FINAL
REPORT ON

BASELINE WILDLIFE AND WILDLIFE HABITAT FOR THE PROPOSED NICO PROJECT

Submitted to:

Fortune Minerals Limited
Suite 1902, 140 Fullarton Street
London, Ontario
N6A 5P2

Prepared by:

Golder Associates Ltd.
1721 8th Street
Saskatoon, Saskatchewan
S7H 0T4

November 2010 **08-1373-0017.7200**

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 WILDLIFE AND WILDLIFE HABITAT

1.1 INTRODUCTION

Fortune Minerals Limited (Fortune) is proposing to develop the NICO Cobalt-Gold-Bismuth-Copper Project (Project) approximately 160 kilometres (km) northwest of Yellowknife in the Northwest Territories (NWT). The wildlife baseline is one component of a comprehensive environmental and socio-economic baseline program to collect information about the natural and socio-economic environment in the vicinity of the Project. The wildlife baseline describes existing wildlife and wildlife habitat, prior to Project development.

The Project is located within the Marian River drainage basin, approximately 10 km east of Hislop Lake at a latitude of 63°33' North and a longitude of 116°45' West (Figure 1.1-1). At the largest scale, the Project is located on the boundary of the Taiga Plains and Taiga Shield Ecoregions.

Within the region, wildlife represents an integral part of the terrestrial environment and many species have important ecological, cultural, social, and/or economic value, and are referred to as valued components (VCs). Valued components may be represented by either individual species or a guild (a group of organisms that exhibit similar habitat requirements and that respond in a similar way to changes in their environment). The wildlife baseline report presents a review and interpretation of qualitative and quantitative information from literature, and data collected during the 2003 to 2010 field programs for all VCs and other wildlife species.

The presence of specific vegetation types and structures (i.e., habitat types) influences the ability of wildlife species to thrive in an area. Vegetation is determined by the climate, soil, terrain, and hydrologic regime of an area. Baseline information will be used to develop plans for the monitoring and protection of wildlife that may be influenced by the Project. Species-specific objectives are outlined within each section of this wildlife baseline report. The broad objectives were as follows:

- to identify VCs for detailed description and assessment;
- to describe the population status and distribution of VCs and other wildlife;
- to describe the seasonal range, habitat use, and movement of migratory species;

LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- WATERCOURSE
- WATERBODY
- TREELINE
- REGIONAL STUDY AREA (2007 - PRESENT)

REFERENCE

Base data obtained from Atlas of Canada, DMTI and ESRI.
Projection: Canada Lambert Conformal Conic

100 0 100
SCALE 1:3,000,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
LOCATION OF THE NICO PROJECT

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-004-GIS
PROJECT No. 08-1373-0017 | SCALE AS SHOWN | REV. 2

DESIGN	LD	27 Oct. 2008
GIS	MK	26 Aug. 2010
CHECK	LY	17 Nov. 2010
REVIEW	GA	17 Nov. 2010

FIGURE: 1.1-1

- to identify important habitat features and describe the use of these habitats by wildlife in relation to the Project;
- to provide information on other wildlife that may be found within the vicinity of the Project; and
- to present sufficient baseline information to allow an assessment of potential direct and indirect Project effects on wildlife within a local study area (LSA), and indirect and cumulative effects within and beyond broader regional study areas (RSAs).

To meet these objectives, the wildlife baseline summary report has been organized into the following sections.

Section 1.2 provides the criteria used in the selection of VCs included in the wildlife baseline study.

Section 1.3 lists species at risk observed or expected within the study areas.

Section 1.4 provides a detailed description of the spatial boundaries, which were delineated based on the predicted spatial extent of the potential Project-related effects and life history attributes of wildlife species potentially occupying the area. Spatial boundaries included a LSA and RSA for the proposed mine site and a RSA for the Proposed NICO Project Access Road (NPAR).

Section 2 provides detailed descriptions of data collection methods for wildlife species selected as VCs, as well as other wildlife species potentially occurring near the Project.

Section 3 provides qualitative and quantitative information on the population status and distribution of VCs, local habitats, seasonal habitat use, and seasonal movement or high use areas. Where data are available, descriptions of other species occurring near the Project also are provided. Information is further supported by data from other developments in similar ecosystems.

1.1.1 SELECTION OF VALUED COMPONENTS

Valued components (VCs) represent physical, biological, cultural, social, and economic properties of the environment that are considered important to society. Wildlife VCs were selected for detailed study in the baseline report, and selection was based on the following criteria:

- species that reflect the interests of regulatory agencies and First Nations groups, communities, and other people with an interest in the Project;
- ecological, social, cultural, and economic aspects of the ecosystem;
- territorial (NWT General Status Ranking Program 2009) and federal (SARPR 2009) listed species; and
- current experience with environmental assessments and effects monitoring programs in NWT and Nunavut (e.g., Diavik Diamond Mine, Ekati Diamond Mine, Snap Lake Mine, Gahcho Kué Project, Doris North Gold Mine Project, and Jericho Diamond Project).

The selected VCs consisted of mammals (e.g., woodland and barren-ground caribou, moose, wolverine, black bear, marten, and muskrat) and birds (i.e., upland breeding birds, waterbirds, and raptors). The rationale for each VC is provided in Table 1.1-1. Baseline studies also included information on other species in the region, such as beaver (*Castor canadensis*), gray wolf (*Canis lupus*) red fox (*Vulpes vulpes*), and lynx (*Lynx canadensis*).

Table 1.1-1 Valued Components Selected for Detailed Evaluation within the Study Area

Valued Component	Rationale for Selection
Barren-ground caribou (*Rangifer tarandus groenlandicus*)	migratory species with extensive range requirements; may be affected by disturbance during seasonal movements; primary prey species for large carnivores in northern environments; important subsistence, economic, and cultural species; listed as '*sensitive*' in the NWT[a] (see Table 1.1-2)
Woodland caribou (*Rangifer tarandus caribou*)	extensive range requirements; may be affected by disturbance; primary prey species for large carnivores in boreal forest environments; important subsistence, economic, and cultural species; listed as '*sensitive*' in the NWT, and ranked as '*threatened*' by COSEWIC and SARA[a] (see Table 1.1-2)
Moose (*Alces alces*)	large home range size; important subsistence and cultural species; prey species for large carnivores
Black bear (*Ursus americanus*)	large home range size; top predator in ecosystem, can be attracted to human disturbance; long generation time means one individual may be affected by disturbance over multiple years resulting in potential regional population effects
Wolverine (*Gulo gulo*)	large home range size; generally not migratory, but long distance movements are made by transient individuals; can be attracted to human disturbance; because wolverine are long-lived, one individual may be affected by disturbance over multiple years resulting in potential regional population effects; listed as '*sensitive*' in the NWT and '*of special concern*' federally[a] (see Table 1.1-2)
Marten (*Martes americana*)	important economic species
Muskrat (*Ondatra zibethicus*)	important prey species for many carnivores in northern environments; tolerant of human activities, but may be affected by habitat loss, economically important; important subsidence species, especially during the spring.

Table 1.1-1 Valued Components Selected for Detailed Evaluation within the Project Study Area (continued)

Valued Component	Rationale for Selection
Upland breeding birds: Passerines	small territory size and high bird density means large numbers of upland birds may be affected by habitat loss; migratory birds are susceptible to population declines as a result of changing environmental conditions on breeding and overwintering habitats; some species are listed as '*sensitive'*, '*may be at risk*', or *'at risk'* in the NWT and '*of special concern'* and *'threatened'* federally[a] (see Table 1.1-2)
Waterbirds: Geese Ducks Loons Grebes	waterbirds may be affected by loss of shoreline habitat for breeding; important staging habitat may also be lost; sensitive to noise disturbance and human activity; some species are important for subsistence
Raptors: Falcons Hawks Eagles Owls	breeding habitat is limited; sensitive to noise disturbance and human activity during nesting; some populations declined in the late 20th century, and are listed as '*sensitive*' in the NWT and '*of special concern*' federally[a] (see Table 1.1-2)

[a] Territorial status is from the NWT General Status Ranking Program (2009) and federal status is from the Species at Risk Public Registry (SARPR 2009).

NWT= Northwest Territories.

1.1.2 SPECIES AT RISK

Guidelines for wildlife at risk drafted by the the Mackenzie Valley Environment Inpact Review Board (MVRB 2008) were used to identify species at risk known to occur or likely to occur within the study areas (Table 1.1-2). These guidelines recommended that species at risk include:

- species listed as '*at risk*' in the NWT General Status Ranking Program (2009);
- species listed as '*endangered*', '*threatened*', or of '*special concern*' by COSEWIC (2009); or
- species listed as '*endangered*', '*threatened*', or of '*special concern*' under Schedule 1 of SARA (2009).

Although not required by the MVRB species at risk guidelines, species listed as '*may be at risk*' under the Northwest Territories General Status Ranks were also included.

Olive-sided flycatcher and common nighthawk are the only species listed as '*at risk'* by the NWT General Status Ranking Program (2009) in the Project's RSAs, while the rusty blackbird is listed as '*may be at risk*'. Olive-sided flycatcher and common nighthawk, along with woodland caribou are listed as '*threatened'* by

COSEWIC (2009), while the rusty blackbird and all other species identified are listed as species of '*special concern*'. Though listed as a species of '*special concern*' by COSEWIC (2009), horned grebe is considered '*secure*' in the NWT (NWT General Status Ranking Program 2009). Rusty blackbird, common nighthawk, and woodland caribou are the only species listed under Schedule 1 of the SARA (SARPR 2009). Schedule 1 is the official list of wildlife species at risk. It classifies species as being *extirpated, endangered, threatened,* or *of special concern*. Once listed, measures to protect and recover a listed species are implemented. Schedule 2 and Schedule 3 are species that were designated at risk by COSEWIC prior to October 1999 and must be reassessed using revised criteria before they can be added to Schedule 1 of SARA (2009).

Table 1.1-2 Species at Risk Observed or Expected in the Regional Study Areas

Common Name	Scientific Name	NWT General Status Rank[a]	COSEWIC Status[b]	SARA Status[b]
Woodland caribou (Boreal population)	*Rangifer tarandus caribou*	Sensitive	Threatened	Threatened – Schedule 1
Wolverine (Western population)	*Gulo gulo*	Sensitive	Special Concern	No status
Peregrine falcon (*anatum/tundrius* complex) [c]	*Falco peregrinus anatum/tundrius*	Sensitive	Special Concern	Threatened Schedule 1 (*anatum*) Special Concern Schedule 3 (*tundrius*)
Short-eared owl	*Asio flammeus*	Sensitive	Special Concern	Special Concern-Schedule 3
Horned grebe (Western population)	*Podiceps auritus*	Secure	Special Concern	No status
Olive-sided flycatcher	*Contopus cooperi*	At Risk	Threatened	No status
Rusty blackbird	*Euphagus carolinus*	May be at Risk	Special Concern	Special Concern – Schedule 1
Common nighthawk	*Chordeiles minor*	At Risk	Threatened	Threatened – Schedule 1

[a] NWT Species Monitoring Infobase. http://www.enr.gov.nt.ca/_live/pages/wpPages/Infobase.aspx. Accessed Nov12, 2009.

[b] SARA Public Registry. http://www.sararegistry.gc.ca/default_e.cfm. Accessed March 31, 2010.

[c] The anatum and tundruis subspecies of Peregrine Falcon were reassessed by COSEWIC in 2007 and combined into one subpopulation complex. This subpopulation complex was listed by COSEWIC as Special Concern. This subpopulation is not listed under SARA (2009)

1.2 SPATIAL BOUNDARIES

The Project is within the Marian River drainage basin and is located within the Taiga Shield and Taiga Plains Ecoregions (Ecosystem Classification Working Group 2007, 2008). To facilitate the assessment and interpretation of potential

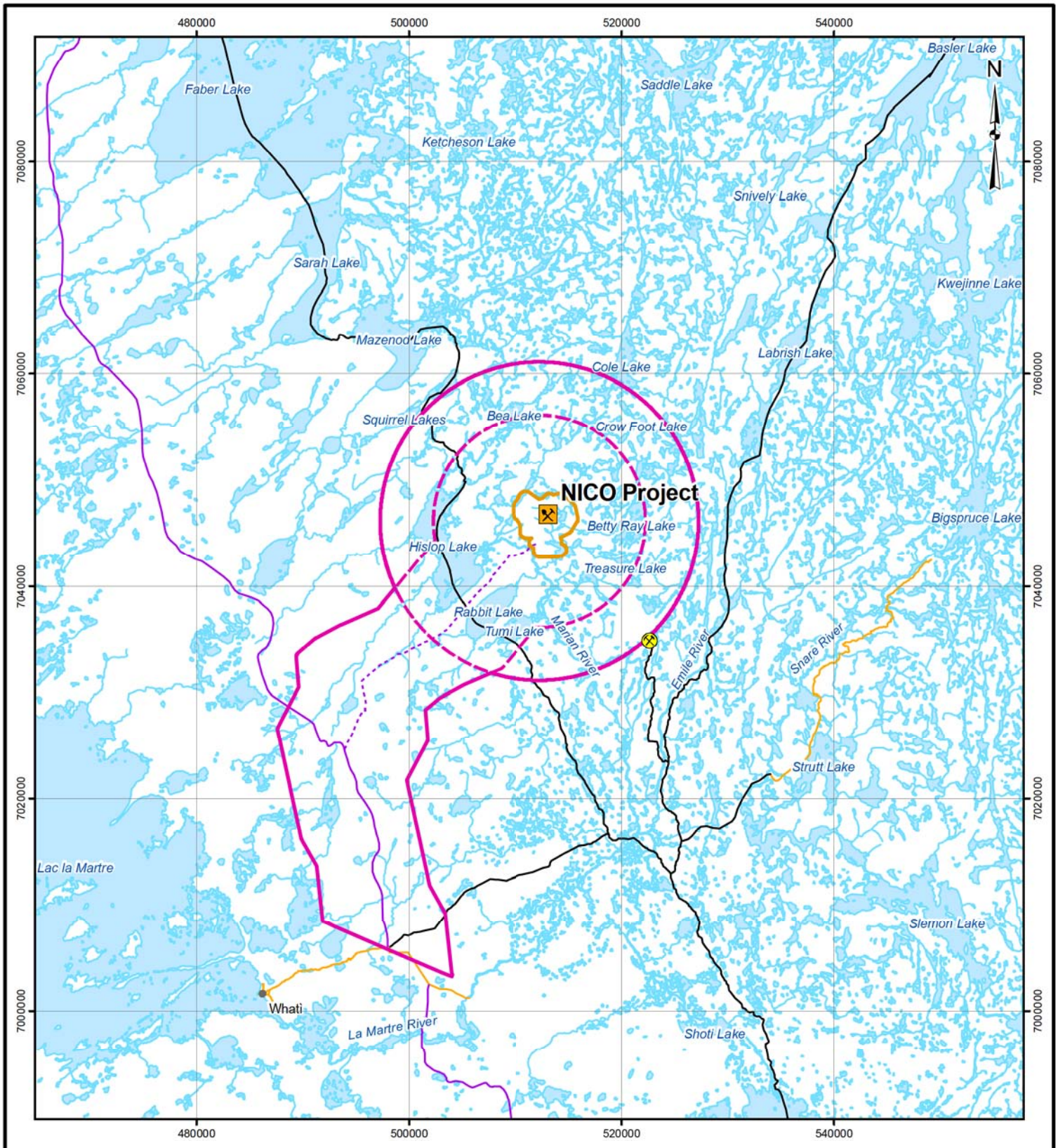
effects associated with the Project, it is necessary to define appropriate spatial boundaries.

Wildlife baseline studies were completed from 2003 to 2010 within the following spatial boundaries:

- regional study area for the proposed mine site (i.e., mine RSA);
- regional study area for the Proposed NICO Project Access Road (NPAR RSA); and
- local study area for the proposed mine site (i.e., LSA).

Spatial boundaries were delineated based on the predicted spatial extent of the Project-related effects and the life history attributes of wildlife species potentially influenced by the Project. The RSAs (Figure 1.2-1) were selected to capture any effect that may extend beyond 1 km from the Project and subsequently influence the abundance and distribution of populations. The LSA (Figure 1.2-1) was selected to assess the immediate direct and indirect effects of the proposed mine on individual animals and wildlife habitat.

Survey intensity varied within each spatial boundary, depending on the baseline study objectives for each wildlife species. Broader baseline studies were completed within the RSAs to assess wildlife seasonal distribution and movement, and detailed studies were completed in the LSA to assess habitat importance for each species (i.e., foraging, cover, and breeding).



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- LOCAL STUDY AREA
- REGIONAL STUDY AREA (2003-2006)
- REGIONAL STUDY AREA (2007-PRESENT)

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT

FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE

WILDLIFE REGIONAL AND LOCAL STUDY AREAS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-005-GIS			
PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 1
DESIGN	LD	27 Oct. 2008	
GIS	ANK	18 May 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

FIGURE: 1.2-1

1.2.1 Regional Study Area (Proposed Mine)

The proposed mine RSA was defined to capture the large scale direct and indirect effects of the Project on VCs or wildlife populations with wide distributions (Figure 1.2-1). In 2007, the RSA was increased from 314 square kilometres (km^2) to 706 km^2 (i.e., the radius was increased from 10 km to 15 km, centered on the proposed mine site) because of increased knowledge about the effects from disturbance on barren-ground and woodland caribou. In the summer of 2008 wildfire burned approximately 10 percent (%) of the proposed mine RSA.

Barren-ground caribou use the proposed mine RSA as part of their winter range. The RSA is also home to a number of other wide-ranging species including wolves, lynx, wolverine, raptors, and waterfowl. Consequently, the scale and boundaries of the RSA were selected to capture the diversity of habitats that support the seasonal requirements of these wide-ranging species. Although the distribution of habitat types within the RSA meet seasonal life requirements, not all habitat needs are met because many of these species are migratory.

The size and shape of the proposed mine RSA were determined from the expected zone of influence from different Project activities on barren-ground and woodland caribou, which have some of the largest seasonal home ranges for wildlife known to occur in the region. Studies on the movements of woodland caribou in the boreal forest of Newfoundland near resource extraction industries indicated that caribou avoided mining activities, with avoidance distances of up to 4 km during the summer and 6 km during the late winter, pre-calving, and calving seasons (Weir et al. 2007). Monitoring of wildlife presence and activity near a park road in Alaska did not detect avoidance by caribou or grizzly bears, but fewer moose and dall sheep were observed within 500 metres (m) of the road (Burson et al. 2000); however, an increase in traffic on the road did not change the abundance, distribution, or behaviour of caribou, grizzly bears, moose, or dall sheep. Above the treeline, studies of barren-ground caribou have detected behavioural changes extending 5 to 7 km from the mine (BHPB 2004), and avoidance from 11 to 40 km around major mine developments (Boulanger et al. 2004; Johnson et al. 2005; Golder 2008a, b; Boulanger et al. 2009).

These results suggest that the zone of influence in tundra environments may be greater than in forested areas. In addition, the effects on barren-ground caribou occurred during the calving and post-calving periods when animals are more sensitive to disturbance. In contrast, effects on caribou from Project activities will likely occur during the winter and in a forested environment where the geographic extent of noise and visual disturbance should be reduced. Therefore, it is anticipated that the boundary of the RSA around the proposed mine and road

should be large enough to contain exposure and reference areas to predict and monitor potential effects to wildlife.

The proposed mine RSA includes 2 Level II Ecoregions: Taiga Shield and Taiga Plains. The Taiga Shield Ecoregion is located northeast of Rabbit and Hislop lakes (Ecosystem Classification Working Group 2008), while the Taiga Plains Ecoregion covers the southwest portion of the RSA (Ecosystem Classification Working Group 2007).

The Taiga Shield High Boreal Level III Ecoregion is bedrock-dominated with jack pine and mixed spruce forests on rock outcrops. White spruce (*Picea glauca*) and trembling aspen (*Populus tremuloides*) stands are found in low-elevation areas with adequate nutrient and water supplies. Peat plateaus and shore and floating fens are scattered throughout the Ecoregion (Ecosystem Classification Working Group 2008).

The Taiga Plains Ecoregion is comprised of the Great Slave Uplands High Boreal and Central Great Bear Plains Low Subarctic Level III Ecoregions. The Great Slave Uplands region is dominated by low-growing open black spruce forests (*Picea mariana*), treed bogs, horizontal fens, and peat plateaus are dominant. Upland deciduous, mixed-wood, and coniferous stands are found in elevated areas with better drainage (Ecosystem Classification Working Group 2007). The Central Great Bear Plains Ecoregion is dominated by closed to open mixed spruce forest with shrub, moss, and lichen understories or regenerating dwarf birch. Pond and fen complexes are scattered throughout, while closed mixed-wood, white spruce, and jack pine (*Pinus banksiana*) stands occupy rolling to ridged glacial flutings (Ecosystem Classification Working Group 2007).

1.2.2 Proposed NICO Project Access Road Study Area

The NPAR RSA was defined by the expected limit of direct and indirect effects from the NPAR on surrounding soil, vegetation, and wildlife. The proposed NPAR during baseline studies was a 50 km road that joins the Project to the existing all-weather access road east of Whati. The NPAR distance has since been reduced to 27 km; however, the original 50 km NPAR was evaluated during baseline analyses. The NPAR RSA was defined by a 6.5 km buffer surrounding the 50 km road alignment (Figure 1.2-1), based on a study by Cameron et al. (2005) that detected a reduced density of barren-ground caribou within 4 km of roads and pipelines.

Habitat conditions in the NPAR study area are characteristic of regional habitat conditions. However, the NPAR is located primarily within the Taiga Plains

Ecoregion and is more heavily treed than the RSA and LSA for the proposed mine.

1.2.3 Local Study Area

The LSA boundary (Figure 1.2-1) was defined by the expected spatial extent of the immediate direct (e.g., Project footprint) and indirect effects (e.g., dust deposition) from the proposed mine on surrounding soil, vegetation, and wildlife. For species with small home ranges, such as upland bird species and small carnivores, the LSA could contain habitat that is capable of supporting all requirements necessary for life, including forage, cover, and breeding habitat. The LSA (Figure 1.2-1) was defined as a 500 m buffer around the Project lease boundary, and had previously included the proposed alignment for the NPAR.

The LSA contains habitat that is characteristic of regional habitat conditions and vegetation that is typical of the Taiga Shield Ecoregion. Most habitat types are equally represented within the LSA and proposed mine RSA; however, coniferous spruce, treed fen, marsh/graminoid fen, and deep water habitats are more common within the proposed mine RSA than the LSA. Bedrock-open conifer habitat is more common within the LSA than the RSA.

2 METHODS

2.1 DATA SOURCES

This baseline report integrates previous and recent information on wildlife populations from available literature, existing knowledge, and field surveys. These data will be used within the environmental planning and assessment of potential effects from the Project, and provide a basis for developing wildlife mitigation and monitoring plans during the environmental permitting process.

The following previous documents associated with the Project have been integrated into this report:

- Environmental Scoping for Fortune Minerals NICO and Sue-Dianne Properties (Fortune Minerals 1998);
- Heritage Resources Impact Assessment, Fortune Minerals NICO Gold Prospect Northwest Territories, Archaeologists Permit #2003-942 (Fortune Minerals 2003);
- 2003 Environmental Surveys at Fortune Minerals NICO Property: Final Report (Fortune Minerals 2004);
- Environmental Surveys at Fortune Minerals Limited NICO deposit, 1998-2004 (Fortune Minerals 2005); and
- Terrestrial Baseline Studies for Fortune Minerals NICO Project, NWT 2003-2005 (Fortune Minerals 2006).

2.2 BASELINE INVESTIGATIONS

Baseline studies on wildlife species and wildlife habitat were completed within the proposed mine site and regional study areas (LSA and proposed mine RSA) and in the Proposed NICO Projec Access Road (NPAR) study area (NPAR RSA) from 2003 to 2010. Qualitative data was collected from 1998 to 2002. Qualitivative and quantitative data (i.e., estimates of the natural variation in wildlife presence, abundance, and distribution) were collected from 2003 to 2010 within the LSA and RSAs using ground and aerial surveys. However, quantitative data are not available for black bears, wolverines, or certain species of birds. The sections below summarize the baseline data collected on wildlife species identified as valued components (VCs) and other species such as fox, lynx, and black bear (raw data are presented in Appendix I, Tables I-1 to I-8).

2.2.1 CARIBOU

Baseline field studies were initiated in 2003 and were completed annually through 2010 in the LSA and RSAs. The objectives of the studies were to estimate the natural range of variation in the following parameters:

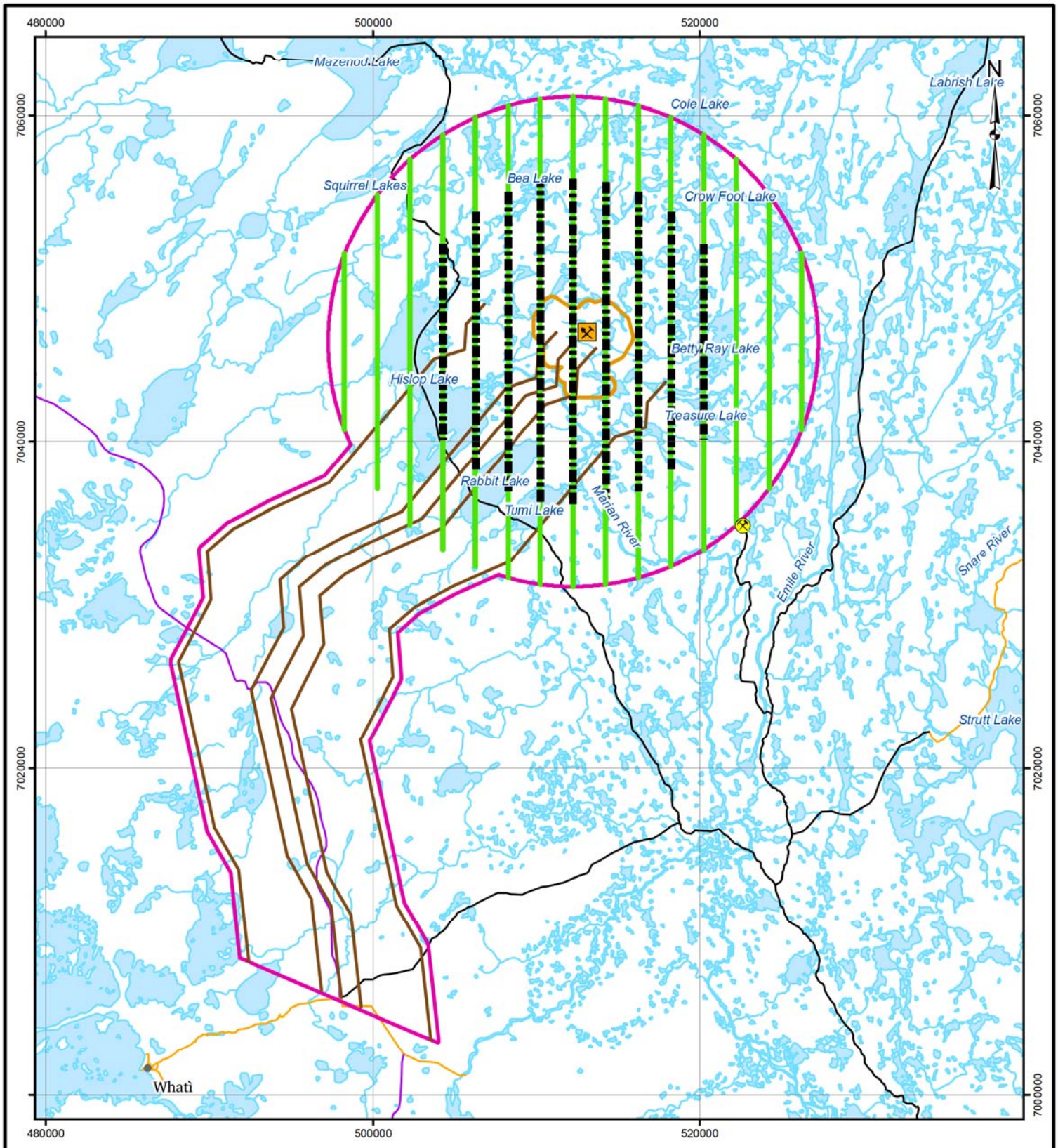
- abundance, distribution, group size, and group composition of caribou in the study areas; and
- caribou-habitat associations in the study areas.

Winter aerial surveys were completed annually from 2004 to 2010. As well, pellet surveys were carried out from 2005 to 2007, and winter track surveys were completed in 2005, 2008, and 2009. The following sections describe the details of these surveys.

2.2.1.1 Aerial Surveys

Aerial surveys from 2004 to 2010 were divided into 2 components based on the proposed mine site and NPAR study areas (Figure 2.2-1). A record of aerial survey dates is provided in Table 2.2-1. Within the proposed mine RSA, from 2004 to 2006, there were 9 transects oriented in a north-south direction spaced 2 km apart. The survey width was 200 m on either side of the aircraft, which resulted in approximately 16 % coverage of the RSA. From 2007 to 2010, there were 15 transects oriented in a north-south direction spaced 2 km apart. The survey width was still 200 m on either side of the aircraft, and resulted in approximately 20 % coverage of the RSA.

Within the NPAR RSA from 2004 to 2010, 5 transects were flown parallel to the road alignment with a survey width of 100 m on either side of the aircraft, which covered approximately 9 % of the area. A central transect was flown directly over the proposed road alignment, 2 transects were flown approximately 1 km from either side of the alignment, and 2 transects were flown 6 km from either side of the alignment (Figure 2.2-1). The aerial surveys completed for the NPAR RSA followed the entire proposed right-of-way into the proposed mine RSA (Figure 2.2-1). Therefore, the area of the NPAR RSA used for aerial survey calculations was different than the area of the NPAR RSA used in other wildlife baseline calculations (e.g., snow track densities).



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- WATERCOURSE
- WATERBODY
- 10 KM MINE RSA TRANSECT (2003-2006)
- 15 KM MINE RSA TRANSECT (2007-PRESENT)
- ROAD RSA TRANSECT
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

10 0 10

SCALE 1:325,000 KILOMETRES

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT

FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE

LOCATION OF AERIAL SURVEY TRANSECTS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-013-GIS			
PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 2
DESIGN	LD	27 Oct. 2008	
GIS	MK	26 Aug. 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

FIGURE: 2.2-1

Table 2.2-1 Dates of Aerial Surveys from 2004 to 2010

Year	Date	Size of Proposed Mine RSA	Proportion of Proposed Mine RSA Surveyed (%)
2004	26 November, 10 December	10 km radius	16
2005	11 April, 4 May	10 km radius	16
2006	11 April, 6 December	10 km radius	16
2007	11 April, 11 December	15 km radius	20
2008	15 April; 12 December	15 km radius	20
2009	17 December	15 km radius	20
2010	22 March	15 km radius	20

RSA = Regional Study Area

Aerial surveys were completed from a Turbo Beaver fixed-wing aircraft at an altitude of 120 m above ground level (agl) and an average speed of 120 kilometres per hour (km/h). Crews consisted of 2 wildlife biologists who recorded observations on either side of the aircraft. Grant Beck from the North Slave Metis Alliance (NSMA) also participated in 2 of the aerial surveys. Observers recorded an estimate of group size, group composition (groups with calves or groups without calves), dominant behaviour, habitat, and Universal Transverse Mercator (UTM) co-ordinates using a Global Positioning System (GPS) unit. Observations made between or at the end of transects were recorded, but not included in the analysis.

To augment the instantaneous measure of caribou distribution made during aerial surveys, caribou snow track abundance was also recorded. This provided a measure of caribou distribution over a longer term (i.e., since the last major snowfall). The density of tracks was subjectively classified as either none (no tracks visible), low (occasional single tracks), medium (multiple single tracks [trails]), or high (continuous tracks or many trails [networks]). Snow track abundance observations and UTM coordinates were recorded every 2 minutes along transect lines by both observers. Incidental observations of other species and tracks were also recorded.

Capturing a representative sample of each habitat type (i.e., vegetation class) within the study areas is important to confirm that the area is being surveyed at a sufficient intensity, and to provide robust observational data to determine interactions between habitat and distribution. Tables 2.2-2 to 2.2-4 indicate that habitats were sampled in proportion to their availability within the RSA for the proposed mine site and NPAR.

Table 2.2-2 Proportion of Habitat Surveyed during Ungulate Aerial Surveys within the Proposed Mine Regional Study Area, 2004 to 2006

Habitat Type	Area within the Proposed Mine RSA (km^2)[a]	Proportion of RSA (%)	Area Surveyed (km^2)	Proportion of Area Surveyed (%)
Bedrock - open conifer	43.29	11.39	9.09	14.69
Burn	0.01	0.00	0.01	0.02
Coniferous pine	5.67	1.49	0.89	1.44
Coniferous spruce	214.46	56.43	35.51	57.39
Deciduous aspen - paper birch	2.50	0.66	0.18	0.29
Marsh/graminoid fen	2.59	0.68	0.3	0.48
Open bog	4.66	1.23	0.86	1.39
Shrubland	2.62	0.69	0.24	0.39
Treed bog	14.99	3.94	2.51	4.06
Treed fen	3.51	0.92	0.26	0.42
Water	85.72	22.56	12.02	19.43
Total	**380.02**	**100.00**	**61.87**	**100.00**

[a] From the Ecological Landscape Classification

RSA = regional study area

Table 2.2-3 Proportion of Habitat Surveyed during Ungulate Aerial Surveys within the Proposed Mine Regional Study Area, 2007 and 2008

Habitat Type	Area within the Proposed Mine RSA (km^2)[a]	Proportion of RSA (%)	Area Surveyed (km^2)	Proportion of Area Surveyed (%)
Bedrock - open conifer	94.86	13.42	19.81	13.76
Burn	0.04	0.01	0.01	0.01
Coniferous pine	12.96	1.83	2.19	1.52
Coniferous spruce	402.55	56.95	83.89	58.26
Deciduous aspen - paper birch	5.67	0.80	1.00	0.69
Marsh/graminoid fen	6.52	0.92	1.45	1.01
Open bog	10.16	1.44	2.10	1.46
Shrubland	4.85	0.69	0.70	0.49
Treed bog	26.33	3.72	5.33	3.70
Treed fen	8.35	1.18	1.19	0.83
Water	134.55	19.03	26.33	18.28
Total	**706.86**	**100.00**	**144.00**	**100.00**

[a] From the Ecological Landscape Classification

RSA = regional study area

Table 2.2-4 Proportion of Habitat Surveyed during Ungulate Aerial Surveys within the Proposed Mine Regional Study Area, 2009 to 2010

Habitat Type	Area within the Proposed Mine RSA (km^2)[a]	Proportion of RSA (%)	Area Surveyed (km^2)	Proportion of Area Surveyed (%)
Bedrock - open conifer	87.73	12.41	18.71	12.99
Burn	69.05	9.77	13.72	9.53
Coniferous pine	11.94	1.69	1.95	1.35
Coniferous spruce	348.04	49.24	72.59	50.41
Deciduous aspen - paper birch	5.35	0.76	0.98	0.68
Marsh/graminoid fen	6.20	0.88	1.39	0.97
Open bog	9.35	1.32	1.95	1.36
Shrubland	4.57	0.65	0.68	0.47
Treed bog	24.42	3.45	5.09	3.53
Treed fen	7.55	1.07	1.02	0.71
Water	132.65	18.77	25.93	18.01
Total	**706.86**	**100.00**	**144.00**	**100.00**

[a] From the Ecological Landscape Classification

RSA = regional study area

Table 2.2-5 Proportion of Habitat Surveyed during Ungulate Aerial Surveys within the Proposed NICO Project Access Road Regional Study Area, 2004 to 2010

Habitat Type	Area within the NPAR RSA (km^2)[a]	Proportion of NPAR RSA (%)	Area Surveyed (km^2)	Proportion of Area Surveyed (%)
Bedrock - open conifer	7.78	1.37	1.19	2.37
Burn	29.70	5.25	0.06	0.12
Coniferous pine	37.25	6.58	3.38	6.75
Coniferous spruce	332.64	58.76	31.47	62.80
Deciduous aspen - paper birch	5.78	1.02	0.44	0.88
Marsh/graminoid fen	19.38	3.42	1.58	3.15
Open bog	7.75	1.37	0.60	1.20
Shrubland	2.83	0.50	0.27	0.54
Treed bog	31.67	5.60	3.94	7.86
Treed fen	22.60	3.99	2.24	4.47
Water	68.65	12.13	4.96	9.90
Total	**566.04**	**100.00**	**50.11**	**100.00**

[a] From the Ecological Landscape Classification

NPAR = Proposed NICO Project Access Road

RSA = regional study area

Analysis

The distribution, behaviour, and composition of caribou were determined for the proposed mine and NPAR RSAs. Caribou density was estimated by summing the total number of individuals observed per transect and dividing this sum by the total area surveyed per transect.

Group size was determined directly from the observation data, and the number of groups that contained 1 to 4, 5 to 29, and greater than 30 individuals was divided by the total number of groups to determine the most common group size. Group composition (the percent of groups that contained calves [i.e., nursery groups] or only adults [i.e., non-nursery groups]) was calculated as the number of nursery or non-nursery groups divided by the total number of groups for which group composition had been determined during aerial surveys.

Caribou behaviour was categorized as either feeding/resting (bedded, standing, feeding) or moving (walking, trotting, running). The proportion of groups within these 2 categories was determined by dividing the number of feeding/resting or moving observations by the total number of observations for which an activity was recorded. Caribou distribution was calculated by dividing the number of caribou observations within habitat types, as determined from the Ecological Landscape Classification (ELC), by the total number of caribou observations.

Caribou habitat selection was evaluated by calculating Manly's standardized selection ratios (β_i; Manly et al. 2002) from aerial survey data. Manly's standardized selection ratios are the probability of a habitat being used if all habitat types are equally available. Manly's standardized selection ratios were calculated using the following formulas:

$$\omega_i = \text{proportion of habitat i used / proportion of habitat i available}$$

$$\beta_i = \omega_i / \text{sum } \omega_i \text{ for all habitat types}$$

Habitat types with higher standardized selection ratios have a higher probability of being used than habitat types that have lower selection ratios. Habitat type for all caribou observations was determined from the ELC and associated GPS location. Burn, coniferous pine, deciduous aspen-paper birch, marsh/graminoid fen, open bog, shrubland, and treed fen habitats were not included in the proposed mine RSA analyses because each habitat covered less than 2 % of the RSA. Burn was included in the 2009 and 2010 analysis as the wildfire in the summer of 2008 burned approximately 10 % of the proposed mine RSA. Bedrock-open conifer, burn, deciduous aspen-paper birch, open bog, and

shrubland were excluded from the NPAR RSA analysis because each habitat type covered less than 2 % of the RSA.

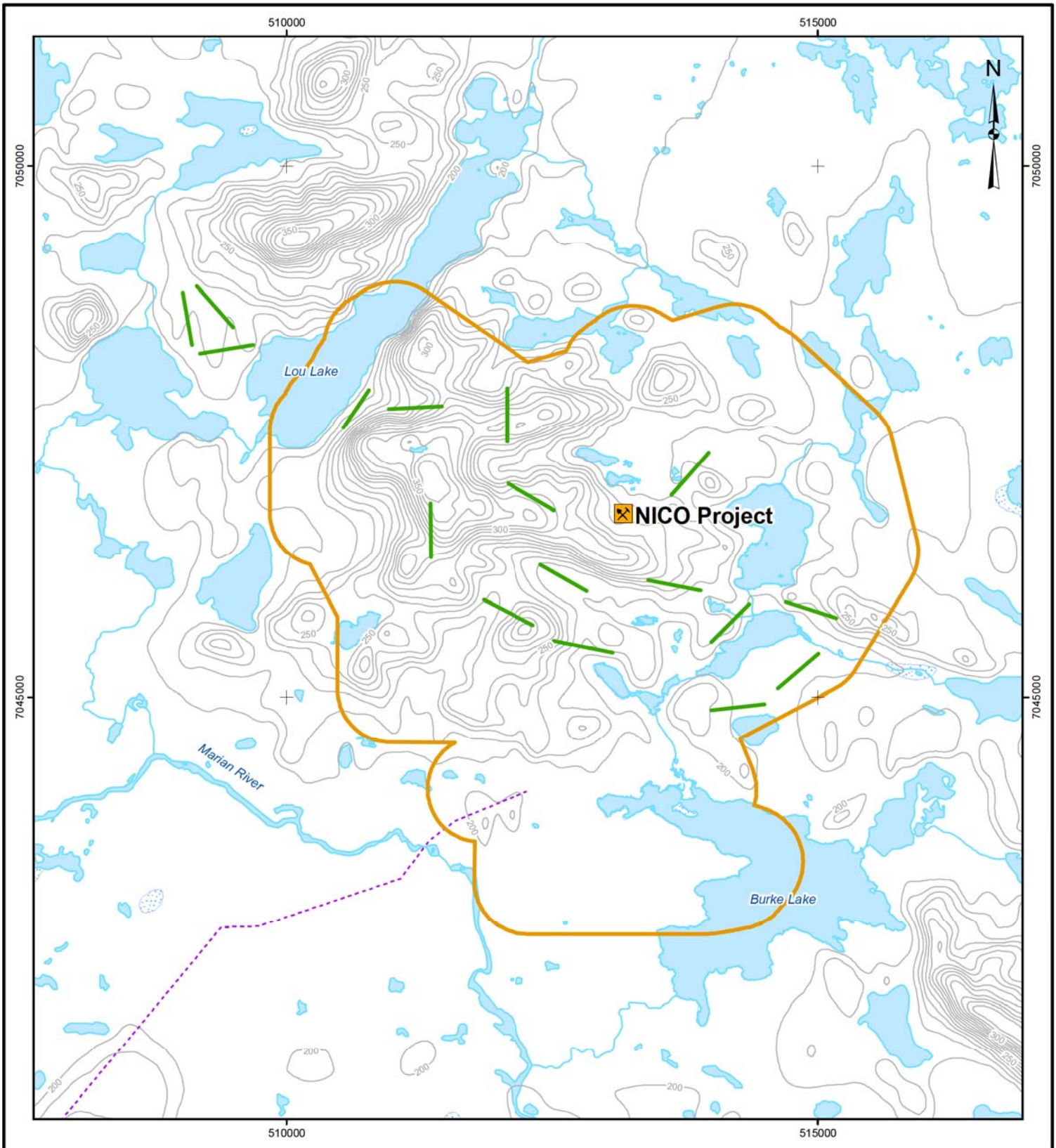
2.2.1.2 Pellet Surveys

Rapid assessment surveys for caribou sign were completed from 14 to 16 September 2003. Areas likely to have high concentrations of game trails and wildlife activity (perimeters of waterbodies, valleys, and other potential travel corridors) near the Project were identified on topographic maps and aerial photographs. Searches of these areas were completed on foot and were focused on sign (tracks, scat, antlers and bones, and browse). The UTM co-ordinates location, type of sign, and estimated age of each incidence of sign were recorded.

Pellet surveys were completed during the summers of 2005 to 2007 to determine moose and caribou distribution and habitat use within and adjacent to the LSA. Sampling periods included:

- 24 and 25 June 2005;
- 9 to 11 June 2006; and
- 13 and 16 June 2007.

Moose and caribou pellet groups were counted along 12, 500 m long transects in 2005 and 2006, and 5- 500 m long transects in 2007 (Figure 2.2-2). Two observers surveyed each transect. Observers were separated by approximately 10 m, and each observer recorded pellet groups within 0.5 m on either side of their transect. A pellet group was defined as 6 or more pellets touching one another. Only pellets estimated to have been dropped within the most recent winter were recorded (i.e., to record only the arrival of caribou during the winter prior to the survey). A GPS unit was used to record the UTM co-ordinates of habitat type changes along each transect.



LEGEND

- NICO PROJECT
- CONTOUR (10 METRE INTERVAL)
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- WETLAND
- PELLET SURVEY TRANSECT (2005-2007)
- LOCAL STUDY AREA

1 0 1

SCALE 1:50,000 KILOMETRES

REFERENCE

Base data obtained from GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT

FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE

LOCATION OF PELLET SURVEYS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-008-GIS			
PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 1
DESIGN	LD	05 Nov. 2008	
GIS	ANK	20 May 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

FIGURE: 2.2-2

Analysis

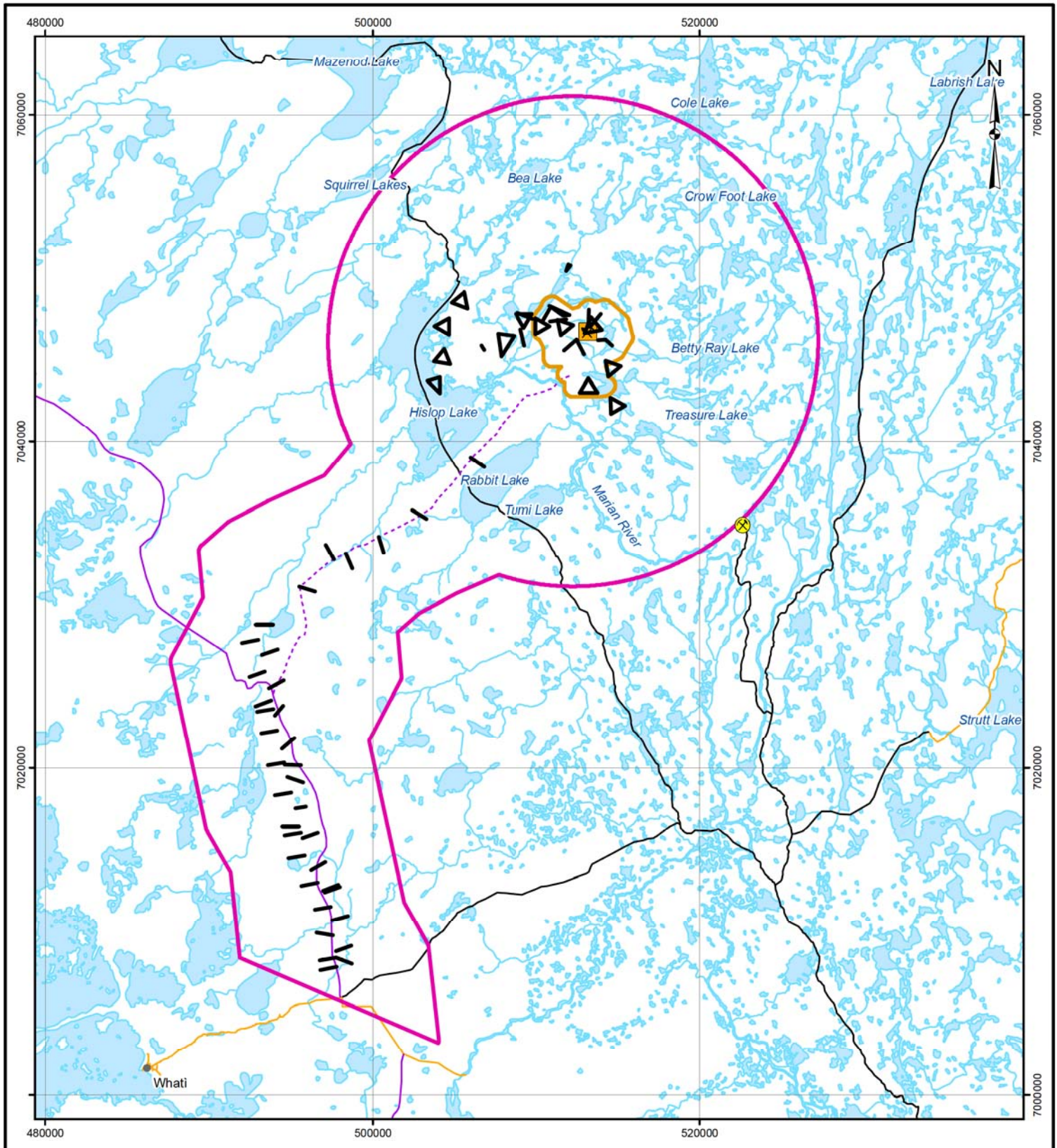
Pellet group abundance was calculated as the number of caribou pellet groups encountered in each habitat type per transect. Pellet group abundance was also calculated for moose.

2.2.1.3 Winter Track Count Surveys

In 2005, 2008, and 2009 winter track surveys were completed to determine the relative activity, distribution, and habitat use of ungulates and carnivores within the proposed mine and NPAR study areas. Ten transects (each 1 km long) were established within the proposed mine study areas (i.e., LSA and RSA) in 2005 (Figure 2.2-3). Forty-one transects (range 0.1 to 1.3 km in length) were established within the proposed mine study areas in 2009 (Figure 2.2-3). No winter track surveys were carried out within the proposed mine study areas in 2008. Eleven transects (each 1 km long) were established within the NPAR study area in 2005 and 24 transects (each 1 km long) were established within the NPAR study area in 2008 (Figure 2.2-3). No surveys were completed within the NPAR study area in 2009. Tracks within 5 m on either side of the transect line (i.e., total 10 m width) were recorded. Surveys were completed from 4 to 8 April 2005, 26 February to 1 March 2008, and 8 to 12 March, 2009. Winter track count surveys were timed to occur at least 0.5 days after a snowfall of greater than 2 cm to allow time for animals to make tracks after a snowfall event. Snow conditions were rated by observers as good, fair, or poor. Surveys were postponed during high winds or a snowfall event.

The start, change in direction, change in habitat type, and end-points of each transect were recorded with a GPS device. Each 10 m, observers recorded habitat type, and the type and number of all snow tracks observed. Snow tracks were categorized as either tracks, trails, or networks. Snow thickness was recorded for each major vegetation type over the course of the survey.

Capturing a representative sample of each habitat type (i.e., vegetation class) within the study areas is important to confirm that the area is being surveyed at a sufficient intensity, and to provide robust observational data to determine interactions between habitat and distribution. Tables 2.2-5 to 2.2-7 indicate that habitats were sampled in proportion to their availability within the RSAs for the proposed mine site and NPAR.



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- WINTER TRACK TRANSECT (2005, 2008, 2009)
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

10 0 10
SCALE 1:325,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
LOCATION OF WINTER TRACK COUNT SURVEYS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-014-GIS

PROJECT No. 08-1373-0017			SCALE AS SHOWN	REV. 2
DESIGN	LD	27 Oct. 2008		
GIS	ANK	18 May 2010		
CHECK	LY	17 Nov. 2010		
REVIEW	GA	17 Nov. 2010		

FIGURE: 2.2-3

Table 2.2-5 Proportions of Habitats and the Area Surveyed within the Proposed Mine Regional Study Area during Winter Track Surveys, 2005

Habitat	Area within the Proposed Mine RSA (km^2)	Percent of RSA (%)	Area Surveyed (km^2)	Percent of Area Surveyed (%)
Bedrock-open conifer	43.29	11.39	0.02	19.18
Burn	0.01	0.003	0	0
Coniferous pine	5.67	1.49	0.001	0.51
Coniferous spruce	214.46	56.43	0.07	66.53
Deciduous aspen-paper birch	2.50	0.66	0.002	1.73
Marsh/graminoid fen	2.59	0.68	0.0001	0.10
Open bog	4.66	1.23	0.001	1.43
Shrubland	2.62	0.69	0	0
Treed bog	14.99	3.94	0.003	2.55
Treed fen	3.51	0.92	0	0
Water	85.72	22.56	0.01	7.96
Total	**380.02**	**100.00**	**0.098**	**100.00**

RSA = regional study area

Table 2.2-6 Proportions of Habitats and the Area Surveyed within the Proposed Mine Regional Study Area during Winter Track Surveys, 2009

Habitat	Area within the Proposed Mine RSA (km^2)	Percent of RSA (%)	Area Surveyed (km^2)	Percent of Area Surveyed (%)
Bedrock-open conifer	87.73	12.41	0.05	13.88
Burn	69.05	9.77	0.06	17.10
Coniferous pine	11.94	1.69	0	0.00
Coniferous spruce	348.04	49.24	0.14	39.24
Deciduous aspen-paper birch	5.35	0.76	0.001	0.19
Marsh/graminoid fen	6.20	0.88	0.003	0.83
Open bog	9.35	1.32	0.004	0.95
Shrubland	4.57	0.65	0.01	1.84
Treed bog	24.42	3.45	0.004	1.17
Treed fen	7.55	1.07	0.03	7.23
Water	132.65	18.77	0.06	17.57
Total	**706.86**	**100.00**	**0.369**	**100.00**

RSA = regional study area

Table 2.2-7 Proportions of Habitats and the Area Surveyed within the Proposed NICO Project Access Road Regional Study Area during Winter Track Surveys, 2005 and 2008

Habitat	Area within NPAR RSA (km^2)	Percent of RSA (%)	Area Surveyed (km^2)	Percent of Area Surveyed (%)
Bedrock-open conifer	1.19	0.31	0.002	0.67
Burn	0.36	0.09	0.001	0.23
Coniferous pine	35.37	9.23	0.03	7.55
Coniferous spruce	250.91	65.46	0.25	72.19
Deciduous aspen-paper birch	4.07	1.06	0.01	1.77
Marsh/graminoid fen	17.82	4.65	0.01	4.33
Open bog	6.39	1.67	0.002	0.58
Shrubland	1.35	0.35	0.00004	0.12
Treed bog	24.96	6.51	0.02	4.35
Treed fen	20.03	5.23	0.03	7.66
Water	20.86	5.44	0.002	0.58
Total	**383.30**	**100.00**	**0.345**	**100.00**

RSA = regional study area

Analysis

For each habitat, a track density index (expressed as number of tracks per kilometre per day [TKD]) was calculated as the number of tracks per kilometre of distance travelled per number of days since the last snow fall. Track counts were classified into 3 different groups: tracks, trails, and networks. A single track intercept was recorded as one individual. Although one animal of the same species may have crossed the transect at multiple locations, each time they crossed the transect it was counted as an observation. No attempts were made to determine the number of individuals because estimating the frequency or relative activity of mammal use in each habitat was the objective. Trails that crossed transects were assumed to represent three times the activity level of a single track. Networks, which consisted of tracks and trails crossing the transect at several locations within 10 to 20 m, were assumed to represent 5 times the activity level of a single track. These calculations were completed to determine the activity level of caribou in the RSAs. Track density was also calculated for other wildlife species detected during the 2005, 2008, and 2009 winter track surveys (e.g., moose, wolf, fox, fisher and marten, and wolverine). Winter track data for the NPAR RSA from 2005 and 2008 were pooled because the wildfire of 2008 did not burn any of the NPAR RSA. Winter track data of 2005 and 2009 for the proposed mine RSA were analyzed separately because the wildfire of 2008 changed the amount of habitats that were available with the proposed mine RSA.

A Chi-square test (Yates correction [Yates 1934]) was used to examine if the proportion of habitats where tracks were encountered was equal to the proportion of habitats available. Due to the high number of track networks observed, only the presence/absence of tracks was used in the Chi-square analysis (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed]). A Chi-square test could be used because the availability of habitat types was known (as determined from the ELC) (Thomas and Taylor 1990). The analysis compared the proportion of tracks encountered in each habitat to the expected proportion of tracks in each habitat, based on the amount of habitat available.

Bonferroni adjusted 95 % confidence intervals were generated around the proportion of each habitat used (Neu et al. 1974; Byers et al. 1984). If the confidence intervals are above or below the expected proportion of use, based on availability, the habitat is relatively preferred or avoided, respectively. No Chi-square test was completed for habitats in which caribou tracks (or tracks of other species) had an expected number of observations less than 5 (Byers et al. 1984). Chi-square tests to determine habitat selection were performed for other species recorded during winter track count surveys, where applicable.

2.2.1.4 Satellite-Collared Caribou Data

Annual and seasonal ranges were calculated for satellite-collared caribou in the Bathurst, Ahiak, and Bluenose East herds using a geographic information system (GIS) platform. Data were provided courtesy of the Department of Environment and Natural Resources (ENR), Government of Northwest Territories. Annual and seasonal ranges for the Bathurst herd were calculated based on satellite-collared data from 1 January 1995 through 31 March 2010. The temporal extent of satellite-collared data for the Bluenose East herd is from 1 January 1996 through 31 March 2010, and for the Ahiak herd is from 1 January 2001 to 31 March 2010. Caribou distribution for each herd was classified into 6 periods based on inspection of annual movements of satellite-collared caribou (ENR 2009) as follows:

- northern migration (1 to 31 May);
- calving (1 to 15 June);
- post-calving aggregation (16 June to 1 July);
- summer dispersal (2 July to 31 August);
- rut and fall migration (1 September to 31 October); and
- winter dispersal (1 November to 30 April).

To identify critical caribou areas, the density tool in Spatial Analyst® was used for each herd and season in a GIS environment. The density of individual satellite locations around each grid cell (i.e., the map was divided up into grid cells) was calculated using a search radius equal to 80 km. This distance approximates the maximum distance travelled between satellite locations. Then a 95 % volume contour was created from the density raster using Hawth's Tools (SpatialEcology.com 2009). The percent volume contour represented a boundary of area that contained 95 % of the points, and was used to generate the kernel density estimate. Based on the contour, a contiguous polygon was created to show the size and position of the seasonal home ranges for each herd.

The number of satellite collar locations within 50 km of the Project was also determined because of studies of barren-ground caribou that have detected caribou avoidance from 11 to 40 km around major mine developments (Boulanger et al. 2004; Johnson et al. 2005; Golder 2008a, b; Boulanger et al. 2009).

2.2.2 MOOSE

Aerial, pellet, and winter track surveys to determine the occurrence, abundance, and distribution of moose in the study areas were carried out from 2004 to 2010 at the same time as the caribou surveys (Sections 2.2.1.1. to 2.2.1.3).

2.2.3 CARNIVORES

Rapid assessment surveys to determine the presence of black bears, wolves, lynx, wolverines, and martens dens, and potential denning habitat were carried out from 14 to 16 September 2003 within the LSA of the proposed mine site and the RSA of the NPAR. Areas likely to have high concentrations of game trails and wildlife activity (perimeters of waterbodies, valleys, and other potential travel corridors) were identified on topographic maps and aerial photos. Searches of these areas were completed on foot and were focused for sign of black bear, wolf, fox, lynx, wolverine, and marten. Areas of potential denning habitat for carnivores were also identified on topographic maps, aerial photos, and while completing other surveys. These areas included boulder areas, cliff bases, and any well-drained sand or soil. Within these areas, searches were completed for dens and evidence of carnivore activity (scat, tracks, and kills).

Carnivore tracks were also recorded during winter track surveys in 2005, 2008, and 2009 to determine activity levels and habitat associations (Section 2.2.1.3).

2.2.4 BEAVER AND MUSKRAT

In 2003 and 2004, ground-based searches of lakes for beavers and other aquatic mammals (e.g., muskrat, river otter, and mink) sign within the RSAs for the proposed mine site and NPAR were completed, and these surveys were supplemented by aerial surveys in July 2004 (Fortune Minerals 2005). In 2005, surveys for aquatic mammal sign were performed concurrently with aerial surveys for waterbirds (see Section 2.2.11), and through ground surveys of the two stream crossings along the proposed road alignment (i.e., Unnamed creek [locally called the 3 m Stream] and the Marian River). Ground surveys were completed within 500 m on either side of each proposed stream crossing. Although there are 9 stream crossing points along the proposed NPAR, only the Marian River and 3 m Stream contain suitable habitat for aquatic mammals (i.e., surface flowing with a clear channel and had sufficient volume to flow throughout the year), or are fish-bearing.

2.2.5 UPLAND BREEDING BIRDS

Upland breeding birds (e.g., songbirds) are commonly studied in baseline and monitoring programs because they are well-studied indicators of habitat quality and habitat change. Upland breeding bird surveys were completed to describe species occurrence, relative abundance, and habitat use of songbirds and other bird species that nest in terrestrial/riparian habitat. The spring migration of birds to the NWT begins in early May and peaks between mid- and late May. The breeding season for small perching birds (passerines) typically starts during the first week of June and continues for about 3 weeks. Fall migration begins in mid-August for some species, such as sandpipers, and continues through to mid-September for late migrants, such as the horned lark (*Eremophila alpestris*).

Specifically, the objectives of the 2005 to 2009 upland breeding bird surveys were as follows:

- to document the natural variation in upland bird species density and richness within the LSA and NPAR RSA; and
- to assess the importance of upland bird nesting habitats within the LSA and NPAR RSA.

Standard point count surveys were completed from 14 to 16 June 2005, 9 to 15 June 2006, 14 to 18 June 2007, 10 to 13 June 2008, and 13 to 17 June 2009. Surveys were carried out between 2:45 am and 9:00 am (Ralph et al. 1993). Point count stations were established along transects a minimum of 250 m apart, and at locations between lakes and within expected disturbance areas (Figure 2.2-4). A

GPS device was used to navigate along a pre-determined bearing and to record plot location. At each point count station, the observer waited 2 minutes to allow the birds to adjust to the observer's presence. A 5-minute survey period followed, and all species heard or observed within 50 m were recorded. Flyovers and birds observed outside the survey area were recorded as incidentals and used to provide a comprehensive species list (Appendix I, Table I-5), but were excluded from the statistical analysis. The following data were collected:

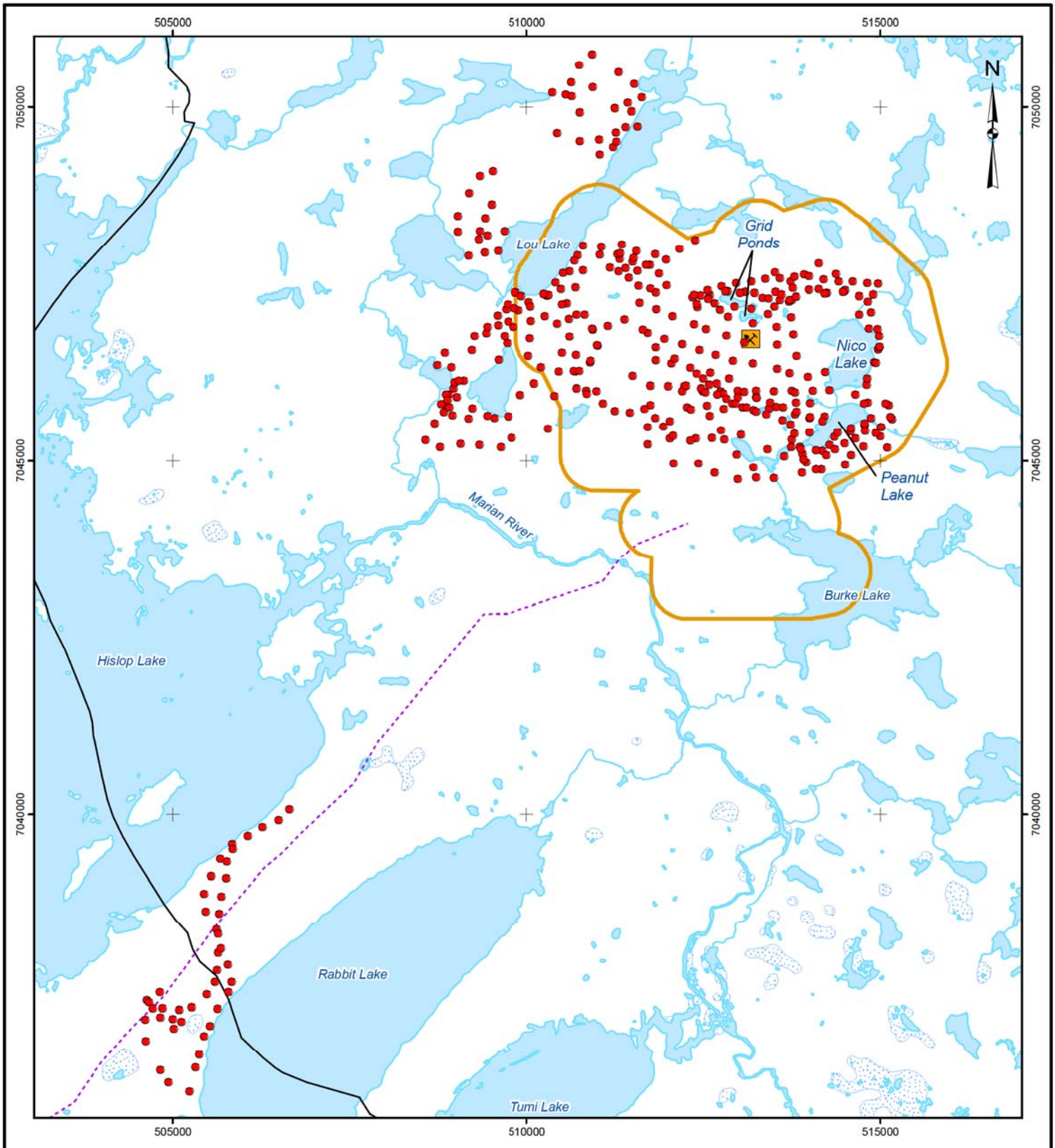
- UTM co-ordinate of point count station;
- date and time of observation;
- species;
- number of individuals;
- habitat; and
- behavioural activity (e.g., flushed, territorial calls or displays, nest or nest with eggs, and flyovers).

The survey was not completed during periods of high winds (i.e., Beaufort Scale greater than 5 [trees in leaf sway]) or inclement weather that would reduce the likelihood of identifying species. In total, 558 point counts were completed in 10 habitat types (Table 2.2-5).

Table 2.2-5 Distribution of Upland Bird Point Counts Across Habitats, 2005 to 2009

Habitat Type	Number of Point Counts within and Adjacent to the Proposed Mine LSA	Number of Point Counts in the NPAR RSA
Bedrock - open conifer	113	0
Burn	26	0
Coniferous spruce	146	18
Deciduous aspen - paper birch	14	4
Marsh/graminoid fen	16	0
Mixedwood spruce-paper birch-aspen	101	8
Open bog	2	0
Shrubland	9	0
Treed bog	14	15
Treed fen	72	0
Total	**513**	**45**

LSA = local study area; NPAR = Proposed NICO Projet Access Road; RSA = regional study area



LEGEND

- NICO PROJECT
- EXISTING WINTER ROAD
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- WETLAND
- SAMPLE PLOT
- LOCAL STUDY AREA

2 0 2

SCALE 1:75,000 KILOMETRES

REFERENCE

Base data obtained from GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT

TITLE
LOCATION OF UPLAND BREEDING BIRD SURVEY PLOTS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-007-GIS				
PROJECT No. 08-1373-0017			SCALE AS SHOWN	REV. 2
DESIGN	AND	04 Nov. 2008		
GIS	ANK	18 May 2010		
CHECK	LY	17 Nov. 2010		
REVIEW	GA	17 Nov. 2010		

FIGURE: 2.2-4

Analysis

Two levels of analysis were performed. A species-level analysis examined how the density of individual species varied across the habitats. A community-level analysis examined the variation in density and richness among habitats of all species in the bird community. In the community-level analysis, observations where birds were recorded as within the plot (i.e., within 50 m of the observer), but could not be identified to species, were included in density estimates, but excluded from the species richness estimates, unless it was the only individual recorded in a plot. Relative abundance (density) was calculated as the number of individuals per effective area surveyed. The effective detection radius (EDR) (Buckland et al. 2001) was used to calculate the effective area surveyed using the formula:

$$EDR = \sqrt{\frac{2}{\left(\left(\frac{2}{k^2}\right) * \ln\left(\frac{n}{n_2}\right)\right)}}$$

where k = the distance at which birds are declared as being in our out (i.e., 50 m), n = total number of birds detected, and n_2 = total numbers of birds detected outside value of k (E. Bayne, pers. comm. 2009).

