

# **Jumbo Glacier Resort Master Plan**

## **Appendix 3-P** Bird Survey Report

Prepared by  
ENKON Environmental

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**SUB-SECTION D.3 (B): WILDLIFE  
RESOURCES**

**Project Report Supplement  
Migratory and Non-migratory Birds**

**JUMBO GLACIER RESORT  
DEVELOPMENT**

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# INTRODUCTION

## 1.1 Background

Glacier Resorts Ltd plans to develop the Jumbo Glacier Resort (JGR), a destination ski resort in the Jumbo Valley near Invermere, British Columbia (Figure 1). In January 2004, the proponent submitted a Project Report to the Environmental Assessment Office (EAO) as required under the *BC Environmental Assessment Act* for a destination resort of JGR's proposed size. The Project Report addressed terms of reference addressed requirements given in the Final Project Report Specifications for the proposed Jumbo Glacier Alpine Resort Project (Environmental Assessment Office May 1998).

While the report submitted in January 2004 had addressed most of the Project Report Specifications, it had not addressed two specifications that required detailed bird surveys of the proposed development. The EAO accepted the Project Report for review conditional upon the completion of the required bird surveys during the breeding season in 2004.

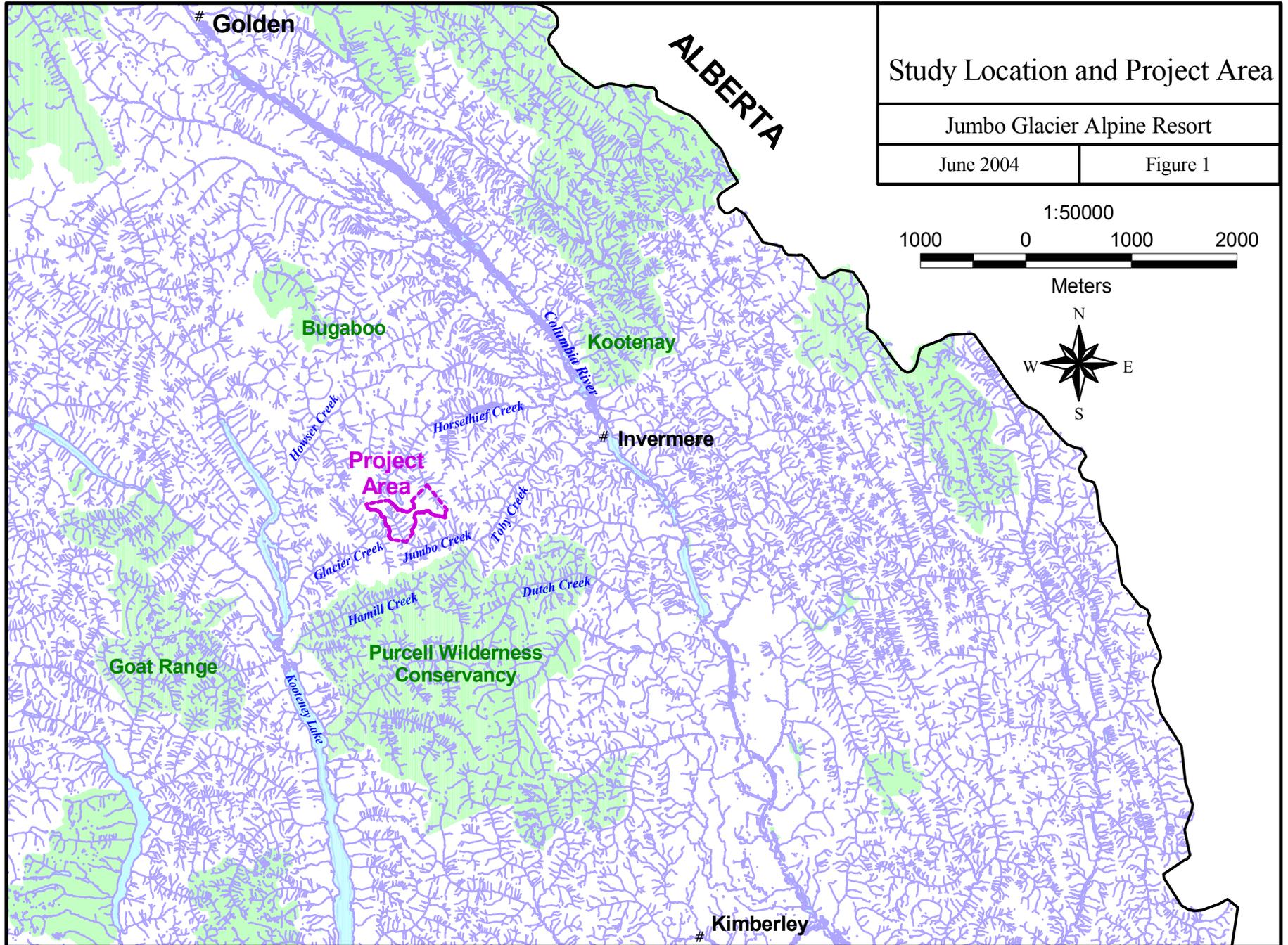
ENKON Environmental Limited completed migratory and non-migratory bird surveys in during June 2004. This report supplement contains the results of those surveys. The report is intended to satisfy the Project Report Specifications D.3 (D) Birds.

## 1.2 Terms of Reference

The following are the terms of reference for migratory and non-migratory bird surveys associated with the proposed Jumbo Glacier Resort Development.

The proponent must conduct a thorough survey of the project area to determine the use of the area by migratory birds. The survey must be detailed enough to allow an accurate estimate of presence/absence, relative abundance and habitat use. Results of the survey must be used to mitigate impacts on migratory birds by appropriate modifications to the resort design.

The proponent must conduct a thorough survey of the project area to determine the use of the area by non-migratory birds, with special emphasis placed on identification of nesting sites and feeding areas which could be physically disrupted or impacted by resort development and operation.



## **METHODOLOGY**

### **2.1 Field Survey for Migratory Birds<sup>1</sup>**

The field survey for migratory birds in the JGR study area was conducted from 10 June to 14 June 2004 during the spring-summer breeding period for higher elevation habitats such as the JGR location. The field inventories consisted of a combination of encounter transects, point counts, and surveys targeted at riverine birds (e.g. American dipper, harlequin duck).

The field work was conducted in mid-June and followed the Resources Information Standards Committee (RISC) survey protocols. The standards and related dataforms used as a guide during the inventory include:

- Inventory Methods for Forest and Grassland Songbirds: Standards for Components of British Columbia's Biodiversity No. 15 (Version 2.0);
- Inventory Methods for Woodpeckers: Standards for Components of British Columbia's Biodiversity No. 19 (Version 2.0);
- Inventory Methods for Riverine Birds: Harlequin Duck, Belted Kingfisher and American Dipper No. 12 (Version 2.0); and
- Species Inventory Fundamentals: Standards for Components of British Columbia's Biodiversity No.1.

Common passerine and passerine-like bird species residing within the Engelmann Spruce-Subalpine Fir (ESSF) and Alpine Tundra (AT) biogeoclimatic zone are summarized in Appendix A and are compiled from Birds of Canada and Birds of the Canadian Rockies.

Migratory bird surveys focused on the resort base area with lesser effort placed on the ski runs/lifts (due to the inability to define these areas in the field and unsafe foot access). However lower, middle and upper elevations were surveyed to ensure that habitats for all potential bird species are inventoried.

#### **2.1.1 Encounter Transects**

Encounter (foot) surveys (Figure 2) along the stream margins, trails/roads and dense vegetation were performed to locate nests of passerine and passerine-like birds and verify breeding bird use of the area. Transect routes followed point count routes and were stratified whenever possible to obtain representative habitat areas (e.g., edge, riparian, forest habitats). Transects were walked at a slow hiking pace, stopping when appropriate to record data, scan the forest canopy, identify birds, or listen.

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<sup>1</sup> For survey purposes, non-migratory passerine birds are included in this section.

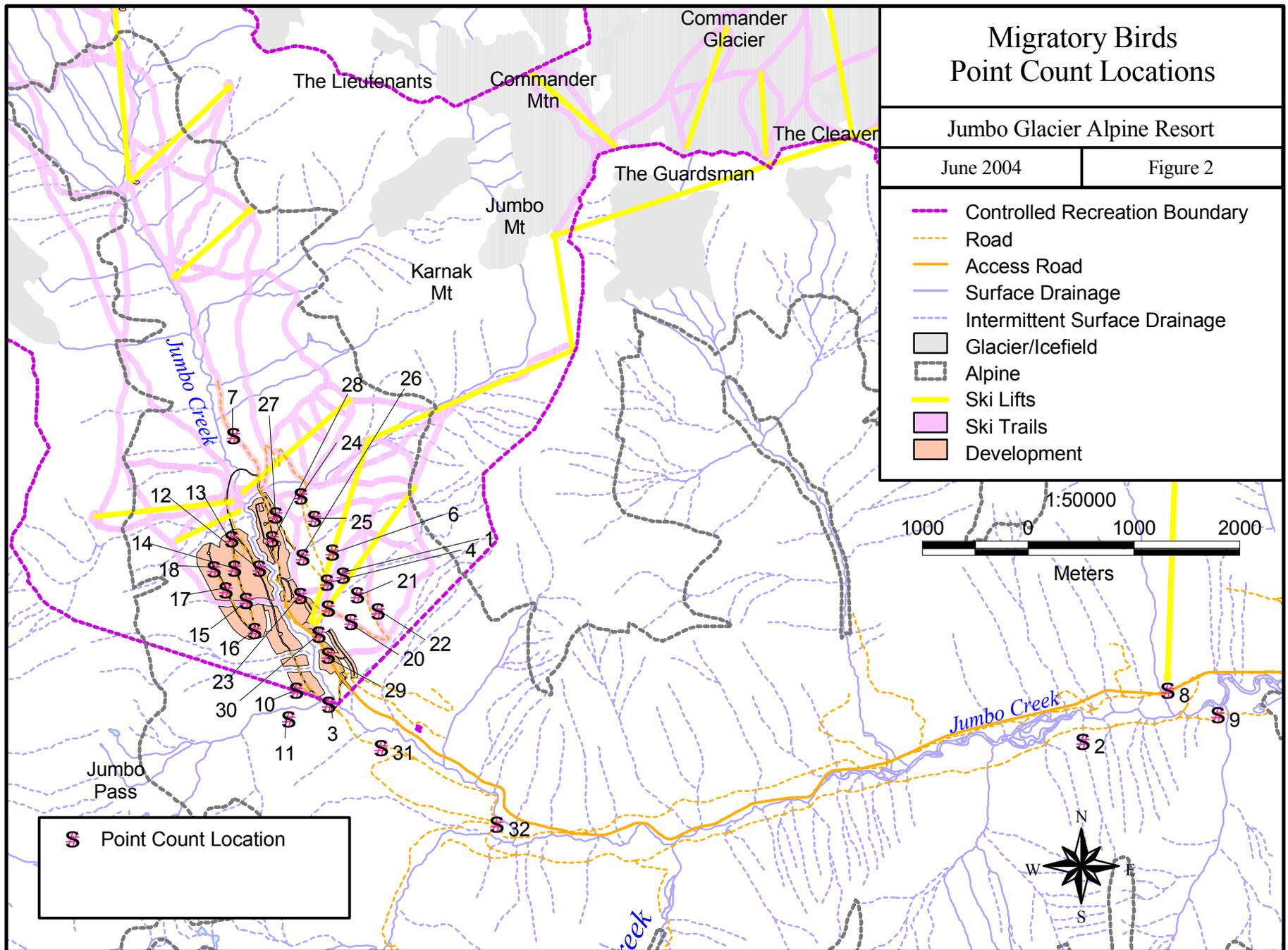
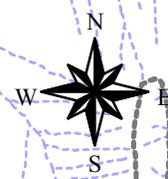
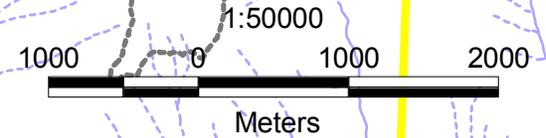
# Migratory Birds Point Count Locations

Jumbo Glacier Alpine Resort

June 2004

Figure 2

-  Controlled Recreation Boundary
-  Road
-  Access Road
-  Surface Drainage
-  Intermittent Surface Drainage
-  Glacier/Icefield
-  Alpine
-  Ski Lifts
-  Ski Trails
-  Development

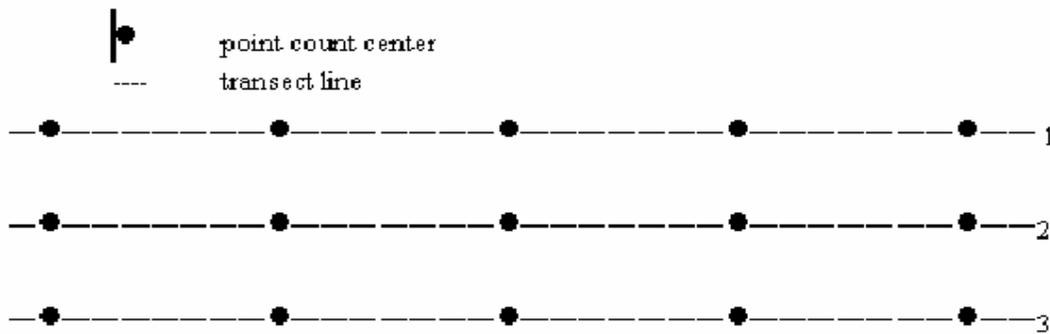


 Point Count Location

For each bird detection, the distance traversed along transect was recorded by a GPS hand-held unit. Based on visual observations and calls/songs heard, the occurrences of breeding forest birds were classified as “present” or “not detected.” Observers scanned each transect for the presence of breeding bird nests, but nest were difficult to detect.

### 2.1.2 Variable Radius Point Counts

According to RISC protocols, Point Count (PC) stations (Figure 2) were placed at approximately 100 m intervals along each transect (Figure 3, from RISC 1999), with a radii of detection of 50 m. After a one-minute period of silence, visual and auditory observations of birds were noted during a three minute survey period around each PC station.



