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FINAL REPORT

SD 6-2 2009 Terrestrial Vegetation and Wildlife Baseline Synthesis Report - Meliadine Gold Project, Nunavut

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REPORT

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EXECUTIVE SUMMARY

Agnico-Eagle Mines Limited (AEM) is proposing to construct and operate a gold mine, known as the Meliadine Gold Project (Project) 25 kilometres (km) north of Rankin Inlet, and 80 km south of the Chesterfield Inlet in the Kivalliq Region of Nunavut. The proposed Project site is located on a peninsula between the east, south and west basins of Meliadine Lake on Inuit Owned Land.

Wildlife and vegetation studies have been undertaken since the mid-1990s when Western Mining Corporation International Ltd. (WMC) undertook a multi-year gold exploration program in the Project area. This terrestrial baseline report represents a synthesis of all respective vegetation and wildlife studies that have taken place since this time. Specifically, the data presented in this baseline report were collected between 1998 and 2009 under the direction of Complex Minerals Corporation (Complex), then owners of the Project, and were based on the Project footprint at that time. In 2010, AEM acquired Comaplex and the Project, and as such all references to Comaplex contained within this document are assumed by AEM.

To facilitate the assessment and interpretation of potential effects associated with the Project, it is necessary to define appropriate spatial boundaries. Spatial boundaries were developed with consideration of both vegetation and wildlife components.

The Regional Study Area (RSA) was selected to capture any effects that may extend beyond the immediate Project area and subsequently to assess potential cumulative effects on vegetation and wildlife in the broader regional context. A Local Study Area (LSA) also was defined for the vegetation component to assess the immediate direct and indirect effects of the Project on vegetation resources.

Vegetation Baseline

The vegetation baseline report section represents a synthesis of all data collected during the 1998 to 2009 field programs and provides a summary of baseline conditions concerning the abundance and distribution of plant communities, occurrence of rare plants, and metal concentrations present in soils and plant tissues. Mapping of plant communities within the LSA was based on interpretation of 1:10 000 air photos or orthophotographs in conjunction with results from field data.

Baseline vegetation surveys were done at the Project in 1998, 2008 and 2009. The purpose of these studies was to document flora species and characterize plant community types that may be affected by the Project development. Baseline studies included detailed vegetation inventory surveys in the vicinity of the Project development and aerial reconnaissance surveys in the broader regional area. The objectives of the vegetation baseline study were to:

- collect quantitative vegetation and plant community data;
- define and map plant communities using these collected data;
- identify and report on valued components (VCs);
- describe and map the occurrence of rare plants or unusual plant associations within the LSA; and
- develop a regional ecological land classification system.

The regional land cover classification map was developed using satellite imagery, remote sensing software, and GIS to provide information on the relative abundance and distribution of vegetation types within the RSA. Field data were collected over the summers of 1998, 2008, and 2009 on 416 sites across the range of vegetation types within the Project area, including 337 plots in 1998, 59 plots in 2008, and 20 plots in 2009. Classification of vegetation cover types was based on the classification system developed in 1998 for consistency; modifications were made to account for inclusions of any new community types or associations.

The RSA boundary was established to assess the importance of the Project within a broader regional context, as it forms the foundation for quantifying potential effects of the Project on regional vegetation resources and wildlife habitat. The RSA was defined as a 52 km radius from the proposed Project and covers an area of approximately 850 000 ha. The RSA falls within the Maguse River Upland Ecoregion portion of the Southern Arctic Ecozone and is characterized by an abundance of waterbodies surrounded by uplands with terrestrial vegetation underlain by areas of continuous permafrost. Eight land cover classes were identified for the regional ecological land classification (ELC). Heath vegetation represents the dominant vegetation cover at 445 926 ha (52%) of the RSA, whereas wetlands and riparian areas are distributed over 122 575 ha (14%) of the RSA. The remaining 280 983 ha (33%) of the RSA are classified as water (predominantly lakes and the tidal basin of Hudson's Bay) and a small percentage of bare ground and rock outcrops.

The mine site LSA boundary encompasses the Tiriganiaq Zone main site, F Zone area, and the area, and was defined by the expected spatial extent of the immediate direct (e.g., Project footprint) and indirect effects (e.g., dust deposition) of the Project on surrounding soil, vegetation, and wildlife resources. The LSA for the anticipated mine sites was defined by the extent of the potential effects of the Project and is characteristic of regional habitat conditions and vegetation within the Maguse River Upland Ecoregion. However, the major landforms in the LSA are dominated by a large esker that runs northwest/southeast and numerous drumlins or drumlinoid ridges. The LSA for the proposed all-weather road was defined by the expected limit of direct and indirect effects from the road on the surrounding vegetation and was delineated by a 1 km buffer on either side of the anticipated right-of-way surrounding the proposed road alignment. The LSA for the road contains vegetation and landscape terrain features that are typical of the regional conditions. However, the proposed road is located primarily on high ground and tends to follow the ridge lines of eskers and bedrock outcrops.

In total, 10 plant community types were classified and mapped in the 8251 ha mine and road LSA, including 4 upland terrestrial vegetation classes, 3 wetlands classes, and 3 un-vegetated classes. Upland terrestrial vegetation encompasses 4468 ha (54%) of the LSA, with the heath tundra community type dominating the landscape. Wetlands are distributed over 2273 ha (27%) of the LSA, and the remaining 1509 ha (18%) of the LSA is classified as un-vegetated units that are predominantly composed of waterbodies and rivers. Disturbance features and un-vegetated sand areas represent <1% of the total LSA.

A total of 7 rare plant species were observed within the LSA during the 1998, 2008 and 2009 field programs. Four are designated "Sensitive" by the government of Nunavut (Government of Nunavut 2005) and include pretty milkvetch (*Astragalus eucosmus*), northern tansy-mustard (*Descurainia sophioides*), hairy butterwort (*Pinguicula villosa*), and Lanate willow (*Salix lanata* sp. *calcicola*). One species, *Salix planifolia* sp. *tyrrellii*, was initially recorded as "Threatened" by COSEWIC (1997) but has since been delisted (COSEWIC 2008). Additionally, 2 species, moor rush (*Juncus stygius*) and false chamomile (*Tripleurospermum maritimum*) have no previous documented records in Nunavut, as they were not included in the *Draft General Status Ranks of Vascular Plants in Nunavut* (Government of Nunavut 2005) and are considered as rare for purposes of this report. No other territorial or federally listed species (Nunavut 2005; COSEWIC 2008) were documented as occurring in the LSA.

There are an additional 13 species of rare plants that may have the potential to occur in the LSA, though they were not encountered during the 1998, 2008, or 2009 surveys. These are all listed as “Sensitive” (Government of Nunavut 2005), with the exception of autumn bluegrass (*Poa autumnalis*), which has been ranked as “Undetermined” due to insufficient data.

Assessments of baseline metal concentrations in plant tissue and soil in the LSA was undertaken in the fall of 2008 and completed in the fall of 2009, to provide a basis for evaluating potential effects of dust borne contaminants containing metals originating from the proposed mine sites and all-weather road. In total, 29 permanent sample sites were established in the vicinity of the mine site and along the road at which plant tissue samples from at least 2 different plant species and a soil sample were collected from each site. Most of the soil metal concentrations were within acceptable guidelines, with the exception of Arsenic (As), which exceeded CCME (2007) guidelines for agricultural use on 12 plots, all but 3 of which were found in the immediate vicinity of the proposed Meliadine main site or along the proposed road near the mine site. Metal concentrations in tissue from selected plant species were also analyzed to provide an understanding of baseline levels of various metals that may be concentrated in plant tissue. The results of the plant tissue metals analyses indicated a wide variability in the range of metal concentrations, with highest levels of Arsenic (As)found in alpine manzanita *(Arctostaphylos alpine)*, and water sedge (*Carex aquatilis)* on 2 plots located near the proposed Meliadine main mine site.

