glacier Cabin. The cabin has a private bedroom which sleeps 3, office space and kitchen facilities<sup>36</sup> The former Kalmia Lake Ranger Station (A-frame) is no longer in service.

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<sup>36</sup> Kitchen and office space is jointly shared with ACC custodians.

**DRAFT ONLY-UNDER REVIEW**

## Key Management Issues

Theme	Issue
Recreational Use	<ul style="list-style-type: none"> <li>• High visitor use concentrated in a few areas.</li> <li>• High potential for expanding commercial recreation.</li> <li>• New accommodation facility will affect recreational use patterns.</li> <li>• Recreational and environmental capacity needs consideration.</li> <li>• Risk assessment with regards to avalanche dangers (anticipated increased visitor use in winter).</li> <li>• Woodbury Fire of 2003 created unsafe conditions along entire length of the Woodbury Trail and sections of the Silver Spray Trail.</li> </ul>
Vehicle and Air Access	<ul style="list-style-type: none"> <li>• Slide on Keen Creek road has cut-off access.</li> <li>• Forest Service Roads no longer providing same level of access.</li> <li>• Pressure to allow mechanized access and increase air access.</li> </ul>
Commercial Recreation	<ul style="list-style-type: none"> <li>• Growing interest in expanding commercial recreation opportunities to support local community tourism.</li> </ul>
Biodiversity Protection	<ul style="list-style-type: none"> <li>• Adjacent resource extraction and other disturbances (mining, logging, wildfire) may be affecting wildlife migration and viability.</li> <li>• Lack of baseline knowledge and inventory</li> <li>• Rare and endangered species (known and suspected) are found within the park boundaries and require a long-term management strategy.</li> <li>• Human conflict with grizzly bears.</li> <li>• Conservation role within the CCM Ecosection.</li> <li>• Limited interpretation and education as visitor use increases</li> </ul>

**DRAFT ONLY-UNDER REVIEW**

Theme	Issue
Cultural Heritage Values	<ul style="list-style-type: none"><li>• Old mine sites and artifacts provide historic interest, but present public safety concerns and conservation concerns.</li></ul>
First Nations Traditional Uses and Values	<ul style="list-style-type: none"><li>• First Nations uses (i.e., ethno-botanical, hunting and fishing) are suspected but little is known.</li></ul>

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Eileen Pearkes- Author

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Nancy Hansen- Alpine Club of Canada

Leni Neumeier- Discovery Canada Outdoor Adventure

Randy Bouchard- Bouchard & Kennedy Research Consultants

Steve Bennel- High Terrain Helicopters

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## Appendix A. Water Quality Testing

Four Lakes within the park have been tested for water quality, reports are as follows:

<b>Gazetted Name</b>	<b>Survey Date</b>	<b>Agency Name</b>	<b>Source</b>	<b>pH</b>	<b>TDS</b>	<b>Hydrogen Sulfide</b>
KOKANEE LAKE	1974-08-02 00:00:00.0	Other	< LAKES BC>	6.7		NO COLOUR; 31.1 M.
KOKANEE LAKE	1982-01-01 00:00:00.0	MOE - Fisheries Inventory	< LAKES BC>			
KOKANEE LAKE	1982-08-20 00:00:00.0	Other	< LAKES BC>		14	

<b>Gazetted Name</b>	<b>Survey Date</b>	<b>Agency Name</b>	<b>pH</b>	<b>TDS</b>	<b>Hydrogen Sulfide</b>	<b>Secchi Depth (m)</b>
GIBSON LAKE	1974-08-26 00:00:00.0	Other	6.7		NO COLOUR	93
GIBSON LAKE	1982-01-01 00:00:00.0	Other				
GIBSON LAKE	1982-08-21 00:00:00.0	Other		20		

<b>Gazetted Name</b>	<b>Region</b>	<b>Survey Date</b>	<b>Agency Name</b>	<b>Source</b>	<b>pH</b>	<b>TDS</b>	<b>Secchi Depth (m)</b>
KASLO LAKE	4	1974-07-26 00:00:00.0	Other	< LAKES BC>	6.6		13.7
KASLO LAKE	4	1982-01-01 00:00:00.0	MOE - Fisheries Inventory	< LAKES BC>			
KASLO LAKE	4	1982-08-19 00:00:00.0	Other	< LAKES BC>		14	

**DRAFT ONLY-UNDER REVIEW**

<b>Name</b>	<b>Survey Date</b>	<b>Agency Name</b>	<b>pH</b>	<b>TDS</b>	<b>Hydrogen Sulfide</b>
SUNSET LAKE	1974-08-09 00:00:00.0	Other	6.8		NO COLOUR; 12.8 M.
SUNSET LAKE	1982-08-22 00:00:00.0	Other		19	
SUNSET LAKE	1989-01-01 00:00:00.0	MOE - Fisheries Inventory			

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**Appendix B: Fish Stocking History**

<b>Kaslo Lake Stocking Data</b>					
<i>Date Stocked</i>	<i>Species Stocked</i>	<i>Stock</i>	<i>Number Stocked</i>	<i>Average Size</i>	<i>Life Cycle Stage</i>
01/01/1974	Westslope (Yellowstone) Cutthroat Trout	CONNOR	5000	0.5	FRY
01/01/1971	Westslope (Yellowstone) Cutthroat Trout	CONNOR	5000	0.2	FRY
01/01/1968	Westslope (Yellowstone) Cutthroat Trout	KIAKHO	5000	0.2	FRY

<b>Kokanee Lake Stocking Data</b>					
<i>Date Stocked</i>	<i>Species Stocked</i>	<i>Stock</i>	<i>Number Stocked</i>	<i>Average Size</i>	<i>Life Cycle Stage</i>
01/01/1974	Westslope (Yellowstone) Cutthroat Trout	CONNOR	10000	0.5	FRY
01/01/1971	Westslope (Yellowstone) Cutthroat Trout	CONNOR	5000	0.2	FRY
01/01/1969	Westslope (Yellowstone) Cutthroat Trout	KIAKHO	5000	0.2	FRY
01/01/1968	Westslope (Yellowstone) Cutthroat Trout	KIAKHO	5000	0.2	FRY

<b>Sunset Lake Stocking Data</b>					
<i>Date Stocked</i>	<i>Species Stocked</i>	<i>Stock</i>	<i>Number Stocked</i>	<i>Average Size</i>	<i>Life Cycle Stage</i>
01/09/1986	Westslope (Yellowstone) Cutthroat Trout	CONNOR	2000	0.1	UNKNOWN
01/09/1983	Westslope (Yellowstone) Cutthroat Trout	CONNOR	2500	0.3	UNKNOWN