Species richness was used as the measure of diversity among habitats and within the study area. Annual changes in the abundance of different species can produce inaccurate and unpredictable trends in other species diversity measures, such as Fisher's and Simpson's heterogeneity indices (Gotelli and Colwell 2001). In a report for the Canadian Environmental Assessment Agency, Costello et al. (2004) reviewed a number of species diversity indices and concluded that species richness provides the most suitable univariate measure of community diversity.

To determine if sampling was sufficient to estimate total species richness within the LSA, rarefaction (bootstrap) techniques were used to generate species richness estimates for the LSA (Gotelli and Colwell 2001). An individual plot was considered the unit of replication and the data set was re-sampled 100 times using program EstimateS (Ver. 8, Colwell 2006).

2.2.6 WATERBIRDS

Waterbirds include loons, grebes, mergansers, scoters, American coot, ducks, geese, swans, gulls, and terns. The lakes and wetlands of the boreal forest host a large number of migratory waterbird species. Species richness of waterbirds is considered a valuable indicator of the quality of wetlands in an area. Different

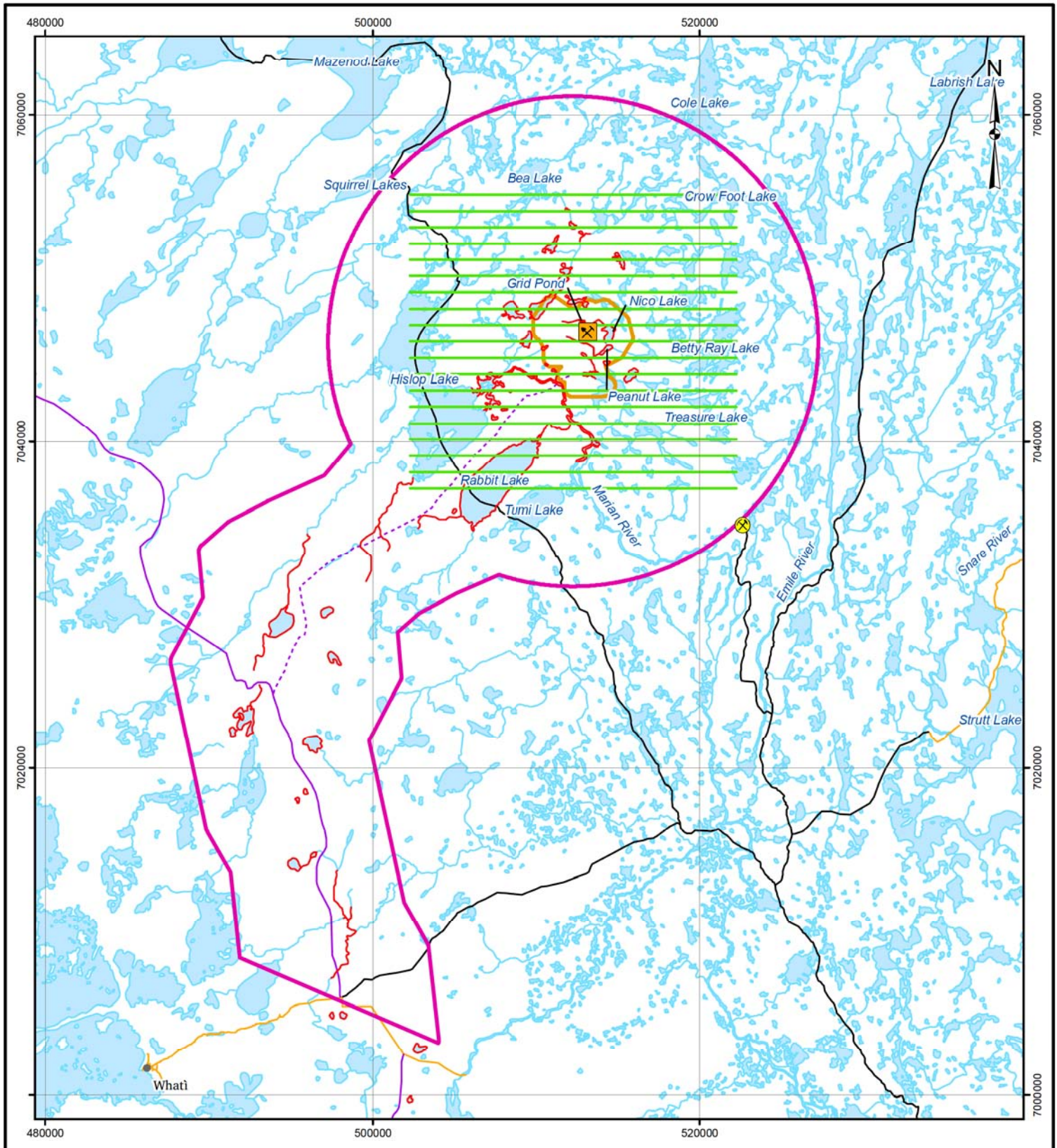
species of waterbirds using wetlands can represent multiple facets of wetlands productivity. For example, loons will nest and raise their young on a lake that supports fish whereas ducks eat aquatic insects, emergent plant seeds, benthic organisms, and submersed vegetation (Cox 1990; Korschren and Dahlgren 1992). Aside from food, wetlands attributes, such as size, shape, and emergent vegetation structure and composition, are important for waterbird nesting territories and safety from predators.

Waterbird surveys were completed to document the abundance, species composition, and brood production of waterbirds. Waterbirds were surveyed using aerial and ground surveys. Fall migration surveys were completed in 2003 whereas surveys from 2004 to 2006 were intended to coincide with the breeding season (June) and the brood-rearing/molting period (mid- to late July).

Migrating waterbirds were surveyed from the ground at lakes near the exploration bulk sampling site on 14 to 16 September 2003. In 2004 and 2005, aerial surveys were completed for waterbirds on 119 lakes within the proposed mine and NPAR RSAs, and on an 8 km segment of the Marian River within the study areas. Surveys included all lakes within the LSA (e.g., Grid lakes, Nico Lake, Peanut Lake, and several ponds downstream of the proposed Project site), and lakes within 1 km of either side of the 50 km NPAR. Waterbodies were surveyed on 13 and 14 July 2004, 13 to 15 June 2005, and 23 to 25 July 2005. Surveys along the perimeters of lake shorelines were flown by helicopter at 50 m agl and a speed of 80 to 100 km/h. Slower speeds were flown along irregular and vegetated shorelines, whereas faster speeds were flown along straight and open shorelines. The entire surface of the 8 km segment of the Marian River was surveyed. There was no limit to the time spent surveying each waterbody as the purpose was to identify and estimate the number of all waterbirds present within the surveyed area.

In 2006, 19 transects, each 20 km in length, were flown within the proposed mine RSA (Figure 2.2-5). Each transect had a survey width of 200 m on either side of the aircraft. Surveys were completed on 4 June and 27 July 2006. All waterbodies along the transects were surveyed by flying at 50 m agl at a speed of 80 to 100 km/h. All waterbird observations were placed into one of the following categories based on the Patton (2002) classification:

- Lone drake – single isolated drake without visible association to hen;
- Flocked drakes – 2 to 4 drakes in close association;
- Pair – male and female in close association; and



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- 2004 AND 2005 WATERBIRD AND AQUATIC MAMMAL SURVEY
- 2006 WATERBIRD SURVEY
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

10 0 10
SCALE 1:325,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
LOCATION OF AERIAL WATERBIRD SURVEY AREAS AND TRANSECTS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-016-GIS				
PROJECT No. 08-1373-0017			SCALE AS SHOWN	REV. 2
DESIGN	LD	27 Oct. 2008		
GIS	MK	26 Aug. 2010		
CHECK	LY	17 Nov. 2010		
REVIEW	GA	17 Nov. 2010		

FIGURE: 2.2-5

- Group – 3 or more of mixed-sex groups of the same species in close association, which were not separated into singles and pairs (a hen and 2 drakes were recorded as a pair and a lone drake; 5 or more flocked drakes were recorded as a group).

The number of juveniles present were also recorded if broods were observed.

Analysis

A sample-based rarefaction (bootstrapping) technique was used to estimate the number of species of waterbirds within the RSAs (Magurran 1988; Gotelli and Colwell 2001). The data set consisted of observations from 2004 and 2005, and was re-sampled 100 times without replacement using the program EstimateS (ver. 8.0, Colwell 2005). Using the rarefaction curve, species richness was standardized to the cumulative number of individuals observed. Data from 2006 transect surveys were not used in the species rarefaction technique because the sampling design and recorded information was not equivalent to data collected in 2004 and 2005. In 2006, birds were classified into groups. In 2004 and 2005, the estimated number of birds was recorded.

2.2.7 RAPTORS

Raptors are birds of prey and include falcons, eagles, hawks, and owls. Impacts on raptor populations can be reflected throughout the ecosystem because they occupy a top trophic level (Kennedy 1980). As such, raptors are commonly used as indicators of ecosystem productivity in baseline and monitoring programs.

The initial identification of raptor nest sites typically occurred during aerial and ground surveys for other species (e.g., caribou, upland birds, and waterbirds). Aerial surveys of identified raptor nests for spring occupancy, and summer nest success and chick production, are standard and accepted methods used in baseline and monitoring programs (DDMI 1998, 2007; De Beers 2002, 2007; Miramar 2005, 2007; BHPB 2007). Analyses have detected significant annual variation in nest success and chick production (BHPB 2007; Golder 2008a, b). The data provide robust estimates of the demographic performance of raptor populations among different regions of Nunavut and the NWT, which can be used to make inferences about local and regional-scale effects on these biological indicator species of environmental change.

Raptor studies began on 12 September 2003 with a ground survey of cliffs and trees along the shoreline of lakes and rivers, and again on 13 and 14 July 2004. From 2005 to 2009, the previously identified nests were monitored through fly-by observations from a helicopter. All visits were completed as briefly as

possible and in suitable weather conditions to limit disturbance to the birds. Identified raptor nests were monitored from 13 to 15 June 2005, 5 June 2006, 14 June 2007, 11 to 13 June 2008, and 13 June 2009 to determine nest occupancy. Nests were considered occupied if at least one adult bird was observed. Eggs were counted if visible and the number of chicks was also recorded. Surveys to determine raptor productivity were carried out on 23 to 25 July 2005, 28 July 2006, 3 August 2007, and 16 July 2009. Nests were determined as successful if at least one chick was observed in the nest. No productivity survey (i.e., July) was completed in 2008 due to a forest fire burning in the area.

3 RESULTS

3.1 CARIBOU

3.1.1 Population Status and Distribution

3.1.1.1 General Information

Three ecotypes of caribou exist in the Northwest Territories (NWT). Barren-ground caribou migrate between the barren-ground tundra and the boreal forest. Woodland caribou can be separated into 2 ecotypes – northern mountain and boreal caribou. Northern mountain woodland caribou are migratory and inhabit slopes of the Mackenzie Mountains to the NWT-Yukon Border (ENR 2009). In general, boreal woodland caribou are not migratory and inhabit forested areas year round. Boreal woodland caribou (hereafter referred to as woodland caribou) may be present within the regional study areas (RSAs) year round, whereas barren-ground caribou are expected to be present within the RSAs during the winter.

Caribou (barren-ground and woodland) have high social, cultural, and economic value for the people and communities living in the Canadian North. Aboriginal people have a strong connection with caribou, and rely on the animals for food, clothing, and cultural wellness. In addition, caribou represent a key ecological species because they influence the landscape through their movements and feeding, and provide food for predators and scavengers such as wolves, bears, wolverines, and foxes.

3.1.1.2 Barren-ground Caribou

All herds of barren-ground caribou present in the NWT appear to have declined over the past 5 to 10 years (NWT General Status Ranking Program 2009; Vors and Boyce 2009; but see Fisher et al. 2009). As a result, all herds of barren-ground caribou in the NWT (with the exception of Peary caribou) are ranked as '*sensitive*' in the NWT (NWT General Status Ranking Program 2009). The number of animals in barren-ground caribou herds increase and decrease at relatively regular intervals, for example, 30 to 60 years (Kendrick et al. 2005; Zalatan et al. 2006; ENR 2009). Although these natural fluctuations in herd size appear to be linked to changes in climatic patterns and winter range quality (Ferguson and Messier 2000; Weladji and Holand 2003; Gunn 2009; Vors and Boyce 2009), the exact mechanisms responsible for generating these population cycles are unknown. During the last 15 years, 7 of 8 Arctic caribou herds have appeared to declined (Porcupine, Cape Bathurst, Bluenose East, Bluenose West,

Bathurst, Beverly, and Qamanirjuaq) (NWT General Status Ranking Program 2009; Fisher et al. 2009; BQCMB 2008, 2009), and 34 of the 43 major herds world-wide are in decline (Vors and Boyce 2009). The status of the Ahiak herd since the mid-1990s is unknown, but given the synchronicity in population cycles of barren-ground caribou, population decreases in this herd are suspected.

Recent surveys to determine the population size of the Bathurst caribou herd indicate that the herd size has decreased by approximately 75 % between 2006 and 2009. Herd size was approximately 128 000 individuals in 2006 and 31 900 individuals in 2009 (ENR 2009). Between 1986 and 2006, the herd declined from 472 000 individuals to 128 000 individuals (a 73 % decrease) (Fisher et al. 2009). The Qamanirjuaq herd's population estimate was 345 000 individuals in 2008, which is down from the estimate of 496 000 individuals in 1994 (a 30 % decrease) (BQCMB 2009). Furthermore, for every 100 cows there was estimated to be only 15 or 20 calves, for the Beverly and Qamanirjuaq herds, respectively. This is far below the usual 80 calves per 100 cows. Because of concerns about caribou population declines in the NWT, ENR implemented interim emergency conservation measures on January 1, 2010 (ENR 2010b). These emergency measures prohibit non-Aborginals (both residents and non-residents) from hunting individuals from the Bathurst herd on their wintering grounds in the North and South Slave regions. The Yellowknife Dene First Nation also cancelled its fall caribou hunt in 2009 because of concerns over the Bathurst herd decline (Miltenberger 2010).

There are a number of natural large-scale environmental factors that can influence the foraging behaviour, energetics, survival, and reproduction of caribou populations. Food abundance and quality on summer and winter ranges are important elements in barren-ground caribou population dynamics (Reimers 1983; Skogland 1990; Post and Klein 1999). Snow conditions, such as depth and hardness, also affect the movement rate and food accessibility for caribou (Stuart-Smith et al. 1997). Extreme weather events, such as late spring snowfall or late snowmelt, can influence access to food and result in lower calf weights or delayed parturition (i.e., births), which influences survival of young (Skogland 1984; Adamczewski et al. 1987; Cameron et al. 1993). High insect abundance can also decrease forage intake, milk production, calf growth, and calf survival (Helle and Tarvainen 1984; Russell et al. 1998). Factors that influence adult female food intake from summer through winter also determine pregnancy rate and parturition rate. There is a complex interaction between habitat and caribou foraging and movement patterns that is not well understood for caribou herds. For example, studies of caribou have shown that the historical cumulative effect of overgrazing on calving, summer, or winter ranges can result in periodic range shifts and large population fluctuations (Messier et al. 1988; Ferguson and Messier 2000).

Variation in barren-ground caribou movement and distribution occurs within and among years, and for different populations. Caribou population numbers naturally fluctuate, and caribou expand their range when populations increase and limit their distribution when populations decrease (Banfield and Jakimchuk 1980; Bergerud et al. 1984; Heard and Calef 1986). Although the precise timing and location of barren-ground caribou movements between winter ranges and calving grounds are unpredictable, general corridors and the broad timing of movements are known. Caribou movements are generally classed into 6 periods (biological seasons) based on satellite-collared caribou data (ENR 2009).

Barren-ground caribou migrate from wintering grounds in the boreal forest, north to calving grounds in the tundra. Pregnant cows lead the northern migration in late winter/early spring, followed by juveniles and bulls (Miller 1992). After calving, cows and calves begin to migrate back to the winter range. As spring turns into summer, the cows meet up with the bulls that have continued to travel north (ENR 2009). In August and September, the caribou move across the tundra towards the treeline. The rut occurs in October, and may last for 2 to 3 weeks. The distribution of barren-ground caribou changes constantly during the winter as they search for places where the food is abundant and the snow is the shallowest (ENR 2009). When spring arrives, the caribou once again begin their migration to the calving grounds.

Northern Migration

The timing and routes of barren-ground caribou movements during the northern spring migration to the calving grounds tend to be more predictable than other migrations (Case et al. 1996; Gunn et al. 2002; BHPB 2004). Cows and yearlings usually form the lead group (Pruitt 1960; Curatolo 1975), while bulls typically lag behind on the wintering grounds.

Calving

Most cows arrive on the calving grounds in the last week of May or early June. Bulls, some yearlings, and non-pregnant females tend to lag behind during the northern migration and generally do not migrate as far as the calving grounds (Case et al. 1996). Severe weather conditions and deep snow may delay animals and affect distribution on the calving grounds (Sutherland and Gunn 1996). Most barren-ground caribou herds show some flexibility in the use of calving grounds or variations in use of the same general area from year to year (Banfield and Jakimchuk 1980), Sutherland and Gunn 1996.

Calving grounds on the barren ground tundra are often located in high, rocky areas where there is little shelter from wind and driving snow. These conditions

are favourable since they provide patches of bare ground that allow the cows to feed. The northern location of the calving grounds also provides protection from wolf predation, as wolves tied to a natal den are less mobile.

Although the breeding dates of barren-ground caribou are highly synchronized (Gunn 1984a), cows that are in poor physical condition may have prolonged gestation (Bergerud 1975). In years with poor weather conditions or reduced forage productivity, calving may peak later than normal (Gunn 1984a). The majority of calving takes place in the first 2 weeks of June. Within this period, there is a 5-day interval when most calves are born (Fleck and Gunn 1982).

Post-Calving Aggregation

The post-calving period is characterized by an increase in movement and an aggregation of individuals into larger groups (Pruitt 1960; Curatolo 1975). Initially, these groups include cows and calves. These groups are gradually joined by non-calving cows, yearlings, and adult bulls. The aggregation of caribou into large mixed groups may be caused by an increase in insect harassment (Case et al. 1996) or may be related to forage requirements.

Summer Dispersal

The movement of the post-calving aggregations slows around the end of July, at which time animals begin to disperse (Curatolo 1975). Caribou form small groups with the bulls typically segregating into separate bands (Pruitt 1960). Timing of dispersal may be related to a decline in insect harassment that allows caribou a chance to feed and rest, thereby restoring energy reserves prior to winter. During this time lactating cows and calves have high nutrient demands (Gunn et al. 1983). Barren-ground caribou spend the summer primarily on the tundra portion of their range (Case et al. 1996), although some animals move towards the treeline (Banfield and Jakimchuk 1980).

Rut and Fall Migration

Unlike the spring migration, movements in the fall are not easily predicted. Timing and location is highly variable and may occur from early September to late October. The rut usually coincides with the fall migration. Fall freeze up and the lack of snow and ice on lakes may influence fall movements, which may also influence the location of the caribou during and after the rut (Gunn 1984b). At this time, barren-ground caribou are generally found in large mixed groups near the treeline (Curatolo 1975). Because of the variability in timing of the fall migration, the rut may take place before, during, or after the main migration (Banfield and Jakimchuk 1980). The rut typically peaks in late October (Gunn 1984b). Sparring may begin by the end of September, with sporadic rutting

activity occurring through early November. Following the rut, the cows and bulls will segregate and disperse over the wintering grounds.

Winter Dispersal

Barren-ground caribou generally disperse throughout their winter range from November through March. Caribou distribution over the winter range is highly variable and movement is limited by snow depth (Curatolo 1975; Banfield and Jakimchuk 1980). Winter distribution is difficult to predict. The most frequently used winter ranges are near the treeline, although some animals will overwinter on the tundra (Banfield and Jakimchuk 1980). After the rut, the bulls generally move deeper into the forest than cows and yearlings (Case et al. 1996) and the sexes typically remain segregated.

3.1.1.3 Woodland Caribou

Most woodland caribou populations have also declined in recent years (ENR 2009). The boreal ecotype of woodland caribou is listed as '*sensitive*' in the NWT (NWT General Status Ranking Program 2009) and '*threatened*' by COSEWIC (2009) and SARA (2009). The northern mountain ecotype is '*of special concern*' territorially and federally. The southern mountain populations are listed as '*threatened*' and the Atlantic (formerly Gaspé) populations are considered '*endangered*' (COSEWIC 2009; SARA 2009).

Woodland caribou are distributed across the forested and mountainous regions of Canada, reaching the northern limit of their range in the NWT (ENR 2009). Little is known about the status of woodland caribou in the NWT (Dzus 2001). Woodland caribou in the NWT range from the Alberta border north to the tundra, west of Great Bear and Great Slave Lakes. (Edmonds and Smith 1991). Woodland caribou do not have definitive calving grounds like barren-ground caribou, although individual females often show fidelity to previous calving sites (Edmonds and Smith 1991; Dzus 2001). Instead pregnant females separate themselves from other caribou for calving.

Woodland caribou populations occur at low densities (0.03 to 0.12 caribou/km^2) throughout the mid-continent (Stuart-Smith et al. 1997). However, population numbers and trends for woodland caribou in Canada are poorly known; low densities, large land area, and multiple jurisdictions inhibit accurate population estimates. The population estimate of woodland caribou in the NWT was between 4000 and 6400 in 2001 (ENR 2009). The population estimate of the North Slave population of woodland caribou, which occupy the area surrounding the Project, was 700 individuals in 2005 (SARPR 2009). This population

estimate was derived from numbers of collared animals in other areas of the NWT and the current population trend of the North Slave population is unknown.

Woodland caribou are typically not migratory and remain in forested habitats year round (Dzus 2001; ENR 2009). The woodland caribou rut occurs in early- to mid-October (Edmonds and Bloomfield 1984). In November, woodland caribou disperse into smaller groups throughout their annual home range (Dzus 2001). When snow depth increases, caribou tend to move into areas of higher tree cover since movement and feeding are easier in these areas (Fuller and Keith 1981).

Foraging behaviour, energetics, survival, and reproduction of woodland caribou populations can be influenced by many environmental factors. Deep, crusted snow can affect energy expenditure and food accessibility for caribou (Stuart-Smith et al. 1997). Extreme winter conditions can influence access to food and result in lower calf weights, delayed parturition, or starvation, which influences calf survival (Skogland 1984; Adamczewski et al. 1987; Cameron et al. 1993; Dzus 2001). Female nutrition status from summer to winter also affects pregnancy rate and parturition rate (Dzus 2001). Caribou recruitment (Environment Canada 2008), distribution (Schaefer and Pruitt 1991; Dunford 2003; Joly et al. 2003; Vors et al. 2007; Courtois et al. 2007; Schaefer and Mahoney 2007; Dalerum et al. 2007), and persistence (Schaefer and Mahoney 2007; Vors et al. 2007; Wittmer et al. 2007; Sorenson et al. 2008) are also negatively affected by the level of disturbance (anthropogenic and burned) within caribou ranges.

3.1.1.4 Occurrence of Caribou within the Regional Study Areas

The occurrence of barren-ground caribou in the RSAs was estimated from the presence of satellite-collared animals from the Bathurst, Ahiak, and Bluenose East herds (Table 3.1-1). The study area falls within the area commonly used by wintering Bathurst caribou (Figure 3.1-1). The Ahiak and Bluenose East caribou herds also have the potential to use the study areas during the winter months (Figures 3.1-2 and 3.1-3).

Table 3.1-1 Number of Collared Caribou and Number of Satellite Point Locations within the Regional Study Areas, 1995 to 2010

Herd	Season	Number of Collared Caribou in the RSAs	Total Number of Collared Caribou	Number of Satellite Point Locations in the RSAs	Total Number of Satellite Point Locations[d]
Bathurst[a]	winter dispersal	6	94	21	13 734
	northern migration	0	85	0	1484
	calving	0	76	0	1148
	post-calving	0	78	0	1825
	summer dispersal	0	78	0	8111
	fall (rut)	0	79	0	2317
Bluenose East[b]	winter dispersal	0	43	0	11 166
	northern migration	0	36	0	3256
	calving	0	43	0	2253
	post-calving	0	43	0	2394
	summer dispersal	0	39	0	6441
	fall (rut)	0	35	0	4770
Ahiak[c]	winter dispersal	0	62	0	20 119
	northern migration	0	59	0	3917
	calving	0	57	0	1884
	post-calving	0	57	0	2033
	summer dispersal	0	57	0	6447
	fall (rut)	0	55	0	5327

[a] the Bathurst collared caribou estimates are based on data from 1995 to 2010

[b] the Bluenose collared caribou estimates are based on data from 1996 to 2010

[c] the Ahiak collared caribou estimates are based on data from 2001 to 2010. Ahiak data from 2008 to 2010 were combined Ahiak and Beverly herd satellite collar data

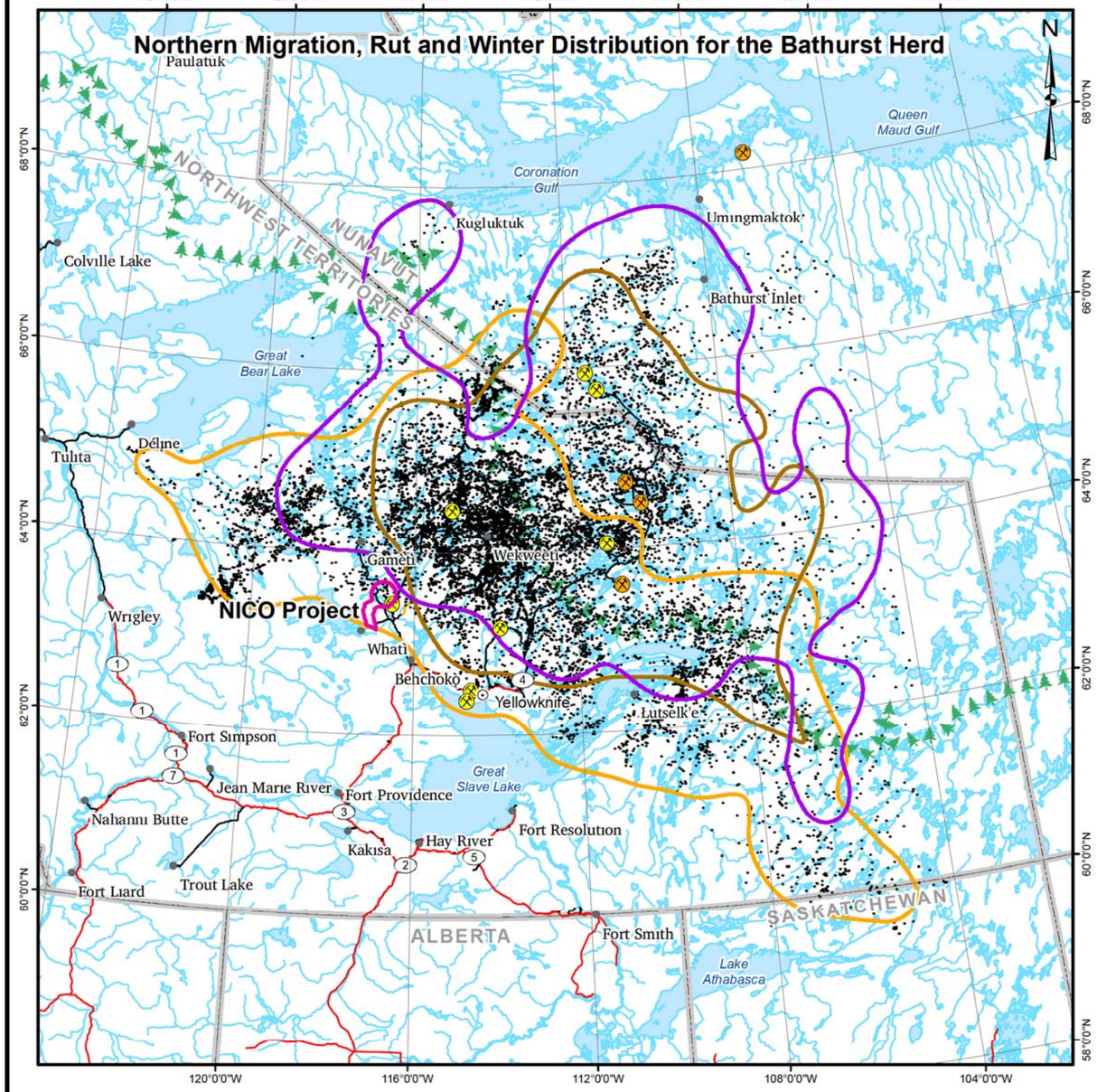
[d] sum of all satellite collar locations from 1995 to 2010

RSAs = regional study areas for the proposed mine and Proposed NICO Project Access Road

From fall 1996 through March 2010, the study area was included in the area used by wintering collared caribou cows from the Bathurst herd in 5 years (1 individual each in 1996, 1998, 2000, and 2004 and 2 individuals in 2005) and was close (within 50 km) in 6 other years (1996, 1999, 2000, 2005, 2006, and 2007; Figure 3.1-1; Table 3.1-2). One caribou from the Bluenose East caribou herd was recorded within 50 km of the Project in the winter of 2007 (Table 3.1-2).

Northern Migration, Rut and Winter Distribution for the Bathurst Herd

Calving, Post-calving, and Summer Distribution for the Bathurst Herd



LEGEND

- PROPOSED OR OPERATIONAL MINE
- DECOMMISSIONED MINE
- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- WATERCOURSE
- WATERBODY
- BATHURST CARIBOU SATELLITE LOCATION
- TREELINE
- REGIONAL STUDY AREA
- NORTHERN MIGRATION
- RUT
- WINTER
- CALVING
- POST-CALVING
- SUMMER

REFERENCE

Base data obtained from Atlas of Canada, DMTI and ESRI.
Environment and Natural Resources, Government of Northwest Territories, 2010
Projection: Canada Lambert Conformal Conic

150 0 150
SCALE 1:6,500,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
ANNUAL AND SEASONAL DISTRIBUTION OF SATELLITE-COLLARED CARIBOU FOR THE BATHURST HERD 1996 TO 2010

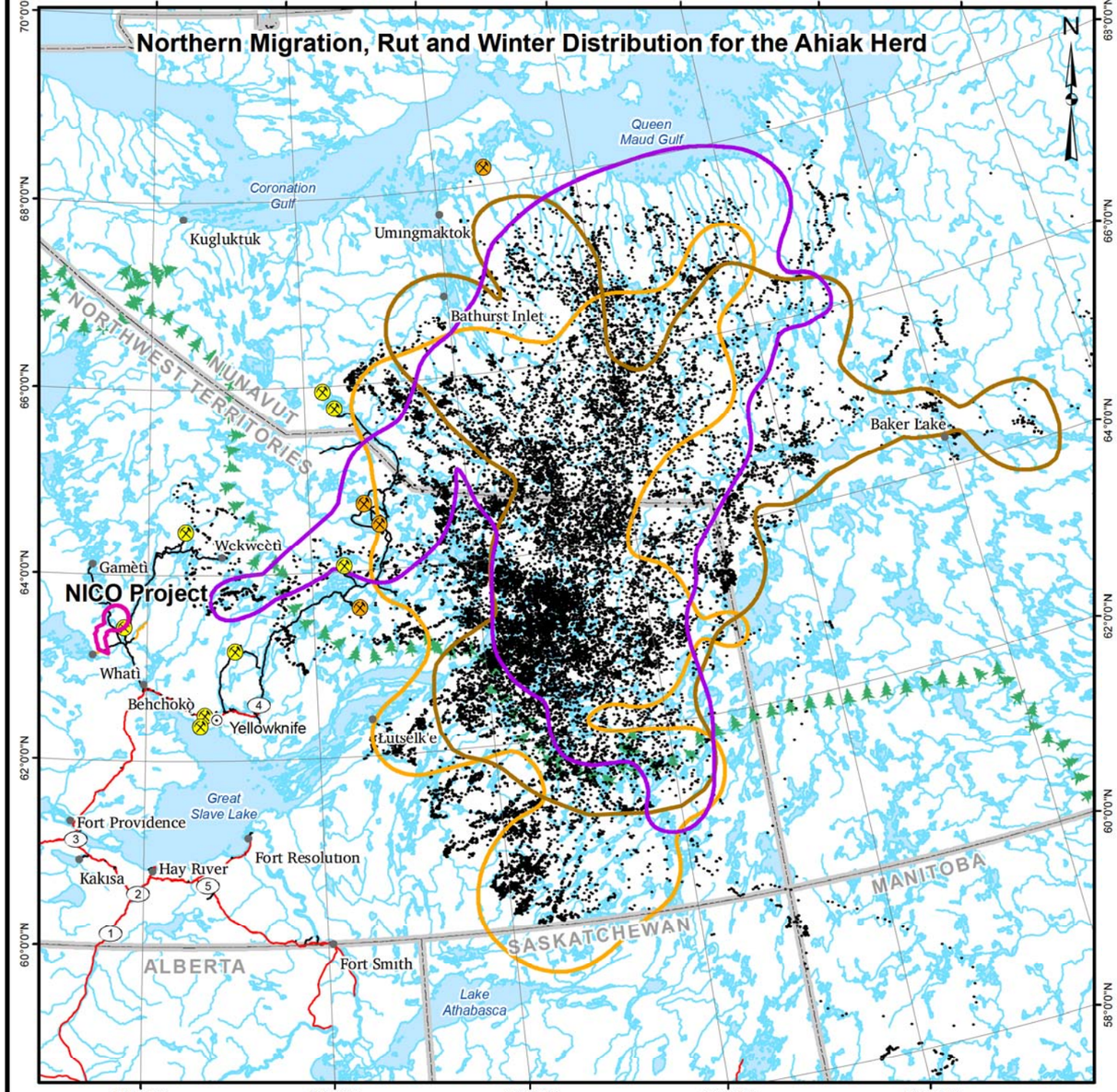
Golder Associates
Edmonton, Alberta

FILE No. B-Wild-002-GIS
PROJECT No. 08-1373-0017 | SCALE AS SHOWN | REV. 3

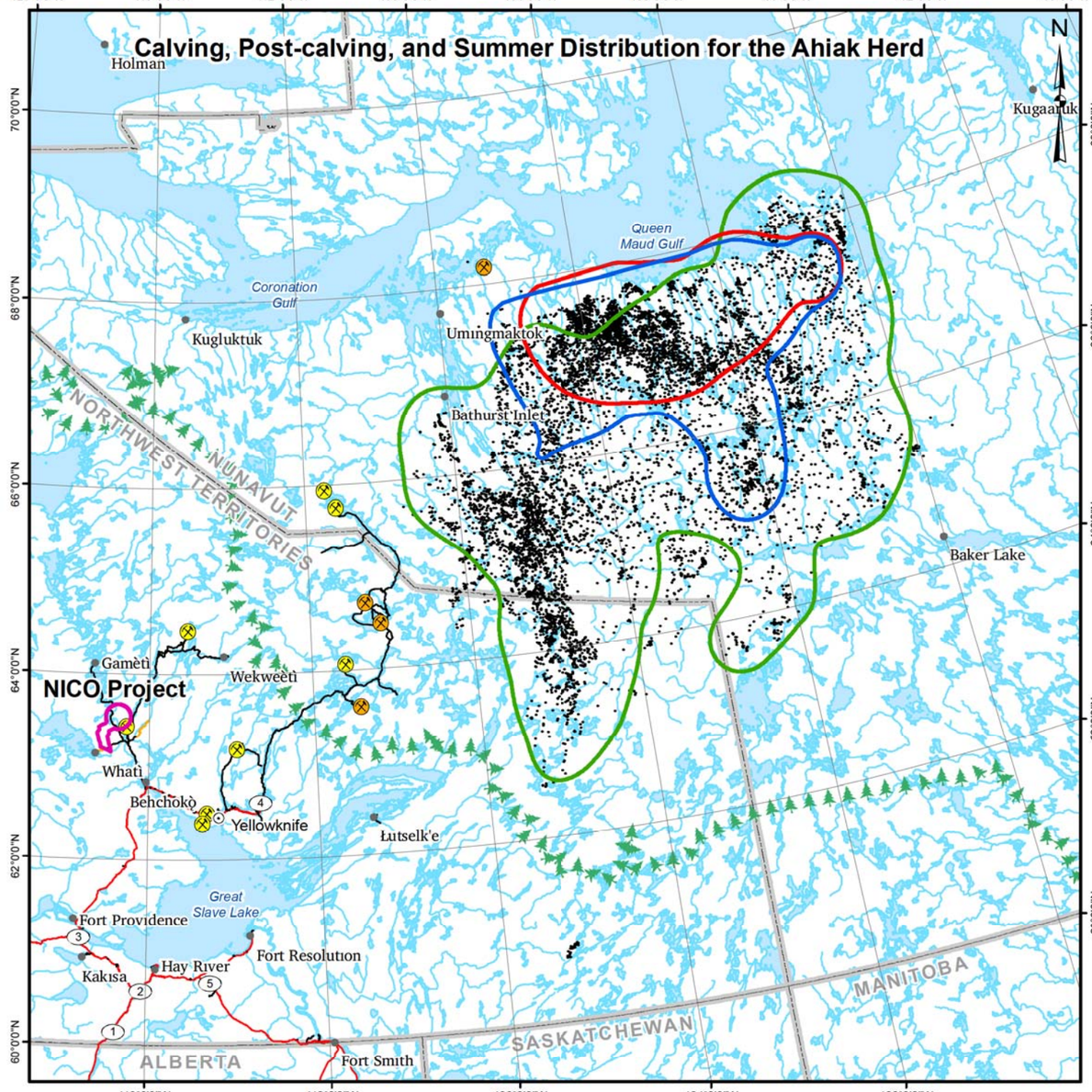
DESIGN	LD	23 Oct. 2008
GIS	MK	26 Aug. 2010
CHECK	LY	17 Nov. 2010
REVIEW	GA	17 Nov. 2010

FIGURE: 3.1-1

Northern Migration, Rut and Winter Distribution for the Ahiak Herd



Calving, Post-calving, and Summer Distribution for the Ahiak Herd



LEGEND

- PROPOSED OR OPERATIONAL MINE
- DECOMMISSIONED MINE
- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- WATERCOURSE
- WATERBODY
- AHIAK CARIBOU SATELLITE LOCATION
- TREELINE
- REGIONAL STUDY AREAS
- NORTHERN MIGRATION
- RUT
- WINTER
- CALVING
- POST-CALVING
- SUMMER

REFERENCE

Base data obtained from Atlas of Canada, DMTI and ESRI.
Environment and Natural Resources, Government of Northwest Territories, 2010
Projection: Canada Lambert Conformal Conic

Note: Collar Data 2008-2010 is combined Ahiak and Beverly Herds.

150 0 150
SCALE 1:6,500,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

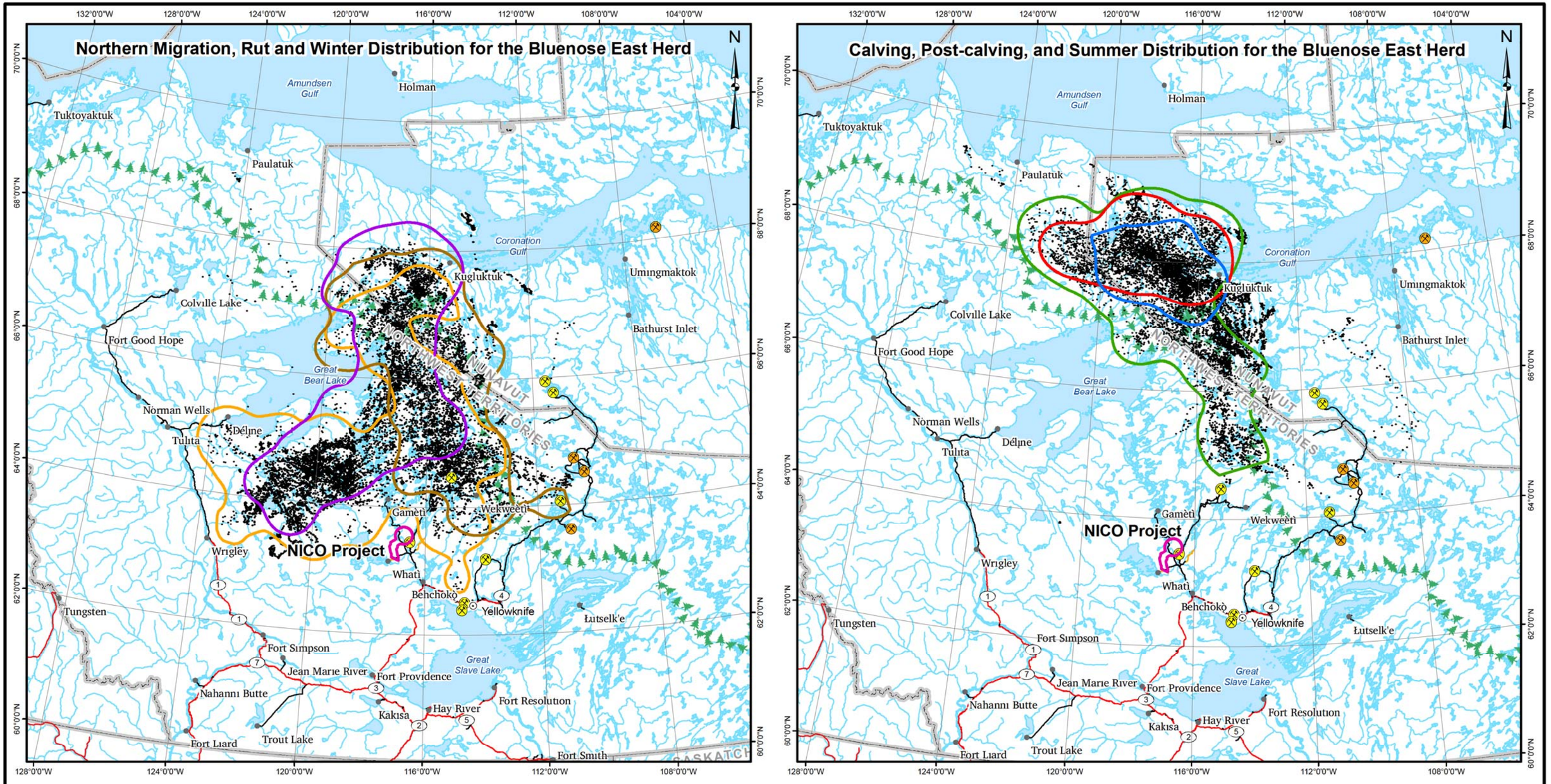
TITLE
ANNUAL AND SEASONAL DISTRIBUTION OF SATELLITE-COLLARED CARIBOU FOR THE AHIAK HERD 2001 TO 2010

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-001-GIS			
PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 2
DESIGN	LD	23 Oct. 2008	**FIGURE: 3.1-2**
GIS	MK	27 Aug. 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

Northern Migration, Rut and Winter Distribution for the Bluenose East Herd

Calving, Post-calving, and Summer Distribution for the Bluenose East Herd



LEGEND

- PROPOSED OR OPERATIONAL MINE
- DECOMMISSIONED MINE
- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- WATERCOURSE
- WATERBODY
- BLUENOSE EAST CARIBOU SATELLITE LOCATION
- TREELINE
- REGIONAL STUDY AREAS
- NORTHERN MIGRATION
- RUT
- WINTER
- CALVING
- POST-CALVING
- SUMMER

REFERENCE

Base data obtained from Atlas of Canada, DMTI and ESRI.
Environment and Natural Resources, Government of Northwest Territories, 2010
Projection: Canada Lambert Conformal Conic

150 0 150
SCALE 1:6,500,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
ANNUAL AND SEASONAL DISTRIBUTION OF SATELLITE-COLLARED CARIBOU FOR THE BLUENOSE EAST HERD, 1996 TO 2010

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-003-GIS

PROJECT No. 08-1373-0017			SCALE AS SHOWN	REV. 2
DESIGN	LD	27 Oct. 2008		
GIS	MK	26 Aug. 2010		
CHECK	LY	17 Nov. 2010		
REVIEW	GA	17 Nov. 2010		

FIGURE: 3.1-3

Table 3.1-2 Number of Collared Caribou and Number of Locations within 50 km of the Project, 1995 to 2010

Year	Bathurst		Bluenose East		Ahiak	
	Number of Satellite-Collared Caribou	Number of Satellite Locations	Number of Satellite-Collared Caribou	Number of Satellite Locations	Number of Satellite-Collared Caribou	Number of Satellite Locations
1995	0	0	ND	ND	ND	ND
1996	4	5	0	0	ND	ND
1997	0	0	0	0	ND	ND
1998	5	8	0	0	ND	ND
1999	7	48	0	0	ND	ND
2000	5	40	0	0	ND	ND
2001	0	0	0	0	0	0
2002	0	0	0	0	0	0
2003	0	0	0	0	0	0
2004	1	7	0	0	0	0
2005	5	44	0	0	0	0
2006	3	5	0	0	0	0
2007	3	9	1	1	0	0
2008	0	0	0	0	0	0
2009	0	0	0	0	0	0
2010	0	0	0	0	0	0

ND = data were not available because there were no radio-collared caribou in these herds during the indicated years.

The area used by barren-ground caribou during the winter varies among years (Case et al. 1996; Gunn et al. 2002). The Bathurst caribou herd has the greatest probability of being affected by the Project, as individuals have been recorded in the proximity of the study areas during several years (Table 3.1-2). Bluenose East caribou are not likely to be influenced by the Project in most years, as only one individual has been recorded within 50 km of the Project from 1996 through 2010 (Table 3.1-2). Individuals from the Ahiak caribou herd have the lowest likelihood of being influenced by the Project, as individuals from this herd have not been recorded within 50 km of the Project (Table 3.1-2).

The RSAs fall within the range identified for NWT North Slave woodland caribou population (ENR 2009). However, John Mantla (Behchokò [pers comm. 2003]) indicated that he knew of no traditional hunting of woodland caribou in the area, and believed that they were not commonly present in the study areas. Woodland caribou tend to be more common to the west of the RSAs, beyond the community of Whatì (Dogrib Treaty 11 Council 2001).

The Bathurst caribou herd typically ranges over an area of about 412 000 km^2, which extends from Bathurst Inlet to the northern boreal forest (Gunn et al. 2002). The estimated annual range (based on 95 % kernel density of data from 1996 to 2010 [Figure 3.1-1]) is 400 435 km^2. Winter distribution extends from the south side of Great Bear Lake to as far south as northern Saskatchewan (Figure 3.1-1).

The estimated annual range of the Ahiak caribou herd (based on 95 % kernel density from data from 2001 to 2010 [Figure 3.1-2]) is 443,717 km^2. Winter distribution extends from the south side of Queen Maud Gulf to northern Saskatchewan (Figure 3.1-2). The estimated annual range of the Bluenose East caribou herd (based on 95% kernel density from data from 2001 to 2010 [Figure 3.1-3]) is 236 375 km^2. Winter distribution extends from the north side of Great Bear Lake, south to the community of Behchokò (Figure 3.1-3).

Abundance, Group Size, Composition, and Distribution

Proposed Mine Regional Study Area

Caribou data collected during field programs did not differentiate between barren-ground and woodland caribou as it is difficult to discriminate individuals of each group from aerial, pellet, and winter track surveys. Regardless, the surveyes are scheduled around movements of barren-ground caribou. During aerial surveys in the proposed mine RSA, 98 caribou groups consisting of 1014 individuals were recorded. Group size ranged from 1 to 50 individuals, although most of the groups tended to be small. For example, 40 % of the groups contained 1 to 4 individuals and 53 % of the groups contained 5 to 29 individuals. Only 7 groups (7 %) were comprised of 30 or more individuals.

The observed number of caribou and caribou density in the proposed mine RSA varied greatly among years (Table 3.1-3). Mean caribou density within the proposed mine RSA from 2004 to 2006 was 14.79 ± 2.58 caribou/km^2 whereas density from 2007 to 2010 was 0.82 ± 0.21 caribou/km^2. This is likely due to the small size of the study area relative to the winter home range of barren-ground caribou herds, as well as their high daily movement rates ranging from 2 km to over 20 km per day between November and May; Gunn et al. 2001) and their highly variable distribution and movement during the winter (Curatolo 1975; Banfield and Jakimchuk 1980).

Caribou distribution was concentrated within a central band across the proposed mine RSA; fewer caribou were observed in the northern and southern portions of the study area (Figure 3.1-4). These observations were associated with the hilly regions of the study area and the associated bedrock-open conifer habitat;

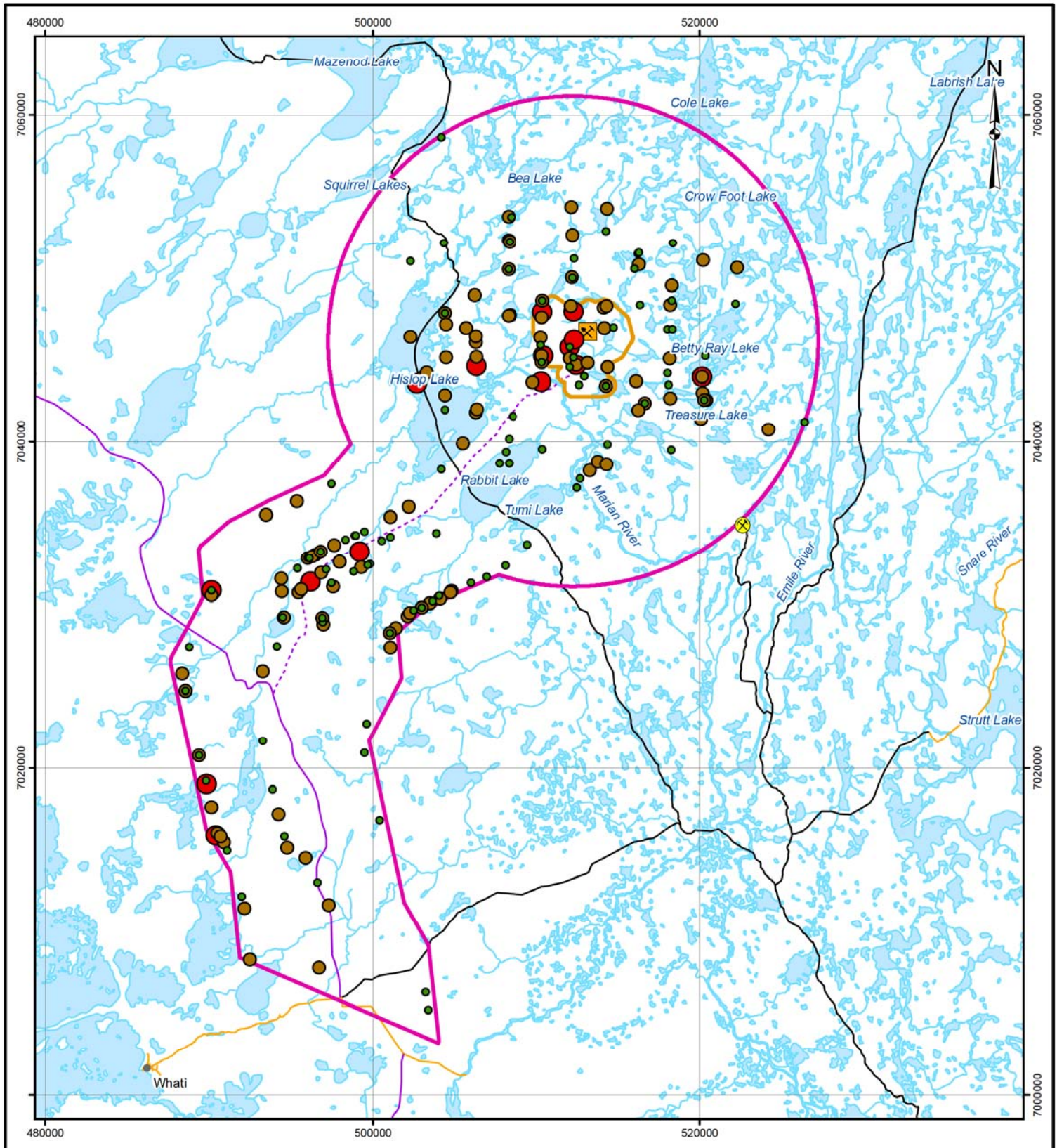
however, snow tracks recorded during aerial surveys indicated that caribou used most of the study area (Figure 3.1-5).

Table 3.1-3 Observed and Estimated Number of Caribou in the Proposed Mine Regional Study Area, 2004 to 2010

Survey Date	Number of Caribou Observed
26-Nov-04	409
10-Dec-04	8
11-Apr-05	402
4-May-05	32
11-Apr-06	39
6-Dec-06	0
11-Apr-07	0
11-Dec-07	91
15-Apr-08	2
12-Dec-08	0
17-Dec-09	24
22-Mar-10	7

In addition to the aerial surveys, caribou activity in the region was estimated from the presence of satellite-collared animals. Using an area of 50 km around the Project, there have been 167 satellite collar locations recorded from 34 caribou from 1995 to 2010. All but one of these locations were from individuals of the Bathurst caribou herd. Satellite-collared Bathurst caribou were present in 1996, 1998 to 2000, and 2004 to 2007. One to 7 individuals were present in each of these years. All of these locations were recorded between November and April. These data suggest that the probability of Bathurst caribou occurring in the RSA during winter is highly variable among years (Table 3.1-2). One location from a Bluenose caribou individual was recorded on 28 November 2007 (Table 3.1-2).

Determining the group composition of caribou during the winter is difficult during an aerial survey. Calves have grown substantially and most bulls have lost their antlers, making it difficult for observers to determine age and sex of the animals. As a result, the composition of 64 % of the 98 caribou groups observed was undetermined. For the remaining 35 groups where group composition could be determined, 63 % contained only adults and 37 % were nursery groups (i.e., groups with calves).



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY

NUMBER OF CARIBOU

- 1 - 4
- 5 - 29
- > 30
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

10 0 10

SCALE 1:325,000 KILOMETRES

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT

FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE

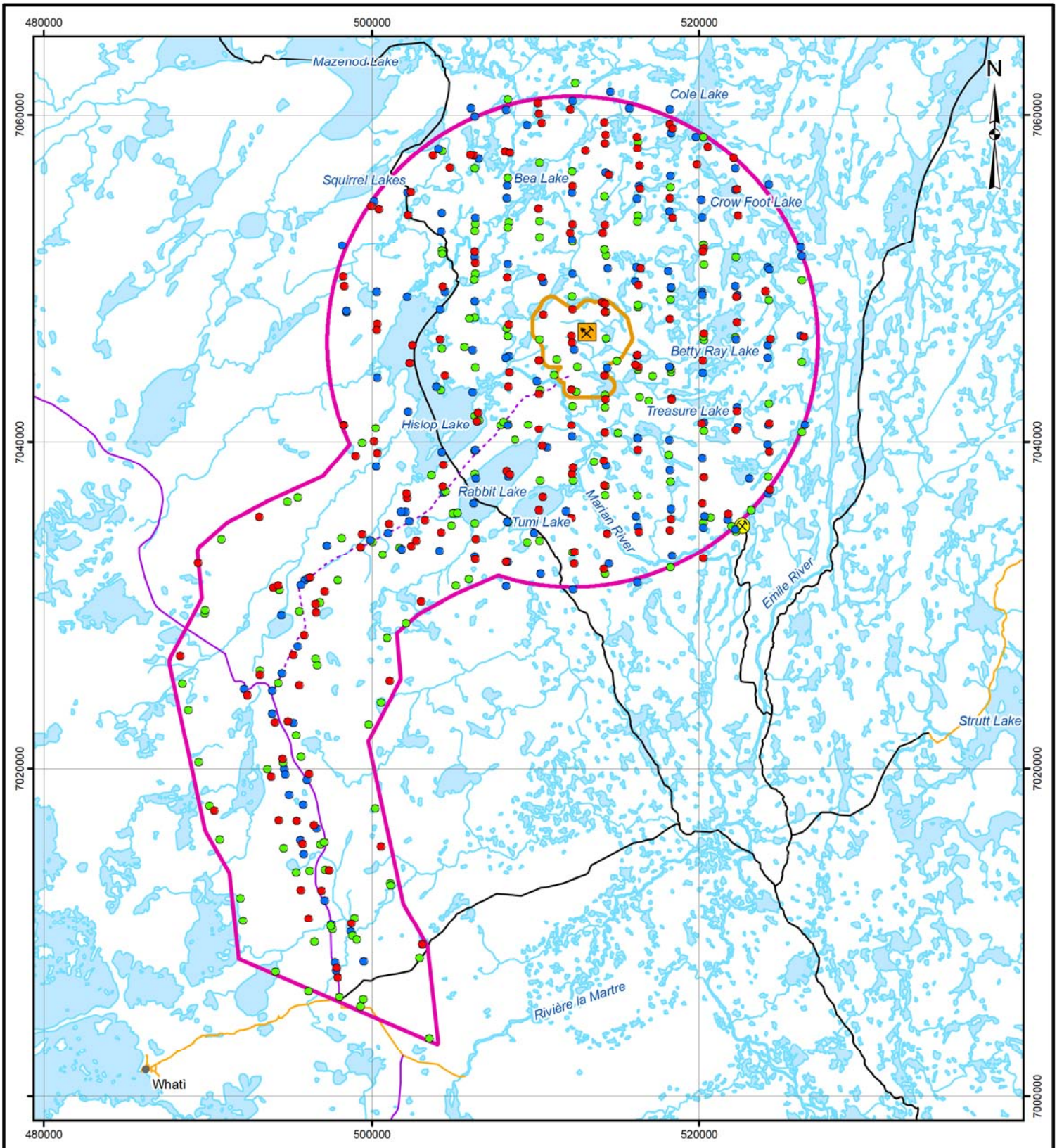
CARIBOU DISTRIBUTION AND GROUP SIZE IN THE REGIONAL STUDY AREAS, 2004 TO 2010

Golder Associates
Edmonton, Alberta

FILE No. B-Wld-018-GIS

PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 1
DESIGN	LD	27 Oct. 2008	
GIS	ANK	18 May 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

FIGURE: 3.1-4



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY

TRACK DENSITY

- HIGH (CONTINUOUS TRACKS OR NETWORK)
- MEDIUM (MULTIPLE SINGLE TRACKS/TRAILS)
- LOW (OCCASIONAL SINGLE TRACKS)
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
CARIBOU SNOW TRACK INDEX FROM AERIAL SURVEYS, 2004 TO 2010

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-017-GIS			
PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 0
DESIGN	LD	27 Oct. 2008	FIGURE: 3.1-5
GIS	ANK	18 May 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

I:\CLIENTS\FORTUNE_MINERALS\08-1373-0017\Mapping\MXD\Wildlife\B-Wild-017-GIS.mxd

Dominant group behaviour was recorded for 95 groups during the 9 aerial surveys with caribou observations. Behaviour was categorized as either feeding/resting (bedded, standing, feeding) or moving (walking, trotting, running). Groups displaying these 2 behaviours were approximately equal. For example, 44 groups exhibited feeding/resting behaviour and 51 groups were moving. With respect to habitat, from 2004 to 2006 most caribou groups were observed in frozen lake (66 %) and coniferous spruce (20 %) habitats. Similarly, from 2007 to 2010 most caribou group observations were made in frozen lake (53 %) and coniferous spruce (29 %) habitats.

Ground-based snow track surveys indicated that caribou track densities were high in coniferous spruce and bedrock-open conifer habitats within the proposed mine RSA in 2005 (Table 3.1-4). Caribou tracks were also recorded in deciduous aspen-paper birch, open bog, treed bog, and frozen water habitats in 2005. No caribou tracks were recorded within the proposed mine RSA in 2009. Due the limited availability of some habitats in the study area (Table 2.2-5; Table 2.2-6), survey effort (distance sampled) was low or did not occur in burn, coniferous pine, marsh/graminoid fen, shrubland, and treed fen habitats (Table 3.1-4). Caribou tracks were abundant within the proposed mine RSA, as 53% of the observations were classified as networks (i.e., assumed to have 5 times the activity level of a single track). Trails (i.e., assumed to have 3 times the activity level of a single track) accounted for 39 % of the observations, and single tracks accounted for 8 % of the caribou track observations.

In summer, the highest densities of caribou pellets were recorded in bedrock-open conifer and mixedwood spruce-paper birch-aspen habitats (Table 3.1-5). A few pellets were found in deciduous trembling aspen-paper birch and treed bog habitats. No pellets were found in other habitat types.

Table 3.1-4 Snow Track Density and Habitat Selection of Caribou among Habitats within the Proposed Mine Regional Study Area, 2005

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)	Proportion of Total Tracks [Use]	Proportion of Total Habitat Available[b]	95% Confidence Intervals for Use
Bedrock-Open Conifer	47.38 ± 15.25	102.01	1.88	0.23	0.11	0.17 - 0.29
Burn	NS	NS	0	NS	0.00003	NS
Coniferous Pine	0	0.00	0.05	0.00	0.01	0
Coniferous Spruce	25.77 ± 6.87	245.53	6.52	0.55	0.56	0.49 - 0.62
Deciduous Aspen-Paper Birch	46.43 ± 23.42	39.29	0.17	0.09	0.01	NA[d]
Marsh/Graminoid Fen	0	0.00	0.01	0.00	0.01	NA[d]
Open Bog	45.83[c]	20.56	0.14	0.05	0.01	NA[e]
Shrubland	NS	NS	0	NS	0.01	NS
Treed Bog	29.28 ± 10.23	16.23	0.25	0.04	0.04	0.01 - 0.06
Treed Fen	NS	NS	0	NS	0.01	NS
Frozen Water (Ice)	24.14 ± 14.13	18.96	0.78	0.04	0.23	0.02 - 0.07
Total		**442.57**	**9.80**	**1.00**	**1.00**	

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

[b] Proportion of Total Habitat Available = Expected Proportion of Use. A habitat type is preferred if the expected proportion of use is below the 95% confidence intervals for use of that habitat type, the habitat is neutrally selected if the expected proportion of use is within the 95% confidence intervals, and the habitat is avoided if the expected proportion of use is above the 95% confidence interval values.

[c] Only the mean is reported because only 2 sites were surveyed in open bog habitat.

[d] Expected frequency of use was less than 5.

[e] Not reported because surveys were only completed in 2 segments of open bog habitat.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed) per km surveyed per days since last snow fall

NS = Not Surveyed

NA = Not Applicable

Table 3.1-5 Caribou Pellet Group Density among Habitats within the Proposed Mine Regional Study Area, 2005 to 2007

Habitat Type	Number of Pellet Groups (mean ± 1SE)[a]	Distance Sampled (km)
Bedrock-Open Conifer	4.27 ± 3.39	1.76
Coniferous Pine	0	0.04
Coniferous Spruce	0	1.09
Deciduous Trembling Aspen-Paper Birch	1.0[b]	0.26
Mixedwood Spruce-Paper birch-Aspen	6.19 ± 5.72	2.84
Open Bog	0	0.19
Treed Bog	0.50 ± 0.50	6.89
Total		**13.07**

[a] Number of pellet groups per habitat type per transect

[b] Only the mean is reported as only one transect was completed in decidous trembling aspen-paper birch habitat

SE = Standard Error

Proposed NICO Project Access Road Regional Study Area

During aerial surveys in the NPAR RSA, 126 caribou groups comprising 1168 animals were recorded. Group size ranged from 1 to 50 individuals, and most of the groups tended to be small, with an average group size of 9 animals. Groups containing 1 to 4 individuals comprised 46 % of the observations, and group containing 5 to 29 individuals, comprised 48 % of the observations. Only 8 groups (6 %) were comprised of 30 or more individuals.

Similar to the proposed mine RSA, the observed number of caribou in the NPAR RSA varied greatly among years and generally showed a decrease over time (Table 3.1-6). Caribou distribution within the NPAR study area was concentrated south to south-east of Rabbit and Hislop lakes. A smaller concentration of caribou sightings occurred north of Whatì at the south-west extent of the road transects. Most observations of caribou groups were made in coniferous spruce (33%) or frozen lake (29%) habitat.

Table 3.1-6 Observed Number of Caribou along the Proposed NICO Project Access Road Regional Study Area, 2004 to 2010

Survey Date	Number of Caribou Observed
26-Nov-04	554
10-Dec-04	370
11-Apr-05	194
04-May-05	13
11-Apr-06	0
6-Dec-06	2
11-Apr-07	4
11-Dec-07	21
15-Apr-08	0
12-Dec-08	0
17-Dec-09	0
22-Mar-10	0

Of the 126 caribou groups observed, 92 were classified as nursery or non-nursery groups. Non-nursery and nursery groups made up 67 % and 33 % of the classified groups, respectively. Dominant group behaviour was recorded for 113 groups during the 7 aerial surveys with caribou observations. Of theses 74 (65 %) were displaying feeding/resting behaviour and 39 (35 %) were moving.

Caribou winter tracks were observed in coniferous pine and coniferous spruce habitats within the NPAR study area (Table 3.1-7). Due the limited availability of some habitats in the study area, survey effort was low in bedrock-open conifer, burn, frozen lake, open bog, and shrubland habitats (Table 2.2-7). Single tracks comprised 24 % of caribou track observations, and trails comprised 76 % of caribou track observations within the NPAR. No caribou track networks were recorded within the NPAR study area.

Table 3.1-7 Caribou Snow Track Density among Habitats within the Proposed NICO Project Access Road Regional Study Area, 2005 and 2008

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)
Bedrock-Open Conifer	0	0	0.23
Burn	0	0	0.08
Coniferous Pine	0.62 ± 0.62	2.78	2.60
Coniferous Spruce	0.17 ± 0.11	3.58	24.87
Deciduous Aspen-Paper Birch	0	0	0.61
Marsh/Graminoid Fen	0	0	1.49
Open Bog	0	0	0.20
Shrubland	0	0	0.04
Treed Bog	0	0	1.50
Treed Fen	0	0	2.64
Frozen Water (Ice)	0	0	0.20
Total		**6.35**	**34.45**

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed) per km surveyed per days since last snow fall.