Wildlife Baseline

Golder Associates Ltd. (Golder) and Arc Wildlife Services Ltd. (Jalkotzy 2000a, 2000b) completed baseline wildlife surveys at the Meliadine Gold Project (Project) in 1998, 1999, 2000, 2008, and 2009. The objective of wildlife studies were to provide baseline data that are necessary to assess the potential effects of the Project on caribou and other wildlife species, while minimizing uncertainty, and to develop a wildlife mitigation and monitoring plan. The focus of the 2008 and 2009 field program was to gather data to complement the previously collected data that may be required to prepare an environmental effect assessment and to guide project design and environmental mitigation. The objective of this data report is to present a synthesis of the baseline and research data collected to date.

Baseline data, collected over the 5 years of surveys, encompasses the following species or species groups:

- barren-ground caribou (*Rangifer tarandus*);
- arctic fox (*Alopex lagopus*);
- raptors;
- upland birds;
- shorebirds;
- waterfowl;
- Tundra Swan (*Cygnus columbianus*); and
- loons.

In all study years, aerial surveys for caribou were completed in a 121 400 ha (1998 to 2000) or 849 500 ha (2008 to 2009) study area. Fox den surveys were completed in 1998 and 2008 in a 10 km radius from the Project. Raptor nest surveys were conducted over suitable habitat within 10 km of the Project area as well as along the proposed road alignment to Rankin Inlet in all years. Surveys for upland breeding birds were completed in the Project area in 2008 and 2009, as well as the Discovery area in 2008. Aerial surveys for waterfowl were completed in June and July of 2008 and 2009 within 4 strata, each covering an area of 3200 ha in the study area during each survey. Loon and swan nesting surveys were completed in 1998, 1999, 2000, and 2009 within 2 survey areas, a potentially impacted area and a control area, with areas of 3900 ha and 5100 ha, respectively.

Key baseline findings in the Project study area include:

- barren-ground caribou of the Qamanirjuaq herd are regular but transient visitors during their spring migration and calving periods;
- 37 bird species have been observed including 14 species of waterfowl, 5 species of shorebird, 3 species of raptor, and 2 owl species;
- the most common species of upland birds are Lapland Longspur (*Calcarius lapponicus)*, Horned Lark (*Eremophila alpestris)*, and Savannah Sparrow (*Passerculus sandwichensis)*;
- shorebirds are uncommon and have not been documented breeding;
- Pacific Loons (*Gavia pacifica)* and Tundra Swans (*Cygnus columbianus)* are confirmed, regular breeding summer residents;
- Peregrine Falcon (*Falco peregrines)*, Rough-legged Hawk *(Buteo lagopus)*, and Gyrfalcon (*Falco rusticolus)* have been documented and confirmed as breeding;
- Short-eared Owls (*Asio flammeus)* have been documented and nest observations indicate that they are likely breeding;
- Sandhill Cranes (*Grus canadensis*) occur throughout the study area in summer and are confirmed as breeding;
- arctic fox (*Alopex lagopus*) and arctic hare (*Lepus arcticus*) are common residents;
- wolves (*Canis lupus*), muskox (*Ovibos moschatus)*, and polar bears (*Ursus maritimus)* are infrequently observed;
- grizzly bears (*Ursus arctos)*, wolverines (*Gulo gulo*) or their sign were not seen in the study area during wildlife surveys for Project; and
- polar bear and the Peregrine Falcon are the only species that are listed under COSEWIC as “Special Concern” that have been documented in the study area.

LIST OF ABBREVIATIONS

Acronyms	
AGL	Above ground level
AEM	Agnico-Eagle Mines Limited
GPS	Global positioning system
BQCMB	Beverly and Qamanirjuaq Caribou Management Board
CCME	Canadian Council of Ministers of Environment
Comaplex	Comaplex Minerals Corporation
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
EC	Environment Canada
ELC	Ecological land classification
GIS	Geographic Information System
GNDoE	Government of Nunavut Department of Environment
Golder	Golder Associates Ltd.
ICPOES	Inductively Coupled Plasma Optical Emission Spectrometry
ICPMS	Inductively coupled plasma mass spectrometry
KAI	Kappa Index of Agreement
LSA	Local Study Area
n	Number or sample size
PRISM	Program for Regional and International Shorebird Monitoring
Project	Meliadine Gold Project
RSA	Regional Study Area
SARA	*Species at Risk Act*
SD	Standard deviation
SE	Standard error
TTA	Training and test area
UTM	Universal Transverse Mercator
VCs	Valued components
VCF	Visibility correction factor
WMC	Western Mining Corporation
ZOI	Zone of influence
Units	
ha	Hectare
km	Kilometre
km^2	Square kilometre
km/h	Kilometres per hour
m	Metre
mg/kg	Milligram per kilogram
%	Percent

GLOSSARY

Arctic	The region above 66.5 degrees North latitude
Baseline	Background, existing, pre-activity, or pre-construction environmental conditions
Biodiversity	The number and variety of organisms found within a specified geographic region
Calving Period	The time of year when caribou use calving grounds for the birth of newborn caribou. The period commences with the initiation of calving and includes some time prior to calving, i.e., congregation of cows and calves. Defined for the Qamanirjuaq herd as late May to late June.
Carnivore	A mammal that eats animals
Ecosystem	A spatially defined system including all biological organisms and abiotic environment, interacting as a functional unit
Ecozone	Area of the Earth's surface representative of large, general ecological units characterized by interactive and adjusting biotic and abiotic factors
Eskers	Long, narrow bodies of sand and gravel deposited by a subglacial stream running between ice walls or in an ice tunnel, left behind after melting of the ice of a retreating glacier
Eyrie	The nest of a bird of prey, built in a high, inaccessible place
Fern	Vascular plant that does not make seeds
GPS	Global positioning system, a global satellite navigation aid
Habitat	The natural environment in which an animal or plant lives
Lichen	Any complex organism of the group Lichens, composed of a fungus in symbiotic union with an alga and having a greenish, grey, yellow, brown, or blackish thallus that grows in leaflike, crustlike, or branching forms on rocks, trees and other surfaces
Liverwort	Non-vascular plant that does not make seeds
Local Study Area	Defines the spatial extent directly or indirectly affected by the project
Mean	The average of a numerical set, the sum of the observations divided by the number of observations
Microtopography	Very small scale variations in the height and roughness of the ground surface
Migration	Movements from one region to another of birds, fish, or mammals in search of food or shelter, often on an annual basis according to season
Moss	Non-vascular plant that does not make seeds
Non-Vascular Plant	Plants that do not possess conductive tissues for the transport of water and food
Nutrient Regime	The relative supply of nutrients available for plant growth at a given site
pH	The degree of acidity (or alkalinity) of soil or solution. The pH scale is generally presented from 1 (most acidic) to 14 (most alkaline). A difference of one pH unit represents a ten-fold change in hydrogen ion concentration.
Plant Community	A group of interacting plant species that exists within a defined space and time
Point Count	A circular plot survey where observers spend a prescribed time looking and listening for birds
Population index	An estimate of waterfowl in a given area based on observations in a sub-sampled area and adjusted for birds not observed
Post-calving period	The time of year after the calving period, when cows and newborn calves congregate. Caribou disperse during this period and areas used include the calving grounds and a substantial extension to the south and west of the calving ground. Defined for the Qamanirjuaq herd as late June to the end of July.
Rare Plant	A native plant species found in restricted areas, at the edge of its range or in low numbers within a province, state, territory or country
Regional Study Area	The area that is beyond the limits of local study areas that may be affected by the Project. The regional study area for this study was defined to be an area with a 52 km radius centered on the Project.
Riparian	Refers to terrain, vegetation or simply a position next to or associated with a stream, floodplain or standing waterbody