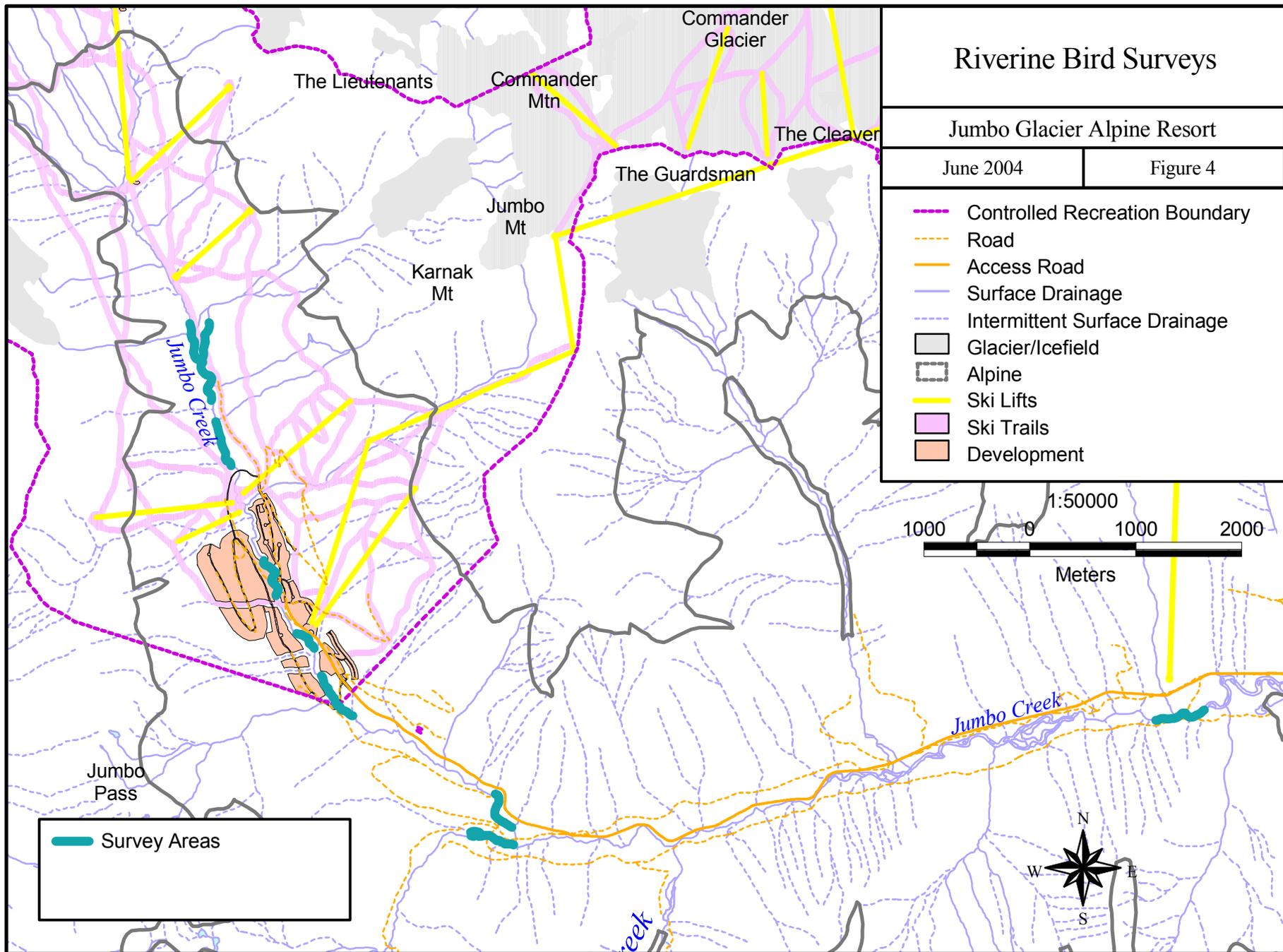
**Figure 3 Sample layout for an encounter transect survey with point count stations**

Stations in the field were established using a compass; a distance of 50 m was measured once and superimposed around each PC station to give the surveyors a visual detection radius of approximately 50 m. A total of at least 15 PC stations (including replicated sites) were completed each morning, after dawn, for a total of 32 PC stations. Each station was replicated at least once; normally this was done the next day, except in the case of 14 June. On 14 June the replication was completed on the same day.

### 2.1.3 Riverine Bird Surveys

River transects and roadside travel surveys were utilised throughout the JGR area (Figure 4) to survey for riverine birds such as American dipper and harlequin duck. Local knowledge of rivers and the birds present was collected from a local guide-outfitter before embarking on labour-intensive walking surveys.

A spring ground-survey for harlequin ducks and American dipper was conducted during the 10-14 June 2004 bird surveys. Breeding pairs, individuals of harlequin ducks were searched for by walking along accessible banks along suitable streams (1st- 6th order, 2°- 6°) within the project area. When it was not possible to walk the stream banks, due to thick vegetation and steep slopes, the surveyors walked to the stream bank and used



binoculars to survey 100 m upstream and downstream sections of the stream. Some sections of the streams within the study area were impossible to walk due to safety issues.

Roadside surveys were conducted for harlequin ducks and American dipper at points where the access road crossed suitable streams. The survey involved watching for birds, and stopping at convenient lookouts. The surveyors used binoculars to survey 100 m upstream and 100 m downstream from the bridge crossing.

## 2.2 Field Survey for Non-migratory Birds<sup>2</sup>

The field survey for non-migratory birds in the Jumbo Glacier Resort (JGR) study area was conducted during the summer breeding period for higher elevation habitats. The field inventories consisted of a combination of roadside surveys, call playback surveys, encounter transects, standwatches and surveys targeted at locating ground-dwelling birds (e.g., blue grouse).

The field work was completed in mid-June and followed the Resources Information Standards Committee (RISC) survey protocols. The standards and related dataforms which were used as a guide during the survey include:

- *Inventory Methods for Raptors: Standards for Components of British Columbia's Biodiversity* No.11. (Version 2.0);
- *Standardized Inventory Methodologies for Components of British Columbia's Biodiversity: Upland Gamebirds (Grouse, Quail, and Columbids)* No. 17. Version 1.1); and
- *Species Inventory Fundamentals: Standards for Components of British Columbia's Biodiversity* No.1.

An extensive list of possible resident raptor and gamebird species is included in Appendix A (compiled from *Birds of Canada* and *Birds of the Canadian Rockies*).

Non-migratory bird surveys focused on the resort base area with lesser effort placed on the ski runs/lifts (due to the inability to define these areas in the field and unsafe foot access). However lower, middle and upper elevations were surveyed to ensure that habitats for all potential bird species were inventoried.

### 2.2.1 Roadside Survey

For the purpose of this study, the forest service road that accesses the JGR study area was driven at low speed in one direction while the skyline above was scanned for perching and soaring raptors. The roadside survey is a good method for covering large areas. Roadside surveys can be used to inventory conspicuous raptors during the breeding season. For presence/not detected all that is required is that the raptor be sighted and

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<sup>2</sup> For survey purposes, non-migratory birds includes raptors and ground-dwelling birds

identified regardless of its distance from the transect line (i.e., there is no fixed-width for observations).

### **2.2.2 Encounter Transects**

Encounter (foot) surveys were conducted during daylight hours along stream margins, established ski runs and within vegetation. They were performed to locate raptor nests and to verify raptor use of the area. Transect routes were stratified whenever possible to obtain representative habitat areas. Based on visual observations and calls heard, the occurrences of raptors will be classified as “present” or “not detected.” Observers scanned areas along transect for the presence of raptor nests.

### **2.2.3 Standwatches**

Standwatches were used to supplement call playback, foot and roadside surveys when determining presence/not detected of either conspicuous or inconspicuous raptors or their nest sites during the breeding season. Standwatches did not follow a strict sampling design, nor are they required to follow strict survey design. In general, standwatches require surveyors to position themselves at selected vantage points where suspected nesting habitat is searched for raptors rising out of the canopy. Any raptor visual, auditory, or nest encounter was recorded.

### **2.2.4 Call Playback Survey**

Raptors call to identify themselves, establish and defend territories and to attract mates. The use of call playback takes advantage of this knowledge by using recorded calls to simulate the presence of an "intruder" into an already claimed territory. The response of the bird can be either behavioural (visual) and/or vocal which, allows the observer to record the presence of the bird. Use call playback for inconspicuous or nocturnal raptor species (e.g., owls and accipiters) known to respond to calls during the breeding season.

Call playback surveys were conducted by broadcasting calls at stations both along roadsides using vehicles, and in more remote areas while walking transects (Figure 5). It was important to avoid playing calls during courtship, egg laying or incubation periods as this may disrupt successful breeding of raptors.

The call playback survey methodology followed procedures outlined in *Inventory Methods for Raptors: Standards for Components of British Columbia's Biodiversity No. 11* (Version 2.0).

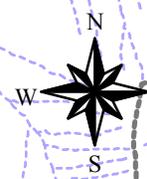
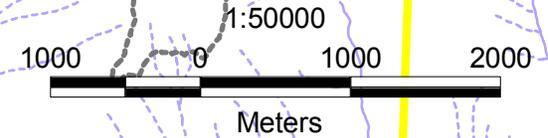
# Nocturnal and Diurnal Call Playback Survey Locations

Jumbo Glacier Alpine Resort

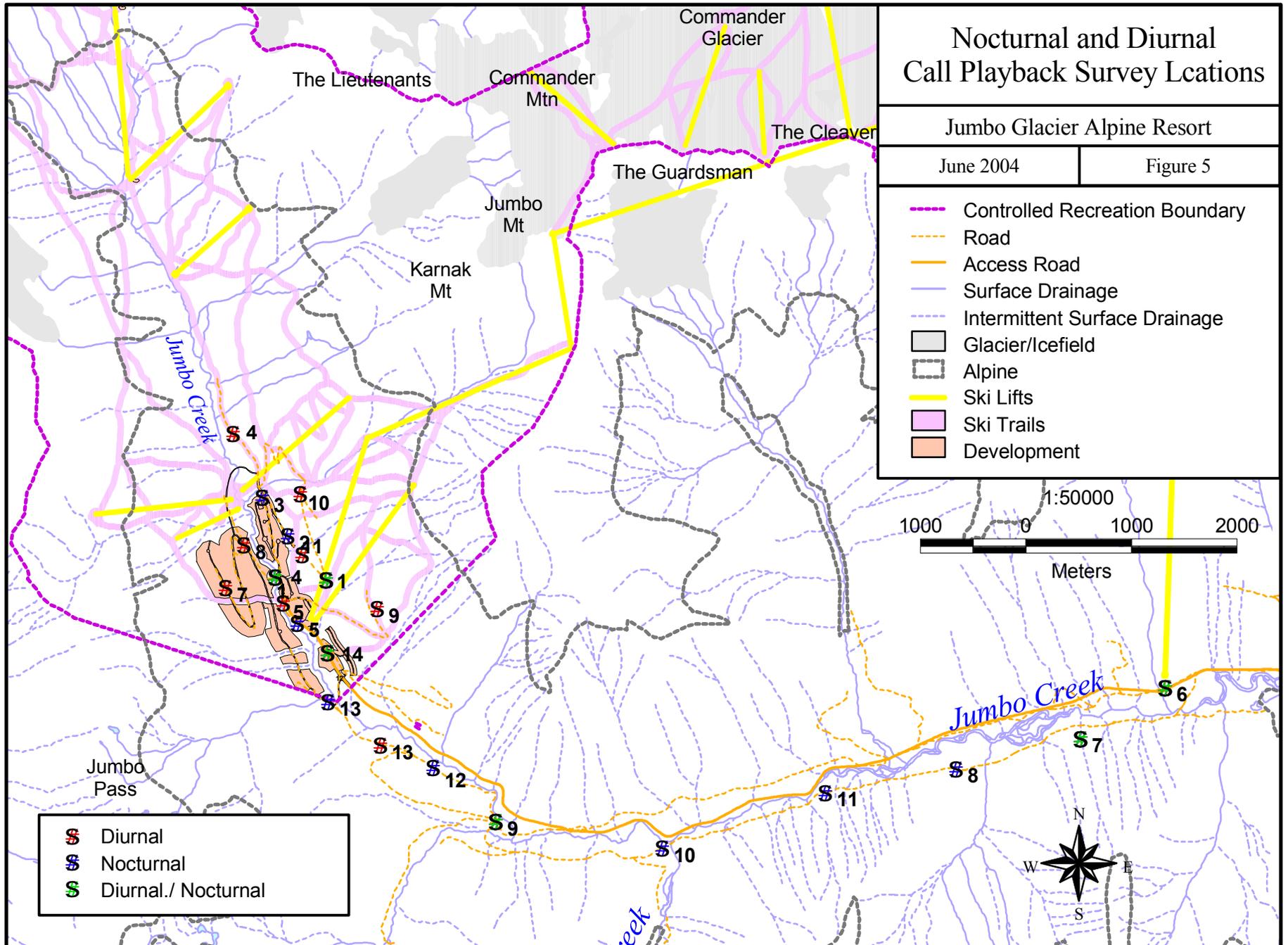
June 2004

Figure 5

-  Controlled Recreation Boundary
-  Road
-  Access Road
-  Surface Drainage
-  Intermittent Surface Drainage
-  Glacier/Icefield
-  Alpine
-  Ski Lifts
-  Ski Trails
-  Development



-  Diurnal
-  Nocturnal
-  Diurnal./ Nocturnal



Calls of target nocturnal raptor species and territorial diurnal raptors potentially occurring in the study area were played at all call playback stations using a Radio Shack® 32-2037 megaphone connected to a Sony® Discman. The following raptor species are known to respond to night time broadcasted vocalisations and they may also occur in the JGR area:

1. Northern pygmy owl;
2. Northern saw-whet owl;
3. Northern hawk owl;
4. barred owl;
5. great horned owl; and
6. great gray owl.

These six owl calls were broadcasted, in foregoing order, at each call playback site. The following diurnal raptor calls were used during the day time call playback surveys: 1) merlin, 2) Cooper's hawk, 3) sharp-shinned hawk and 4) Northern goshawk.