3.1.2 Habitat Selection and Foraging

Habitat selection and caribou behaviour are frequently the result of their response to environmental conditions; therefore, caribou can be found in a variety of habitat types at any one time (Case et al. 1996). The selection of habitat appears to be related to food availability, ease of travel, relief from insects, and predation (Curatolo 1975). Cows with calves play an important role in influencing caribou behaviour because they direct the overall movements of the herd and pass on traditional movement patterns (Curatolo 1975).

Woodland caribou prefer mature to old conifer forests since these habitats contain lichen, which is the caribou's primary winter food source (Dzus 2001). Woodland caribou primarily select peatland-dominated landscapes, such as black

spruce bogs and black spruce-tamarack fens, while typically avoiding upland areas; however, caribou will use lichen-rich jack pine stands (Stuart-Smith et al. 1997). Woodland caribou tend to calve in low-lying areas, such as muskeg bogs and fens (Dzus 2001).

Wildfire can alter the availability of forage for caribou inhabiting forested environments (i.e., woodland caribou year-round or barren-ground caribou during the winter). Studies from central Alaska suggest that the depletion in lichen abundance after wildfire changes caribou range use and forces caribou to increase their home range size during the winter (Courtois et al. 2007). However, studies in northern Alberta found no change in caribou range size or use after wildfire (Dalerum et al. 2007). Instead, Dalerum et al. (2007) suggest that caribou occupying large home ranges (i.e., caribou in more northern areas) may be able to use alternative areas within their home ranges to forage for lichen, instead of switching to new, previously unused areas. The severity of a fire affects woodland caribou populations differently depending on the mosaic of burned and unburned patches that are left after the fire (Environment Canada 2008). The differential effects on woodland caribou habitat quality are related to the effects on forage, the post-disturbance trajectory of burned areas, and the numerical response by predators and competitors. Fire disturbance has been negatively associated with caribou recruitment (Environment Canada 2008) and severe fires may negatively impact woodland caribou since woodland caribou avoid young forests (Schaefer and Pruitt 1991; Dunford 2003; Joly et al. 2003; Dalerum et al. 2007). Barren-ground caribou may avoid recent fires (within 55 years of being burned; Joly et al. 2007) because lichen cover may be reduced to 5 %, even after 20 to 35 years of regeneration (Jandt et al. 2008).

Habitat preference from winter track surveys within the proposed mine RSA in 2009 and within the NPAR study area could not be determined because the expected frequencies of caribou tracks among all habitats did not meet statistical assumptions. Analysis for the proposed mine RSA in 2005 indicated that caribou track encounters were statistically different among 5 habitats (Chi-square = 122.22, df = 4, $P < 0.001$). Bonferroni confidence intervals suggested that treed bog and coniferous spruce habitats were selected in proportion to their availability (Table 3.1-4). Bedrock-open conifer habitat was preferred, while coniferous pine and frozen water habitats were avoided relative to availability.

Manly's standardized selection ratios of caribou aerial survey data suggested that frozen lake was the most preferred habitat within the proposed mine RSA during winter from 2004 to 2010 (Table 3.1-8; Table 3.1-9; Table 3.1-10). Frozen lake was also the most preferred habitat within the NPAR according to aerial survey data from 2004 to 2010 (Table. 3.1-11).

Table 3.1-8 Manly's Selection Ratios for Caribou Observations during Aerial Surveys within the Proposed Mine Regional Study Area, 2004 to 2006

Habitat Type[a]	Actual Proportion of Use	Expected Proportion of Use	Manly's Standardized Selection Ratio
Bedrock-open conifer	0.05	0.12	0.10
Coniferous spruce	0.21	0.60	0.08
Treed bog	0.03	0.04	0.15
Frozen lake	0.71	0.24	0.67

[a] Determined from the Ecological Landscape Classification

Table 3.1-9 Manly's Selection Ratios for Caribou Observations during Aerial Surveys within the Proposed Mine Regional Study Area, 2007 and 2008

Habitat Type[a]	Actual Proportion of Use	Expected Proportion of Use	Manly's Standardized Selection Ratio
Bedrock-open conifer	0.20	0.13	0.30
Coniferous spruce	0.20	0.57	0.07
Treed bog	0	0.04	0
Frozen lake	0.60	0.19	0.63

[a] Determined from the Ecological Landscape Classification

Table 3.1-10 Manly's Selection Ratios for Caribou Observations during Aerial Surveys within the Proposed Mine Regional Study Area, 2009 and 2010

Habitat Type[a]	Actual Proportion of Use	Expected Proportion of Use	Manly's Standardized Selection Ratio
Bedrock-open conifer	0	0.13	0
Burn	0	0.10	0
Coniferous spruce	0.57	0.53	0.34
Treed bog	0	0.04	0
Frozen lake	0.43	0.20	0.66

[a] Determined from the Ecological Landscape Classification

Table 3.1-11 Manly's Selection Ratios for Caribou Observations during Aerial Surveys within the Proposed NICO Project Access Road Regional Study Area, 2004 to 2010

Habitat Type[a]	Actual Proportion of Use	Expected Proportion of Use	Manly's Standardized Selection Ratio
Coniferous pine	0.05	0.09	0.04
Coniferous spruce	0.37	0.65	0.05
Marsh/graminoid fen	0.05	0.05	0.10
Treed bog	0.18	0.07	0.25
Treed fen	0.01	0.05	0.02
Frozen lake	0.34	0.05	0.54

[a] Determined from the Ecological Landscape Classification

A wide range of forage plants are used by caribou and food habits vary seasonally (Banfield and Jakimchuk 1980). Caribou are not typically browsers and most of the early winter diet consists of lichens (genera *Cladonia* and *Cladina* spp. preferred) and the green parts of sedges (*Carex* spp.) and horsetails (*Equisetum* spp.) because of their high digestibility and high protein levels (Miller 1976; Case et al. 1996). The consumption of grasses and sedges diminishes over winter, as these plants become less digestible (Kelsall 1968). In late winter, lichens are used extensively, although alder (*Alnus* spp.), birch (*Betula papyrifera*), and willow (*Salix* spp.) may be consumed when other food resources are scarce. Snow characteristics, such as hardness and depth, can influence forage availability and the selection of winter habitat (Case et al. 1996; Dzus 2001). Snow cover, rather than food availability, appears to limit the capacity of winter ranges to support barren-ground caribou. In spring, lichen uplands are the first areas to become snow free, and shrubby lichens become important until new plant growth emerges. Unique habitat features sought out by caribou include mineral licks of frost boils or mud boils, which are primarily mounds of silt and clay (Pruitt 1960).

Lichen provides a good source of energy but it is not rich in protein (Miller 1992). Therefore, in spring and summer, caribou tend to select new plant growth and flowers, which are rich in minerals and protein (Thompson and McCourt 1981; Miller 1992). During the calving season, willow, dwarf birch (*Betula glandulosa*), green alder (*Alnus crispa*), and cotton grass (*Eriophorum* spp.) are consumed as new growth emerges (Fleck and Gunn 1982). Following calving, caribou will move to areas where new vascular plants are more abundant. Willow, forbs, grasses, and sedges become important forage species in summer (Case et al. 1996; Demarais and Krebs 2000). By late summer, the leaves of deciduous shrubs, such as willow, dwarf birch, and bearberry (*Arctostaphylos* spp.), form much of the diet (Skoog 1986). In the fall, grasses, sedges, mushrooms, birch, and willow leaves remain important because of the protein content (Miller 1992).

3.2 MOOSE

3.2.1 Population Status and Distribution

Moose populations in the NWT are listed as '*secure*' (NWT General Status Ranking Program 2009), and are not listed federally (COSEWIC 2009; SARA 2009). Traditional moose range encompasses suitable habitat south of the treeline throughout the NWT. However, since the early 1900s, moose have been seen at numerous locations on the tundra where adequate forage is available (ENR 2009). Moose densities in northern environments are low (5 to 15 moose per 100 km^2 [ENR 2009]) compared to southern boreal forest regions (Sly et al. 2001). The estimated number of moose in the NWT is approximately 20 000 individuals (ENR 2009).

The best areas for moose are characterized by semi-open forest cover, an abundance of willow and aspen stands, and are located close to lakes, river valleys, stream banks, or sand bars. During the summer, moose may move into the tundra where they feed on semi-aquatic vegetation in wetlands and shallow lakes (Bromley and Buckland 1995). Moose cows usually select areas in immediate proximity to small ponds and marshes for calving. Stenhouse et al. (1994) found that mean annual home range for cows in the Mackenzie Valley, NWT was 174 km^2 (± 31 km^2, N = 29). This home range estimate was larger than those reported for adult moose in other parts of North America (Stenhouse et al. 1994), which may indicate that forage abundance was lower (Mace et al. 1984; Risenhoover 1986).

Moose are primarily threatened by direct and indirect habitat loss, altered predator/prey relationships, and hunting. Their primary predators are wolves and bears, which most often kill calves, although adults can also become prey (Ballard and Van Ballenberghe 1997). Predation and snow conditions are interrelated factors that can affect moose survival and recruitment. When snow is deep, moose gather in areas of shallow snow, which increases predation risk from wolves (ENR 2009). In addition, snow depth of over 90 centimetres (cm) greatly hinders their movements and reduces the availability of suitable browse species above the snowpack (ENR 2009).

Currently in the NWT, moose are managed mostly by controlling the hunting season for residents and non-residents (ENR 2009). The estimated total NWT moose harvest is 1000 to 2000 animals per year, 80 to 90 % of which is taken by General Hunting License holders who are able to hunt during any season.

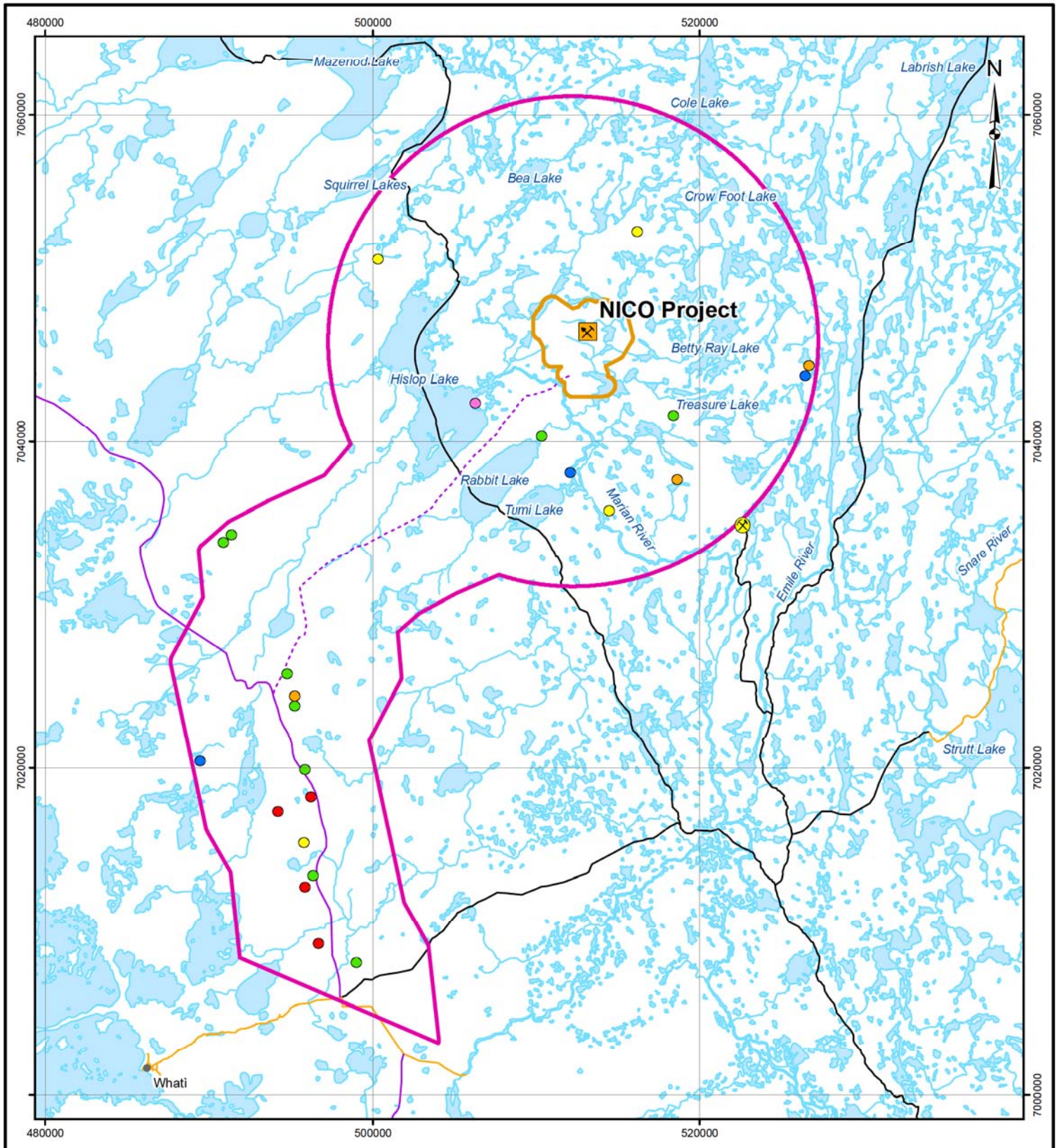
3.2.1.1 Occurrence and Distribution of Moose within the Regional Study Areas

A total of 24 groups (39 individuals) of moose were observed during 8 of the 12 aerial surveys in the RSAs (all surveys except 4 May 2005, 11 April 2006, 15 April 2008, and 22 March 2010) (Figure 3.2-1; Table 3.2-1; Table 3.2-2). Incidental observations of moose were also made during other wildlife surveys (Table 3.2-1; Table 3.2-2). One observation of a moose calf was made in 2004 and one calf was observed in 2008 (Table 3.2-1; Table 3.2-2). All other observations were of adults. An observation was also made of a moose swimming in Burke Lake on 13 June 2005. From 2004 through 2010, 11 adult moose and 1 calf were recorded in the proposed mine RSA (Table 3.2-1), and 29 adult moose and 1 calf were observed in the NPAR study area (Table 3.2-2).

Table 3.2-1 Aerial and Incidental Observations of Moose within the Proposed Mine Regional Study Area, 2004 to 2010

Date	Bulls/Unknown	Cows	Calves	Habitat[a]
26-Nov-04	1 unknown	0	0	Bedrock-open conifer
10-Dec-04	1 unknown	0	0	Bedrock-open conifer
11-Apr-05	2 unknown	0	0	Coniferous spruce
11-Dec-07	1 unknown	0	0	Coniferous spruce
12-Dec-08	0	1	1	Frozen water (ice)
12-Dec-08	1 bull	0	0	Coniferous spruce
17-Dec-09	1 unknown	0	0	Coniferous spruce
17-Dec-09	2 unknown	0	0	Burn
17-Dec-09	1 unknown	0	0	Bedrock-open conifer

[a] Determined from the Ecological Landscape Classification



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- MOOSE OBSERVATION, 2004
- MOOSE OBSERVATION, 2005
- MOOSE OBSERVATION, 2006
- MOOSE OBSERVATION, 2007
- MOOSE OBSERVATION, 2008
- MOOSE OBSERVATION, 2009
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

10 0 10
SCALE 1:325,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
LOCATION OF MOOSE OBSERVATIONS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-012-GIS				
PROJECT No. 08-1373-0017			SCALE AS SHOWN	REV. 1
DESIGN	LD	27 Oct. 2008		
GIS	ANK	20 May 2010		
CHECK	LY	17 Nov. 2010		
REVIEW	GA	17 Nov. 2010		

FIGURE: 3.2-1

Table 3.2-3 Incidental and Aerial Observations of Moose within the Proposed NICO Project Access Road Regional Study Area, 2004 to 2010

Date	Bulls/Unknown	Cows	Calves	Habitat[a]
13-Jul-04	0	1	1	Coniferous spruce
26-Nov-04	1 unknown	0	0	Coniferous spruce
26-Nov-04	2 unknown	0	0	Coniferous spruce
26-Nov-04	1 unknown	0	0	Treed fen
26-Nov-04	2 unknown	0	0	Frozen water (ice)
10-Dec-04	1 unknown	0	0	Open bog
10-Dec-04	1 unknown	0	0	Coniferous spruce
10-Dec-04	3 unknown	0	0	Coniferous spruce
23-Jul-05	0	1	0	Coniferous spruce
23-Jul-05	1 unknown	0	0	Open bog
6-Dec-06	0	2	0	Coniferous spruce
6-Dec-06	0	3	0	Coniferous spruce
6-Dec-06	0	2	0	Coniferous pine
6-Dec-06	0	1	0	Treed bog
11-Apr-07	0	1	0	Coniferous pine
11-Dec-07	1 bull	0	0	NR
12-Dec-08	4 bulls	0	0	Coniferous spruce
17-Dec-09	1 unknown	0	0	Treed bog

[a] Determined from the Ecological Landscape Classification

NR = Not recorded

Moose tracks were observed more frequently in deciduous trembling aspen-paper birch habitat than coniferous spruce habitat in the proposed mine RSA during winter track surveys in 2005 (Table 3.2-3). No moose tracks were observed in any other surveyed habitat type within the proposed mine RSA in 2005. Moose tracks were only recorded in coniferous spruce and treed fen habitat during winter track surveys in 2009 (Table. 3.2-4). The highest density of moose tracks was observed within deciduous trembling aspen-paper birch habitat within the NPAR study area (Table 3.2-5). Moose tracks were also found in coniferous spruce and coniferous pine habitats within the NPAR. Similar to caribou, the limited availability of some habitats in the RSAs constrained the ability to sample burn, bedrock-open conifer, coniferous pine, marsh/graminoid fen, shrubland, open bog, and treed fen habitats (Table 2.2-5; Table 2.2-6; Table 2.2-7). Single tracks accounted for 100% of the moose track observations in the study areas.

During summer, the highest densities of moose pellets were recorded in bedrock-open conifer and coniferous spruce habitats (Table 3.2-6). Pellets were also recorded in deciduous trembling aspen-paper birch and treed bog habitats. No moose pellets were observed in other habitat types.

Table 3.2-3 Moose Snow Track Density among Habitats within the Proposed Mine Regional Study Area, 2005

Habitat Type	Number of Tracks[a] (mean ± SE)	Observed Use (TKD)	Distance Sampled (km)
Bedrock-Open Conifer	0	0	1.88
Burn	NS	NS	0
Coniferous Pine	0	0	0.05
Coniferous Spruce	0.40 ± 0.40	8.33	6.52
Deciduous Aspen-Paper Birch	2.58 ± 1.30	7.74	0.17
Marsh/Graminoid Fen	0	0	0.01
Open Bog	0	0	0.14
Shrubland	NS	NS	0
Treed Bog	0	0	0.25
Treed Fen	NS	NS	0
Frozen Water (Ice)	0	0	0.78
Total		**16.07**	**9.80**

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed) per km surveyed per days since last snow fall.

Table 3.2-4 Moose Snow Track Density among Habitats within the Proposed Mine Regional Study Area, 2009

Habitat Type	Number of Tracks[a] (mean ± SE)	Observed Use (TKD)	Distance Sampled (km)
Bedrock-Open Conifer	0	0	5.13
Burn	0	0	6.32
Coniferous Pine	NS	NS	0
Coniferous Spruce	0.69 ± 0.40	39.44	14.50
Deciduous Aspen-Paper Birch	0	0	0.07
Marsh/Graminoid Fen	0	0	0.31
Open Bog	0	0	0.35
Shrubland	0	0	0.68
Treed Bog	0	0	0.43
Treed Fen	0.27 ± 0.15	5.08	2.67
Frozen Water (Ice)	0	0	6.49
Total		**44.53**	**36.95**

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed]) per km surveyed per days since last snow fall.

Table 3.2-5 Moose Snow Track Density among Habitats within the Proposed NICO Project Access Road Regional Study Area, 2005 and 2008

Habitat	Mean Number of Tracks[a] (± 1SE)	Observed Use (TKD)	Distance Sampled (km)
Bedrock-Open Conifer	0	0	0.23
Burn	0	0	0.08
Coniferous Pine	0.22 ± 0.22	3.92	2.60
Coniferous Spruce	0.21 ± 0.09	10.86	24.87
Deciduous Aspen-Paper Birch	0.64 ± 0.64	2.54	0.61
Marsh/Graminoid Fen	0	0	1.49
Open Bog	0	0	0.20
Shrubland	0	0	0.04
Treed Bog	0	0	1.50
Treed Fen	0	0	2.64
Frozen Water (Ice)	0	0	0.20
Total		**17.32**	**34.45**

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed]) per km surveyed per days since last snow fall.

Table 3.2-6 Moose Pellet Group Density Observed among Habitat Types within the Local Study Area during Summer, 2005 to 2007

Habitat Type	Number of Pellet Groups (mean ± 1SE)[a]	Distance Sampled (km)
Bedrock-Open Conifer	1.64 ± 0.53	1.76
Coniferous Pine	0	0.04
Coniferous Spruce	0	1.09
Deciduous Trembling Aspen-Paper Birch	1.0	0.26
Mixedwood Spruce-Paper Birch-Aspen	1.19 ± 0.36	2.84
Open Bog	0	0.19
Treed Bog	0.50 ± 0.50	6.89
Total		**13.07**

[a] Number of pellet groups per habitat type per transect

SE = Standard Error

3.2.2 Habitat Selection and Foraging

Optimal moose habitat consists of deciduous shrub and ground layers within deciduous, mixed, and conifer forests that offer edge or disturbed areas of early successional vegetation (Poole and Stuart-Smith 2003; Osko et al. 2004). Deciduous browse is a primary food source, varying from twigs and bark in the winter, to leaves in the spring and summer (URSUS and Komex 1997). In spring, moose tend to seek out low elevation areas, usually wetlands, muskeg, and river floodplains, as this is typically where the first green-up occurs (Stelfox 1993). Moose obtain the majority of their annual salt requirements from pond lilies and aquatic vegetation (Stelfox 1993). They tend to continue to use these areas in the summer periods where they will also feed in adjacent forest stands. Habitat preference of moose during all study periods and study areas could not be determined because the number of moose tracks detected among habitats was not adequate (i.e., expected frequencies of moose tracks among habitats were less than 5).

Moose are positively influenced by wildfire because fire increases the availability of deciduous browse species that moose depend on throughout the winter (MacCracken and Viereck 1990; Collins and Helm 1997). Moose densities were found to be greatest in 10 to 26 year old burned areas (Maier et al. 2005). Moose occupation of burned areas will vary with fire intensity, as severely burned areas will have little vegetation growth for up to 5 years (Gasaway et al. 1989).

During summer, moose use upland forests and eat fresh shoots and leaves from deciduous shrubs and young deciduous trees (mainly trembling aspen and balsam poplar). However, moose are also known to browse on young coniferous trees, such as balsam fir, in the summer. Moose diet in summer is typically made up of 74 % shrubs and trees, 25 % forbs, and 1 % graminoids (Rednecker 1987). During the fall and winter, moose typically prefer habitats where adequate browse is available. Preferred fall and winter browse includes red-osier dogwood (*Cornus sericea*), willow species, trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), dwarf birch, alder, and beaked hazelnut (*Corylus cornuta*), among others (Stelfox 1993). To access this forage, habitats with high cover of shrub species, such as shrubby fens and bogs and riparian habitats with open canopies, are usually preferred, particularly in late winter. Shrub height is important during winter conditions, as forage shrub species must be higher than the snowpack to be accessed by moose.

3.3 BLACK BEAR

3.3.1 Population Status and Distribution

Black bears are found below the treeline in the NWT (ENR 2009). Black bears are listed as '*secure*' in the NWT (NWT General Status Ranking Program 2009) and are not listed federally (COSEWIC 2009; SARA 2009).

Black bears hibernate during winter, so the activity of bears within the RSAs will vary seasonally. Black bear abundance within the RSAs is also expected to vary between years in response to denning behaviour and food availability. Bears have a low level of den reuse and den locations are often several kilometres apart between consecutive years (Linnell et al. 2000). Black bears are also sensitive to disturbance during winter hibernation and may abandon their dens if disturbance occurs within 1 km of their den site (Linnell et al. 2000). Because black bear home range size fluctuates in response to food availability, less bears may be present within the study area during years of low food abundance. During these times, individual home ranges will be larger because bears will be forced to travel greater distances to obtain adequate amounts of forage (Pelchat and Ruff 1986).

Black bear home ranges cover between 75 and 200 km^2 in the NWT (ENR 2009). Black bear home ranges may overlap but individual bears maintain small core areas within their home ranges as exclusive territories (ENR 2009). Black bear cubs separate from their mother between 2 and 4 years of age (Schwartz and Franzmann 1992). Dispersal occurs between May and July, and males tend to disperse farther from natal home ranges than females (Schwartz and Franzmann 1992). Movement of male black bears is high in the spring when males travel large distances to mate with females (Young and Ruff 1982). Foraging movement is also greater at this time of year. Male black bear movement declines towards the fall (Young and Ruff 1982).

3.3.1.1 Occurrence and Distribution of Black Bears within the Regional Study Areas

Black bear sign, including scat and bear skull and jaw remains, was found at 13 locations in the LSAs in September 2003 (Fortune Minerals 2004). A black bear den was identified by an archaeological crew in 2004, but it could not be re-located in the summer of 2005. The den was located in primarily organic soil, in a well drained mound at the edge of small graminoid wetland and had been constructed within the previous year. Between 10 June and 17 August 2005, there were 7 observations of black bears within the proposed mine RSA, one of which

included a sow and a cub. Two black bears were observed during caribou aerial surveys. One bear was observed on 11 April 2005, and another individual was observed on 11 April 2006.

3.3.2 Habitat Selection and Foraging

Black bears require habitat that provides them with cover for security and an abundance of forage; therefore, preferred black bear habitat is a mixture of forested and open areas (Lariviére 2001; ENR 2009). Black bears also require secluded areas for denning. Dens may be made in tree cavities, crevices, caves, or under large rocks (Lariviére 2001; ENR 2009).

Black bears may benefit from wildfire (Fisher 2005), as berry production (Hamer 1996) and moose densities (Schwartz and Franzmann 1989, 1990) increase in recently burned areas. Fire may decrease appropriate denning habitat because black bears den in mature trembling aspen and spruce forests, while avoiding regenerating habitats (Tietje and Ruff 1980).

Black bears are omnivorous but most of their diet consists of herbaceous vegetation. Horsetails, graminoid species, and animal matter make up the majority of black bear early spring diet (Beeman and Pelton 1980; Graber and White 1983; Raine and Kansas 1989; Schwartz and Franzmann 1991: Lariviére 2001; ENR 2009). Bears prey on moose calves from birth until approximately 30 days of age, at which time moose calves are able to outrun the bears (Schwartz and Franzmann 1991). Snowshoe hares (*Lepus americanus*), adult moose carcasses, and birds and their eggs also make up an important part of early spring black bear diet (Schwartz and Franzmann 1991).

Later in the spring and throughout the summer, insects become more important staples in black bear diets (Beeman and Pelton 1980; Graber and White 1983; Raine and Kansas 1989). Most of the build up of fat reserves for the winter hibernation comes from berries, which make up the majority of the late summer and fall diet (Lariviére 2001; ENR 2009; Beeman and Pelton 1980; Graber and White 1983; Raine and Kansas 1989).

3.4 WOLF

3.4.1 Population Status and Distribution

In the NWT, three separate groups of gray wolves can be distinguished based on behaviour and distribution (ENR 2009). Wolves that live below the treeline and maintain regular territories are timber or boreal wolves, wolves that live on the

Arctic islands are Arctic wolves, and wolves that travel above and below the treeline and do not maintain regular territories are known as tundra wolves (ENR 2009). Only tundra and boreal wolves are expected to be influenced by the Project. All populations of wolves are considered to be '*secure*' in the NWT (NWT General Status Ranking Program 2009). Federally, gray wolves are '*not at risk*' (COSEWIC 2009), and are not listed under SARA (2009).

The abundance of gray wolves within the RSAs is expected to vary annually and seasonally in response prey (primarily caribou) availability. At the regional scale, home ranges for tundra wolves are established based on food availability (McLoughlin et al. 2004). As predators of migratory caribou, tundra wolves in the Arctic have larger home ranges and are less territorial than other wolves in North America (Walton et al. 2001; ENR 2009). At the local scale, tundra wolves select areas with suitable den habitat, such as eskers, kames, and other glacialfluvial deposits (McLoughlin et al. 2004). Eskers comprise only 1 to 3 % of the Arctic tundra ecosystem (Mueller 1995; Cluff et al. 2002), so the availability of suitable den sites, rather than the availability of food resources, may limit wolf populations in the central Canadian Arctic (McLoughlin et al. 2004).

Tundra wolves restrict movements to smaller summer ranges near the den site from parturition in mid-to-late May until the pups can travel with the adults in September or October (Kuyt 1972; Heard and Williams 1992; Cluff et al. 2002). Male and female wolves differ in their movements in summer, but not during other times of the year. The summer range for females is between 500 and 1000 km^2, whereas males will range over 2000 km^2 (Walton et al. 2001; Cluff et al. 2002). This difference is likely a result of different parental roles. Males allocate more time searching for food, while females remain closer to the den.

According to North Slave Métis Alliance (NSMA) members, tundra wolves typically have large territories and usually travel in pairs (NSMA 1999). Walton et al. (2001) found that annual movements covered ranges over 60 000 km^2. The winter movements of wolves likely depend on the distribution of caribou (Walton 2000; Musiani et al. 2007) and not on the location of traditional wintering areas. The straight-line distances from the den site of wolves to the most distant location during winter averaged 500 km (Walton 2000; Cluff et al. 2002).

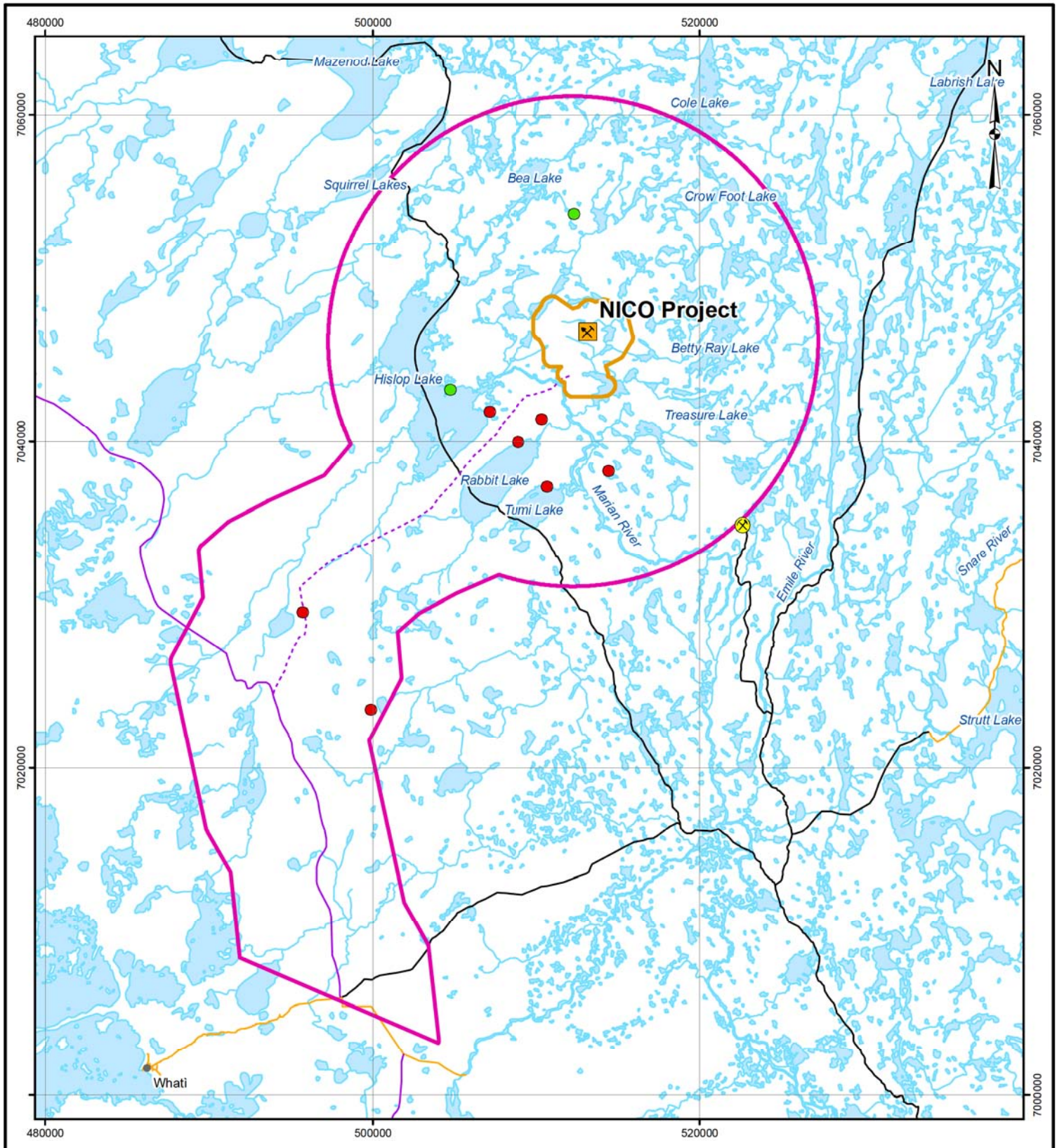
Boreal wolves are found south of the treeline in the NWT. Boreal wolves are territorial and relatively sedentary compared to tundra wolves, and may be present within the study area year round (Musiani et al. 2007). The main prey species for boreal wolves in the NWT are moose and woodland caribou, as these species also inhabit forested areas year round (Gasaway et al. 1992). Home ranges in northeastern Alberta, where moose is the dominant prey species, cover

between 357 to 1779 km^2 (winter) and 195 to 629 km^2 (summer) (Fuller and Keith 1980). However, moose densities in northern environments are much lower than in more southern latitudes (ENR 2009) and so wolf home ranges in the NWT should be larger than those in Alberta. Jędrzejewski et al. (2007) report that wolf home range size averages 950 km^2 at latitude 60° N. Boreal wolf spring and summer ranges are smaller than winter ranges because packs are limited by pup mobility during these periods.

3.4.1.1 Occurrence and Distribution of Wolves within the Regional Study Areas

Wolf analyses did not differentiate between tundra and boreal wolves, as discrimination between these 2 groups is difficult without satellite tracking or DNA analysis. Wolf scat was found at 6 locations in the proposed mine RSA in 2003 (Fortune Minerals 2004). Of the 6 incidences of wolf sign, 5 were found near the north end of Nico Lake, however no GPS location was recorded for these sightings. All sign was of a similar age (~ 1 year). The concentration of scat near the north end of Nico Lake and the consistent age of the sign suggests the possibility that a den or rendezvous site may have been present in that area during the summer of 2002. In 2004, no fresh wolf sign was observed in the Nico Lake area, suggesting that no wolf den was present in the area that year. During caribou aerial surveys in 2004 and 2005, 22 wolves in 9 groups were observed (Figure 3.4-1).

Within the proposed mine RSA in 2005, the highest density of wolf tracks was observed in coniferous spruce habitat (Table 3.4-1). Bedrock-open conifer habitat had the next highest density of wolf winter tracks, followed by frozen lake habitat (Table 3.4-1). The limited availability of some habitats in the RSAs constrained the ability to sample burn, coniferous pine, marsh/graminoid fen, shrubland, open bog, and treed fen habitats (Table 2.2-5; Table 2.2-6; Table 2.2-7). Wolf tracks were only recorded in frozen water habitat within the proposed mine RSA in 2009 and in treed fen habitat within the NPAR study area.



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- WOLF OBSERVATION, 2004
- WOLF OBSERVATION, 2005
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
LOCATION OF WOLF OBSERVATIONS

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-010-GIS

PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 1
DESIGN	LD	27 Oct. 2008	
GIS	ANK	18 May 2009	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

FIGURE: 3.4-1

Single wolf tracks comprised 56% of the wolf track observations within the proposed mine RSA and 100% of the observations within the NPAR study area. Trails (i.e., assumed to have 3 times the activity level of a single track) comprised 33% of the wolf track observations, and networks (i.e., assumed to have 5 times the activity level of a single track) comprised 11% of the wolf track observations within the proposed mine RSA.

Table 3.4-1 Wolf Snow Track Density among Habitats within the Proposed Mine Regional Study Area, 2005

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)
Bedrock-Open Conifer	1.50 ± 1.50	5.00	1.88
Burn	NS	NS	0
Coniferous Pine	0	0	0.05
Coniferous Spruce	1.66 ± 0.97	24.00	6.52
Deciduous Aspen-Paper Birch	0	0	0.17
Marsh/Graminoid Fen	0	0	0.01
Open Bog	0	0	0.14
Shrubland	NS	NS	0
Treed Bog	0	0	0.25
Treed Fen	NS	NS	0
Frozen Water (Ice)	0.22 ± 0.22	0.87	0.78
Total		**29.87**	**9.80**

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

SE = Standard Error

TKD = Presence of tracks (e.g. 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed) per km surveyed per days since last snow fall.

3.4.2 Habitat Selection and Foraging

Although considered a habitat generalist, wolves in the tundra appear to select habitat based on the availability of food resources and den site locations. During the spring, tundra wolves follow the caribou herds north of the treeline and choose den sites south of the caribou calving grounds (Parker 1973; Heard and Williams 1992). This strategy likely optimizes the availability of food resources for rearing pups (Heard and Williams 1992). Caribou will remain on the calving grounds until late June before dispersing south and arriving closer to the treeline in July and August. This coincides with the time when the nutritional demands of wolf pups are greatest (Kelsall 1968; Parker 1973; Fancy et al. 1989; Heard and Williams 1992).

Boreal wolves are territorial and prey primarily on caribou and moose within their territory. Boreal wolf habitat preference is likely dependent on optimizing fitness by reducing travel costs, while maintaining potential for encountering prey (Alexander et al. 2005). Wolves also use cutlines and other linear disturbances for ease of movement (James and Stuart-Smith 2000; Shell Canada 2007). Boreal wolves prefer open areas and tend to avoid dense conifer cover in winter (Penner 1976). Wolves use upland areas more often than peatlands, possibly due to a higher density of moose in upland areas (McLoughlin et al. 2005). Habitat selection for wolf during all study periods and in all study areas could not be determined since the expected use in all habitats was less than 5.

Few data exist on wolf response to wildfire, but existing studies suggest moose and caribou densities influence wolf use of burned areas (reviewed in Nelson et al. 2008). Wolves in Alaska occurred in similar densities in burns greater than 9 years old (Schwartz and Franzmann 1990). Wolves used burned areas more than expected during and one year after a forest fire in northwestern Alaska, but use declined during the subsequent 2 winters (Ballard et al. 2000). Wolf density changes were attributed to changes in caribou distribution throughout the study period (Ballard et al. 2000).

Wolves that den on the tundra are thought to do so almost exclusively in eskers, kames, and drumlins (Williams 1990; Mueller 1995). The sandy composition of these deposits provides suitable habitat for excavation of dens in a landscape that is dominated by bedrock, boulders, standing water, and permafrost (Mech and Packard 1990; Mueller 1995). Esker material does not have to be extensive. Active wolf dens may be located in slightly raised and well-drained mounds of sand and gravel (Cluff et al. 2002).

Den site selection is not well understood for wolves in forested habitats (Norris et al. 2002). No studies have investigated boreal wolf den site selection in the NWT; however, studies on wolves in forested environments have reported that wolves prefer coniferous forest stands and avoid hardwood stands (Norris et al. 2002; Theuerkauf et al. 2003).

The wolf is an opportunistic hunter, primarily targeting weak, young, or old animals; however, wolves are capable of bringing down healthy prey. In the Arctic, caribou are the only ungulate species that occurs at densities sufficient to support wolves (Williams 1990; Walton et al. 2001). Wolves that occupy these regions feed almost exclusively on caribou (Kuyt 1972; Stephenson and James 1982). Caribou were the dominant prey item found in scats collected at natal den sites in tundra habitats (Williams 1990; Banci and Moore 1997). Moose and woodland caribou are the primary prey species of wolves in the northern boreal forest (Fuller and Keith 1980).

Depending on the area and the time of year, a wolf's diet may also include Arctic hare (*Lepus articus*), fox, Arctic ground squirrel (*Spermophilus paryii*), lemmings and voles, ptarmigan, and waterbirds and their eggs (ENR 2009). Musk oxen (*Ovibos moschatus*), which occur in a patchy distribution in the NWT, are also hunted by wolves when available (Cluff et al. 2002). Prey items identified at natal den sites during baseline studies at the Diavik Diamond Mine included caribou, Arctic ground squirrel, Arctic hare, ptarmigan, geese, small birds, and fish (DDMI 1998). Beavers are an important secondary food source for wolves in boreal environments (Tremblay et al. 2001).

3.5 LYNX

3.5.1 Population Status and Distribution

Lynx are found throughout the boreal forest. Lynx in the NWT are listed as '*secure*' (NWT General Status Ranking Program 2009) and are '*not at risk*' under COSEWIC (2008).

Lynx home range size varies with the abundance of prey and the season. Larger home ranges are required when prey density is low, and lynx have larger ranges in the summer than the winter (Keith 1993). Lynx home ranges in the NWT cover 15 to 25 km^2 (ENR 2009). Lynx home ranges were stable for three consecutive years in the Mackenzie Bison Santuary in the NWT (Poole 1995). There was extensive inter-sexual home-range overlap between males and females and little overlap in home-range between individuals of the same sex (Poole 1995).

Mating occurs between February and March, and the young are born between April and May. The young disperse between 9 and 12 months of age (Keith 1993; Poole 1997). Unlike other mammal species, in which primarily males disperse, both male and female dispersal is common in lynx (Brand and Keith 1979; Poole 1997; Campbell and Strobeck 2006). Adults may abandon their home range territories during periods of low snowshoe hare densities and disperse to other areas. Long distance dispersals of 830 km (O'Donoghue et al. 1997) and 1000 km (Slough and Mowat 1996) have been reported for lynx during cyclic lows of the snowshoe hare cycle.

3.5.1.1 Occurrence and Distribution of Lynx within the Regional Study Areas

Lynx tracks within the proposed mine RSA were found only within coniferous spruce habitat during winter track surveys in 2005. Lynx tracks were observed in coniferous spruce and treed bog habitats within the proposed mine RSA in 2009. Within the NPAR study area, lynx track densities were the highest on frozen

lakes, followed by treed bog and deciduous trembling aspen-paper birch habitats (Table 3.6-2). Lynx tracks were also observed in marsh/graiminoid fen, treed fen, and coniferous spruce habitats. However, survey efforts (distance sampled) for several habitats within the RSAs (e.g., burn, coniferous pine, shrubland, and open bog) were constrained by the limited availability of habitats (Table 2.2-5; Table 2.2-6; Table 2.2-7).

Table 3.6-1 Snow Track Density and Habitat Selection of Lynx among Habitats within the Proposed NICO Project Access Road Regional Study Area, 2005 and 2008

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)
Bedrock-Open Conifer	0	0	0.23
Burn	0	0	0.08
Coniferous Pine	0	0	2.60
Coniferous Spruce	0.55 ± 0.31	30.08	24.87
Deciduous Aspen-Paper Birch	0.88 ± 0.88	3.51	0.61
Marsh/Graminoid Fen	0.63 ± 0.63	6.25	1.49
Open Bog	0	0	0.20
Shrubland	0	0	0.04
Treed Bog	2.74 ± 2.32	13.55	1.50
Treed Fen	0.24 ± 0.24	4.55	2.64
Frozen Water (Ice)	7.50 ± 7.50	20	0.20
Total		**77.94**	**34.45**

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed)] per km surveyed per days since last snow fall.

3.5.2 Habitat Selection and Foraging

Lynx favour old-growth boreal forest with a dense undercover of thickets and windfalls (Keith 1993); however, they will occupy other types of habitat if there is minimal forest cover and adequate prey abundance. Lynx in the NWT selected dense deciduous and coniferous forest, shrubland, and meadow habitats over wetlands and open black spruce forests (Poole et al. 1996). Mowat and Slough (2003) found that lynx in the Yukon used regenerating forest and riparian habitats more often than mature white spruce forest during the summer. Riparian habitats had greater use during the winter than other habitat types (Mowat and Slough 2003). Habitat preference during all study periods in all study areas could not be determined because the number of lynx tracks detected among habitats was not adequate (i.e., expected frequencies of lynx tracks among habitats were less than 5).

Lynx avoid recent burns because there is little vegetation cover for their main prey species, snowshoe hare. Fifteen to 30 year old burns are prime habitat for lynx and snowshoe hare (reviewed in Nelson et al. 2008). Fires may also create appropriate denning habitat for lynx by creating deadfall and willow thickets (Koehler 1990).

Lynx primarily feed on snowshoe hare and in times of high hare densities will feed on little else (ENR 2009). However, in times of low snowshoe hare densities lynx diets may be supplemented by grouse, ptarmigan, voles, mice, squirrels, foxes, and carrion (Nellis et al. 1972; Brand et al. 1976; Brand and Keith 1979; ENR 2009). Lynx populations throughout North America are closely tied to, and lag one to 2 years behind, the cyclic fluctuations of snowshoe hare populations (Brand et al. 1976; Poole 1994; ENR 2009). There can be large emigrations of lynx from the boreal forest to southern latitudes in times of low hare populations (Keith 1993).

3.6 WOLVERINE

3.6.1 Population Status and Distribution

Wolverine, the largest member of the weasel family, has a circumpolar distribution in the tundra, taiga plains, and boreal forests (Weir 2004). The western Canada population, including NWT and Nunavut, is listed as a species '*of special concern*' (COSEWIC 2009) and currently has no status under SARA (2009). Wolverine status in the NWT is considered '*sensitive*' (NWT General Status Ranking Program 2009). Wolverines are an important cultural and economic resource for people of the NWT. Traditional knowledge indicates that wolverines were harvested primarily for their fur, although historically they were sometimes killed as an emergency food source.

Wolverines are highly adaptable, tending to change their location and distribution over time. Wolverines are known for their large home ranges and extensive movements in search of food, and during dispersal (Hash 1987). Males occupy territories from about 230 to 1580 km^2, and females from about 50 to 400 km^2 (Hornocker and Hash 1981; Gardner 1985; Whitman et al. 1986; Banci 1987; Copeland 1996; Landa et al. 1998). Smaller home ranges for females likely results from limitations on movement imposed during nursing (Hornocker and Hash 1981; Gardner 1985; Banci 1987). The size of a home range will vary seasonally, yearly, with habitat type, and with the age of the animal (Banci 1987).

Food availability is the primary factor determining movements and home range requirements (Hornocker and Hash 1981; Banci 1994). Wolverine populations generally exhibit low densities, which are likely related to their large home range requirements. Wolverines will defend territories from members of the same sex, although there may be some overlap in home ranges (Krebs and Lewis 2000). Home ranges will overlap substantially with those of the opposite sex (Banci and Harestad 1990; Copeland 1996). Individuals of the same sex may also tolerate each other when resources are abundant, predictable, and not easily defendable (Banci 1987).

Male juvenile wolverines disperse between 7 and 18 months of age, and females disperse between 7 and 26 months of age (Vangen et al. 2001). A large proportion of males (83 %) and females (69 %) were reported to disperse in Norway (Vangen et al. 2001).

3.6.1.1 Occurrence of Wolverine within the Regional Study Areas

One wolverine trail (i.e., assumed to have 3 times the activity level of a single track) and 3 tracks were recorded within the proposed mine RSA during winter track surveys in 2009. The trail and 2 tracks were observed in coniferous spruce habitat and one track was recorded in treed fen habitat. A single wolverine track observed within the NPAR study area during the 2008 winter track count survey. This track was found in coniferous spruce habitat. No wolverine sign was observed in the proposed mine or NPAR RSAs in 2005. A wolverine was seen during vegetation surveys on 13 August 2008. The wolverine was observed in coniferous spruce habitat, in a spruce tree, near the existing winter road. Despite the low frequency of sign observed, it is likely that wolverines are present year round in the study area and the surrounding region. Wolverine abundance would be expected to increase during winters when caribou are present in the study area. The RSAs include a number of boulder areas that are potential wolverine denning habitats (Fortune Minerals 2004).

3.6.2 Habitat Selection and Foraging

Wolverines are associated with a variety of habitat types (Hatler 1989). Habitat use typically depends on adequate food resources and den site availability. Wolverines occur more frequently where large ungulates are common and where carrion is abundant from hunter kills, predation, and natural mortality (COSEWIC 2003). Preferred landscape features appear to depend less on vegetation characteristics, and more on the structure of the terrain and availability of secure hiding cover for dens and food caching (Lofroth 2001). No data are available for wolverine response to wildfire; however, it is likely that wolverine

will be negatively influenced by wildfire because they avoid early succession habitats (Copeland 1996).

Den site requirements for wolverines in the boreal forest are not well understood. The persistence of snow cover at a den site through the spring is an important factor for wolverines throughout their range (Magoun and Copeland 1998; Aubry et al. 2007; Copeland et al. 2007).

Wolverines are scavengers and predators that will cache food for future use. Wolverine feed opportunistically and their diet generally reflects annual and seasonal changes in food availability (Magoun 1987). Although wolverines are capable of taking large ungulates as live prey, the presence of ungulates in the diet is mostly the result of scavenging (Hornocker and Hash 1981; Gardner 1985; Banci 1987; Copeland 1996). The remnants of a caribou carcass may be cached in den sites or in deep crevasses of rocky terrain for later consumption. The interdependence of wolverine on other large carnivores such as wolves and black bear to provide carrion is unclear.

Ungulates are important in the wolverine diet year round (Banci 1994), but the summer diet is more varied. Wolverines have been reported to consume minnows in the summer when the water is shallow (LKDFN et al. 1999). Small mammals, such as lemmings and voles, waterbirds and their eggs, ptarmigan, and other wolverines, are also hunted opportunistically (Gardner 1985; Hash 1987; Magoun 1987; Banci 1994; NSMA 1999). Plants and berries may also be consumed (Banci 1994).

3.7 MARTEN

3.7.1 Population Status and Distribution

Historically, marten have been trapped for fur in North America, and populations have declined since European contact (Buskirk and Ruggiero 1994). Marten are the most important fur bearing species in the NWT because of the size and the density of their fur (ENR 2009). Marten is listed as '*secure*' in the NWT (NWT General Status Ranking Program 2009). The Newfoundland/Labrador population is listed as '*threatened*' under COSEWIC (2009) and '*endangered*' under SARA (2009). All other North American populations are not listed federally.

Martens breed between July and August, and the young are born in March or April of the following year (Strickland et al. 1982). Marten occupy larger home ranges than would be expected for a mammal of their size (Buskirk and Ruggiero 1994). Adult males occupy ranges of 0.8 to 45 km^2, and adult females occupy

ranges of 0.42 to 27 km^2 (Burnett 1981; Mech and Rogers 1977; Latour et al. 1994; Smith and Schaefer 2002). Marten home ranges vary as a function of geographic area, habitat type, and prey density (Soutiere 1979; Thompson and Colgan 1987). Marten movements have not been rigorously studied, and reports on the dispersal period ranges from August to October (Buskirk and Ruggiero 1994). There is no information on the dispersal distance in juveniles or adults.

3.7.1.1 Occurrence and Distribution of Marten within the Regional Study Areas

Marten were the most abundant carnivore species in the RSAs according to winter track count surveys. The highest density of marten tracks were found in bedrock-open conifer habitat during winter track surveys within the proposed mine RSA in 2005 (Table 3.8-1). Marten tracks were also recorded in coniferous spruce and treed bog habitats in 2005. Marten tracks were most abundant in shrubland habitat within the proposed mine RSA in 2009 (Table 3.8-2). Marten tracks were also recorded in treed fen, open bog, coniferous spruce, burn, frozen water, and bedrock-open conifer habitats during surveys in 2009.

High densities of marten tracks were found within coniferous pine and treed fen habitats within the NPAR study area (Table 3.8-3). Marten tracks also were recorded in coniferous spruce, treed bog, deciduous trembling aspen-paper birch, and marsh/graminoid fen habitats within the NPAR study area (Table 3.8-3). However, survey efforts (distance sampled) for several habitats within the RSAs (e.g., burn, coniferous pine, shrubland, and open bog) were constrained by the limited availability of habitats (Table 2.2-5; Table 2.2-6; Table 2.2-7).

Table 3.8-1 Snow Track Density and Habitat Selection of Marten among Habitats within the Proposed Mine Regional Study Area, 2005

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)	Proportion of Total Tracks [Use]	Proportion of Total Habitat Available[b]	95% Confidence Intervals for Use
Bedrock-Open Conifer	1.57 ± 0.82	14.20	1.88	0.29	0.11	0.14 - 0.44
Burn	NS	NS	0	NS	0.00003	NS
Coniferous Pine	0	0	0.05	0	0.01	NA[d]
Coniferous Spruce	0.93 ± 0.25	31.96	6.52	0.35	0.56	0.19 - 0.51
Deciduous Trembling Aspen-Paper Birch	0	0	0.17	0	0.01	NA[d]
Marsh/Graminoid Fen	NA[c]	25.00	0.01	0.35	0.01	NA[d]
Open Bog	0	0	0.14	0	0.01	NA[d]
Shrubland	NS	0	0	NS	0.01	NS
Treed Bog	0.62 ± 0.62	1.23	0.25	0.02	0.04	NA[d]
Treed Fen	NS	NS	0	NS	0.01	NS
Frozen Water (Ice)	0	0.00	0.78	0	0.23	0
Total		**72.39**	**9.80**	**1.00**	**1.00**	

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

[b] Proportion of Total Habitat Available = Expected Proportion of Use. A habitat type is preferred if the expected proportion of use is below the 95% confidence intervals for use of that habitat type, the habitat is neutrally selected if the expected proportion of use is within the 95% confidence intervals, and the habitat is avoided if the expected proportion of use is above the 95% confidence interval values.

[c] Only one segment were surveyed in marsh/graminoid fen habitat; therefore, mean number of tracks equals the observed use

[d] Expected frequency of use was less than 5.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed) per km surveyed per days since last snow fall.

NS = Not Surveyed

NA = Not Applicable

Table 3.8-2 Snow Track Density and Habitat Selection of Marten among Habitats within the Proposed Mine Regional Study Area, 2009

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)	Proportion of Total Tracks [Use]	Proportion of Total Habitat Available[b]	95% Confidence Intervals for Use
Bedrock-Open Conifer	0.02 ± 0.02	6.52	5.13	0.04	0.12	0.00 - 0.09
Burn	0.43 ± 0.15	0.40	6.32	0.003	0.10	0.00 - 0.02
Coniferous Pine	NS	NS	0	0	0.02	NA
Coniferous Spruce	1.59 ± 0.42	79.27	14.50	0.54	0.49	0.43 - 0.66

Table 3.8-2 Snow Track Density and Habitat Selection of Marten among Habitats within the Mine Regional Study Area, 2009 (continued)

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)	Proportion of Total Tracks [Use]	Proportion of Total Habitat Available[b]	95% Confidence Intervals for Use
Deciduous Trembling Aspen-Paper Birch	0	0	0.07	0	0.01	NA
Marsh/Graminoid Fen	0	0	0.31	0	0.01	NA
Open Bog	1.67 ± 1.67	10.00	0.35	0.07	0.01	NA
Shrubland	6.48 ± 5.80	6.87	0.68	0.05	0.01	NA
Treed Bog	0	0	0.43	0	0.03	0
Treed Fen	2.11 ± 0.86	40.18	2.67	0.28	0.01	NA
Frozen Water (Ice)	0.12 ± 0.12	2.22	6.49	0.02	0.19	0.00 - 0.04
Total		**145.46**	**36.95**	**1.00**	**1.00**	

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

[b] Proportion of Total Habitat Available = Expected Proportion of Use. A habitat type is preferred if the expected proportion of use is below the 95% confidence intervals for use of that habitat type, the habitat is neutrally selected if the expected proportion of use is within the 95% confidence intervals, and the habitat is avoided if the expected proportion of use is above the 95% confidence interval values.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed) per km surveyed per days since last snow fall.

NS = Not Surveyed

NA = Not Applicable (i.e., expected frequency of use was less than 5).

Table 3.8-3 Snow Track Density and Habitat Selection of Marten among Habitats within Proposed NICO Project Access Road Regional Study Area, 2005 and 2008

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)	Proportion of Total Tracks [Use]	Proportion of Total Habitat Available (%)	95% Confidence Intervals for Use
Bedrock-Open Conifer	0	0	0.23	0	0.003	NA[d]
Burn	NA[c]	12.50	0.08	0.06	0.001	NA[d]
Coniferous Pine	3.84 ± 1.39	58.02	2.60	0.27	0.09	0.19 - 0.36
Coniferous Spruce	1.71 ± 0.50	78.17	24.87	0.37	0.65	0.27 - 0.46
Deciduous Trembling Aspen-Paper Birch	0.88 ± 0.88	3.51	0.61	0.02	0.01	NA[d]
Marsh/Graminoid Fen	0.72 ± 0.54	4.60	1.49	0.02	0.05	0.00 - 0.05
Open Bog	0	0	0.20	0	0.02	NA[d]

Table 3.8-3 Snow Track Density and Habitat Selection of Marten among Habitats within Proposed NICO Project Access Road Regional Study Area, 2005 and 2008 (continued)

Habitat Type	Number of Tracks (mean ± 1SE)[a]	Observed Use (TKD)	Distance Sampled (km)	Proportion of Total Tracks [Use]	Proportion of Total Habitat Available (%)	95% Confidence Intervals for Use
Shrubland	0	0	0.04	0	0.004	NA[d]
Treed Bog	1.67 ± 0.98	10	1.50	0.05	0.07	0.01 - 0.09
Treed Fen	2.60 ± 1.08	46.89	2.64	0.22	0.05	0.14 - 0.30
Frozen Water (Ice)	0	0	0.20	0	0.05	0
Total		**213.68**	**34.45**	**1.00**	**1.00**	

[a] Number of tracks per km surveyed per days since last snow fall. Includes single tracks, trails, and networks weighted by 1, 3, and 5, respectively.

[b] Proportion of Total Habitat Available = Expected Proportion of Use. A habitat type is preferred if the expected proportion of use is below the 95% confidence intervals for use of that habitat type, the habitat is neutrally selected if the expected proportion of use is within the 95% confidence intervals, and the habitat is avoided if the expected proportion of use is above the 95% confidence interval values.

[c] Only one segment were surveyed in burn habitat; therefore, mean number of tracks equals the observed use.

[d] Expected frequency of use was less than 5.

SE = Standard Error

TKD = Presence of tracks (i.e., 0 [if no tracks, trails, or networks were observed] or 1 [if at least one trail, track, or network was observed) per km surveyed per days since last snow fall.

NS = Not Surveyed

NA = Not Applicable

3.7.2 Habitat Selection and Foraging

Marten have been classified as requiring late succession forests and are intolerant of habitat types with sparse canopy cover (Buskirk and Ruggiero 1994; Chapin et al. 1997; Smith and Schaefer 2002). Some studies suggest that marten are closely associated with late-succession mesic conifer forests that have complex physical structure near the ground (Buskirk and Ruggiero 1994). However, other studies suggest that requirements of canopy cover and structure near the ground can be met in a variety of habitat types (Chapin et al. 1997).

Within the proposed mine RSA in 2005, habitat selection analysis indicated that marten track encounters were statistically different among three habitats (Chi-square = 38.71 df = 2, $P < 0.001$). Bonferroni confidence intervals suggested that bedrock-open conifer habitat was preferred relative to its availability, whereas coniferous spruce and frozen water habitats were avoided relative to availability (Table 3.8-1). Analysis for the proposed mine RSA in 2009 indicated that marten track encounters were statistically different among 5 habitats (Chi-square = 46.13, df = 4, $P < 0.001$). Bonferroni confidence intervals suggested that bedrock-open conifer, burn, treed bog, and frozen water habitats were avoided

relative to availability. Coniferous spruce was selected in proportion to availability. For the NPAR study area, the frequency of marten track observations was statistically different among 6 habitats (Chi-square = 224.27, df = 5, $P < 0.001$). Treed bog habitat was selected in proportion to its availability, whereas marsh/graminoid fen, coniferous spruce, and frozen water habitats were avoided relative to availability (Table 3.8-3). Coniferous pine and treed fen habitats were preferred by marten relative to availability.

Wildfire may provide a mosaic of habitats for marten to use throughout various life stages (Nelson et al. 2008). Marten do use burned areas, but burned habitat is avoided relative to its availability on the landscape (Latour 1994). Non-breeding individuals were found in higher densities in 6 to 9 year old burn versus mature sites; however, breeding individuals were only found in low densities in these recently burned areas (Paragi et al. 1996; Fisher and Wilkinson 2005). Non-breeding individuals may be responding to the high density of microtine prey species that can be found in burned areas (Nelson et al. 2008). Burns may not provide adequate denning habitat for marten.

Although there is little information available on denning sites that are preferred by marten, especially in western and northern North America, studies have reported marten to be highly selective of sites used for denning. Marten have separate denning sites for parturition and raising their young with both den types reported to be found only in old-growth forest (Ruggiero et al. 1998).

Marten diet varies seasonally. In summer, marten eat bird eggs and nestlings, insects, fish, and young mammals. Their winter diet is more restricted and is comprised of small to medium sized mammals. Snowshoe hare is an important prey species for marten and can consist of 3 to 64% of marten diet by biomass (Poole and Graf 1996). Marten diet, body fat, ovulation rates, and juvenile recruitment vary with snowshoe hare density.

3.8 BEAVER AND MUSKRAT

3.8.1 Population Status and Distribution

Beavers occur in streams, ponds, and the margins of large lakes throughout North America, except for peninsular Florida, the Arctic tundra, and the southwestern deserts (Allen 1983). Beaver are listed as '*secure*' in the NWT and are not listed under SARA (2009) or COSEWIC (2009).

Muskrats occur throughout most of North America, with the exception of Florida and coastal Georgia and South Carolina (Allen and Hoffman 1984). Muskrat are

listed as '*secure*' in the NWT (NWT General Status Ranking Program 2009) and are not listed federally (COSEWIC 2009; SARA 2009).

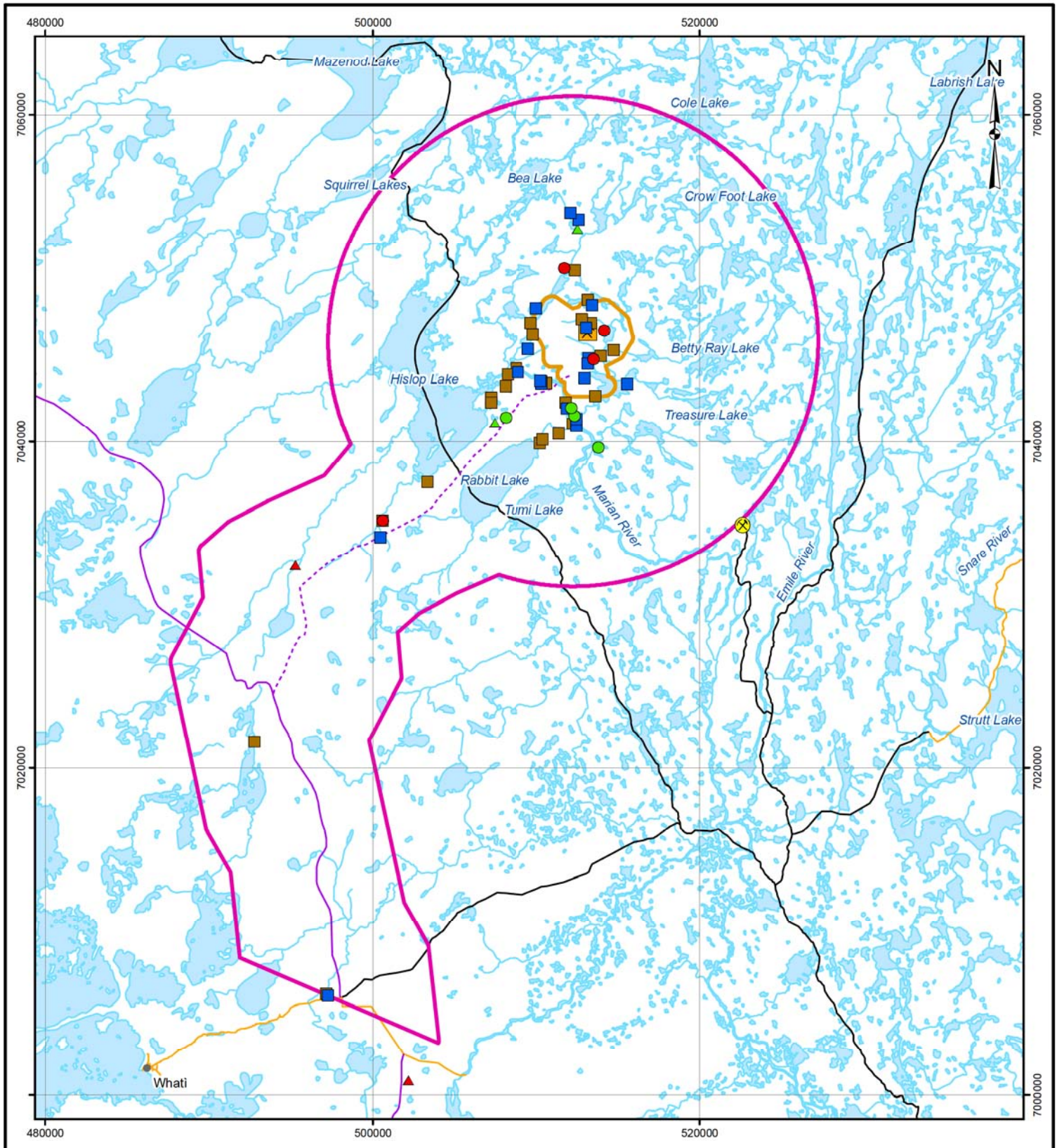
Beavers are colonial and usually have between 4 and 8 individuals in a colony. Colonies usually consist of a pair of monogamous adults, subadults, and young of the year (Allen 1983; Parker et al. 2006). Breeding occurs between January and February, and young are born between April and May. Young usually stay with their parents for a year and disperse in the spring when vegetation is abundant (Nitsche 2001; Allen 1983).

Muskrat territories range from 40 to 100 m in diameter (Danell 1978), with larger territories usually present in areas of low emergent vegetation cover (Allen and Hoffman 1984). Muskrats are promiscuous and males compete over females (Aleksiuk 1986). Breeding occurs immediately after spring break up in March, April, or May (Aleksiuk 1986).