<b>Upper Joker Lakes Stocking Data</b>					
<i>Date Stocked</i>	<i>Species Stocked</i>	<i>Stock</i>	<i>Number Stocked</i>	<i>Average Size</i>	<i>Life Cycle Stage</i>
01/09/1983	Westslope (Yellowstone) Cutthroat Trout	CONNOR	7500	0.3	UNKNOWN
01/08/1981	Westslope (Yellowstone) Cutthroat Trout	CONNOR	7700	0.1	UNKNOWN
01/01/1978	Westslope (Yellowstone) Cutthroat Trout	CONNOR	5000	0.1	UNKNOWN

<b>Nalmet Lake Stocking Data</b>					
<i>Date Stocked</i>	<i>Species Stocked</i>	<i>Stock</i>	<i>Number Stocked</i>	<i>Average Size</i>	<i>Life Cycle Stage</i>
01/01/1970	Westslope (Yellowstone) Cutthroat Trout	KIAKHO	10000	0.2	FRY

<b>Gibson Lake</b>					
<i>Date Stocked</i>	<i>Species Stocked</i>	<i>Stock</i>	<i>Number Stocked</i>	<i>Average Size</i>	<i>Life Cycle Stage</i>
01/08/1981	Westslope (Yellowstone) Cutthroat Trout	CONNOR	7700	0.1	UNKNOWN
01/01/1978	Westslope (Yellowstone) Cutthroat Trout	CONNOR	5000	0.1	UNKNOWN
01/01/1976	Westslope (Yellowstone) Cutthroat Trout	CONNOR	5000	0.2	UNKNOWN
01/01/1974	Westslope (Yellowstone) Cutthroat Trout	CONNOR	5000	0.5	FRY

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Appendix C: Water Licences

Licence Number	Stream Name	Purpose	Quantity	Licencee	Water District and Precinct	Licence Status	Priority Date	Issue Date
C100412	Kokanee Creek	Conservation.- Construction	10 CS	FISHERIES BRANCH 401-333 VICTORIA ST NELSON BC V1L4K3	NEL - PROCTOR	Current	1985/04/10	1999/11/16
C102736	Kokanee Creek	Domestic	500 GD	JOSAY EUGENE RR 3 COMP 7 SITE 8 NELSON B C V1L5P6	NEL - PROCTOR	Current	1952/10/15	1991/12/18
C103730	Kokanee Creek	Domestic	500 GD	MOSER WARREN R & CHRISTINA M RR 3 COMP 36 SITE 7 NELSON BC V1L5P6	NEL - PROCTOR	Current	1967/10/23	1992/10/31
C103731	Kokanee Creek	Domestic	500 GD	HETHERINGT ON THOMAS & MARY  4695 HWY 3A NELSON BC V1L6N3	NEL - PROCTOR	Current	1967/10/23	1992/10/31
C106146	Kokanee Creek	Domestic	500 GD	RYLL BARBARA 4644 HIGHWAY 3A NELSON BC V1L6N3	NEL - PROCTOR	Current	1972/08/23	1994/07/25
C116069	Keen Creek	Power- Residential	.9 CS	PARKS BRANCH BOX 118 WASA BC V0B2K0	KAS - KASLO	Current	N/A	2001/03/12

GD= Gallons per day.  
CS = Cubic feet per second.

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## Appendix D: Rare Natural Plant Communities (KLFD/ABFD)

Shading indicates occurrence (not confirmed by site inventory) within Kokanee Glacier Provincial Park

English Name	Biogeoclimatic Site Unit(s)	Provincial List	Forest District
Subalpine fir / black huckleberry / bear-grass	ESSFwc1/00	Blue	KLFD
Douglas fir / tall Oregon-grape / parsley fern	ICHdw/02	Red	KLFD
Western redcedar/Douglas fir - mock-orange	ICHxw/01	Blue	KLFD
Subalpine fir / black huckleberry / bear-grass	ESSFwc1/00	Blue	ABFD
	ESSFwc4/00		
Douglas fir / tall Oregon-grape / parsley fern	ICHdw/02	Red	ABFD

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## Appendix E: Rare and Endangered Flora (KLFD)

Rare and endangered flora species within the Kootenay Lake Forest District: Shading indicates confirmation within Kokanee Glacier Provincial Park.