The call playback survey involved a 30 minute survey at each stop, which included looking and listening for raptors in the surrounding area (2 minutes), playing CD-quality territorial raptor calls followed by silent listening (~2.5 minutes/species) and listening for species response vocalizations or flight (3 minutes). The call playback protocol required the surveyor to play calls at three intervals in a 360° radius of the playback station, with each interval followed by 30 seconds of listening for owl response vocalizations (or flight).

### **2.2.5 Ground-dwelling Bird Surveys**

Point counts for ground-dwelling birds involved recording observations of the target species from a survey point, regardless of their distance. Survey protocols followed the RISC Standardized Inventory Methodologies for Components of British Columbia's Biodiversity: Upland Gamebirds (Grouse, Quail, and Columbids) No. 17 (Version 1.1).

Call playback survey locations for ground-dwelling gamebirds are summarized in Figure 6. Call playback was conducted for appropriate ground-dwelling gamebird species (see Table 1) and in appropriate habitat. Playbacks consisted of two cycles of approximately 30-seconds of recordings, followed by one minute of silence-listening and observing.

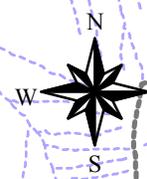
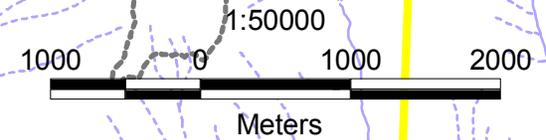
# Call Playback for Ground-dwelling Birds and Spotting Scope Survey Points for Ptarmigan

Jumbo Glacier Alpine Resort

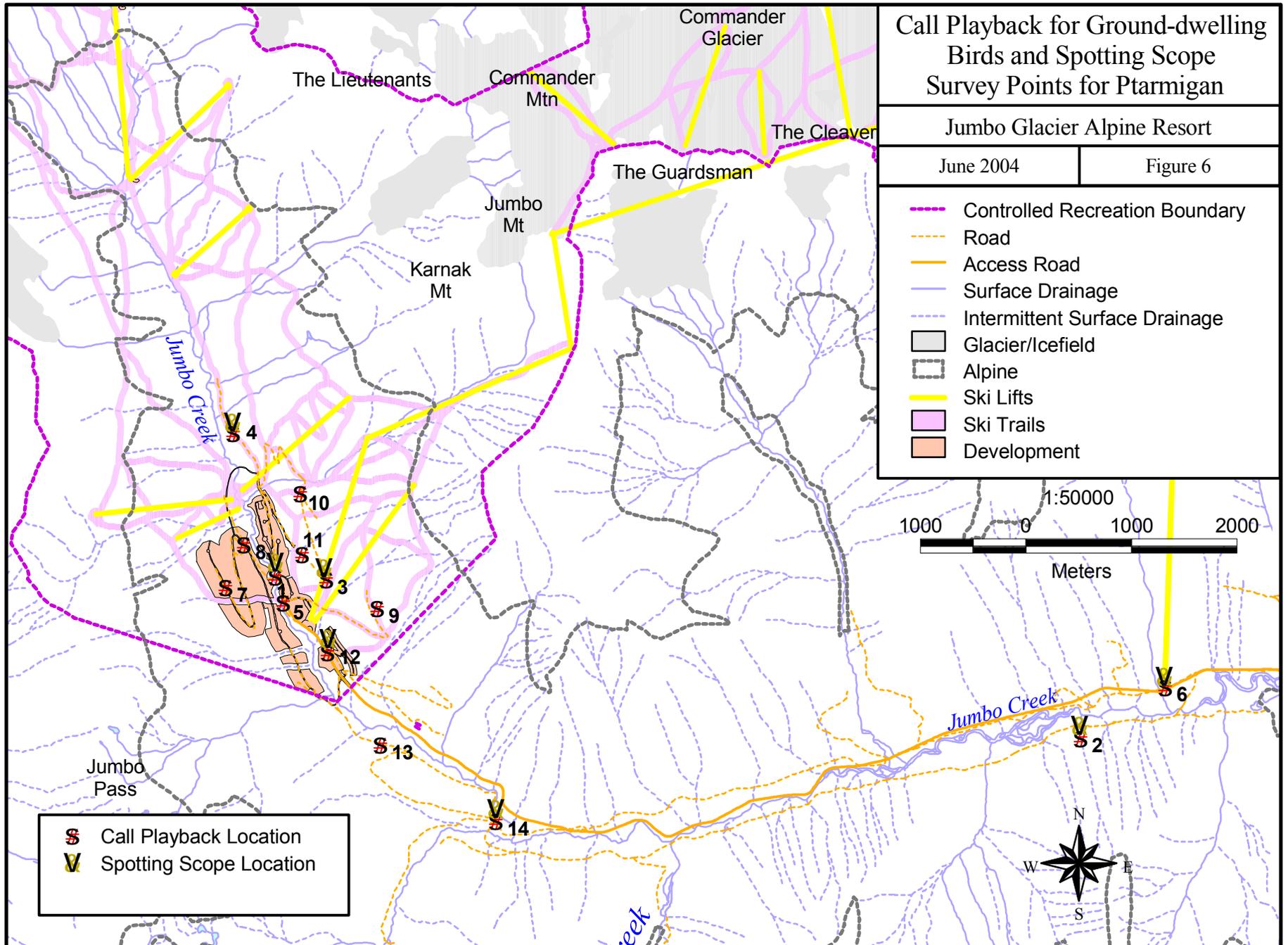
June 2004

Figure 6

-  Controlled Recreation Boundary
-  Road
-  Access Road
-  Surface Drainage
-  Intermittent Surface Drainage
-  Glacier/Icefield
-  Alpine
-  Ski Lifts
-  Ski Trails
-  Development



-  Call Playback Location
-  Spotting Scope Location



**Table 1** Gamebird species and specific considerations for conducting surveys using point counts of undefined radius

Species	Inter-point distance	Duration of observation	Time	Season <sup>3</sup>	Detection Method
Spruce grouse ( <i>D. c. canadensis</i> )	0.4 km	3 min	0.5 hours before sunrise to 1.5 after	Late April - late May	Flutterflights by males
Blue grouse (interior races)	0.4 km	3 min	0.5 hours before sunrise	Late April - late May	Hooting by males
Ruffed grouse (interior races)	0.8 km	4 min	0.5 hours before sunrise	Mid April - late May	Drumming by males
Willow ptarmigan	1.0 km	3 min	Throughout day or night	Mid May - mid June	Response to flight song playback
Rock ptarmigan	1.0 km	3 min	Throughout day or night	Mid May - late June	Response to flight song playback
White-tailed ptarmigan	1.0 km	3 min	Throughout day, night or morning	Mid May - mid June	Response to challenge call playback

Surveyors began by conducting call playback for ptarmigan species, but abandoned this survey technique after it became clear that access to the ptarmigan’s alpine habitat would be impossible and calls would not be heard from the lower sub-alpine habitat. However, in lieu of conducting call playback surveys for ptarmigan species, one surveyor used a hi-powered spotted scope (Bausch & Lomb Discoverer® 15-60x60 zoom) to search above the treeline for ptarmigans (Figure 6).

<sup>3</sup> Spring arrives late due to the high elevation of the study area, thus a June survey period is deemed to be appropriate.

## RESULTS

### 3.1 Migratory Birds

#### 3.1.1 Encounter Transects

Thirty-four bird species were observed within the Engelmann Spruce-Subalpine Fir (ESSF) biogeoclimatic zone during the June 2004 encounter transects of the site. Survey results are summarized in Table 2. Most of the listed species are migratory (e.g., Fox sparrow), while a few non-migratory passerine/passerine-like species are also included (e.g., Gray jay)<sup>4</sup>. Due to the inability to access the Alpine Tundra (AT) biogeoclimatic zone, ENKON was unable to gather presence/absence status for AT migratory bird species. However many birds that frequent alpine habitats were recorded during transects and point counts at lower elevations; this suggests that a reasonable conclusion can be reached about their presence above the treeline.

**Table 2 Migratory birds that were recorded during the June 2004 site survey**

Common name	Scientific name	Common name	Scientific name
American Dipper	<i>Cinclus mexicanus</i>	Mountain Chickadee	<i>Parus gambeli</i>
American Robin	<i>Turdus migratorius</i>	Olive-sided Flycatcher	<i>Contopus cooperi</i>
Black-capped Chickadee	<i>Poecile atricapilla</i>	Pine Grosbeak	<i>Pinicola enucleator</i>
Cassin's Finch	<i>Carpodacus cassinii</i>	Pine Siskin	<i>Carduelis pinus</i>
Chipping Sparrow	<i>Spizella passerina</i>	Red Crossbill	<i>Loxia curvirostra</i>
Clark's Nutcracker	<i>Nucifraga columbiana</i>	Red-breasted Nuthatch	<i>Sitta canadensis</i>
Common Crow	<i>Corvus brachyrhyncho</i>	Ruby crowned Kinglet	<i>Regulus calendula</i>
Common Raven	<i>Corvus corax</i>	Spotted Sandpiper	<i>Actitis macularia</i>
Dark-eyed Junco	<i>Junco hyemalis</i>	Steller's Jay	<i>Cyanocitta stelleri</i>
Downy Woodpecker	<i>Picoides pubescens</i>	Townsend's Solitaire	<i>Myadestes townsendi</i>
Fox Sparrow	<i>Passerella iliaca</i>	Varied Thrush	<i>Ixoreus naevius</i>
Golden-crowned Kinglet	<i>Regulus strapa</i>	Water Pipit	<i>Anthus spinoletta</i>
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	White crowned Sparrow	<i>Zonotrichia leucophrys</i>
Gray Jay	<i>Perisoreus canadensis</i>	Western Tanager	<i>Piranga ludoviciana</i>
Hammond's Flycatcher	<i>Empidonax hammondii</i>	Wilson's Warbler	<i>Wilsonia pusilla</i>
Harlequin Duck <sup>5</sup>	<i>Histrionicus histrionicus</i>	Winter Wren	<i>Troglodytes troglodytes</i>
Mountain Bluebird	<i>Salialia currucoides</i>	Yellow-rumped Warbler	<i>Dendroica coronata</i>

<sup>4</sup> For survey purposes, non-migratory passerine birds are included in this section

<sup>5</sup> Identified as a species of concern in the Final Report Specifications (EAO 1998), *Species at Risk Act* Special concern

The inability to survey the AT zone is not considered a significant data gap because no clearing of alpine areas will be required for ski runs, and because summer recreational activities will have minimal to no impact on unglaciated alpine areas.

### 3.1.2 Variable Radius Point Count

The variable radius point count methodology was utilised for the migratory bird point count survey because the Resource Information Standards Committee recommends this as the method for estimating relative abundance. This methodology requires the surveyor to establish a radius of detection for the point count observations, for the purposes of this survey the radius of detection was set to 50 m.

Some of the bird species observed during the encounter transects were not recorded during the variable radius point count survey because they perch and fly in the upper forest canopy; thus these species were likely outside of the 50 m radius of detection. The bird species that were recorded during each point count survey are summarised below (Table 3). Weather conditions for each morning bird survey were generally cloudy with cloud cover ranging from 95% to 100%. The wind was calm ranging from 0 to 2 on the Land Beaufort Scale. Precipitation ranged from light rain (most mornings), sometimes escalating to heavy rainfall, or in the case of 14 June 2004 wet snow. However, the temperature never dropped below 6°C.

**Table 3 Migratory birds that were recorded during point count surveys with a 50 m radius of detection**

Date	Point count station	Common name of species recorded (weather conditions)	Species recorded during replication
11 June	1	common raven, varied thrush, 2 chipping sparrow, gray jay, winter wren	gray jay, American robin, dark-eyed junco, winter wren, winter wren
11 June	2	American robin, 2 Western tanager, pine siskin	common raven, American robin, pine siskin, gray jay
11 June	3	fox sparrow, dark-eyed junco, 2 black-capped chickadee, Clark's nutcracker	fox sparrow, dark-eyed junco, gray jay, black-capped chickadee
11 June	4	Clark's nutcracker, pine grosbeak, downy woodpecker, gray jay, mountain bluebird	golden-crowned sparrow, gray jay, white-crowned sparrow
11 June	5	Clark's nutcracker, dark-eyed junco pair, dark-eyed junco, gray jay	Clark's nutcracker, dark-eyed junco, chipping sparrow
11 June	6	downy woodpecker, varied thrush	ruby-crowned kinglet, golden-crowned kinglet, Wilson's warbler
11 June	7	golden-crowned sparrow, 2 yellow-rumped warbler, white-crowned sparrow	Townsend's warbler, white-crowned sparrow, varied thrush
12 June	8	dark-eyed junco, chipping sparrow	Townsend's solitaire, Hammond's flycatcher, Clark's nutcracker