3.8.1.1 Occurrence and Distribution of Beaver and Muskrat within the Regional Study Areas

A total of 44 beaver lodges were observed in waterbodies within the RSAs for the proposed mine site and NPAR (Figure 3.9-1). The status (i.e., occupied or unoccupied) of these lodges was not determined. A total of 8 observations have been made of single beavers within the study areas since 2003 (Figure 3.9-1). Five beaver trails were seen along the Marian River in 2005. No beaver sign was observed at the other stream crossing along the NPAR (3 m Stream) in any study year. It is unlikely that beaver will be present at 3 m Stream due to the fast flow and rocky substrate of the stream.

Muskrat lodges, feeding platforms, scat, and individuals were observed during ground surveys completed in September 2003. Four observations of muskrat sign were recorded during aerial surveys completed in 2004 and 2005. One muskrat platform was observed along the Marian River in 2005 (Figure 3.9-1). No muskrat sign was detected at 3 m Stream and it is unlikely that muskrat are present in this stream due to the fast water flow and rocky substrate.



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- BEAVER OBSERVATION, 2004
- BEAVER OBSERVATION, 2005
- BEAVER LODGE, 2004
- BEAVER LODGE, 2005
- MUSKRAT OBSERVATION, 2004
- MUSKRAT OBSERVATION, 2005
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

10 0 10
SCALE 1:325,000 KILOMETRES

PROJECT
FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE
LOCATION OF MUSKRAT OBSERVATIONS AND BEAVER OBSERVATIONS AND LODGES

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-011-GIS				
PROJECT No. 08-1373-0017			SCALE AS SHOWN	REV. 1
DESIGN	LD	27 Oct. 2008		
GIS	ANK	18 May 2010		
CHECK	LY	17 Nov. 2010		
REVIEW	GA	17 Nov. 2010		

FIGURE: 3.9-1

3.8.2 Habitat Selection and Foraging

Beavers require deep enough water to limit the risk of lodges becoming "frozen-out" during winter, as their lodge entrances are built below water level. In areas where water levels are low, beavers build dams to provide a constant water depth. In areas where water is naturally deep, lodges are built on lake or river margins (Allen 1983).

Beaver in the boreal forest may benefit from fire (Kelsall et al. 1977) especially in areas where trembling aspen is an early successional species (Slough and Sadleir 1977; Barnes and Mallik 2001) because they rely on aspen for food and building supplies (Kelsall et al. 1977). However, a study in Alberta found that beaver populations declined over a period of 12 years in an area of prescribed burn (Hood et al. 2007).

Beavers are herbivores and eat the leaves, twigs, and bark of woody plants, as well as many species of aquatic and terrestrial herbaceous vegetation (Allen 1983). Diet will vary seasonally. Aspen, willow, balsam poplar, and alder are preferred in the summer, whereas conifers and the rhizomes and roots of aquatic vegetation are important food sources during the winter (Allen 1983). Beavers cache food to sustain them through the winter months.

Muskrats occur in marshes, ponds, lakes, and slow-moving rivers. Water at a site must be deep enough to not freeze in the winter, but shallow enough to allow the growth of aquatic vegetation (ideal water depth is between 1 and 2 m) (Aleksiuk 1986). Muskrats build a variety of structures depending on habitat conditions. Along rivers, where bank substrate is appropriate for digging, they construct extensive burrows with underwater entrances as a defense against predators. In marshes, muskrat build lodges out of vegetation and mud. They also build feeding platforms and "push ups," shelters made of vegetation that cover a hole in the ice, which are used for feeding and as breathing holes.

Wildfire is thought to improve muskrat habitat by maintaining wetlands and aquatic edge habitat around wetlands, as well as increasing the amount of herbaceous vegetation that is available in an area (Nelson et al. 2008). Marshes in southeastern United States are often burned to promote muskrat habitat (Nelson et al. 2008), and one study from Manitoba found that summer burning increased fall muskrat populations (Ward 1968).

Muskrats are primarily herbivores, although they will eat some animal matter (Allen and Hoffman 1984). Broad-leaved cattail (*Typha latifolia*) is a preferred food source (Bellrose 1950) and can support 2 to 7 times as many individuals as

other vegetation types (Allen and Hoffman 1984). Stream dwelling muskrats tend to have more diverse diets than those that live in marshes. Individuals that inhabit lakes are more opportunistic feeders and may ingest more animal matter than other populations (Allen and Hoffman 1984).

3.9 UPLAND BREEDING BIRDS

3.9.1 Population Status and Distribution

Upland breeding birds (e.g., songbirds) are commonly studied in baseline and monitoring programs because they are well-studied indicators of habitat quality and habitat change. Some birds are also an important resource for aboriginals in the NWT and Nunavut, as they are used for food and provide other materials, such as feathers, which are used to make blankets and pillows (LKDFN et al. 2001).

The spring migration of birds to the NWT begins in early May and peaks around mid- to late May. The breeding season for small perching birds (passerines) typically starts during the first week of June and continues for approximately 3 weeks. Fall migration begins in mid-August for some species such as sandpipers, and continues through to mid-September for late migrants such as horned larks. Common nighthawk, olive-sided flycatcher, and rusty blackbird are federal listed species that were recorded within the RSAs (Table 1.1-2).

3.9.1.1 Species Level Results

A total of 42 bird species were identified in 10 habitat types during upland breeding bird surveys from 2005 to 2009, including incidental observations (i.e, heard outside of 50 m, fly-overs, waterbirds, and raptors) (Appendix I, Table I-5). Thirty-eight bird species were identified within upland breeding bird survey plots (i.e, within 50 m).

The effective detection radius was calculated to be 53.44 m (i.e., 0.89 ha). Thus, density estimates for species and community analyses were determined using the 0.89 ha area. Density, measured as the number of individuals per hectare, was calculated for each of the 38 species detected within survey plots for each habitat type (Table 3.10-1). Yellow-rumped warbler had the highest densities in bedrock-open conifer, deciduous aspen-paper birch, and mixedwood spruce-trembling aspen-paper birch habitats. Chipping sparrow was the most abundant species in burn, marsh/graminoid fen, and open bog habitats. Dark-eyed junco had the highest densities in coniferous spruce, treed bog, and treed fen habitats. Northern waterthrush was the most abundant species in shrubland habitat.

Table 3.10-1 Mean (± 1SE) Density (Birds per Hectare) of Upland Breeding Bird Species by Habitat within the Local Study Area, 2005 to 2009

Common Name	Scientific Name	Bedrock-Open Conifer	Burn	Coniferous Spruce	Deciduous Aspen-Paper Birch	Marsh/Graminoid Fen	Mixedwood Spruce-Aspen-Paper Birch	Open Bog	Shrubland	Treed Bog	Treed Fen
Spruce grouse	*Dedgragapus canadensis*	0	0	0.03 ± 0.01	0	0	0.01 ± 0.01	0	0	0	0
Lesser yellowlegs	*Tringa flavipes*	0	0.04 ± 0.04	0.01 ± 0.01	0	0.28 ± 0.13	0	0	0.25 ± 0.17	0.08 ± 0.05	0.02 ± 0.02
Wilson's snipe	*Gallinago delicata*	0	0.04 ± 0.04	0.02 ± 0.01	0	0.14 ± 0.10	0	0	0.13 ± 0.13	0	0
Common nighthawk	*Chordeiles minor*	0.01 ± 0.01	0	0	0	0	0	0	0	0	0
Hairy woodpecker	*Picoides villosus*	0	0	0	0	0	0.01 ± 0.01	0	0	0.04 ± 0.04	0
Northern flicker	*Colaptes auratus*	0	0	0.01 ± 0.01	0	0	0.01 ± 0.01	0	0	0	0
Olive-sided flycatcher	*Contopus cooperi*	0	0.04 ± 0.04	0.01 ± 0.01	0	0	0.01 ± 0.01	0	0	0	0.03 ± 0.03
Western wood-pewee	*Contopus sordidulus*	0	0	0	0	0.07 ± 0.07	0	0	0	0	0.02 ± 0.02
Least flycatcher	*Empidonax minimus*	0	0	0.01 ± 0.01	0	0	0	0	0	0	0
Alder flycatcher	*Empidonax alnorum*	0	0.04 ± 0.04	0.01 ± 0.01	0	0	0.03 ± 0.02	0	0	0	0.02 ± 0.02
Eastern phoebe	*Tyrannus tyrannus*	0.01 ± 0.01	0	0	0	0	0.02 ± 0.01	0	0	0	0.02 ± 0.02
Warbling vireo	*Vireo gilvus*	0	0	0	0	0	0.01 ± 0.01	0	0	0	0
Gray jay	*Perisoreus canadensis*	0.12 ± 0.04	0.13 ± 0.13	0.30 ± 0.06	0.19 ± 0.10	0	0.20 ± 0.05	0	0.13 ± 0.13	0.39 ± 0.14	0.17 ± 0.07
Boreal chickadee	*Poecile hudsonicus*	0	0	0.02 ± 0.01	0	0	0.03 ± 0.02	0	0	0	0
Ruby-crowned kinglet	*Regulus calendula*	0	0	0.09 ± 0.03	0	0	0.08 ± 0.03	0	0	0	0.03 ± 0.02
Townsend's solitaire	*Myadestes townsendi*	0.08 ± 0.03	0	0.01 ± 0.01	0	0	0.04 ± 0.03	0	0	0	0
American robin	*Turdus migratorius*	0.02 ± 0.01	0.04 ± 0.04	0.06 ± 0.02	0	0	0.03 ± 0.02	0	0	0.04 ± 0.04	0.03 ± 0.02
Hermit thrush	*Catharus guttatus*	0.15 ± 0.05	0	0.21 ± 0.04	0.19 ± 0.10	0.07 ± 0.07	0.23 ± 0.05	0.57[a]	0	0.12 ± 0.09	0.16 ± 0.06
Swainson's thrush	*Catharus ustulatus*	0.08 ± 0.04	0	0.20 ± 0.04	0.13 ± 0.13	0.07 ± 0.07	0.17 ± 0.05	0	0	0.27 ± 0.11	0.14 ± 0.05
Blackpoll warbler	*Dendroica striata*	0	0.09 ± 0.06	0.02 ± 0.01	0	0	0.03 ± 0.02	0	0.38 ± 0.19	0	0.02 ± 0.02
Yellow-rumped warbler	*Dendroica coronata*	0.29 ± 0.05	0.39 ± 0.13	0.43 ± 0.05	0.38 ± 0.13	0.07 ± 0.07	0.43 ± 0.07	0	0.51 ± 0.20	0.20 ± 0.08	0.30 ± 0.08
Palm warbler	*Dendroica palmarum*	0	0.04 ± 0.04	0.02 ± 0.01	0	0.07 ± 0.07	0	0	0	0.08 ± 0.05	0.08 ± 0.03
Yellow warbler	*Dendroica petechia*	0.01 ± 0.01	0	0.02 ± 0.01	0	0	0.01 ± 0.01	0	0.51 ± 0.33	0	0
Northern waterthrush	*Seiurus noveboracensis*	0.01 ± 0.01	0.04 ± 0.04	0.06 ± 0.02	0	0.21 ± 0.15	0.05 ± 0.03	0	1.14 ± 0.42	0	0.09 ± 0.05
Orange-crowned warbler	*Vermivora celata*	0.10 ± 0.03	0	0.19 ± 0.04	0.25 ± 0.15	0.07 ± 0.07	0.31 ± 0.05	0	0.13 ± 0.13	0.04 ± 0.04	0.19 ± 0.05
Tennessee warbler	*Vermivora peregrina*	0.01 ± 0.01	0.04 ± 0.04	0.07 ± 0.03	0	0.14 ± 0.10	0.09 ± 0.03	0	0.51 ± 0.20	0	0.17 ± 0.06
Dark-eyed junco	*Junco hyemalis*	0.21 ± 0.04	0.48 ± 0.13	0.50 ± 0.07	0.06 ± 0.06	0.07 ± 0.07	0.29 ± 0.06	0	0.13 ± 0.13	0.86 ± 0.18	0.47 ± 0.10
Chipping sparrow	*Spizella passerina*	0.23 ± 0.05	0.57 ± 0.16	0.27 ± 0.04	0.06 ± 0.06	0.36 ± 0.23	0.25 ± 0.06	1.14[a]	0.13 ± 0.13	0.43 ± 0.14	0.38 ± 0.08
Lincoln's sparrow	*Melospiza lincolnii*	0	0.13 ± 0.07	0.09 ± 0.02	0	0.14 ± 0.10	0.06 ± 0.03	0	0.25 ± 0.17	0.04 ± 0.04	0.19 ± 0.06
Song sparrow	*Melospiza melodia*	0	0	0.01 ± 0.01	0	0	0	0	0	0	0
Swamp sparrow	*Melospiza georgiana*	0	0.04 ± 0.04	0.05 ± 0.02	0	0.28 ± 0.13	0.02 ± 0.01	0.57[a]	0.76 ± 0.33	0	0.05 ± 0.03
White-crowned sparrow	*Zonotrichia leucophrys*	0.01 ± 0.01	0.04 ± 0.04	0	0	0	0	0	0	0	0.02 ± 0.02
White-throated sparrow	*Zonotrichia leucophrys*	0	0.09 ± 0.06	0.01 ± 0.01	0	0	0.02 ± 0.01	0	0.13 ± 0.13	0	0
Rusty blackbird	*Euphagus carolinus*	0	0	0	0	0	0	0	0.38 ± 0.27	0	0
Red-winged blackbird	*Agelaius phoeniceus*	0	0	0	0	0	0	0	0	0	0.02 ± 0.02
White-winged crossbill	*Loxia leucoptera*	0.01 ± 0.01	0	0	0	0	0	0	0	0	0
Pine grosbeak	*Pinicola enucleator*	0	0	0.01 ± 0.01	0	0	0	0	0	0	0
Common redpoll	*Carduelis flammea*	0.03 ± 0.02	0	0.01 ± 0.01	0	0	0.03 ± 0.02	0	0	0	0.02 ± 0.02

[a] Only the mean is reported because only 2 open bog plots were surveyed

Least flycatcher, song sparrow, and pine grosbeak were unique to coniferous spruce habitat (Table 3.10-1). Northern flicker, spruce grouse, and boreal chickadee were only observed in coniferous spruce and mixedwood spruce-trembling aspen-paper birch habitats. Common nighthawk and white-winged crossbill were unique to bedrock-open conifer habitat, while red-winged blackbird was only detected in treed fen habitat. Hairy woodpecker was only observed in mixedwood spruce-trembling aspen-paper birch and treed bog habitats, while rusty blackbird was only detected in shrubland habitat. Western wood-pewee was only observed in marsh/graminoid fen and treed fen habitats, while warbling vireo was only recorded in mixedwood spruce-trembling aspen-paper birch habitat.

Chipping sparrow was the only species recorded in all sampled habitat types (Table 3.10-1). Gray jay was observed in all habitats except for marsh/graminoid fen and open bog habitats. Hermit thrush and orange-crowned warbler were detected in all habitats except for burn and shrubland. Yellow-rumped warbler was not recorded in open bog habitat.

3.9.1.2 Community Level Results

Observed species richness ranged from 1 to 8 species among habitats, and was highest in shrubland habitat (Table 3.10-2). Species richness was lowest in bedrock-open conifer, deciduous aspen-paper birch, and open bog habitats. However, the number of plots sampled for several habitats within the LSA and NPAR RSA (e.g., marsh/graminoid fen, open bog, shrubland, and treed fen) was constrained by limited availability of habitats (Table 2.2-5; Table 2.2-6; Table 2.2-7).

Shrubland habitat had the highest average density of observed birds and deciduous habitat had the lowest average density of observed birds (Table 3.10-2; Figure 3.10-1). Density ranged from 0 to 13.65 birds/ha among all habitat types.

Table 3.10-2 Relative Abundance (birds/hectare) and Observed Species Richness of Upland Birds among Habitats in the Local Study Area and Proposed NICO Project Access Road Regional Study Area, 2005 to 2009

Habitat Type	Number of Plots	Relative Abundance		Observed Species Richness	
		Mean ± 1SE	Min – Max	Mean ± 1SE	Min – Max
Bedrock-open conifer	113	1.43 ± 0.16	0 - 9.10	1.1 ± 0.1	0 - 5
Burn	26	2.54 ± 0.35	0 - 5.69	1.8 ± 0.3	0 - 4
Coniferous spruce	164	2.84 ± 0.17	0 - 10.24	2.0 ± 0.1	0 - 7
Deciduous aspen-paper birch	18	1.33 ± 0.32	0 - 3.41	1.0 ± 0.2	0 - 3
Marsh/graminoid fen	16	2.42 ± 0.58	0 - 9.10	1.7 ± 0.3	0 - 5
Mixedwood spruce-aspen–paper birch	109	2.57 ± 0.18	0 - 7.96	1.9 ± 0.1	0 - 6
Open bog	2	2.27[a]	1.14 - 3.41	1.5 ± 0.5	1 - 2
Shrubland	9	5.94 ± 1.18	1.14 - 13.65	3.8 ± 0.6	1 - 8
Treed bog	29	2.75 ± 0.35	0 - 5.69	1.8 ± 0.2	0 - 4
Treed fen	72	2.76 ± 0.31	0 - 13.65	1.9 ± 0.2	0 - 8

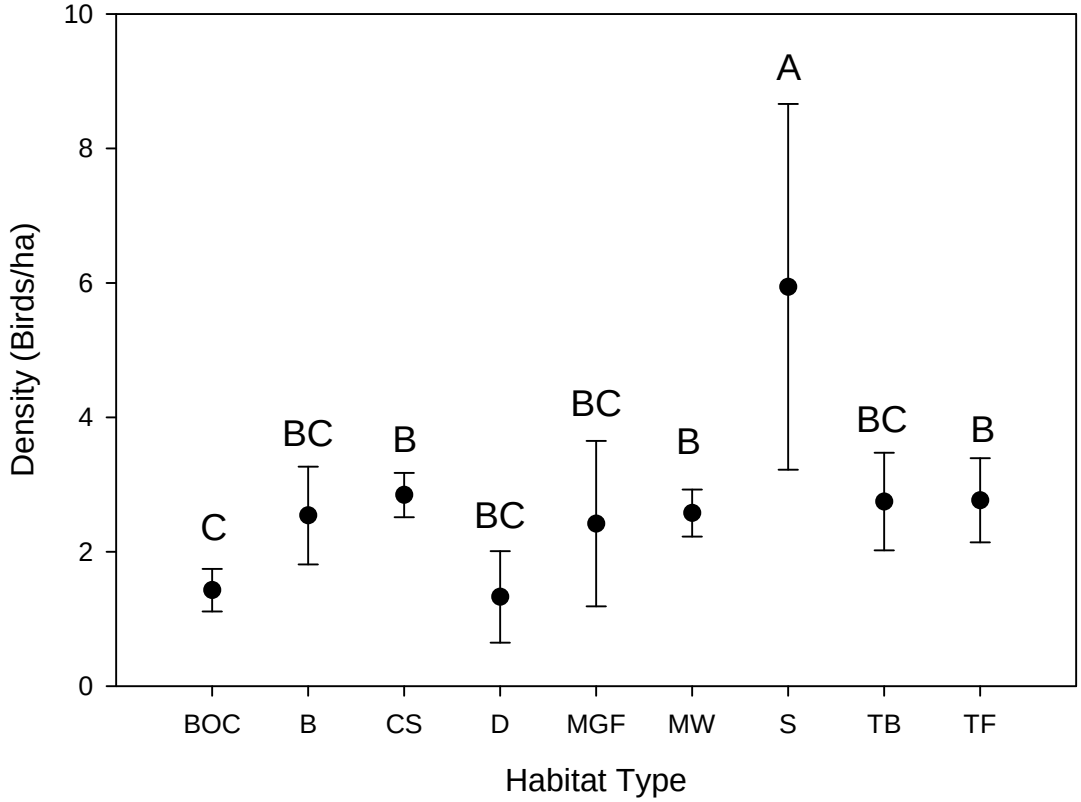
a Only the mean is reported because only 2 sites were surveyed in open bog habitat.

Mean = mean of all plots

SE = standard error

Min = minimum; Max = maximum]

Figure 3.10-1 Mean (± 1SE) Density (birds per hectare) of Upland Breeding Birds by Habitat Type

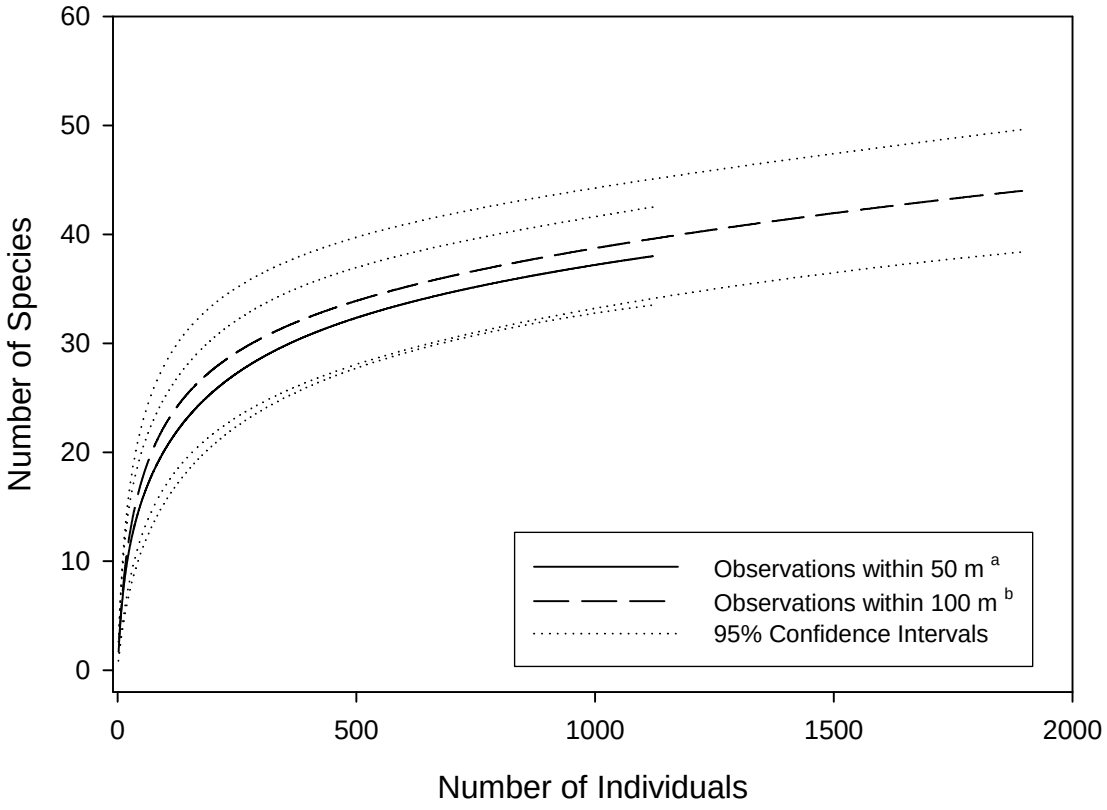


Note: BOC = Bedrock-open conifer; B = Burn; CS = Coniferous spruce; D = Deciduous trembling aspen-paper birch; MGF = Marsh/graminoid fen; MW = mixedwood spruce-paper birch-aspen; S = Shrubland; TB = Treed bog; TF = Treed fen

Note: Habitats not connected by the same letter are significantly different from each other. Open bog is not shown because only two sites were surveyed in this habitat type

The species accumulation curve for the LSA and NPAR RSA, using all birds recorded within the sampling radius (i.e., 50 m), did not reach an asymptote (Figure 3.10-2). The curve predicted that 38 species (34 - 43 [95 % CI]) would be present in the LSA and NPAR RSA, based on 1,121 observed birds. Using all observations recorded during BBS (i.e., fly-overs and birds detected within 100 m) the generated species accumulation curve also did not reach an asymptote (Figure 3.10-2). The curve predicted that 44 species (38 – 50 [95 % CI]) would be present in the LSA and NPAR RSA based on 1895 observed birds. These results suggest that survey effort was not adequate to record all birds that may be present within the study area.

Figure 3.10-2 Species Richness Curve (95% Confidence Intervals) for Upland Breeding Birds Recorded within the Local Study Area and Proposed NICO Project Access Road Regional Study Area



[a] Only includes birds recorded within 50 m of the observer

[b] Includes all birds recorded during point count surveys

3.9.2 Habitat Selection and Foraging

Nest requirements (e.g., tree cavities) designate where certain bird species will nest and breed. Upland breeding birds nest in a variety of habitats, including woodland, grassland, shrubland, and disturbed habitats. Woodland habitat breeding species (e.g., least flycatcher, Tennessee warbler) were the most numerous species observed during birding bird survey (BBS) within the LSA and NPAR RSA and accounted for 63 % of the 38 upland breeding bird species recorded. Shrubland breeding birds (e.g., yellow warbler, white-throated sparrow) accounted for 21 % of the 38 species recorded. Wetland breeding species (e.g., northern waterthrush, red-winged blackbird) accounted for 10 % of the species recorded, while open habitat (e.g., common nighthawk) and disturbed habitat nesting species (e.g., eastern phoebe) each accounted for 3 % of the 38 species recorded.

Most upland breeding birds observed within the study area are insectivorous, although they will also occasionally eat seeds, fruit, and arthropods (Birds of North America Online 2010). Some exceptions to this are gray jay, which is omnivorous, and common redpoll, which is primarily a seed eater.

Wildfire affects upland breeding bird species by changing the vegetation structure and food sources that are available in forested areas. Fire decreases the amount of live trees and canopy cover that is present in an area, while it increases the amount of shrub and ground cover. Therefore, tree-nesters, such as Tennessee warbler and red-eyed vireo, have decreased abundance in recently burned (less than 5 years) forests, while shrub- and ground-nesters, such as white-throated sparrow and chipping sparrow, have increased abundance in recently burned areas (Haney et al. 2008). Snag- and cavity-nesting birds, such as downy woodpecker (*Picoides pubescens*) and hairy woodpecker, may have increased abundance in recently burned landscapes (Jackson et al. 2002; Jackson and Ouellet 2002). Fire can decrease leaf-feeding insect and seed abundance, thereby limiting the presence of birds that rely on these food sources in recently burned areas (Russell et al. 2009). However, outbreaks of bark-beetle after fire may increase abundances of other bird species (Jackson and Ouellet 2002).

3.10 WATERBIRDS

3.10.1 Population Status and Distribution

The spring migration of waterbirds (e.g., loons, grebes, coots, ducks, and geese) to the NWT begins in early May, and in some years, at the end of April (Łutsel K'e Dene Elders and Land-Users et al. 2003). Throughout generations, people have depended upon ducks and geese to use the same migration routes to reach their staging and nesting areas in the NWT. People travel to these waterbird staging areas in the spring and fall to harvest the migrating birds, (Lutsel K'e Dene Elders and Land-Users et al. 2002; Golder 2010) and in the summer, they travel to the barren-lands where birds migrate to lay eggs (NSMA 1999).

3.10.1.1 Occurrence of Waterbirds within the Regional Study Areas

Horned grebe was the only federal listed species recorded within the RSAs during field surveys (Table 3.11-2; Table 3.11-3). Surf scoter, white-winged scoter, northern pintail, and long-tailed duck are territorial listed species that were observed within the RSAs. Greater and lesser scaup are difficult to differentiate in the field, therefore observations of scaup were grouped into 'scaup species'. Scaup were detected during field surveys and so it is possible

that the territorial listed lesser scaup may be present within the RSAs during the waterbird breeding season.

During the fall migration survey in 2003, 5 species of waterbirds were observed within the proposed LSA. Buffleheads were commonly recorded on a number of lakes (27 individuals). An aggregation of scaup (40 individuals), buffleheads (40 individuals), and 3 mallards were observed on Nico Lake. Two flocks of tundra swans (15 birds and 6 birds) were observed flying over Burke Lake. A flock of approximately 40 Canada geese were recorded flying over the proposed mine LSA.

Surveys completed in 2004 and 2005 identified 23 waterbird species or species groups (Table 3.11-2). Species in Table 3.11-2 were included in a species accumulation curve, and a list of all species observed by site staff and during wildlife surveys is provided in Appendix I (Table I-7). The most common species or species groups observed included scaup species, common goldeneye, American wigeon, mallard, Pacific loon, and green-winged teal. The largest groups of scaup were observed on Burke, Hislop, and Rabbit lakes during summer production surveys. Broods for 14 of the 23 species were observed during these surveys. Densities of birds within the surveyed area ranged from approximately 0.04 adult/km^2 of water for red-throated loons, American coots, and ruddy ducks to 104 adult scaup/km^2 of water (Table 3.11-2). Total density was 167 adult waterbirds/km^2 of water and 7.5 young/km^2 of water.

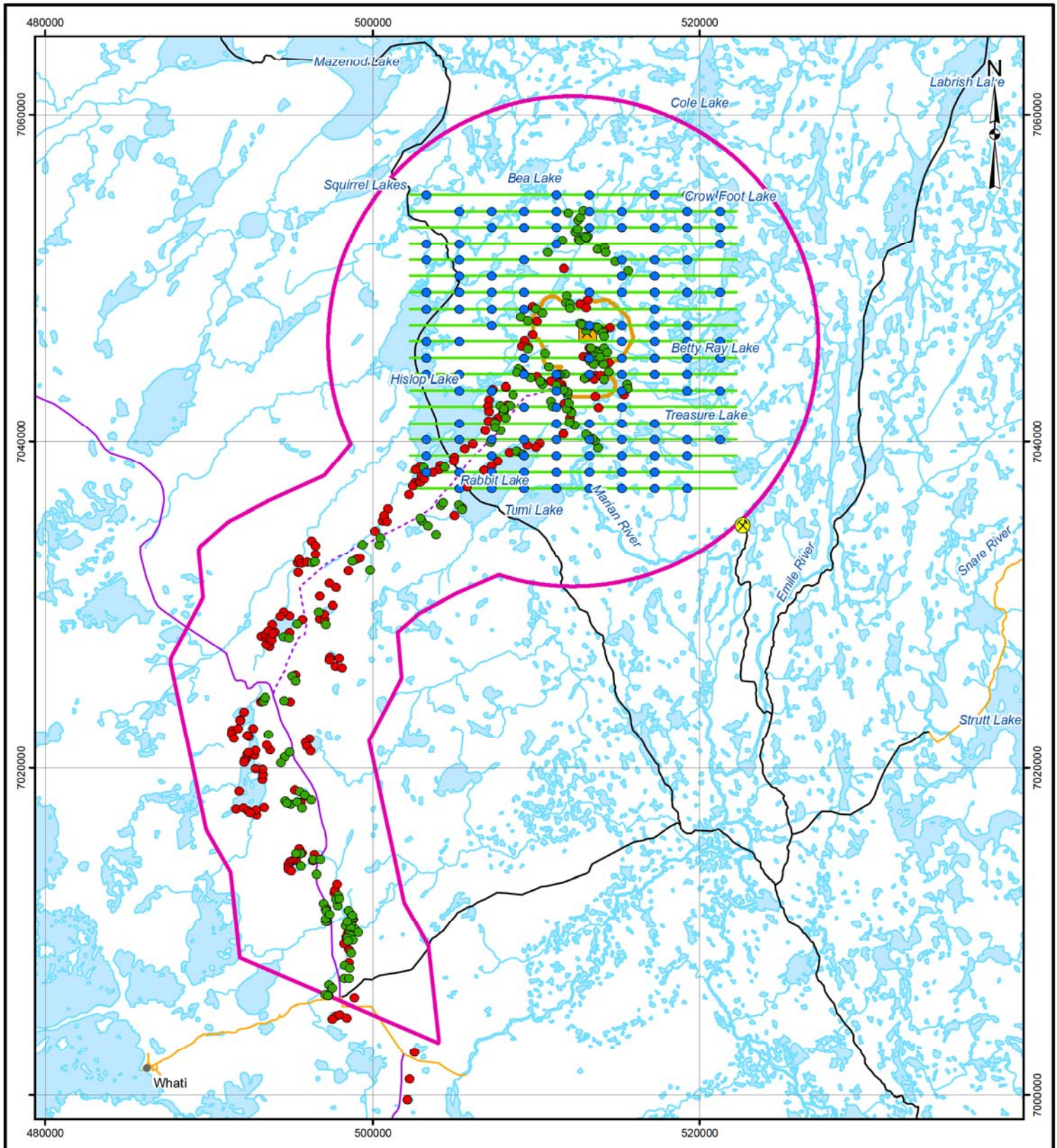
Surveys completed in 2006 identified 15 waterbird species or species groups (Table 3.11-3). The most numerous birds observed were scaup species followed by buffleheads, mallard, American wigeon, surf scoter, and white-winged scoter were also commonly observed (Table 3.11-3).

Table 3.11-2 Results of Waterbird Aerial Surveys within the Regional Study Areas, 2004 and 2005

Group	Common Name	Scientific Name	Brood Presence	Groups	Adults	Broods	Young	Groups/km^2 of Water	Adults/km^2 of Water	Young/km^2 of Water
Loons	Red-throated loon	*Gavia stellata*	Yes	1	1	1	1	0.04	0.04	0.04
	Pacific loon	*Gavia pacifica*	Yes	46	87	8	10	1.99	3.76	0.43
	Common loon	*Gavia immer*	Yes	17	29	3	3	0.74	1.25	0.13
Grebes	Horned grebe	*Podiceps auritus*	No	6	10	0	0	0.26	0.43	0.00
	Red-necked grebe	*Podiceps grisegena*	Yes	27	54	4	5	1.17	2.34	0.22
Mergansers and scoters	White-winged scoter	*Melanitta fusca*	No	11	36	0	0	0.48	1.56	0.00
	Surf scoter	*Melanitta perspicillata*	Yes	11	58	1	6	0.48	2.51	0.26
	Common merganser	*Mergus merganser*	Yes	6	10	1	6	0.26	0.43	0.26
Coot	American coot	*Fulica americana*	No	1	1	0	0	0.04	0.04	0.00
Ducks, geese and swans	Tundra swan	*Cygnus columbianus*	Yes	3	7	1	2	0.13	0.30	0.09
	Canada goose	*Branta canadensis*	Yes	8	26	4	12	0.35	1.12	0.52
	American wigeon	*Anas americana*	Yes	24	128	3	11	1.04	5.54	0.48
	Green-winged teal	*Anas carolinensis*	Yes	33	73	5	23	1.43	3.16	1.00
	Northern pintail	*Anas acuta*	No	4	11	0	0	0.17	0.48	0.00
	Northern shoveler	*Anas clypeata*	No	2	4	0	0	0.09	0.17	0.00
	Mallard	*Anas platyrhynchos*	Yes	57	115	10	48	2.47	4.98	2.08
	Common goldeneye	*Bucephala clangula*	Yes	34	493	2	10	1.47	21.33	0.43
	Bufflehead	*Bucephala albeola*	No	60	203	0	0	2.60	8.78	0.00
	Long-tailed duck	*Clangula hyemalis*	No	1	2	0	0	0.04	0.09	0.00
	Canvasback	*Aythya valisineria*	No	3	7	0	0	0.13	0.30	0.00
	Ring-necked duck	*Aythya collaris*	Yes	21	96	1	4	0.91	4.15	0.17
	Scaup spp.	*Aythya affinis or Aythya marila*	Yes	129	2406	6	32	5.58	104.10	1.38
	Ruddy duck	*Oxyura jamaicensis*	No	1	1	0	0	0.04	0.04	0.00

Table 3.11-3 Results of Waterbird Aerial Surveys within the Proposed Mine Regional Study Area, 2006

Group	Common Name	Scientific Name	Brood Presence	Pairs	Lone Drakes	Flocked drakes	Groups
Loons	Common loon	*Gavia immer*	No	4	0	0	0
	Pacific loon	*Gavia pacifica*	No	2	0	0	0
	Unknown loon	*Gavia* spp.	No	1	0	0	0
Grebes	Red-necked grebe	*Podiceps grisegena*	Yes	0	0	0	0
Mergansers and scoters	Red-breasted merganser	*Mergus serrator*	No	2	1	0	0
	Surf scoter	*Melanitta perspicillata*	No	7	1	0	0
	White-winged scoter	*Melanitta fusca*	No	5	2	0	0
Ducks, geese, and swans	Tundra swan	*Cygnus columbianus*	No	2	0	0	0
	Mallard	*Anas platyrhynchos*	Yes	1	6	2	0
	American wigeon	*Anas americana*	No	3	5	0	0
	Common Goldeneye	*Bucephala clangula*	No	1	1	0	0
	Bufflehead	*Bucephala albeola*	No	12	7	2	0
	Ring-necked duck	*Aythya collaris*	No	3	0	0	0
	Canvasback	*Aythya valisineria*	No	0	1	0	0
	Scaup species	*Aythya affinis* or *Aythya marila*	No	32	11	16	30
	Unknown diver		Yes	0	0	0	0
	Unknown duck		Yes	6	0	0	0
Terns	Tern species	*Sterna* spp.	No	2	0	0	0



LEGEND

- NICO PROJECT
- DECOMMISSIONED MINE
- POPULATED PLACE
- EXISTING ALL-WEATHER ROAD
- EXISTING WINTER ROAD
- PROPOSED ALL-LAND WINTER ROAD ROUTE
- PROPOSED NICO PROJECT ACCESS ROAD
- WATERCOURSE
- WATERBODY
- WATERBIRD OBSERVATION, 2004
- WATERBIRD OBSERVATION, 2005
- WATERBIRD OBSERVATION, 2006
- 2006 WATERBIRD SURVEY
- LOCAL STUDY AREA
- REGIONAL STUDY AREA

10 0 10

SCALE 1:325,000 KILOMETRES

REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT

FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE

LOCATION OF WATERBIRD OBSERVATIONS, 2004 TO 2006

Golder Associates
Edmonton, Alberta

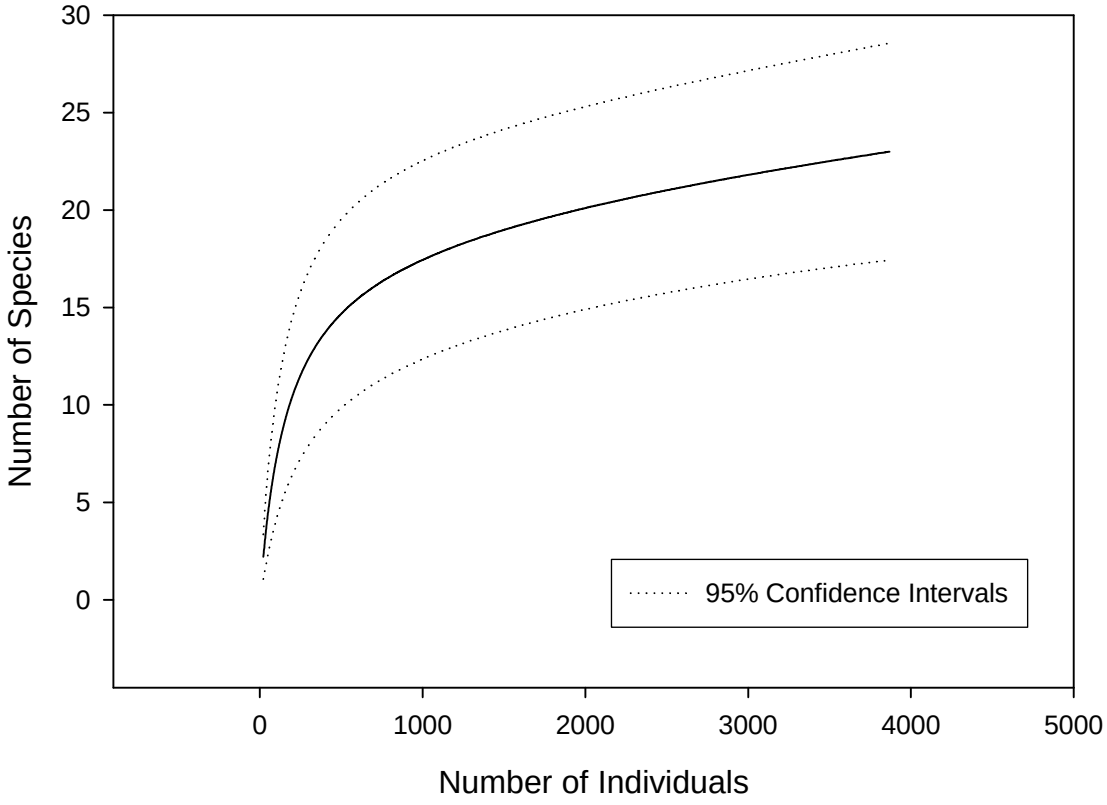
FILE No. B-Wild-019-GIS

PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 1
DESIGN	LD	27 Oct. 2008	FIGURE: 3.11-1
GIS	ANK	18 May 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

Waterbird surveys from 2004 to 2006 observed a minimum of 25 species distributed throughout the RSAs (Figure 3.11-1), and 14 species were identified as producing young. Scaup species were the most common waterbirds recorded during all 4 years.

Due to differences in survey methods between 2004/2005 and 2006, data collected during 2004 and 2005 was used to generate a waterbird species accumulation curve (see Section 2.2.12) (Figure 3.11-2). Baseline data from 2004 and 2005 generated a species rarefaction curve that did not reach an asymptote. Therefore, the sampling effort was not adequate to estimate total species richness in the RSAs.

Figure 3.11-2 Species Richness Curve for Waterbirds in the Regional Study Areas, 2004 and 2005



3.10.2 Habitat Selection and Foraging

Following spring migration, mating pairs of waterfowl select a waterbody or portion of a waterbody (known as a pair pond) as their territory. In the boreal forest, dabbling ducks (e.g., mallard, blue-winged teal) generally nest in heavily

vegetated marshes, bogs, shrubland, forests, or on islands. Diving ducks (e.g., canvasback, ring-necked duck) generally nest over water in either emergent vegetation or other structures (e.g., muskrat pushup) but are also known to nest in the uplands near water. Brood rearing occurs on larger wetlands as they provide food sources as well as cover from predators. Waterfowl densities vary with invertebrate presence and biomass as invertebrates are the primary food for most waterfowl species (Elmberg et al. 2000). Waterfowl young are dependent on invertebrates during their first 4 weeks of life because invertebrates satisfy protein requirements for feather development (Hornung 2005). Waterfowl also feed on a variety of submersed vegetation and seeds of emergent vegetation.

Runoff from burned watersheds or direct ash deposition from wildfire can change the water color and nutrient concentrations in wetlands (Haszard and Clark 2007). These changes may affect invertebrate presence and abundance, thereby impacting waterbird populations. Cavity-nesting species (e.g., bufflehead and common goldeneye) may also be affected by wildfire as fire increases the abundance of woodpeckers and number of snags in an area.

3.11 RAPTORS

3.11.1 Population Status and Distribution

Raptors are birds of prey and include falcons, eagles, hawks, and owls. Falcon production is known to be seasonally variable and highly dependent upon small mammal and bird populations, and availability of suitable nesting habitat. Raptors are known to be sensitive to disturbances, particularly during breeding, and declines in raptor populations have been attributed to human activities and developments (Craighead and Mindell 1981).

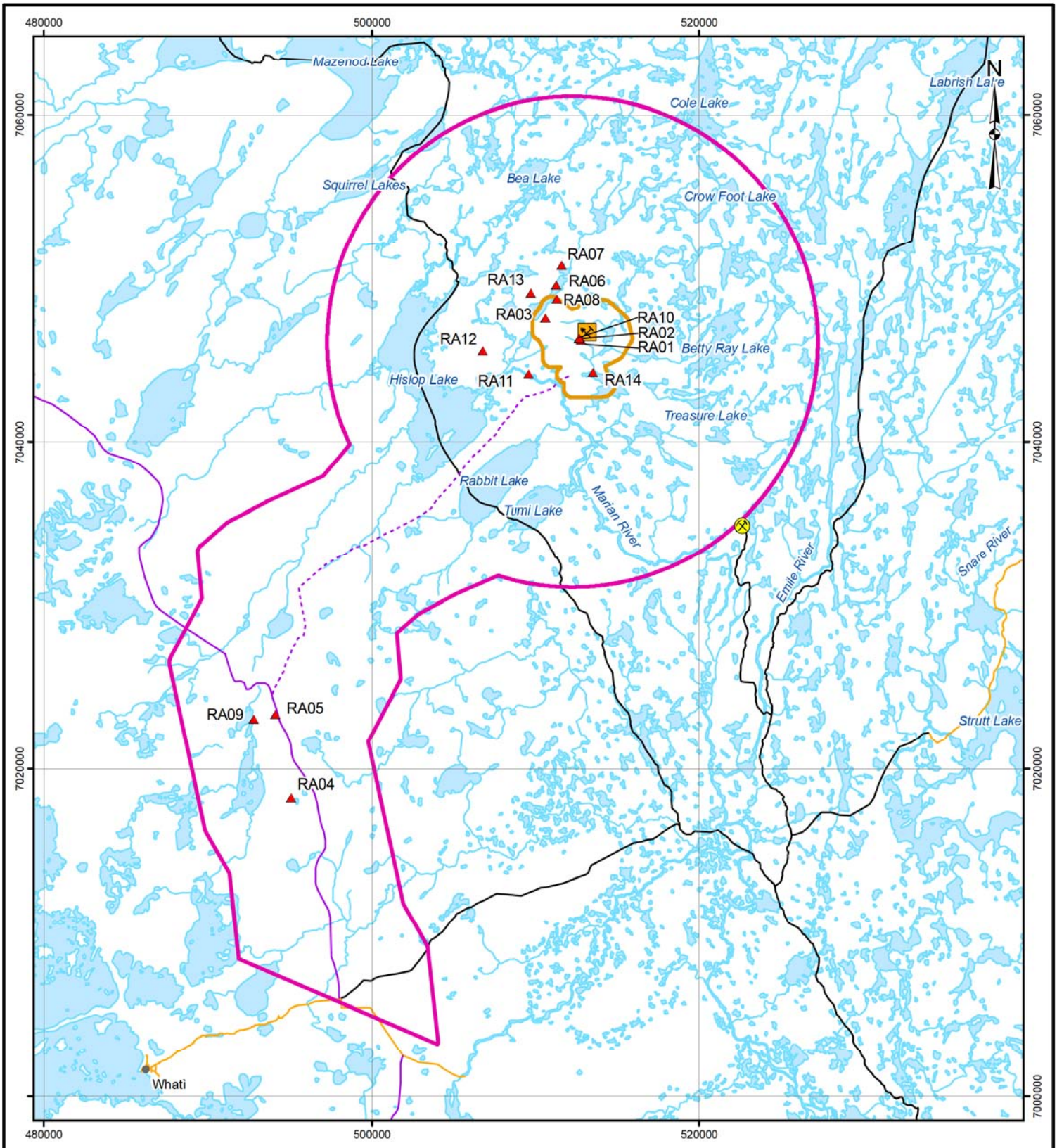
The short-eared owl is listed as a species of '*special concern*' under COSEWIC (2009) and Schedule 3 of SARA (2009). The peregrine falcon is listed on Schedule 1 of SARA (2009). These species are also listed in NWT as '*sensitive*' (NWT General Status Ranking Program 2009). Recently, peregrine populations in the Canadian Arctic have increased due to the decline in the use of organochlorine pesticides in their wintering areas (Shank et al. 1993). In addition to the peregrine falcon, the gyrfalcon is also a high-profile species in the north and the official bird of the NWT.

3.11.1.1 Occurrence of Raptors within the Regional Study Areas

Currently, 14 raptor nests have been discovered in the RSAs (Figure 3.12-1). This includes the nests of 5 bald eagles, 1 red-tailed hawk, 2 peregrine falcons,

1 great grey owl, 1 common raven, and 4 unidentified raptors (Tables 3.12-1 to 3.12-3). Surveys in 2003 identified 3 inactive nest sites. In 2004, 8 new nest sites were detected, and 3 additional nest sites were discovered in 2005 (Table 3.12-1). No new nests were discovered from 2006 to 2009. The Environment and Natural Resources Department (ENR) of the Government of the Northwest Territories maintains a database of all known raptor nests in the NWT. In 2005, this database was queried for the entire 85N map sheet (extending from 63^{o} 00' N 116^{o} 00' W to 64^{o} 00' N 118^{o} 00' W) to determine if any other nests may be present in the region. No raptor nest sites were known to ENR in this area (S. Carriere, pers. comm. 2005).

Surveys suggest that occupancy rates of surveyed nests in the RSAs are low (Table 3.12-2). None of the 3 nests found in 2003 appeared to be active that summer, and only 1 of 11 nests surveyed in 2004 was occupied (although nests that had been occupied in the spring and failed, or fledged before the July survey in these 2 years would not have been recorded). Four of the 12 nest sites surveyed in 2005 were occupied by 3 pairs of bald eagles and one pair of peregrine falcons. The nests that were inactive at the time of the June 2005 occupancy survey remained inactive at the time of the July 2005 productivity survey. Surveys completed in 2006 also found a low nest occupancy rate, with 3 of the 8 surveyed nests occupied. However, 2007 had the highest nest occupancy rate, with 6 out of the 11 surveyed nests occupied (Table 3.12-2). Four of 11 surveyed nests were active in 2008. Two of the 14 nests were active in 2009.



REFERENCE

Base data obtained from Atlas of Canada, DMTI and GeoGratis.
Projection: UTM Zone 11 Datum: NAD 83

PROJECT

FORTUNE MINERALS LIMITED
NICO DEVELOPERS ASSESSMENT REPORT

TITLE

LOCATION OF RAPTOR NESTS, 2003 TO 2009

Golder Associates
Edmonton, Alberta

FILE No. B-Wild-015-GIS			
PROJECT No. 08-1373-0017		SCALE AS SHOWN	REV. 2
DESIGN	LD	27 Oct. 2008	FIGURE: 3.12-1
GIS	ANK	18 May 2010	
CHECK	LY	17 Nov. 2010	
REVIEW	GA	17 Nov. 2010	

I:\CLIENTS\FORTUNE_MINERALS\08-1373-0017\Mapping\MXD\Wildlife\B-Wild-015-GIS.mxd

Table 3.12-1 History of Raptor Nest Site Occupancy in the Regional Study Areas, 2003 to 2009

Nest Site	Common Name	Scientific Name	Occupied in 2003	Occupied in 2004	Occupied in 2005	Occupied in 2006	Occupied in 2007	Occupied in 2008	Occupied in 2009
RA01	Peregrine falcon	*Falco peregrinus*	no	no	no	no	yes – common raven	yes	no
RA02	Unknown		no	no	no	NS	no	no	no
RA03	Peregrine falcon	*Falco peregrinus*	no	no	yes	yes	yes	no	no
RA04	Red-tailed hawk	*Buteo jamaicensis*	ND	yes	NS	NS	NS	NS	yes- common raven
RA05	Unknown		ND	no	no	NS	NS	NS	no
RA06	Bald eagle	*Haliaeetus leucocephalus*	ND	no	yes	yes	yes	yes	no
RA07	Bald eagle	*Haliaeetus leucocephalus*	ND	no	no	no	no	no	no
RA08	Common raven	*Corvus corax*	ND	no	NS	NS	yes	no	no
RA09	Unknown		ND	no	no	NS	NS	NS	NS
RA10	Unknown		ND	no	no	NS	no	no	no
RA11	Bald eagle	*Haliaeetus leucocephalus*	ND	no	no	no	no	yes	no
RA12	Great grey owl	*Strix nebulosa*	ND	ND	no	no	yes	no	no
RA13	Bald eagle	*Haliaeetus leucocephalus*	ND	ND	yes	yes	no	no	no
RA14	Bald eagle	*Haliaeetus leucocephalus*	ND	ND	yes	no	yes	yes	yes

ND = No data because nest was not yet identified

NS = Nest not surveyed

Table 3.12-2 History of Raptor Nest Productivity, 2003-2009

Year	2003	2004	2005	2006	2007	2008	2009
Known Nests	3	11	14	14	14	14	14
Number Surveyed	3	11	12	8	11	11	14
Occupied Nests	0	1	4	3	6	4	2
Productive Nests	0	1	3	2	5	2	2
Number of Chicks	0	2	5	2	12	2	3

The occupied red-tailed hawk nest produced 2 young in 2004. In 2005, 3 of the 4 occupied raptor nests produced 5 chicks (Table 3.12-2), whereas 2 of 3 active nests produced 2 young in 2006. In 2007, 5 of 6 occupied nests produced 12 chicks. Although the July survey in 2008 could not be completed due to a fire in the region, the June survey recorded one chick each in 2 of the 4 occupied nests. Nest RA03, located 1.5 km from the main camp complex, produced

3 peregrine young in 2007. Nest RA04 was occupied by a common raven in 2009 and contained 3 young during the occupancy survey in 13 June 2009. Productivity of this nest was not determined during the 16 July 2009 survey. Nest RA14 was occupied by a bald eagle during the June survey in 2009 and contained 2 young during the occupancy survey. The productivity of this nest was not assessed during the 16 July 2009 survey. Nests RA04, RA05 and RA09 have not been regularly surveyed, as they lie outside of the proposed mine RSA. RA09 was a tree nest that has apparently collapsed since 2006, as it has not been found during subsequent surveys.

3.11.2 Habitat Selection and Foraging

Peregine falcons prefer to nest on cliffs with open gulfs of air (i.e., not confined areas), but human structures (e.g., skyscrapers) in urban areas can also be used (White et al. 2002). Peregrines also require open areas for foraging. Birds are the primary prey of peregrines although occasionally small mammals, bats, amphibians, fish, and insects will also be consumed.

Red-tailed hawks are very adaptable, and can be found nesting in a variety of habitats, as long as there are open areas interspersed with patches of trees or other elevated perches (Preston and Beane 2009). Red-tailed hawks primarily eat rodents and rabbits, but are also known to consume other birds, reptiles, fish and carrion.

Bald eagles generally nest in forested areas adjacent to large, fish-bearing waterbodies; however, they will nest on cliffs, large rocks, and the ground if suitable trees are not available (Buehler 2000). Bald eagles prefer to eat fish but will consume carrion, muskrats, hares, and waterfowl if available.

Great gray owls generally nest in dense coniferous forest near bogs, forest edges, or other openings (Bull and Duncan 1993). Great gray owls are rodent specialists, although other small mammals (e.g., snowshoe hare) will also be eaten.

Wildfire primarily affects raptor species by decreasing nesting habitat and changing prey abundance (Bull and Wales 2001). Bald eagle and northern goshawk were shown to be negatively affected by fire in the northeastern United States because of loss of suitable nest trees. Peregrine falcon may be negatively affected by fire since fire may change the presence and abundance of prey species (Bull and Wales 2001).

4 SUMMARY

4.1 GENERAL SETTING

The wildlife baseline is one component of a comprehensive environmental and socio-economic baseline program to collect information about the natural and socio-economic environment in the vicinity of NICO Project (Project). The wildlife baseline report presents a review and interpretation of qualitative and quantitative information from literature, and data collected during the 2003 to 2010 field programs. Rapid assessment and systematic surveys focused on sensitive, ecologically, and traditionally important wildlife species and habitats within the region of the Project.

The proposed mine regional study area (RSA) was defined to capture the maximum predicted spatial extent of direct and indirect effects from the Project on wildlife species. In 2007, the RSA was increased from 314 km^2 to 706 km^2 (i.e., the radius was increased from 10 km to 15 km, centered on the proposed mine site). The local study area (LSA) boundary was defined by the expected spatial extent of the immediate direct (e.g., Project footprint) and indirect effects (e.g., dust deposition) from the Project on surrounding soil, vegetation, and wildlife. The LSA was defined as a 500 m buffer around the former proposed Project lease boundary.

The Proposed NICO Project Access Road (NPAR) RSA was defined by the expected limit of direct and indirect effects from the road on surrounding soil, vegetation, and wildlife. The Proposed NICO Project Access Road during baseline studies was a 50 km road that joins the Project to the existing all-weather access road east of Whatì. The NPAR RSA was defined by a 6.5 km buffer surrounding the proposed 50 km road alignment.

Habitat within the proposed mine and NPAR RSAs (i.e., study area) represents the Taiga Shield and the Taiga Plains Ecoregions. The boundary between the 2 Ecoregions is located along the eastern shorelines of Rabbit and Hislop lakes. Wildlife species characteristic of both habitat types may be found near the Project. Habitat in the northeast portion of the study area is characterized by many lakes, wetlands, and open forests. Trees are small and tree coverage generally is low. Jack pine habitat is found in low coverage along hilltops in association with small black spruce, reindeer lichen, and exposed bedrock. Habitat in the southwest portion the study area is characterized by more tree coverage, many wetlands, and fewer lakes. Spruce forests tend to be comprised of larger trees of more uniform size. Dense stands of large jack pine are present, and treed fens are common.

In the summer of 2008 wildfire burned approximately 10 % of the proposed mine RSA. This change on the landscape may affect wildlife species to varying degrees. Moose, black bear, beaver, and muskrat are expected to be positively influenced by fire because fire increases the amount of shrubby and herbaceous vegetation in an area. Caribou, lynx, marten, and wolverine may be negatively impacted by wildfire since these species avoid early successional habitats. Barren-ground caribou may not be negatively affected by fire if their home range is large enough for them to be able to use alternative, unburned areas for foraging.

Birds also vary in their responses to wildfire. Tree-nesting birds may be negatively affected by fire since fire decreases the amount of live trees and canopy cover in an area. Cavity- and snag-nesting species may be positively influenced by wildfire as these nesting substrates become more common after a fire. Shrub- and ground-nesting species may be positively influenced by fire as there is generally denser shrub and ground cover after a fire. Waterfowl may be affected by fire if there are changes in invertebrate communities and biomass due to changes in water colour and nutrient concentrations from runoff and ash deposition.

Wildlife species composition in the study area appears to be consistent with that expected based on traditional knowledge and literature on the species. The Project is within the barren-ground caribou wintering grounds. As a result, carnivore species that rely on the caribou herds are regular inhabitants within the study area. Habitats in the proposed mine and NPAR RSAs provide den sites, forage, and cover for large and small carnivore species. Habitats in the study area support a variety of songbird and waterbird species. Raptors are also present in the RSAs.

4.2 BARREN-GROUND AND WOODLAND CARIBOU

4.2.1 Methods

Satellite-collared data from the Bathurst, Ahiak, and Bluenose East herds were used to estimate the frequency of different barren-ground caribou herds in the region from 1995 to 2010 (data courtesy of the Department of Environment and Natural Resources [ENR]). Baseline information on caribou was collected through winter aerial surveys, pellet surveys, and winter track counts from 2004 through 2010 to determine the occurrence, abundance, distribution, and habitat associations of caribou within the RSAs. Group composition, group size, and instantaneous observations of behaviour (from aerial surveys) were also recorded.

Aerial surveys were divided into 2 components based on the proposed mine site and NPAR study areas. Within the proposed mine RSA, from 2004 to 2006, there were 9 transects oriented in a north-south direction spaced 2 km apart. From 2007 to 2010, there were 15 transects oriented in a north-south direction spaced 2 km apart. Within the NPAR RSA from 2004 to 2010 a central transect was flown directly over the proposed road alignment, 2 transects were flown 1 km from either side of the alignment, and 2 transects were flown 5 km from either side of the alignment. Observers recorded an estimate of group size, group composition (groups with calves or groups without calves), dominant behaviour, habitat, and Universal Transverse Mercator (UTM) co-ordinates. Caribou snow track abundance was also recorded.

Caribou (and moose) pellet groups were counted along 12 transects (500 m long) in 2005 and 2006, and 5 transects (500 m long) in 2007 within and adjacent to the LSA. A pellet group was defined as 6 or more pellets touching one another. Only pellets estimated to have been dropped within the recent winter (i.e., since the arrival of caribou during the previous winter) were recorded.

In 2005, 2008, and 2009 winter track surveys were completed to determine the distribution and habitat use of caribou, moose, and carnivores within the proposed mine and NPAR study areas. In 2005, 10 transects, each 1 km long, were established within the proposed mine RSA. Forty-two transects (range 0.1 to 1.3 km in length) were established within the proposed mine RSA in 2009. No winter track surveys were carried out within the proposed mine RSA in 2008. In 2005, 11 transects each 1 km long, were established within the NPAR study areas; in 2008, 24 transects (1 km long) were established. No winter track surveys were carried out within the NPAR RSA in 2009. The number of tracks, habitat type, and UTM coordinates of each track and change in habitat type were recorded.

4.2.2 Results

Based on satellite collar data from 1996 to 2010, the Bathurst caribou herd has the greatest probability of being affected by the Project, as individuals have been recorded within the study area during several years. Bluenose East caribou are not likely to be influenced by the Project in most years, as only 2 individuals have been recorded within 50 km of the Project from 1996 through 2010. Individuals from the Ahiak caribou herd have the lowest likelihood of being influenced by the Project as individuals from this herd have not been recorded within 50 km of the Project. Woodland caribou are believed to be common west of the RSAs, beyond the community of Whatì (Dogrib Treaty 11 Council 2001) and uncommon in the RSAs (J. Mantla pers. comm. 2003). Barren-ground

caribou typically do not occupy the RSAs during the northern migration, calving, post-calving aggregation, summer dispersal, and fall (rut) period.

During aerial surveys in the proposed mine RSA, 98 caribou groups consisting of 1014 individuals were recorded. Group size ranged from 1 to 50 individuals, although most of the groups tended to be small. For example, 40% of the groups contained 1 to 4 individuals and 53% of the groups contained 5 to 29 individuals. Only 7 groups (7%) were comprised of 30 or more individuals.

Aerial surveys showed that the number of caribou in the study area during the winter varies from year to year. Caribou distribution was concentrated within a central band across the proposed mine RSA. Fewer caribou were observed in the northern and southern portions of the RSA, but snow tracks from aerial surveys indicated that caribou use the entire study area.

Determining the group composition of caribou during the winter is difficult during an aerial survey. Calves have grown substantially and most bulls have lost their antlers, making it difficult for observers to determine age and sex of the animals. As a result, the composition of 64 % of the 98 caribou groups observed was undetermined. For the remaining 35 groups where group composition could be determined, 63 % contained only adults and 37% were nursery groups (i.e., groups with calves) within the proposed mine RSA.

Dominant group behaviour was recorded for 95 groups during the 9 aerial surveys with caribou observations. Behaviour was categorized as either feeding/resting (bedded, standing, feeding) or moving (walking, trotting, running). Groups displaying these 2 behaviours were approximately equal. For example, 44 groups exhibited feeding/resting behaviour and 51 groups were moving. With respect to habitat, from 2004 to 2006 most caribou groups were observed in frozen lake (66 %) and coniferous spruce (20%) habitats. Similarily from 2007 to 2010 most caribou group observations were made in frozen lake (53 %) and coniferous spruce (29 %) habitats.

Ground-based snow track surveys indicated that caribou track densities were high in coniferous spruce and bedrock-open conifer habitats within the proposed mine RSA in 2005. Caribou tracks were also recorded in deciduous aspen-paper birch, open bog, treed bog, and frozen lake habitats in 2005. Caribou tracks were abundant within the proposed mine RSA, as 53 % of the observations were classified as networks (i.e., assumed to have 5 times the activity level of a single track). Trails (i.e., assumed to have 3 times the activity level of a single track) accounted for 39% of the observations, and single tracks accounted for 8 % of the caribou track observations. No caribou tracks were recorded within the

proposed mine RSA in 2009. Due the limited availability of some habitats in the study area, survey effort (distance sampled) was low or did not occur in burn, coniferous pine, marsh/graminoid fen, shrubland, and treed fen habitats.

Habitat preference from winter track surveys within the proposed mine RSA in 2009 could not be determined because the expected frequencies of caribou tracks among all habitats were less than 5. Analysis for the proposed mine RSA in 2005 indicated that caribou track encounters were statistically different among 5 habitats. Bonferroni confidence intervals suggested that treed bog and coniferous spruce habitats were selected in proportion to their availability. Bedrock-open conifer habitat was preferred, while coniferous pine and frozen water habitats were avoided relative to availability. Manly's habitat selection ratios from 2004 to 2010 aerial survey data indicated that caribou preferred frozen lake habitat within the proposed mine RSA during winter.

In summer, the highest densities of caribou pellets were recorded in bedrock-open conifer and mixedwood spruce-paper birch-aspen habitats. A few pellets were found in deciduous trembling aspen-paper birch and treed bog habitats. No pellets were found in other habitat types.

During aerial surveys in the NPAR RSA, 126 caribou groups comprising 1168 animals were recorded in the winters of 2004 through 2010. Group size ranged from 1 to 50 individuals, and most of the groups tended to be small with an average group size of 9 animals. Groups containing 1 to 4 individuals accounted for 46 % of the observations, and 48 % were comprised 5 to 29 individuals. Only 8 groups (6 %) contained 30 or more individuals.

The estimated number of caribou in the NPAR study area during winter aerial surveys ranged from 0 to 6156 during 2004 through 2010. Caribou distribution within the NPAR study area was concentrated south to south-east of Rabbit and Hislop lakes. A smaller concentration of caribou observations occurred north of Whati at the south-west extent of the road transects. Most caribou group observations were made in coniferous spruce (33 %) or frozen lake (29 %) habitat.

Ninety-two of the 126 caribou groups observed were classified into nursery and non-nursery groups. Non-nursery and nursery groups made up 67% and 33%, of the total classified groups, respectively. Dominant group behaviour was recorded for 113 groups during the 7 aerial surveys which observed caribou. There were 74 (65%) groups displaying feeding/resting behaviour, whereas 39 (35%) groups were moving.

Manly's selection ratios for aerial survey data within the NPAR from 2004 to 2010 indicate that frozen lake was the most preferred habitat during winter. Habitat preference from winter track surveys within the NPAR study area could not be determined because the expected frequencies of caribou tracks among all habitats were less than 5. Caribou winter tracks were observed in coniferous pine and coniferous spruce habitats within the NPAR study area. Due the limited availability of some habitats in the study area, survey effort was low in bedrock-open conifer, burn, frozen lake, open bog, and shrubland habitats. Tracks accounted for 24 % of caribou track observations within the NPAR RSA and trails (assumed to have three times the activity level of a single track) accounted for 76 % of caribou track observations.

Large fires may temporarily change barren-ground caribou migration routes, but there is little evidence that wildfires have an impact on barren-ground caribou numbers. After a fire, caribou that occupy large home ranges may be able to use alternative areas within their home ranges to forage for lichen, instead of switching to new, previously unused areas. Wildfire may negatively impact woodland caribou as woodland caribou avoid young forests.

4.3 MOOSE

4.3.1 Methods

Aerial, pellet, and winter track surveys were used to determine the abundance, distribution, relative activity, and habitat associations of moose in the RSAs from 2004 to 2010.

4.3.2 Results

Moose were documented in the proposed mine RSA in the winters of 2004, 2005, 2007, 2008, and 2009 during aerial surveys. Aerial surveys detected moose the NPAR study area in the winters of 2004 through 2009. One calf was observed within the proposed mine RSA in 2008 and one calf was recorded in the NPAR RSA in 2004. Most moose were observed in coniferous spruce habitat. From 2004 through 2010, 11 adult moose were recorded in the proposed mine RSA, and 29 adult moose were observed in the NPAR study area.