Scientific Name	English Name	G Rank	Provincial	COSEWIC	BC Status
<i>Acorus americanus</i>	American sweet-flag	G5	S2S3		BLUE
<i>Anemone canadensis</i>	Canada anemone	G5	S2S3		BLUE
<i>Anemone piperi</i>	Piper's anemone	G4	S1		RED
<i>Artemisia ludoviciana</i> var. <i>incompta</i>	western mugwort	G5TNR	S2S3		BLUE
<i>Bidens vulgata</i>	tall beggarticks	G5	S1		RED
<i>Calamagrostis montanensis</i>	plains reedgrass	G5	S2		RED
<i>Callitriche heterophylla</i> ssp. <i>heterophylla</i>	two-edged water-starwort	G5T5	S2S3		BLUE
<i>Carex adusta</i>	lesser brown sedge	G5	S1		RED
<i>Carex amplifolia</i>	bigleaf sedge	G4	S2S3		BLUE
<i>Carex comosa</i>	bearded sedge	G5	S2S3		BLUE
<i>Carex heleonastes</i>	Hudson Bay sedge	G4	S2S3		BLUE
<i>Carex lenticularis</i> var. <i>lenticularis</i>	lakeshore sedge	G5T5	S2		RED
<i>Carex scoparia</i>	pointed broom sedge	G5	S2S3		BLUE
<i>Carex scopulorum</i> var. <i>bracteosa</i>	Holm's Rocky Mountain sedge	G5TNR	S2S3		BLUE
<i>Carex tenera</i>	tender sedge	G5	S2S3		BLUE
<i>Carex vulpinoidea</i>	fox sedge	G5	S2S3		BLUE
<i>Cheilanthes gracillima</i>	lace fern	G4G5	S2S3		BLUE
<i>Clarkia pulchella</i>	pink fairies	G5?	S3		BLUE
<i>Crassula aquatica</i>	pigmyweed	G5	S3		BLUE
<i>Delphinium bicolor</i> ssp. <i>bicolor</i>	Montana larkspur	G4G5TNR	S2S3		BLUE
<i>Downingia elegans</i>	common downingia	G5	SX		RED
<i>Dryopteris cristata</i>	crested wood fern	G5	S2S3		BLUE
<i>Elodea nuttallii</i>	Nuttall's waterweed	G5	S2S3		BLUE
<i>Elymus virginicus</i> var. <i>submuticus</i>	beardless wildrye	G5T4T5	SH		RED
<i>Epilobium halleanum</i>	Hall's willowherb	G5	S2S3		BLUE
<i>Epipactis gigantea</i>	giant helleborine	G3	S2S3	SC (1998)	BLUE
<i>Glycyrrhiza lepidota</i>	wild licorice	G5	S2		RED
<i>Helenium autumnale</i> var. <i>grandiflorum</i>	mountain sneezeweed	G5TNR	S2S3		BLUE
<i>Heterocodon rariflorum</i>	heterocodon	G5	S3		BLUE
<i>Hypericum scouleri</i> ssp. <i>nortoniae</i>	western St. John's-wort	G5TNR	S2S3		BLUE
<i>Idahoia scapigera</i>	scalepod	G5	S2		RED
<i>Impatiens aurella</i>	orange touch-me-not	G4?	S2S3		BLUE
<i>Impatiens ecalcarata</i>	spurless touch-me-not	G3G4	S2S3		BLUE
<i>Juncus confusus</i>	Colorado rush	G5	S1		RED
<i>Juncus regelii</i>	Regel's rush	G4?	S3		BLUE
<i>Lewisia triphylla</i>	three-leaved lewisia	G4?	S2S3		BLUE
<i>Ligusticum verticillatum</i>	verticillate-umbel lovage	G4G5	S2S3		BLUE
<i>Linanthus septentrionalis</i>	northern linanthus	G5	S2S3		BLUE
<i>Lupinus arbustus</i> ssp. <i>pseudoparviflorus</i>	Montana lupine	G5TNR	S1		RED
<i>Megalodonta beckii</i> var. <i>beckii</i>	water marigold	G4G5T4	S3		BLUE
<i>Melica bulbosa</i> var. <i>bulbosa</i>	oniongrass	G5T5	S2		RED

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Scientific Name	English Name	G Rank	Provincial	COSEWIC	BC Status
<i>Melica smithii</i>	Smith's melic	G4	S2S3		BLUE
<i>Mertensia paniculata</i> var. <i>borealis</i>	tall bluebells	G5TNR	S2S3		BLUE
<i>Monardella odoratissima</i> ssp. <i>odoratissima</i>	monardella	G4G5TNR	S1		RED
<i>Muhlenbergia glomerata</i>	marsh muhly	G5	S3		BLUE
<i>Myriophyllum ussuriense</i>	Ussurian water -milfoil	G3	S3		BLUE
<i>Oxytropis campestris</i> var. <i>columbiana</i>	Columbia River locoweed	G5T3	S3		BLUE
<i>Platanthera dilatata</i> var. <i>albiflora</i>	fragrant white rein orchid	G5TNR	S2S3		BLUE
<i>Polygonum polygaloides</i> ssp. <i>kelloggii</i>	Kellogg's knotweed	G4G5T3T5	S2S3		BLUE
<i>Scrophularia lanceolata</i>	lance-leaved figwort	G5	S2S3		BLUE
<i>Senecio hydrophiloides</i>	sweet-marsh butterweed	G4G5	S1		RED
<i>Senecio hydrophilus</i>	alkali- marsh butterweed	G5	SH		RED
<i>Sphenopholis obtusata</i>	prairie wedgegrass	G5	S1		RED
<i>Stellaria obtusa</i>	blunt-sepaled starwort	G5	S2S3		BLUE
<i>Thalictrum dasycarpum</i>	purple meadowrue	G5	S2S3		BLUE
<i>Thermopsis rhombifolia</i>	prairie golden bean	G5	S1		RED
<i>Wolffia borealis</i>	northern water-meal	G5	S2		RED

**DRAFT ONLY-UNDER REVIEW**

## Appendix F: Rare and Endangered Flora (ABFD)

Rare and endangered flora species within the Arrow Boundary Forest District: Shading indicates confirmation within Kokanee Glacier Provincial Park.

Scientific Name	English Name	G Rank	Provincial	COSEWIC	BC Status
<i>Agastache urticifolia</i>	nettle-leaved giant-hyssop	G5	S3		BLUE
<i>Agoseris lackschewitzii</i>	pink agoseris	G4	S2S3		BLUE
<i>Arabis holboellii</i> var. <i>pinetorum</i>	Holboell's rockcress	G5T5?	S2S3		BLUE
<i>Arnica longifolia</i>	seep-spring arnica	G5	S2S3		BLUE
<i>Aster ascendens</i>	long-leaved aster	G5	S2S3		BLUE
<i>Astragalus microcystis</i>	least bladderly milk-vetch	G5	S1		RED
<i>Astragalus vexilliflexus</i> var. <i>vexilliflexus</i>	bent-flowered milk-vetch	G4TNR	S2S3		BLUE
<i>Botrychium simplex</i>	least moonwort	G5	S2S3		BLUE
<i>Carex amplifolia</i>	bigleaf sedge	G4	S2S3		BLUE
<i>Carex epapillosa</i>	blackened sedge	G5	S2S3		BLUE
<i>Carex lenticularis</i> var. <i>lenticularis</i>	lakeshore sedge	G5T5	S2		RED
<i>Carex scoparia</i>	pointed broom sedge	G5	S2S3		BLUE
<i>Castilleja tenuis</i>	hairy owlclover	G5	S1		RED
<i>Cheilanthes gracillima</i>	lace fern	G4G5	S2S3		BLUE
<i>Clarkia pulchella</i>	pink fairies	G5?	S3		BLUE
<i>Clarkia rhomboidea</i>	common clarkia	G5	S1		RED
<i>Coreopsis tinctoria</i> var. <i>atkinsoniana</i>	Atkinson's coreopsis	G5T5	S1		RED
<i>Crepis occidentalis</i> ssp. <i>pumila</i>	western hawkbeard	G5T5	S1		RED
<i>Delphinium sutherlandii</i>	Sutherland's larkspur	GNR	S2S3		BLUE
<i>Dicentra uniflora</i>	steer's head	G4?	S2S3		BLUE
<i>Dryopteris cristata</i>	crested wood fern	G5	S2S3		BLUE
<i>Epilobium glaberrimum</i> ssp. <i>fastigiatum</i>	smooth willowherb	G5TNR	S2S3		BLUE
<i>Epilobium leptocarpum</i>	small-fruited willowherb	G5	S2S3		BLUE
<i>Erysimum asperum</i>	prairie rocket	G5	S1		RED
<i>Floerkea proserpinacoides</i>	false-mermaid	G5	S2S3	NAR (1984)	BLUE
<i>Hesperochiron pumilus</i>	dwarf hesperochiron	G4	S1		RED
<i>Hesperostipa spartea</i>	porcupinegrass	G5	S2		RED
<i>Heterocodon rariflorum</i>	heterocodon	G5	S3		BLUE
<i>Hypericum scouleri</i> ssp. <i>nortoniae</i>	western St. John's-wort	G5TNR	S2S3		BLUE
<i>Impatiens ecalcarata</i>	spurless touch-me-not	G3G4	S2S3		BLUE
<i>Lewisia triphylla</i>	three-leaved lewisia	G4?	S2S3		BLUE
<i>Ligusticum verticillatum</i>	verticillate-umbel lovage	G4G5	S2S3		BLUE
<i>Linanthus harknessii</i>	Harkness' linanthus	G4?	S1		RED
<i>Linanthus septentrionalis</i>	northern linanthus	G5	S2S3		BLUE
<i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i>	Spanish-clover	G5T5	S2S3		BLUE
<i>Melica smithii</i>	Smith's melic	G4	S2S3		BLUE
<i>Melica spectabilis</i>	purple oniongrass	G5	S2S3		BLUE
<i>Mertensia paniculata</i> var. <i>borealis</i>	tall bluebells	G5TNR	S2S3		BLUE
<i>Mimulus breviflorus</i>	short-flowered monkey-flower	G4	S1		RED
<i>Mimulus breweri</i>	Brewer's monkey-flower	G5	S2S3		BLUE