**Table 3** Migratory birds that were recorded during point count surveys with a 50 m radius of detection

Date	Point count station	Common name of species recorded (weather conditions)	Species recorded during replication
12 June	9	ruby-crowned kinglet, Hammond's flycatcher, water pipit	dark-eyed junco, downy woodpecker, white-crowned sparrow, varied thrush,
12 June	10	Townsend's warbler, white-crowned sparrow, varied thrush, Wilson's warbler	chipping sparrow, ruby-crowned kinglet, red-breasted nuthatch
12 June	11	Townsend's solitaire, Hammond's flycatcher, gray jay	Clark's nutcracker, ruby-crowned kinglet, gray jay, golden-crowned sparrow,
12 June	12	chipping sparrow, ruby-crowned kinglet, red-breasted nuthatch	Western tanager, gray jay, red-breasted nuthatch
12 June	13	Clark's nutcracker, varied thrush, ruby-crowned kinglet, golden-crowned sparrow	Townsend's warbler, gray jay, Clark's nutcracker
12 June	14	Western tanager, gray jay, red-breasted nuthatch	dark-eyed junco, Clark's nutcracker, golden-crowned sparrow
12 June	15	Townsend's warbler, gray jay, winter wren, Clark's nutcracker	gray jay, winter wren, Clark's nutcracker, red-breasted nuthatch
12 June	16	dark-eyed junco, winter wren, Clark's nutcracker, golden-crowned sparrow, chipping sparrow	Hammond's flycatcher
12 June	17	none	red-breasted nuthatch, gray jay, Clark's nutcracker, Hammond's flycatcher
12 June	18	Clark's nutcracker, chipping sparrow, Hammond's flycatcher	dark-eyed junco, Townsend's warbler, black-capped chickadee
13 June	19	Wilson's warbler, chipping sparrow, varied thrush, winter wren	gray jay, golden-crowned kinglet, common raven, dark-eyed junco
13 June	20	yellow-rumped warbler	none
13 June	21	none	gray jay, Hammond's flycatcher, mountain chickadee, Clark's nutcracker
13 June	22	dark-eyed junco, varied thrush, Townsend's warbler, black-capped chickadee	red-breasted nuthatch, 2 dark-eyed junco, golden-crowned kinglet, common raven,
13 June	23	gray jay, winter wren	gray jay, mountain chickadee, Townsend's warbler
13 June	24	Townsend's warbler, gray jay, Clark's nutcracker, Hammond's flycatcher	Townsend's solitaire, Hammond's flycatcher, gray jay, red-breasted nuthatch,
13 June	25	gray jay, red-breasted nuthatch, golden-crowned kinglet, Wilson's warbler, common raven, dark-eyed junco	downy woodpecker, varied thrush, gray jay, Clark's nutcracker
13 June	26	Wilson's warbler, 2 chipping sparrow, white-crowned sparrow, golden-crowned sparrow	Wilson's warbler, 2 dark-eyed junco, 2 gray jay, mountain chickadee

**Table 3 Migratory birds that were recorded during point count surveys with a 50 m radius of detection**

Date	Point count station	Common name of species recorded (weather conditions)	Species recorded during replication
13 June	27	Wilson’s warbler, yellow-rumped warbler, dark-eyed junco, gray jay	red-breasted nuthatch, gray jay, Clark’s nutcracker, Hammond’s flycatcher
13 June	28	dark-eyed junco	golden-crowned sparrow, gray jay, white-crowned sparrow, pine grosbeak
13 June	29	yellow-rumped warbler, chipping sparrow, black-capped chickadee	gray jay, American robin, 2 Western tanager, pine siskin
14 June	30	mountain bluebird, Townsend’s warbler, Clark’s nutcracker	mountain bluebird, Townsend’s warbler, Clark’s nutcracker, dark-eyed junco, chipping sparrow,
14 June	31	Steller’s jay	Clark’s nutcracker, pine grosbeak, downy woodpecker, gray jay, mountain bluebird
14 June	32	mountain chickadee, Townsend’s warbler	none

### 3.1.3 Riverine Bird Surveys

The river-shore line bird surveys recorded the presence of the American dipper and the harlequin duck (Photograph 1). The locations where the riverine birds were observed are illustrated in Figure 7.



**Photograph 1 Harlequin duck observed along Upper Jumbo Creek**

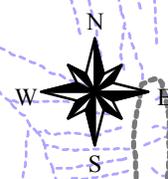
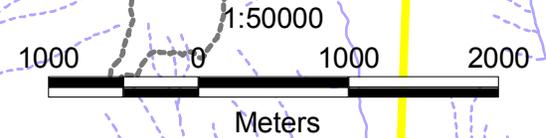
# Observations of Harlequin Ducks

Jumbo Glacier Alpine Resort

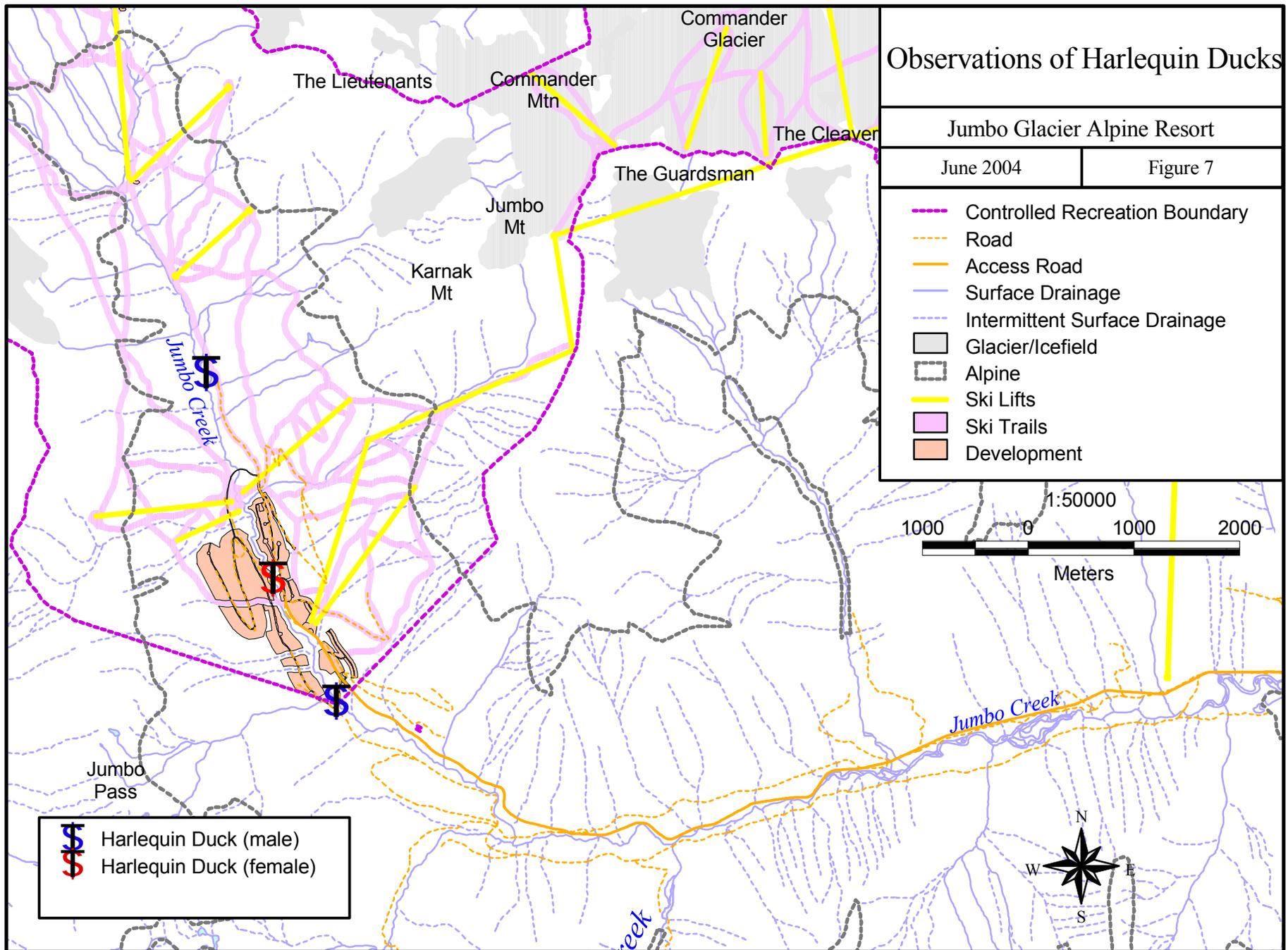
June 2004

Figure 7

- Controlled Recreation Boundary
- Road
- Access Road
- Surface Drainage
- Intermittent Surface Drainage
- Glacier/Icefield
- Alpine
- Ski Lifts
- Ski Trails
- Development



- Harlequin Duck (male)
- Harlequin Duck (female)



## 3.2 Non-migratory Birds

Non-migratory bird species that could be resident within the Engelmann Spruce-Subalpine Fir and Alpine Tundra biogeoclimatic zone of the JGR area are summarized in Table 4; the table is based on survey results and *Ecosystems of British Columbia*. For organizational purposes, non-migratory passerine and passerine-like birds have been included in the previous section. Only the species highlighted in bold were observed during the June 2004 bird survey.

**Table 4 Non-migratory birds that could occur in ESSF and AT biogeoclimatic zones at JGR**

Common name	Scientific name	Common name	Scientific name
American kestrel	<i>Falco sparverius</i>	<b>Merlin</b>	<b><i>Falco columbarius</i></b>
Anatum Peregrine Falcon <sup>67</sup>	<i>Falco peregrinus</i>	Northern pygmy owl	<i>Glaucidium gnoma</i>
Bald eagle*	<i>Haliaeetus leucocephalus</i>	Northern saw-whet owl	<i>Aegolius acadicus acadicus</i>
Barred owl	<i>Strix varia</i>	Osprey	<i>Pandion haliaetus</i>
Cooper's hawk	<i>Accipiter cooperii</i>	Red-tailed hawk	<i>Buteo jamaicensis</i>
<b>Golden eagle</b>	<b><i>Aquila chrysaetos</i></b>	Rough-legged hawk	<i>Buteo lagopus</i>
Great gray owl	<i>Strix nebulosa</i>	Sharp-shinned hawk	<i>Accipiter striatus</i>
Great horned owl	<i>Bubo virginianus</i>	Blue grouse	<i>Dendragapus obscurus</i>
Gyrfalcon	<i>Falco rusticolus</i>	Rock ptarmigan	<i>Logopus mutus</i>
Long eared owl	<i>Asio otus</i>	Ruffed grouse	<i>Bonasa umbellus</i>
Northern goshawk	<i>Accipiter gentilis</i>	White-tailed Ptarmigan	<i>Lagopus leucurus</i>
Northern hawk owl	<i>Surnia ulula</i>	Willow Ptarmigan	<i>Lagopus lagopus</i>

### 3.2.1 Roadside Survey, Encounter Transects and Standwatches

Despite extensive and intensive survey effort, the only species recorded during the June 2004 bird survey were golden eagle and merlin. A golden eagle was observed soaring above a south-west facing sub-alpine slope (10 June 2004) and two golden eagles were observed hunting songbirds high above the old Jumbo Creek bridge site. A merlin call was heard at the old Jumbo Creek bridge crossing, without the aid of a broadcasted merlin call. An unidentified raptor was observed along the logging road North of the old sawmill site. It took flight after being startled by the surveyors and was impossible to

<sup>6</sup> Identified as a species of concern in the Final Report Specifications (EAO 1998)

<sup>7</sup> Provincially red-listed, listed by the *Species at Risk Act* as threatened

identify. The surveyors returned to the site on two occasions to attempt to identify the raptor, but it was not present on either occasion.

The red-listed peregrine falcon was not recorded during the June bird survey. A spotting scope was often used to scan sub-alpine and alpine cliff areas for wildlife activity, but no soaring peregrine falcons were observed.

### **3.2.2 Call Playback Survey**

The call playbacks of potentially occurring owl calls did not result in responses from any nocturnal owls during the post-dusk surveys on 11, 12 and 13 June 2004.

Diurnal call playback site at PC 25 resulted in a merlin response to the third broadcasted merlin call. The diurnal call playback survey also targeted the Northern goshawk because it, like the peregrine falcon, is a raptor species of particular provincial concern. However, no Northern goshawks were recorded during the call playback survey, or during roadside surveys, encounter transects and standwatches.

### **3.2.3 Ground-dwelling bird Survey**

No ground-dwelling gamebirds were detected during the avian field survey from 10 June to 14 June 2004.

## **DISCUSSION**

### **4.1 Migratory Birds**

A total of thirty-four migratory bird species were observed during encounter transects and point counts within the JGR project area. The Jumbo drainage enjoys a diverse and seemingly healthy population of sub-alpine passerine and passerine-like birds.

The habitats in which they were observed can be summarised by one of five habitat types: 1) meadow, 2) gladed heliskiing run, 3) forest cut-block, 4) access road or cleared area with adjacent forest and 5) forest dominated. Figure 8 illustrates the number of migratory birds observed in each habitat type. Additionally, the following photographs summarised the habitat components found at the various point count sites.