Moose tracks were observed more frequently in deciduous trembling aspen-paper birch habitat than coniferous spruce habitat in the proposed mine RSA during winter track surveys in 2005. No moose tracks were observed in any other surveyed habitat type within the proposed mine RSA in 2005. Moose tracks were only recorded in coniferous spruce and treed fen habitat during winter track

surveys in 2009. The highest density of moose tracks was observed within deciduous trembling aspen-paper birch habitat within the NPAR study area. Moose tracks were also found in coniferous spruce and coniferous pine habitats within the NPAR. Similar to caribou, the limited availability of some habitats in the RSAs constrained the ability to sample burn, bedrock-open conifer, coniferous pine, marsh/graminoid fen, shrubland, open bog, and treed fen habitats. Habitat preference in the proposed mine RSA in 2005 and 2009 and NPAR RSA could not be determined because the number of moose tracks detected among habitats was not adequate (i.e., expected frequencies of moose tracks within habitats were less than 5).

In summer, the highest densities of moose pellets were recorded in bedrock-open conifer and mixedwood spruce-paper birch-aspen habitats. Pellets were also recorded in deciduous trembling aspen-paper birch and treed bog habitats. No moose pellets were observed in other habitat types. Habitats with high cover of shrub species are usually preferred in late winter, such as shrubby fens and bogs, and riparian habitats with open canopies. Shrub height is important during winter conditions, as forage shrub species must be higher than the snowpack to be accessed by moose.

Moose are positively influenced by wildfire as fire increases the availability of deciduous browse species. Moose occupation of burned areas will vary with fire intensity, as severely burned areas will have little vegetation growth for up to 5 years.

4.4 BLACK BEAR

4.4.1 Methods

Rapid assessment surveys to determine the presence of black bears and other carnivore species, dens, and potential denning habitat were carried out in 2003 within the LSA and NPAR RSA. Areas likely to have high concentrations of game trails and wildlife activity (perimeters of waterbodies, valleys, and other potential travel corridors) were identified on topographic maps and aerial photos. Searches of these areas were completed on foot. Areas of potential denning habitat for carnivores were also identified on topographic maps, aerial photos, and while completing other surveys.

4.4.2 Results

Black bear sign, including scat and bear skull and jaw remains, was found at 13 locations in the RSAs. One den was located during archaeology surveys in

2004 in a well drained mound at the edge of a small graminoid wetland. In 2005, there were 7 incidental observations of black bears within the RSAs, including a sow with a cub.

Black bear abundance within the RSAs is expected to vary between years in response to denning behaviour and food availability. Bears have a low level of den reuse and den locations are often several kilometres apart between consecutive years (Linnell et al. 2000). Black bear home range size fluctuates in response to food availability, and fewer bears may be present within the study area during years of low food abundance.

Preferred black bear habitat is a mixture of forested and open areas (Larivière 2001; ENR 2009). Black bears also require secluded areas for denning. Dens may be made in tree cavities, crevices, caves, or under large rocks (Larivière 2001; ENR 2009).

Black bears may benefit from wildfire as berry production and moose densities increase in recently burned areas. However, increases in berries and moose are dependent on the intensity of the fire, which affects the length of time it takes for berries and browse to grow. Fire may also improve denning habitat because black bears den in mature trembling aspen and spruce forests, while avoiding late succession muskeg habitat.

4.5 WOLF

4.5.1 Methods

Rapid assessment surveys to locate wolf dens and potential wolf denning habitat within the LSA and NPAR RSA were carried out in 2003. Wolf tracks were also recorded during winter track surveys in 2005, 2008, and 2009 to determine relative activity levels and habitat associations in the RSAs.

4.5.2 Results

Unlike boreal wolves that live below the treeline, tundra wolves are not territorial, and they will follow migrating caribou herds. Den site availability appears to be the primary limiting factor for tundra wolves in the NWT. Dens on the tundra are built primarily in eskers, kames, and drumlins. These materials do not have to be extensive, and active wolf dens may be located in slightly raised and well-drained mounds of sand and gravel. During the spring, tundra wolves follow the caribou herds north of the treeline and choose den sites south of the caribou calving grounds (Parker 1973; Heard and Williams 1992). The Project is

not near the calving grounds, and is not predicted to influence the denning habitat for tundra wolves.

Boreal wolves are territorial and prey primarily on caribou and moose, which occur in the RSAs. Boreal wolf habitat preference is likely dependent on optimizing fitness by reducing travel costs, while maintaining potential for encountering prey (Alexander et al. 2005). Boreal wolves prefer open areas and tend to avoid dense coniferous cover in winter (Penner 1976). Wolves use upland areas more often than peatlands, possibly due to a higher density of moose in upland areas (McLoughlin et al. 2005).

Within the proposed mine RSA in 2005, the highest density of wolf tracks was observed in coniferous spruce habitat. Bedrock-open conifer habitat had the next highest density of wolf winter tracks, followed by frozen lake habitat. The limited availability of some habitats in the RSAs constrained the ability to sample burn, coniferous pine, marsh/graminoid fen, shrubland, open bog, and treed fen habitats. Wolf tracks were only recorded in frozen water habitat within the proposed mine RSA in 2009 and in treed fen habitat within the NPAR study areas. Single tracks accounted for 56 % of track observations within the proposed mine RSA and 100 % of track observations within the NPAR RSA. Trails (assumed to have 3 times the activity level of a single track) and networks (assumed to have 5 times the activity level of a single track) accounted for 33% and 11% of track observations within the proposed mine RSA, respectively. Habitat selection for wolf within the proposed mine RSA in 2005 and 2009 and the NPAR in 2005 and 2008 could not be determined since the expected Use in all habitats was less than 5.

The abundance of gray wolves within the RSAs is expected to vary annually and seasonally in response to factors such as prey availability and suitability of den habitat. Wolf sign was found near the north end of Nico Lake in 2003, and wolves were observed during aerial surveys in 2004 and 2005 in the study area. A den may have been present near Nico Lake in 2002; however, it was not found.

Few data exist on wolf response to wildfire and their use of burned areas. Wolf response is likely dependent on the response of prey species to disturbance from fire. In Alaska, wolf density changes were attributed to changes in caribou distribution throughout the study period.

4.6 LYNX

4.6.1 Methods

Lynx tracks were recorded during winter track surveys in 2005, 2008, and 2009 to determine relative activity levels and habitat associations in the RSAs.

4.6.2 Results

Lynx are found throughout the boreal forest of North America. Studies of lynx in the NWT showed that dense deciduous and coniferous forest, shrubland, and meadow habitats were preferred over wetland and open black spruce forests (Poole et al. 1996). Lynx tracks within the proposed mine RSA were found only within coniferous spruce habitat during winter track surveys in 2005. Lynx tracks were only observed in coniferous spruce and treed bog habitats within the proposed mine RSA in 2009. Within the NPAR study area, lynx track densities were the highest on frozen lakes, followed by treed bog and deciduous trembling aspen-paper birch habitats. Lynx tracks were also observed in marsh/graminoid fen, treed fen, and coniferous spruce habitats. However, survey efforts (distance sampled) for several habitats within the RSAs (e.g., burn, coniferous pine, shrubland, and open bog) were constrained by the limited availability of habitats. Habitat preference in the proposed mine RSA in 2005 and 2009 and the NPAR in 2005 and 2008 could not be determined because the number of lynx tracks detected among habitats was not adequate (i.e., expected frequencies of lynx tracks among habitats were less than 5).

Lynx avoid recent burns because there is little vegetation cover for their main prey species, snowshoe hare. Fifteen to 30 year old burns are prime habitat for lynx and snowshoe hare. Lynx populations throughout North America are closely tied to, and lag 1 to 2 years behind, the cyclic fluctuations of snowshoe hare populations. Fires may also create appropriate denning habitat for lynx by creating deadfall and willow thickets.

4.7 WOLVERINE

4.7.1 Methods

Wolverine tracks were recorded during winter track surveys in 2005, 2008, and 2009 to determine relative activity levels and habitat associations in the RSAs.

4.7.2 Results

Wolverines occur primarily where there are large ungulate populations, and wolverine densities appear directly related to the availability of food resources. Wolverine populations generally exhibit low densities, which are likely related to large home range requirements. One wolverine trail (i.e., assumed to have 3 times the activity level of a single track) and 3 tracks were recorded within the proposed mine RSA during winter track surveys in 2009. The trail and 2 tracks were observed in coniferous spruce habitat and one track was recorded in treed fen habitat. A single wolverine track observed within the NPAR study area during the 2008 winter track count survey. This track was found in coniferous spruce habitat. No wolverine sign was observed in the proposed mine or NPAR RSAs in 2005. A wolverine was seen during vegetation surveys on 13 August 2008. The wolverine was observed in coniferous spruce habitat. It is likely that wolverines are present year round in the study area and the surrounding region. Wolverine abundance would be expected to increase during winters when caribou are present in the study area.

No specific habitat component has been identified as being more important than other components for wolverine. Habitat use typically depends on adequate food resources and den site availability. Wolverine dens can vary from simple resting sites to complex natal dens with extensive tunnel networks that are frequently associated with rocky outcrops and deep snowdrifts. Den site requirements for wolverines in the boreal forest are not well understood. The persistence of snow cover at a den site through the spring is an important factor for wolverines throughout their range. Wolverines prefer open, rocky areas for denning and reports of wolverine dens in dense forest stands are rare. The study area includes a number of boulder areas that are potential wolverine denning habitats. However, no dens have been documented within the proposed mine and NPAR RSAs.

No data are available for wolverine response to wildfire; however, it is likely that wolverine will be negatively influenced by wildfire because they avoid early succession habitats (Copeland 1996).

4.8 MARTEN

4.8.1 Methods

Winter track surveys were completed in 2005, 2008, and 2009 to estimate relative activity levels and habitat associations for marten.

4.8.2 Results

Marten have been classified as requiring late-succession forests and are intolerant of habitat types with sparse canopy cover (Buskirk and Ruggiero 1994; Chapin et al. 1997; Smith and Schaefer 2002). Some studies suggest that marten are closely associated with late-succession mesic conifer forests that have complex physical structure near the ground (Buskirk and Ruggiero 1994). However, other studies suggest that requirements of canopy cover and structure near the ground can be met in a variety of habitat types (Chapin et al. 1997).

Marten were the most abundant carnivore species in the study area according to winter track count surveys. Within the proposed mine RSA in 2005, the highest density of marten tracks were found in bedrock-open conifer habitat followed by coniferous spruce and treed bog habitats. Within the proposed mine RSA in 2009, marten tracks had the highest densities in shrubland habitat. Marten tracks were also observed in treed fen, open bog, coniferous spruce, frozen water, burn, and bedrock-open conifer habitats.

High densities of marten tracks were found within coniferous pine and treed fen habitats within the NPAR study area. Marten tracks were also recorded in coniferous spruce, treed bog, deciduous aspen-paper birch, and marsh/graminoid fen habitats within the NPAR study area. However, survey efforts (distance sampled) for several habitats within the RSAs (e.g., burn, coniferous pine, shrubland, and open bog) were constrained by the limited availability of habitats.

Within the proposed mine RSA in 2005, analysis indicated that marten track encounters were statistically different among three habitats. Results suggested that bedrock-open conifer was preferred relative to its availability, while coniferous spruce and frozen lake habitats were avoided. Habitat selection analysis within the proposed mine RSA in 2009 indicated that marten track encounters were statistically different among five habitats. Marten selected coniferous spruce habitat in proportion to its availability, while bedrock-open conifer, burn, frozen water, and treed bog habitats were avoided relative to availability. For the NPAR study area, the frequency of marten track observations was statistically different among 6 habitats. Treed bog habitat was used in proportion to its availability, while marsh/graminoid fen, coniferous spruce, and frozen lake habitats were avoided relative to availability. Coniferous pine and treed fen habitats were preferred by marten relative to availability

Wildfire may provide a mosaic of habitats for marten to use throughout various life stages and provide a high density of microtine prey species. However, burns may not provide adequate denning habitat for marten.

Although there is little information available on denning sites that are preferred by marten, especially in western and northern North America, studies have reported marten to be highly selective of sites used for denning. Marten have separate denning sites for parturition and raising their young with both den types being reported to be found in old-growth forest.

4.9 BEAVER AND MUSKRAT

4.9.1 Methods

In 2003 and 2004, ground and aerial surveys of lakes for beavers and muskrat were completed within the proposed mine and NPAR study areas. In 2005, surveys for aquatic mammals were performed concurrently with aerial surveys for waterbirds within the RSAs, and through ground surveys of the 2 stream crossings along the proposed 50 km NPAR alignment.

4.9.2 Results

A total of 44 beaver lodges (inactive and active) and 8 beavers were observed on waterbodies within the RSAs. Muskrat lodges, feeding platforms, scat, and individuals were observed during ground surveys completed in September 2003. Four observations of muskrat sign were recorded during the aerial survey completed in 2004 and 2005. One muskrat platform was observed along the Marian River in 2005. No beaver or muskrat sign was detected at 3 m Stream for the NPAR, and it is unlikely that these species are present in this stream due to the fast water flow and rocky substrate.

Beaver in the boreal forest may benefit from fire in areas where trembling aspen is an early succession species because they rely on aspen for food and building supplies. However, evidence from a prescribed burn in Alberta suggests that beaver populations may decrease. Wildfire is thought to improve muskrat habitat by maintaining wetland and aquatic edge habitat around wetlands, as well as increasing the amount of herbaceous vegetation that is available in an area.

4.10 BIRDS

4.10.1 Methods

Standard point count surveys (Ralph et al. 1993) were completed to survey for upland birds (passerines, ptarmigan, grouse, and upland breeding shorebirds) from 2005 through 2009. In total, 558 point counts were completed in 10

vegetation types within the LSA and NPAR RSA. However, the number of plots sampled for several habitats within the study area (e.g., coniferous pine, marsh/graminoid fen, open bog, shrubland, and treed fen) was constrained by the limited availability of habitats. Community species density and individual species densities among habitats were estimated using an effective detection radius. Community species richness was determined from birds recorded within 50 m of the observer.

Migrating waterbirds (e.g., loons, grebes, coots, ducks, geese, and terns) were surveyed from the ground at lakes near the bulk sampling site in 2003. In 2004 and 2005, aerial surveys were completed for waterbirds on 119 lakes and on an 8 km segment of the Marian River within the LSA and RSAs. Surveys included all lakes within the LSA and lakes within 1 km of either side of the proposed NPAR. In 2006, 19 transects, each 20 km long, were flown within the proposed mine RSA. Data were used to determine the abundance, distribution, and number of waterbird species occurring and breeding in the RSAs.

The initial identification of raptor nest sites (e.g., falcons, eagles, and hawks) occurred during aerial and ground surveys for other species. Surveys of new and known nest sites occurred in September 2003 and July 2004. From 2005 through 2007 and in 2009, nest sites were visited during early June to determine occupancy, and during mid- to late July or early August to determine nest success and productivity. In 2008, nests were only surveyed in June, as there was a fire burning in the region during July. The nests were monitored through fly-by observations from a helicopter. Nests were considered occupied if at least one adult bird was observed. Eggs were counted if visible and the number of chicks was also recorded. Nests were determined successful if at least one chick was observed in the nest.

4.10.2 Results

The boreal forest provides important areas for bird nesting, breeding, moulting, and staging areas during migration for various species including passerines, shorebirds, raptors, and waterfowl. The spring migration of birds to the NWT usually begins in mid-April to early May and peaks around mid- to late May for many species. Fall migration begins in mid-August for some species such as sandpipers, and continues through to mid-September for late migrants such waterfowl.

A total of 38 upland bird species were identified within survey plots from 2005 to 2009. Lesser yellowlegs, boreal chickadee, blackpoll warbler, and white-throated sparrow are territorial listed species that were observed within the RSAs.

Common nighthawk, olive-sided flycatcher, and rusty blackbird are the only federal listed species that were recorded within the RSAs,

The effective detection radius was calculated to be 53.44 m (i.e., 0.89 ha). Density estimates for species and community analyses determined using the 0.89 ha area. Yellow-rumped warbler had the highest densities in bedrock-open conifer, deciduous aspen-paper birch, and mixedwood spruce-trembling aspen-paper birch habitats. Chipping sparrow was the most abundant species in burn, marsh/graminoid fen, and open bog habitats. Dark-eyed junco had the highest densities in coniferous spruce, treed bog, and treed fen habitats. Northern waterthrush was the most abundant species in shrubland habitat.

Least flycatcher, song sparrow, and pine grosbeak were unique to coniferous spruce habitat. Northern flicker, spruce grouse, and boreal chickadee were only observed in coniferous spruce and mixedwood spruce-trembling aspen-paper birch habitats. Common nighthawk and white-winged crossbill were unique to bedrock-open conifer habitat, while red-winged blackbird was only detected in treed fen habitat. Hairy woodpecker was only observed in mixedwood spruce-trembling aspen-paper birch and treed bog habitats, while rusty blackbird was only detected in shrubland habitat. Western wood-pewee was only observed in marsh/graminoid fen and treed fen habitats, while warbling vireo was only recorded in mixedwood spruce-trembling aspen-paper birch habitat.

Chipping sparrow was the only species recorded in all sampled habitat types. Gray jay was observed in all habitats except for marsh/graminoid fen and open bog habitats. Hermit thrush and orange-crowned warbler were detected in all habitats except for burn and shrubland. Yellow-rumped warbler was not recorded in open bog habitat. However, the number of plots sampled for several habitats within the LSA and NPAR RSA (e.g., marsh/graminoid fen, open bog, shrubland, and treed fen) was constrained by limited availability of habitats.

Observed species richness ranged from 0 to 8 species among habitats, and was highest in shrubland habitat. Species richness was lowest in bedrock-open conifer, deciduous aspen-paper birch, and open bog habitats. However, the number of plots sampled for several habitats within the LSA and NPAR RSA (e.g., marsh/graminoid fen, open bog, shrubland, and treed fen) was constrained by limited availability of habitats. Shrubland habitat had the highest average density of observed birds and deciduous habitat had the lowest average density of observed birds. Density ranged from 0 to 13.65 birds/ha among habitats.

The species accumulation curve for the LSA, using all birds recorded within the sampling radius (i.e., 50 m), did not reach an asymptote. The curve predicted that

38 species (34 - 43 [95 % CI]) would be present in the LSA and NPAR RSA, based on 1121 observed birds. Using all observations recorded during BBS (i.e., fly-overs and birds detected within 100 m) the generated species accumulation curve also did not reach an asymptote. The curve predicted that 44 species (38 – 50 [95 % CI]) would be present in the LSA and NPAR RSA based on 1895 observed birds. These results suggest that survey effort was not adequate to record all birds that may be present within the study area.

Wildfire affects upland breeding bird species by changing the vegetation structure and food sources that are available in forested areas. Fire decreases the amount of live trees and canopy cover that is present in an area, while it increases the amount of shrub and ground cover and the number of snags. Therefore, tree-nesting species would be expected to decrease in abundance after a fire, while shrub-, ground-, snag-, and cavity-nesters may increase in abudance in recently burned areas.

During the fall migration survey in 2003, 5 species of waterbirds were observed within the LSA. Buffleheads were commonly recorded on a number of lakes. An aggregation of scaup, buffleheads, and mallards were observed on Nico Lake. Two flocks of tundra swans were observed flying over Burke Lake. A flock of Canada geese were recorded flying over the proposed mine area.

Surveys completed in 2004 and 2005 identified 23 waterbird species or species groups. Densities of birds within the surveyed area ranged from approximately 0.04 adult/km^2 of water for red-throated loons, American coots, and ruddy ducks to 104 adult scaup/km^2 of water. Total density was 167 adult waterbirds/km^2 of water and 7.5 young/km^2 of water.

Surveys completed in 2006 identified 15 waterbird species or species groups. The most common species or species groups observed from 2004 through 2006 included scaup species, buffleheads, common goldeneye, American wigeon, mallard, Pacific loon, and green-winged teal. The largest groups of scaup were observed on Burke, Hislop, and Rabbit lakes during summer production surveys.

Waterbird surveys from 2004 to 2006 observed a minimum of 25 species distributed throughout the RSAs, and 14 species were identified as producing young. Due to differences in survey methods between 2004/05 and 2006, data collected during 2004 and 2005 were used to generate a waterbird species accumulation curve. Data from 2004 and 2005 generated a species rarefaction curve that did not reach an asymptote. Therefore, the sampling effort was not adequate to estimate species richness in the RSAs.

Runoff and ash deposition from wildfires may change invertebrate community composition and biomass, thereby impacting waterbird populations. Cavity-nesters may be positively influenced by fire since fire can increase woodpecker abundance and number of snags in an area.

Currently, 14 raptor nests have been discovered in the RSAs from 2003 through 2009. All nest sites were identified before 2006. Surveys suggest that occupancy rates of surveyed nests in the RSAs are low. None of the 3 nests found in 2003 appeared to be active that summer, and only 1 of 11 nests surveyed in 2004 was occupied (although nests that had been occupied in the spring and failed, or fledged before the July survey in these 2 years would not have been recorded). Four of the 12 nest sites surveyed in 2005 were occupied by 3 pairs of bald eagles and one pair of peregrine falcons. Surveys completed in 2006 also found a low nest occupancy rate with 3 of the 8 surveyed nests occupied. However, 2007 had the highest nest occupancy rate with 6 out of the 11 surveyed nests occupied. Four of 11 surveyed nests were active in 2008. All identified nests were surveyed in 2009.

The occupied red-tailed hawk nest produced 2 young in 2004. In 2005, 3 of the 4 occupied raptor nests produced 5 chicks, whereas 2 of 3 active nests produced 2 young in 2006. In 2007, 5 of 6 occupied nests produced 12 chicks. Although the July survey in 2008 could not be completed due to a fire in the region, the June survey recorded one chick each in 2 of the 4 occupied nests. Nest RA03, located 1.5 km from the main camp complex, produced 3 peregrine young in 2007. Nest RA04 was occupied by a common raven in 2009 and contained 3 young during the occupancy survey in 13 June 2009. Productivity of this nest was not determined during the 16 July 2009 survey. Nest RA14 was occupied by a bald eagle during the June survey in 2009 and contained two young during the occupancy survey. The productivity of this nest was not assessed during the 16 July 2009 survey.

Wildfire primarily affects raptor species by decreasing nesting habitat and changing prey abundance. Tree-nesting species may decrease in abundace in recently burned areas. Raptor species that consume small birds may also decrease in abundance, while small mammal specialists may increase in abudance, depending on their prey responses to wildfire.

5 REFERENCES

Adamczewski, J.Z., C.C. Gates, R.J. Hudson, and M.A. Price. 1987. Seasonal changes in body composition of mature female caribou and calves (*Rangifer tarandus groenlandicus*) on an Arctic island with limited winter resources. Canadian Journal of Zoology 65:1149-1157.

Alexander, S.M., P.C. Paquet, T.B. Logan, and D.J. Salier. 2005. Snow-tracking versus radiotelemetry for predicting wolf-environment relationships in the Rocky Mountains of Canada. Wildlife Society Bulletin 33(4):1216-1224.

Aleksiuk, M. Hinterland who's who - Muskrat. 1986. Available at http://www.hww.ca/hww2.asp?id=96. Accessed: 11 August 2008.

Allen, A.W. 1983. Habitat suitability index models: Beaver. U.S. Fish and Wildlife Service, FWS/OBS-W10.30 Revised.

Allen, A.W., and R.D. Hoffman. 1984. Habitat suitability index models: Muskrat. U.S. Fish and Wildlife Service, FWS/OBS-82/10.46.

Aubry, K.B., K.S. McKelvey, and J.P. Copeland. 2007. Distribution and broadscale habitat relations of the wolverine in the contiguous United States. Journal of Wildlife Management 71(7):2147–2158.

Ballard, W.B., and V. Van Ballenberghe. 1997. Predator/prey relationships. Pages 247-273 in A. W. Franzmann and C. C. Schwartz, editors. Ecology and Managment of North American Moose. Smithsonian Institute Press, Washington, DC.

Ballard, W.B., P.R. Krausman, S. Boe, S. Cunningham, and H.A. Whitlaw. 2000. Short-term response of gray wolves, *Canis lupis*, to wildfire in Northwestern Alaska. Canadian Field-Naturalist 114(2):241-247.

Banci, V. 1987. Ecology and behaviour of wolverine in Yukon. M.Sc. Thesis. Simon Fraser University, Burnaby, British Columbia.

Banci, V. 1994. Wolverine. Pages 99-127 in L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon and W.J. Zielinski, editors. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the Western United States. General Technical Report RM-254 edition. United States Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Banci, V., and A.S. Harestad. 1990. Home range and habitat use of wolverines *Gulo gulo* in Yukon, Canada. Holarctic Ecology 13(3):195-200.

Banci, V., and S. Moore. 1997. BHP Billiton Diamonds Inc. Lac de Gras, NWT, 1996 Wildlife Studies. Report prepared by Rescan Environmental Services Ltd.

Banfield, A. W.F., and R.D. Jakimchuk. 1980. Analysis of the characteristics and behaviour of barren-ground caribou in Canada. Prepared for the Polar Gas Project, Polar Gas Environmental Program.

Barnes D.M. and A.U. Mallik. 2001. Effects of beaver, *Castor canadensis*, herbivory on streamside vegetation in a northern Ontario watershed. Canadian Field-Naturalist 115:9–21.

Bayne, E. 2009. Personal communication.Assistant Professor, Department of Biology, University of Alberta. Communicated to Craig Machtans, Canadian Wildlife Service..

Beeman, L.E. and M.R. Pelton. 1980. Seasonal foods and feeding ecology of black bears in the Smoky Mountains. International Conference on Bear Research and Management 4:141-147.

Bellrose, F.C. 1950. The relationships of muskrat populations to various marsh and aquatic plants. Journal of Wildlife Management 14(3): 299-315.

Bergerud, A.T. 1975. The reproductive season of Newfoundland caribou. Canadian Journal of Zoology 53:1213-1221.

Bergerud, A.T., R.D. Jakimchuk, and D.R. Carruthers. 1984. The buffalo of the north: Caribou (*Rangifer tarandus*) and human developments. Arctic 37(1):7-22.

BHPB (BHP Billiton Diamonds Inc.). 2004. EKATI Diamond Mine 2003 Wildlife Effects Monitoring Program. Prepared by Golder Associates Ltd. for BHP Billiton Diamonds Inc., Yellowknife, Northwest Territories.

BHPB. 2007. EKATI Diamond Mine 2006 Wildlife Effects Monitoring Program. Prepared by Rescan™ Environmental Services Ltd. for BHP Billiton Diamonds Inc., Yellowknife, Northwest Territories.

Birds of North America Online. 2009. The birds of North America online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu/bna. Accessed: 20 May 2010.

Boulanger, J., K. Poole, B. Fournier, J. Wierzchowski, T. Gaines, and A. Gunn. 2004. Assessment of Bathurst caribou movements and distribution in the Slave Geological Province. Government of the Northwest Territories Manuscript Report 158.

Boulanger, J., K.G. Poole, A. Gunn, and J. Wierzchowski. 2009. The zone of influence for migratory tundra caribou around Canada's Arctic diamond mines: estimation and implications. DRAFT Technical Report.

BQCMB (Beverly and Qamanirjuaq Caribou Management Board). 2008. Facts point to major decline in Beverly Herd. Caribou News in Brief 12(2). Available at: http://www.arctic-caribou.com/news_winter08-09.html#facts. Accessed: 4 January 2009.

BQCMB. 2009. Shrinking Beverly herd goes from bad to worse. Caribou News in Brief 13(1). Available at: http://www.arctic-caribou.com/news_summer2009.html#SHRINKING. Accessed: 4 January 2009.

Brand, C.J., L.B. Keith, and C.A. Fischer. 1976. Lynx responses to changing snowshoe hare densities in central Alberta. Journal of Wildlife Management 40 (2): 416-428.

Brand, C.J., and L.B. Keith. 1979. Lynx demography during a snowshoe hare decline in Alberta. Journal of Wildlife Management 43(3):827-849.

Bromley, M., and L. Buckland. 1995. Biological information for the Slave Geological Province. Report 83. Department of Renewable Resources, Government of the Northwest Territories, Yellowknife, Northwest Territories.

Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. Introduction to distance sampling. Oxford University Press. Oxford, New York.

Buehler, D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*), The birds of North America online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Available from: http://bna.birds.cornell.edu/bna/species/506 Accessed: 14 September 2009.

Bull, E.L., and J.R. Duncan. 1993. Great gray owl (*Strix nebulosa*). The birds of North America online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Available at: http://bna.birds.cornell.edu/bna/species/041. Accessed 14 September 2009.

Bull, E.L., and B.C. Wales. 2001. Effects of disturbance on birds of conservation concern in eastern Oregon and Washington. Northwest Science 75 (Special Issue):166-173.

Burnett, G.W. 1981. Movements and habitat use of the American marten in Glacier National Park, Montana. Missoula, MT. University of Montana. *M.Sc. Thesis*. 130 pp. Cited in Buskirk, S.W. and L.F. Ruggiero. 1994. American marten. U.S. Forest Service General Technical Report GM-254. pp. 7-37.

Burson III, S.L., J.L Belant, K.A. Fortier, and W.C. Tomkiewicz III. 2000. The effect of vehicle traffic on wildlife in Denali National Park. Arctic 53(2): 146-151.

Buskirk, S.W., and L.F. Ruggiero. 1994. American marten. Pages 7-37 General Technical Report GM-254. U.S. Forest Service, .

Byers, C.R., R.K. Steinhorst, and P.R. Krausman. 1984. Clarification of a technique for analysis of utilization-availability data. Journal of Wildlife Management 48(3):1050-1053.

Cameron, R.D., W.T. Smith, S.G. Fancy, K.L. Gerhart, and R.G White. 1993. Calving success of female caribou in relation to body weight. Canadian Journal of Zoology 71:480-486.

Cameron, R.D., W.T. Smith, R.G. White, and B. Griffith. 2005. Central Arctic caribou and petroleum development: distributional, nutritional, and reproductive implications. Arctic 58(1): 1-9.

Campbell, V. and C. Strobeck. 2006. Fine-scale genetic structure and dispersal in Canada lynx (*Lynx canadensis*) within Alberta, Canada. Canadian Journal of Zoology 84(8):1112-1119.

Carriere, S. 2005. Personal Communication. November 16, 2005.

Case, R., L. Buckland, and M. Williams. 1996. The status and management of the Bathurst caribou herd, Northwest Territories, Canada. Government of the Northwest Territories File Report 116:34-34.

Chapin, T.G., D.J. Harrison, and D.M. Phillips. 1997. Seasonal habitat selection by marten in an untrapped forest preserve. Journal of Wildlife Management 61(3):707-717.

Cluff, H.D., L.R. Walton, and P.C. Paquet. 2002. Movements and habitat use of wolves denning in the Central Arctic, Northwest Territories and Nunavut, Canada. Final report to the West Kitikmeot/Slave Study Society. Yellowknife, Northwest Territories.

Collins W.B., and D. J. Helm. 1997. Moose, *Alces alces*, habitat relative to riparian succession in the boreal forest, Susitna River, Alaska. Canadian Field-Naturalist 111:567–574.

Colwell, R.K. 2006. EstimateS: Statistical estimation of species richness and shared species from samples. Version 8.0 edition. Available at: http://purl.oclc.org/estimates.

Copeland, J.P. 1996. Biology of the wolverine in central Idaho. *M.Sc. Thesis*. University of Idaho, Boise, Idaho.

Copeland, J.P., J.M. Peek, C.R. Groves, W.E. Melquist, K.S. McKelvey, G.W. McDaniel, C.D. Long, and C.E. Harris. 2007. Seasonal habitat associations of the wolverine in central Idaho. Journal of Wildlife Management 71:2201–2212.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2003. COSEWIC Assessment and Update Status Report on the Wolverine *Gulo gulo* in Canada. Canadian Species at Risk. Ottawa, Ontario.

COSEWIC. 2009. Database of wildlife species assessed by COSEWIC. Available from: http://www.cosewic.gc.ca/eng/sct1/searchform_e.cfm. Accessed: 30 July 2009.

Costello, M.J., G. Pohle, and A. Martin. 2004. Evaluating biodiversity in marine environmental assessments. Canadian Environmental Assessment Agency Research and Development Monograph Series. Available from http://www.ceaa.gc.ca/015/001/019/title_e.htm. Accessed: 9 December 2008.

Courtois, R., J.P. Ouellet, L. Breton, A. Gringas, and C. Dussault. 2007. Effects of forest disturbance on density, space use, and mortality of woodland caribou. Ecoscience 14(4):491-498.

Cox, G.W. 1990. Measurement of species diversity, laboratory manual of general ecology. Sixth Edition edition. William C. Brown Publishers, Dubuque, Iowa.

Craighead, F.C.J., and D.P. Mindell. 1981. Nesting raptors in western Wyoming, 1947 and 1975. Journal of Wildlife Management 45:865-872.

Curatolo, J.A. 1975. Factors influencing local movements and behaviour of barren-ground caribou (*Rangifer tarandus granti*). *M.Sc. Thesis*. University of Alaska, Fairbanks, Alaska.

Dalerum, F., S. Boutin, and J.S. Dunford. 2007. Wildfire effects on home range size and fidelity of boreal caribou in Alberta, Canada. Canadian Journal of Zoology 85:26–32

Danell, K. 1978. Intra- and interannual changes in habitat selection by the muskrat. Journal of Wildlife Management 42(3): 540-9.

DDMI (Diavik Diamond Mines Inc.). 1998. Environmental Effects Report, Wildlife. Prepared by Axys Environmental Consulting Ltd. And Penner Associates Ltd. for Diavik Diamond Mines Inc.

DDMI. 2007. 2006 Wildlife Monitoring Report. March 2007. Prepared by Diavik Diamond Mines Inc.

De Beers. 2002. Snap Lake Diamond Project Environmental Assessment Report. February 2002. Prepared for De Beers Canada Mining Inc. by Golder Associates Ltd., Yellowknife, Northwest Territories.

De Beers. 2007. Snap Lake Project Wildlife Effects Monitoring Program. 2006 Annual Report. Prepared for De Beers Canada Inc. by Golder Associates Ltd., Yellowknife, Northwest Territories.

Demarais, S., and P.R. Krebs. 2000. Ecology and management of large mammals in North America. Prentice-Hall Inc, Upper Saddle River, N.J.

Dogrib Treaty 11 Council. 2001. Caribou Migration and the state of their habitat. Final Report to the West Kitikmeot Slave Study Society. Yellowknife, Northwest Territories.

Dunford, J.S. 2003. Woodland caribou-wildfire relationships in Northern Alberta. M.Sc. Thesis. Department of Biological Sciences, University of Alberta, Edmonton, Alberta. 125p.

Dzus, E. 2001. Status of woodland caribou (*Rangifer tarandus caribou*) in Alberta Alberta Environment, Edmonton, Alberta. 30 p.

Ecosystem Classification Working Group. 2008. Ecological Regions of the Northwest Territories - Taiga Shield. Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT, Canada. viii + 146 p. + insert map.

Ecosystem Classification Working Group. 2007. Ecological Regions of the Northwest Territories - Taiga Plains. Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT, Canada. vii + 209 p. + insert map.

Edmonds, E.J., and M. Bloomfield. 1984. A study of woodland caribou (*Rangifer tarandus caribou*) in west central Alberta, 1979 to 1983. Alberta Energy and Natural Resources, Fish and Wildlife Division, Edmonton, AB.

Edmonds, E.J., and K.G. Smith. 1991. Mountain caribou calf production and survival, and calving and summer habitat use in west-central Alberta. Wildlife Research Series No. 4. Alberta Fish and Wildlife Division, Edmonton, AB.

Elmberg, J. K. Sjoberg, H. Poysa, and P. Nummi. 2000. Abundance-distribution relationships on interacting trophic levels: the case of lake-nesting waterfowl and dytiscid water beetles. Journal of Biogeography 27:821-827.

ENR (Environment and Natural Resources). 2009. Press release on the 2009 population estimates for the Bathurst caribou herd. Available from: http://www.cbc.ca/canada/north/story/2009/09/24/nwt-bathurst-caribou.html Accessed: 25 September 2009.

ENR. 2010. Interim Emergency Measures Conserving the Bathurst Caribou Herd. Available from: http://www.enr.gov.nt.ca/_live/documents/documentManagerUpload/Interim_Emergency_Conservation_Measures.pdf. Accessed: April 8, 2010.

Environment Canada. 2008. Scientific review for the identification of critical habitat for woodland caribou (*Rangifer tarandus caribou*), boreal population, in Canada. Environment Canada, Ottawa, Ontario. 252 p.

Fancy, S.G., L.F. Pank, K.R. Whitten, and W.L. Regelin. 1989. Seasonal movements of caribou in Arctic Alaska as determined by satellite. Canadian Journal of Zoology 67:644-650.

Ferguson, M.A.D., and F. Messier. 2000. Mass emigration of Arctic tundra caribou from a traditional winter range: Population dynamics and physical condition. Journal of Wildlife Management 64:168-178.

Fisher J.T. and L. Wilkinson. 2005. The response of mammals to forest fire and timber harvest in the North American boreal forest. Mammal Review 35:51–81.

Fisher, J. T., L. D. Roy, and M. Hiltz. 2009. Barren-ground caribou management in the Northwest Territories: An independent peer review. Alberta Research Council, Sustainable Ecosystems Unit, Ecological Conservation Management Program. Vegreville, Alberta. 53 p.

Fleck, E.S., and A. Gunn. 1982. Characteristics of three barren-ground caribou calving ground in the Northwest Territories. Progress Report 7. NWT Wildlife Service, Yellowknife, N.W.T.

Fortune Minerals (Fortune Minerals Limited). 1998. Environmental Scoping for Fortune Minerals' NICO and Sue-Dianne Properties. Prepared for Fortune Minerals Ltd. by Golder Associates Ltd.

Fortune Minerals. 2003. Heritage Resources Impact Assessment, Fortune Minerals NICO Gold Prospect Northwest Territories, Archaeologists Permit #2003-942. Prepared for Fortune Minerals Ltd. by Golder Associates Ltd.

Fortune Minerals. 2004. 2003 Environmental Surveys at Fortune Minerals' NICO Property. Prepared for Fortune Minerals Ltd. by Golder Associates Ltd.

Fortune Minerals. 2005. Environmental Surveys at Fortune Minerals Limited NICO deposit, 1998-2004. Prepared for Fortune Minerals Ltd. by Golder Associates Ltd.

Fortune Minerals. 2006. Terrestrial Baseline Studies for Fortune Mineral's NICO Project, NWT 2003-2005. Prepared for Fortune Minerals Ltd. by Golder Associates Ltd.

Fuller, T.K., and L.B Keith. 1980. Wolf population dynamics and prey relationships in northeastern Alberta. Journal of Wildlife Management 44 (3): 583-602.

Fuller, T.K., and L.B. Keith. 1981. Woodland caribou population dynamics in northeastern Alberta. Journal of Wildlife Management 45:197-213.

Gardner, C.L. 1985. The ecology of wolverines in Southcentral Alaska. *M.Sc. Thesis*. University of Alaska, Fairbanks, Alaska.

Gasaway W.C., S.D. Dubois, R.D. Boertje, D.J. Reed, and D.T. Simpson. 1989. Response of radio-collared moose to a large burn in central Alaska. Canadian Journal of Zoology 67:325–329.

Gasaway, W.C., R.D. Boertje, D.V. Grangaard, D.G. Kelleyhouse, R.O. Stephenson, and D.G. Larsen. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. Wildlife Monographs 120: 3-59

Golder. (Golder Associates Ltd.). 2008a. Analysis of environmental effects from the Diavik Diamond Mine on wildlife in the Lac de Gras region. Submitted to Diavik Diamond Mines Inc., Yellowknife, NT.

Golder. 2008b. Snap Lake Mine: Analysis of Environmental Effects on Wildlife 1999 to 2007. Prepared by Golder Associates Ltd. for De Beers Canada Ltd, Yellowknife, NT.

Golder. 2010. Report on traditional land use baseline for the proposed NICO project. Submitted to Fortune Minerlas Limited, London, ON. 30 p

Gotelli, N., and R.K. Colwell. 2001. Quantifying biodiversity: Procedures and pitfalls in the measurement and comparison of species richness. Ecology Letters 4:379-391.

Graber, D.M. and M. White. 1983. Black bear food habits in Yosemite National Park International Conference on Bear Research and Management 5:1-10

Gunn, A. 1984a. A Review of research on the effects of human activities on barren-ground caribou of the Beverly and Kaminuriak herds, Northwest Territories. File Report No. 43. NWT Wildlife Service, Yellowknife, N.W.T.

Gunn, A. 1984b. Sex and age composition of the Beverly herd of barren-ground caribou in the fall of 1981 and 1982. File Report No. 40. N.W.T. Wildlife Service, Yellowknife, N.W.T.

Gunn, A. 2009. Facing a future of change: Wild migratory caribou and reindeer. Arctic 62(3) iii-vi.

Gunn, A., R. Glaholt, F.L. Miller, and K. Jingfors. 1983. Caribou behaviour, range use patterns and short term responses to helicopter landings on the Beverly calving ground, NWT, 1982. File Report No. 30. NWT Wildlife Service, Government of the Northwest Territories., Yellowknife, N.W.T.

Gunn, A., J. Dragon, and J. Boulanger. 2002. Seasonal movements of satellite-collared caribou from the Bathurst herd. Final Report to the West Kitikmeot Slave Study Society.

Gunn, A., B. Griffith, G. Kofinas, and D. Russell. 2001. Cumulative impacts and the Bathurst caribou herd: Proposed tools for assessing the effects. Contract report. Department of Indian Affairs and Northern Development..

Hamer D. 1996. Buffaloberry, *Shepherdia canadensis* (L) Nutt, fruit production in fire-successional bear feeding sites. Journal of Range Management 49:520–529.

Haney, A., S. Apfelbaum, and J.M. Burris. 2008. Thirty years of post-fire succession in a southern boreal forest bird community. American Midland Naturalist 159:421-433.

Hash, H.S. 1987. Wolverine. in M. Novak, J. A. Baker, M. E. Obbard and B. Malloch, editors. Wild furbearer management and conservation in North America. Chapter 36 edition. Ontario Trappers Association and Ontario Ministry of Natural Resources.

Haszard, S. and R.G. Clark. 2007. Wetland use by white-winged scoters (*Melanitta fusca*) in the Mackenzie Delta Region. Wetlands 27(4):855-863.

Hatler, D.F. 1989. A wolverine management strategy for British Columbia. Wildlife Bulletin ISSN 0829-9560 no. B-60,. Wildlife Branch, Ministry of Environment, Victoria, British Columbia.

Heard, D.C., and G.W. Calef. 1986. Population dynamics of the Kaminuriak caribou herd, 1968-1985. Rangifer Special Issue 1:159-166.

Heard, D.C., and T.M. Williams. 1992. Distribution of wolf dens on migratory caribou ranges in the Northwest Territories, Canada. Canadian Journal of Zoology 70(8):1504-1510.

Helle, T., and L. Tarvainen. 1984. Effects of insect harassment on weight gain and survival in reindeer (*Rangifer tarandus*) calves. Rangifer 4:24-27.

Hood G.A., S.E. Bayley, and W. Olson. 2007. Effects of prescribed fire on habitat of beaver (*Castor canadensis*) in Elk Island National Park, Canada. Forest Ecology Management 239:200–209.

Hornocker, M.G., and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Canadian Journal of Zoology 59:1286-1301.

Hornung, J.P. 2005. Invertebrate community structure in relation to the foraging ecology of mallard and bufflehead ducklings in western Canada. Ph.D. Dissertation. Department of Renewable Resources, University of Alberta, Edmonton, Alberta.

Jackson, J.A. and H.R. Ouellet. 2002. Downy woodpecker (*Picoides pubescens*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu/bna/species/613. Accessed January 4, 2009.

Jackson, J.A., H.R. Ouellet, and B.J. Jackson. 2002. Hairy Woodpecker (*Picoides villosus*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu/bna/species/702. Accessed 4 January 2009.

James, A.R.C., and A.K. Stuart-Smith. 2000. Distribution of caribou and wolves in relation to linear corridors. Journal of Wildlife Management 64(1):154-159.

Jandt, R., K. Joly, C.R. Meyers, and C. Racine. 2008. Slow recovery of lichen on burned caribou winter range in Alaska tundra: potential influences of climate warming and other disturbance factors. Arctic, Antarctic, and Alpine Research 40(1):89-95.

Jędrzejewski, W., K. Schmidt, J. Theuerkauf, B. Jędrzejewska, and R. Kowalczyk. 2007. Territory size of wolves *Canis lupus*: linking local (Białowieża Primeval Forest, Poland) and Holarctic-scale patterns. Ecography 30: 66-76.

Johnson, C.J., M.S. Boyce, R.L. Case, H.D. Cluff, R.J. Gau, A. Gunn, and R. Mulders. 2005. Cumulative effects of human developments on Arctic wildlife. Wildlife Monographs 160:1-36.

Joly, K., B.W. Dale, W.B. Collins, and L. Adams. 2003. Winter habitat use by female caribou in relation to wildland fires in interior Alaska. Canadian Journal of Zoology 81(7):1192–1201

Joly, K., P. Bente, and J. Dau. 2007. Response of overwintering caribou to burned habitat in northwest Alaska. Arctic 60(4):401-410.

Keith, L.B. 1993. Hinterland Who's Who - Canada Lynx. Available from http://www.hww.ca/hww2.asp?id=84. Accessed August 2008.

Kelsall, J.P. 1968. The migratory barren-ground caribou of Canada. Department of Indian Affairs and Northern Development, Ottawa, Ontario.

Kelsall J.P., E.S. Telfer, and T.D. Wright. 1977. The effects of fire on the ecology of the boreal forest, with particular reference to the Canadian north: a review and selected bibliography. Canadian Wildlife Service Occasional Paper Number 32, Ottawa: Canadian Wildlife Service.

Kendrick, A., P.O. Lyver, and LKDFN. 2005. Denésoliné (Chipewyan) knowledge of barren-ground caribou (*Rangifer tarandus groenlandicus*) movements. Arctic 58:175-191.

Kennedy, P. L. 1980. Raptor baseline studies in energy development. Wildlife Society Bulletin 8:129-135.

Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in North Central Washington. Canadian Journal of Zoology 68:845–51.

Korschren, C.E., and R.B. Dahlgren. 1992. Human Disturbances of waterfowl: causes, effects, and management. fish and wildlife leaflet 13. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Krebs, J.A., and D. Lewis. 2000. Wolverine ecology and habitat use in the North Columbia Mountains: Progress Report. Pages 695-703 in L. M. Darling, editor. Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk, Kamloops, B.C., 15-19 February, 1999. Volume Two. edition. B.C. Ministry of Environment, Lands and Parks and University College of the Caribou, Kamloops, British Columbia.

Kuyt, E. 1972. Food habits and ecology of wolves on the barren-ground caribou range in the Northwest Territories. Canadian Wildlife Service Report Series 21:1-36.

Landa, A., O. Strand, J. D. C. Linnell, and T. Skogland. 1998. Home-range sizes and altitude selection for Arctic foxes and wolverines in an alpine environment. Canadian Journal of Zoology 76(3):448-457.

Lariviére, S. 2001. *Ursus americanus.* Mammalian Species 647:1-11.

Latour, P.B., N. Maclean, and K.G. Poole. 1994. Movements of martens, *Martes americana*, in burned and unburned taiga in the Mackenzie Valley, Northwest Territories. Canadian Field-Naturalist 108:351-354

Linnell, J.D.C., J.E. Swenson, R. Andersen, and B. Barnes. 2000. How vulnerable are denning bears to disturbance? Wildlife Society Bulletin 28(2): 400-413.

LKDFN (Łutsel K'e Dene First Nation), M. Drybones, N. Drybones, J. Catholique, V. Desjardans, H. Lockheart, P. Marlowe, A. Michel, J. Michel, J. B. Rabesca, M. Catholique, B. Parlee, B. Catholique, and L. Catholique. 1999. Habitats and Wildlife of Gahcho Kué and Katth'I Nene. Final Report. Submitted to the WKSS.

LKDFN, S. Ellis, B. Parlee, B. Catholique, H. Catholique, M. Michel, and S. Catholique. 2001. Traditional Knowledge in the Nâ Yaghe Kué Region: An Assessment of the Snap Lake Project. Final Assessment Report. Submitted to De Beers Canada Mining Inc.

Lofroth, E. C. 2001. Wolverine ecology in plateau and foothill landscapes, 1996-2001. 2000/01 Year end report, Northern Wolverine Project. Forest Renewal Activity No. 712260. Ministry of Environment, Lands and Parks, Victoria, British Columbia.

Łutsel K'e Dene Elders and Land-Users, S. Ellis, B. Catholique, S. Desjarlais, B. Catholique, H. Catholique, M. Basil, N. Casaway, S. Catholique, and J. Lockhart. 2002. Traditional Knowledge in the Kache Tué Study Region: Phase Three – Towards a Comprehensive Environmental Monitoring Program in the Kakinÿne Region. Final Report. Submitted to the WKSS.

Łutsel K'e Dene Elders and Land-Users, S. Ellis, E. Marlowe, M. Catholique, G. Enzoe, D. Enzoe, S. Desjarlais, H. Basil, R. Enzoe, J. Isadore, N. Casaway, T. Enzoe, S. Catholique, and J. Lockhart. 2003. Ni hat'ni Watching the Land: Results and Implications of 2002-2003 Monitoring Activities in the Traditional Territory of the Łutsel K'e Denesoline. Final Report – Complete. Submitted to the WKSS, Walter and Duncan Gordon Foundation.

Mace, G.M., P.H. Harvey, and T.H. Clutton-Brock. 1984. Vertebrate hone-range size and energetic requirements. Pages 32-53 in J. R. Swingland and P. J. Greenwood, editors. The Ecology of Animal Movement. Oxford University Press, Oxford, United Kingdom.

MacCracken J.G. and L.A. Viereck. 1990. Browse regrowth and use by moose after fire in interior Alaska. Northwest Scientist 64:11–18.

Magoun, A.J. 1987. Summer and winter diets of wolverines, *Gulo gulo*, in Arctic Alaska. Canadian Field-Naturalist 101:392-397.

Magoun, A.J., and J.P. Copeland. 1998. Characteristics of wolverine reproductive den sites. Journal of Wildlife Management 62(4):1313-1321.

Magurran, A.E. 1988. Ecological diversity and its measurement. Princeton University Press, Princeton, New Jersey.

Maier J.A.K., J.M. Ver Hoef, A.D McGuire, R.T. Bowyer, L. Saperstein, and H.A. Maier. 2005. Distribution and density of moose in relation to landscape characteristics: effects of scale. Canadian Journal of Forest Research 35:2233–2243.

Manly, B. F. J., L. L. McDonald, D. L. Thomas, T. L. McDonald, and W. P. Erickson. 2002. Resource selection by animals: statistical design and analysis for field studies. 2nd ed. Kluwer Academic Publishers, Norwell, Massachussets.

Mantla, J. 2003. Personal Communication. Communicated to Adam Smith of Golder Associates Ltd., Fortune Minerals NICO Property, 14 September 2003.

McLoughlin, P.D., L.R. Walton, H.D. Cluff, P.C. Paquet, and M.A. Ramsay. 2004. Hierarchical habitat selection by tundra wolves. Journal of Mammalogy 85(3):576-580.

McLoughlin, P.D., J.S. Dunford, and S. Boutin. 2005. Relating predation mortality to broad-scale habitat selection. Journal of Animal Ecology 74: 701-707.

Mech, L.D., and J.D. Packard. 1990. Possible use of wolf, *Canis lupus*, den over several centuries. Canadian Field-Naturalist 104:484-485.

Mech, L.D.; Rogers, L.L. 1977. Status, distribution, and movements of martens in northeastern Minnesota. Res. Pap. NE-143. Radnor, PA: U.S. Depart-ment of Agriculture, Northern Forest Experiment Station. 7 p. Cited in Buskirk, S.W. and L.F. Ruggiero. 1994. American marten. U.S. Forest Service General Technical Report GM-254. pp. 7-37.

Messier, F., J. Huot, D.L. Hanaff, and S. Luttich. 1988. Demography of the George River caribou herd: Evidence of population regulation by forage exploitation and range expansion. Arctic 41:279-287.

Miller, F.L. 1976. Biology of the Kaminuriak population of barren-ground caribou. Canadian Wildlife Service Report Series. No. 36.

Miller, F.L. 1992. Hinterland Who's Who – Caribou. Available from http://www.hww.ca/hww2.asp?id=85. Accessed 31 July 2008.

Miramar (Miramar Hope Bay Ltd.). 2005. Final Environmental Impact Statement, Doris North Project, Nunavut, Canada. Miramar Hope Bay Ltd.

Miramar. 2007. Doris North Gold Mine Project. Wildlife Mitigation and Monitoring Program. 2007 Annual Report. Prepared by Golder Associates Ltd. for Miramar Hope Bay Ltd.

Mowat, G. and B. Slough. 2003. Habitat preference of Canada lynx through a cycle in snowshoe hare abundance. Canadian Journal of Zoology 81: 1736-1745.

Mueller, F. P. 1995. Tundra esker systems and denning by grizzly bears, Wolves, Foxes, and Ground Squirrels in the Central Arctic. File Report No. 115. Northwest Territories. Department of Renewable Resources. Government of the Northwest Territories, Yellowknife, Northwest Territories.

Musiani, M., J.A. Leonard, H.D. Cluff, C.C. Gates, S. Mariani, P.C. Paquet, C. Vila, and R.K. Wayne. 2007. Differentation of tundra/taiga and boreal coniferous forest wolves: Genetics, coat colour, and association with migratory caribou. Molecular Ecology 16:4149-4170.

MVRB (Mackenzie Valley Environment Impact Review Board). 2008. Revised Draft Review Board Guidelines for Considering Wildlife at Risk (including SARA Species) in Environmental Impact Assessment in the Mackenzie Valley. Mackenzie Valley Environment Impact Review Board, Yellowknife, NT.

Nelson, J.L., E.S. Zavaleta, and F.S. Chapin III. 2008 Boreal fire effects on subsistence resources in Alaska and adjacent Canada. Ecosystems 11:156–171.

Nellis, C.H., S.P. Wetmore, and L.B. Keith. 1972. Lynx-prey interactions in central Alberta. Journal of Wildlife Management 36(2):320-329.

Neu, C.W., C.R. Byers, and J.M. Peek. 1974. A technique for analysis of utilization-availability data. Journal of Wildlife Management 38(3):541-545.

Nitsche, K.A. 2001. Behaviour of beavers (*Castor fiber albicus* Matschie, 1907) during the flood periods. In A. Czech, G. Schwab editors. Proceedings of the Second European Beaver Symposium, Bialowieza, Poland, September 2000., Krakow, Poland: Heritage Society.

Norris, D.R., M.T. Theberge, and J.B. Theberge. 2002. Forest composition around wolf (*Canis lupus*) dens in eastern Algonquin Provincial Park, Ontario. Canadian Journal of Zoology 80(5): 866-872

NSMA (North Slave Metis Alliance). 1999. Can't Live Without Work: A Companion to the Comprehensive Study Report on the Diavik Diamonds Project. Available from http://www.ngps.nt.ca/Upload/Interveners/North%20Slave%20Metis%20Alliance/061128_NSMA_Submission_withoutwork.pdf . Accessed:31 July 2008.

NWT General Status Ranking Program. 2009. NWT Species Monitoring Infobase. Environment and Natural Resources, GNWT, Yellowknife, NWT. Available from: http://www.enr.gov.nt.ca/_live/pages/wpPages/Infobase.aspx. Accessed: 12 November 2009.

O'Donoghue, M., S. Boutin, C.J. Krebs, and E.J. Hoffer. 1997. Numerical responses of coyotes and lynx to the snowshoe hare cycle. Oikos 80(1): 150-162.

Osko, T.J., M.N. Hiltz, R.J. Hudson, and S.M. Wasel. 2004. Moose habitat preferences in response to changing availability. Journal of Wildlife Management 68(3):576-584.

Paragi T.F., W.N. Johnson, D.D. Katnik, and A.J. Magoun. 1996. Marten selection of postfire seres in the Alaskan taiga. Canadian Journal of Zoology 74:2226–37.

Parker, G.R. 1973. Distribution and densities of wolves within barren-ground caribou range in northern mainland Canada. Journal of Mammalogy 54:341-348.

Parker, H., F. Rosell, and A. Mysterud. 2006. Harvesting of males delays female breeding in a socially monogamous mammal: the beaver. Biology Letters 3: 106-108.

Patton, K.A. 2002. Ducks Unlimited Canada Western Boreal Forest Program Aerial Waterbird Survey Protocols. Ducks Unlimited Canada Internal Report. Edmonton, Alberta.

Pelchat, B.O. and R.L. Ruff. 1986. Habitat and spatial relationships of black bears in boreal mixedwood forest of Alberta. International Conference on Bear Research and Management 6:81-92.

Penner, D.F. 1976. Preliminary baseline investigations of furbearing and ungulate mammals using lease no. 17. Environmental Resources Monographs 1976-3. Syncrude Canada Ltd., Edmonton, Alberta.

Poole, K.G. 1994. Characteristics of an unharvested lynx population during a snowshoe hare decline. Journal of Wildlife Management 58(4):608-618.

Poole, K.G. 1995. Spatial organization of a lynx population. Canadian Journal of Zoology 73: 632-641.

Poole, K.G., L.A. Wakelyn, and P.N. Nicklen. 1996. Habitat selection by lynx in the Northwest Territories. Canadian Journal of Zoology **74**(5):845-850.

Poole, K.G., and R.P. Graf. 1996. Winter diet of marten during a snowshoe hare decline. Canadian Journal of Zoology 74:456-466.

Poole, K., and A.K. Stuart-Smith. 2003. Winter habitat selection by moose in the East Kootenay, BC: Final Report. Prepared for Tembec Industries Inc. Aurora Wildlife Research, Nelson, British Columbia.

Post, E., and D.R. Klein. 1999. Caribou calf production and seasonal range quality during a population decline. Journal of Wildlife Management 63:335-345.

Preston, C.R. and R.D. Beane. 2009. Red-tailed hawk (*Buteo jamacensis*), the birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Available from: http://bna.birds.cornell.edu/bna/species/052 Accessed: 14 September 2009.

Pruitt, W.O.J. 1960. Behaviour of the Barren-ground Caribou. Biological Papers 3. University of Alaska, Fairbanks, Alaska. 44 p.

Raine, R.M. and J.L. Kansas. 1989. Black bear seasonal food habits and distribution by elevation in Banff National Park, Alberta. International Conference on Bear Research and Management 8:297-304.

Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. Handbook of field methods for monitoring landbirds. General Technical Report PSW-GTR-144. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, California.

Rednecker, L.A. 1987. Bioenergetics and behaviour of moose (*Alces alces*) in the aspen-dominated boreal forest. *Ph.D. Thesis.* University of Alberta, Edmonton, Alberta.

Reimers, E. 1983. Reproduction in wild reindeer in Norway. Canadian Journal of Zoology 61:211-217.

Risenhoover, K. L. 1986. Winter activity patterns of moose in interior Alaska. Journal of Wildlife Management 50:727-734.

Ruggiero, L.F., E. Pearson, and S.E. Henry. 1998. Characteristics of American marten den sites in Wyoming. Journal of Wildlife Management 62(2):663-673.

Russell, D.E., A.M. Martell, and W.A.C. Nixon. 1998. Range ecology of the Porcupine caribou herd. Rangifer Special Issue 8.

Russell, R.E., J.A. Royle, V.A. Saab, J.F. Lehmkuhl, W.M. Block, and J.R. Sauer. 2009. Modeling the effects of environmental disturbance on wildlife communities: Avian responses to prescribed fire. Ecological Applications 19(5):1253-1263.

SARA (*Species at Risk Act*). 2009. c. 29. Government of Canada.

SARPR. 2009. Species At Risk Public Registry. Government of Canada. Available from http://www.sararegistry.gc.ca/default_e.cfm. Accessed 12 November 2009.

Schaefer, J.A., and Pruitt, W.O., Jr. 1991. Fire and woodland caribou in southeastern Manitoba. Wildlife Monographs 116: 1–39.

Schaefer, J. A., and S. P. Mahoney. 2007. Effects of progressive clearcut loggin on Newfoundland caribou. Journal of Wildlife Management **71**(6):1753-1757.

Schwartz C.C., and A.W. Franzmann. 1989. Bears, wolves, moose and forest succession; some management considerations on the Kenai Peninsula. Alces 25:1–10.

Schwartz C.C., and A.W. Franzmann. 1990. Interrelationship of black bears to moose and forest succession in the Northern coniferous forest. Wildlife Monographs 113:1–58.

Schwartz, C.C., and A.W. Franzmann. 1991. Interrelationship of black bears to moose and forest succession in the northern coniferous forest. Wildlife Monographs 113: 3-58

Schwartz, C.C. and A.W. Franzmann. 1992. Dispersal and survival of subadult black bears from the Kenai Peninsula, Alaska. Journal of Wildlife Management 56(3):426-431.

Shank, C.C., R G. Bromley, and K.G. Poole. 1993. Increase in breeding population of tundra peregrine falcons in the central Canadian Arctic. Wilson Bulletin 105:188-190.

Shell Canada (Shell Canada Ltd.). 2007. Terrestrial Assessment for the Jackpine Mine Expansion and Pierre River Mine Project Report. Prepared for Shell Canada Limited.

Skogland, T. 1984. The effects of food and maternal conditions on fetal growth and size in wild reindeer. Rangifer 4:39-46.

Skogland, T. 1990. Density dependence in a fluctuating wild reindeer herd: Maternal vs. offspring effects. Oecologia 84:442-450.

Skoog, R.O. 1986. Ecology of the Caribou (*Rangifer tarandus granti*) in Alaska. *Ph.D. Thesis*. University of California, Berkeley, California.

Slough, B.G., and R.M.F.S. Sadleir. 1977. A land capability classification for beaver (*Castor canadensis* Kuhl). Canadian Journal of Zoology 55:1324–35.

Slough, G., and G. Mowat. 1996. Lynx population dynamics in an untrapped refugium. Journal of Wildlife Management 60: 946–961.

Sly, P.G., L. Little, R. Freeman, and J. McCullum. 2001. Updated state of knowledge report of the West Kitikmeot and Slave Geological Province. Final Report. Yellowknife, Northwest Territories.

Smith, A.C., and J.A. Schaefer. 2002. Home-range size and habitat selection by American marten (*Martes americana*) in Labrador. Canadian Journal of Zoology 80:1602-1609.

Sorenson, T. P. D. McLoughlin, D. Hervieux, E. Dzus, J. Nolan, B. Wynes, and S. Boutin. 2008. Determining sustainable levels of cumulative effects for boreal caribou. Journal of Wildlife Management **72**(4):900-905.

Soutiere, E.C. 1979. Effects of timber harvesting on marten in Maine. Journal of Wildlife Management 43:850-860.

SpatialEcology.com. 2009.Hawth's Analysis Tools for GIS. Available from: http://www.spatialecology.com/. Accessed July 30, 2009.

Stelfox, J.B. 1993. Hoofed Mammals of Alberta. Lone Pine Publishing, Edmonton, Alberta.

Stenhouse, G.B., P.B. Latour, N. Kutny, N. MacLean, and G. Glover. 1994. Productivity, survival, and movements of female moose in a low-density population, Northwest Territories, Canada. Arctic 48(1):57-62.

Stephenson, R.O., and D. James. 1982. Wolf movements and food habits in Northwest Alaska. Pages 26-42 in F. H. Harrington and P. C. Paquet, editors. Wolves of the World: Perspectives of Behaviour, Ecology, and Conservation. Noyes Publications, Park Ridge, New Jersey.

Strickland, M.A., C.W. Douglas, M. Novak, and N.P. Hunziger. 1982. Fisher Martes pennati. Pages 586-598 in J. A. Chapman and G. A. Feldhamer, eds. Wild mammals of North America: biology, management, and economics. Johns Hopkins University Press, Baltimore, Maryland.

Stuart-Smith, A.K., C.J.A. Bradshaw, S. Boutin, D.M. Hebert, and A.B. Rippin. 1997. Woodland caribou relative to landscape patterns in northeastern Alberta. Journal of Wildlife Management 61:622-633.

Sutherland, M., and A. Gunn. 1996. Bathurst calving ground surveys 1965 – 1996. 118. Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, Yellowknife, N.W.T.

Theuerkauf, J., S. Rouys, W. Jedrzejewski. 2003. Selection of den, rendezvous, and resting sites by wolves in the Bialowieza Forest, Poland. Canadian Journal of Zoology 81(1):163-167.

Thomas, D.L., and E.J. Taylor. 1990. Study designs and tests for comparing resource use and availability. Journal of Wildlife Management 54(2):322-330.

Thompson, D.C., and K.H. McCourt. 1981. Seasonal diets of the Porcupine caribou herd. American Midland Naturalist 105(1):70-76.

Thompson, I.D., and P.W. Colgan. 1987. Numerical responses of martens to a food shortage in northcentral Ontario. Journal of Wildlife Management 51:824-835.

Tietje W.M., and R.L. Ruff. 1980. Denning behaviour of black bears in the boreal forest of Alberta. Journal of Wildlife Management 44:858–870.

Tremblay, J.P., H. Jolicoeur, and R. Lemieux. 2001. Summer food habits of gray wolves in the boreal forest of the Lac Jacques-Cartier highlands, Quebec. Alces 37(1):1-12.

URSUS and Komex (URSUS Ecosystem Management Ltd. and Komex International Ltd.). 1997. Wildlife Field Surveys. Mobil Oil Canada Lease 36 Baseline Study. Prepared for Mobil Oil Canada., Calgary, Alberta.

Vangen, K.M, J. Persson, A. Landa, R. Andersen, and P. Segerström. 2001 Characteristics of dispersal in wolverines. Canadian Journal of Zoology 79(9):1641-1649.

Vors, L. S., J. A. Schaefer, B. A. Pond, A. R. Rodgerson, and B. R. Patterson. 2007. Woodland caribou extirpation and anthropogenic landscape disturbance in Ontario. Journal of Wildlife Management **71**(4):1249-1256.

Vors, L. S., and M. S. Boyce. 2009. Global declines of caribou and reindeer. Global Change Biology. doi: 10.1111/j.1365-2486.2009.01974.x

Walton, L.R. 2000. Investigation into the Movements of Migratory Wolves in the Central Canadian Arctic. M.Sc. Thesis. University of Saskatchewan, Saskatoon, Saskatchewan.