Sedge	Any plant of the genus Carex, perennial herbs, often growing in dense tufts in marshy places. They have triangular jointless stems, a spiked inflorescence and long grass-like leaves which are usually rough on the margins and midrib. There are several hundred species.
Simpson Inverse Index	Used to quantify the biodiversity of a habitat. It takes into account the number of species present, as well as the relative abundance of each species.
Standard deviation	Statistical measurement of the variation in a distribution
Standard error	The standard deviation of the mean
Species at Risk	Species that are listed under Schedule 1 of the *Species at Risk Act* (SARA) as "extirpated", "endangered", or "threatened"
Species diversity	A measure of biodiversity that takes into account the number of species present, as well as the abundance of each species. Species diversity indices are mathematical estimators of diversity based on sample data (i.e., Simpson's Inverse Index).
Species richness	The simplest measure of biodiversity of the different species making up the richness of an area
Strata	Singular stratum
Topographic	The configuration of a surface including its relief and the position of its natural and man-made features
Transect	A straight survey line
Tundra	A treeless, level or gently rolling plain of the Arctic region. It has a marshy surface where mosses, lichens, and low shrubs grow with mucky soil and permafrost underneath.
Upland bird	Songbird and shorebird species
UTM	Universal Transverse Mercator. A mapping grid; the globe is divided into numbered zones, and within each zone, northing and easting values are used to located any point on the Earth's surface.
Vascular plant	Plants that possess conductive tissues for the transport of water and food
Waterfowl	A bird that frequents the water or lives on or near rivers, lakes, seas, etc.; some waterfowl are long-legged waders (such as cranes and herons), whereas others are web-footed swimmers (such as ducks and geese). The term is commonly used to refer to swimming game birds.
Wildlife	Species of plant or animal that are not tamed or domesticated
Wildlife species	As defined in the federal Species at Risk Act (SARA), "wildlife species" mean a species, subspecies, or variety of geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and (a) is native to Canada; or (b) has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Zone of Influence	A geographic area where, if a mine effect was evident, the probability of occurrence values would be highest adjacent to the mine and decrease at as distance from the mine increases

The scientific style and format used in this report follows the recommendations outlined in the "Scientific Style and Format – The CSE Manual for Authors, Editors, and Publishers" 7th Edition prepared by the Council of Scientific Editors. This 2006 publication recommends the preferred format for use of numbers in the text (i.e., use of numerals for numbers with the exception of zero and one, or at the beginning of a sentence), the modern format for citing references, as well as many other style and format conventions.

This report also uses the National Standard of Canada SI Metric Units as identified in the CAN/CSA-Z234.1-00 Metric Practice Guide (Reaffirmed 2006) prepared by the Canadian Standards Association.

Common species names in this report follow the guidelines of the American Society of Ichthyologist and Herpetologists, The American Ornithologists' Union, and the American Society of Mammalogists.

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APPENDICES

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Vegetation

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Wildlife

1.0 INTRODUCTION

1.1 Background and Scope

Agnico-Eagle Mines Limited (AEM) is proposing to construct and operate a gold mine, known as the Meliadine Gold Project (Project) 25 kilometres (km) north of Rankin Inlet (Figure 1-1), and 80 km south of the Chesterfield Inlet in the Kivalliq Region of Nunavut. The proposed Project site is located on a peninsula between the east, south and west basins of Meliadine Lake on Inuit Owned Land.

Meliadine Lake covers an area of 10 700 hectares (ha) with a maximum length of 31 km (Environment Canada 1973). It features a highly convoluted shoreline, 465 km in length, with over 200 islands. Most of the lake drains via the Meliadine River, which originates at the south end of the lake and flows through a series of waterbodies and short river segments into Hudson Bay (distance of 39 km). A second, smaller outflow from the west basin of Meliadine Lake drains into Peter Lake, which discharges into Hudson Bay through the Diana River system (distance of 70 km).

The Project area is within the zone of continuous permafrost approximately 400 km north of the tree line with typical sub-arctic vegetation. The terrain is dominated by glacial landforms that include drumlins of glacial till, eskers consisting of gravels and sands, and numerous shallow lakes. The glacial deposits form low relief ridges oriented in a northwest-southeast direction. Regional drainage patterns are controlled by these ridges and the prevailing permafrost.

Wildlife and vegetation studies have been undertaken since the mid-1990s when Western Mining Corporation International Ltd. (WMC) undertook a multi-year gold exploration program in the Project area. This terrestrial baseline report represents a synthesis of all respective vegetation and wildlife studies that have taken place since this time. Specifically, the data presented in this baseline report were collected between 1998 and 2009 under the direction of Complex Minerals Corporation (Complex), then owners of the Project, and were based on the Project footprint at that time. In 2010, AEM acquired Comaplex and the Project, and as such all references to Comaplex contained within this document are assumed by AEM.

1.2 Objectives

1.2.1 Vegetation Baseline

Vegetation studies were carried out in 1998, 2008, and 2009 for the Project to document flora species and characterize plant community types that may be affected by the Project development. Baseline studies included detailed vegetation inventory surveys in the vicinity of the Project development and aerial reconnaissance surveys in the broader regional area. The objectives of the vegetation baseline study were to:

- collect quantitative vegetation and plant community data;
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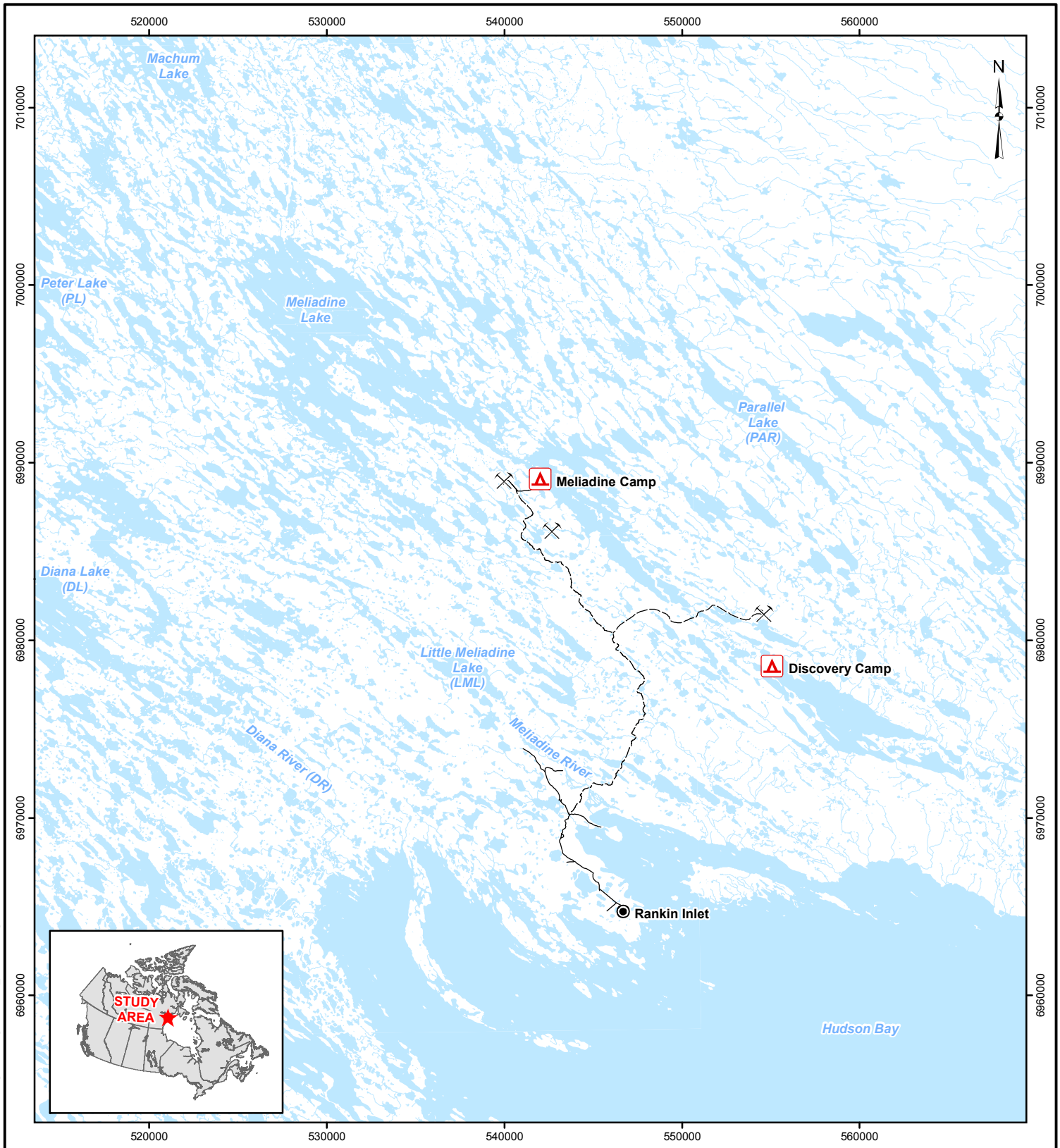
- identify and report on valued components (VCs);
- describe and map the occurrence of rare plants or unusual plant associations within the local study area (LSA); and
- develop a regional ecological land classification system.



LEGEND

- Camp
- Proposed Mine Site
- Road - Existing
- Proposed Road
- Watercourse
- Waterbody

REFERENCE

Base data obtained from Comaplex Minerals Corporation
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

LOCATION OF THE MELIADINE GOLD PROJECT

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	LV	28 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	28 Oct. 2009		
CHECK	LV	22 Nov. 2009		
REVIEW	CO	22 Nov. 2009		

FIGURE 1-1

N:\Bur-Graphics\Projects\2007\1373\07-1373-0055\Mapping\MXD\2009\Vegetation\figure-01-01_location-vegetation.mxd

1.2.2 Wildlife Baseline

Baseline wildlife studies at the Meliadine Gold Project were initiated by Arc Wildlife Services Ltd. in May 1998 and continued through 2000. Further studies were completed in 2008 and 2009 by Golder Associates Ltd. The 2008 and 2009 wildlife studies were designed to update and augment the existing baseline data for all major categories of terrestrial wildlife present, including species at risk. Also in 2009, additional data were collected to address data gaps in the Tiriganiaq, Discovery, and F Zone deposit areas and survey duration for some components. The studies were designed to collect baseline data within the terrestrial study area, including the proposed 2009 Project footprint and the proposed all-weather road corridor. The objective of wildlife studies were to provide baseline data that are necessary to assess the potential effects of the Project on caribou and other wildlife species, while minimizing uncertainty, and to develop a wildlife mitigation and monitoring plan. The objective of this data report is to present a synthesis of the baseline and research data collected to date.

2.0 SUMMARY OF WORK COMPLETED

2.1 Vegetation

Initial baseline vegetation surveys were completed in 1998 for the immediate Project area, and additional vegetation surveys along the all-weather road, Discovery area, and F Zone area were completed in 2008 and 2009. Results of the 1998 vegetation surveys were presented in the 1999 report "1998 Vegetation Baseline Studies, WMC International Ltd., Meliadine West Gold Project" (Burt 1999). Results presented within the 1999 report were updated with the 2008 and 2009 results, and the information has been integrated into this Vegetation Baseline Report.

2.2 Wildlife

A multi-year gold exploration program conducted by WMC began north of Rankin Inlet in 1995 and included wildlife baseline studies from 1998 to 2000 (Jalkotzy 1999, 2000a, 2000b). Those studies focused on barren-ground caribou (*Rangifer tarandus*), arctic foxes (*Alopex lagopus*), Tundra Swans (*Cygnus columbianus*), loons and other waterfowl, and raptors. Golder Associates Ltd. (Golder) completed further baseline wildlife surveys at the Project in June and July 2008 (Golder 2008) and between May and July 2009. These wildlife baseline studies, which build upon the previous studies conducted by Arc Wildlife Services Ltd. in 1998, 1999, and 2000, were designed to update and augment the existing data. Table 2-1 summarizes baseline wildlife studies conducted to date. The focus of the 2008 and 2009 field program was to gather data to complement previously collected data that may be required to prepare a environmental effects assessment and to guide project design and environmental mitigation.

Table 2-1: Summary of Work Completed

Surveys	1998	1999	2000	2008	2009
Caribou – aerial surveys	√	√	√	√	√
Fox dens – ground surveys	√			√	
Raptor – aerial surveys	√			√	√
Upland bird – point count surveys				√	√
Shorebirds – PRISM surveys				√	√
Waterfowl – aerial surveys	√			√	√
Loon and Swans – nest surveys	√	√	√		√

A number of species of concern, including barren-ground caribou, wolves (*Canis lupus*), wolverine (*Gulo gulo*), bear species, raptors, and waterfowl, occur in and around the Project (Table 2-2). Both traditional and scientific knowledge indicate that barren-ground caribou of the Qamanirjuaq herd likely use this area during seasonal migrations (Beverly and Qamanirjuaq Caribou Management Board [BQCMB 1999]). Numerous migratory passerine and shorebird species breed in the uplands and lowlands of this tundra habitat. Six species that have ranges within the study area are listed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC), including 2 of that are also listed by the Species at Risk Act (SARA) (Table 2-2).