**DRAFT ONLY-UNDER REVIEW**

Scientific Name	English Name	G Rank	Provincial	COSEWIC	BC Status
<i>Oxytropis campestris</i> var. <i>columbiana</i>	Columbia River locoweed	G5T3	S3		BLUE
<i>Polemonium occidentale</i> ssp. <i>occidentale</i>	western Jacob's -ladder	G5?T5?	S2S3		BLUE
<i>Polygonum polygaloides</i> ssp. <i>kelloggii</i>	Kellogg's knotweed	G4G5T3 T5	S2S3		BLUE
<i>Rubus nivalis</i>	snow bramble	G4?	S2		RED
<i>Salix boothii</i>	Booth's willow	G5	S2S3		BLUE
<i>Scirpus pallidus</i>	pale bulrush	G5	S1		RED
<i>Scutellaria angustifolia</i>	narrow-leaved skullcap	G5	S2S3		BLUE
<i>Senecio hydrophiloides</i>	sweet-marsh butterweed	G4G5	S1		RED
<i>Senecio hydrophilus</i>	alkali-marsh butterweed	G5	SH		RED
<i>Solidago gigantea</i> ssp. <i>serotina</i>	smooth goldenrod	G5TNR	S1		RED
<i>Stellaria obtusa</i>	blunt-sepaled starwort	G5	S2S3		BLUE
<i>Trichostema oblongum</i>	mountain blue-curls	G5	S1		RED
<i>Trifolium cyathiferum</i>	cup clover	G4	S1		RED
<i>Viola septentrionalis</i>	northern violet	G5	S2S3		BLUE

**DRAFT ONLY-UNDER REVIEW**

## Appendix G: Rare and Endangered Fauna (KLFD/ABFD)

Rare and endangered animal species within the Kootenay Lake and Arrow Boundary Forest Districts. Shading indicates confirmation within Kokanee Glacier Provincial Park.

Scientific Name	English Name	G Rank	Provincial	COSEWIC	BC Status
<i>Acipenser transmontanus</i> pop. 1	White Sturgeon (Kootenay River population)	G4T1Q	S1		RED
<i>Aeronautes saxatalis</i>	White-throated Swift	G5	S3S4B,SZN		BLUE
<i>Aechmophorus occidentalis</i>	Western Grebe	G5	S1B,S3N		RED
<i>Argia vivida</i>	Vivid Dancer	G5	S2		RED
<i>Ardea herodias herodias</i>	Great Blue heron, herodias subspecies	G5T5	S3B,S4N		BLUE
<i>Asio flammeus</i>	Short-eared Owl	G5	S3B,S2N	SC (1994)	BLUE
<i>Botaurus lentiginosus</i>	American Bittern	G4	S3B,SZN		BLUE
<i>Catherpes mexicanus</i>	Canyon Wren	G5	S3	NAR (1992)	BLUE
<i>Chrysemys picta</i>	Painted Turtle	G5	S3S4		BLUE
<i>Coluber constrictor</i>	Racer	G5	S3S4		BLUE
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	G4	S2S3		BLUE
<i>Cottus punctulatus</i>	Rocky Mountain Sculpin	G5TNR	S2S3		BLUE
<i>Cottus confusus</i>	Shorthead Sculpin	G5	S2S3	T (MAY 2001)	BLUE
<i>Dolichonyx oryzivorus</i>	Bobolink	G5	S3B,SZN		BLUE
<i>Euphydryas gillettii</i>	Gillette's Checkerspot	G2G3	S2S3		BLUE
<i>Everes comyntas</i>	Eastern Tailed Blue	G5	S3		BLUE
<i>Falco mexicanus</i>	Prairie Falcon	G5	S2B,SZN	NAR (1996)	RED
<i>Gulo gulo luscus</i>	Wolverine, luscus subspecies	G4T4	S3	SC (2003)	BLUE
<i>Martes pennanti</i>	Fisher	G5	S2		RED
<i>Melanerpes lewis</i>	Lewis's Woodpecker	G4	S3B,SZN	SC (NOV 2001)	BLUE
<i>Oncorhynchus clarki lewisi</i>	Cutthroat Trout, lewisi subspecies	G4T3	S3SE		BLUE
<i>Otus kennicottii macfarlanei</i>	Western Screech-Owl, macfarlanei subspecies	G5T4	S1	E (MAY 2002)	RED
<i>Ovis canadensis</i>	Bighorn Sheep	G4	S2S3		BLUE
<i>Parnassius clodius altaurus</i>	Clodius Appolo, altaurus subspecies	G5T3T4	S3S4		BLUE
<i>Plethodon idahoensis</i>	Coeur d'Alene Salamander	G3G4	S3	SC (NOV 2001)	BLUE
<i>Pyrgus communis</i>	Checkered Skipper	G5	S3		BLUE
<i>Rana pipiens</i>	Northern Leopard Frog	G5	S1	E (MAY 2000)	RED
<i>Rangifer tarandus</i> pop. 1	Caribou (southern population)	G5T2Q	S1	T (MAY 2000)	RED
<i>Recurvirostra americana</i>	American Avocet	G5	S2B,SZN		RED
<i>Rhinichthys umatilla</i>	Umatilla Dace	G4	S2	SC (1988)	RED
<i>Salvelinus confluentus</i>	Bull Trout	G3	S3		BLUE
<i>Sphyrapicus thyr oideus thyroideus</i>	Williamson's Sapsucker, thyroideus subspecies	G5TU	S3B,SZN		BLUE
<i>Sterna forsteri</i>	Forster's Tern	G5	S1B,SZN	DD (1996)	RED
<i>Tamias ruficaudus simulans</i>	Red-tailed Chipmunk, simulans subspecies	G5T4T5	S3S4		BLUE
<i>Taxidea taxus</i>	Badger	G5	S1	E (MAY 2000)	RED
<i>Thomomys talpoides segregatus</i>	Northern Pocket Gopher, segregatus subspecies	G5T2Q	S2		RED
<i>Ursus arctos</i>	Grizzly Bear	G4	S3	SC (MAY 2002)	BLUE