Walton, L.R., H.D. Cluff, P.C. Paquet, and M.A. Ramsay. 2001. Movement patterns of barren-ground wolves in the central Canadian Arctic. Journal of Mammalogy 82(3):867-876.

Ward P. 1968. Fire in relation to waterfowl habitat of the delta marshes. Proceedings of the 8th Tall Timbers Fire Ecology conference: 255–67.

Weir, R.D. 2004. Accounts and measures for managing identified wildlife accounts: Northern Forest Region. Version 2004. Ministry of Water, Land and Air Protection, Government of British Columbia.

Weir, J.N., S. P.Mahoney, B. McLaren and S. H. Ferguson. 2007. Effects of mine development on woodland caribou *Rangifer tarandus* distribution. Wildlife Biology 13(1):66-74.

Weladji, R.D., and O. Holand. 2003. Global climate change and reindeer: effects of winter weather on the autumn weight and growth of calves. Oecologia 136: 317-323.

White, C.M., N.J. Clum, T.J. Cade, and W.G. Hunt. 2002. Peregrine falcon (*Falco peregrinus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Available from: http://bna.birds.cornell.edu/bna/species/660. Accessed 14 September 2009.

Whitman, J.S., W.B. Ballard, and C.L. Gardner. 1986. Home range and habitat use by wolverines in southcentral Alaska. Journal of Wildlife Management 50:460-462.

Williams, T.M. 1990. Summer diet and behaviour of wolves denning on Barren-ground Caribou Range in the Northwest Territories, Canada. *M.Sc. Thesis.* University of Alberta, Edmonton, Alberta.

Wittmer, H. U., B. N. McLellan, R. Serrouya, C. D. Apps. 2007. Chanages in landscape composition influence the decline of a threatened woodland caribou population. Journal of Animal Ecology **76**: 568-579.

Yates, F. 1934. The analysis of multiple classifications with unequal numbers in the different classes. Journal of the American Statistical Association **29**(185):51-66.

Young, B.F. and R.L. Ruff. 1982. Population dynamics and movements of black bears in east central Alberta. Journal of Wildlife Management 46(4):845-860.

Zalatan, R., A. Gunn and G.H.R. Henry. 2006. Long-term abundance patterns of barren-ground caribou using trampling scars on roots of *Picea mariana* in the Northwest Territories, Canada. Arctic, Antarctic and Alpine Research, 38: 624-630.

6 GLOSSARY OF TERMS

6.1 UNITS

%	percent
cm	centimetre
km	kilometre
km^2	square kilometre
km/h	kilometre per hour
ha	hectare
m	metre

6.2 ACRONYMS

agl	above ground level
BHPB	BHP Billiton Diamonds Inc.
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EDR	effective detection radius
ELC	ecological landscape classification
ENR	Department of Environment and Natural Resources
Fortune	Fortune Minerals Limited
GIS	geographic information system
GPS	geographic position system
LSA	local study area
NSMA	North Slave Métis Alliance
NPAR	Proposed NICO Project Access Road
NWT	Northwest Territories
Project	NICO cobalt-gold-bismuth-copper Project
RSA	regional study area
SARA	*Species at Risk Act*
SARPR	Species at Risk Public Registry

TKD	tracking encountered per kilometre per day
UTM	Universal Transverse Mercator
VC	valued components

APPENDIX I

RAW DATA

Table I-1 Caribou Observations, 2004 to 2008

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
26-Nov-04	Caribou	25	mine RSA	11V	504420	7047866
26-Nov-04	Caribou	3	mine RSA	11V	504420	7047866
26-Nov-04	Caribou	15	mine RSA	11V	504507	7047171
26-Nov-04	Caribou	10	mine RSA	11V	504492	7045144
26-Nov-04	Caribou	15	mine RSA	11V	504435	7042846
26-Nov-04	Caribou - Cows and Bulls	4	mine RSA	11V	504440	7041950
26-Nov-04	Caribou - Cows and Bulls	15	mine RSA	11V	506314	7041785
26-Nov-04	Caribou	30	mine RSA	11V	506340	7044630
26-Nov-04	Caribou	8	mine RSA	11V	506338	7045179
26-Nov-04	Caribou	10	mine RSA	11V	506299	7046077
26-Nov-04	Caribou	5	mine RSA	11V	506301	7046436
26-Nov-04	Caribou - Cows and Bulls	4	mine RSA	11V	508498	7053740
26-Nov-04	Caribou	14	mine RSA	11V	508406	7052213
26-Nov-04	Caribou - Cow, Bull, and Calf	3	mine RSA	11V	508406	7052213
26-Nov-04	Caribou - Cows and Bulls	20	mine RSA	11V	508421	7047708
26-Nov-04	Caribou - Cows and Bulls	10	mine RSA	11V	508421	7047708
26-Nov-04	Caribou - Adult	1	mine RSA	11V	508376	7040130
26-Nov-04	Caribou - Adults	4	mine RSA	11V	508352	7038657
26-Nov-04	Caribou - Adults	2	mine RSA	11V	510424	7039494
26-Nov-04	Caribou	50	mine RSA	11V	510338	7043655
26-Nov-04	Caribou	3	mine RSA	11V	510317	7045899
26-Nov-04	Caribou	12	mine RSA	11V	510294	7046382
26-Nov-04	Caribou	25	mine RSA	11V	510372	7047582
26-Nov-04	Caribou - Adult	1	mine RSA	11V	512366	7051180
26-Nov-04	Caribou - Adults and Calves	30	mine RSA	11V	512331	7047943
26-Nov-04	Caribou - Adults and Calves	30	mine RSA	11V	512353	7046221
26-Nov-04	Caribou - Adults and Calves	4	mine RSA	11V	512330	7045142
26-Nov-04	Caribou - Adults	2	mine RSA	11V	514402	7039801
26-Nov-04	Caribou - Adults	15	mine RSA	11V	514345	7048273
26-Nov-04	Caribou - Adults	5	mine RSA	11V	514363	7054262
26-Nov-04	Caribou - Adults	2	mine RSA	11V	516334	7051539
26-Nov-04	Caribou - Adults	5	mine RSA	11V	516324	7050837
26-Nov-04	Caribou - Adults	4	mine RSA	11V	516386	7048365
26-Nov-04	Caribou- Cow and Calf	2	mine RSA	11V	518317	7039476
26-Nov-04	Caribou - Bull	1	mine RSA	11V	518352	7046864
26-Nov-04	Caribou - Adult	1	mine RSA	11V	518331	7048600
26-Nov-04	Caribou - Adults	15	mine RSA	11V	518340	7049541
26-Nov-04	Caribou - Adults	4	mine RSA	11V	520374	7045233
26-Nov-04	Caribou - Adults	8	NPAR	11V	505704	7046938
26-Nov-04	Caribou - Adults	10	NPAR	11V	493503	7035488
26-Nov-04	Caribou - Cow, Bull, and Calves	4	NPAR	11V	508607	7041537

Table I-1 Caribou Observations, 2004 to 2008 (continued)

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
26-Nov-04	Caribou - Adults	9	NPAR	11V	497981	7032642
26-Nov-04	Caribou - Adults	5	NPAR	11V	496874	7031965
26-Nov-04	Caribou - Adults	8	NPAR	11V	495483	7030747
26-Nov-04	Caribou - Calves	6	NPAR	11V	499323	7032295
26-Nov-04	Caribou - Adults	2	NPAR	11V	499709	7032428
26-Nov-04	Caribou - Adult	1	NPAR	11V	512666	7043448
26-Nov-04	Caribou - Adults	20	NPAR	11V	513179	7044810
26-Nov-04	Caribou - Cow and Calf	2	NPAR	11V	506973	7031690
26-Nov-04	Caribou - Cow and Calf	2	NPAR	11V	506022	7031343
26-Nov-04	Caribou	20	NPAR	11V	504832	7030861
26-Nov-04	Caribou - Adults	2	NPAR	11V	504060	7030538
26-Nov-04	Caribou	20	NPAR	11V	503522	7030085
26-Nov-04	Caribou - Adults	10	NPAR	11V	503298	7044233
26-Nov-04	Caribou	11	NPAR	11V	503019	7043890
26-Nov-04	Caribou - Cows, Bulls, and Calves	50	NPAR	11V	502715	7043551
26-Nov-04	Caribou - Cows, Bulls, and Calves	40	NPAR	11V	490151	7030893
26-Nov-04	Caribou - Adults	5	NPAR	11V	493305	7025922
26-Nov-04	Caribou - Adults	3	NPAR	11V	494148	7027459
26-Nov-04	Caribou - Adults	7	NPAR	11V	494589	7029241
26-Nov-04	Caribou - Adults	2	NPAR	11V	504191	7038267
26-Nov-04	Caribou - Adults	20	NPAR	11V	505509	7039854
26-Nov-04	Caribou - Adults	20	NPAR	11V	509800	7043624
26-Nov-04	Caribou - Adults	15	NPAR	11V	496995	7028812
26-Nov-04	Caribou - Adults	6	NPAR	11V	497607	7031115
26-Nov-04	Caribou - Adults	2	NPAR	11V	507761	7038654
26-Nov-04	Caribou - Adults	5	NPAR	11V	513179	7044810
26-Nov-04	Caribou - Adult	1	NPAR	11V	509482	7033675
26-Nov-04	Caribou - Adults	2	NPAR	11V	503025	7029825
26-Nov-04	Caribou - Adults	20	NPAR	11V	502163	7029296
26-Nov-04	Caribou - Adults	12	NPAR	11V	494449	7030828
26-Nov-04	Caribou	20	NPAR	11V	494410	7031606
26-Nov-04	Caribou - Adults	5	NPAR	11V	496318	7032947
26-Nov-04	Caribou - Adults	2	NPAR	11V	498351	7033993
26-Nov-04	Caribou - Adults	6	NPAR	11V	502226	7035985
26-Nov-04	Caribou - Adults	30	NPAR	11V	496209	7031393
26-Nov-04	Caribou - Adults	3	NPAR	11V	498840	7032038
26-Nov-04	Caribou - Adults	7	NPAR	11V	513812	7038733
26-Nov-04	Caribou - Adults	10	NPAR	11V	513331	7038205
26-Nov-04	Caribou - Adults	4	NPAR	11V	508130	7032410
26-Nov-04	Caribou - Adult	1	NPAR	11V	490151	7030893

Table I-1 Caribou Observations, 2004 to 2008 (continued)

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
26-Nov-04	Caribou - Cows, Bulls, and Calves	20	NPAR	11V	490168	7030581
26-Nov-04	Caribou - Adults	3	NPAR	11V	488805	7027423
26-Nov-04	Caribou - Adults	3	NPAR	11V	498922	7034254
26-Nov-04	Caribou	10	NPAR	11V	501105	7027380
26-Nov-04	Caribou - Cow and Calf	2	NPAR	11V	500422	7016819
26-Nov-04	Caribou	4	NPAR	11V	495419	7032244
26-Nov-04	Caribou	2	NPAR	11V	495419	7032244
26-Nov-04	Caribou	25	NPAR	11V	496036	7032860
26-Nov-04	Caribou - Cow, Bull, and Calf	3	NPAR	11V	496036	7032860
26-Nov-04	Caribou - Adults	2	NPAR	11V	496843	7033253
26-Nov-04	Caribou - Cows, Bulls, and Calves	5	NPAR	11V	496843	7033253
26-Nov-04	Caribou - Cows, Bulls, and Calves	6	NPAR	11V	503025	7029825
26-Nov-04	Caribou - Cows, Bulls, and Calves	20	NPAR	11V	501423	7028559
26-Nov-04	Caribou	1	NPAR	11V	501065	7028267
26-Nov-04	Caribou	6	NPAR	11V	501065	7028267
10-Dec-04	Caribou - Cows and Calves	8	mine RSA	11V	520239	7051104
10-Dec-04	Caribou - Adults	8	NPAR	11V	492501	7008278
10-Dec-04	Caribou - Adults	4	NPAR	11V	501098	7034152
10-Dec-04	Caribou	12	NPAR	11V	488568	7024735
10-Dec-04	Caribou	4	NPAR	11V	488568	7024735
10-Dec-04	Caribou - Cows, Bulls, and Calves	10	NPAR	11V	489415	7020778
10-Dec-04	Caribou - Adults	3	NPAR	11V	492013	7012157
10-Dec-04	Caribou - Cows, Bulls, and Calves	7	NPAR	11V	492169	7011436
10-Dec-04	Caribou - Cows, Bulls, and Calves	2	NPAR	11V	494532	7029223
10-Dec-04	Caribou - Cows, Bulls, and Calves	15	NPAR	11V	496491	7033046
10-Dec-04	Caribou - Cows, Bulls, and Calves	2	NPAR	11V	496919	7029190
10-Dec-04	Caribou - Calves	8	NPAR	11V	496919	7029190
10-Dec-04	Caribou - Adults	4	NPAR	11V	503913	7034372
10-Dec-04	Caribou	3	NPAR	11V	512520	7037140
10-Dec-04	Caribou - Adults	4	NPAR	11V	497486	7037371
10-Dec-04	Caribou - Adults	5	NPAR	11V	495393	7036345
10-Dec-04	Caribou - Cows, Bulls, and Calves	8	NPAR	11V	488385	7025807
10-Dec-04	Caribou - Cows, Bulls, and Calves	4	NPAR	11V	489821	7019217
10-Dec-04	Caribou	30	NPAR	11V	489871	7019020
10-Dec-04	Caribou - Adults	2	NPAR	11V	491108	7014962
10-Dec-04	Caribou - Adults	5	NPAR	11V	496750	7007812
10-Dec-04	Caribou	7	NPAR	11V	494801	7015113
10-Dec-04	Caribou - Adults	2	NPAR	11V	494631	7015816
10-Dec-04	Caribou - Cows, Bulls, and Calves	8	NPAR	11V	494275	7017181
10-Dec-04	Caribou - Cows, Bulls, and Calves	4	NPAR	11V	493317	7021651

Table I-1 Caribou Observations, 2004 to 2008 (continued)

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
10-Dec-04	Caribou - Adults	3	NPAR	11V	496134	7032864
10-Dec-04	Caribou - Adults	4	NPAR	11V	499514	7034495
10-Dec-04	Caribou - Adults	2	NPAR	11V	500554	7033916
10-Dec-04	Caribou - Cows, Bulls, and Calves	50	NPAR	11V	499214	7033275
10-Dec-04	Caribou - Adult	1	NPAR	11V	497150	7032170
10-Dec-04	Caribou - Adults	7	NPAR	11V	495636	7030935
10-Dec-04	Caribou - Adults	12	NPAR	11V	495920	7014509
10-Dec-04	Caribou - Adults	3	NPAR	11V	496635	7013019
10-Dec-04	Caribou - Adults	5	NPAR	11V	497325	7011644
10-Dec-04	Caribou - Cow, Bull, and Calf	3	NPAR	11V	496953	7028925
10-Dec-04	Caribou - Cow, Bull, and Calves	4	NPAR	11V	499854	7032493
10-Dec-04	Caribou - Adults	6	NPAR	11V	504747	7030735
10-Dec-04	Caribou - Adults	8	NPAR	11V	504120	7030400
10-Dec-04	Caribou - Adults	4	NPAR	11V	499634	7022727
10-Dec-04	Caribou - Cow, Bull, and Calves	4	NPAR	11V	499515	7020939
10-Dec-04	Caribou - Cow, Bull, and Calves	4	NPAR	11V	489415	7020778
10-Dec-04	Caribou	25	NPAR	11V	490177	7017612
10-Dec-04	Caribou	25	NPAR	11V	490914	7015454
10-Dec-04	Caribou - Adults	3	NPAR	11V	493904	7018702
10-Dec-04	Caribou - Adults	6	NPAR	11V	497661	7033653
10-Dec-04	Caribou - Adults	3	NPAR	11V	498994	7034260
10-Dec-04	Caribou - Adults	2	NPAR	11V	503258	7006322
10-Dec-04	Caribou - Adults	3	NPAR	11V	503408	7005208
10-Dec-04	Caribou - Cows, Bulls, and Calves	12	NPAR	11V	490531	7016035
10-Dec-04	Caribou	10	NPAR	11V	490742	7015818
11-Apr-05	Caribou	10	mine RSA	11V	520124	7041391
11-Apr-05	Caribou	20	mine RSA	11V	520124	7041391
11-Apr-05	Caribou	20	mine RSA	11V	520201	7042965
11-Apr-05	Caribou	40	mine RSA	11V	520177	7043949
11-Apr-05	Caribou	20	mine RSA	11V	520177	7043949
11-Apr-05	Caribou	1	mine RSA	11V	518068	7044191
11-Apr-05	Caribou	1	mine RSA	11V	518135	7043463
11-Apr-05	Caribou	20	mine RSA	11V	516171	7043688
11-Apr-05	Caribou	25	mine RSA	11V	514169	7048183
11-Apr-05	Caribou	8	mine RSA	11V	514206	7046947
11-Apr-05	Caribou	20	mine RSA	11V	514303	7043385
11-Apr-05	Caribou	1	mine RSA	11V	514303	7043385
11-Apr-05	Caribou	1	mine RSA	11V	512079	7044560
11-Apr-05	Caribou	27	mine RSA	11V	512091	7045084
11-Apr-05	Caribou	40	mine RSA	11V	512106	7045764

Table I-1 Caribou Observations, 2004 to 2008 (continued)

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
11-Apr-05	Caribou	1	mine RSA	11V	512106	7045764
11-Apr-05	Caribou	8	mine RSA	11V	512174	7048300
11-Apr-05	Caribou	8	mine RSA	11V	512174	7048300
11-Apr-05	Caribou	10	mine RSA	11V	512225	7050048
11-Apr-05	Caribou	3	mine RSA	11V	510412	7048602
11-Apr-05	Caribou	12	mine RSA	11V	510412	7048602
11-Apr-05	Caribou	30	mine RSA	11V	510404	7047908
11-Apr-05	Caribou	8	mine RSA	11V	510389	7045234
11-Apr-05	Caribou	15	mine RSA	11V	510390	7044861
11-Apr-05	Caribou	1	mine RSA	11V	510390	7044861
11-Apr-05	Caribou	5	mine RSA	11V	508325	7047705
11-Apr-05	Caribou	2	mine RSA	11V	508317	7050523
11-Apr-05	Caribou	4	mine RSA	11V	508317	7050523
11-Apr-05	Caribou	20	mine RSA	11V	508317	7050523
11-Apr-05	Caribou	15	mine RSA	11V	508325	7052324
11-Apr-05	Caribou	6	mine RSA	11V	508313	7053770
11-Apr-05	Caribou	20	NPAR	11V	501099	7035378
11-Apr-05	Caribou	1	NPAR	11V	512975	7043998
11-Apr-05	Caribou	1	NPAR	11V	503681	7030223
11-Apr-05	Caribou	30	NPAR	11V	490422	7015901
11-Apr-05	Caribou	30	NPAR	11V	510466	7045254
11-Apr-05	Caribou	2	NPAR	11V	497492	7031338
11-Apr-05	Caribou	25	NPAR	11V	512499	7044695
11-Apr-05	Caribou	50	NPAR	11V	512499	7044695
11-Apr-05	Caribou	25	NPAR	11V	516682	7042328
11-Apr-05	Caribou	2	NPAR	11V	516682	7042328
11-Apr-05	Caribou	8	NPAR	11V	516298	7041902
04-May-05	Caribou	2	mine RSA	11V	520318	7042540
04-May-05	Caribou	3	mine RSA	11V	518066	7046850
04-May-05	Caribou	4	mine RSA	11V	516040	7050548
04-May-05	Caribou	4	mine RSA	11V	514760	7046962
04-May-05	Caribou	4	mine RSA	11V	512265	7049993
04-May-05	Caribou	4	mine RSA	11V	504372	7052148
04-May-05	Caribou	11	mine RSA	11V	520318	7042540
04-May-05	Caribou	3	NPAR	11V	502522	7029656
04-May-05	Caribou	10	NPAR	11V	502285	7029492
24-Jul-05	Caribou - Scat	6	mine LSA			
24-Jul-05	Caribou - Scat	5	mine LSA			
24-Jul-05	Caribou - Scat	4	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			

Table I-1 Caribou Observations, 2004 to 2008 (continued)

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
24-Jul-05	Caribou - Scat	2	mine LSA			
24-Jul-05	Caribou - Scat	7	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			
24-Jul-05	Caribou - Scat	4	mine LSA			
24-Jul-05	Caribou - Scat	6	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			
24-Jul-05	Caribou - Scat	2	mine LSA			
24-Jul-05	Caribou - Scat	5	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			
24-Jul-05	Caribou - Scat	4	mine LSA			
24-Jul-05	Caribou - Scat	6	mine LSA			
24-Jul-05	Caribou - Scat	7	mine LSA			
24-Jul-05	Caribou - Scat	2	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			
24-Jul-05	Caribou - Scat	1	mine LSA			
24-Jul-05	Caribou - Scat	4	mine LSA			
24-Jul-05	Caribou - Scat	3	mine LSA			
24-Jul-05	Caribou - Scat	2	mine LSA			
24-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	11	mine LSA			
25-Jul-05	Caribou - Scat	3	mine LSA			
25-Jul-05	Caribou - Scat	4	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	3	mine LSA			
25-Jul-05	Caribou - Scat	2	mine LSA			
25-Jul-05	Caribou - Scat	4	mine LSA			
25-Jul-05	Caribou - Scat	5	mine LSA			
25-Jul-05	Caribou - Scat	3	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	2	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
25-Jul-05	Caribou - Scat	1	mine LSA			
11-Apr-06	Caribou	12	mine RSA	11V	520432	7042524

Table I-1 Caribou Observations, 2004 to 2008 (continued)

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
11-Apr-06	Caribou	20	mine RSA	11V	518234	7042623
11-Apr-06	Caribou	7	mine RSA	11V	518234	7042623
10-Jun-06	Caribou - Scat	2	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
10-Jun-06	Caribou - Scat	1	mine LSA			
11-Jun-06	Caribou - Scat	1	mine LSA			
06-Dec-06	Caribou	2	NPAR	11V	512706	7037730
11-Apr-07	Caribou - Bulls	4	NPAR	11V	508147	7039322
11-Dec-07	Caribou	3	mine RSA	11V	526459	7041186
11-Dec-07	Caribou	5	mine RSA	11V	524262	7040710
11-Dec-07	Caribou - Adults	6	mine RSA	11V	518207	7045083
11-Dec-07	Caribou - Adults	6	mine RSA	11V	514326	7038579
11-Dec-07	Caribou - Cows, Bulls, and Calves	25	mine RSA	11V	514418	7044547
11-Dec-07	Caribou - Cows and Calves	25	mine RSA	11V	512180	7054377
11-Dec-07	Caribou - Adults	5	mine RSA	11V	506378	7041966
11-Dec-07	Caribou - Adults and Calves	5	mine RSA	11V	506249	7048949
11-Dec-07	Caribou - Cow and Calf	2	mine RSA	11V	504184	7058610
11-Dec-07	Caribou - Adults	9	mine RSA	11V	502330	7046395
11-Dec-07	Caribou - Adults and Calves	10	NPAR			
11-Dec-07	Caribou - Adult	1	NPAR			
11-Dec-07	Caribou	20	NPAR			
15-Apr-08	Caribou - Adults	2	mine RSA	11V	522231	7048424

NPAR= Proposed NICO project access road regional study area; mine RSA= proposed mine regional study area; mine LSA= proposed mine local study area

Table I-2 Moose Observations, 2004 to 2007

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
26-Nov-04	Moose	1	NPAR	11V	495841	7019923
26-Nov-04	Moose	2	NPAR	11V	498994	7008132
26-Nov-04	Moose	1	NPAR	11V	496351	7013457
26-Nov-04	Moose	2	NPAR	11V	495227	7023858
26-Nov-04	Moose	1	mine RSA	11V	518399	7041628
10-Dec-04	Moose	1	NPAR	11V	494742	7025794
10-Dec-04	Moose	1	NPAR	11V	491367	7034321
10-Dec-04	Moose	3	NPAR	11V	490850	7033861
10-Dec-04	Moose	1	mine RSA	11V	510330	7040342
11-Apr-05	Moose	2	mine RSA	11V	506258	7042377
24-Jul-05	Moose - Scat	1	mine LSA			
24-Jul-05	Moose - Scat	1	mine LSA			
24-Jul-05	Moose - Scat	1	mine LSA			
24-Jul-05	Moose - Scat	1	mine LSA			
24-Jul-05	Moose - Scat	1	mine LSA			
25-Jul-05	Moose - Scat	2	mine LSA			
25-Jul-05	Moose - Scat	1	mine LSA			
09-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	2	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	2	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	1	mine LSA			
10-Jun-06	Moose - Scat	2	mine LSA			
11-Jun-06	Moose - Scat	1	mine LSA			
11-Jun-06	Moose - Scat	1	mine LSA			
11-Jun-06	Moose - Scat	1	mine LSA			

Table I-2 Moose Observations, 2004 to 2007 (continued)

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
11-Jun-06	Moose - Scat	1	mine LSA			
11-Jun-06	Moose - Scat	1	mine LSA			
06-Dec-06	Moose - Cows	2	NPAR	11V	496202	7018264
06-Dec-06	Moose - Cows	3	NPAR	11V	494193	7017378
06-Dec-06	Moose - Cows and Bulls	2	NPAR	11V	495853	7012749
06-Dec-06	Moose - Cow	1	NPAR	11V	496654	7009276
11-Apr-07	Moose - Cow	1	NPAR	11V	489447	7020454
16-Jun-07	Moose - Scat	2	mine LSA			
16-Jun-07	Moose - Scat	1	mine LSA			
11-Dec-07	Moose - Bull	1	NPAR	11V		
11-Dec-07	Moose - Adult	1	mine RSA	11V	512107	7038068

NPAR= Proposed NICO project access road regional study area; mine RSA= proposed mine regional study area; mine LSA= proposed mine local study area

Table I-3 Black Bear Observations, 2004 to 2006

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
Sep-04	Black Bear Den	1	NPAR	11V	498684	7033306
11-Apr-05	Black Bear	1	NPAR	11V	490875	7015192
11-Apr-06	Black Bear	1	NPAR	11V	504986	7037629

NPAR= Proposed NICO project access road regional study area

Table I-4 Wolf Observations, 2004 to 2005

Date	Observation	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
26-Nov-04	Wolf	1	mine RSA	11V	510332	7041372
26-Nov-04	Wolf	1	mine RSA	11V	514434	7038187
26-Nov-04	Wolf	1	NPAR	11V	507125	7041837
26-Nov-04	Wolf	1	NPAR	11V	508874	7039978
10-Dec-04	Wolf	3	NPAR	11V	499866	7023632
10-Dec-04	Wolf	1	NPAR	11V	495718	7029550
10-Dec-04	Wolf	11	mine RSA	11V	510438	7036157
11-Apr-05	Wolf	2	mine RSA	11V	512323	7053950
04-May-05	Wolf	1	mine RSA	11V	504420	7043439

NPAR= Proposed NICO project access road regional study area; mine RSA= proposed mine regional study area

Table I-5 Upland Breeding Bird Observations, 2005 to 2009

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jun-05	Gray jay	1	mine RSA	11V	512061	7047056
14-Jun-05	Gray jay	1	mine RSA	11V	512847	7047043
14-Jun-05	Gray jay	1	mine RSA	11V	512596	7046251
16-Jun-05	Gray jay	1	mine RSA	11V	512793	7045310
16-Jun-05	Gray jay	1	mine RSA	11V	511999	7046061
14-Jun-05	Townsend's solitaire	1	mine RSA	11V	512596	7046251
14-Jun-05	American robin	1	mine RSA	11V	512847	7047043
14-Jun-05	Swainson's thrush	1	mine RSA	11V	511838	7047149
14-Jun-05	Swainson's thrush	1	mine RSA	11V	512847	7047043
16-Jun-05	Swainson's thrush	1	mine RSA	11V	513496	7044756
16-Jun-05	Hermit thrush	1	mine RSA	11V	513205	7044914
16-Jun-05	Hermit thrush	1	mine RSA	11V	511999	7046061
16-Jun-05	Northern waterthrush	3	mine RSA	11V	513744	7045203
16-Jun-05	Northern waterthrush	1	mine RSA	11V	513899	7045101
14-Jun-05	Orange-crowned warbler	1	mine RSA	11V	513200	7046956
16-Jun-05	Tennessee warbler	1	mine RSA	11V	513496	7044756
16-Jun-05	Yellow warbler	1	mine RSA	11V	513496	7044756
14-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	511598	7047242
14-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	511838	7047149
14-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	513200	7046956
14-Jun-05	Yellow-rumped warbler	2	mine RSA	11V	512847	7047043
14-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	512199	7046656
14-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	512442	7046575
14-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	512316	7046322
14-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	511831	7046426
16-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	513206	7045723
16-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	513206	7045723
16-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	512793	7045310
16-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	513744	7045203
16-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	511999	7046061
16-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	512430	7044966
16-Jun-05	Yellow-rumped warbler	1	mine RSA	11V	513899	7045101
14-Jun-05	Dark-eyed junco	1	mine RSA	11V	512461	7047346
14-Jun-05	Dark-eyed junco	1	mine RSA	11V	512864	7046169
14-Jun-05	Dark-eyed junco	1	mine RSA	11V	511831	7046426
16-Jun-05	Dark-eyed junco	2	mine RSA	11V	512617	7045331
16-Jun-05	Dark-eyed junco	1	mine RSA	11V	512793	7045310
16-Jun-05	Dark-eyed junco	1	mine RSA	11V	512970	7045093
16-Jun-05	Dark-eyed junco	2	mine RSA	11V	512970	7045093
16-Jun-05	Dark-eyed junco	1	mine RSA	11V	511999	7046061
14-Jun-05	Chipping sparrow	2	mine RSA	11V	512061	7047056

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jun-05	Chipping sparrow	1	mine RSA	11V	512539	7046871
14-Jun-05	Chipping sparrow	1	mine RSA	11V	512824	7046782
14-Jun-05	Chipping sparrow	1	mine RSA	11V	512847	7047043
14-Jun-05	Chipping sparrow	1	mine RSA	11V	512847	7047043
16-Jun-05	Chipping sparrow	1	mine RSA	11V	513525	7045770
16-Jun-05	Chipping sparrow	1	mine RSA	11V	513206	7045723
16-Jun-05	Chipping sparrow	1	mine RSA	11V	512793	7045310
16-Jun-05	Chipping sparrow	1	mine RSA	11V	512970	7045093
16-Jun-05	Chipping sparrow	1	mine RSA	11V	513744	7045203
16-Jun-05	Chipping sparrow	1	mine RSA	11V	513242	7045998
16-Jun-05	Chipping sparrow	1	mine RSA	11V	513899	7045101
14-Jun-05	Lincoln's sparrow	1	mine RSA	11V	512061	7047056
16-Jun-05	Red-winged blackbird	1	mine RSA	11V	513639	7045071
16-Jun-05	Rusty blackbird	1	mine RSA	11V	513744	7045203
11-Jun-06	Wilson's snipe	1	NPAR	11V	514502	7044948
11-Jun-06	Wilson's snipe	1	NPAR	11V	514588	7045090
10-Jun-06	Lesser yellowlegs	1	NPAR	11V	512582	7046088
10-Jun-06	Lesser yellowlegs	1	NPAR	11V	513429	7045747
11-Jun-06	Lesser yellowlegs	1	NPAR	11V	514502	7044948
11-Jun-06	Hairy woodpecker	1	NPAR	11V	514764	7045210
10-Jun-06	Eastern phoebe	1	mine RSA	11V	510599	7047015
10-Jun-06	Eastern phoebe	1	mine RSA	11V	512094	7046449
11-Jun-06	Olive-sided flycatcher	2	NPAR	11V	513751	7045308
11-Jun-06	Western wood-pewee	1	NPAR	11V	513957	7044979
09-Jun-06	Gray jay	1	mine RSA	11V	513973	7046190
10-Jun-06	Gray jay	1	NPAR	11V	512582	7046088
10-Jun-06	Gray jay	2	NPAR	11V	512582	7046088
10-Jun-06	Gray jay	1	NPAR	11V	512781	7045962
10-Jun-06	Gray jay	1	NPAR	11V	513031	7045379
10-Jun-06	Gray jay	1	mine RSA	11V	512201	7045995
11-Jun-06	Gray jay	1	NPAR	11V	514575	7045424
12-Jun-06	Gray jay	1	NPAR	11V	510931	7050759
12-Jun-06	Gray jay	2	NPAR	11V	511401	7049730
12-Jun-06	Boreal chickadee	2	NPAR	11V	510931	7050759
12-Jun-06	Boreal chickadee	1	NPAR	11V	511303	7050503
10-Jun-06	Townsend's solitaire	1	NPAR	11V	512592	7045646
10-Jun-06	Townsend's solitaire	1	mine RSA	11V	511005	7046636
10-Jun-06	Townsend's solitaire	1	mine RSA	11V	511148	7046912
10-Jun-06	Ruby-crowned kinglet	1	NPAR	11V	512988	7045911
09-Jun-06	American robin	1	mine RSA	11V	514042	7045999

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
09-Jun-06	American robin	1	mine RSA	11V	513540	7046304
11-Jun-06	American robin	1	NPAR	11V	513751	7045308
11-Jun-06	American robin	1	NPAR	11V	514764	7045210
12-Jun-06	American robin	1	NPAR	11V	510552	7050183
09-Jun-06	Hermit thrush	1	mine RSA	11V	513794	7045978
09-Jun-06	Hermit thrush	1	mine RSA	11V	514283	7046009
09-Jun-06	Hermit thrush	1	mine RSA	11V	513537	7046903
09-Jun-06	Hermit thrush	1	mine RSA	11V	513502	7047187
09-Jun-06	Hermit thrush	1	mine RSA	11V	513522	7047395
10-Jun-06	Hermit thrush	1	NPAR	11V	512781	7045962
10-Jun-06	Hermit thrush	3	mine RSA	11V	510818	7047073
10-Jun-06	Hermit thrush	3	mine RSA	11V	511148	7046912
11-Jun-06	Hermit thrush	1	NPAR	11V	513997	7045409
11-Jun-06	Hermit thrush	1	NPAR	11V	514179	7045150
12-Jun-06	Hermit thrush	2	NPAR	11V	510750	7049528
12-Jun-06	Hermit thrush	1	NPAR	11V	510552	7050183
12-Jun-06	Hermit thrush	2	NPAR	11V	505751	7039102
09-Jun-06	Swainson's thrush	1	mine RSA	11V	514283	7046009
09-Jun-06	Swainson's thrush	1	mine RSA	11V	513502	7047187
10-Jun-06	Swainson's thrush	2	NPAR	11V	512201	7045995
10-Jun-06	Swainson's thrush	1	NPAR	11V	512582	7046088
10-Jun-06	Swainson's thrush	1	NPAR	11V	512582	7046088
10-Jun-06	Swainson's thrush	2	NPAR	11V	512325	7045734
10-Jun-06	Swainson's thrush	3	NPAR	11V	512592	7045646
10-Jun-06	Swainson's thrush	1	NPAR	11V	513031	7045379
10-Jun-06	Swainson's thrush	1	NPAR	11V	513031	7045379
10-Jun-06	Swainson's thrush	3	mine RSA	11V	510802	7047699
10-Jun-06	Swainson's thrush	2	mine RSA	11V	510691	7047459
11-Jun-06	Swainson's thrush	2	NPAR	11V	513407	7045171
11-Jun-06	Swainson's thrush	1	NPAR	11V	513751	7045308
11-Jun-06	Swainson's thrush	1	NPAR	11V	511567	7049735
12-Jun-06	Swainson's thrush	1	NPAR	11V	510363	7050217
11-Jun-06	Blackpoll warbler	1	NPAR	11V	513751	7045308
09-Jun-06	Northern waterthrush	1	mine RSA	11V	514283	7046009
11-Jun-06	Northern waterthrush	1	NPAR	11V	513751	7045308
11-Jun-06	Northern waterthrush	1	NPAR	11V	513751	7045308
09-Jun-06	Orange-crowned warbler	1	mine RSA	11V	513794	7045978
10-Jun-06	Orange-crowned warbler	1	mine RSA	11V	510935	7046863
10-Jun-06	Orange-crowned warbler	1	mine RSA	11V	511005	7046636
10-Jun-06	Orange-crowned warbler	1	mine RSA	11V	510898	7046394

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
10-Jun-06	Orange-crowned warbler	2	mine RSA	11V	510688	7046268
09-Jun-06	Tennessee warbler	1	mine RSA	11V	513794	7045978
09-Jun-06	Tennessee warbler	1	mine RSA	11V	514283	7046009
09-Jun-06	Tennessee warbler	2	mine RSA	11V	513537	7046903
09-Jun-06	Tennessee warbler	1	mine RSA	11V	513742	7047036
09-Jun-06	Tennessee warbler	2	mine RSA	11V	513502	7047187
09-Jun-06	Tennessee warbler	1	mine RSA	11V	513502	7047187
09-Jun-06	Tennessee warbler	1	mine RSA	11V	513751	7047283
10-Jun-06	Tennessee warbler	1	NPAR	11V	512781	7045962
10-Jun-06	Tennessee warbler	1	NPAR	11V	512988	7045911
10-Jun-06	Tennessee warbler	1	mine RSA	11V	511005	7046636
11-Jun-06	Tennessee warbler	1	NPAR	11V	513407	7045171
11-Jun-06	Tennessee warbler	2	NPAR	11V	513751	7045308
11-Jun-06	Tennessee warbler	3	NPAR	11V	514774	7045517
11-Jun-06	Tennessee warbler	1	NPAR	11V	515094	7045192
09-Jun-06	Yellow warbler	1	mine RSA	11V	513973	7046190
09-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	514042	7045999
09-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	514283	7046009
09-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	513773	7046796
09-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	513751	7047283
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	510691	7047459
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	510567	7047238
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	510289	7047346
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	510935	7046863
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	510935	7046863
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	511005	7046636
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	511148	7046912
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	511385	7047004
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	511824	7046608
10-Jun-06	Yellow-rumped warbler	2	mine RSA	11V	512406	7046238
10-Jun-06	Yellow-rumped warbler	1	mine RSA	11V	512406	7046238
11-Jun-06	Yellow-rumped warbler	1	NPAR	11V	513998	7045615
11-Jun-06	Yellow-rumped warbler	2	NPAR	11V	513997	7045409
11-Jun-06	Yellow-rumped warbler	1	NPAR	11V	513751	7045308
11-Jun-06	Yellow-rumped warbler	2	NPAR	11V	514349	7045348
11-Jun-06	Yellow-rumped warbler	1	NPAR	11V	514774	7045517
11-Jun-06	Yellow-rumped warbler	1	NPAR	11V	515094	7045192
11-Jun-06	Yellow-rumped warbler	1	NPAR	11V	515163	7045598
12-Jun-06	Yellow-rumped warbler	1	NPAR	11V	510628	7050360
12-Jun-06	Yellow-rumped warbler	1	NPAR	11V	511633	7050145

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
09-Jun-06	Dark-eyed junco	1	mine RSA	11V	513813	7046492
09-Jun-06	Dark-eyed junco	1	mine RSA	11V	513539	7046651
10-Jun-06	Dark-eyed junco	2	NPAR	11V	512781	7045962
10-Jun-06	Dark-eyed junco	1	NPAR	11V	512753	7045435
10-Jun-06	Dark-eyed junco	1	NPAR	11V	513247	7045913
10-Jun-06	Dark-eyed junco	1	NPAR	11V	513031	7045379
10-Jun-06	Dark-eyed junco	4	mine RSA	11V	510691	7047459
10-Jun-06	Dark-eyed junco	1	mine RSA	11V	510567	7047238
10-Jun-06	Dark-eyed junco	1	mine RSA	11V	510818	7047073
10-Jun-06	Dark-eyed junco	1	mine RSA	11V	511148	7046912
10-Jun-06	Dark-eyed junco	1	mine RSA	11V	511385	7047004
10-Jun-06	Dark-eyed junco	1	mine RSA	11V	511824	7046608
11-Jun-06	Dark-eyed junco	1	NPAR	11V	513735	7045523
11-Jun-06	Dark-eyed junco	1	NPAR	11V	513751	7045308
11-Jun-06	Dark-eyed junco	1	NPAR	11V	514179	7045150
11-Jun-06	Dark-eyed junco	1	NPAR	11V	513957	7044979
11-Jun-06	Dark-eyed junco	1	NPAR	11V	514502	7044948
11-Jun-06	Dark-eyed junco	2	NPAR	11V	515000	7045357
11-Jun-06	Dark-eyed junco	1	NPAR	11V	511567	7049735
12-Jun-06	Dark-eyed junco	1	NPAR	11V	511265	7049652
12-Jun-06	Dark-eyed junco	1	NPAR	11V	511245	7049991
12-Jun-06	Dark-eyed junco	1	NPAR	11V	510743	7050600
12-Jun-06	Dark-eyed junco	1	NPAR	11V	511430	7050068
12-Jun-06	Dark-eyed junco	1	NPAR	11V	511519	7050334
12-Jun-06	Dark-eyed junco	1	NPAR	11V	511633	7050145
09-Jun-06	Chipping sparrow	1	mine RSA	11V	513794	7045978
09-Jun-06	Chipping sparrow	1	mine RSA	11V	514224	7046258
09-Jun-06	Chipping sparrow	1	mine RSA	11V	513773	7046796
09-Jun-06	Chipping sparrow	1	mine RSA	11V	513742	7047036
09-Jun-06	Chipping sparrow	1	mine RSA	11V	513502	7047187
09-Jun-06	Chipping sparrow	2	mine RSA	11V	513522	7047395
10-Jun-06	Chipping sparrow	1	NPAR	11V	512988	7045911
10-Jun-06	Chipping sparrow	1	NPAR	11V	513247	7045913
10-Jun-06	Chipping sparrow	2	NPAR	11V	513031	7045379
10-Jun-06	Chipping sparrow	1	mine RSA	11V	510802	7047699
10-Jun-06	Chipping sparrow	2	mine RSA	11V	510691	7047459
10-Jun-06	Chipping sparrow	2	mine RSA	11V	510567	7047238
10-Jun-06	Chipping sparrow	2	mine RSA	11V	511148	7046912
10-Jun-06	Chipping sparrow	1	mine RSA	11V	510898	7046394
10-Jun-06	Chipping sparrow	1	mine RSA	11V	510688	7046268

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
10-Jun-06	Chipping sparrow	1	mine RSA	11V	512094	7046449
11-Jun-06	Chipping sparrow	1	NPAR	11V	514179	7045150
11-Jun-06	Chipping sparrow	1	NPAR	11V	514349	7045348
11-Jun-06	Chipping sparrow	1	NPAR	11V	514774	7045517
12-Jun-06	Chipping sparrow	1	NPAR	11V	505751	7039102
09-Jun-06	Lincoln's sparrow	1	mine RSA	11V	514224	7046258
09-Jun-06	Lincoln's sparrow	1	mine RSA	11V	513751	7047283
09-Jun-06	Lincoln's sparrow	1	mine RSA	11V	513751	7047283
10-Jun-06	Lincoln's sparrow	1	NPAR	11V	512781	7045962
10-Jun-06	Lincoln's sparrow	1	mine RSA	11V	510691	7047459
10-Jun-06	Lincoln's sparrow	1	mine RSA	11V	510691	7047459
10-Jun-06	Lincoln's sparrow	1	mine RSA	11V	510688	7046268
11-Jun-06	Lincoln's sparrow	1	NPAR	11V	513407	7045171
11-Jun-06	Lincoln's sparrow	1	NPAR	11V	514575	7045424
11-Jun-06	Lincoln's sparrow	1	NPAR	11V	514774	7045517
11-Jun-06	Swamp sparrow	1	NPAR	11V	514170	7044877
11-Jun-06	Swamp sparrow	1	NPAR	11V	514588	7045090
10-Jun-06	White-crowned sparrow	1	mine RSA	11V	510691	7047459
15-Jun-07	American bittern	1	NPAR	11V	511350	7048064
15-Jun-07	Spruce grouse	1	mine RSA	11V	505837	7039585
18-Jun-07	Spruce grouse	1	mine RSA	11V	513762	7047448
16-Jun-07	Sora	1	mine RSA	11V	509175	7047903
17-Jun-07	Wilson's snipe	1	NPAR	11V	509110	7046140
17-Jun-07	Wilson's snipe	1	mine RSA	11V	509725	7046669
17-Jun-07	Wilson's snipe	1	mine RSA	11V	509712	7047149
17-Jun-07	Wilson's snipe	1	mine RSA	11V	509429	7046806
17-Jun-07	Wilson's snipe	1	mine RSA	11V	509219	7046569
17-Jun-07	Wilson's snipe	1	mine RSA	11V		
17-Jun-07	Wilson's snipe	1	mine RSA	11V		
17-Jun-07	Wilson's snipe	1	mine RSA	11V	508890	7045949
17-Jun-07	Wilson's snipe	1	mine RSA	11V	508826	7045809
16-Jun-07	Lesser yellowlegs	1	mine RSA	11V	504622	7036803
17-Jun-07	Lesser yellowlegs	1	mine RSA	11V	509009	7045908
17-Jun-07	Lesser yellowlegs	1	mine RSA	11V	508946	7045650
17-Jun-07	Lesser yellowlegs	1	mine RSA	11V	508890	7045949
17-Jun-07	Lesser yellowlegs	1	mine RSA	11V	508699	7045539
18-Jun-07	Lesser yellowlegs	1	mine RSA	11V	513176	7047160
18-Jun-07	Lesser yellowlegs	1	mine RSA	11V	513920	7047636
18-Jun-07	Lesser yellowlegs	1	mine RSA	11V	514369	7047646
18-Jun-07	Lesser yellowlegs	1	mine RSA	11V	514499	7047422

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
18-Jun-07	Lesser yellowlegs	1	mine RSA	11V	514243	7047383
18-Jun-07	Lesser yellowlegs	1	mine RSA	11V	514826	7045831
15-Jun-07	Hairy woodpecker	1	mine RSA	11V	506649	7040077
15-Jun-07	Alder flycatcher	1	NPAR	11V	511972	7047850
17-Jun-07	Alder flycatcher	1	mine RSA	11V	508826	7045809
18-Jun-07	Alder flycatcher	1	mine RSA	11V	513715	7047281
18-Jun-07	Alder flycatcher	1	mine RSA	11V	514820	7047259
18-Jun-07	Alder flycatcher	1	mine RSA	11V	514704	7047076
17-Jun-07	Eastern phoebe	1	mine RSA	11V	509446	7045643
17-Jun-07	Eastern phoebe	1	mine RSA	11V	509739	7045636
16-Jun-07	Warbling vireo	1	mine RSA	11V	504635	7037385
17-Jun-07	Warbling vireo	1	mine RSA	11V	505091	7037242
14-Jun-07	Gray jay	3	NPAR	11V	510986	7045996
15-Jun-07	Gray jay	2	NPAR	11V	512383	7048130
15-Jun-07	Gray jay	2	NPAR	11V	505638	7038053
15-Jun-07	Gray jay	1	NPAR	11V	505785	7037498
15-Jun-07	Gray jay	1	NPAR	11V	505828	7037641
15-Jun-07	Gray jay	2	NPAR	11V	505656	7038603
15-Jun-07	Gray jay	1	NPAR	11V	505779	7037886
15-Jun-07	Gray jay	1	NPAR	11V	505677	7038114
15-Jun-07	Gray jay	1	NPAR	11V	505617	7038380
15-Jun-07	Gray jay	1	NPAR	11V	505758	7039344
15-Jun-07	Gray jay	1	mine RSA	11V	505670	7039379
15-Jun-07	Gray jay	1	mine RSA	11V	505837	7039585
16-Jun-07	Gray jay	2	mine RSA	11V	509020	7048248
16-Jun-07	Gray jay	1	mine RSA	11V	505592	7037640
16-Jun-07	Gray jay	1	mine RSA	11V	509332	7049037
16-Jun-07	Gray jay	2	mine RSA	11V	505482	7037464
16-Jun-07	Gray jay	2	mine RSA	11V	509520	7049105
16-Jun-07	Gray jay	1	mine RSA	11V	505630	7037258
16-Jun-07	Gray jay	1	mine RSA	11V	505120	7037081
16-Jun-07	Gray jay	2	mine RSA	11V	505442	7036870
16-Jun-07	Gray jay	2	mine RSA	11V	505373	7036611
16-Jun-07	Gray jay	1	mine RSA	11V	505316	7036431
16-Jun-07	Gray jay	1	mine RSA	11V	504818	7037493
16-Jun-07	Gray jay	2	mine RSA	11V	504938	7036215
16-Jun-07	Gray jay	1	mine RSA	11V	504613	7037111
16-Jun-07	Gray jay	1	mine RSA	11V	504665	7037355
17-Jun-07	Gray jay	3	NPAR	11V	509110	7046140
17-Jun-07	Gray jay	1	mine RSA	11V	510311	7047349

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
17-Jun-07	Gray jay	1	mine RSA	11V	509600	7046435
17-Jun-07	Gray jay	3	mine RSA	11V	509429	7046806
17-Jun-07	Gray jay	2	mine RSA	11V	509009	7045908
17-Jun-07	Gray jay	1	mine RSA	11V		
17-Jun-07	Gray jay	1	mine RSA	11V	509179	7045602
17-Jun-07	Gray jay	1	mine RSA	11V	509446	7045643
17-Jun-07	Gray jay	1	mine RSA	11V	508569	7045302
17-Jun-07	Gray jay	2	mine RSA	11V	509062	7045245
17-Jun-07	Gray jay	1	mine RSA	11V	509784	7045331
17-Jun-07	Gray jay	1	mine RSA	11V	510306	7045458
18-Jun-07	Gray jay	1	mine RSA	11V	504718	7037267
18-Jun-07	Gray jay	2	mine RSA	11V	513581	7047284
18-Jun-07	Gray jay	1	mine RSA	11V	513762	7047448
18-Jun-07	Gray jay	2	mine RSA	11V	514127	7047796
18-Jun-07	Gray jay	1	mine RSA	11V	514869	7047106
18-Jun-07	Gray jay	1	mine RSA	11V	514984	7046613
18-Jun-07	Gray jay	1	mine RSA	11V	515006	7045484
18-Jun-07	Gray jay	1	mine RSA	11V	515006	7045484
15-Jun-07	Boreal chickadee	1	NPAR	11V	505828	7037641
14-Jun-07	Townsend's solitaire	1	NPAR	11V	510928	7046878
14-Jun-07	Townsend's solitaire	1	NPAR	11V	510998	7046639
14-Jun-07	Townsend's solitaire	1	NPAR	11V	510986	7045996
15-Jun-07	Townsend's solitaire	1	NPAR	11V	511401	7047730
15-Jun-07	Townsend's solitaire	1	NPAR	11V	511742	7047774
15-Jun-07	Townsend's solitaire	1	NPAR	11V	511556	7047978
18-Jun-07	Townsend's solitaire	2	mine RSA	11V	514369	7047646
14-Jun-07	Ruby-crowned kinglet	1	NPAR	11V	510724	7047910
14-Jun-07	Ruby-crowned kinglet	1	NPAR	11V	510609	7047682
14-Jun-07	Ruby-crowned kinglet	1	NPAR	11V	510909	7046421
14-Jun-07	Ruby-crowned kinglet	1	NPAR	11V	510671	7046272
15-Jun-07	Ruby-crowned kinglet	1	NPAR	11V	512165	7048009
15-Jun-07	Ruby-crowned kinglet	1	NPAR	11V	512383	7048130
15-Jun-07	Ruby-crowned kinglet	1	NPAR	11V	505656	7038603
15-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	505837	7039585
16-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	509687	7048259
16-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	509444	7048198
16-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	505592	7037640
16-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	505015	7036979
16-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	505316	7036431
17-Jun-07	Ruby-crowned kinglet	2	mine RSA	11V		

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	509110	7046140
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	509009	7045908
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	508946	7045650
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	509179	7045602
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	508890	7045949
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	509446	7045643
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	509446	7045643
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	510107	7046101
17-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	508569	7045302
18-Jun-07	Ruby-crowned kinglet	1	mine RSA	11V	514704	7047076
15-Jun-07	American robin	1	NPAR	11V	511401	7047730
15-Jun-07	American robin	1	NPAR	11V	511819	7047930
15-Jun-07	American robin	1	NPAR	11V	511556	7047978
15-Jun-07	American robin	1	mine RSA	11V	506494	7039930
16-Jun-07	American robin	1	mine RSA	11V	509598	7047975
16-Jun-07	American robin	1	mine RSA	11V	509175	7047903
16-Jun-07	American robin	1	mine RSA	11V	509175	7047903
16-Jun-07	American robin	1	mine RSA	11V	509020	7048248
16-Jun-07	American robin	1	mine RSA	11V	509021	7048471
16-Jun-07	American robin	1	mine RSA	11V	509184	7048788
16-Jun-07	American robin	1	mine RSA	11V	509332	7049037
16-Jun-07	American robin	1	mine RSA	11V	505630	7037258
17-Jun-07	American robin	1	mine RSA	11V	509849	7047389
17-Jun-07	American robin	1	mine RSA	11V	509725	7046669
17-Jun-07	American robin	1	mine RSA	11V	509110	7046140
17-Jun-07	American robin	1	mine RSA	11V		
17-Jun-07	American robin	1	mine RSA	11V	509906	7045943
18-Jun-07	American robin	1	mine RSA	11V	513176	7047160
18-Jun-07	American robin	2	mine RSA	11V	514817	7046166
14-Jun-07	Hermit thrush	1	NPAR	11V	510710	7047079
14-Jun-07	Hermit thrush	1	NPAR	11V	510928	7046878
14-Jun-07	Hermit thrush	1	NPAR	11V	510909	7046421
14-Jun-07	Hermit thrush	1	NPAR	11V	510671	7046272
14-Jun-07	Hermit thrush	1	NPAR	11V	510851	7045956
15-Jun-07	Hermit thrush	1	NPAR	11V	511032	7047924
15-Jun-07	Hermit thrush	1	NPAR	11V	511285	7047930
15-Jun-07	Hermit thrush	1	NPAR	11V	511500	7047826
15-Jun-07	Hermit thrush	1	NPAR	11V	511819	7047930
15-Jun-07	Hermit thrush	1	NPAR	11V	511556	7047978
15-Jun-07	Hermit thrush	1	NPAR	11V	511972	7047850

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
15-Jun-07	Hermit thrush	1	NPAR	11V	512165	7048009
15-Jun-07	Hermit thrush	1	NPAR	11V	512383	7048130
15-Jun-07	Hermit thrush	1	NPAR	11V	505785	7037498
15-Jun-07	Hermit thrush	1	NPAR	11V	505642	7038320
15-Jun-07	Hermit thrush	1	NPAR	11V	505656	7038603
15-Jun-07	Hermit thrush	1	NPAR	11V	505685	7038846
15-Jun-07	Hermit thrush	1	NPAR	11V	505617	7038380
15-Jun-07	Hermit thrush	1	NPAR	11V	505758	7039344
15-Jun-07	Hermit thrush	1	NPAR	11V	505758	7039344
15-Jun-07	Hermit thrush	1	NPAR	11V	505463	7038629
15-Jun-07	Hermit thrush	1	mine RSA	11V	505443	7038885
15-Jun-07	Hermit thrush	1	mine RSA	11V	506055	7039696
15-Jun-07	Hermit thrush	1	mine RSA	11V	505542	7039137
15-Jun-07	Hermit thrush	1	mine RSA	11V	505542	7039137
15-Jun-07	Hermit thrush	1	mine RSA	11V	505670	7039379
16-Jun-07	Hermit thrush	1	mine RSA	11V	509687	7048259
16-Jun-07	Hermit thrush	1	mine RSA	11V	509598	7047975
16-Jun-07	Hermit thrush	1	mine RSA	11V	509598	7047975
16-Jun-07	Hermit thrush	1	mine RSA	11V	509444	7048198
16-Jun-07	Hermit thrush	2	mine RSA	11V	509406	7047949
16-Jun-07	Hermit thrush	2	mine RSA	11V	509322	7048139
16-Jun-07	Hermit thrush	1	mine RSA	11V	509338	7048258
16-Jun-07	Hermit thrush	1	mine RSA	11V	509020	7048248
16-Jun-07	Hermit thrush	1	mine RSA	11V	509409	7048443
16-Jun-07	Hermit thrush	1	mine RSA	11V	509409	7048443
16-Jun-07	Hermit thrush	1	mine RSA	11V	509504	7048633
16-Jun-07	Hermit thrush	1	mine RSA	11V	509184	7048788
16-Jun-07	Hermit thrush	1	mine RSA	11V	505592	7037640
16-Jun-07	Hermit thrush	1	mine RSA	11V	505482	7037464
16-Jun-07	Hermit thrush	1	mine RSA	11V	505120	7037081
16-Jun-07	Hermit thrush	1	mine RSA	11V	505015	7036979
16-Jun-07	Hermit thrush	1	mine RSA	11V	504828	7037140
16-Jun-07	Hermit thrush	1	mine RSA	11V	505316	7036431
16-Jun-07	Hermit thrush	2	mine RSA	11V	504635	7037385
16-Jun-07	Hermit thrush	1	mine RSA	11V	504818	7037493
16-Jun-07	Hermit thrush	1	mine RSA	11V	504818	7037493
16-Jun-07	Hermit thrush	1	mine RSA	11V	504858	7037266
16-Jun-07	Hermit thrush	1	mine RSA	11V	505002	7037117
17-Jun-07	Hermit thrush	1	mine RSA	11V	509884	7047137
17-Jun-07	Hermit thrush	1	mine RSA	11V	509807	7046901

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
17-Jun-07	Hermit thrush	1	mine RSA	11V	509807	7046901
17-Jun-07	Hermit thrush	1	mine RSA	11V	509725	7046669
17-Jun-07	Hermit thrush	1	mine RSA	11V		
17-Jun-07	Hermit thrush	1	mine RSA	11V	509597	7046920
17-Jun-07	Hermit thrush	1	mine RSA	11V	509600	7046435
17-Jun-07	Hermit thrush	1	mine RSA	11V	509429	7046806
17-Jun-07	Hermit thrush	1	mine RSA	11V	509009	7045908
17-Jun-07	Hermit thrush	1	mine RSA	11V	509219	7046569
17-Jun-07	Hermit thrush	1	mine RSA	11V	508946	7045650
17-Jun-07	Hermit thrush	1	mine RSA	11V	508946	7045650
17-Jun-07	Hermit thrush	1	mine RSA	11V	509179	7045602
17-Jun-07	Hermit thrush	1	mine RSA	11V	510107	7046101
17-Jun-07	Hermit thrush	1	mine RSA	11V	510203	7046325
17-Jun-07	Hermit thrush	1	mine RSA	11V	508775	7045201
17-Jun-07	Hermit thrush	1	mine RSA	11V	508775	7045201
17-Jun-07	Hermit thrush	1	mine RSA	11V	510020	7046491
17-Jun-07	Hermit thrush	1	mine RSA	11V	510044	7046737
17-Jun-07	Hermit thrush	1	mine RSA	11V	509630	7045204
18-Jun-07	Hermit thrush	1	mine RSA	11V	504718	7037267
18-Jun-07	Hermit thrush	1	mine RSA	11V	512412	7047186
18-Jun-07	Hermit thrush	1	mine RSA	11V	512657	7047238
18-Jun-07	Hermit thrush	1	mine RSA	11V	512942	7047191
18-Jun-07	Hermit thrush	1	mine RSA	11V	512942	7047191
18-Jun-07	Hermit thrush	1	mine RSA	11V	513176	7047160
18-Jun-07	Hermit thrush	1	mine RSA	11V	513411	7047083
18-Jun-07	Hermit thrush	1	mine RSA	11V	512343	7047322
18-Jun-07	Hermit thrush	1	mine RSA	11V	513581	7047284
18-Jun-07	Hermit thrush	1	mine RSA	11V	513762	7047448
18-Jun-07	Hermit thrush	2	mine RSA	11V	513920	7047636
18-Jun-07	Hermit thrush	1	mine RSA	11V	513920	7047636
18-Jun-07	Hermit thrush	1	mine RSA	11V	514127	7047796
18-Jun-07	Hermit thrush	1	mine RSA	11V	514127	7047796
18-Jun-07	Hermit thrush	2	mine RSA	11V	514959	7046869
18-Jun-07	Hermit thrush	1	mine RSA	11V	514984	7046613
18-Jun-07	Hermit thrush	1	mine RSA	11V	514934	7046389
18-Jun-07	Hermit thrush	1	mine RSA	11V	514817	7046166
18-Jun-07	Hermit thrush	1	mine RSA	11V	514647	7045944
14-Jun-07	Swainson's thrush	2	NPAR	11V	510909	7046421
15-Jun-07	Swainson's thrush	1	NPAR	11V	511032	7047924
15-Jun-07	Swainson's thrush	1	NPAR	11V	511401	7047730

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
15-Jun-07	Swainson's thrush	1	NPAR	11V	505627	7037811
15-Jun-07	Swainson's thrush	2	mine RSA	11V	506494	7039930
16-Jun-07	Swainson's thrush	1	mine RSA	11V	509598	7047975
16-Jun-07	Swainson's thrush	1	mine RSA	11V	509020	7048248
16-Jun-07	Swainson's thrush	1	mine RSA	11V	509021	7048471
16-Jun-07	Swainson's thrush	1	mine RSA	11V	509184	7048788
16-Jun-07	Swainson's thrush	1	mine RSA	11V	505442	7036870
16-Jun-07	Swainson's thrush	1	mine RSA	11V	505373	7036611
16-Jun-07	Swainson's thrush	1	mine RSA	11V	505373	7036611
16-Jun-07	Swainson's thrush	1	mine RSA	11V	505316	7036431
16-Jun-07	Swainson's thrush	1	mine RSA	11V	505235	7036089
16-Jun-07	Swainson's thrush	1	mine RSA	11V	504938	7036215
16-Jun-07	Swainson's thrush	1	mine RSA	11V	504825	7036391
17-Jun-07	Swainson's thrush	1	mine RSA	11V	509712	7047149
17-Jun-07	Swainson's thrush	1	mine RSA	11V	509597	7046920
17-Jun-07	Swainson's thrush	1	mine RSA	11V	509597	7046920
17-Jun-07	Swainson's thrush	1	mine RSA	11V	509259	7046767
17-Jun-07	Swainson's thrush	1	mine RSA	11V	508775	7045201
17-Jun-07	Swainson's thrush	1	mine RSA	11V	509062	7045245
18-Jun-07	Swainson's thrush	1	mine RSA	11V	513762	7047448
18-Jun-07	Swainson's thrush	2	mine RSA	11V	512840	7047406
18-Jun-07	Swainson's thrush	1	mine RSA	11V	512840	7047406
18-Jun-07	Swainson's thrush	1	mine RSA	11V		
18-Jun-07	Swainson's thrush	1	mine RSA	11V		
18-Jun-07	Swainson's thrush	1	mine RSA	11V	514834	7046881
18-Jun-07	Swainson's thrush	1	mine RSA	11V	514983	7046770
16-Jun-07	Blackpoll warbler	1	mine RSA	11V	509406	7047949
17-Jun-07	Blackpoll warbler	1	mine RSA	11V	508890	7045949
17-Jun-07	Blackpoll warbler	1	mine RSA	11V	508826	7045809
17-Jun-07	Blackpoll warbler	1	mine RSA	11V	510306	7045458
18-Jun-07	Blackpoll warbler	1	mine RSA	11V	514704	7047076
16-Jun-07	Northern waterthrush	1	mine RSA	11V	509406	7047949
16-Jun-07	Northern waterthrush	1	mine RSA	11V	509175	7047903
16-Jun-07	Northern waterthrush	1	mine RSA	11V	509021	7048471
17-Jun-07	Northern waterthrush	2	mine RSA	11V	508826	7045809
18-Jun-07	Northern waterthrush	1	mine RSA	11V	514820	7047259
14-Jun-07	Orange-crowned warbler	1	NPAR	11V	510724	7047910
14-Jun-07	Orange-crowned warbler	1	NPAR	11V	510710	7047079
14-Jun-07	Orange-crowned warbler	2	NPAR	11V	510671	7046272
14-Jun-07	Orange-crowned warbler	2	NPAR	11V	510851	7045956

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
15-Jun-07	Orange-crowned warbler	1	NPAR	11V	511032	7047924
15-Jun-07	Orange-crowned warbler	1	NPAR	11V	511182	7047735
15-Jun-07	Orange-crowned warbler	1	NPAR	11V	511401	7047730
15-Jun-07	Orange-crowned warbler	1	NPAR	11V	512165	7048009
15-Jun-07	Orange-crowned warbler	1	NPAR	11V	505627	7037811
15-Jun-07	Orange-crowned warbler	1	NPAR	11V	505642	7038320
15-Jun-07	Orange-crowned warbler	1	NPAR	11V	505656	7038603
15-Jun-07	Orange-crowned warbler	1	mine RSA	11V	505463	7038629
16-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509598	7047975
16-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509444	7048198
16-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509322	7048139
16-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509020	7048248
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509807	7046901
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509725	7046669
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509600	7046435
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509110	7046140
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V		
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	508946	7045650
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V		
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509179	7045602
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509739	7045636
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509906	7045943
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	510203	7046325
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	508775	7045201
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	510020	7046491
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	509325	7045231
17-Jun-07	Orange-crowned warbler	1	mine RSA	11V	510306	7045458
18-Jun-07	Orange-crowned warbler	1	mine RSA	11V	513176	7047160
18-Jun-07	Orange-crowned warbler	1	mine RSA	11V	513176	7047160
18-Jun-07	Orange-crowned warbler	1	mine RSA	11V	513411	7047083
18-Jun-07	Orange-crowned warbler	1	mine RSA	11V	513334	7047309
16-Jun-07	Palm warbler	1	mine RSA	11V	504938	7036215
16-Jun-07	Tennessee warbler	1	mine RSA	11V	504665	7037355
16-Jun-07	Tennessee warbler	1	mine RSA	11V	504665	7037355
17-Jun-07	Tennessee warbler	1	mine RSA	11V		
18-Jun-07	Tennessee warbler	1	mine RSA	11V	513715	7047281
18-Jun-07	Tennessee warbler	1	mine RSA	11V		
18-Jun-07	Tennessee warbler	1	mine RSA	11V	514820	7047259
18-Jun-07	Tennessee warbler	1	mine RSA	11V	514704	7047076
18-Jun-07	Tennessee warbler	1	mine RSA	11V	515006	7045484