Table 2-2: Species of Concern in the Regional Study Area

Species	Scientific Name	COSEWIC Status[a]	SARA Status[b]	Nunavut Status[c]	Record of Presence in the Regional Study Area
Polar bear	*Ursus maritimus*	Special Concern	-	Sensitive	Observed within the Project area (1998, 1999, 2000)
Grizzly bear	*Ursus arctos*	Special Concern	-	Sensitive	Mark Ittinuar- observations northwest of project area
Wolverine	*Gulo gulo*	Special Concern	-	Sensitive	Mark Ittinuar- observations northwest of project area
Grey wolf	*Canis lupus*	Not at Risk	-	Sensitive	Observed within Project area (2008)
Peregrine Falcon (tundra)	*Falco peregrinus*	Special Concern	Schedule 3 Special Concern	May be at Risk	Observed within Project area (1998,1999, 2000); confirmed nesting (2008, 2009)
Short-eared Owl	*Asio flammeus*	Special Concern	Schedule 3 Special Concern	Sensitive	Observed within Project area (2000, 2008, 2009)
Common Eider	*Somateria mollisima*	-	-	Sensitive	Observed within Project area (2008, 2009)
King Eider	*Somateria spectabilis*	-	-	Sensitive	Observed within Project area (2009)
Northern Pintail	*Anas acuta*	-	-	Sensitive	Observed within Project area (1998, 2008, 2009)
Least Sandpiper	*Calidris minutilla*	-	-	Sensitive	Observed within Project area (2008, 2009)
Semipalmated Sandpiper	*Calidris pusilla*	-	-	Sensitive	Observed within Project area (2008, 2009)
Horned Lark	*Eremophila alpestris*	-	-	Sensitive	Observed within Project area (1998, 2008, 2009)
American Tree Sparrow	*Spizella arborea*	-	-	Sensitive	Observed within Project area (2008)
Snow Bunting	*Plectrophenax nivalis*	-	-	Sensitive	Observed within Project area (2008, 2009)
White-crowned Sparrow	*Zonotrichia leucophrys*	-	-	Sensitive	Observed within Project area (2008)
American Pipit	*Anthus rubescens*	-	-	Sensitive	Observed within Project area (1998, 2008, 2009)

[a] COSEWIC Status: Committee on the Status of Endangered Wildlife in Canada. http://www.cosewic.gc.ca/eng/sct1/searchform_e.cfm, accessed 30 July 2008

[b] SARA Status: Species at Risk Act. http://www.sararegistry.gc.ca/default_e.cfm, accessed 30 July 2008

[c] Nunavut Wild Species – General Status of Wild Species in Nunavut. Government of Nunavut. Department of Sustainable Development. 33p.

[d] Information obtained from Jalkotzy (1999, 2000a, 2000b) and from Mark Ittinuar (aboriginal assistant) of Rankin Inlet during 2008 field programs.

[e] "-" indicates that species is not listed under COSEWIC or SARA

3.0 STUDY AREA

The Project is located approximately 25 km north of Rankin Inlet in Nunavut (Figure 1-1). To facilitate the assessment and interpretation of potential effects associated with the Project, it is necessary to define appropriate spatial boundaries. Spatial boundaries were developed with consideration of both vegetation and wildlife components.

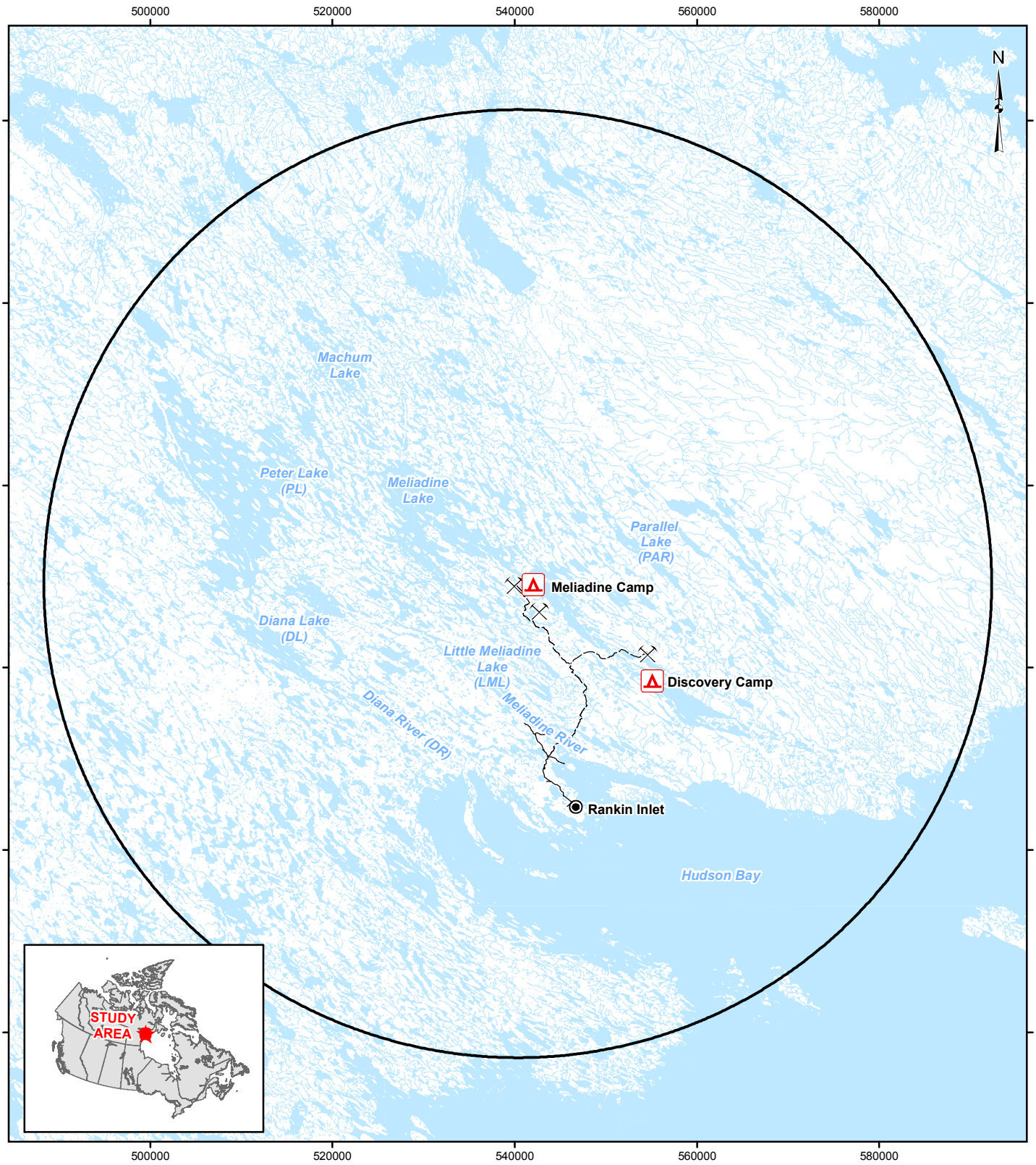
The Regional Study Area (RSA) was selected to capture any effects that may extend beyond the immediate Project area on vegetation and wildlife in the broader regional context. A Local Study Area (LSA) also was defined for the vegetation component to assess the immediate direct and indirect effects of the Project on vegetation resources.

3.1 Regional Study Area

The regional study area (RSA) was established to assess the importance of the Project within a broader regional context (Figure 3-1), as it forms the foundation for quantifying potential effects of the Project to regional vegetation resources and wildlife habitat. The RSA was defined as a 52 km radius from the proposed Project and covers an area of approximately 850 000 ha. The RSA boundary was defined with consideration of the spatial requirements for the wildlife study, as RSA level information will be used as the foundation from which to quantify potential effects of the Project on both vegetation resources and wildlife habitat. Thus, the RSA must be of sufficient size to encompass the potential zone of influence on caribou from mining activities (Johnson et al. 2005).