**DRAFT ONLY-UNDER REVIEW**

## Appendix H: Seasonal Abundance of Birds in BEC zones.

Seasonal abundance: Lower case = uncommon, scarce, or rare; Upper case = common or abundant.

- P = spring (March-May)
- S = summer (June-August)
- A = autumn (September – November)
- W = winter (December – February)
- M = migratory (spring and autumn)
- Y = yearlong

Common Name	ICHmw	ICHwk	Common Name	ESSFw	ESSFwp	Common Name
Pacific loon	swm	sm	Pacific loon	sm	sm	Pacific loon
Common loon	Y	Sw M	Common loon	sm	sm	Common loon
Yellow-billed loon	y	sm	Red-necked grebe	sm		Canada goose
Pied-billed grebe	Sw M	sm	Canada goose	s	s	Blue-winged teal
Horned grebe	Sw M	sM	Mallard	ps	ps	Ring-necked duck
Red-necked grebe	Sw M	SM	Blue-winged teal	ps	ps	Lesser scaup
Eared grebe	y		Cinnamon teal	s	s	Harlequin duck
Western grebe	sm	sm	American wigeon	p	p	Oldsquaw
American white pelican	sm		Ring-necked duck	s	s	Surf scoter
Double-crested cormorant	s	a	Lesser scaup	sm	sm	White-winged scoter
American bittern	sm	sa	Harlequin duck	ps	ps	Common goldeneye
Great blue heron	Sw M	sa	Oldsquaw	m	m	Barrow's goldeneye
Cattle egret	a		Surf scoter	m	m	Bufflehead
Black-crowned night-heron	ps		White-winged scoter	m	m	Hooded merganser
Tundra swan	y	m	Common goldeneye	ps	ps	Common merganser
Trumpeter swan	wm		Barrow's goldeneye	sm	sm	Sharp-shinned hawk
Snow goose	wm	wm	Bufflehead	ps	ps	Cooper's hawk
Ross' goose	w		Hooded merganser	ps	ps	Northern goshawk subspp.
Canada goose	Sw M	sM	Common merganser	ps	ps	Red-tailed hawk
Wood duck	ps		Bald eagle	ps	ps	Rough-legged hawk
Green-winged teal	sM	sm	Northern harrier	m	m	Golden eagle
Mallard	Sw M	Sm	Sharp-shinned hawk	sM	sM	American kestrel
Northern pintail	sm	m	Cooper's hawk	sm	sm	Merlin
Blue-winged teal	ms	s	Northern goshawk subspp.	y	y	Blue grouse
Cinnamon teal	ps	p	Swainson's hawk	ps	ps	Willow ptarmigan
Northern shoveler	ps	ps	Red-tailed hawk	sm	sm	Rock ptarmigan White-tailed ptarmigan subspp.
Gadwall	ps		Rough-legged hawk	m	m	
Eurasian wigeon	m	a	Golden eagle	sm	sm	Greater yellowlegs
American wigeon	sM	sm	American kestrel	sm	sm	Lesser yellowlegs
Canvasback	sm	m	Merlin	sm	sm	Solitary sandpiper
Redhead	y	ps	Peregrine Falcon subsp. anatum	ps		Spotted sandpiper
Ring-necked duck	sm	ps	Spruce grouse	y		Least sandpiper
Greater scaup	m		Blue grouse	y	y	Baird's sandpiper
Lesser scaup	sm	m	White-tailed ptarmigan subspp.		y	Pectoral sandpiper
Harlequin duck	ps	ps	Semipalmated plover	ps	ps	Common snipe
Oldsquaw	m	m	Greater yellowlegs	m	m	Red-necked phalarope
Surf scoter	m	m	Lesser yellowlegs	m	m	Bonaparte's gull