**Photograph 2 Meadow habitat at the base of avalanche slide**



**Photograph 3 Gladed heliskiing run, shrub dominated**



**Photograph 4 Previous forest cut-block, shrub dominated**

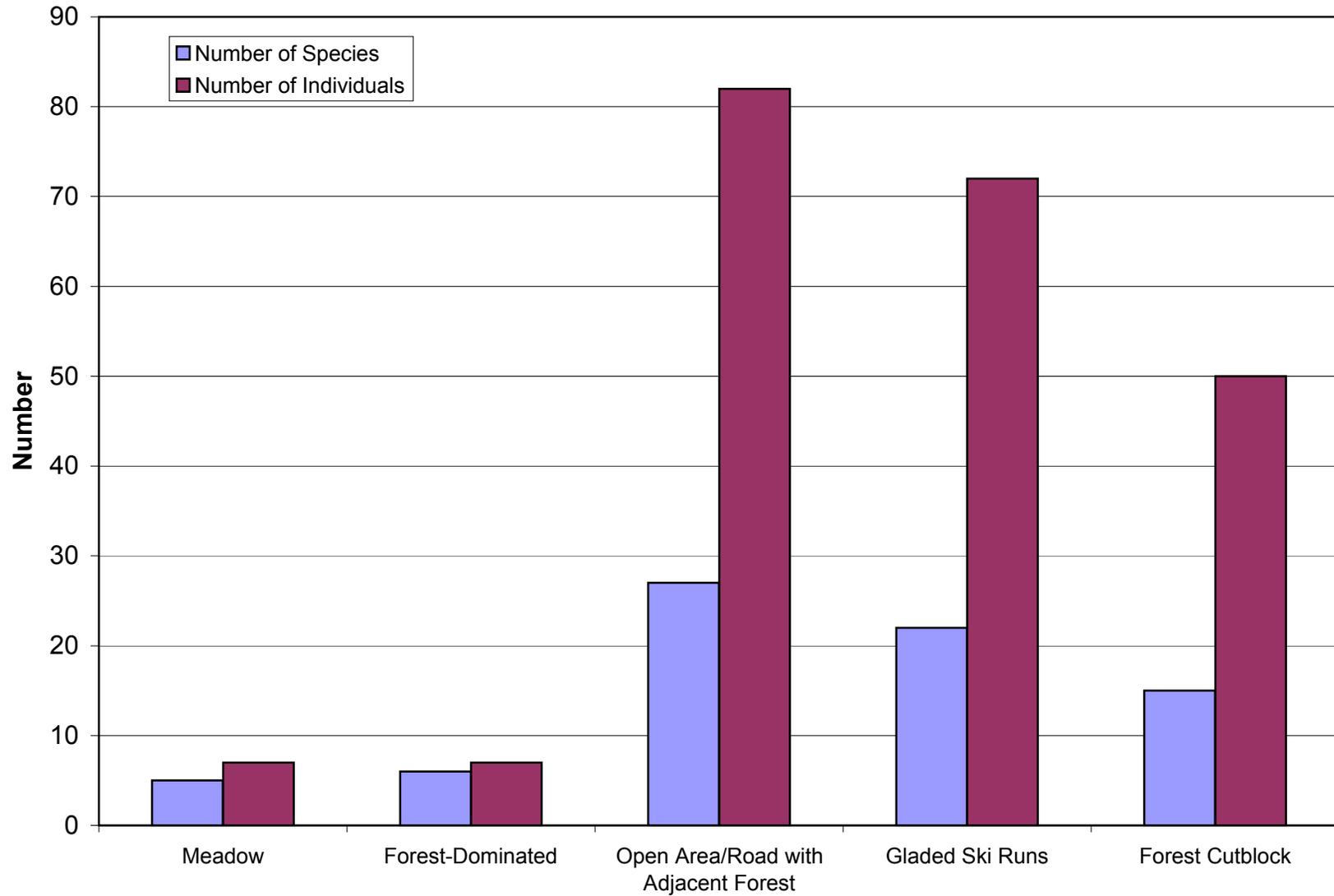


**Photograph 5 Access road and/or cleared area**



**Photograph 6 Dominated by Englemann spruce and Sub-alpine fir**

**Figure 8 Relative Abundances of Birds in Surveyed Habitat Types**



An average 6.5 birds were recorded at each point count over two days of observation. None of the habitat types exhibited an obvious deficiency or abundance of individual birds or bird diversity relative to the survey effort (i.e., point counts results did not deviate from the average). There were a total of 15 species observed with a forest cut-block, 6 species within a forest dominated area, 22 species recorded in the gladed ski run areas, 5 within the meadow habitat and 27 species observed during point counts at open areas/road that were adjacent to forest habitat (Table 5). The most abundant species observed was the ubiquitous gray jay, followed by dark-eyed junco and Clark’s nutcracker. All species, with the exception of the golden-crowned kinglet were observed in the open areas or roads.

**Table 5 Bird species observed during point count surveys**

Species Recorded	Habitat Type					
	Forest Cut-block	Forest-Dominated	Gladed Ski Runs	Meadow	Open Area/Road	Grand Total
<b>Number of PC Stations</b>	<b>8</b>	<b>1</b>	<b>10</b>	<b>1</b>	<b>12</b>	<b>32</b>
American robin					4	4
black-capped chickadee	1		1		4	6
chipping sparrow	4		4		5	13
Clark’s nutcracker	8	1	6		6	21
common raven			3		2	5
dark-eyed junco	3		11		8	22
downy woodpecker			3		2	5
fox sparrow					2	2
golden-crowned kinglet			4			4
golden-crowned sparrow	3	1	2	1	1	8
gray jay	6	2	11		11	30
Hammond’s flycatcher	3	1	3		3	10
mountain bluebird			1		3	4
mountain chickadee			2		2	4
pine grosbeak			1		2	3
pine siskin					3	3
red-breasted nuthatch	6		3		1	10
ruby-crowned kinglet	3	1	1		1	6
Steller’s jay					1	1
Townsend’s solitaire		1	1		1	3

**Table 5 Bird species observed during point count surveys**

Species Recorded	Habitat Type					Grand Total
	Forest Cut-block	Forest-Dominated	Gladed Ski Runs	Meadow	Open Area/Road	
<b>Number of PC Stations</b>	<b>8</b>	<b>1</b>	<b>10</b>	<b>1</b>	<b>12</b>	<b>32</b>
Townsend's warbler	4		2	1	4	11
varied thrush	2		4	1	2	9
water pipit					1	1
Western tanager	2				4	6
white-crowned sparrow	1		2	2	2	7
Wilson's warbler	1		5		1	7
winter wren	3		1		4	8
yellow-rumped warbler			1	2	2	5
<b>Total Number of Species</b>	<b>15</b>	<b>6</b>	<b>22</b>	<b>5</b>	<b>27</b>	<b>28</b>
<b>Total Number of Birds</b>	<b>50</b>	<b>7</b>	<b>72</b>	<b>7</b>	<b>82</b>	<b>218</b>

The numbers of bird species associated with forest and meadow habitats in the JGR project area no doubt is higher than indicated by Table 5 because only one point count station was located in each of these habitat types. However, the point counts were stratified in proportion to the amount of each habitat type in the development area (resort base and lower elevation ski runs). Thus, the numbers of birds using various habitat types reflect the abundance of the habitat types in areas where habitat loss will occur.

The presence of the harlequin duck, which is identified as a species of local concern, has been confirmed. Presence was confirmed as a result of the bird survey and discussions with a local resident and hiker, who reported that harlequin ducks are present throughout Jumbo and Toby Creeks. In fact, there was likely at least one breeding pair in June 2004 on Jumbo Creek, inferring from ENKON's observation of a male and female in same area of Jumbo Creek.

## 4.2 Non-migratory Birds

The Jumbo drainage did not exhibit a significant amount of raptor or gamebird activity. In fact raptor and gamebird activity was surprising low for a forest setting with a limited amount of human disturbance. Discussions with a local guide-outfitter suggest that Upper Toby Creek has greater raptor and gamebird activity relative to the Jumbo drainage.

Raptors present within the proposed development area likely favour hunting within the gladed heliskiing runs or forest cut blocks. These areas are dominated by shrub or small

tree seedlings, and this allows raptors to more easily hunt for small mammals and songbirds.

No raptor nest locations were identified during the June 2004 bird survey. However, based on these survey results, a pair of golden eagles may be nesting within or near the proposed JGR resort. Golden eagles often nest in steep cliffs and talus areas.

### **4.3 Species of Conservation Interest**

During the June 2004 field study, ENKON recorded 33 passerine and passerine-like bird species (mostly migratory), two migratory waterbird species, and two non-migratory raptor species. These observations did not include any red-listed, blue-listed or COSEWIC-listed species. However, harlequin duck, a species of local concern was observed at several points along Jumbo Creek, including near the proposed resort base.

### **4.4 Level of Detail**

According to the Project Specifications, “The survey must be detailed enough to allow an accurate estimate of presence/absence, relative abundance and habitat use.” The level of detail applied to the June 2004 bird survey should be sufficient to use the results as baseline information with which to compare future surveys of migratory birds. However, to be comparable, such surveys must utilise the same RISC survey protocols. The following assumptions must be met to assess relative abundance (RISC 1999):

1. Identical or statistically comparable methodologies are used when comparison between areas or monitoring trends in one area over time is an objective of inventory effort.
2. Environmental, biological and sampling factors are kept as constant as possible to minimise differences in survey bias and precision between surveys.
3. Surveys are independent; one survey does not influence another.

If these assumptions are met then each replicate survey should show (on average) the same relative bias allowing calculation of trends and comparison between areas.

Future surveys conducted to assess relative abundance should meet the following prerequisites:

1. follow the RISC (1999) guidelines for determining relative abundance;
2. conduct the survey in mid-June after snow has melted from the sub-alpine area; and
3. consider conducting the survey in mildly rainy weather, as the June 2004 survey was conducted during spring rains.

## **POTENTIAL IMPACTS AND MITIGATION**

A detailed summary of potential impacts to migratory and non-migratory birds is provided in the original JGR Project Report (Appendix 3B – Wildlife Resources). This chapter identifies potential construction and operation impacts and recommends specific mitigation measures based on the results of the field study. It also summarizes the previous impact assessment and mitigation measures.

The relevant sections of Project Report Appendix 3B have been revised to incorporate the information contained in this chapter. The complete revised sections are attached as Appendix B.

### **5.1 Migratory Birds**

#### **5.1.1 Construction Impacts**

##### **Songbirds**

Clearing and construction of the resort base and ski runs will result in permanent loss of bird habitat. This habitat loss will occur primarily in forest cut-blocks, where the resort base will be built. Loss of forest habitat has been minimized by selecting a cut-block for the resort base and by planning most of the ski runs along existing gladed heliskiing runs or in alpine areas that will not require clearing.

Neither base area nor ski run construction will affect critical habitat for migratory songbirds. All of the species observed during the June 2004 surveys are habitat generalists. All species observed are expected to continue to breed in the area. Overall populations of some of these bird species may be reduced slightly, but the viability of local populations is not likely to be compromised. Bird species that flourish in anthropogenic settings, such as Clark's nutcracker and gray jay, are likely to increase in numbers.

Birds inhabiting areas not directly impacted by ski run development will be subjected to a considerable level of sensory disturbance during clearing and construction. Disturbed birds may temporarily be displaced to areas away from disturbance. There is some potential for nest abandonment if construction occurs during the nesting season.

Overall impacts of the project activity on migratory bird species are considered to be of low<sup>8</sup> significance following mitigation.

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<sup>8</sup> Potential impact may result in a slight decline in resource in study area during the life of the project. Research, monitoring and/or recovery initiatives would not normally be required. (From Natural Resources Canada (2003) and cited in The Application Terms of Reference for Whistler Nordic Centre Project)

## **Harlequin Duck**

Construction activities potentially could disturb harlequin ducks, which likely use Jumbo Creek in and around the resort base for nesting. However, the riparian areas will not be directly affected by construction because they will be protected by a 30-m riparian buffer. Thus impacts to this species of concern should be minimal.

### **5.1.2 Operational Impacts**

#### **Songbirds**

Operational impacts on migratory songbirds are expected to be low. Most of the species observed are highly adaptable and coexist well with humans. Some human-habituated species such as gray jay and Clark's nutcracker may benefit from human food sources during the winter.

Summer ski run maintenance activities might disturb nesting birds, possibly leading to nest failure, particularly if the activities were conducted during the nesting period. Impacts are most likely for species utilizing either meadows or early-successional habitat where maintenance of vegetation in an early seral condition for ski trails could impact ground- and shrub-nesting birds. However, since much of the vegetation maintenance occurs in the late-summer season, many of the ground-nesting birds would have finished nesting, and thus would not be impacted. Moreover, since maintenance activities are likely infrequent and short in duration, overall impacts are expected to be localized temporally and spatially and of low significance. Continued disturbance is expected to be limited since lift and trail maintenance would occur over a relatively short period each summer and would not occur on every trail every summer.

#### **Harlequin Duck**

Any human activity along the Jumbo Creek riparian corridor could be disruptive to nesting harlequin ducks. Except for skiing on the glaciers, the only summer activity planned for the JGR is one hiking trail, which will lead visitors to the top of Glacier Dome. This hiking trail will not intersect at any point with Jumbo Creek or harlequin duck habitat. Thus, there is relatively low potential for summer activities at JGR to disturb harlequin ducks. However, mitigation measures have been developed to prevent resort guests from entering the riparian areas of Jumbo Creek where they could disturb nesting ducks.

### **5.1.3 Mitigation Measures**

#### **General Mitigation**

According to the project specifications, the proponent should use the information garnered from the baseline migratory bird survey to "mitigate impacts on migratory birds by appropriate modifications to the resort design". The June 2004 bird survey results suggest that that JGR has located the resort base and the majority of resort structures and

sub-alpine ski runs in previously cleared areas. The resort as designed will not impact any critical habitat for bird species of conservation interest. In addition, it will not impact critical habitat for the more common migratory birds observed in the study area because these species are habitat generalists. Thus, there are no obvious resort design modifications that could more effectively mitigate impacts on migratory birds than does the current resort design.

### **Harlequin Duck**

To avoid disturbance harlequin ducks, the resort base design should direct all activity away from the Jumbo Creek corridor, especially at specific harlequin duck nesting sites. Design features to achieve this could include fencing the riparian protection and enhancement areas within the resort base and posting signs that state “Environmentally Sensitive Area - Entry Prohibited.”

The resort will not offer any water-based activities such as canoeing, kayaking or rafting. Furthermore, the resort management will discourage such activities and prohibit visitors, if any, who bring canoes, rafts or rafts from launching them anywhere on the JGR property.

In addition, resort staff should be trained in appropriate behaviour in the vicinity of harlequin ducks and their habitats. Information on protecting harlequin ducks should be conveyed to resort guests. Literature on harlequin ducks could be included with the literature on grizzly bears to be developed and distributed as part of the Grizzly Bear Management Plan.

## **5.2 Non-Migratory Birds**

### **5.2.1 Construction Impacts**

Specific nesting and feeding sites for non-migratory birds were not observed during the June 2004 wildlife surveys. In fact, very little non-migratory bird activity was recorded during the site inventory. Thus, the surveys did not produce any observations that would alter the impact assessment presented in the Project Report.

Construction is not expected to have a significant impact on the two non-migratory bird species seen during the 2004 survey, golden eagle and merlin. Nesting areas for golden eagle are often in steep cliffs and talus areas, which will be unaffected because they are far from the resort base and unsuitable for use as ski runs. Any impacts to merlin and other low-elevation nesting raptors are likely to be minor because the Jumbo Valley and the surrounding area provide these species with sufficient nesting opportunities.

In the long term, the development of shrub dominated habitats on ski runs will likely attract breeding populations of several species of songbirds and small mammals. The combination of higher densities of these prey species and preferred edge habitat may benefit raptor species such as golden eagle.

### **5.2.2 Operation Impacts**

Once the resort facilities are in place, further impacts to raptors on the site are expected to be relatively low. There is some potential for mortality due to window strikes and vehicle collisions. Presence of bird feeders and higher small bird populations may benefit diurnal species, which prey on small songbirds.