The RSA is located within the Maguse River Upland Ecoregion portion of the Southern Arctic Ecozone (Ecological Stratification Working Group 1995). This ecoregion is classified as having a low arctic ecoclimate, with long cold winters and short cool summers with prolonged periods of misty weather. The average annual frost free period is less than 90 days (Fletcher and Young, ca. 1976*)* and mean summer temperatures are around 6°C, whereas mean winter temperatures are -24°C (Ecological Stratification Working Group 1995). Mean annual precipitation is variable and ranges from 250 to 400 mm, with more than 400 mm occurring south of Eskimo Point (now Arviat). The landscape of the Maguse River Upland Ecoregion is dominated by broad, sloping uplands and lowlands of crystalline Archean origin, interspersed by hummocky bedrock outcrops that are covered with discontinuous acidic, sandy, granitic till and prominent fluvio-glacial ridges or eskers (Ecological Stratification Working Group 1995). Areas of continuous permafrost with medium ice content are quite common, and soils are typically composed of Turbic Cryosols, with Organic (Mesisol) and Regosolic soils occurring in areas without permafrost (Ecological Stratification Working Group 1995).

The regional landscape is dominated by an abundance of waterbodies that account for about 30% of the area. The waterbodies are surrounded by uplands with terrestrial vegetation. The most common terrestrial plant community in the RSA is heath tundra, which is dominated by low-growing heath shrubs, such as marsh Labrador tea (*Ledum palustre*), bearberry (*Arctostaphylos* sp.), and black crowberry (*Empetrum nigrum*). Drier areas associated with bedrock outcrops and boulder fields are characterized by abundant lichens, with limited vascular plant cover. Poorly drained areas in the regional landscape are predominantly characterized by graminoid tussock-hummock communities, with low shrub communities occurring along riparian areas adjacent to stream, ponds, and lakes. Wetlands account for 25 to 50% of the land area and are predominantly characterized by low- and high-centred polygon fens (Ecological Stratification Working Group 1995). Typical wildlife species include barren-ground caribou, arctic fox, weasel, arctic ground squirrel (*Spermophilus parryii*), willow ptarmigan (*Lagopus lagopus),* and Rough-legged Hawk (*Buteo lagopus*). Along coastal areas, Snow Geese (*Chen caerulescens*), swans, Canada Geese (*Branta canadensis*) and shorebirds are common, whereas various whale species and seals inhabit coastal water (Ecological Stratification Working Group 1995).



LEGEND

- Camp
- Proposed Mine Site
- Road - Existing
- Proposed Road
- Watercourse
- Terrestrial Regional Study Area
- Waterbody

12 0 12

SCALE 1:600,000 KILOMETRES

REFERENCE

Base data obtained from Comaplex Minerals Corporation
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

REGIONAL STUDY AREA USED FOR THE BASELINE VEGETATION AND WILDLIFE STUDIES

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	LV	29 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	29 Oct. 2009		
CHECK	LV	22 Nov. 2009		
REVIEW	CO	22 Nov. 2009		

FIGURE 3-1

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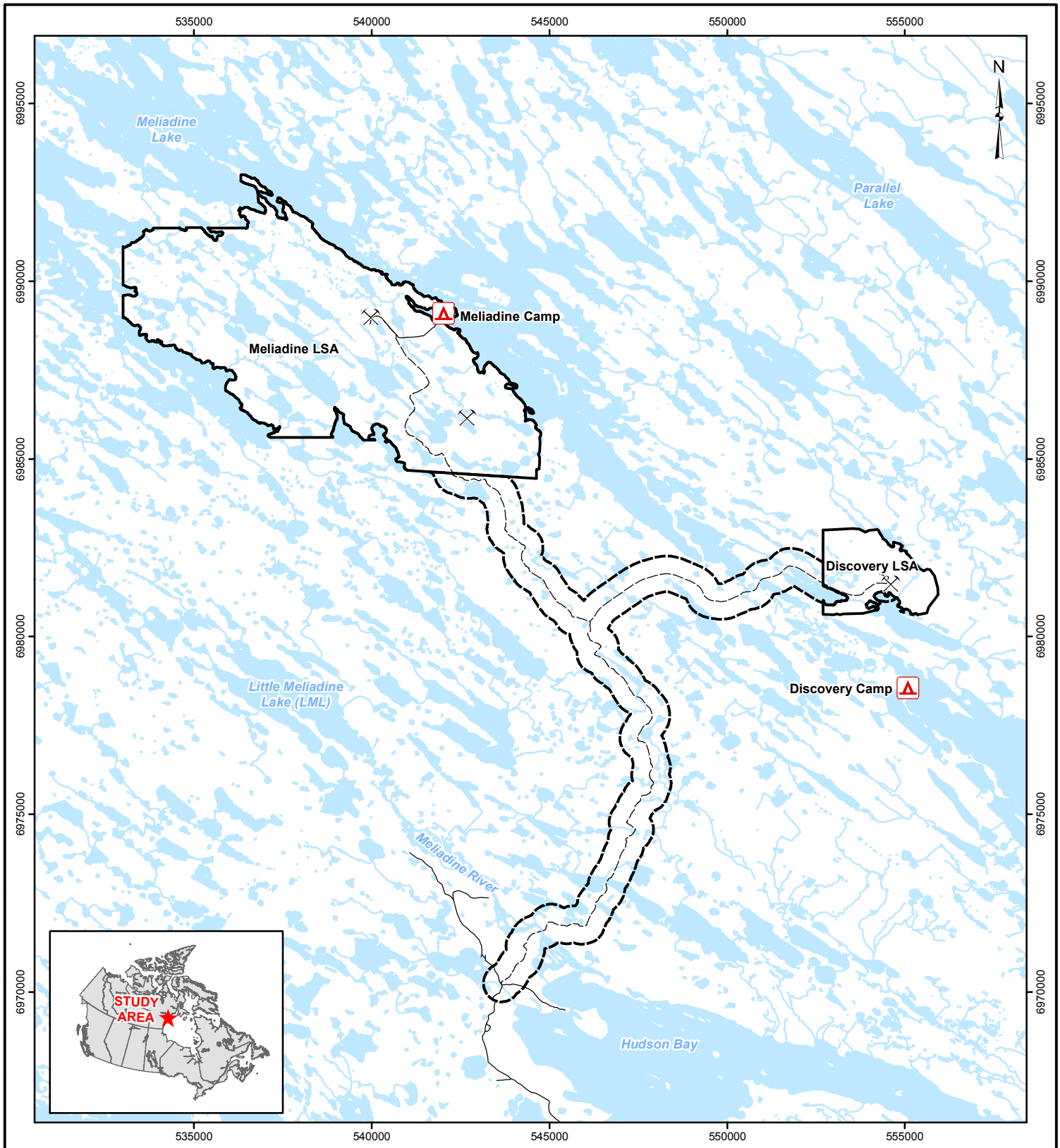
3.2 Local Study Area

The LSA for the mine 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 the surrounding vegetation. The LSA is based on the 2009 Project footprint and includes the Meliadine main site, F Zone area, and the Discovery area, The LSA for the proposed mine site was defined as the anticipated extent of direct Project effects (Figure 3-2).