**DRAFT ONLY-UNDER REVIEW**

Common Name	ICHmw	ICHwk	Common Name	ESSFw	ESSFwp	Common Name
White-winged scoter	sm	sm	Spotted sandpiper	ps	ps	Mew gull
Common goldeneye	y	ps	Least sandpiper	a	a	Herring gull
Barrow's goldeneye	y	y	Baird's sandpiper	s	s	Rufous hummingbird
Bufflehead	Sw M	ps	Pectoral sandpiper	s	s	Say's phoebe
Hooded merganser	y	ps	Common snipe	s	s	Horned lark
Common merganser	Sw M	sm	Red-necked phalarope	s	s	Tree swallow
Red-breasted merganser	y	a	Bonaparte's gull	ps	ps	Violet-green swallow
Ruddy duck	sm	sa	Mew gull	s	s	Cliff swallow
Turkey vulture	ps	s	Herring gull	m	m	Barn swallow
Osprey	PSaw	sm	Great horned owl	y		Mountain bluebird
Bald eagle	swM	Psa	Boreal owl	y	y	Townsend's solitaire
Northern harrier	swM	m	Rufous hummingbird	PS	PS	American robin
Sharp-shinned hawk	swM	sM	Belted kingfisher	s	s	American pipit
Cooper's hawk	sm	sm	Downy woodpecker	y		Savannah sparrow
Northern goshawk subsp.	y	y	Hairy woodpecker subsp.	ps		Golden-crowned sparrow
Swainson's hawk	m		Three-toed woodpecker	y	y	White-crowned sparrow
Red-tailed hawk	Sw M	sm	Black-backed woodpecker	y	y	Snow bunting
Rough-legged hawk	wm	m	Pileated woodpecker	ps		Rosy finch
Golden eagle	y	y	Olive-sided flycatcher	s		
American kestrel	Sw M	sM	Hammond's flycatcher	ps		
Merlin	y	sm	Horned lark	sa	sa	
Peregrine Falcon subsp. anatum	sm	ps	Tree swallow	ps	ps	
Prairie falcon	s		Violet-green swallow	s	s	
Spruce grouse	y	y	Northern rough-winged swallow	s		
Blue grouse	y	y	Cliff swallow	s	s	
Ruffed grouse	Y	y	Barn swallow	s	s	
Wild turkey	y		Gray jay	y		
Virginia rail	sm		Steller's jay subsp.	y		
Sora	ps		Clark's nutcracker	y	y	
American coot	Sw M	sa	American crow	sm	sm	
Sandhill crane	m		Common raven	y	y	
Black-bellied plover	a	a	Mountain chickadee	y	y	
Lesser golden-plover	a		Boreal chickadee	y	y	
Semipalmated plover	sm	s	Red-breasted nuthatch	y	sa	
Killdeer	swM	ps	Brown creeper	y		
Greater yellowlegs	sM	s	Winter wren	y		
Lesser yellowlegs	m	s	American dipper	mw	m	
Solitary sandpiper	sm	ps	Golden-crowned kinglet	y	y	
Spotted sandpiper	PSa	ps	Ruby-crowned kinglet	y	sa	
Upland sandpiper		s	Mountain bluebird	ps	ps	
Sanderling	sm	a	Townsend's solitaire	sa	sa	
Semipalmated sandpiper	sm	a	Hermit thrush	s	s	
Western sandpiper	a		American robin	sm	sa	
Least sandpiper	a	a	Varied thrush	sm		
White-rumped sandpiper	a		American pipit	sa	sa	
Baird's sandpiper	sa	s	Bohemian waxwing	y	y	
Pectoral sandpiper	saw	s	Northern shrike	a	a	

**DRAFT ONLY-UNDER REVIEW**

Common Name	ICHmw	ICHwk	Common Name	ESSFw	ESSFwp
Short-billed dowitcher	s		European starling	sm	
Long-billed dowitcher	sa	s	Orange-crowned warbler	sa	sa
Common snipe	sm	sm	Yellow -rumped warbler	sa	sa
Wilson's phalarope	ps		Townsend's warbler	sa	
Red-necked phalarope	ps	s	Blackpoll warbler	sa	sa
Parasitic jaeger	s		American redstart	sa	
Bonaparte's gull	SA	ps	Northern waterthrush	sa	
Mew gull	s	ps	MacGillivray's warbler	sa	
Ring-billed gull	sM	s	Common yellowthroat	sa	
California gull	PSaw	sa	Wilson's warbler	sa	sa
Herring gull	swM	sm	Chipping sparrow	s	s
Thayer's gull	a		Fox sparrow	s	
Sabine's gull	a		Song sparrow	s	s
Common tern	pSA	sa	White-crowned sparrow	s	s
Black tern	ps	ps	Dark-eyed junco	sm	sm
Rock dove	Y		Snow bunting	mw	mw
Band-tailed pigeon	ps		Rusty blackbird	ps	
Mourning dove	y		Rosy finch	y	y
Black-billed cuckoo	s		Pine grosbeak subspp.	sm	sm
Barn owl	psw		Red crossbill	y	y
Great horned owl	y	y	White-winged crossbill	y	y
Northern hawk owl	saw		Common redpoll	mw	
Northern pygmy owl	y	y	Hoary redpoll	mw	mw
Barred owl	y	a	Pine siskin	Y	Y
Great gray owl	w		Evening grosbeak	sm	
Long-eared owl	y				
Short-eared owl	w m	p			
Boreal owl	p				
Northern saw-whet owl	y	s			
Common nighthawk	pSA	pS			
Black swift	SM	SM			
Vaux's swift	PSa	s			
Black-chinned hummingbird	ps				
Anna's hummingbird	pw				
Calliope hummingbird	PS	ps			
Rufous hummingbird	PSa	PSa			
Belted kingfisher	Sw M	Sw M			
Lewis' woodpecker	sm	a			
Red-naped sapsucker	PSa	ps			
Red-breasted sapsucker		ps			
Downy woodpecker	Sw M	y			
Hairy woodpecker subspp.	y	y			
Three-toed woodpecker	y	y			
Black-backed woodpecker	y	y			
Northern flicker	Y	sm			
Pileated woodpecker	y	y			
Olive-sided flycatcher	ps	ps			