Disturbance of ground nesting birds could occur during maintenance of ski runs, possibly leading to nest failure, if the activities were conducted during the nesting period. Overall impacts are expected to be localized temporally and spatially and of low significance, provided that maintenance activities are infrequent and short in duration. Continued disturbance is expected to be limited since lift and trail maintenance would occur over a relatively short period each summer and would not occur on every trail every summer.

The potential for raptor collisions with transmission lines is low and not considered to be significant. However, the occurrences of raptor electrocutions due to transmission lines should be monitored and an adaptive management plan devised if deemed necessary. Any problem areas should be identified during maintenance activities. Reporting records can locate problem poles and regions for potential retrofitted with protection devices. Refer to *Suggested Practices for Raptor Protection on Power Lines* (RRF and EEI 1996) for a detailed examination of mitigation techniques to protect raptors from powerline electrocutions.

Hikers are expected to cause some sensory disturbance to raptors should trails extend into the higher elevations, though the level of disturbance is not expected to be unacceptable, especially because hiking will occur on one designated trail to Glacier Dome. Resort management will train staff and provide information to guests on appropriate behaviour in the vicinity of raptors and their nesting habitat.

Ground nesting, non-migratory birds, such as blue grouse, may be vulnerable to off-trail use. The greatest potential impacts will likely occur in subalpine and alpine areas where many of the breeding birds are ground-dwelling nesters. Since there will be only one hiking trail within the resort (the trail to Glacier Dome), off-trail use leading to habitat loss is expected to be of low significance for alpine areas. Hiking will not be possible in high-alpine areas.

### **5.2.3 Mitigation Measures**

As noted for non-migratory birds, the resort base design and mountain plan have avoided impacts on critical non-migratory bird habitat. Based on the results of the June 2004 bird survey, there is no additional mitigation for non-migratory birds beyond that presented in the Project Report. This section summarizes the mitigation measures presented in the Project Report.

If active raptor nests are found within the construction area during land development activities, all activity in the vicinity of the nest will be halted until a management plan is developed with the cooperation of regulatory agencies. The *Interim Wildlife Guidelines for Commercial Backcountry Recreation British Columbia* (MWLAP 2002) should be considered as a template.

The Northern goshawk requires undisturbed habitat and requires a nest area ranging from 8 ha (Reynolds 1983) to 50 ha (McCarthy *et al.* 1989). These nest areas also require mature/old-growth stand structure and relatively closed canopies with corresponding open understories (Kennedy 1988; Hayward and Escano 1989; Reynolds *et al.* 1992). In light of these habitat requirements for Northern goshawk, it would be an unlikely resident of the Jumbo Valley, due to habitat fragmentation from previous logging and current heliskiing.

Therefore, the nest protection guidelines for Bald Eagle from MWLAP (2002) would be appropriate for the nests of other raptors that might occur in the project area:

1. Prevent facility development within 150 m of nest trees.
2. Minimize human activities within 150 m of active nests between February and July.
3. Maintain all existing habitat components within 150 m of nest trees.
4. Train staff and provide information to guests on appropriate behaviour in the vicinity of raptors and their nesting habitat.

An attempt will be made to retain all large old-growth trees or other trees that may be suitable for raptor nesting and perching. Perching opportunities are not expected to be limiting along the edges of ski runs.

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## **APPENDICES**

## **APPENDIX A**

### **Common Passerine and Passerine-Like Bird Species Residing within the Engelmann Spruce-Subalpine Fir (ESSF) and Alpine Tundra (AT) Biogeoclimatic Zones**

LIST OF BIRDS							
COMMON NAME	LATIN NAME	A	B	Status	RANGE	HABITAT TYPE	REFERENCE
ORDER GAVIIFORMES (Loons)							
Common Loon	<i>Gavia immer</i>		U	Yellow	~ESSF, AT	subalpine lakes	1,5,6
ORDER PODICIPEDIFORMES (Grebes)							
Horned Grebe	<i>Podiceps auritus</i>		U	Yellow		ponds, lakes	1,5,6
Eared Grebe	<i>Podiceps nigricollis</i>		U	Yellow		reed lakes	1,5,6
ORDER CICONIIFORMES (Hérons)							
American Bittern	<i>Botaurus lentiginosus</i>		U			bogs, marsh	1,5,6
ORDER ANSERIFORMES (Geese, Ducks)							
Canada Goose	<i>Branta canadensis</i>		P	Yellow		B,M -Can. Rcks	1,5,6
Mallard	<i>Anas platyrhynchos</i>		E	Yellow		Can. Rcks	1,5,6
Gadwall	<i>Anas strepera</i>		U	Yellow		not B in Rcks	1,5,6
Northern Pintail	<i>Anas acuta</i>		U	Yellow		Can. Rcks	1,5,6
Green-winged Teal	<i>Anas crecca</i>		U	Yellow		Can. Rcks	1,5,6
Blue-winged Teal	<i>Anas discors</i>		U	Yellow		lakes, rivers	1,5,6
American Widgeon	<i>Anas americana</i>		U	Yellow		occ. B	1,5,6
Wood Duck	<i>Aix sponsa</i>		U	Yellow		not in Koot. Nat Park	1,5,6
Ring-necked Duck	<i>Aythya collaris</i>		U	Yellow		common in Can. Rcks	1,5,6
Northern Shoveler	<i>Anas clypeata</i>		U	Yellow			1,5,6
Lesser Scaup	<i>Aythya affinis</i>		U	Yellow		large lakes	1,5,6
Barrow's Goldeneye	<i>Bucephala islandica</i>		U	Yellow		mnt lakes/ponds	1,5,6
Bufflehead	<i>Bucephala albeola</i>		U	Yellow		lake/marshes/rivers	1,5,6
Harlequin Duck	<i>Histrionicus histrionicus</i>		P	Y.S4	ESSF	g	1,5,6
Hooded Merganser	<i>Lophodytes cucullatus</i>		U	Yellow		streams, ponds	1,5,6
Common Merganser	<i>Mergus merganser</i>		U	Yellow		boreal forest, stream	1,5,6
ORDER FALCONIFORMES (Vultures, Hawks, Falcons)							
Northern Goshawk	<i>Accipiter gentilis laingi</i>	*	K	Red	ESSF	c	1,5,6,7
Northern Goshawk	<i>Accipiter gentilis atricapillus</i>	*	K	Y.S4	ESSF	c	1,5,6,7
Sharp-shinned Hawk	<i>Accipiter striatus</i>		E	Yellow	AT	l	1,5,6
Cooper's Hawk	<i>Accipiter cooperii</i>		E	Y.S4		B S. Rcks	1,5,6
Red-tailed Hawk	<i>Buteo jamaicensis</i>		E	Yellow		lower elevations	1,5,6
Golden Eagle	<i>Aquila chrysaetos</i>	*	K	Y.S4	ESSF, AT	dfhkm	1,5,6,7
Bald Eagle	<i>Haliaeetus leucocephalus</i>		E	Yellow		near water/fish	1,5,6
Northern Harrier	<i>Circus cyaneus</i>		P	Y.S4	migrant	breeds in Waterton	1,5,6
Osprey	<i>Pandion haliaetus</i>	*	K	Y.S4		near water/fish	1,5,6,7

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E=Expected  
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U=Unlikely

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COMMON NAME	LATIN NAME	A	B	Status	RANGE	HABITAT TYPE	REFERENCE
Peregrine Falcon	<i>Falco peregrinus</i>	*	K	Red	ESSF	f	1,5,6,7
Merlin	<i>Falco columbarius</i>		E	Yellow	ESSF	subalpine	1,5,6
American Kestrel	<i>Falco sparverius</i>	*	K	Yellow		tree cavity nest	1,5,6,7
ORDER GALLIFORMES (Grouse)							
Blue Grouse	<i>Dendragapus obscurus</i>		E	Yellow	ESSF	a, b, d	1,5,6
Spruce Grouse	<i>Dendragapus canadensis</i>		E	Yellow	ESSF	a	1,5,6
Ruffed Grouse	<i>Bonasa umbellus</i>	*	K	Yellow	ESSF	g	1,5,6,7
Sharp-tailed Grouse	<i>Tympanuchus phasisnellus</i>		U	Y.S4			5,6
White-tailed Ptarmigan	<i>Lagopus leucurus</i>	*	K	Yellow	AT	h, i, k, l	1,5,6,7
ORDER GRUIFORMES (Rails)							
Sora	<i>Porzana carolina</i>		U	Yellow		slough, shallow lks	1,5,6
American Coot	<i>Fulica americana</i>		U	Yellow		will use slow rivers	1,5,6
ORDER CHARADRIIFORMES (Shorebirds)							
Killdeer	<i>Charadrius vociferus</i>		U	Yellow		B in Can. Rcks	1,5,6
Common Snipe	<i>Gallinago gallinago</i>		U	Yellow		B in Can. Rcks	1,5,6
Spotted Sandpiper	<i>Actitis macularia</i>		E	Yellow			1,5,6
ORDER COLUMBIFORMES (Doves)							
Mourning Dove	<i>Zenaida macroura</i>		U	Yellow		scare in Can. Rcks	1,5,6
ORDER STRIGIFORMES (Owls)							
Great Horned Owl	<i>Bubo virginianus</i>	*	K	Yellow			1,5,6,7
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	*	K	Yellow	ESSF	c	1,5,6,7
Northern Hawk-Owl	<i>Surnia ulula</i>		U	Yellow	ESSF	c	1,5,6
Barred Owl	<i>Strix varia</i>	*	K	Yellow	ESSF	a	1,5,6,7
Great Gray Owl	<i>Strix nebulosa</i>		E	Yellow%	ESSF	a	1,5,6
Long-eared Owl	<i>Asio otus</i>		E	Y.S4			1,5,6
Short-eared Owl	<i>Asio flammeus</i>		U	Yellow			1,5,6
Northern Saw-whet Owl	<i>Aegolius acadicus acadicus</i>		E	Yellow			1,5,6
ORDER CAPRIMULGIFORMES (Goatsuckers)							
Common Nighthawk	<i>Chordeiles minor</i>		U	Yellow		open areas	1,5,6
ORDER APODIFORMES (Swifts, Hummingbirds)							
Black Swift	<i>Cypseloides niger</i>		P	Yellow			1,5,6
Vaux's Swift	<i>Chaetura vauxi</i>		U	Y.S4		rare in Columbian M.	1,5,6
Rufous Hummingbird	<i>Selasphorus rufus</i>		P	Yellow	ESSF, AT	bci	1,5,6
Calliope Hummingbird	<i>Stellula calliope</i>		P	Yellow			1,5,6
Belted Kingfisher	<i>Ceryle alcyon</i>		P	Yellow			1,5,6

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ORDER PICIFORMES (Woodpeckers)							
Northern Flicker	<i>Coaptetes auratus</i>		P	Yellow			1,5,6
Pileated Woodpecker	<i>Dryocopus pileatus</i>	*	K	Yellow			1,5,6,7
Hairy Woodpecker	<i>Picoides villosus</i>		P	Yellow			1,5,6
Three-toes Woodpecker	<i>Picoides tridactylus</i>		U	Yellow		more common north	
Black-backed Woodpecker	<i>Picoides arcticus</i>		P	Yellow	ESSF	ac	1,5,6
Downy Woodpecker	<i>Picoides pubescens</i>		P	Yellow	ESSF	a, c	1,5,6
ORDER PASSERIFORMES (Perching Birds)							
Eastern Kingbird	<i>Tyrannus tyrannus</i>		P	Yellow	in Rockies	open water	1,5,6
Western Kingbird	<i>Tyrannus verticalis</i>		U	Yellow			1,5,6
Say's Phoebe	<i>Sayornis saya</i>			Yellow	AT	m	1,5,6
Willow Flycatcher	<i>Empidonax traillii</i>		P	Yellow			1,5,6
Least Flycatcher	<i>Empidonax minimus</i>		P	Yellow			1,5,6
Hammond's Flycatcher	<i>Empidonax hammondii</i>		P	Yellow	ESSF	a	1,5,6
Olive-sided Flycatcher	<i>Contopus borealis</i>		P	Yellow			1,5,6
Horned Lark	<i>Eremophila alpestris</i>		P	Y.S4	AT	h	1,5,6
Violet-green Swallow	<i>Tachycineta thalassina</i>		P	Yellow			1,5,6
Tree Swallow	<i>Tachycineta bicolor</i>		P	Yellow			1,5,6
Bank Swallow	<i>Riparia riparia</i>		P	Yellow			1,5,6
Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>		P	Yellow			1,5,6
Barn Swallow	<i>Hirundo rustica</i>		P	Yellow			1,5,6
Cliff Swallow	<i>Hirundo pyrrhonota</i>		P	Yellow			1,5,6
Gray Jay	<i>Perisoreus canadensis</i>	*	K	Yellow			1,5,6,7
Steller's Jay	<i>Cyanocitta stelleri</i>	*	K	Yellow	ESSF	a	1,5,6,7
Black-billed Magpie	<i>Pica pica</i>		U	Yellow			1,5,6
Common Raven	<i>Corvus corax</i>	*	K	Yellow	AT	k	1,5,6,7
Common Crow	<i>Corvus brachyrhynchos</i>	*	K	Yellow			1,5,6,7
Clark's Nutcracker	<i>Nucifraga columbiana</i>	*	K	Yellow			1,5,6,7
Black-capped Chickadee	<i>Parus atricapillus</i>		P	Yellow			1,5,6
Mountain Chickadee	<i>Parus gambeli</i>		P	Yellow	ESSF	a	1,5,6
Boreal Chickadee	<i>Parus hudsonicus</i>		P	Yellow			1,5,6
Red-breasted Nuthatch	<i>Sitta canadensis</i>		P	Yellow	ESSF	a	1,5,6
Brown Creeper	<i>Certhia americana</i>		P	Yellow			1,5,6
American Dipper	<i>Cinclus mexicanus</i>	*	K	Yellow	ESSF	g	1,5,6,7
House Wren	<i>Troglodytes aedon</i>		P	Yellow			1,5,6