The LSA habitat is characteristic of regional habitat conditions and vegetation within the Maguse River Upland Ecoregion. However, the LSA is located in a large area of “ribbed (rogen) moraine” that is characterized by a radiating esker-outwash systems and linear drumlin fields (Aylsworth and Shilts 1989). As a result, the major landforms in the LSA are dominated by a large esker that runs northwest/southeast and numerous drumlins or drumlinoid ridges. Ridge complexes on drumlins and eskers are characterized by a range of plant communities and associations depending on substrate, orientation, and snow accumulation, but are typically dominated by heath tundra and lichen-heath communities. Low-lying areas between the drumlins and eskers are dominated by sedge wetlands, shallow ponds, and various shallow and deep water lakes including Meliadine, Lake A8, Lake B5, Lake A6, and Lake B7.

The LSA for the all-weather winter road was defined by the expected limit of direct and indirect effects from the road on the surrounding vegetation and wildlife. The proposed all-weather road joins the Project to the existing winter road near Rankin Inlet and includes the road that leads to the Discovery area. The LSA for the all-weather road was defined by a 500 m buffer on either side of the anticipated right-of-way surrounding the proposed road alignment (Figure 3-2).

The LSA for the all-weather road contains vegetation and landscape terrain features that are typical of the regional conditions. However, the road is located primarily on high ground and tends to follow the ridge lines of eskers and bedrock outcrops. As such, vegetation tends to be dominated by heath tundra and heath lichen communities.



LEGEND

- Camp
- Proposed Mine Site
- Road - Existing
- Proposed Road
- Watercourse
- Local Study Area - Mine
- Local Study Area - Road
- Waterbody

REFERENCE

Base data obtained from Comaplex Minerals Corporation
Projection: UTM Zone 15 Datum: NAD 83

3 0 3

SCALE 1:150,000 METRES

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

LOCAL STUDY AREA USED FOR THE BASELINE VEGETATION STUDIES

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	LV	29 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	29 Oct. 2009		
CHECK	LV	22 Nov. 2009		
REVIEW	CO	22 Nov. 2009		

FIGURE 3-2

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4.0 VEGETATION BASELINE

4.1 Methods

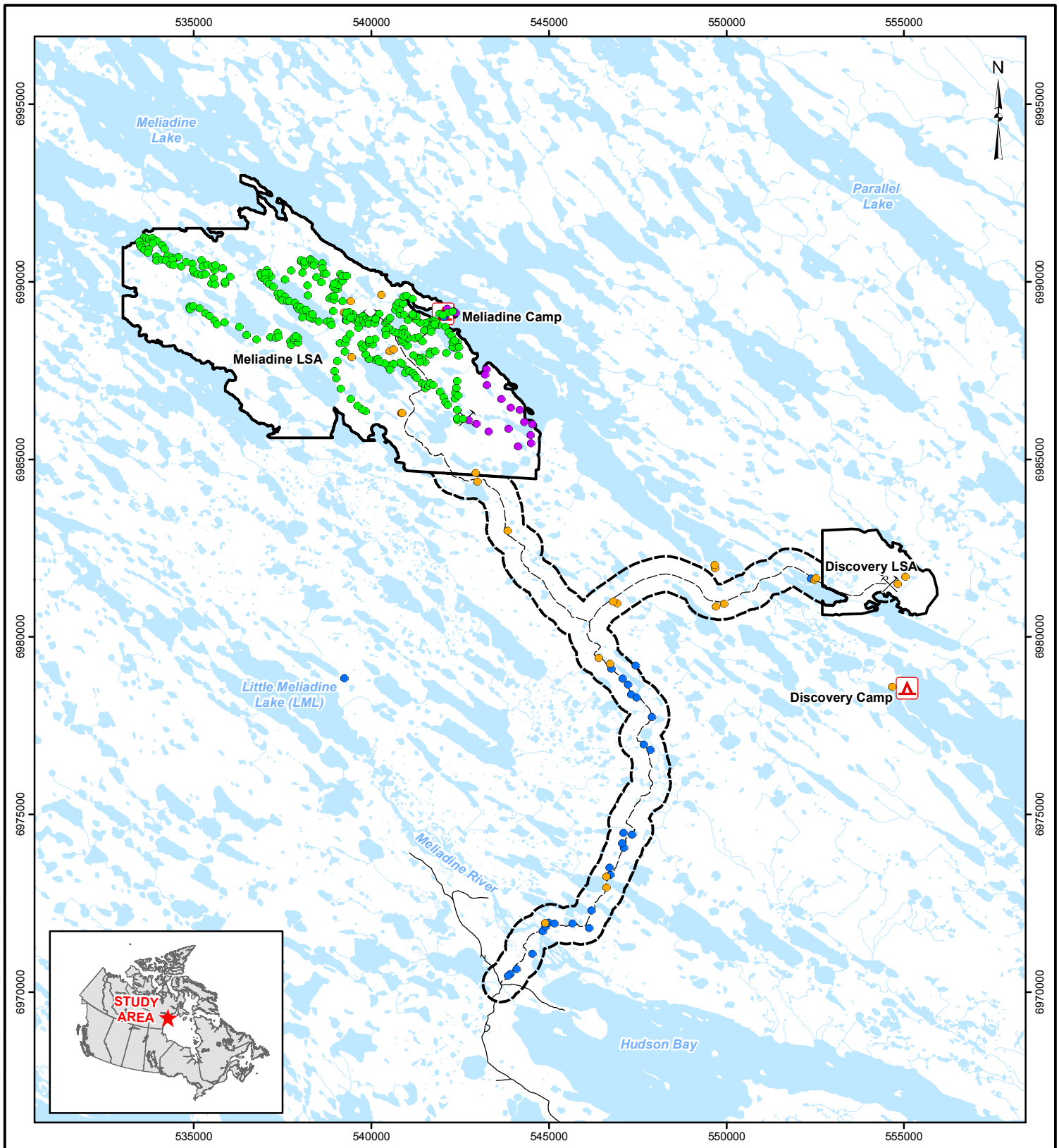
4.1.1 Baseline Field Surveys

Prior to undertaking the field surveys, a review of relevant vegetation studies completed in and around Rankin Inlet and the Arctic in general was completed to provide a perspective of available information.

Baseline vegetation surveys were carried out in the summer of 1998 over 3 survey periods (9 to 11 June, 9 to 11 July, and 16 to 23 August) to collect baseline vegetation data for the main Project area. In the summer of 2008 (29 to 31 July and 1 to 6 September) and 2009 (27 to 30 August), additional vegetation surveys were completed in the F Zone area, and along the proposed all-weather road from the project site to Rankin Inlet and to the Discovery area. Total, 416 plots were established, including 337 plots in 1998, 59 plots in 2008, and 20 plots in 2009 (Figure 4-1). All vegetation surveys were completed by a field botanist and a local assistant. To ensure consistent and reliable data collection, an initial training session reviewing applicable data collection protocols and common plant species was implemented prior to commencing the field surveys.

Field survey methods followed previously established protocols that were developed for the Diavik Project (Burt 1997) and other projects, including the Meadowbank Gold Project and the Baffinland Iron Mines Mary River Project (unpublished data). Prior to undertaking the vegetation surveys, preliminary plot locations were identified through a review of 1:50 000 topographical and 1:10 000 airphotos. Vegetation plots were established in a representative location within a given plant association type and care was taken to avoid transitional areas. A 5x5 m plot size was used to collect vegetation data, including plant species and percent cover information, and a Global Positioning System (GPS) coordinate was taken at the centre of each plot. Information collected at each plot included the following variables:

- plant community association;
- plant species composition and percent cover;
- slope and aspect;
- terrain and microtopography;
- percent surface substrate;
- moisture and nutrient regime;
- incidental wildlife observations (e.g., sightings, signs, habitat use);
- archaeological features;
- site photos (landscape and close-up); and
- other comments.