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
17-Jun-07	Yellow warbler	1	mine RSA	11V	508890	7045949
17-Jun-07	Yellow warbler	2	mine RSA	11V	508826	7045809
18-Jun-07	Yellow warbler	1	mine RSA	11V	514704	7047076
14-Jun-07	Yellow-rumped warbler	1	NPAR	11V	510724	7047910
14-Jun-07	Yellow-rumped warbler	2	NPAR	11V	510928	7046878
14-Jun-07	Yellow-rumped warbler	1	NPAR	11V	510928	7046878
14-Jun-07	Yellow-rumped warbler	1	NPAR	11V	510909	7046421
15-Jun-07	Yellow-rumped warbler	1	NPAR	11V		
15-Jun-07	Yellow-rumped warbler	1	NPAR	11V	505642	7038320
15-Jun-07	Yellow-rumped warbler	1	NPAR	11V	505685	7038846
15-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	505443	7038885
15-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	506055	7039696
15-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	506649	7040077
15-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	505463	7038629
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509598	7047975
16-Jun-07	Yellow-rumped warbler	2	mine RSA	11V	509406	7047949
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509175	7047903
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509020	7048248
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509021	7048471
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509504	7048633
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509184	7048788
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509332	7049037
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	505482	7037464
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	505528	7037019
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	505316	7036431
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	504635	7037385
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	504818	7037493
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	504858	7037266
16-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	504825	7036391
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	510311	7047349
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509712	7047149
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509259	7046767
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509009	7045908
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V		
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V		
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	509739	7045636
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	508569	7045302
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	510032	7047247
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	510306	7045458
17-Jun-07	Yellow-rumped warbler	1	mine RSA	11V		

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V		
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	513411	7047083
18-Jun-07	Yellow-rumped warbler	2	mine RSA	11V	513581	7047284
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	513762	7047448
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	514127	7047796
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	513715	7047281
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	514869	7047106
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	514817	7046166
18-Jun-07	Yellow-rumped warbler	2	mine RSA	11V	514820	7047259
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	514647	7045944
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	514834	7046881
18-Jun-07	Yellow-rumped warbler	1	mine RSA	11V	514826	7045831
14-Jun-07	Dark-eyed junco	1	NPAR	11V	510724	7047910
14-Jun-07	Dark-eyed junco	2	NPAR	11V	510609	7047682
14-Jun-07	Dark-eyed junco	1	NPAR	11V	510486	7047435
14-Jun-07	Dark-eyed junco	1	NPAR	11V	510503	7047217
14-Jun-07	Dark-eyed junco	1	NPAR	11V	510710	7047079
14-Jun-07	Dark-eyed junco	1	NPAR	11V	510851	7045956
15-Jun-07	Dark-eyed junco	1	NPAR	11V		
15-Jun-07	Dark-eyed junco	1	NPAR	11V	511032	7047924
15-Jun-07	Dark-eyed junco	1	NPAR	11V	511182	7047735
15-Jun-07	Dark-eyed junco	1	NPAR	11V	511401	7047730
15-Jun-07	Dark-eyed junco	1	NPAR	11V	511819	7047930
15-Jun-07	Dark-eyed junco	1	NPAR	11V	511742	7047774
15-Jun-07	Dark-eyed junco	1	NPAR	11V	511972	7047850
15-Jun-07	Dark-eyed junco	1	NPAR	11V	512165	7048009
15-Jun-07	Dark-eyed junco	1	NPAR	11V	505627	7037811
15-Jun-07	Dark-eyed junco	1	NPAR	11V	505638	7038053
15-Jun-07	Dark-eyed junco	1	NPAR	11V	505785	7037498
15-Jun-07	Dark-eyed junco	1	NPAR	11V	505828	7037641
15-Jun-07	Dark-eyed junco	1	NPAR	11V	505828	7037641
15-Jun-07	Dark-eyed junco	2	NPAR	11V	505677	7038114
15-Jun-07	Dark-eyed junco	3	NPAR	11V	505758	7039344
15-Jun-07	Dark-eyed junco	1	NPAR	11V	505844	7039517
15-Jun-07	Dark-eyed junco	1	mine RSA	11V	505443	7038885
15-Jun-07	Dark-eyed junco	1	mine RSA	11V	506055	7039696
15-Jun-07	Dark-eyed junco	1	mine RSA	11V	505542	7039137
15-Jun-07	Dark-eyed junco	1	mine RSA	11V	505670	7039379
15-Jun-07	Dark-eyed junco	1	mine RSA	11V	506494	7039930
15-Jun-07	Dark-eyed junco	2	mine RSA	11V	506649	7040077

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
15-Jun-07	Dark-eyed junco	1	mine RSA	11V	506649	7040077
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	509687	7048259
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	509598	7047975
16-Jun-07	Dark-eyed junco	2	mine RSA	11V	509406	7047949
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	509322	7048139
16-Jun-07	Dark-eyed junco	2	mine RSA	11V	509175	7047903
16-Jun-07	Dark-eyed junco	2	mine RSA	11V	509338	7048258
16-Jun-07	Dark-eyed junco	3	mine RSA	11V	509020	7048248
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	509409	7048443
16-Jun-07	Dark-eyed junco	4	mine RSA	11V	509021	7048471
16-Jun-07	Dark-eyed junco	2	mine RSA	11V	509504	7048633
16-Jun-07	Dark-eyed junco	2	mine RSA	11V	509184	7048788
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	509184	7048788
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	505592	7037640
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	505630	7037258
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	505120	7037081
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	505528	7037019
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	505316	7036431
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	504622	7036803
16-Jun-07	Dark-eyed junco	1	mine RSA	11V	509007	7045908
17-Jun-07	Dark-eyed junco	2	mine RSA	11V	510311	7047349
17-Jun-07	Dark-eyed junco	2	mine RSA	11V	509884	7047137
17-Jun-07	Dark-eyed junco	3	mine RSA	11V	509712	7047149
17-Jun-07	Dark-eyed junco	1	mine RSA	11V		
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	509597	7046920
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	509429	7046806
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	509219	7046569
17-Jun-07	Dark-eyed junco	1	mine RSA	11V		
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	508946	7045650
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	508826	7045809
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	508827	7045697
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	509906	7045943
17-Jun-07	Dark-eyed junco	2	mine RSA	11V	508699	7045539
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510107	7046101
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	508569	7045302
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510203	7046325
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	508775	7045201
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510020	7046491
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510044	7046737
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510061	7046987

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510032	7047247
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510453	7046264
17-Jun-07	Dark-eyed junco	1	mine RSA	11V	510500	7046533
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	512412	7047186
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	512657	7047238
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	512343	7047322
18-Jun-07	Dark-eyed junco	2	mine RSA	11V	513581	7047284
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	512593	7047350
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	513920	7047636
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	513091	7047392
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	513091	7047392
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	514369	7047646
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	513334	7047309
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	514499	7047422
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	513715	7047281
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	514130	7047430
18-Jun-07	Dark-eyed junco	3	mine RSA	11V	514486	7047403
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	514934	7046389
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	514820	7047259
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	514983	7046770
18-Jun-07	Dark-eyed junco	1	mine RSA	11V	515006	7045484
14-Jun-07	Chipping sparrow	1	NPAR	11V	510724	7047910
15-Jun-07	Chipping sparrow	1	NPAR	11V	511285	7047930
15-Jun-07	Chipping sparrow	1	NPAR	11V	511285	7047930
15-Jun-07	Chipping sparrow	1	NPAR	11V	511819	7047930
15-Jun-07	Chipping sparrow	2	mine RSA	11V	506264	7039825
15-Jun-07	Chipping sparrow	1	mine RSA	11V	506494	7039930
16-Jun-07	Chipping sparrow	1	mine RSA	11V	509598	7047975
16-Jun-07	Chipping sparrow	1	mine RSA	11V	509598	7047975
16-Jun-07	Chipping sparrow	1	mine RSA	11V	509406	7047949
16-Jun-07	Chipping sparrow	1	mine RSA	11V	509175	7047903
16-Jun-07	Chipping sparrow	1	mine RSA	11V	509020	7048248
16-Jun-07	Chipping sparrow	1	mine RSA	11V	505015	7036979
16-Jun-07	Chipping sparrow	1	mine RSA	11V	505373	7036611
16-Jun-07	Chipping sparrow	1	mine RSA	11V	505316	7036431
16-Jun-07	Chipping sparrow	1	mine RSA	11V	504938	7036215
16-Jun-07	Chipping sparrow	1	mine RSA	11V	504622	7036803
17-Jun-07	Chipping sparrow	1	mine RSA	11V	509849	7047389
17-Jun-07	Chipping sparrow	1	mine RSA	11V	509849	7047389
17-Jun-07	Chipping sparrow	1	mine RSA	11V	509712	7047149

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
17-Jun-07	Chipping sparrow	1	mine RSA	11V	509429	7046806
17-Jun-07	Chipping sparrow	1	mine RSA	11V	509259	7046767
17-Jun-07	Chipping sparrow	1	mine RSA	11V	509739	7045636
17-Jun-07	Chipping sparrow	1	mine RSA	11V	510020	7046491
17-Jun-07	Chipping sparrow	1	mine RSA	11V	509784	7045331
18-Jun-07	Chipping sparrow	1	mine RSA	11V	504718	7037267
18-Jun-07	Chipping sparrow	1	mine RSA	11V	512412	7047186
18-Jun-07	Chipping sparrow	1	mine RSA	11V	512343	7047322
18-Jun-07	Chipping sparrow	1	mine RSA	11V	512593	7047350
18-Jun-07	Chipping sparrow	1	mine RSA	11V	513091	7047392
18-Jun-07	Chipping sparrow	1	mine RSA	11V	514486	7047403
18-Jun-07	Chipping sparrow	1	mine RSA	11V		
18-Jun-07	Chipping sparrow	2	mine RSA	11V	514917	7046398
18-Jun-07	Chipping sparrow	1	mine RSA	11V	515006	7045484
16-Jun-07	Lincoln's sparrow	1	mine RSA	11V	505263	7037282
16-Jun-07	Lincoln's sparrow	1	mine RSA	11V	505235	7036089
17-Jun-07	Lincoln's sparrow	1	mine RSA	11V	509849	7047389
17-Jun-07	Lincoln's sparrow	1	mine RSA	11V	509712	7047149
17-Jun-07	Lincoln's sparrow	1	mine RSA	11V		
17-Jun-07	Lincoln's sparrow	1	mine RSA	11V	508890	7045949
18-Jun-07	Lincoln's sparrow	1	mine RSA	11V	512657	7047238
18-Jun-07	Lincoln's sparrow	1	mine RSA	11V	512593	7047350
18-Jun-07	Lincoln's sparrow	1	mine RSA	11V	513715	7047281
18-Jun-07	Lincoln's sparrow	1	mine RSA	11V	514130	7047430
18-Jun-07	Lincoln's sparrow	1	mine RSA	11V	514820	7047259
18-Jun-07	Lincoln's sparrow	1	mine RSA	11V	514704	7047076
17-Jun-07	Song sparrow	1	mine RSA	11V	509725	7046669
17-Jun-07	Swamp sparrow	1	mine RSA	11V	509849	7047389
17-Jun-07	Swamp sparrow	1	mine RSA	11V		
17-Jun-07	Swamp sparrow	1	mine RSA	11V	508890	7045949
17-Jun-07	Swamp sparrow	1	mine RSA	11V	508890	7045949
17-Jun-07	Swamp sparrow	1	mine RSA	11V	508826	7045809
18-Jun-07	Swamp sparrow	1	mine RSA	11V	513176	7047160
18-Jun-07	Swamp sparrow	1	mine RSA	11V	512593	7047350
18-Jun-07	Swamp sparrow	1	mine RSA	11V	514704	7047076
17-Jun-07	White-throated sparrow	1	mine RSA	11V	509009	7045908
17-Jun-07	White-throated sparrow	1	mine RSA	11V	508946	7045650
17-Jun-07	White-throated sparrow	1	mine RSA	11V	508890	7045949
17-Jun-07	White-throated sparrow	1	mine RSA	11V	508826	7045809
17-Jun-07	Rusty blackbird	1	mine RSA	11V		

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
17-Jun-07	Rusty blackbird	2	mine RSA	11V	508826	7045809
15-Jun-07	Pine grosbeak	1	mine RSA	11V	505542	7039137
15-Jun-07	Common redpoll	1	NPAR	11V	511182	7047735
15-Jun-07	Common redpoll	1	NPAR	11V	511556	7047978
15-Jun-07	Common redpoll	1	NPAR	11V		
15-Jun-07	Common redpoll	1	NPAR	11V	505785	7037498
16-Jun-07	Common redpoll	1	mine RSA	11V	509444	7048198
16-Jun-07	Common redpoll	1	mine RSA	11V	509406	7047949
16-Jun-07	Common redpoll	1	mine RSA	11V	505592	7037640
16-Jun-07	Common redpoll	1	mine RSA	11V	505263	7037282
17-Jun-07	Common redpoll	1	mine RSA	11V	508827	7045697
17-Jun-07	Common redpoll	1	mine RSA	11V	510020	7046491
17-Jun-07	Common redpoll	1	mine RSA	11V	509630	7045204
18-Jun-07	Common redpoll	1	mine RSA	11V	513581	7047284
18-Jun-07	Common redpoll	1	mine RSA	11V	514127	7047796
18-Jun-07	Common redpoll	1	mine RSA	11V	514984	7046613
18-Jun-07	Common redpoll	1	mine RSA	11V		
14-Jun-07	Unknown	1	NPAR	11V	510724	7047910
14-Jun-07	Unknown	1	NPAR	11V	510998	7046639
15-Jun-07	Unknown	1	NPAR	11V	511059	7048033
15-Jun-07	Unknown	1	NPAR	11V	511556	7047978
15-Jun-07	Unknown	1	NPAR	11V		
15-Jun-07	Unknown	1	NPAR	11V	505627	7037811
15-Jun-07	Unknown	1	NPAR	11V	505685	7038846
16-Jun-07	Unknown	1	mine RSA	11V	509406	7047949
16-Jun-07	Unknown	1	mine RSA	11V	505235	7036089
16-Jun-07	Unknown	1	mine RSA	11V	504818	7037493
17-Jun-07	Unknown	1	mine RSA	11V		
17-Jun-07	Unknown	1	mine RSA	11V	508826	7045809
18-Jun-07	Unknown	1	mine RSA	11V		
18-Jun-07	Unknown	1	mine RSA	11V	512657	7047238
18-Jun-07	Unknown	1	mine RSA	11V	513411	7047083
18-Jun-07	Unknown	1	mine RSA	11V	513091	7047392
18-Jun-07	Unknown	2	mine RSA	11V	514130	7047430
18-Jun-07	Unknown	1	mine RSA	11V	514968	7046577
18-Jun-07	Unknown	1	mine RSA	11V	514805	7046083
18-Jun-07	Unknown	1	mine RSA	11V	514826	7045831
18-Jun-07	Unknown	2	mine RSA	11V	515006	7045484
11-Jun-08	Spruce grouse	1	mine RSA	11V	513879	7045173
12-Jun-08	Spruce grouse	1	mine RSA	11V	514969	7047511

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
11-Jun-08	Wilson's snipe	1	mine RSA	11V	514393	7045408
11-Jun-08	Wilson's snipe	1	mine RSA	11V	514495	7045252
12-Jun-08	Wilson's snipe	1	mine RSA	11V	514211	7047374
12-Jun-08	Lesser yellowlegs	1	mine RSA	11V	514473	7047392
13-Jun-08	Northern flicker	1	mine RSA	11V	509037	7046142
12-Jun-08	Alder flycatcher	1	mine RSA	11V	513810	7047327
13-Jun-08	Least flycatcher	1	mine RSA	11V	509813	7047170
11-Jun-08	Olive-sided flycatcher	1	mine RSA	11V	513860	7045204
13-Jun-08	Olive-sided flycatcher	1	mine RSA	11V	508735	7046360
13-Jun-08	Western wood-pewee	1	mine RSA	11V	508934	7046326
10-Jun-08	Gray jay	1	mine RSA	11V	511252	7045715
10-Jun-08	Gray jay	1	mine RSA	11V	512312	7045292
10-Jun-08	Gray jay	1	mine RSA	11V	511671	7045741
10-Jun-08	Gray jay	1	mine RSA	11V	511465	7045689
11-Jun-08	Gray jay	1	mine RSA	11V	514088	7044977
11-Jun-08	Gray jay	1	mine RSA	11V	514495	7045252
11-Jun-08	Gray jay	1	mine RSA	11V	514778	7045533
11-Jun-08	Gray jay	1	mine RSA	11V	514182	7045569
11-Jun-08	Gray jay	1	mine RSA	11V	514087	7045152
11-Jun-08	Gray jay	1	mine RSA	11V	514007	7045628
12-Jun-08	Gray jay	1	mine RSA	11V	513994	7047618
12-Jun-08	Gray jay	1	mine RSA	11V	512807	7047403
12-Jun-08	Gray jay	1	mine RSA	11V	512960	7047521
12-Jun-08	Gray jay	1	mine RSA	11V	512759	7047473
12-Jun-08	Gray jay	1	mine RSA	11V	513578	7047583
12-Jun-08	Gray jay	3	mine RSA	11V	513988	7047427
13-Jun-08	Gray jay	1	mine RSA	11V	508900	7045765
13-Jun-08	Gray jay	1	mine RSA	11V	508735	7046360
13-Jun-08	Gray jay	1	mine RSA	11V	509925	7047337
11-Jun-08	Boreal chickadee	1	mine RSA	11V	514278	7045235
12-Jun-08	Townsend's solitaire	1	mine RSA	11V	514199	7047574
12-Jun-08	Townsend's solitaire	1	mine RSA	11V	513787	7047608
12-Jun-08	Townsend's solitaire	1	mine RSA	11V	513578	7047583
11-Jun-08	Ruby-crowned kinglet	1	mine RSA	11V	514356	7045167
11-Jun-08	Ruby-crowned kinglet	1	mine RSA	11V	514939	7045399
11-Jun-08	Ruby-crowned kinglet	1	mine RSA	11V	513860	7045204
13-Jun-08	Ruby-crowned kinglet	1	mine RSA	11V	509037	7046142
13-Jun-08	American robin	1	mine RSA	11V	508855	7045950
10-Jun-08	Hermit thrush	1	mine RSA	11V	510708	7046031
10-Jun-08	Hermit thrush	1	mine RSA	11V	510746	7046276

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
10-Jun-08	Hermit thrush	1	mine RSA	11V	510049	7047192
10-Jun-08	Hermit thrush	1	mine RSA	11V	510608	7046761
11-Jun-08	Hermit thrush	1	mine RSA	11V	514087	7045152
12-Jun-08	Hermit thrush	1	mine RSA	11V	512960	7047521
12-Jun-08	Hermit thrush	1	mine RSA	11V	514199	7047574
12-Jun-08	Hermit thrush	1	mine RSA	11V	512370	7047350
12-Jun-08	Hermit thrush	1	mine RSA	11V	511517	7047872
13-Jun-08	Hermit thrush	1	mine RSA	11V	509925	7047337
10-Jun-08	Swainson's thrush	1	mine RSA	11V	510049	7047192
10-Jun-08	Swainson's thrush	1	mine RSA	11V	510898	7045922
10-Jun-08	Swainson's thrush	1	mine RSA	11V	511081	7045815
10-Jun-08	Swainson's thrush	1	mine RSA	11V	510239	7047365
11-Jun-08	Swainson's thrush	1	mine RSA	11V	512497	7046167
11-Jun-08	Swainson's thrush	1	mine RSA	11V	514088	7044977
11-Jun-08	Swainson's thrush	1	mine RSA	11V	514007	7045628
11-Jun-08	Swainson's thrush	1	mine RSA	11V	513818	7045703
11-Jun-08	Swainson's thrush	1	mine RSA	11V	513626	7045768
12-Jun-08	Swainson's thrush	2	mine RSA	11V	514703	7047334
12-Jun-08	Swainson's thrush	1	mine RSA	11V	514899	7047359
13-Jun-08	Swainson's thrush	1	mine RSA	11V	508875	7045874
13-Jun-08	Swainson's thrush	1	mine RSA	11V	509590	7047958
13-Jun-08	Swainson's thrush	1	mine RSA	11V	509813	7047170
13-Jun-08	Swainson's thrush	1	mine RSA	11V	509743	7046978
13-Jun-08	Swainson's thrush	1	mine RSA	11V	508855	7045950
13-Jun-08	Swainson's thrush	1	mine RSA	11V	509037	7046142
13-Jun-08	Blackpoll warbler	1	mine RSA	11V	508977	7046118
13-Jun-08	Blackpoll warbler	1	mine RSA	11V	509446	7046902
10-Jun-08	Northern waterthrush	1	mine RSA	11V	514768	7045818
11-Jun-08	Northern waterthrush	1	mine RSA	11V	514778	7045533
11-Jun-08	Northern waterthrush	1	mine RSA	11V	514278	7045235
11-Jun-08	Northern waterthrush	1	mine RSA	11V	515012	7045481
11-Jun-08	Northern waterthrush	1	mine RSA	11V	513879	7045173
11-Jun-08	Northern waterthrush	1	mine RSA	11V	514087	7045152
11-Jun-08	Northern waterthrush	2	mine RSA	11V	513860	7045204
12-Jun-08	Northern waterthrush	1	mine RSA	11V	514703	7047334
12-Jun-08	Northern waterthrush	2	mine RSA	11V	514899	7047359
13-Jun-08	Northern waterthrush	1	mine RSA	11V	508900	7045765
13-Jun-08	Northern waterthrush	1	mine RSA	11V	508875	7045874
13-Jun-08	Northern waterthrush	1	mine RSA	11V	509037	7046142
13-Jun-08	Northern waterthrush	1	mine RSA	11V	508934	7046326

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jun-08	Northern waterthrush	1	mine RSA	11V	508785	7045810
10-Jun-08	Orange-crowned warbler	1	mine RSA	11V	511934	7045489
10-Jun-08	Orange-crowned warbler	1	mine RSA	11V	511820	7045616
10-Jun-08	Orange-crowned warbler	1	mine RSA	11V	511671	7045741
10-Jun-08	Orange-crowned warbler	1	mine RSA	11V	511465	7045689
10-Jun-08	Orange-crowned warbler	1	mine RSA	11V	510708	7046031
10-Jun-08	Orange-crowned warbler	1	mine RSA	11V	510608	7046761
10-Jun-08	Orange-crowned warbler	1	mine RSA	11V	511252	7045715
10-Jun-08	Orange-crowned warbler	2	mine RSA	11V	511081	7045815
11-Jun-08	Orange-crowned warbler	2	mine RSA	11V	513242	7045702
11-Jun-08	Orange-crowned warbler	1	mine RSA	11V	513389	7045663
11-Jun-08	Orange-crowned warbler	1	mine RSA	11V	515146	7045628
11-Jun-08	Orange-crowned warbler	2	mine RSA	11V	513818	7045703
11-Jun-08	Orange-crowned warbler	2	mine RSA	11V	513443	7045831
11-Jun-08	Orange-crowned warbler	1	mine RSA	11V	514007	7045628
11-Jun-08	Orange-crowned warbler	1	mine RSA	11V	513618	7045579
11-Jun-08	Orange-crowned warbler	1	mine RSA	11V	513783	7045394
12-Jun-08	Orange-crowned warbler	1	mine RSA	11V	512566	7047300
12-Jun-08	Orange-crowned warbler	1	mine RSA	11V	512408	7047231
12-Jun-08	Orange-crowned warbler	1	mine RSA	11V	512370	7047350
12-Jun-08	Orange-crowned warbler	1	mine RSA	11V	514609	7047542
12-Jun-08	Orange-crowned warbler	1	mine RSA	11V	514407	7047540
12-Jun-08	Orange-crowned warbler	1	mine RSA	11V	513578	7047583
12-Jun-08	Orange-crowned warbler	1	mine RSA	11V	513374	7047578
13-Jun-08	Orange-crowned warbler	1	mine RSA	11V	509446	7046902
13-Jun-08	Orange-crowned warbler	1	mine RSA	11V	508735	7046360
13-Jun-08	Orange-crowned warbler	1	mine RSA	11V	508855	7045950
10-Jun-08	Palm warbler	1	mine RSA	11V	510239	7047365
10-Jun-08	Palm warbler	1	mine RSA	11V	510260	7047056
11-Jun-08	Palm warbler	1	mine RSA	11V	512497	7046167
12-Jun-08	Palm warbler	1	mine RSA	11V	513374	7047578
12-Jun-08	Palm warbler	1	mine RSA	11V	513016	7047384
12-Jun-08	Palm warbler	1	mine RSA	11V	513419	7047303
12-Jun-08	Palm warbler	1	mine RSA	11V	513602	7047358
11-Jun-08	Tennessee warbler	1	mine RSA	11V	513618	7045579
11-Jun-08	Tennessee warbler	1	mine RSA	11V	513626	7045768
11-Jun-08	Tennessee warbler	1	mine RSA	11V	513860	7045204
13-Jun-08	Tennessee warbler	1	mine RSA	11V	508785	7045810
13-Jun-08	Tennessee warbler	2	mine RSA	11V	508900	7045765
13-Jun-08	Tennessee warbler	1	mine RSA	11V	508934	7046326

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jun-08	Tennessee warbler	1	mine RSA	11V	508839	7045637
13-Jun-08	Yellow warbler	1	mine RSA	11V	508875	7045874
13-Jun-08	Yellow warbler	1	mine RSA	11V	508977	7046118
13-Jun-08	Yellow warbler	2	mine RSA	11V	508785	7045810
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	510049	7047192
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	510260	7047056
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	511465	7045689
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	511252	7045715
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	511081	7045815
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	510898	7045922
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	510608	7046761
10-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	510433	7046947
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	514495	7045252
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	514393	7045408
11-Jun-08	Yellow-rumped warbler	2	mine RSA	11V	514235	7045086
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	514778	7045533
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	513915	7045028
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	515146	7045628
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	513107	7045766
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	513242	7045702
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	513389	7045663
11-Jun-08	Yellow-rumped warbler	2	mine RSA	11V	514007	7045628
11-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	513783	7045394
12-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	514899	7047359
12-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	513175	7047542
12-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	511978	7047484
12-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	513221	7047383
12-Jun-08	Yellow-rumped warbler	2	mine RSA	11V	514703	7047334
12-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	512566	7047300
13-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	508839	7045637
13-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	508875	7045874
13-Jun-08	Yellow-rumped warbler	1	mine RSA	11V	509230	7045753
10-Jun-08	Dark-eyed junco	1	mine RSA	11V	510260	7047056
10-Jun-08	Dark-eyed junco	2	mine RSA	11V	510239	7047365
10-Jun-08	Dark-eyed junco	1	mine RSA	11V	511081	7045815
10-Jun-08	Dark-eyed junco	1	mine RSA	11V	511252	7045715
11-Jun-08	Dark-eyed junco	2	mine RSA	11V	513107	7045766
11-Jun-08	Dark-eyed junco	1	mine RSA	11V	513915	7045028
11-Jun-08	Dark-eyed junco	1	mine RSA	11V	513389	7045663
11-Jun-08	Dark-eyed junco	1	mine RSA	11V	513242	7045702

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
11-Jun-08	Dark-eyed junco	1	mine RSA	11V	514939	7045399
12-Jun-08	Dark-eyed junco	1	mine RSA	11V	511300	7047683
12-Jun-08	Dark-eyed junco	1	mine RSA	11V	511568	7047695
12-Jun-08	Dark-eyed junco	1	mine RSA	11V	511978	7047484
12-Jun-08	Dark-eyed junco	1	mine RSA	11V	512960	7047521
12-Jun-08	Dark-eyed junco	2	mine RSA	11V	513175	7047542
12-Jun-08	Dark-eyed junco	1	mine RSA	11V	514814	7047520
13-Jun-08	Dark-eyed junco	1	mine RSA	11V	508875	7045874
13-Jun-08	Dark-eyed junco	1	mine RSA	11V	509832	7047388
13-Jun-08	Dark-eyed junco	1	mine RSA	11V	508977	7046118
13-Jun-08	Dark-eyed junco	1	mine RSA	11V	508900	7045765
10-Jun-08	Chipping sparrow	1	mine RSA	11V	511081	7045815
10-Jun-08	Chipping sparrow	1	mine RSA	11V	510898	7045922
10-Jun-08	Chipping sparrow	1	mine RSA	11V	510708	7046031
10-Jun-08	Chipping sparrow	1	mine RSA	11V	510677	7047838
10-Jun-08	Chipping sparrow	2	mine RSA	11V	510412	7047524
11-Jun-08	Chipping sparrow	1	mine RSA	11V	513626	7045768
11-Jun-08	Chipping sparrow	1	mine RSA	11V	513242	7045702
11-Jun-08	Chipping sparrow	1	mine RSA	11V	513107	7045766
11-Jun-08	Chipping sparrow	1	mine RSA	11V	512828	7045888
11-Jun-08	Chipping sparrow	1	mine RSA	11V	512531	7045975
11-Jun-08	Chipping sparrow	1	mine RSA	11V	514087	7045152
11-Jun-08	Chipping sparrow	1	mine RSA	11V	513818	7045703
11-Jun-08	Chipping sparrow	2	mine RSA	11V	513389	7045663
11-Jun-08	Chipping sparrow	1	mine RSA	11V	514007	7045628
12-Jun-08	Chipping sparrow	1	mine RSA	11V	512960	7047521
12-Jun-08	Chipping sparrow	2	mine RSA	11V	513374	7047578
12-Jun-08	Chipping sparrow	1	mine RSA	11V	513221	7047383
12-Jun-08	Chipping sparrow	2	mine RSA	11V	514473	7047392
12-Jun-08	Chipping sparrow	1	mine RSA	11V	513810	7047327
12-Jun-08	Chipping sparrow	1	mine RSA	11V	514703	7047334
12-Jun-08	Chipping sparrow	1	mine RSA	11V	512408	7047231
13-Jun-08	Chipping sparrow	1	mine RSA	11V	508735	7046360
13-Jun-08	Chipping sparrow	1	mine RSA	11V	509686	7046769
13-Jun-08	Chipping sparrow	1	mine RSA	11V	509037	7046142
13-Jun-08	Chipping sparrow	2	mine RSA	11V	508839	7045637
13-Jun-08	Chipping sparrow	1	mine RSA	11V	508900	7045765
13-Jun-08	Chipping sparrow	2	mine RSA	11V	509230	7045753
10-Jun-08	Lincoln's sparrow	1	mine RSA	11V	510239	7047365
10-Jun-08	Lincoln's sparrow	1	mine RSA	11V	510412	7047524

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
10-Jun-08	Lincoln's sparrow	1	mine RSA	11V	510520	7047662
11-Jun-08	Lincoln's sparrow	1	mine RSA	11V	512959	7045819
12-Jun-08	Lincoln's sparrow	1	mine RSA	11V	512807	7047403
11-Jun-08	Swamp sparrow	1	mine RSA	11V	513389	7045663
11-Jun-08	Swamp sparrow	1	mine RSA	11V	513107	7045766
11-Jun-08	Swamp sparrow	1	mine RSA	11V	513242	7045702
11-Jun-08	Swamp sparrow	1	mine RSA	11V	513618	7045579
11-Jun-08	Swamp sparrow	2	mine RSA	11V	515012	7045481
13-Jun-08	Swamp sparrow	1	mine RSA	11V	508875	7045874
13-Jun-08	Swamp sparrow	1	mine RSA	11V	508977	7046118
13-Jun-08	Swamp sparrow	2	mine RSA	11V	508785	7045810
13-Jun-08	Swamp sparrow	1	mine RSA	11V	508959	7046032
13-Jun-08	Swamp sparrow	1	mine RSA	11V	508900	7045765
13-Jun-08	White-throated sparrow	1	mine RSA	11V	508875	7045874
13-Jun-08	White-throated sparrow	1	mine RSA	11V	508855	7045950
11-Jun-08	Common redpoll	2	mine RSA	11V	513080	7045984
12-Jun-08	Common redpoll	1	mine RSA	11V	514199	7047574
12-Jun-08	Common redpoll	1	mine RSA	11V	512960	7047521
12-Jun-08	Common redpoll	1	mine RSA	11V	512807	7047403
12-Jun-08	Common redpoll	1	mine RSA	11V	513016	7047384
12-Jun-08	Common redpoll	1	mine RSA	11V	511324	7047946
13-Jun-08	Common redpoll	1	mine RSA	11V	508977	7046118
10-Jun-08	Unknown	1	mine RSA	11V	510677	7047838
11-Jun-08	Unknown	1	mine RSA	11V	515146	7045628
11-Jun-08	Unknown	1	mine RSA	11V	513242	7045702
11-Jun-08	Unknown	1	mine RSA	11V	513818	7045703
11-Jun-08	Unknown	1	mine RSA	11V	513389	7045663
11-Jun-08	Unknown	1	mine RSA	11V	513915	7045028
11-Jun-08	Unknown	1	mine RSA	11V	512828	7045888
11-Jun-08	Unknown	1	mine RSA	11V	514088	7044977
12-Jun-08	Unknown	1	mine RSA	11V	513988	7047427
12-Jun-08	Unknown	2	mine RSA	11V	512408	7047231
12-Jun-08	Unknown	2	mine RSA	11V	514211	7047374
12-Jun-08	Unknown	1	mine RSA	11V	512807	7047403
13-Jun-08	Unknown	1	mine RSA	11V	509540	7045614
17-Jun-09	American kestrel	1	mine RSA	11V	513443	7047652
15-Jun-09	Spruce grouse	1	mine RSA	11V	513617	7045774
16-Jun-09	Spotted sandpiper	1	mine RSA	11V	514271	7045233
14-Jun-09	Wilson's snipe	1	mine RSA	11V	513709	7045540
14-Jun-09	Wilson's snipe	1	mine RSA	11V	513744	7045317

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jun-09	Wilson's snipe	1	mine RSA	11V	514037	7046003
15-Jun-09	Wilson's snipe	1	mine RSA	11V	513387	7045665
15-Jun-09	Wilson's snipe	1	mine RSA	11V	513081	7046686
15-Jun-09	Wilson's snipe	1	mine RSA	11V	512361	7046943
15-Jun-09	Wilson's snipe	1	mine RSA	11V	512062	7047057
16-Jun-09	Wilson's snipe	1	mine RSA	11V	514568	7045086
17-Jun-09	Wilson's snipe	1	mine RSA	11V	513181	7047167
14-Jun-09	Lesser yellowlegs	1	mine RSA	11V	513995	7045404
15-Jun-09	Lesser yellowlegs	1	mine RSA	11V	513387	7045665
15-Jun-09	Lesser yellowlegs	1	mine RSA	11V	511832	7046432
17-Jun-09	Lesser yellowlegs	1	mine RSA	11V	514207	7047372
17-Jun-09	Common nighthawk	1	mine RSA	11V	513580	7047579
13-Jun-09	Northern flicker	1	mine RSA	11V	510261	7047061
13-Jun-09	Northern flicker	1	mine RSA	11V	510935	7046876
15-Jun-09	Northern flicker	1	mine RSA	11V	512955	7045824
15-Jun-09	Northern flicker	1	mine RSA	11V	512052	7046360
15-Jun-09	Northern flicker	1	mine RSA	11V	512062	7047057
16-Jun-09	Alder flycatcher	1	mine RSA	11V	514760	7045818
16-Jun-09	Alder flycatcher	1	mine RSA	11V	515162	7045599
16-Jun-09	Alder flycatcher	1	mine RSA	11V	514874	7045608
16-Jun-09	Alder flycatcher	1	mine RSA	11V	515013	7045476
17-Jun-09	Alder flycatcher	1	mine RSA	11V	513411	7047081
13-Jun-09	Eastern phoebe	1	mine RSA	11V	510800	7048053
16-Jun-09	Olive-sided flycatcher	1	mine RSA	11V	514495	7044946
14-Jun-09	Gray jay	1	mine RSA	11V	513744	7045317
16-Jun-09	Gray jay	3	mine RSA	11V	512615	7045333
17-Jun-09	Gray jay	2	mine RSA	11V	513336	7047312
15-Jun-09	Common raven	1	mine RSA	11V	511189	7047736
15-Jun-09	Boreal chickadee	1	mine RSA	11V	511835	7047143
13-Jun-09	Townsend's solitare	1	mine RSA	11V	510433	7046949
13-Jun-09	Townsend's solitare	1	mine RSA	11V	510606	7046759
13-Jun-09	Townsend's solitare	1	mine RSA	11V	510606	7046759
13-Jun-09	Townsend's solitare	1	mine RSA	11V	511824	7047381
13-Jun-09	Townsend's solitare	2	mine RSA	11V	510935	7046876
15-Jun-09	Townsend's solitare	1	mine RSA	11V	513004	7045994
15-Jun-09	Townsend's solitare	1	mine RSA	11V	512869	7046167
15-Jun-09	Townsend's solitare	1	mine RSA	11V	512052	7046360
15-Jun-09	Townsend's solitare	1	mine RSA	11V	511832	7046432
15-Jun-09	Townsend's solitare	1	mine RSA	11V	512820	7046784
15-Jun-09	Townsend's solitare	1	mine RSA	11V	511189	7047736

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jun-09	Ruby-crowned kinglet	1	mine RSA	11V	510412	7047530
13-Jun-09	Ruby-crowned kinglet	1	mine RSA	11V	510052	7047192
16-Jun-09	Ruby-crowned kinglet	1	mine RSA	11V	513877	7045183
16-Jun-09	Ruby-crowned kinglet	1	mine RSA	11V	513523	7044787
16-Jun-09	Ruby-crowned kinglet	1	mine RSA	11V	513198	7044917
16-Jun-09	Ruby-crowned kinglet	1	mine RSA	11V	513246	7044769
16-Jun-09	Ruby-crowned kinglet	1	mine RSA	11V	513246	7044769
15-Jun-09	American robin	1	mine RSA	11V	513198	7046378
16-Jun-09	American robin	1	mine RSA	11V	514647	7045946
16-Jun-09	American robin	1	mine RSA	11V	514760	7045818
16-Jun-09	American robin	1	mine RSA	11V	514793	7045422
16-Jun-09	American robin	1	mine RSA	11V	514793	7045422
16-Jun-09	American robin	1	mine RSA	11V	514588	7045459
16-Jun-09	American robin	1	mine RSA	11V	514759	7045214
16-Jun-09	American robin	1	mine RSA	11V	514568	7045086
16-Jun-09	American robin	1	mine RSA	11V	514495	7044946
16-Jun-09	American robin	1	mine RSA	11V	514092	7045160
16-Jun-09	American robin	1	mine RSA	11V	513877	7045183
16-Jun-09	American robin	1	mine RSA	11V	512034	7045332
16-Jun-09	American robin	1	mine RSA	11V	511715	7045240
16-Jun-09	American robin	1	mine RSA	11V	511713	7045489
17-Jun-09	American robin	1	mine RSA	11V	513760	7047450
13-Jun-09	Hermit thrush	1	mine RSA	11V	510052	7047192
13-Jun-09	Hermit thrush	1	mine RSA	11V	510261	7047061
13-Jun-09	Hermit thrush	1	mine RSA	11V	510606	7046759
13-Jun-09	Hermit thrush	1	mine RSA	11V	510906	7046421
13-Jun-09	Hermit thrush	1	mine RSA	11V	511389	7047005
13-Jun-09	Hermit thrush	1	mine RSA	11V	511389	7047005
13-Jun-09	Hermit thrush	1	mine RSA	11V	511600	7047243
13-Jun-09	Hermit thrush	2	mine RSA	11V	510261	7047061
13-Jun-09	Hermit thrush	2	mine RSA	11V	510606	7046759
13-Jun-09	Hermit thrush	2	mine RSA	11V	510935	7046876
14-Jun-09	Hermit thrush	1	mine RSA	11V	513744	7045317
15-Jun-09	Hermit thrush	1	mine RSA	11V	513617	7045774
15-Jun-09	Hermit thrush	1	mine RSA	11V	513617	7045774
15-Jun-09	Hermit thrush	1	mine RSA	11V	513617	7045774
15-Jun-09	Hermit thrush	1	mine RSA	11V	513004	7045994
15-Jun-09	Hermit thrush	1	mine RSA	11V	513004	7045994
15-Jun-09	Hermit thrush	1	mine RSA	11V	513205	7045727
15-Jun-09	Hermit thrush	1	mine RSA	11V	512955	7045824

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
15-Jun-09	Hermit thrush	1	mine RSA	11V	512788	7045746
15-Jun-09	Hermit thrush	1	mine RSA	11V	512550	7045789
15-Jun-09	Hermit thrush	1	mine RSA	11V	512496	7046170
15-Jun-09	Hermit thrush	1	mine RSA	11V	512782	7045963
15-Jun-09	Hermit thrush	1	mine RSA	11V	512820	7046784
15-Jun-09	Hermit thrush	1	mine RSA	11V	511591	7047473
15-Jun-09	Hermit thrush	1	mine RSA	11V	511835	7047143
15-Jun-09	Hermit thrush	1	mine RSA	11V	511712	7046815
15-Jun-09	Hermit thrush	1	mine RSA	11V	511189	7047736
15-Jun-09	Hermit thrush	2	mine RSA	11V	512062	7047057
15-Jun-09	Hermit thrush	3	mine RSA	11V	512597	7046251
16-Jun-09	Hermit thrush	1	mine RSA	11V	515069	7045817
16-Jun-09	Hermit thrush	1	mine RSA	11V	513246	7044769
13-Jun-09	Swainson's thrush	1	mine RSA	11V	510800	7048053
13-Jun-09	Swainson's thrush	1	mine RSA	11V	510520	7047653
13-Jun-09	Swainson's thrush	1	mine RSA	11V	510412	7047530
13-Jun-09	Swainson's thrush	1	mine RSA	11V	510412	7047530
13-Jun-09	Swainson's thrush	1	mine RSA	11V	510052	7047192
13-Jun-09	Swainson's thrush	1	mine RSA	11V	510433	7046949
13-Jun-09	Swainson's thrush	2	mine RSA	11V	510245	7047362
13-Jun-09	Swainson's thrush	2	mine RSA	11V	510261	7047061
13-Jun-09	Swainson's thrush	3	mine RSA	11V	510906	7046421
14-Jun-09	Swainson's thrush	1	mine RSA	11V	513709	7045540
14-Jun-09	Swainson's thrush	1	mine RSA	11V	514037	7046003
14-Jun-09	Swainson's thrush	1	mine RSA	11V	514279	7046005
14-Jun-09	Swainson's thrush	1	mine RSA	11V	514279	7046005
15-Jun-09	Swainson's thrush	1	mine RSA	11V	513617	7045774
15-Jun-09	Swainson's thrush	1	mine RSA	11V	513238	7045992
15-Jun-09	Swainson's thrush	1	mine RSA	11V	513445	7045829
15-Jun-09	Swainson's thrush	1	mine RSA	11V	513387	7045665
15-Jun-09	Swainson's thrush	1	mine RSA	11V	512315	7046230
15-Jun-09	Swainson's thrush	1	mine RSA	11V	512315	7046230
15-Jun-09	Swainson's thrush	1	mine RSA	11V	512782	7045963
15-Jun-09	Swainson's thrush	2	mine RSA	11V	513387	7045665
15-Jun-09	Swainson's thrush	2	mine RSA	11V	512693	7045953
16-Jun-09	Swainson's thrush	1	mine RSA	11V	514183	7044877
16-Jun-09	Swainson's thrush	1	mine RSA	11V	513893	7044833
16-Jun-09	Swainson's thrush	1	mine RSA	11V	513523	7044787
16-Jun-09	Swainson's thrush	1	mine RSA	11V	513246	7044769
16-Jun-09	Swainson's thrush	1	mine RSA	11V	512986	7044744

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
16-Jun-09	Swainson's thrush	2	mine RSA	11V	514647	7045946
17-Jun-09	Swainson's thrush	1	mine RSA	11V	512955	7047515
17-Jun-09	Swainson's thrush	1	mine RSA	11V	513580	7047579
17-Jun-09	Swainson's thrush	1	mine RSA	11V	513336	7047312
17-Jun-09	Swainson's thrush	1	mine RSA	11V	514610	7047541
17-Jun-09	Swainson's thrush	1	mine RSA	11V	514913	7047357
17-Jun-09	Swainson's thrush	1	mine RSA	11V	514486	7047405
17-Jun-09	Swainson's thrush	1	mine RSA	11V	514874	7047100
14-Jun-09	Blackpoll warbler	1	mine RSA	11V	513709	7045540
15-Jun-09	Blackpoll warbler	1	mine RSA	11V	513617	7045774
16-Jun-09	Blackpoll warbler	1	mine RSA	11V	513635	7045069
16-Jun-09	Blackpoll warbler	1	mine RSA	11V	513523	7044787
16-Jun-09	Blackpoll warbler	1	mine RSA	11V	512986	7044744
17-Jun-09	Blackpoll warbler	1	mine RSA	11V	513760	7047450
14-Jun-09	Northern waterthrush	2	mine RSA	11V	513744	7045317
16-Jun-09	Northern waterthrush	1	mine RSA	11V	514647	7045946
16-Jun-09	Northern waterthrush	1	mine RSA	11V	514760	7045818
16-Jun-09	Northern waterthrush	1	mine RSA	11V	514874	7045608
16-Jun-09	Northern waterthrush	1	mine RSA	11V	514874	7045608
16-Jun-09	Northern waterthrush	1	mine RSA	11V	514588	7045459
16-Jun-09	Northern waterthrush	1	mine RSA	11V	514383	7045419
16-Jun-09	Northern waterthrush	1	mine RSA	11V	513877	7045183
16-Jun-09	Northern waterthrush	1	mine RSA	11V	513893	7044833
16-Jun-09	Northern waterthrush	1	mine RSA	11V	513635	7045069
16-Jun-09	Northern waterthrush	2	mine RSA	11V	513523	7044787
13-Jun-09	Orange-crowned warbler	1	mine RSA	11V	510433	7046949
13-Jun-09	Orange-crowned warbler	1	mine RSA	11V	510606	7046759
13-Jun-09	Orange-crowned warbler	1	mine RSA	11V	510699	7046505
13-Jun-09	Orange-crowned warbler	1	mine RSA	11V	510999	7046636
13-Jun-09	Orange-crowned warbler	2	mine RSA	11V	510906	7046421
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	513238	7045992
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	513238	7045992
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	512869	7046167
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	512597	7046251
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	512315	7046230
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	512315	7046230
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	512496	7046170
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	512062	7047057
15-Jun-09	Orange-crowned warbler	1	mine RSA	11V	512062	7047057
16-Jun-09	Orange-crowned warbler	1	mine RSA	11V	514647	7045946

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
16-Jun-09	Orange-crowned warbler	1	mine RSA	11V	513198	7044917
17-Jun-09	Orange-crowned warbler	1	mine RSA	11V	513443	7047652
17-Jun-09	Orange-crowned warbler	1	mine RSA	11V	514000	7047603
17-Jun-09	Orange-crowned warbler	1	mine RSA	11V	514913	7047357
17-Jun-09	Orange-crowned warbler	1	mine RSA	11V	515100	7046847
15-Jun-09	Palm warbler	1	mine RSA	11V	513387	7045665
15-Jun-09	Palm warbler	3	mine RSA	11V	513617	7045774
16-Jun-09	Palm warbler	1	mine RSA	11V	512615	7045333
17-Jun-09	Palm warbler	1	mine RSA	11V	513580	7047579
17-Jun-09	Palm warbler	1	mine RSA	11V	513580	7047579
17-Jun-09	Palm warbler	1	mine RSA	11V	514000	7047603
17-Jun-09	Palm warbler	1	mine RSA	11V	514486	7047405
16-Jun-09	Tennessee warbler	1	mine RSA	11V	515162	7045599
16-Jun-09	Tennessee warbler	1	mine RSA	11V	514183	7044877
15-Jun-09	Yellow warbler	1	mine RSA	11V	512550	7045789
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510800	7048053
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510682	7047837
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510412	7047530
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510052	7047192
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510052	7047192
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510052	7047192
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510261	7047061
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510433	7046949
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510699	7046505
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510699	7046505
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510906	7046421
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	510935	7046876
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511147	7046915
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511147	7046915
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511147	7046915
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511389	7047005
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511600	7047243
13-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511824	7047381
13-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	510245	7047362
13-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	510999	7046636
13-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	511824	7047381
13-Jun-09	Yellow-rumped warbler	3	mine RSA	11V	510261	7047061
14-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513744	7045317
14-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514037	7046003
14-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514279	7046005

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513969	7046193
14-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	513709	7045540
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513445	7045829
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513004	7045994
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513387	7045665
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513205	7045727
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512597	7046251
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512955	7045824
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512955	7045824
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512315	7046230
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512788	7045746
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511832	7046432
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512270	7045778
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512496	7046170
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512496	7046170
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512197	7045997
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512820	7046784
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513198	7046378
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512539	7046867
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512361	7046943
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512361	7046943
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512670	7046505
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512444	7046572
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512200	7046654
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511591	7047473
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511952	7046734
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511835	7047143
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511712	7046815
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511712	7046815
15-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	511189	7047736
15-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	513617	7045774
15-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	513617	7045774
15-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	512496	7046170
15-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	512492	7045996
15-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	513081	7046686
15-Jun-09	Yellow-rumped warbler	2	mine RSA	11V	511952	7046734
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514647	7045946
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	515162	7045599
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	515162	7045599
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	515087	7045194

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514759	7045214
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514759	7045214
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514568	7045086
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514495	7044946
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513893	7044833
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513523	7044787
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513198	7044917
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512789	7045313
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512432	7044960
16-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512079	7044968
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512955	7047515
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513084	7047387
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	512656	7047237
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513181	7047167
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513336	7047312
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513411	7047081
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	513583	7047281
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514913	7047357
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	515100	7046847
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514702	7047335
17-Jun-09	Yellow-rumped warbler	1	mine RSA	11V	514874	7047100
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510682	7047837
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510520	7047653
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510520	7047653
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510412	7047530
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510412	7047530
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510052	7047192
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510261	7047061
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510606	7046759
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510606	7046759
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510906	7046421
13-Jun-09	Dark-eyed junco	1	mine RSA	11V	510906	7046421
13-Jun-09	Dark-eyed junco	2	mine RSA	11V	510245	7047362
14-Jun-09	Dark-eyed junco	1	mine RSA	11V	513709	7045540
14-Jun-09	Dark-eyed junco	1	mine RSA	11V	514037	7046003
14-Jun-09	Dark-eyed junco	1	mine RSA	11V	514279	7046005
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	513004	7045994
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	512597	7046251
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	512315	7046230
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	512052	7046360

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	512052	7046360
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	511832	7046432
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	512492	7045996
15-Jun-09	Dark-eyed junco	1	mine RSA	11V	512820	7046784
15-Jun-09	Dark-eyed junco	2	mine RSA	11V	513081	7046686
15-Jun-09	Dark-eyed junco	2	mine RSA	11V	512539	7046867
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514647	7045946
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514760	7045818
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514874	7045608
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514874	7045608
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514793	7045422
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514588	7045459
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514759	7045214
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514568	7045086
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514271	7045233
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	514495	7044946
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	513877	7045183
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	513198	7044917
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	512655	7044834
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	512326	7045286
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	512079	7044968
16-Jun-09	Dark-eyed junco	1	mine RSA	11V	511713	7045489
16-Jun-09	Dark-eyed junco	2	mine RSA	11V	513893	7044833
16-Jun-09	Dark-eyed junco	2	mine RSA	11V	513635	7045069
16-Jun-09	Dark-eyed junco	2	mine RSA	11V	512789	7045313
17-Jun-09	Dark-eyed junco	1	mine RSA	11V	513984	7047423
17-Jun-09	Dark-eyed junco	1	mine RSA	11V	514207	7047372
17-Jun-09	Dark-eyed junco	1	mine RSA	11V	514702	7047335
13-Jun-09	Chipping sparrow	1	mine RSA	11V	510520	7047653
13-Jun-09	Chipping sparrow	1	mine RSA	11V	510520	7047653
13-Jun-09	Chipping sparrow	1	mine RSA	11V	510606	7046759
13-Jun-09	Chipping sparrow	1	mine RSA	11V	510906	7046421
13-Jun-09	Chipping sparrow	1	mine RSA	11V	510999	7046636
13-Jun-09	Chipping sparrow	1	mine RSA	11V	511147	7046915
13-Jun-09	Chipping sparrow	1	mine RSA	11V	511824	7047381
13-Jun-09	Chipping sparrow	1	mine RSA	11V	511824	7047381
13-Jun-09	Chipping sparrow	1	mine RSA	11V	511872	7047646
13-Jun-09	Chipping sparrow	2	mine RSA	11V	510699	7046505
14-Jun-09	Chipping sparrow	1	mine RSA	11V	513995	7045404
14-Jun-09	Chipping sparrow	1	mine RSA	11V	514037	7046003

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jun-09	Chipping sparrow	1	mine RSA	11V	514037	7046003
14-Jun-09	Chipping sparrow	1	mine RSA	11V	514037	7046003
14-Jun-09	Chipping sparrow	1	mine RSA	11V	513969	7046193
14-Jun-09	Chipping sparrow	2	mine RSA	11V	513744	7045317
14-Jun-09	Chipping sparrow	2	mine RSA	11V	514279	7046005
15-Jun-09	Chipping sparrow	1	mine RSA	11V	513617	7045774
15-Jun-09	Chipping sparrow	1	mine RSA	11V	513617	7045774
15-Jun-09	Chipping sparrow	1	mine RSA	11V	513445	7045829
15-Jun-09	Chipping sparrow	1	mine RSA	11V	513387	7045665
15-Jun-09	Chipping sparrow	1	mine RSA	11V	513205	7045727
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512597	7046251
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512597	7046251
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512955	7045824
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512315	7046230
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512315	7046230
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512788	7045746
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512550	7045789
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512270	7045778
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512492	7045996
15-Jun-09	Chipping sparrow	1	mine RSA	11V	513081	7046686
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512820	7046784
15-Jun-09	Chipping sparrow	1	mine RSA	11V	513198	7046378
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512670	7046505
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512670	7046505
15-Jun-09	Chipping sparrow	1	mine RSA	11V	512444	7046572
15-Jun-09	Chipping sparrow	1	mine RSA	11V	511446	7047599
15-Jun-09	Chipping sparrow	1	mine RSA	11V	511189	7047736
15-Jun-09	Chipping sparrow	2	mine RSA	11V	512197	7045997
15-Jun-09	Chipping sparrow	2	mine RSA	11V	511835	7047143
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514647	7045946
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514647	7045946
16-Jun-09	Chipping sparrow	1	mine RSA	11V	515162	7045599
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514874	7045608
16-Jun-09	Chipping sparrow	1	mine RSA	11V	515013	7045476
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514793	7045422
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514793	7045422
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514588	7045459
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514588	7045459
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514759	7045214
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514383	7045419

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514271	7045233
16-Jun-09	Chipping sparrow	1	mine RSA	11V	514495	7044946
16-Jun-09	Chipping sparrow	1	mine RSA	11V	513893	7044833
16-Jun-09	Chipping sparrow	1	mine RSA	11V	513198	7044917
16-Jun-09	Chipping sparrow	1	mine RSA	11V	512973	7045096
16-Jun-09	Chipping sparrow	1	mine RSA	11V	512655	7044834
16-Jun-09	Chipping sparrow	1	mine RSA	11V	512079	7044968
16-Jun-09	Chipping sparrow	1	mine RSA	11V	512034	7045332
16-Jun-09	Chipping sparrow	1	mine RSA	11V	511713	7045489
16-Jun-09	Chipping sparrow	1	mine RSA	11V	511713	7045489
16-Jun-09	Chipping sparrow	2	mine RSA	11V	514760	7045818
16-Jun-09	Chipping sparrow	2	mine RSA	11V	514874	7045608
16-Jun-09	Chipping sparrow	2	mine RSA	11V	515087	7045194
16-Jun-09	Chipping sparrow	2	mine RSA	11V	514183	7044877
17-Jun-09	Chipping sparrow	1	mine RSA	11V	512656	7047237
17-Jun-09	Chipping sparrow	1	mine RSA	11V	512957	7047203
17-Jun-09	Chipping sparrow	1	mine RSA	11V	513580	7047579
17-Jun-09	Chipping sparrow	1	mine RSA	11V	514000	7047603
17-Jun-09	Chipping sparrow	1	mine RSA	11V	513760	7047450
13-Jun-09	Lincoln's sparrow	1	mine RSA	11V	510800	7048053
13-Jun-09	Lincoln's sparrow	1	mine RSA	11V	510682	7047837
13-Jun-09	Lincoln's sparrow	1	mine RSA	11V	510412	7047530
13-Jun-09	Lincoln's sparrow	2	mine RSA	11V	510520	7047653
14-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513709	7045540
14-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513744	7045317
15-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513238	7045992
15-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513238	7045992
15-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513205	7045727
16-Jun-09	Lincoln's sparrow	1	mine RSA	11V	514760	7045818
16-Jun-09	Lincoln's sparrow	1	mine RSA	11V	515162	7045599
16-Jun-09	Lincoln's sparrow	1	mine RSA	11V	514874	7045608
16-Jun-09	Lincoln's sparrow	1	mine RSA	11V	515013	7045476
16-Jun-09	Lincoln's sparrow	1	mine RSA	11V	515087	7045194
16-Jun-09	Lincoln's sparrow	1	mine RSA	11V	514183	7044877
16-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513635	7045069
17-Jun-09	Lincoln's sparrow	1	mine RSA	11V	512412	7047187
17-Jun-09	Lincoln's sparrow	1	mine RSA	11V	512957	7047203
17-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513181	7047167
17-Jun-09	Lincoln's sparrow	1	mine RSA	11V	513760	7047450
17-Jun-09	Lincoln's sparrow	1	mine RSA	11V	515031	7047251

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jun-09	Swamp sparrow	1	mine RSA	11V	514007	7045827
15-Jun-09	Swamp sparrow	1	mine RSA	11V	513617	7045774
15-Jun-09	Swamp sparrow	1	mine RSA	11V	513238	7045992
15-Jun-09	Swamp sparrow	1	mine RSA	11V	513205	7045727
15-Jun-09	Swamp sparrow	1	mine RSA	11V	512955	7045824
17-Jun-09	Swamp sparrow	1	mine RSA	11V	513181	7047167
14-Jun-09	White-crowned sparrow	1	mine RSA	11V	514007	7045827
14-Jun-09	White-crowned sparrow	1	mine RSA	11V	514037	7046003
13-Jun-09	White-throated sparrow	1	mine RSA	11V	510800	7048053
14-Jun-09	White-throated sparrow	1	mine RSA	11V	514007	7045827
14-Jun-09	White-throated sparrow	1	mine RSA	11V	513744	7045317
15-Jun-09	White-throated sparrow	1	mine RSA	11V	513617	7045774
16-Jun-09	White-throated sparrow	1	mine RSA	11V	514495	7044946
16-Jun-09	White-throated sparrow	1	mine RSA	11V	511715	7045240
16-Jun-09	White-throated sparrow	1	mine RSA	11V	511713	7045489
15-Jun-09	White-winged crossbill	1	mine RSA	11V	512788	7045746
15-Jun-09	White-winged crossbill	1	mine RSA	11V	512270	7045778
15-Jun-09	White-winged crossbill	1	mine RSA	11V	512693	7045953
15-Jun-09	White-winged crossbill	1	mine RSA	11V	512922	7046419
16-Jun-09	White-winged crossbill	1	mine RSA	11V	512432	7044960
17-Jun-09	White-winged crossbill	3	mine RSA	11V	515100	7046847
13-Jun-09	Unknown	1	mine RSA	11V	510935	7046876
13-Jun-09	Unknown	2	mine RSA	11V	510245	7047362
14-Jun-09	Unknown	1	mine RSA	11V	513744	7045317
14-Jun-09	Unknown	1	mine RSA	11V	513995	7045404
14-Jun-09	Unknown	1	mine RSA	11V	514147	7045553
14-Jun-09	Unknown	1	mine RSA	11V	514221	7046255
14-Jun-09	Unknown	1	mine RSA	11V	513969	7046193
15-Jun-09	Unknown	1	mine RSA	11V	513617	7045774
15-Jun-09	Unknown	1	mine RSA	11V	513238	7045992
15-Jun-09	Unknown	1	mine RSA	11V	512597	7046251
15-Jun-09	Unknown	1	mine RSA	11V	512315	7046230
15-Jun-09	Unknown	1	mine RSA	11V	512052	7046360
15-Jun-09	Unknown	1	mine RSA	11V	511832	7046432
15-Jun-09	Unknown	1	mine RSA	11V	511832	7046432
15-Jun-09	Unknown	1	mine RSA	11V	513081	7046686
15-Jun-09	Unknown	1	mine RSA	11V	512539	7046867
15-Jun-09	Unknown	1	mine RSA	11V	512539	7046867
15-Jun-09	Unknown	1	mine RSA	11V	512361	7046943
15-Jun-09	Unknown	1	mine RSA	11V	511835	7047143

Table I-5 Upland Breeding Bird Observations, 2005 to 2008 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
16-Jun-09	Unknown	1	mine RSA	11V	514760	7045818
16-Jun-09	Unknown	1	mine RSA	11V	514183	7044877
16-Jun-09	Unknown	1	mine RSA	11V	514183	7044877
16-Jun-09	Unknown	1	mine RSA	11V	511713	7045489
16-Jun-09	Unknown	2	mine RSA	11V	514874	7045608
16-Jun-09	Unknown	2	mine RSA	11V	515013	7045476
16-Jun-09	Unknown	2	mine RSA	11V	512655	7044834
17-Jun-09	Unknown	1	mine RSA	11V	512957	7047203
17-Jun-09	Unknown	1	mine RSA	11V	513783	7047604
17-Jun-09	Unknown	1	mine RSA	11V	513783	7047604
17-Jun-09	Unknown	1	mine RSA	11V	514000	7047603
17-Jun-09	Unknown	1	mine RSA	11V	513411	7047081
17-Jun-09	Unknown	1	mine RSA	11V	513583	7047281

NPAR = Proposed NICO Project Access Road regional study area; mine RSA= proposed mine regional study area

Table I-6 Waterbird Observations, 2004 to 2005

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jul-04	Common loon	4	NPAR	11V	492435	7021968
13-Jul-04	Common loon	2	NPAR	11V	493360	7017624
14-Jul-04	Common loon	1	mine RSA	11V	512078	7048462
14-Jul-04	Common loon	1	mine RSA	11V	507119	7042580
14-Jul-04	Common loon	2	mine RSA	11V	510412	7047904
14-Jul-04	Common loon	1	mine RSA	11V	510412	7047904
14-Jul-04	Common loon	1	mine RSA	11V	508814	7044261
14-Jul-04	Common loon	1	mine RSA	11V	513766	7047036
14-Jul-04	Common loon	2	mine RSA	11V	509217	7039235
13-Jul-04	Pacific loon	2	NPAR	11V	496357	7014444
13-Jul-04	Pacific loon	1	NPAR	11V	496357	7014444
13-Jul-04	Pacific loon	2	NPAR	11V	495372	7017963
13-Jul-04	Pacific loon	2	NPAR	11V	495842	7018383
13-Jul-04	Pacific loon	2	NPAR	11V	493645	7022081
13-Jul-04	Pacific loon	1	NPAR	11V	493645	7022081
13-Jul-04	Pacific loon	1	NPAR	11V	493692	7027483
13-Jul-04	Pacific loon	2	NPAR	11V	493692	7027483
13-Jul-04	Pacific loon	1	NPAR	11V	497526	7004702
13-Jul-04	Pacific loon	2	NPAR	11V	497995	7004962
13-Jul-04	Pacific loon	1	NPAR	11V	496154	7021822
13-Jul-04	Pacific loon	2	NPAR	11V	496768	7029169
13-Jul-04	Pacific loon	2	NPAR	11V	502116	6999747
13-Jul-04	Pacific loon	2	NPAR	11V	502533	7002651
13-Jul-04	Pacific loon	2	NPAR	11V	498606	7010080
13-Jul-04	Pacific loon	1	NPAR	11V	497687	7012589
13-Jul-04	Pacific loon	1	NPAR	11V	493360	7017624
13-Jul-04	Pacific loon	2	NPAR	11V	493360	7017624
13-Jul-04	Pacific loon	2	NPAR	11V	493360	7017624
13-Jul-04	Pacific loon	6	NPAR	11V	497404	7026811
13-Jul-04	Pacific loon	2	NPAR	11V	497727	7026270
13-Jul-04	Pacific loon	2	NPAR	11V	497950	7026769
14-Jul-04	Pacific loon	3	mine RSA	11V	514467	7044846
14-Jul-04	Pacific loon	2	mine RSA	11V	507955	7041842
14-Jul-04	Pacific loon	2	mine RSA	11V	507672	7041486
14-Jul-04	Pacific loon	2	mine RSA	11V	508814	7044261
13-Jul-04	Red-necked grebe	2	NPAR	11V	498474	7009915
13-Jul-04	Red-necked grebe	1	NPAR	11V	497898	7012269
13-Jul-04	Red-necked grebe	1	NPAR	11V	495317	7014411
14-Jul-04	Red-necked grebe	1	mine RSA	11V	509333	7046201
14-Jul-04	Red-necked grebe	1	mine RSA	11V	513352	7044914

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jul-04	Red-necked grebe	1	NPAR	11V	507119	7042580
14-Jul-04	Red-necked grebe	1	NPAR	11V	507119	7042580
14-Jul-04	Red-necked grebe	2	mine RSA	11V	508814	7044261
14-Jul-04	Red-necked grebe	1	mine RSA	11V	508814	7044261
14-Jul-04	Red-necked grebe	2	mine RSA	11V	509217	7039235
13-Jul-04	Horned grebe	1	NPAR	11V	498559	7008930
14-Jul-04	Horned grebe	2	mine RSA	11V	509217	7039235
14-Jul-04	Tundra swan	4	NPAR	11V	507119	7042580
14-Jul-04	Tundra swan	2	mine RSA	11V	509217	7039235
13-Jul-04	Canada goose	3	NPAR	11V	502116	6999747
13-Jul-04	Canada goose	6	NPAR	11V	498115	7026151
14-Jul-04	Canada goose	1	mine RSA	11V	508245	7042260
13-Jul-04	American wigeon	5	NPAR	11V	495296	7025733
13-Jul-04	American wigeon	4	NPAR	11V	493692	7027483
13-Jul-04	American wigeon	2	NPAR	11V	502533	7002651
13-Jul-04	American wigeon	5	NPAR	11V	493360	7017624
14-Jul-04	American wigeon	6	mine RSA	11V	509333	7046201
14-Jul-04	American wigeon	2	NPAR	11V	504984	7035496
14-Jul-04	American wigeon	1	NPAR	11V	509217	7039235
14-Jul-04	American wigeon	10	mine RSA	11V	509217	7039235
13-Jul-04	Mallard	1	NPAR	11V	498441	7010302
13-Jul-04	Mallard	2	NPAR	11V	495317	7014411
13-Jul-04	Mallard	2	NPAR	11V	493165	7024124
13-Jul-04	Mallard	3	NPAR	11V	493692	7027483
13-Jul-04	Mallard	2	NPAR	11V	493692	7027483
13-Jul-04	Mallard	6	NPAR	11V	493692	7027483
13-Jul-04	Mallard	9	NPAR	11V	495437	7032012
13-Jul-04	Mallard	1	NPAR	11V	495437	7032012
13-Jul-04	Mallard	1	NPAR	11V	495437	7032012
13-Jul-04	Mallard	2	NPAR	11V	495437	7032012
13-Jul-04	Mallard	3	NPAR	11V	492435	7021968
13-Jul-04	Mallard	4	NPAR	11V	492435	7021968
13-Jul-04	Mallard	2	NPAR	11V	496286	7033960
13-Jul-04	Mallard	7	NPAR	11V	495377	7014711
13-Jul-04	Mallard	6	NPAR	11V	493360	7017624
13-Jul-04	Mallard	1	NPAR	11V	493360	7017624
13-Jul-04	Mallard	1	NPAR	11V	493360	7017624
13-Jul-04	Mallard	1	NPAR	11V	497366	7026646
14-Jul-04	Mallard	1	NPAR	11V	500920	7035910
14-Jul-04	Mallard	5	NPAR	11V	504984	7035496