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Winter Wren	<i>Troglodytes troglodytes</i>		P	Yellow	ESSF	a	1,5,6
Rock Wren	<i>Salpinctes obsoletus</i>		P	Yellow			1,5,6
American Robin	<i>Turdus migratorius</i>	*	K	Yellow			1,5,6,7
Varied Thrush	<i>Ixoreus naevius</i>	*	K	Yellow	ESSF	a	1,5,6,7
Hermit Thrush	<i>Catharus guttatus</i>		P	Yellow			1,5,6
Swainson's Thrush	<i>Catharus ustulatus</i>		P	Yellow			1,5,6
Veery	<i>Catharus fuscescens</i>		P	Y.S4			1,5,6
Mountain Bluebird	<i>Sialia currucoides</i>	*	K	Yellow			1,5,6,7
Townsend's Solitaire	<i>Myadestes townsendi</i>		P	Yellow	AT	m	1,5,6
Golden-crowned Kinglet	<i>Regulus satrapa</i>		P	Yellow	ESSF	a	1,5,6
Ruby-crowned Kinglet	<i>Regulus calendula</i>		P	Yellow			1,5,6
Water Pipit	<i>Anthus spinoletta</i>		P	Yellow	AT	h	1,5,6
Bohemian Waxwing	<i>Bombycilla garrulus</i>		P	Yellow	ESSF	c	1,5,6
Cedar Waxwing	<i>Bombycilla cedrorum</i>		P	Yellow			1,5,6
European Starling	<i>Sturnus vulgaris</i>		E	Yellow			1,5,6
Solitary Vireo	<i>Vireo solitarius</i>		P	Yellow			1,5,6
Red-eyed Vireo	<i>Vireo olivaceus</i>		P	Y.S4			1,5,6
Warbling Vireo	<i>Vireo gilvus</i>		P	Yellow			1,5,6
Tennessee Warbler	<i>Vermivora peregrina</i>		U	Yellow			1,5,6
Orange-crowned Warbler	<i>Vermivora celata</i>		P	Yellow			1,5,6
Yellow Warbler	<i>Dendroica petechia</i>	*	K	Yellow			1,5,6,7
Yellow-rumped Warbler	<i>Dendroica coronata</i>		P	Yellow	ESSF	c	1,5,6
Townsend's Warbler	<i>Dendroica townsendi</i>		P	Yellow			1,5,6
Northern Waterthrush	<i>Seiurus noveboracensis</i>		P	Yellow			1,5,6
MacGillivray's Warbler	<i>Oporornis tolmiei</i>		P	Yellow			1,5,6
Common Yellowthroat	<i>Geothlypis trichas</i>		P	Yellow			1,5,6
Wilson's Warbler	<i>Wilsonia pusilla</i>		P	Yellow	ESSF	c	1,5,6
American Redstart	<i>Setophaga ruticilla</i>		P	Yellow			1,5,6
Western Meadowlark	<i>Sturnella neglecta</i>		U	Yellow			1,5,6
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>		U	Y.S4			1,5,6
Red-winged Blackbird	<i>Agelaius phoeniceus</i>		U	Yellow			1,5,6
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>		U	Yellow			1,5,6
Brown-headed Cowbird	<i>Molothrus ater</i>		U	Yellow			1,5,6
Western Tanager	<i>Piranga ludoviciana</i>		E	Yellow	ESSF	c	1,5,6
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>		P	Yellow			1,5,6

K=Known  
E=Expected  
P=Possible  
U=Unlikely

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COMMON NAME	LATIN NAME	A	B	Status	RANGE	HABITAT TYPE	REFERENCE
Luzuli Bunting	<i>Passerina amoena</i>		P	Yellow			1,5,6
Evening Grosbeak	<i>Coccothraustes vespertinus</i>		P	Yellow			1,5,6
Purple Finch	<i>Carpodacus purpureus</i>		P	Yellow	as migrants	breeks northern area	1,5,6
Cassin's Finch	<i>Carpodacus cassinii</i>		P	Yellow	ESSF	a	1,5,6
Pine Grosbeak	<i>Pinicola enucleator</i>		E	Yellow	ESSF	c	1,5,6
Rosy Finch	<i>Leucosticte arctoa</i>	*	K	Yellow	AT	h	1,5,6,7
Pine Siskin	<i>Carduelis pinus</i>		P	Yellow	ESSF	a	1,5,6
Red Crossbill	<i>Loxia curvirostra</i>		P	Yellow	ESSF	a	1,5,6
White-winged Crossbill	<i>Loxia leucoptera</i>		P	Yellow	ESSF	a	1,5,6
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>		P	Yellow			1,5,6
House Sparrow	<i>Passer domesticus</i>		P	Yellow			1,5,6
Savannah Sparrow	<i>Passerculus sandwichensis</i>		P	Yellow			1,5,6
Vesper Sparrow	<i>Poocetes gramineus</i>		U	Yellow	extreme north		1,5,6
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>		E	Yellow	ESSF	b	1,5,6
Clay-colored Sparrow	<i>Spizella pallida</i>		P	Yellow			1,5,6
Chipping Sparrow	<i>Spizella passerina</i>	*	K	Yellow			1,5,6,7
Brewer's Sparrow	<i>Spizella breweri</i>		P	Yellow			1,5,6
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>		E	Yellow			1,5,6
Fox Sparrow	<i>Passerella iliaca</i>		E	Yellow	ESSF	b	1,5,6
Lincoln's Sparrow	<i>Melospiza lincolni</i>		P	Yellow			1,5,6
Song Sparrow	<i>Melospiza melodia</i>		P	Yellow			1,5,6
Dark-eyed Junco	<i>Junco hyemalis</i>	*	K	Yellow	ESSF	c	1,5,6,7
Clark's Nutcracker	<i>Nucifraga columbiana</i>		E	Yellow	ESSF	a	1,5,6

**References:**

- 1.Ecosystems of British Columbia, D. Meidinger & J. Pojar
- 5.The Birds of Canada, W. Earl Godfrey
- 6.Birds of the Canadian Rockies, George W. Scotter, Tom J. Ulrich, Edgar T. Jones
- 7.Direct observation, field survey

- E=Expected
- P=Possible
- U=Unlikely
- K=Known

- S4=apparently secure
- A=Observed directly or through sign
- B=Species expected or could occur in Jumbo Valley

- a=Old-growth and mature coniferous forests
- b=Subalpine parkland meadows
- c=Young seral forests
- d=Steep rugged south aspect grasslands
- e=Avalanche tracks
- f=Rocky cliffs, talus and sparsely vegetated rocks

- g=Riparian areas, wetlands, meadows, floodplains, lakes and streams
- h=Alpine heath, grasslands, tundra and scrub
- i=Alpine meadows
- j=Windswept and south aspect alpine
- k=Krummholz

- K=Known
- E=Expected
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- U=Unlikely

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## **APPENDIX B**

### **Revision to Sections 2.12 to 2.14 of Project Report Appendix 3B – Wildlife Resources**

## **WILDLIFE IMPACTS AND MITIGATION**

### **2.12 Harlequin Duck**

#### **2.12.1 Overview of Occurrence**

According to the Canada Land Inventory mapping for waterfowl capability, the project area is class 7 habitat for waterfowl. This classification means that the site has no capacity for arable culture or permanent pasture (CLI 1998), two traits that are often required for suitable waterfowl habitat. The steep topography of the area makes it unsuitable for most waterfowl, with the exception of harlequin ducks. Harlequin ducks need fast-flowing streams, which contain abundant insect larvae. Jumbo Creek has these habitat characteristics.

In June 2004, ENKON observed harlequin ducks in Jumbo Creek near the proposed resort base. Since both male and female ducks were present, it is likely that harlequin ducks nest in the area.

#### **2.12.2 Overview of Impact on Habitat**

Harlequin ducks nest along streams with densely vegetated shorelines. The JGR resort base will be designed to preserve a 30-m undisturbed riparian buffer on both sides of Jumbo Creek. The ski runs and the single hiking trail will not approach the riparian area of Jumbo Creek. Widening of the access road along Jumbo Creek will be done on the upslope side to avoid encroachment into the riparian zone. Therefore, none of the construction activities will impact harlequin duck habitat.

#### **2.12.3 Construction Phase: Impacts and Mitigation**

##### *2.12.3.1 Ski Runs*

Construction of the ski runs will not have any impact on harlequin ducks.

##### *2.12.3.2 Resort Base and Roads*

Construction activities potentially could disturb harlequin ducks. In addition, erosion and sedimentation could degrade water quality, negatively affecting these ducks. However, the riparian setbacks will eliminate or minimize any disturbance or water quality impacts. In addition to the protection afforded by riparian buffer, implementation of a sediment and erosion control plan will minimize or eliminate effects on water quality. Thus, no residual impacts to harlequin ducks are anticipated.

### *2.12.3.3 Helicopter Use*

Helicopter use could disturb harlequin ducks. However, helicopter use during construction will be very limited (if helicopters are used at all). It is unlikely that this disturbance would cause ducks to abandon their nests or leave the area. Furthermore, effects, if any, would be temporary. Harlequin duck behaviour and breeding population would return to baseline levels after construction.

## **2.12.4 Operation Phase: Impacts and Mitigation**

### *2.12.4.1 Resort Base and Facilities*

#### Impacts

Any human activity along the Jumbo Creek riparian corridor during the summer could be disruptive to nesting harlequin ducks. Except for skiing on the glaciers, the only summer activity planned for the JGR is one hiking trail, which will lead visitors to the top of Glacier Dome. This hiking trail will not intersect at any point with Jumbo Creek or harlequin duck habitat. Thus, there is relatively low potential for summer activities at JGR to disturb harlequin ducks. However, mitigation measures have been developed to prevent resort guests from entering the riparian areas of Jumbo Creek where they could disturb nesting ducks.

#### Mitigation Measures

To avoid disturbance to harlequin ducks, the resort base design will direct all activity away from the Jumbo Creek corridor, especially at specific harlequin duck nesting sites. Design features to achieve this could include fencing the riparian protection and enhancement areas within the resort base and posting signs that state “Environmentally Sensitive Area - Entry Prohibited.”

The resort will not offer any water-based activities such as canoeing, kayaking or rafting. Furthermore, the resort management will discourage such activities and prohibit visitors, if any, who bring canoes, rafts or rafts from launching them anywhere on the JGR property.

Resort staff will be trained in appropriate behaviour in the vicinity of harlequin ducks and their habitats. Information on protecting harlequin ducks will be conveyed to resort guests. Literature on harlequin ducks could be included with the literature on grizzly bears to be developed and distributed as part of the Grizzly Bear Management Plan.

### *2.12.4.2 Winter Ski Operations*

Winter ski operations will not have any effects on harlequin ducks, which will be absent from the Jumbo Valley.

#### *2.12.4.3 Avalanche Control*

Avalanche control will not have any effects on harlequin ducks.

#### *2.12.4.4 Summer Ski Run Maintenance*

Summer ski run maintenance will not have any effects on harlequin ducks as it will not occur near Jumbo Creek.

#### *2.12.4.5 Stormwater Run-off*

Implementation of an effective stormwater management plan will prevent any adverse effects on water quality or riparian vegetation. Therefore, stormwater runoff from the resort base will not affect harlequin ducks.

#### *2.12.4.6 Transmission Lines*

Transmission lines will not have any effect on harlequin ducks.

#### *2.12.4.7 Access Development and Vehicle Traffic*

Collisions with vehicles are unlikely to be a significant source of mortality for harlequin ducks.

#### *2.12.4.8 Hikers*

Hikers will not significantly affect harlequin ducks. The JGR resort will contain only one hiking trail (to Glacier Dome), which will not cross or parallel Jumbo Creek. Off-trail hiking will be prohibited, and fencing of the riparian zone within the base area will further discourage hikers from walking along the creek.

#### *2.12.4.9 Garbage*

Garbage will not have any effect on harlequin ducks.

### **2.13 Migratory Birds**

#### **2.13.1 Overview of Occurrence**

The project area provides habitat for a possible 36 passerine and passerine-like species (Appendix A), most of which are migratory. Some species are migratory while others are winter residents. ENKON confirmed the presence of 33 of these species during the June 2004 bird surveys.

#### **2.13.2 Overview of Impact on Habitat**

Clearing and construction of the resort base and ski runs will result in permanent loss of bird habitat. This habitat loss will occur primarily in forest cut-blocks, where the resort

base will be built. Loss of forest habitat has been minimized by selecting a cut-block for the resort base and by planning most of the ski runs along existing gladed heliskiing runs or in alpine areas that will not require clearing.

Neither base area nor ski run construction will affect critical habitat for migratory songbirds. All of the species observed during the June 2004 surveys are habitat generalists. All species observed are expected to continue to breed in the area. Overall populations of some of these bird species may be reduced slightly, but the viability of local populations is not likely to be compromised. Bird species that flourish in anthropogenic settings, such as Clark's nutcracker and gray jay, are likely to increase in numbers.

### **2.13.3 Construction Phase: Impacts and Mitigation**

#### *2.13.3.1 Ski Runs*

##### Impacts

Clearing and construction of ski runs will result in a small, incremental permanent loss of habitats of importance to many bird species. However, impact on passerine and passerine-like habitat is being minimized the use of existing gladed heliskiing runs, and all species are expected to continue to breed in the area. Overall populations of forest-dwelling bird species might be reduced, but the viability of local populations is not likely to be compromised.

There may be an increased amount of edge habitat, which could lead to increased nest predation and nest parasitism (Manolis *et al.* 2002, Flaspohler *et al.* 2001). In addition, birds inhabiting areas not directly impacted by ski run development will be subjected to a considerable level of sensory disturbance. Overall impacts of the project activity on migratory bird species are considered to be of medium<sup>1</sup> significance on a sub-regional scale, but of low<sup>2</sup> significance following mitigation.

Development of shrub-dominated habitats on ski runs will attract a diversity of shrub-associated species (e.g., American robin, song sparrow). Populations of these and other species with similar habitat requirements are expected to increase within the project area. Other species dependent on dead trees for nesting cavities and foraging (e.g., woodpeckers) will likely take advantage of trees blown down along the edge of ski runs.