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Common Name	ICHmw	ICHwk	Common Name	ICHmw	ICHwk
Western wood-pewee	ps	ps	Nashville warbler	sm	sm
Alder flycatcher		ps	Yellow warbler	sm	sm
Willow flycatcher	ps	ps	Magnolia warbler	sm	sm
Hammond's flycatcher	sm	sm	Yellow - rumped warbler	sm	sm
Dusky flycatcher	ps	ps	Townsend's warbler	sm	sm
Western flycatcher complex	sm	sm	Black-and-white warbler	s	
Ash-throated flycatcher	s		American redstart	sm	sm
Western kingbird	ps		Northern waterthrush	sm	sm
Eastern kingbird	sm	sm	MacGillivray's warbler	sm	sm
Horned lark	y	m	Common yellowthroat	sm	sm
Tree swallow	PSa	PSa	Wilson's warbler	sm	sm
Violet-green swallow	Psa	Psa	Western tanager	sm	sm
Northern rough-winged swallow	PSa	PSa	Black-headed grosbeak	sm	sm
Bank swallow	PS	PS	Lazuli bunting	sm	sm
Cliff swallow	PSa	PSa	Rufous-sided towhee	y	ps
Barn swallow	SM	PSa	American tree sparrow	mw	m
Gray jay	y	y	Chipping sparrow	Psa	Psa
Steller's jay subsp.	y	y	Vesper sparrow subsp.	sm	
Blue jay	y	y	Lark sparrow	ps	
Clark's nutcracker	psAW	y	Savannah sparrow	sm	sm
Black-billed magpie	y	y	Fox sparrow	y	sm
American crow	Y	SMw	Song sparrow	y	sm
Common raven	Y	Y	Lincoln's sparrow	sm	sm
Black-capped chickadee	y	y	White-throated sparrow	aw	
Mountain chickadee	y	y	Golden-crowned sparrow	ps	m
Boreal chickadee	aw	y	White-crowned sparrow	sM	sM
Chestnut-backed chickadee	Y	Y	Harris' sparrow	aw	aw
Red-breasted nuthatch	y	y	Dark-eyed junco	sMw	sMw
White-breasted nuthatch	y	m	Lapland longspur	a	
Brown creeper	y	y	Snow bunting	mw	mw
Rock wren	sm	sm	Bobolink	ps	
House wren	sm	sm	Red-winged blackbird	SMw	sm
Winter wren	Y	Y	Western meadowlark	y	
Marsh wren	y		Yellow - headed blackbird	PSa	ps
American dipper	y	y	Rusty blackbird	y	psa
Golden-crowned kinglet	Y	Y	Brewer's blackbird	SM	sm
Ruby-crowned kinglet	y	y	Brown-headed cowbird	psa	ps
Western bluebird	sm		Northern oriole	ps	
Mountain bluebird	sm	sm	Rosy finch	mw	mw
Townsend's solitaire	y	sm	Pine grosbeak subsp.	y	y
Veery	ps	ps	Purple finch	y	sm
Swainson's thrush	sm	sm	Cassin's finch	y	
Hermit thrush	sm	sm	House finch	y	
American robin	SMw	PSa	Red crossbill	Y	Y
Varied thrush	psAW	psAW	White-winged crossbill	y	y
Gray catbird	sm	*	Common redpoll	MW	MW
American pipit	sm	sm	Pine siskin	Y	Y

**DRAFT ONLY-UNDER REVIEW**

Common Name	ICHmw	ICHwk	Common Name	ICHmw	ICHwk
Bohemian waxwing	psAW	psAW	American goldfinch	pSAw	
Cedar waxwing	PSaw	PSa	Evening grosbeak	psAW	psAW
Northern shrike	mw	mw	House sparrow	y	
European starling	SMw	SMw	Say's phoebe	sm	sm
Solitary vireo	sm	sm	Tennessee warbler	sm	sm
Warbling vireo	sm	sm	Orange-crowned warbler	sm	sm
Red-eyed vireo	sm	sm	Eastern phoebe		ps

**DRAFT ONLY-UNDER REVIEW**

## Appendix I: Seasonal Abundance of Amphibians, Reptiles, and Mammals in BEC zones.

Seasonal abundance: Lower case = uncommon, scarce, or rare; Upper case = common or abundant.

- P = spring (March-May)
- S = summer (June-August)
- A = autumn (September – November)
- W = winter (December – February)
- M = migratory (spring and autumn)
- Y = yearlong

Common Name	ICHmw	ICHwk	Common Name	ESSFw	ESSFwp	Common Name	
<i>Amphibians</i>			<i>Amphibians</i>			<i>Amphibians</i>	
Long-toed salamander	Y	Y	Long-toed salamander	Y	Y	Long-toed salamander	Y
Western toad	Y	Y	Western toad	Y	Y	<i>Mammals</i>	
Pacific treefrog	Y	Y	Spotted frog	Y	Y	Vagrant shrew	Y
Leopard frog	y	y	<i>Mammals</i>			Common pika	Y
Spotted frog	Y	Y	Common shrew	Y	Y	Southern red-backed vole subsp.	Y
Wood frog	Y	Y	Pygmy shrew	y	y	Brown lemming	Y
<i>Reptiles</i>			Dusky shrew	Y	Y	Meadow vole	Y
Painted turtle	Y	y	Water shrew	y	y	Northern bog lemming subsp.	Y
Western skink	y		Vagrant shrew	Y	Y	Bushy-tailed woodrat	Y
Northern alligator lizard	y	y	Silver-haired bat	S	S	Deer mouse	Y
Rubber boa	y		Hoary bat	S	S	Northern pocket gopher subsp.	Y
Western garter snake	Y	Y	California myotis	S		Hoary marmot	Y
Common garter snake	Y	Y	Western long-eared myotis	S		Woodchuck	Y
<i>Mammals</i>			Little brown myotis	S	S	Columbian ground squirrel	Y
Common shrew	Y	Y	Long-legged myotis	S	S	Golden-mantled ground squirrel	Y
Dusky shrew	Y	Y	Snowshoe hare subsp.	Yy	Yy	Cascade mantled ground squirrel	Y
Water shrew	y	y	Common pika	Y	Y	Coyote	Y
Big brown bat	Y	Y	Southern red-backed vole subsp.	Y	Y	Gray wolf	Y
Silver-haired bat	Y	Y	Northern red-backed vole	Y	Y	Red fox	Y
Hoary bat	s	s	Brown lemming		Yy	Wolverine subsp. luscus	S
California myotis	S	S	Long-tailed vole	Y	Y	Long-tailed weasel subsp.	Y
Western long-eared myotis	s	s	Meadow vole	Y	Y	Long-tailed weasel subsp. altifrontalis	Y
Little brown myotis	Y	S	Muskrat	Y	Y	Black bear subsp.	S
Northern long-eared myotis	s	s	Heather vole	y	y	Grizzly bear	F
Long-legged myotis	S	S	Northern bog lemming subsp.	Y	Y	Mountain goat	F
Yuma myotis	S	S	Beaver	Y		Bighorn Sheep subsp. canadensis	Y
Townsend's big-eared bat	y		Bushy-tailed woodrat	Y	Y	Bighorn Sheep subsp. californiana	Y
Snowshoe hare subsp.	Yy	Yy	Deer mouse	Y	Y	Moose	S
Common pika	Y	Y	Porcupine	Y	Y	Elk subsp. nelsoni	S
Southern red-backed vole subsp.	Y	Y	Northern pocket gopher subsp.	Y	Y	Mule deer subsp. hemionus	S
Long-tailed vole	Y	Y	Northern flying squirrel	Y		White-tailed deer	S