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jul-04	Mallard	2	NPAR	11V	502830	7037512
14-Jul-04	Mallard	1	mine RSA	11V	510242	7039906
14-Jul-04	Mallard	1	NPAR	11V	500685	7035214
14-Jul-04	Mallard	3	NPAR	11V	507119	7042580
14-Jul-04	Mallard	3	NPAR	11V	507119	7042580
14-Jul-04	Mallard	1	mine RSA	11V	507119	7042580
14-Jul-04	Mallard	2	mine RSA	11V	509217	7039235
13-Jul-04	Northern pintail	1	NPAR	11V	493692	7027483
13-Jul-04	Northern pintail	2	NPAR	11V	495437	7032012
14-Jul-04	Northern pintail	2	mine RSA	11V	509217	7039235
14-Jul-04	Northern pintail	6	mine RSA	11V	509217	7039235
13-Jul-04	Green-winged teal	6	NPAR	11V	498553	7008127
13-Jul-04	Green-winged teal	6	NPAR	11V	498756	7010832
13-Jul-04	Green-winged teal	1	NPAR	11V	495437	7032012
13-Jul-04	Green-winged teal	1	NPAR	11V	492435	7021968
13-Jul-04	Green-winged teal	4	NPAR	11V	497366	7026646
13-Jul-04	Green-winged teal	1	NPAR	11V	497568	7029984
14-Jul-04	Green-winged teal	2	mine RSA	11V	509333	7046201
14-Jul-04	Green-winged teal	1	mine RSA	11V	512078	7048462
14-Jul-04	Green-winged teal	3	mine RSA	11V	507672	7041486
14-Jul-04	Green-winged teal	8	NPAR	11V	500706	7035520
14-Jul-04	Green-winged teal	1	NPAR	11V	507119	7042580
14-Jul-04	Green-winged teal	6	NPAR	11V	507119	7042580
14-Jul-04	Green-winged teal	1	NPAR	11V	507119	7042580
14-Jul-04	Green-winged teal	2	mine RSA	11V	508814	7044261
13-Jul-04	Bufflehead	3	NPAR	11V	495317	7014411
13-Jul-04	Bufflehead	2	NPAR	11V	495667	7014841
14-Jul-04	Bufflehead	30	mine RSA	11V	507119	7042580
14-Jul-04	Bufflehead	2	mine RSA	11V	509217	7039235
13-Jul-04	Common goldeneye	5	NPAR	11V	495266	7018696
13-Jul-04	Common goldeneye	2	NPAR	11V	498441	7010302
13-Jul-04	Common goldeneye	1	NPAR	11V	497898	7012269
13-Jul-04	Common goldeneye	4	NPAR	11V	495317	7014411
13-Jul-04	Common goldeneye	8	NPAR	11V	495317	7014411
13-Jul-04	Common goldeneye	20	NPAR	11V	495317	7014411
13-Jul-04	Common goldeneye	4	NPAR	11V	493692	7027483
13-Jul-04	Common goldeneye	12	NPAR	11V	493692	7027483
13-Jul-04	Common goldeneye	5	NPAR	11V	496154	7021822
13-Jul-04	Common goldeneye	7	NPAR	11V	498559	7008930
13-Jul-04	Common goldeneye	25	NPAR	11V	493360	7017624

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jul-04	Common goldeneye	2	mine RSA	11V	509333	7046201
14-Jul-04	Common goldeneye	5	mine RSA	11V	512983	7043892
14-Jul-04	Common goldeneye	1	NPAR	11V	500585	7035171
14-Jul-04	Common goldeneye	8	mine RSA	11V	512795	7047245
14-Jul-04	Common goldeneye	20	mine RSA	11V	507119	7042580
14-Jul-04	Common goldeneye	2	mine RSA	11V	508130	7043364
14-Jul-04	Common goldeneye	6	mine RSA	11V	508120	7043381
14-Jul-04	Common goldeneye	3	NPAR	11V	500130	7034550
14-Jul-04	Common goldeneye	5	mine RSA	11V	513290	7047072
14-Jul-04	Common goldeneye	4	mine RSA	11V	513290	7047072
14-Jul-04	Common goldeneye	12	mine RSA	11V	508814	7044261
14-Jul-04	Common goldeneye	1	NPAR	11V	509217	7039235
14-Jul-04	Common goldeneye	6	mine RSA	11V	509217	7039235
14-Jul-04	Common goldeneye	4	mine RSA	11V	509217	7039235
14-Jul-04	Common goldeneye	3	mine RSA	11V	509217	7039235
14-Jul-04	Common goldeneye	20	mine RSA	11V	509217	7039235
14-Jul-04	Ring-necked duck	2	mine RSA	11V	513209	7045098
14-Jul-04	Ring-necked duck	35	NPAR	11V	507119	7042580
14-Jul-04	Ring-necked duck	2	mine RSA	11V	511695	7040499
13-Jul-04	Scaup species	2	NPAR	11V	498441	7010302
13-Jul-04	Scaup species	45	NPAR	11V	495317	7014411
13-Jul-04	Scaup species	30	NPAR	11V	495317	7014411
13-Jul-04	Scaup species	2	NPAR	11V	495296	7025733
13-Jul-04	Scaup species	1	NPAR	11V	493692	7027483
13-Jul-04	Scaup species	2	NPAR	11V	493692	7027483
13-Jul-04	Scaup species	3	NPAR	11V	493692	7027483
13-Jul-04	Scaup species	6	NPAR	11V	493692	7027483
13-Jul-04	Scaup species	30	NPAR	11V	493692	7027483
13-Jul-04	Scaup species	225	NPAR	11V	493692	7027483
13-Jul-04	Scaup species	4	NPAR	11V	493692	7027483
13-Jul-04	Scaup species	70	NPAR	11V	496154	7021822
13-Jul-04	Scaup species	20	NPAR	11V	496154	7021822
13-Jul-04	Scaup species	15	NPAR	11V	496154	7021822
13-Jul-04	Scaup species	1	NPAR	11V	492435	7021968
13-Jul-04	Scaup species	6	NPAR	11V	492435	7021968
13-Jul-04	Scaup species	6	NPAR	11V	492435	7021968
13-Jul-04	Scaup species	5	NPAR	11V	491434	7022363
13-Jul-04	Scaup species	15	NPAR	11V	491434	7022363
13-Jul-04	Scaup species	2	NPAR	11V	496768	7029169
13-Jul-04	Scaup species	1	NPAR	11V	497771	7031071

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jul-04	Scaup species	2	NPAR	11V	497371	7031358
13-Jul-04	Scaup species	5	NPAR	11V	493360	7017624
13-Jul-04	Scaup species	2	NPAR	11V	499226	7032887
13-Jul-04	Scaup species	1	NPAR	11V	498970	7032785
14-Jul-04	Scaup species	2	mine RSA	11V	509333	7046201
14-Jul-04	Scaup species	12	mine RSA	11V	509333	7046201
14-Jul-04	Scaup species	8	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	20	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	25	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	20	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	6	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	25	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	130	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	4	mine RSA	11V	512983	7043892
14-Jul-04	Scaup species	1	mine RSA	11V	513686	7045209
14-Jul-04	Scaup species	2	mine RSA	11V	513209	7045098
14-Jul-04	Scaup species	8	mine RSA	11V	513209	7045098
14-Jul-04	Scaup species	3	mine RSA	11V	507955	7041842
14-Jul-04	Scaup species	3	NPAR	11V	496286	7033960
14-Jul-04	Scaup species	6	NPAR	11V	500706	7035520
14-Jul-04	Scaup species	18	NPAR	11V	504984	7035496
14-Jul-04	Scaup species	4	NPAR	11V	502571	7037493
14-Jul-04	Scaup species	2	NPAR	11V	502830	7037512
14-Jul-04	Scaup species	4	mine RSA	11V	512795	7047245
14-Jul-04	Scaup species	30	NPAR	11V	507119	7042580
14-Jul-04	Scaup species	6	NPAR	11V	507119	7042580
14-Jul-04	Scaup species	7	NPAR	11V	507119	7042580
14-Jul-04	Scaup species	25	NPAR	11V	507119	7042580
14-Jul-04	Scaup species	6	NPAR	11V	507119	7042580
14-Jul-04	Scaup species	4	NPAR	11V	507119	7042580
14-Jul-04	Scaup species	2	mine RSA	11V	507119	7042580
14-Jul-04	Scaup species	125	mine RSA	11V	507119	7042580
14-Jul-04	Scaup species	90	mine RSA	11V	507119	7042580
14-Jul-04	Scaup species	8	mine RSA	11V	508120	7043381
14-Jul-04	Scaup species	25	mine RSA	11V	507325	7043223
14-Jul-04	Scaup species	2	mine RSA	11V	513284	7045729
14-Jul-04	Scaup species	6	mine RSA	11V	513290	7047072
14-Jul-04	Scaup species	2	mine RSA	11V	510412	7047904
14-Jul-04	Scaup species	4	mine RSA	11V	508814	7044261
14-Jul-04	Scaup species	8	mine RSA	11V	508814	7044261

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jul-04	Scaup species	7	mine RSA	11V	509217	7039235
14-Jul-04	Scaup species	12	mine RSA	11V	509217	7039235
14-Jul-04	Scaup species	70	mine RSA	11V	509217	7039235
14-Jul-04	Scaup species	20	mine RSA	11V	509217	7039235
14-Jul-04	Scaup species	2	mine RSA	11V	509217	7039235
13-Jul-04	Ruddy duck	1	NPAR	11V	498396	7009676
13-Jul-04	Long-tailed duck	2	NPAR	11V	491434	7022363
13-Jul-04	Surf scoter	2	NPAR	11V	496768	7029169
14-Jul-04	Surf scoter	1	mine RSA	11V	512078	7048462
13-Jul-04	White-winged scoter	5	NPAR	11V	493692	7027483
13-Jul-04	White-winged scoter	2	NPAR	11V	496768	7029169
13-Jul-04	White-winged scoter	3	NPAR	11V	493360	7017624
14-Jul-04	White-winged scoter	1	mine RSA	11V	512078	7048462
14-Jul-04	White-winged scoter	1	mine RSA	11V	507119	7042580
14-Jul-04	White-winged scoter	2	mine RSA	11V	509217	7039235
13-Jul-04	Common merganser	2	NPAR	11V	493692	7027483
13-Jul-04	Common merganser	2	NPAR	11V	496154	7021822
13-Jul-04	Common merganser	1	NPAR	11V	491434	7022363
13-Jul-04	Common merganser	3	NPAR	11V	493360	7017624
14-Jul-04	Common merganser	1	mine RSA	11V	508814	7044261
13-Jul-04	American coot	1	NPAR	11V	493692	7027483
13-Jun-05	Common loon	1	NPAR	11V	498396	7009676
15-Jun-05	Common loon	1	mine LSA	11V	510732	7051573
24-Jul-05	Common loon	3	mine LSA	11V	509099	7047665
24-Jul-05	Common loon	3	mine LSA	11V	510732	7051573
24-Jul-05	Common loon	1	mine LSA	11V	510412	7047904
24-Jul-05	Common loon	3	mine LSA	11V	510412	7047904
24-Jul-05	Common loon	2	mine LSA	11V	513946	7045182
25-Jul-05	Common loon	3	mine LSA	11V	512983	7043892
13-Jun-05	Pacific loon	2	NPAR	11V	495667	7014841
13-Jun-05	Pacific loon	2	NPAR	11V	496357	7014444
13-Jun-05	Pacific loon	2	NPAR	11V	495372	7017963
13-Jun-05	Pacific loon	2	NPAR	11V	495842	7018383
13-Jun-05	Pacific loon	2	NPAR	11V	493645	7022081
14-Jun-05	Pacific loon	1	mine LSA	11V	515602	7043523
15-Jun-05	Pacific loon	1	mine LSA	11V	512430	7052885
15-Jun-05	Pacific loon	1	mine LSA	11V	514860	7051037
15-Jun-05	Pacific loon	7	NPAR	11V	493692	7027483
15-Jun-05	Pacific loon	2	NPAR	11V	507672	7041486
23-Jul-05	Pacific loon	1	NPAR	11V	496357	7014444

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
23-Jul-05	Pacific loon	3	NPAR	11V	495372	7017963
23-Jul-05	Pacific loon	2	NPAR	11V	495842	7018383
23-Jul-05	Pacific loon	2	NPAR	11V	493645	7022081
23-Jul-05	Pacific loon	4	NPAR	11V	493165	7024124
23-Jul-05	Pacific loon	3	NPAR	11V	493692	7027483
23-Jul-05	Pacific loon	1	NPAR	11V	498637	7010234
24-Jul-05	Pacific loon	3	mine LSA	11V	514860	7051037
24-Jul-05	Pacific loon	3	mine LSA	11V	512908	7054181
25-Jul-05	Pacific loon	3	mine LSA	11V	514467	7044846
23-Jul-05	Red-throated loon	2	NPAR	11V	498553	7008127
13-Jun-05	Red-necked grebe	2	NPAR	11V	498474	7009915
13-Jun-05	Red-necked grebe	2	NPAR	11V	494612	7020695
14-Jun-05	Red-necked grebe	3	mine LSA	11V	515602	7043523
14-Jun-05	Red-necked grebe	4	mine LSA	11V	512983	7043892
14-Jun-05	Red-necked grebe	2	mine LSA	11V	513209	7045098
14-Jun-05	Red-necked grebe	2	mine LSA	11V	508814	7044261
15-Jun-05	Red-necked grebe	1	NPAR	11V	508245	7042260
15-Jun-05	Red-necked grebe	1	NPAR	11V	510812	7044597
15-Jun-05	Red-necked grebe	2	NPAR	11V	507119	7042580
23-Jul-05	Red-necked grebe	2	NPAR	11V	498474	7009915
23-Jul-05	Red-necked grebe	1	NPAR	11V	507119	7042580
23-Jul-05	Red-necked grebe	3	NPAR	11V	508814	7044261
23-Jul-05	Red-necked grebe	2	NPAR	11V	508814	7044261
23-Jul-05	Red-necked grebe	4	NPAR	11V	508814	7044261
25-Jul-05	Red-necked grebe	6	mine LSA	11V	515602	7043523
25-Jul-05	Red-necked grebe	5	mine LSA	11V	512983	7043892
25-Jul-05	Red-necked grebe	4	mine LSA	11V	512983	7043892
13-Jun-05	Horned grebe	1	NPAR	11V	498877	7005977
13-Jun-05	Horned grebe	2	NPAR	11V	498271	7009292
13-Jun-05	Horned grebe	2	NPAR	11V	498396	7009676
13-Jun-05	Horned grebe	2	NPAR	11V	494612	7020695
14-Jun-05	Tundra swan	3	mine LSA	11V	508814	7044261
13-Jun-05	Canada goose	2	NPAR	11V	495317	7014411
15-Jun-05	Canada goose	7	NPAR	11V	493692	7027483
15-Jun-05	Canada goose	8	NPAR	11V	500416	7033734
15-Jun-05	Canada goose	1	NPAR	11V	502907	7035355
23-Jul-05	Canada goose	10	NPAR	11V	495667	7014841
13-Jun-05	American wigeon	1	NPAR	11V	498553	7008127
13-Jun-05	American wigeon	1	NPAR	11V	498474	7009915
13-Jun-05	American wigeon	1	NPAR	11V	498363	7010384

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jun-05	American wigeon	1	NPAR	11V	498756	7010832
14-Jun-05	American wigeon	1	mine LSA	11V	509333	7046201
14-Jun-05	American wigeon	4	mine LSA	11V	508814	7044261
15-Jun-05	American wigeon	2	NPAR	11V	495437	7032012
15-Jun-05	American wigeon	1	NPAR	11V	509217	7039235
23-Jul-05	American wigeon	6	NPAR	11V	498396	7009676
23-Jul-05	American wigeon	1	NPAR	11V	498885	7010204
23-Jul-05	American wigeon	2	NPAR	11V	495437	7032012
23-Jul-05	American wigeon	1	NPAR	11V	507955	7041842
23-Jul-05	American wigeon	1	NPAR	11V	508814	7044261
23-Jul-05	American wigeon	60	NPAR	11V	509217	7039235
23-Jul-05	American wigeon	20	NPAR	11V	509217	7039235
24-Jul-05	American wigeon	1	mine LSA	11V	513686	7045209
13-Jun-05	Mallard	1	NPAR	11V	498474	7009915
13-Jun-05	Mallard	0	NPAR	11V	497856	7011629
13-Jun-05	Mallard	1	NPAR	11V	497961	7012043
13-Jun-05	Mallard	7	NPAR	11V	494612	7020695
14-Jun-05	Mallard	4	mine LSA	11V	515602	7043523
14-Jun-05	Mallard	1	mine LSA	11V	508814	7044261
15-Jun-05	Mallard	2	mine LSA	11V	514860	7051037
15-Jun-05	Mallard	2	NPAR	11V	493692	7027483
15-Jun-05	Mallard	3	NPAR	11V	495437	7032012
15-Jun-05	Mallard	3	NPAR	11V	500416	7033734
15-Jun-05	Mallard	2	NPAR	11V	507672	7041486
15-Jun-05	Mallard	2	NPAR	11V	509217	7039235
23-Jul-05	Mallard	5	NPAR	11V	#N/A	#N/A
23-Jul-05	Mallard	4	NPAR	11V	497171	7011306
23-Jul-05	Mallard	4	NPAR	11V	493692	7027483
23-Jul-05	Mallard	1	NPAR	11V	493692	7027483
23-Jul-05	Mallard	4	NPAR	11V	493692	7027483
23-Jul-05	Mallard	3	NPAR	11V	495437	7032012
23-Jul-05	Mallard	8	NPAR	11V	495437	7032012
23-Jul-05	Mallard	5	NPAR	11V	507672	7041486
23-Jul-05	Mallard	5	NPAR	11V	507119	7042580
23-Jul-05	Mallard	1	NPAR	11V	508814	7044261
23-Jul-05	Mallard	1	NPAR	11V	508814	7044261
23-Jul-05	Mallard	1	NPAR	11V	508814	7044261
23-Jul-05	Mallard	6	NPAR	11V	508814	7044261
23-Jul-05	Mallard	4	NPAR	11V	508814	7044261
23-Jul-05	Mallard	4	NPAR	11V	508814	7044261

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
24-Jul-05	Mallard	4	mine LSA	11V	512430	7052885
25-Jul-05	Mallard	1	mine LSA	11V	515602	7043523
25-Jul-05	Mallard	1	mine LSA	11V	513625	7045505
13-Jun-05	Northern Shoveler	1	NPAR	11V	497961	7012043
15-Jun-05	Northern Shoveler	3	NPAR	11V	493692	7027483
13-Jun-05	Green-winged teal	2	NPAR	11V	498553	7008127
13-Jun-05	Green-winged teal	1	NPAR	11V	498271	7009292
13-Jun-05	Green-winged teal	1	NPAR	11V	498396	7009676
13-Jun-05	Green-winged teal	4	NPAR	11V	497961	7012043
13-Jun-05	Green-winged teal	2	NPAR	11V	496357	7014444
14-Jun-05	Green-winged teal	1	mine LSA	11V	512983	7043892
14-Jun-05	Green-winged teal	1	mine LSA	11V	508814	7044261
15-Jun-05	Green-winged teal	1	mine LSA	11V	512637	7052427
15-Jun-05	Green-winged teal	4	NPAR	11V	493692	7027483
15-Jun-05	Green-winged teal	6	NPAR	11V	500416	7033734
23-Jul-05	Green-winged teal	10	NPAR	11V	493692	7027483
23-Jul-05	Green-winged teal	5	NPAR	11V	507119	7042580
23-Jul-05	Green-winged teal	1	NPAR	11V	508814	7044261
23-Jul-05	Green-winged teal	3	NPAR	11V	508814	7044261
23-Jul-05	Green-winged teal	1	NPAR	11V	508814	7044261
23-Jul-05	Green-winged teal	2	NPAR	11V	509217	7039235
24-Jul-05	Green-winged teal	1	mine LSA	11V	512004	7054024
24-Jul-05	Green-winged teal	5	mine LSA	11V	512004	7054024
24-Jul-05	Green-winged teal	2	mine LSA	11V	510412	7047904
13-Jun-05	Bufflehead	1	NPAR	11V	497289	7006156
13-Jun-05	Bufflehead	1	NPAR	11V	498553	7008127
13-Jun-05	Bufflehead	5	NPAR	11V	498271	7009292
13-Jun-05	Bufflehead	1	NPAR	11V	498396	7009676
13-Jun-05	Bufflehead	2	NPAR	11V	495266	7018696
13-Jun-05	Bufflehead	1	NPAR	11V	498699	7010497
13-Jun-05	Bufflehead	1	NPAR	11V	497012	7011757
13-Jun-05	Bufflehead	2	NPAR	11V	497856	7011629
13-Jun-05	Bufflehead	3	NPAR	11V	497961	7012043
13-Jun-05	Bufflehead	12	NPAR	11V	495317	7014411
13-Jun-05	Bufflehead	1	NPAR	11V	494646	7018022
13-Jun-05	Bufflehead	2	NPAR	11V	494612	7020695
14-Jun-05	Bufflehead	5	mine LSA	11V	515602	7043523
14-Jun-05	Bufflehead	1	mine LSA	11V	509333	7046201
14-Jun-05	Bufflehead	9	mine LSA	11V	512983	7043892
14-Jun-05	Bufflehead	3	mine LSA	11V	513372	7045755

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
14-Jun-05	Bufflehead	2	mine LSA	11V	512795	7047245
14-Jun-05	Bufflehead	14	mine LSA	11V	508814	7044261
14-Jun-05	Bufflehead	2	mine LSA	11V	513766	7047036
14-Jun-05	Bufflehead	7	mine LSA	11V	513766	7047036
15-Jun-05	Bufflehead	1	mine LSA	11V	509099	7047665
15-Jun-05	Bufflehead	2	NPAR	11V	495437	7032012
15-Jun-05	Bufflehead	2	NPAR	11V	499377	7033734
15-Jun-05	Bufflehead	2	NPAR	11V	500416	7033734
15-Jun-05	Bufflehead	5	NPAR	11V	507955	7041842
15-Jun-05	Bufflehead	0	NPAR	11V	508245	7042260
15-Jun-05	Bufflehead	2	NPAR	11V	511038	7042190
15-Jun-05	Bufflehead	0	NPAR	11V	511509	7044120
15-Jun-05	Bufflehead	1	NPAR	11V	510812	7044597
15-Jun-05	Bufflehead	26	NPAR	11V	509217	7039235
23-Jul-05	Bufflehead	1	NPAR	11V		
23-Jul-05	Bufflehead	1	NPAR	11V	498877	7005977
23-Jul-05	Bufflehead	1	NPAR	11V	498474	7009915
23-Jul-05	Bufflehead	4	NPAR	11V	498885	7010204
23-Jul-05	Bufflehead	3	NPAR	11V	497171	7011306
23-Jul-05	Bufflehead	2	NPAR	11V	495317	7014411
23-Jul-05	Bufflehead	2	NPAR	11V	495667	7014841
23-Jul-05	Bufflehead	1	NPAR	11V	495296	7025733
23-Jul-05	Bufflehead	4	NPAR	11V	493692	7027483
23-Jul-05	Bufflehead	1	NPAR	11V	495437	7032012
23-Jul-05	Bufflehead	2	NPAR	11V	495437	7032012
23-Jul-05	Bufflehead	0	NPAR	11V	507119	7042580
23-Jul-05	Bufflehead	2	NPAR	11V	507119	7042580
23-Jul-05	Bufflehead	10	NPAR	11V	495557	7018593
23-Jul-05	Bufflehead	2	NPAR	11V	494922	7021014
23-Jul-05	Bufflehead	0	NPAR	11V	503362	7034873
23-Jul-05	Bufflehead	1	NPAR	11V	509217	7039235
24-Jul-05	Bufflehead	1	mine LSA	11V	513686	7045209
24-Jul-05	Bufflehead	1	mine LSA	11V	512430	7052885
24-Jul-05	Bufflehead	1	mine LSA	11V	513097	7046786
24-Jul-05	Bufflehead	4	mine LSA	11V	513856	7046868
24-Jul-05	Bufflehead	1	mine LSA	11V	514181	7045757
25-Jul-05	Bufflehead	1	mine LSA	11V	512983	7043892
25-Jul-05	Bufflehead	1	mine LSA	11V	513352	7044914
25-Jul-05	Bufflehead	2	mine LSA	11V	513625	7045505
25-Jul-05	Bufflehead	1	mine LSA	11V	513879	7045385

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jun-05	Common goldeneye	2	NPAR	11V	498469	7010649
14-Jun-05	Common goldeneye	52	mine LSA	11V	508814	7044261
15-Jun-05	Common goldeneye	230	NPAR	11V	509217	7039235
23-Jul-05	Common goldeneye	0	NPAR	11V	507119	7042580
23-Jul-05	Common goldeneye	7	NPAR	11V	508814	7044261
23-Jul-05	Common goldeneye	5	NPAR	11V	508814	7044261
23-Jul-05	Common goldeneye	12	NPAR	11V	508814	7044261
23-Jul-05	Canvasback	4	NPAR	11V	509217	7039235
23-Jul-05	Canvasback	2	NPAR	11V	509217	7039235
23-Jul-05	Canvasback	1	NPAR	11V	509217	7039235
13-Jun-05	Ring-necked duck	1	NPAR	11V	493645	7022081
14-Jun-05	Ring-necked duck	8	mine LSA	11V	515602	7043523
14-Jun-05	Ring-necked duck	2	mine LSA	11V	509333	7046201
14-Jun-05	Ring-necked duck	3	mine LSA	11V	513352	7044914
14-Jun-05	Ring-necked duck	3	mine LSA	11V	513372	7045755
14-Jun-05	Ring-necked duck	1	mine LSA	11V	512078	7048462
14-Jun-05	Ring-necked duck	10	mine LSA	11V	513290	7047072
14-Jun-05	Ring-necked duck	9	mine LSA	11V	508814	7044261
15-Jun-05	Ring-necked duck	2	NPAR	11V	494598	7024181
15-Jun-05	Ring-necked duck	2	NPAR	11V	495437	7032012
15-Jun-05	Ring-necked duck	4	NPAR	11V	499852	7032123
15-Jun-05	Ring-necked duck	2	NPAR	11V	508245	7042260
15-Jun-05	Ring-necked duck	2	NPAR	11V	507119	7042580
15-Jun-05	Ring-necked duck	1	NPAR	11V	509217	7039235
23-Jul-05	Ring-necked duck	5	NPAR	11V	493692	7027483
25-Jul-05	Ring-necked duck	2	mine LSA	11V	514467	7044846
25-Jul-05	Ring-necked duck	1	mine LSA	11V	515602	7043523
25-Jul-05	Ring-necked duck	3	mine LSA	11V	512983	7043892
13-Jun-05	Scaup species	2	NPAR	11V	#N/A	#N/A
13-Jun-05	Scaup species	2	NPAR	11V	498877	7005977
13-Jun-05	Scaup species	10	NPAR	11V	498271	7009292
13-Jun-05	Scaup species	2	NPAR	11V	498396	7009676
13-Jun-05	Scaup species	2	NPAR	11V	498474	7009915
13-Jun-05	Scaup species	1	NPAR	11V	495266	7018696
13-Jun-05	Scaup species	1	NPAR	11V	498363	7010384
13-Jun-05	Scaup species	1	NPAR	11V	498699	7010497
13-Jun-05	Scaup species	1	NPAR	11V	498756	7010832
13-Jun-05	Scaup species	2	NPAR	11V	497012	7011757
13-Jun-05	Scaup species	5	NPAR	11V	497961	7012043
13-Jun-05	Scaup species	30	NPAR	11V	495317	7014411

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
13-Jun-05	Scaup species	7	NPAR	11V	494646	7018022
13-Jun-05	Scaup species	8	NPAR	11V	493645	7022081
14-Jun-05	Scaup species	9	mine LSA	11V	515602	7043523
14-Jun-05	Scaup species	6	mine LSA	11V	509333	7046201
14-Jun-05	Scaup species	1	mine LSA	11V	511902	7048955
14-Jun-05	Scaup species	14	mine LSA	11V	512983	7043892
14-Jun-05	Scaup species	13	mine LSA	11V	513352	7044914
14-Jun-05	Scaup species	6	mine LSA	11V	513372	7045755
14-Jun-05	Scaup species	15	mine LSA	11V	512078	7048462
14-Jun-05	Scaup species	13	mine LSA	11V	512795	7047245
14-Jun-05	Scaup species	1	mine LSA	11V	513290	7047072
14-Jun-05	Scaup species	5	mine LSA	11V	508814	7044261
14-Jun-05	Scaup species	4	mine LSA	11V	513766	7047036
15-Jun-05	Scaup species	2	mine LSA	11V	512430	7052885
15-Jun-05	Scaup species	1	mine LSA	11V	514212	7051893
15-Jun-05	Scaup species	2	NPAR	11V	494598	7024181
15-Jun-05	Scaup species	2	NPAR	11V	495296	7025733
15-Jun-05	Scaup species	3	NPAR	11V	493692	7027483
15-Jun-05	Scaup species	38	NPAR	11V	493692	7027483
15-Jun-05	Scaup species	13	NPAR	11V	495437	7032012
15-Jun-05	Scaup species	2	NPAR	11V	499852	7032123
15-Jun-05	Scaup species	11	NPAR	11V	500416	7033734
15-Jun-05	Scaup species	3	NPAR	11V	507955	7041842
15-Jun-05	Scaup species	2	NPAR	11V	508600	7042888
15-Jun-05	Scaup species	1	NPAR	11V	511509	7044120
15-Jun-05	Scaup species	0	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	11	NPAR	11V	507119	7042580
23-Jul-05	Scaup species	3	NPAR	11V	508814	7044261
23-Jul-05	Scaup species	3	NPAR	11V	508814	7044261
23-Jul-05	Scaup species	3	NPAR	11V	508814	7044261
23-Jul-05	Scaup species	12	NPAR	11V	508814	7044261
23-Jul-05	Scaup species	6	NPAR	11V	508814	7044261
23-Jul-05	Scaup species	175	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	5	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	150	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	50	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	36	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	25	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	50	NPAR	11V	509217	7039235
23-Jul-05	Scaup species	150	NPAR	11V	509217	7039235

Table I-6 Waterbird Observations, 2004 to 2005 (continued)

Date	Species	Number	Project Area	UTM Coordinates		
				Zone (NAD 83)	Easting	Northing
23-Jul-05	Scaup species	130	NPAR	11V	509217	7039235
24-Jul-05	Scaup species	2	mine LSA	11V	511902	7048955
24-Jul-05	Scaup species	4	mine LSA	11V	509099	7047665
24-Jul-05	Scaup species	1	mine LSA	11V	512430	7052885
24-Jul-05	Scaup species	6	mine LSA	11V	512430	7052885
24-Jul-05	Scaup species	1	mine LSA	11V	512004	7054024
24-Jul-05	Scaup species	2	mine LSA	11V	513770	7051794
24-Jul-05	Scaup species	19	mine LSA	11V	513290	7047072
25-Jul-05	Scaup species	8	mine LSA	11V	515602	7043523
25-Jul-05	Scaup species	9	mine LSA	11V	515602	7043523
25-Jul-05	Scaup species	71	mine LSA	11V	512983	7043892
14-Jun-05	Surf scoter	2	mine LSA	11V	512983	7043892
14-Jun-05	Surf scoter	3	mine LSA	11V	512078	7048462
15-Jun-05	Surf scoter	7	NPAR	11V	493692	7027483
15-Jun-05	Surf scoter	3	NPAR	11V	507119	7042580
15-Jun-05	Surf scoter	30	NPAR	11V	509217	7039235
24-Jul-05	Surf scoter	4	mine LSA	11V	509099	7047665
24-Jul-05	Surf scoter	1	mine LSA	11V	512430	7052885
24-Jul-05	Surf scoter	3	mine LSA	11V	512004	7054024
25-Jul-05	Surf scoter	8	mine LSA	11V	515602	7043523
13-Jun-05	White-winged scoter	6	NPAR	11V	495317	7014411
14-Jun-05	White-winged scoter	2	mine LSA	11V	512983	7043892
14-Jun-05	White-winged scoter	2	mine LSA	11V	512078	7048462
15-Jun-05	White-winged scoter	11	NPAR	11V	509217	7039235
23-Jul-05	White-winged scoter	1	NPAR	11V	495317	7014411
23-Jul-05	Common merganser	7	NPAR	11V	508814	7044261

NPAR= Proposed NICO project access road regional study area; mine RSA= proposed mine regional study area; mine LSA = proposed mine local study area

Table I-7 Waterbird Observations, 2006

Date	Species	Number	Zone (NAD 83)	Easting at Start	Northing at Start	Easting at End	Northing at End
4-Jun-06	Common Loon	2	11V	522274	7044127	502274	7044127
4-Jun-06	Common Loon	1	11V	502274	7045127	522274	7045127
4-Jun-06	Common Loon	1	11V	502274	7048126	522274	7048127
4-Jun-06	Common Loon	1	11V	502274	7051127	522274	7051126
4-Jun-06	Common Loon	2	11V	502274	7051127	522274	7051126
4-Jun-06	Common Loon	2	11V	502274	7053127	522274	7053127
4-Jun-06	Pacific Loon	2	11V	502274	7037127	522274	7037123
4-Jun-06	Pacific Loon	1	11V	502274	7039127	522274	7039127
4-Jun-06	Pacific Loon	1	11V	502274	7048126	522274	7048127
4-Jun-06	Pacific Loon	1	11V	502274	7048126	522274	7048127
4-Jun-06	Pacific Loon	1	11V	502274	7053127	522274	7053127
4-Jun-06	Pacific Loon	1	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown Loon	2	11V	522274	7038127	502274	7038127
4-Jun-06	Tundra Swan	2	11V	522274	7047127	502274	7047127
4-Jun-06	Snow Goose	2	11V	502274	7045127	522274	7045127
4-Jun-06	Canada Goose	4	11V	522274	7040127	502274	7040127
4-Jun-06	Canada Goose	1	11V	522274	7042127	502274	7042127
4-Jun-06	Canada Goose	1	11V	522274	7046127	502274	7046127
4-Jun-06	American Wigeon	1	11V	502274	7037127	522274	7037123
4-Jun-06	American Wigeon	2	11V	522274	7038127	502274	7038127
4-Jun-06	American Wigeon	4	11V	522274	7038127	502274	7038127
4-Jun-06	American Wigeon	1	11V	502274	7039127	522274	7039127
4-Jun-06	American Wigeon	1	11V	522274	7042127	502274	7042127
4-Jun-06	American Wigeon	5	11V	522274	7042127	502274	7042127
4-Jun-06	American Wigeon	1	11V	522274	7042127	502274	7042127
4-Jun-06	American Wigeon	1	11V	522274	7044127	502274	7044127
4-Jun-06	American Wigeon	1	11V	502274	7045127	522274	7045127
4-Jun-06	Mallard	1	11V	522274	7040127	502274	7040127
4-Jun-06	Mallard	2	11V	522274	7044127	502274	7044127
4-Jun-06	Mallard	1	11V	522274	7044127	502274	7044127
4-Jun-06	Mallard	1	11V	502274	7045127	522274	7045127
4-Jun-06	Mallard	2	11V	502274	7045127	522274	7045127
4-Jun-06	Mallard	1	11V	522274	7046127	502274	7046127
4-Jun-06	Mallard	2	11V	522274	7047127	502274	7047127
4-Jun-06	Mallard	1	11V	522274	7047127	502274	7047127
4-Jun-06	Mallard	1	11V	522274	7050127	502274	7050127
4-Jun-06	Bufflehead	1	11V	502274	7039127	522274	7039127
4-Jun-06	Bufflehead	2	11V	522274	7040127	502274	7040127
4-Jun-06	Bufflehead	1	11V	522274	7040127	502274	7040127
4-Jun-06	Bufflehead	4	11V	502274	7041127	522274	7041127
4-Jun-06	Bufflehead	1	11V	502274	7043127	522274	7043127
4-Jun-06	Bufflehead	2	11V	522274	7044127	502274	7044127

Table I-7 Waterbird Observations, 2006 (continued)

Date	Species	Number	Zone (NAD 83)	Easting at Start	Northing at Start	Easting at End	Northing at End
4-Jun-06	Bufflehead	2	11V	502274	7045127	522274	7045127
4-Jun-06	Bufflehead	2	11V	522274	7047127	502274	7047127
4-Jun-06	Bufflehead	2	11V	522274	7047127	502274	7047127
4-Jun-06	Bufflehead	6	11V	502274	7048126	522274	7048127
4-Jun-06	Bufflehead	1	11V	522274	7049127	502274	7049127
4-Jun-06	Bufflehead	4	11V	522274	7049127	502274	7049127
4-Jun-06	Bufflehead	2	11V	502274	7051127	522274	7051126
4-Jun-06	Bufflehead	2	11V	522274	7052127	502274	7052127
4-Jun-06	Bufflehead	2	11V	522274	7052127	502274	7052127
4-Jun-06	Bufflehead	1	11V	502274	7053127	522274	7053127
4-Jun-06	Bufflehead	4	11V	522274	7054127	502274	7054127
4-Jun-06	Common Goldeneye	1	11V	522274	7040127	502274	7040127
4-Jun-06	Canvasback	1	11V	522274	7050127	502274	7050127
4-Jun-06	Ring-necked Duck	4	11V	522274	7054127	502274	7054127
4-Jun-06	Ring-necked Duck	2	11V	522274	7054127	502274	7054127
4-Jun-06	Scaup species	2	11V	522274	7038127	502274	7038127
4-Jun-06	Scaup species	2	11V	522274	7038127	502274	7038127
4-Jun-06	Scaup species	12	11V	522274	7038127	502274	7038127
4-Jun-06	Scaup species	2	11V	522274	7038127	502274	7038127
4-Jun-06	Scaup species	2	11V	522274	7038127	502274	7038127
4-Jun-06	Scaup species	2	11V	522274	7038127	502274	7038127
4-Jun-06	Scaup species	1	11V	522274	7038127	502274	7038127
4-Jun-06	Scaup species	1	11V	502274	7039127	522274	7039127
4-Jun-06	Scaup species	2	11V	522274	7040127	502274	7040127
4-Jun-06	Scaup species	2	11V	502274	7043127	522274	7043127
4-Jun-06	Scaup species	1	11V	502274	7043127	522274	7043127
4-Jun-06	Scaup species	11	11V	502274	7043127	522274	7043127
4-Jun-06	Scaup species	2	11V	522274	7044127	502274	7044127
4-Jun-06	Scaup species	2	11V	502274	7045127	522274	7045127
4-Jun-06	Scaup species	6	11V	502274	7045127	522274	7045127
4-Jun-06	Scaup species	1	11V	502274	7045127	522274	7045127
4-Jun-06	Scaup species	2	11V	502274	7045127	522274	7045127
4-Jun-06	Scaup species	3	11V	522274	7046127	502274	7046127
4-Jun-06	Scaup species	2	11V	522274	7046127	502274	7046127
4-Jun-06	Scaup species	2	11V	522274	7047127	502274	7047127
4-Jun-06	Scaup species	4	11V	522274	7047127	502274	7047127
4-Jun-06	Scaup species	1	11V	522274	7047127	502274	7047127
4-Jun-06	Scaup species	2	11V	522274	7047127	502274	7047127
4-Jun-06	Scaup species	2	11V	502274	7048126	522274	7048127
4-Jun-06	Scaup species	4	11V	502274	7048126	522274	7048127
4-Jun-06	Scaup species	2	11V	502274	7048126	522274	7048127
4-Jun-06	Scaup species	1	11V	502274	7048126	522274	7048127

Table I-7 Waterbird Observations, 2006 (continued)

Date	Species	Number	Zone (NAD 83)	Easting at Start	Northing at Start	Easting at End	Northing at End
4-Jun-06	Scaup species	2	11V	522274	7049127	502274	7049127
4-Jun-06	Scaup species	3	11V	522274	7049127	502274	7049127
4-Jun-06	Scaup species	2	11V	522274	7049127	502274	7049127
4-Jun-06	Scaup species	4	11V	502274	7051127	522274	7051126
4-Jun-06	Scaup species	2	11V	502274	7051127	522274	7051126
4-Jun-06	Scaup species	2	11V	502274	7051127	522274	7051126
4-Jun-06	Scaup species	5	11V	502274	7051127	522274	7051126
4-Jun-06	Scaup species	3	11V	522274	7052127	502274	7052127
4-Jun-06	Scaup species	2	11V	522274	7052127	502274	7052127
4-Jun-06	Scaup species	1	11V	502274	7053127	522274	7053127
4-Jun-06	Scaup species	2	11V	502274	7053127	522274	7053127
4-Jun-06	Scaup species	6	11V	502274	7053127	522274	7053127
4-Jun-06	Scaup species	4	11V	502274	7053127	522274	7053127
4-Jun-06	Scaup species	3	11V	522274	7054127	502274	7054127
4-Jun-06	Scaup species	3	11V	522274	7054127	502274	7054127
4-Jun-06	Scaup species	1	11V	522274	7054127	502274	7054127
4-Jun-06	Scaup species	6	11V	502274	7055127	522274	7055127
4-Jun-06	Scaup species	3	11V	502274	7055127	522274	7055127
4-Jun-06	Surf Scoter	2	11V	502274	7039127	522274	7039127
4-Jun-06	Surf Scoter	1	11V	522274	7040127	502274	7040127
4-Jun-06	Surf Scoter	2	11V	502274	7043127	522274	7043127
4-Jun-06	Surf Scoter	1	11V	502274	7043127	522274	7043127
4-Jun-06	Surf Scoter	2	11V	522274	7047127	502274	7047127
4-Jun-06	Surf Scoter	2	11V	522274	7049127	502274	7049127
4-Jun-06	Surf Scoter	2	11V	522274	7049127	502274	7049127
4-Jun-06	Surf Scoter	2	11V	522274	7052127	502274	7052127
4-Jun-06	White-winged Scoter	2	11V	502274	7037127	522274	7037123
4-Jun-06	White-winged Scoter	1	11V	502274	7043127	522274	7043127
4-Jun-06	White-winged Scoter	2	11V	522274	7046127	502274	7046127
4-Jun-06	White-winged Scoter	2	11V	522274	7047127	502274	7047127
4-Jun-06	White-winged Scoter	2	11V	502274	7051127	522274	7051126
4-Jun-06	White-winged Scoter	4	11V	502274	7053127	522274	7053127
4-Jun-06	White-winged Scoter	4	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown Scoter	6	11V	522274	7038127	502274	7038127
4-Jun-06	Common Merganser	1	11V	502274	7053127	522274	7053127
4-Jun-06	Red-breasted Merganser	2	11V	502274	7037127	522274	7037123
4-Jun-06	Red-breasted Merganser	1	11V	522274	7042127	502274	7042127
4-Jun-06	Red-breasted Merganser	2	11V	502274	7045127	522274	7045127
4-Jun-06	Red-breasted Merganser	1	11V	522274	7040127	502274	7040127
4-Jun-06	Sandhill Crane	1	11V	502274	7055127	522274	7055127
4-Jun-06	Solitary Sandpiper	1	11V	522274	7054127	502274	7054127
4-Jun-06	Lesser Yellowlegs	1	11V	502274	7037127	522274	7037123

Table I-7 Waterbird Observations, 2006 (continued)

Date	Species	Number	Zone (NAD 83)	Easting at Start	Northing at Start	Easting at End	Northing at End
4-Jun-06	Lesser Yellowlegs	3	11V	522274	7038127	502274	7038127
4-Jun-06	Lesser Yellowlegs	2	11V	522274	7040127	502274	7040127
4-Jun-06	Lesser Yellowlegs	1	11V	522274	7044127	502274	7044127
4-Jun-06	Lesser Yellowlegs	1	11V	502274	7048126	522274	7048127
4-Jun-06	Lesser Yellowlegs	1	11V	502274	7053127	522274	7053127
4-Jun-06	Arctic Tern	2	11V	502274	7037127	522274	7037123
4-Jun-06	Arctic Tern	2	11V	502274	7037127	522274	7037123
4-Jun-06	Arctic Tern	1	11V	522274	7040127	502274	7040127
4-Jun-06	Arctic Tern	1	11V	522274	7040127	502274	7040127
4-Jun-06	Arctic Tern	1	11V	502274	7043127	522274	7043127
4-Jun-06	Arctic Tern	3	11V	502274	7043127	522274	7043127
4-Jun-06	Arctic Tern	2	11V	502274	7045127	522274	7045127
4-Jun-06	Arctic Tern	1	11V	502274	7053127	522274	7053127
4-Jun-06	Arctic Tern	1	11V	502274	7055127	522274	7055127
4-Jun-06	Unknown	2	11V	502274	7037127	522274	7037123
4-Jun-06	Unknown	1	11V	502274	7037127	522274	7037123
4-Jun-06	Unknown	1	11V	502274	7037127	522274	7037123
4-Jun-06	Unknown	2	11V	502274	7037127	522274	7037123
4-Jun-06	Unknown	4	11V	502274	7037127	522274	7037123
4-Jun-06	Unknown	2	11V	502274	7037127	522274	7037123
4-Jun-06	Unknown	4	11V	522274	7038127	502274	7038127
4-Jun-06	Unknown	1	11V	502274	7039127	522274	7039127
4-Jun-06	Unknown	1	11V	502274	7039127	522274	7039127
4-Jun-06	Unknown	4	11V	522274	7040127	502274	7040127
4-Jun-06	Unknown	4	11V	522274	7040127	502274	7040127
4-Jun-06	Unknown	1	11V	502274	7041127	522274	7041127
4-Jun-06	Unknown	1	11V	522274	7044127	502274	7044127
4-Jun-06	Unknown	1	11V	502274	7045127	522274	7045127
4-Jun-06	Unknown	1	11V	502274	7045127	522274	7045127
4-Jun-06	Unknown	2	11V	502274	7045127	522274	7045127
4-Jun-06	Unknown	1	11V	522274	7046127	502274	7046127
4-Jun-06	Unknown	2	11V	522274	7046127	502274	7046127
4-Jun-06	Unknown	2	11V	522274	7047127	502274	7047127
4-Jun-06	Unknown	2	11V	522274	7047127	502274	7047127
4-Jun-06	Unknown	1	11V	502274	7048126	522274	7048127
4-Jun-06	Unknown	4	11V	502274	7048126	522274	7048127
4-Jun-06	Unknown	1	11V	522274	7049127	502274	7049127
4-Jun-06	Unknown	1	11V	502274	7051127	522274	7051126
4-Jun-06	Unknown	2	11V	502274	7051127	522274	7051126
4-Jun-06	Unknown	2	11V	522274	7052127	502274	7052127
4-Jun-06	Unknown	2	11V	502274	7053127	522274	7053127
4-Jun-06	Unknown	1	11V	502274	7053127	522274	7053127

Table I-7 Waterbird Observations, 2006 (continued)

Date	Species	Number	Zone (NAD 83)	Easting at Start	Northing at Start	Easting at End	Northing at End
4-Jun-06	Unknown	2	11V	502274	7053127	522274	7053127
4-Jun-06	Unknown	8	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown	6	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown	1	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown	1	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown	2	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown	1	11V	522274	7054127	502274	7054127
4-Jun-06	Unknown	2	11V	502274	7055127	522274	7055127
4-Jun-06	Unknown	4	11V	502274	7055127	522274	7055127
4-Jun-06	Unknown	8	11V	502274	7055127	522274	7055127
4-Jun-06	Unknown	6	11V	502274	7055127	522274	7055127
27-Jul-06	Common Loon	1	11V	522274	7040127	502274	7040127
27-Jul-06	Common Loon	1	11V	502274	7043127	522274	7043127
27-Jul-06	Common Loon	2	11V	522274	7046127	502274	7046127
27-Jul-06	Common Loon	1	11V	522274	7048127	502274	7048126
27-Jul-06	Common Loon	1	11V	522274	7050127	502274	7050127
27-Jul-06	Common Loon	1	11V	522274	7050127	502274	7050127
27-Jul-06	Pacific Loon	1	11V	522274	7050127	502274	7050127
27-Jul-06	Pacific Loon	2	11V	502274	7053127	522274	7053127
27-Jul-06	Unknown Loon	2	11V	502274	7045127	522274	7045127
27-Jul-06	Tundra Swan	2	11V	522274	7040127	502274	7040127
27-Jul-06	Mallard	3	11V	522274	7044127	502274	7044127
27-Jul-06	Mallard	8	11V	502274	7047127	522274	7047127
27-Jul-06	Mallard	2	11V	522274	7048127	502274	7048126
27-Jul-06	Mallard	4	11V	522274	7052127	502274	7052127
27-Jul-06	Mallard	1	11V	522274	7054127	502274	7054127
27-Jul-06	Bufflehead	1	11V	502274	7047127	522274	7047127
27-Jul-06	Bufflehead	10	11V	522274	7052127	502274	7052127
27-Jul-06	Canvasback	1	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	2	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	17	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	37	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	6	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	8	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	9	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	6	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	2	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	2	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	35	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	5	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	5	11V	502274	7037127	522274	7037127
27-Jul-06	Scaup species	4	11V	522274	7038127	502274	7038127

Table I-7 Waterbird Observations, 2006 (continued)

Date	Species	Number	Zone (NAD 83)	Easting at Start	Northing at Start	Easting at End	Northing at End
27-Jul-06	Scaup species	26	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	22	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	22	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	2	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	6	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	11	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	12	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	10	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	6	11V	522274	7038127	502274	7038127
27-Jul-06	Scaup species	9	11V	502274	7039127	522274	7039127
27-Jul-06	Scaup species	3	11V	502274	7039127	522274	7039127
27-Jul-06	Scaup species	4	11V	502274	7039127	522274	7039127
27-Jul-06	Scaup species	4	11V	502274	7039127	522274	7039127
27-Jul-06	Scaup species	2	11V	502274	7039127	522274	7039127
27-Jul-06	Scaup species	1	11V	522274	7040127	502274	7040127
27-Jul-06	Surf Scoter	2	11V	502274	7043127	522274	7043127
27-Jul-06	White-winged Scoter	1	11V	522274	7038127	502274	7038127
27-Jul-06	White-winged Scoter	4	11V	502274	7043127	522274	7043127
27-Jul-06	White-winged Scoter	7	11V	502274	7049127	522274	7049127
27-Jul-06	White-winged Scoter	10	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown Scoter	2	11V	502274	7039127	522274	7039127
27-Jul-06	Red-breasted Merganser	1	11V	502274	7037127	522274	7037127
27-Jul-06	Red-breasted Merganser	1	11V	502274	7039127	522274	7039127
27-Jul-06	Red-breasted Merganser	1	11V	502274	7039127	522274	7039127
27-Jul-06	Red-breasted Merganser	5	11V	522274	7054127	502274	7054127
27-Jul-06	Unknown Merganser	1	11V	522274	7040127	502274	7040127
27-Jul-06	Unknown	2	11V	502274	7037127	522274	7037127
27-Jul-06	Unknown	1	11V	502274	7037127	522274	7037127
27-Jul-06	Unknown	4	11V	502274	7037127	522274	7037127
27-Jul-06	Unknown	5	11V	502274	7037127	522274	7037127
27-Jul-06	Unknown	1	11V	502274	7037127	522274	7037127
27-Jul-06	Unknown	7	11V	502274	7037127	522274	7037127
27-Jul-06	Unknown	2	11V	502274	7037127	522274	7037127
27-Jul-06	Unknown	1	11V	522274	7038127	502274	7038127
27-Jul-06	Unknown	7	11V	522274	7038127	502274	7038127
27-Jul-06	Unknown	1	11V	522274	7038127	502274	7038127
27-Jul-06	Unknown	10	11V	502274	7039127	522274	7039127
27-Jul-06	Unknown	1	11V	502274	7039127	522274	7039127
27-Jul-06	Unknown	2	11V	502274	7039127	522274	7039127
27-Jul-06	Unknown	1	11V	502274	7039127	522274	7039127
27-Jul-06	Unknown	4	11V	502274	7039127	522274	7039127
27-Jul-06	Unknown	1	11V	522274	7040127	502274	7040127

Table I-7 Waterbird Observations, 2006 (continued)

Date	Species	Number	Zone (NAD 83)	Easting at Start	Northing at Start	Easting at End	Northing at End
27-Jul-06	Unknown	1	11V	522274	7040127	502274	7040127
27-Jul-06	Unknown	1	11V	522274	7040127	502274	7040127
27-Jul-06	Unknown	1	11V	502274	7041127	522274	7041127
27-Jul-06	Unknown	2	11V	502274	7041127	522274	7041127
27-Jul-06	Unknown	1	11V	502274	7041127	522274	7041127
27-Jul-06	Unknown	2	11V	502274	7041127	522274	7041127
27-Jul-06	Unknown	2	11V	502274	7041127	522274	7041127
27-Jul-06	Unknown	3	11V	522274	7042127	502274	7042127
27-Jul-06	Unknown	2	11V	502274	7043127	522274	7043127
27-Jul-06	Unknown	9	11V	522274	7044127	502274	7044127
27-Jul-06	Unknown	8	11V	522274	7044127	502274	7044127
27-Jul-06	Unknown	1	11V	522274	7044127	502274	7044127
27-Jul-06	Unknown	1	11V	502274	7045127	522274	7045127
27-Jul-06	Unknown	2	11V	502274	7045127	522274	7045127
27-Jul-06	Unknown	1	11V	502274	7045127	522274	7045127
27-Jul-06	Unknown	4	11V	522274	7046127	502274	7046127
27-Jul-06	Unknown	5	11V	522274	7046127	502274	7046127
27-Jul-06	Unknown	1	11V	522274	7046127	502274	7046127
27-Jul-06	Unknown	1	11V	502274	7047127	522274	7047127
27-Jul-06	Unknown	2	11V	502274	7047127	522274	7047127
27-Jul-06	Unknown	2	11V	502274	7047127	522274	7047127
27-Jul-06	Unknown	2	11V	502274	7047127	522274	7047127
27-Jul-06	Unknown	4	11V	522274	7048127	502274	7048126
27-Jul-06	Unknown	1	11V	502274	7049127	522274	7049127
27-Jul-06	Unknown	3	11V	502274	7049127	522274	7049127
27-Jul-06	Unknown	2	11V	502274	7049127	522274	7049127
27-Jul-06	Unknown	6	11V	502274	7049127	522274	7049127
27-Jul-06	Unknown	1	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown	1	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown	8	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown	2	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown	1	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown	1	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown	1	11V	502274	7051127	522274	7051126
27-Jul-06	Unknown	7	11V	522274	7052127	502274	7052127
27-Jul-06	Unknown	2	11V	502274	7053127	522274	7053127
27-Jul-06	Unknown	1	11V	522274	7054127	502274	7054127
27-Jul-06	Unknown	2	11V	522274	7054127	502274	7054127
27-Jul-06	Unknown	3	11V	522274	7054127	502274	7054127
27-Jul-06	Unknown	3	11V	502274	7055127	522274	7055127
27-Jul-06	Unknown	1	11V	502274	7055127	522274	7055127

Table I-8 Raptor Observations, 2003 to 2009

Year	Species	UTM Coordinates			# Adults	# Eggs	# Nestlings	Occupied	Productive
		Zone (NAD 83)	UTMEast	UTMNorth					
2003	no activity	11V	512811	7046234	0	0	0	No	No
2003	no activity	11V	512736	7046328	0	0	0	No	No
2003	no activity	11V	510633	7047579	0	0	0	No	No
2004	no activity	11V	512811	7046234	0	0	0	No	No
2004	no activity	11V	512736	7046328	0	0	0	No	No
2004	no activity	11V	510633	7047579	0	0	0	No	No
2004	Red-tailed hawk	11V	495082	7018268	0	0	2	Yes	Yes
2004	no activity	11V	494122	7023397	0	0	0	No	No
2004	no activity	11V	511306	7049572	0	0	0	No	No
2004	Bald eagle	11V	511640	7050798	0	0	0	No	No
2004	no activity	11V	511332	7048758	0	0	0	No	No
2004	no activity	11V	492800	7023096	0	0	0	No	No
2004	no activity	11V	512674	7046335	0	0	0	No	No
2004	no activity	11V	509609	7044148	0	0	0	No	No
2005	no activity	11V	512811	7046234	0	0	0	No	No
2005	no activity	11V	512811	7046234	0	0	0	No	No
2005	no activity	11V	512736	7046328	0	0	0	No	No
2005	no activity	11V	512736	7046328	0	0	0	No	No
2005	Peregrine falcon	11V	510633	7047579	1	Unknown	Unknown	Yes	Unknown
2005	Peregrine falcon	11V	510633	7047579	1	0	3	Yes	Yes
2005	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2005	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2005	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2005	not surveyed	11V	494122	7023397	Unknown	Unknown	Unknown	Unknown	Unknown
2005	no activity	11V	494122	7023397	0	0	0	No	No
2005	Bald eagle	11V	511306	7049572	2	1	0	Yes	
2005	Bald eagle	11V	511306	7049572	0	0	0	No	No
2005	no activity	11V	511640	7050798	0	0	0	No	No
2005	no activity	11V	511640	7050798	0	0	0	No	No
2005	not surveyed	11V	511332	7048759	Unknown	Unknown	Unknown	Unknown	Unknown
2005	not surveyed	11V	511332	7048759	Unknown	Unknown	Unknown	Unknown	Unknown
2005	no activity	11V	492800	7023096	0	0	0	No	No
2005	no activity	11V	492800	7023096	0	0	0	No	No
2005	not surveyed	11V	512673	7046335	Unknown	Unknown	Unknown	Unknown	Unknown
2005	no activity	11V	512673	7046335	0	0	0	No	No
2005	no activity	11V	509609	7044148	0	0	0	No	No
2005	no activity	11V	509609	7044148	0	0	0	No	No
2005	no activity	11V	506780	7045587	0	0	0	No	No
2005	no activity	11V	506780	7045587	0	0	0	No	No
2005	Bald eagle	11V	509736	7049125	1	1	1	Yes	Yes

Table A-8 Raptor Observations, 2003 to 2009 (continued)

Year	Species	UTM Coordinates			# Adults	# Eggs	# Nestlings	Occupied	Productive
		Zone (NAD 83)	UTMEast	UTMNorth					
2005	Bald eagle	11V	509736	7049125	1	0	0	Yes	Yes
2005	Bald eagle	11V	513544	7044258	1	0	1	Yes	Yes
2005	Bald eagle	11V	513544	7044258	0	0	1	Yes	Yes
2006	no activity	11V	512811	7046234	0	0	0	No	No
2006	no activity	11V	512811	7046234	0	0	0	No	No
2006	not surveyed	11V	512736	7046234	Unknown	Unknown	Unknown	Unknown	Unknown
2006	not surveyed	11V	512736	7046234	Unknown	Unknown	Unknown	Unknown	Unknown
2006	Peregrine falcon	11V	510633	7047579	1	0	0	Yes	No
2006	Peregrine falcon	11V	510633	7047579	1	0	0	Yes	No
2006	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2006	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2006	not surveyed	11V	494122	7023397	Unknown	Unknown	Unknown	Unknown	Unknown
2006	not surveyed	11V	494122	7023397	Unknown	Unknown	Unknown	Unknown	Unknown
2006	Bald eagle	11V	511306	7049572	1	0	1	Yes	Yes
2006	Bald eagle	11V	511306	7049572	0	0	1	Yes	Yes
2006	no activity	11V	511640	7050798	0	0	0	No	No
2006	no activity	11V	511640	7050798	0	0	0	No	No
2006	not surveyed	11V	511332	7048759	Unknown	Unknown	Unknown	Unknown	Unknown
2006	no activity	11V	511332	7048759	Unknown	Unknown	Unknown	Unknown	Unknown
2006	not surveyed	11V	492800	7023096	Unknown	Unknown	Unknown	Unknown	Unknown
2006	not surveyed	11V	492800	7023096	Unknown	Unknown	Unknown	Unknown	Unknown
2006	not surveyed	11V	512674	7046335	Unknown	Unknown	Unknown	Unknown	Unknown
2006	no activity	11V	512674	7046335	0	0	0	No	No
2006	no activity	11V	509609	7044178	0	0	0	No	No
2006	no activity	11V	509609	7044178	0	0	0	No	No
2006	no activity	11V	506780	7045587	0	0	0	No	No
2006	no activity	11V	506780	7045587	0	0	0	No	No
2006	Bald eagle	11V	509736	7049124	0	0	1	Yes	Yes
2006	Bald eagle	11V	509736	7049124	0	0	1	Yes	Yes
2006	no activity	11V	513544	7044258	0	0	0	No	No
2006	not surveyed	11V	513544	7044258	Unknown	Unknown	Unknown	Unknown	Unknown
2007	Common raven	11V	512811	7046234	1	0	3	Yes	Yes
2007	no activity	11V	512811	7046234	0	0	0	No	Yes
2007	no activity	11V	512736	7046234	0	0	0	No	No
2007	no activity	11V	512736	7046234	0	0	0	No	No
2007	Peregrine falcon	11V	510633	7047579	1	Unknown	Unknown	Yes	Unknown
2007	Peregrine falcon	11V	510633	7047579	0	0	3	Yes	Yes
2007	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2007	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2007	not surveyed	11V	494122	7023397	Unknown	Unknown	Unknown	Unknown	Unknown

Table A-8 Raptor Observations, 2003 to 2009 (continued)

Year	Species	UTM Coordinates			# Adults	# Eggs	# Nestlings	Occupied	Productive
		Zone (NAD 83)	UTMEast	UTMNorth					
2007	not surveyed	11V	494122	7023397	Unknown	Unknown	Unknown	Unknown	Unknown
2007	Bald eagle	11V	511306	7049572	1	0	2	Yes	Yes
2007	Bald eagle	11V	511306	7049572	0	0	2	Yes	Yes
2007	no activity	11V	511640	7050798	0	0	0	No	No
2007	no activity	11V	511640	7050798	0	0	0	No	No
2007	Common raven	11V	511332	7048759	1	0	1	Yes	Yes
2007	no activity	11V	511332	7048759	0	0	0	Yes	Yes
2007	not surveyed	11V	492800	7023096	Unknown	Unknown	Unknown	Unknown	Unknown
2007	not surveyed	11V	492800	7023096	Unknown	Unknown	Unknown	Unknown	Unknown
2007	no activity	11V	512674	7046335	0	0	0	No	No
2007	no activity	11V	512674	7046335	0	0	0	No	No
2007	no activity	11V	509609	7044178	0	0	0	No	No
2007	no activity	11V	509609	7044178	0	0	0	No	No
2007	Great grey owl	11V	506780	7045587	1	0	3	Yes	Yes
2007	not surveyed	11V	506780	7045587	Unknown	Unknown	Unknown	Unknown	Unknown
2007	no activity	11V	509736	7049124	0	0	0	No	No
2007	no activity	11V	509736	7049124	0	0	0	No	No
2007	Bald eagle	11V	513544	7044258	1	0	0	Yes	No
2007	not surveyed	11V	513544	7044258	Unknown	Unknown	Unknown	Unknown	Unknown
2008	Peregrine falcon	11V	512811	7046266	1	Unknown	Unknown	Yes	Unknown
2008	Peregrine falcon	11V	512811	7046266	2	4	0	Yes	Yes
2008	no activity	11V	512736	7046328	0	0	0	No	No
2008	no activity	11V	510633	7047579	0	0	0	No	No
2008	not surveyed	11V	495082	7018268	Unknown	Unknown	Unknown	Unknown	Unknown
2008	not surveyed	11V	494122	7023397	Unknown	Unknown	Unknown	Unknown	Unknown
2008	Bald eagle	11V	511306	7049572	1	0	0	Yes	No
2008	no activity	11V	511640	7050798	0	0	0	No	No
2008	no activity	11V	511332	7048758	0	0	0	No	No
2008	not surveyed	11V	492800	7023096	Unknown	Unknown	Unknown	Unknown	Unknown
2008	no activity	11V	512674	7046335	0	0	0	No	No
2008	Bald eagle	11V	509609	7044178	1	0	1	Yes	Yes
2008	no activity	11V	506780	7045587	0	0	0	No	No
2008	no activity	11V	509736	7049124	0	0	0	No	No
2008	Unknown	11V	513544	7044258	1	0	1	Yes	Yes
2009	no activity	11V	512811	7046266	0	0	0	No	No
2009	no activity	11V	512736	7046328	0	0	0	No	No
2009	no activity	11V	510633	7047579	0	0	0	No	No
2009	Common raven	11V	495082	7018268	0	0	3	Yes	Yes
2009	no activity	11V	494122	7023397	0	0	0	No	No
2009	no activity	11V	511306	7049572	0	0	0	No	No

Table A-8 Raptor Observations, 2003 to 2009 (continued)

Year	Species	UTM Coordinates			# Adults	# Eggs	# Nestlings	Occupied	Productive
		Zone (NAD 83)	UTMEast	UTMNorth					
2009	no activity	11V	511640	7050798	0	0	0	No	No
2009	no activity	11V	511332	7048758	0	0	0	No	No
2009	no activity	11V	492800	7023096	Unknown	Unknown	Unknown	Unknown	Unknown
2009	no activity	11V	512674	7046335	0	0	0	No	No
2009	no activity	11V	509609	7044178	Unknown	Unknown	Unknown	Unknown	Unknown
2009	no activity	11V	506780	7045587	0	0	0	No	No
2009	no activity	11V	509736	7049124	0	0	0	No	No
2009	Bald eagle	11V	513544	7044258	2	0	2	Yes	Yes
2009	no activity	11V	512811	7046266	0	0	0	No	No
2009	no activity	11V	511332	7048758	0	0	0	No	No