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<sup>1</sup> Potential impact could result in a decline in resource to lower-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives may be required. (From Natural Resources Canada (2003) and cited in The Application Terms of Reference for Whistler Nordic Centre Project)

<sup>2</sup> Potential impact may result in a slight decline in resource in study area during the life of the project. Research, monitoring and/or recovery initiatives would not normally be required. (From Natural Resources Canada (2003) and cited in The Application Terms of Reference for Whistler Nordic Centre Project)

### Mitigation Measures

Maintaining as much avian habitat as possible with the retention of large forested blocks between ski runs will ensure that forest-associated birds will continue to nest on the site. Minimizing fragmentation will help maintain interior forests for forest-associated birds. As previously noted, this has been achieved by maximizing the use of existing gladed ski runs and locating many of the runs on glaciers and alpine habitats that will not require clearing.

To abide by the *B.C. Wildlife Act*, clearing of natural habitats should not occur during the critical 01 April to 31 July breeding period for birds. If the short construction season makes this timing impractical, a recognized wildlife biologist will conduct a comprehensive and intensive nest survey of the subject area to ensure that no active nests will be disturbed by clearing. The nest survey protocol will follow the protocols of the Resources Information Standards Committee.

#### *2.13.3.2 Resort Base and Roads*

### Impacts

As with ski run development, some permanent habitat loss will result from resort development. The amount of habitat loss has been minimized by focusing the resort base in a confined area around the former sawmill site and locating the resort accommodations within an existing logging cut block.

The loss of habitat will directly impact young forest and shrub dependent bird species that currently breed in the area. Although the impact of development on passerine and passerine-like birds is considered to be of medium significance to local populations, on a regional basis, an extensive amount of similar habitat exists in adjacent areas. The viability of migratory bird populations in the area will be maintained.

### Mitigation Measures

Maintaining as much avian habitat as possible with the retention of large forested blocks between ski runs will ensure that forest-associated birds will continue to nest on the site. Riparian corridors will also be retained within all residential and commercial development areas because during the migratory period these corridors are particularly important foraging areas for neotropical birds. These riparian corridors, and other sensitive/unique songbird habitats, will be protected within the streamside buffers.

The resort design minimizes habitat fragmentation by focusing construction in already fragmented habitat. Minimizing fragmentation will help to maintain interior forests for forest-associated birds. The position of shrub-dominated areas, and resulting edge habitats, will likely result in higher species diversity and density than currently exists. However, to maintain the diversity of sensitive forest-dwelling songbirds retention of blocks of intact forest with linkage corridors to adjacent mature forests will be required.

When decommissioning and re-vegetating redundant logging roads and skid trails, methods that promote natural regeneration will be utilized to maintain forest structure. Conversely, silvicultural techniques could be used to provide and enhance requirement of specific migratory birds (e.g., retaining snags).

Clearing of habitats will not occur during the critical 01 April to 31 July breeding period in order to avoid direct impacts, unless a nest survey is conducted and a management plan is developed.

#### *2.13.3.3 Helicopter Use*

Helicopter use is not expected to have significant impacts on passerine and passerine-like birds.

### **2.13.4 Operation Phase: Impacts and Mitigation**

#### *2.13.4.1 Resort Base and Facilities*

Impacts to forest-dependent species from operation of the resort and facilities are expected to be low. Migratory bird mortality from window strikes and vehicle collisions may occur, but on a local scale the magnitude would be negligible. Because typical visits to the proposed JGR will only be short-term (i.e., no long-term residents), domestic cat predation on songbirds is not an expected factor.

New habitat niches will be created for more urban-associated bird species. In addition, residential feeders will create new foraging opportunities.

#### *2.13.4.2 Winter Ski Operations*

Winter ski operations are expected to have insignificant impacts on the few resident birds that remain at high elevations during the summer. Some human-habituated species such as Gray Jay and Clark's Nutcracker may benefit from human food sources during the winter.

#### *2.13.4.3 Avalanche Control*

Avalanche control activities could result in sensory disturbance to high elevation birds occurring close to avalanche cannons. However, winter bird populations are generally very low and widely distributed in high elevation areas. Thus, overall effects are expected to be negligible.

#### *2.13.4.4 Summer Ski Run Maintenance*

Disturbance of nesting birds during maintenance activities could occur, possibly leading to nest failure, particularly if the activities were conducted during the nesting period. Impacts are most likely for species utilizing either meadows or early-successional habitat where maintenance of vegetation in an early seral condition for ski trails may impact ground- and shrub-nesting birds. However, since much of the vegetation maintenance

occurs in the late summer season, many of the ground-nesting birds would have finished nesting, and thus would not be impacted. Moreover, since maintenance activities are likely infrequent and short in duration, overall impacts are expected to be localized temporally and spatially and of low significance. Continued disturbance is expected to be limited since lift and trail maintenance would occur over a relatively short period each summer and would not occur on every trail every summer.

#### *2.13.4.5 Stormwater Run-off*

With an effective stormwater management plan in place the potential for loss of riparian habitat will be small. Thus, stormwater runoff will not affect migratory birds.

#### *2.13.4.6 Transmission Lines*

The potential for bird collisions with transmission lines is expected to be low. Shrub-maintained habitats below transmission lines will provide suitable breeding and migratory habitats for a variety of species. These areas may be particularly important during the migratory period.

#### *2.13.4.7 Access Development and Vehicle Traffic*

Mortality caused by vehicle collisions is likely to be of low significance to local migratory bird populations.

#### *2.13.4.8 Hikers*

Impacts from hikers on most forest dwelling songbirds are expected to be insignificant, although some ground nesting birds may be vulnerable to off-trail use. A trail management plan will minimize off-trail use, which should prevent habitat loss from disturbance of alpine vegetation.

#### *2.13.4.9 Garbage*

Accessible garbage may attract Gray jay and Clark's Nutcracker. These species are generally considered to be of a minor nuisance. Stringent garbage management will greatly reduce the availability of garbage to scavengers.

## **2.14 Non-migratory Birds**

### **2.14.1 Overview of Occurrence**

Specific non-migratory bird nesting and feeding sites were not observed during the June 2004 wildlife surveys; in fact, very little non-migratory bird activity was recorded during the site inventory. The only species that ENKON observed were Golden Eagle and Merlin. Raptors observed in Jumbo Valley by other to date include Osprey, Red-tailed Hawk, Rough-legged Hawk, Goshawk, American kestrel, Barred Owl, Great-horned owl and Northern Pygmy Owl. Bald Eagle, a species of concern, has not been observed in the

project area during field surveys. It is acknowledged that it may occur in the area, but most likely as a migrant. Bald Eagles are generally associated with large bodies of water or rivers with salmon spawning runs, both of which do not occur within the project boundaries. Project impacts on Bald Eagles are expected to be negligible.

#### **2.14.2 Overview of Impact on Habitat**

As noted for non-migratory birds, the resort base design and mountain plan have avoided impacts on critical non-migratory bird habitat. Based on the June 2004 bird surveys, no project modification is required to protect raptors or non-migratory ground birds.

The rock bluffs and ledges at the upper elevations provide ideal nesting sites for several raptors, while the remaining mature coniferous stands and the open burned and/or logged valley slopes provide habitat for others. The project facilities will not modify these habitats.

Specific raptor and ground bird nesting and feeding sites were not observed during the wildlife surveys. However, if land clearing during the nesting season were necessary, a non-migratory bird nest survey would be planned for the construction stage of the project. During that time nests, if present, would be identified, and construction and operational plans would be adjusted, if necessary. If raptor nests were found within the area earmarked for land clearing, the appropriate government agency would be consulted to discuss development options.

A summary of potential environmental effects, which may occur directly or indirectly as a result of resort construction and operations follows in the sections below.

#### **2.14.3 Construction Phase: Impacts and Mitigation**

##### *2.14.3.1 Ski Runs*

###### Impacts

Construction is not expected to have a significant impact on the two non-migratory bird species seen during the 2004 survey, golden eagle and merlin. Nesting areas for golden eagle are often in steep cliffs and talus areas, which will be unaffected because they are far from the resort base and unsuitable for use as ski runs. Any impacts to merlin and other low-elevation nesting raptors are likely to be minor because the Jumbo Valley and the surrounding area provide these species with sufficient nesting opportunities.

Construction of ski runs will cause sensory disturbance and some loss of habitat for other raptors. Removal of older forests, which provide foraging and roosting opportunities for owl species, could result in negative impacts to resident owls, particularly in the area of nest sites. Due to very limited clearing planned for older forests, the overall impact to older-forest associated raptors is considered to be of low significance.

Despite the results of the 2004 bird surveys, there is a potential for raptors to nest within the area proposed for development. Permanent habitat loss would impact raptors occurring in these areas. Those occupying adjacent habitats will be subjected to high levels of sensory disturbance during construction. Overall impacts may be of medium significance to local raptor populations.

Permanent habitat alteration (e.g., conversion of forest to shrub, or clearing of habitat for structures) could lead to indirect mortality and alienation of habitat. Temporary construction impacts may result from clearing for ski lift rights-of-way. However, vegetation would be allowed to regenerate naturally following installation of ski lifts.

Potential permanent construction impacts to raptors could include a decrease in the population and fragmentation of habitat. Direct losses will be prevented by strict adherence to the *Wildlife Act* to avoid disturbing nesting birds. Construction activity inside the breeding window and the ensuing noise may also lead to nest abandonment, which can lead to low survivorship of young.

In the long term, the development of shrub dominated habitats on ski runs will likely attract breeding populations of several species of songbirds and small mammals. The combination of higher densities of these prey species and preferred edge habitat may benefit some raptor species (e.g. Golden Eagle).

#### Mitigation Measures

Retention of riparian habitats along creeks will ensure that important breeding and foraging habitat for many raptor species is maintained and that corridor-linkages are maintained between core forested areas.

If active raptor nests are found within the construction area during land development activities, all activity in the vicinity of the nest will be halted until a management plan is developed with the cooperation of regulatory agencies. The *Interim Wildlife Guidelines for Commercial Backcountry Recreation British Columbia* (MWLAP 2002) should be considered as a template.

The Northern goshawk requires undisturbed habitat and requires a nest area ranging from 8 ha (Reynolds 1983) to 50 ha (McCarthy *et al.* 1989). These nest areas also require mature/old-growth stand structure and relatively closed canopies with corresponding open understories (Kennedy 1988; Hayward and Escano 1989; Reynolds *et al.* 1992). In light of these habitat requirements for Northern goshawk, it would be an unlikely resident of the Jumbo Valley, due to habitat fragmentation from previous logging and current heliskiing.

Therefore, the nest protection guidelines for Bald Eagle from MWLAP (2002) would be appropriate for the nests of other raptors that might occur in the project area:

1. Prevent facility development within 150 m of nest trees.
2. Minimize human activities within 150 m of active nests between February and July.
3. Maintain all existing habitat components within 150 m of nest trees.
4. Train staff and provide information to guests on appropriate behaviour in the vicinity of raptors and their nesting habitat.

An attempt will be made to retain all large old-growth trees or other trees that may be suitable for raptor nesting and perching. Perching opportunities are not expected to be limiting along the edges of ski runs.

#### *2.14.3.2 Resort Base and Roads*

Impacts of and mitigation for the resort base and roads are similar to those described for the ski runs.

#### *2.14.3.3 Helicopter Use*

Helicopter use is not expected to result in significant levels of sensory disturbance to raptors.

### **2.14.4 Operation Phase: Impacts and Mitigation**

#### *2.14.4.1 Resort Base and Facilities*

Once the resort facilities are in place, further impacts to raptors on the site are expected to be relatively low. There is some potential for mortality due to window strikes and vehicle collisions. Presence of bird feeders and higher small bird populations may benefit diurnal species, which prey on small songbirds.

#### *2.14.4.2 Winter Ski Operations*

Resident raptors are expected to move to lower elevations during the winter and are unlikely to interact with winter ski operations at higher elevations.

#### *2.14.4.3 Avalanche Control*

Most raptors will occur at lower elevations during the winter, thus will likely not be disturbed by avalanche control activities.

#### *2.14.4.4 Summer Ski Run Maintenance*

Summer ski run maintenance will likely occur sporadically and be of short duration. Removal of forage habitat (i.e., forest edges) preferred by hunting raptors is not expected to result in measurable changes in populations.

Disturbance of nesting birds during maintenance activities could occur, possibly leading to nest failure, particularly if the activities were conducted during the nesting period. Overall impacts are expected to be localized temporally and spatially and of low significance, provided that maintenance activities are infrequent and short in duration. Continued disturbance is expected to be limited since lift and trail maintenance would occur over a relatively short period each summer and would not occur on every trail every summer.

#### *2.14.4.5 Stormwater Run-off*

The overall potential loss of riparian habitat is expected to be small as there will be an effective stormwater management plan in place to control stormwater events. Thus, no effects on raptor habitat are anticipated.

#### *2.14.4.6 Transmission Lines*

The potential for raptor collisions with transmission lines is low and not considered to be significant. However, the occurrences of raptor electrocutions due to transmission lines should be monitored and an adaptive management plan devised if deemed necessary. Any problem areas should be identified during maintenance activities. Reporting records can locate problem poles and regions for potential retrofitted with protection devices. Refer to *Suggested Practices for Raptor Protection on Power Lines* (RRF and EEI 1996) for a detailed examination of mitigation techniques to protect raptors from powerline electrocutions.

#### *2.14.4.7 Access Development and Vehicle Traffic*

The potential for vehicle collisions with raptors is considered to be low.

#### *2.14.4.8 Hikers*

Hikers are expected to cause some sensory disturbance to raptors should trails extend into the higher elevations, though the level of disturbance is not expected to be unacceptable, especially because hiking will occur on one designated trail to Glacier Dome. Resort management will train staff and provide information to guests on appropriate behaviour in the vicinity of raptors and their nesting habitat.

Ground nesting, non-migratory birds, such as Blue grouse, may be vulnerable to off-trail use. The greatest potential impacts will likely occur in subalpine and alpine areas where many of the breeding birds are ground-dwelling nesters. Since there will be only one hiking trail within the resort (the trail to Glacier Dome), off-trail use leading to habitat loss is expected to be of low significance for alpine areas. Hiking will not be possible in high-alpine areas.

*2.14.4.9 Garbage*

Garbage will be managed through the waste management plan. Impacts from garbage will not be a factor for resident raptors.