**DRAFT ONLY-UNDER REVIEW**

Common Name	ICHmw	ICHwk	Common Name	ESSFw	ESSFwp	Common Name	
Meadow vole	Y	Y	Hoary marmot		Y	Caribou (southeastern populations)	S
Muskrat	Y	Y	Golden-mantled ground squirrel	Y	Y		
Heather vole	y	y	Least chipmunk subsp.	Y	Y		
Northern bog lemming subsp.	y	y	Least Chipmunk subsp. selkiri	Y	Y		
Beaver	Y	Y	Red-tailed chipmunk subsp. simulans	Y	Y		
Bushy-tailed woodrat	Y	Y	Red-tailed chipmunk subsp. ruficaudus	Y	Y		
Deer mouse	Y	Y	Red squirrel	Y			
Porcupine	Y	Y	Meadow jumping mouse subsp.	Y			
Northern pocket gopher subsp.	Y		Western jumping mouse	Y			
Northern pocket gopher aubsp. segregatus	y		Coyote	Y	Y		
House mouse	Y	Y	Gray wolf	Y	S		
Northern flying squirrel	Y	Y	Red fox	Y	Y		
Hoary marmot	Y	Y	Cougar	Y	S		
Yellow-bellied marmot	Y		Lynx	Y	Y		
Woodchuck	Y	Y	Bobcat	Y	Y		
Columbia ground squirrel	Y	Y	Wolverine subsp. luscus	y	y		
Golden-mantled ground squirrel	Y	Y	River otter	Y	y		
Yellow-pine chipmunk	Y	Y	Marten	Y	Y		
Red-tailed chipmunk subsp. simulans	Y		Fisher	Y	Y		
Red squirrel	Y	Y	Long-tailed weasel subsp.	Y	Y		
Meadow jumping mouse subsp.	Y	Y	Least weasel		y		
Western jumping mouse	Y	Y	Mink	Y	Y		
Coyote	Y	Y	Badger	y	y		
Gray wolf	Y	Y	Black bear subsp.	Y	Y		
Red fox	Y	Y	Grizzly bear	SAW	SAW		
Cougar	Y	Y	Mountain goat	Y	S		
Lynx	Y	Y	Bighorn sheep subsp. canadensis	s	s		
Bobcat	Y	Y	Moose	pSAw	S		
Wolverine subsp. luscus	Y	Y	Elk subsp. nelsoni	SA	SA		
River otter	Y	Y	Mule deer subsp. hemionus	SA	SA		
Marten	Y	Y	White-tailed deer	PSA	PSA		
Fisher	y	y	Caribou (southeastern populations)	Y	Y		

## Appendix J: Natural Disturbance Types

Natural disturbance types (NDTs) as outlined in the Forest Practices Code Biodiversity Guidelines (1995) characterize areas with different natural disturbance regimes. Natural disturbance regimes include fire, wind, insects and disease. The following five natural disturbance regimes are recognized in the Forest Practices Code *Biodiversity Guidebook*:

NDT	Definition
NDT1	Ecosystems with rare stand-initiating events
NDT2	Ecosystems with infrequent stand-initiating events
NDT3	Ecosystem with frequent stand-initiating events
NDT4	Ecosystem with frequent stand-maintaining events
NDT5	Alpine Tundra and Subalpine Parkland ecosystems

All of the Biogeoclimatic subzones and variants recognized provincially have been classed into one of the above natural disturbance types. Ecosystems falling within the Biogeoclimatic subzones/variants listed under NDT3 are recognized as being mature starting at 80-120 years, and old at greater than 140 years (100 years for BWBS). Other ecosystems within NDT1, NDT2, NDT 4 and NDT5 are considered mature starting at 80-120 years, and old greater than 250 years.

**DRAFT ONLY-UNDER REVIEW**

**Appendix K: Wildlife (Open Season) Hunting**

Species	Management Units	Open Season
MULE (Black-tailed) DEER Bucks (4 pt or better)	4-7 to 4-9, 4-14 to 4-19, 4-27 to 4-33**	Oct 21. to Nov. 10
WHITE-TAILED DEER Bucks	4-6 to 4-9, 4-14 to 4-19, 4-27 to 4-33**	Sept. 10 to Nov. 30
BLACK BEAR	4-1 to 4-9, 4-14 to 4-40	April 1 to June 30; Sept. 10 to Nov. 30
COUGAR	4-6 to 4-9, 4-14 to 4-19, 4-27 to 4-33, 4-38, 4-39**	Sept. 10 to Mar. 31
WOLF	4-1 to 4-9, 4-14 to 4-40**	April 1 to June 15; Sept. 10 to March 31
COYOTE	4-1 to 4-9, 4-14 to 4-40	Sept. 10 to March 31
SKUNK	4-1 to 4-9, 4-14 to 4-40	April 1 to April 30; Aug. 1 to March 31
RACCOON	4-1 to 4-9, 4-14 to 4-40	Sept. 10 to March 31
RAVEN	4-1 to 4-9, 4-14 to 4-40	April 1 to March 31
BOBCAT	4-1 to 4-9, 4-14 to 4-40	Nov. 15 to Feb. 15
WOLVERINE	4-1 to 4-9, 4-14 to 4-40	Nov. 1 to Jan. 31
SNOWSHOE HARE	4-1 to 4-9, 4-14 to 4-40	April 1 to April 30; Aug. 1 to March 31
COLUMBIAN GROUND SQUIRREL	4-1 to 4-9, 4-14 to 4-40**	April 1 to March 31
BLUE GROUSE; SPRUCE (Franklin) GROUSE; RUFFED GROUSE	4-1 to 4-9, 4-14 to 4-40	Sept. 1 to Nov. 30
PTARMIGAN	4-1 to 4-9, 4-14 to 4-40	Sept. 10 to Nov. 30
DUCKS	4-1 to 4-9, 4-14 to 4-40	Sept. 11 to Dec. 25
COOTS	4-1 to 4-9, 4-14 to 4-40	Sept. 11 to Dec. 25
COMMON SNIPE	4-1 to 4-9, 4-14 to 4-40	Sept. 11 to Dec. 25
SNOW GEESE; ROSS'S GEESE	4-1 to 4-9, 4-14 to 4-40	Sept. 11 to Dec. 25
CANADA GEESE; WHITE-FRONTED GEESE	4-1 to 4-9; 4-14 to 4-40	Sept. 11 to Dec. 25
PHEASANT Cocks	4-6, 4-7	Oct. 15 to Nov. 30