LEGEND

- Tissue Sampling Plot
- Vegetation Plot 1998
- Vegetation Plot 2008
- Vegetation Plot 2009
- Camp
- Proposed Mine Site
- Road - Existing
- Proposed Road
- Watercourse
- Local Study Area - Mine
- Local Study Area - Road
- Waterbody

REFERENCE

Base data obtained from Comaplex Minerals Corporation. Vegetation data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

DISTRIBUTION OF VEGETATION SAMPLE PLOTS IN THE LOCAL STUDY AREA

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	LV	29 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	29 Oct. 2009		
CHECK	LV	22 Nov. 2009		
REVIEW	CO	22 Nov. 2009		

FIGURE 4-1

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Wherever possible, vascular plants were identified to the species level in the field; however, reference specimens were collected from the field for some species and later verified using Porsild and Cody (1980) or other references (Vitt et al. 1998; Burt 1991; Aiken et al. 2007). Lichens were collected and identified using Mosses, Lichens, and Ferns of Northwest North America (Vitt et al. 1998) and On the Lichens of North America (Brodo et al. 2001). All willows, grasses, and sedges were collected for subsequent identification by taxonomic plant specialists (Table 4-1).

Table 4-1: Vascular Plant Specialists

Year	Name	Affiliation and Speciality
1998	Dr. John Thieret	University of Northern Kentucky – specialist on grasses and other graminoids
1998	Dr. Rob Naczi	University of Delaware - specialist on sedges (*Carex* and *Eriophorum*) and rushes (*Juncus* and *Luzula*)
1998 and 2008	Dr. George Argus	Retired from the National Museum of Canada, member of the COSEWIC team – specialist on willows (*Salix*)
2008	Dr. Laurie Consaul	Canadian Museum of Nature - grass taxonomist involved in the development of the "Flora of the Canadian Arctic Archipelago"
2008	Dr. Jeff Saarela	Canadian Museum of Nature - specialist on sedges and cotton-grasses (*Cyperaceae*) and rushes (*Juncaceae*)

A complete list of all vascular plant species encountered in the local study area, as well as those that potentially occur in the area based on collection records for the Rankin Inlet area, is presented in Appendix A1. A preliminary species list of the non-vascular plants of Rankin Inlet is presented in Appendix A2 (lichens), Appendix A3 (mosses and liverworts), and Appendix A4 (fungi species–from literature for this area). A sample of the 2008 data sheet used to collect vegetation data is included in Appendix A5. Scientific nomenclature and common names followed naming conventions consistent with the NatureServe on-line database (NatureServe 2009).

4.1.2 Ecological Land Classification and Mapping

4.1.2.1 Regional Ecological Land Cover Classification Methods

A regional land cover classification map was developed using satellite imagery, remote sensing software, and a geographic information system (GIS) to provide information on the relative abundance and distribution of vegetation types within the RSA. Image classification is a method of automatically categorizing all pixels in an image. The image classification for the RSA satellite imagery is at a coarser scale than completed for the LSA, which uses fine scale data, resulting in a more broadly defined vegetation classification. However, classification of satellite imagery at the RSA level is a generally accepted standard practice for regional vegetation resource mapping and can be integrated with the LSA classification for a seamless product. The RSA vegetation classification for this report used current satellite imagery and classification methods as follows:

- LANDSAT 5 satellite spectral imagery with a 30 × 30 m pixel size;
- cloud-free coverage; and
- imagery captured on 23 July 2005.

The resolution of the imagery (i.e., pixel size) was appropriate for a regional-level vegetation classification, as it balances computer processing time and resolution. Quality control measures were implemented to ensure the imagery was correctly geo-referenced within the RSA. The imagery was translated by remote sensing software (Definiens®) for the classification process.

Land cover classes easily identifiable from the satellite imagery in the Project area were used in selecting classification "training sites." The training sites were selected to capture the range of variation in the reflectance values or "spectral signature" of the vegetation land cover classes. Field verified observation points were collected at selected training sites throughout the RSA and assigned to the appropriate land cover class. A sufficient number of observation points were collected for overall quality control.

Based on the signatures of the training sites, the remote sensing software assigned a best-fit classification to all pixels in the image. The process of selecting "training sites" and image classification was an iterative process that balanced the objectives of having as many meaningful vegetation classes as possible with a reasonable level of accuracy (i.e., pixels being accurately classified at least 70% of the time). Once the classification was complete, polygons other than those used as "training sites" were compared against the classification for validation purposes. The overall accuracy of the Ecological Land Classification (ELC) was determined to be 74.2%, which represents an acceptable level of accuracy based on the current level of knowledge in the remote sensing community. A summary of the RSA classification error matrix is provided in Appendix A6.

The classification resulted in a total of 8 land cover classes within the RSA (Table 4-2). These classes fell within one of the following 3 broad groups:

- heath vegetation;
- wetlands or riparian vegetation; and
- miscellaneous cover types.

Table 4-2: Regional Land Cover Classes

General Land Category	Regional Land Cover Class
Heath	Heath boulder
Heath	Heath lichen - hair lichen
Heath	Heath lichen - *Cetraria*
Heath	Heath tundra
Wetlands	Low shrub
Wetlands	Tussock – hummock
Miscellaneous cover type	Bare ground (rock outcrop)
Miscellaneous cover type	Water

Heath vegetation in this area is defined as land where the soils are not saturated for extended periods of the year. Heath refers to the presence of low growing evergreen shrubs, such as Labrador tea, bearberry, and black crowberry that are typical of these areas. Heath vegetation in the RSA consists of heath tundra or heath boulder and bedrock associations.

Wetlands or riparian vegetation in the RSA are defined as areas that are saturated for most, or all of the growing season. Wetlands or riparian vegetation in the RSA consists of wet sedge meadows or tussock-hummock areas and low shrubby riparian vegetation along the margins of lakes and rivers.

Miscellaneous land cover types include un-vegetated areas, such as bare ground and water. Disturbances were not mapped due to issues with scale, as there are very few anthropogenic disturbances visible at the RSA level.

4.1.2.2 Plant Community Classification and Mapping Methods

In 1998, a preliminary vegetation classification system was developed and mapped for the Project area in the vicinity of the Meliadine main site. In 2008 and 2009, vegetation mapping was expanded to include the all-weather road and Discovery access road, Discovery area, and F Zone. To reduce confusion, the classification system developed in 1998 was used for subsequent vegetation mapping in 2008/2009, though modifications were made to account for inclusions of any new community types or associations.

Like the regional ecological land cover classification, the vegetation classification at the LSA level is represented by several broad land cover groups including the following:

- terrestrial vegetation;
- wetlands;
- un-vegetated types (e.g., sand and water); and
- disturbances.

Within the broader land cover groups, 10 specific plant community types and associations have been identified that correspond to observable features on the landscape (Table 4-3). Plant community types represent mappable units at a scale of 1:10 000 and correspond to major vegetation units that are often associated with distinct terrain features. Within each plant community type, a series of subgroups, or plant associations, have been described that are based on field level observations. These units are not mappable, but have been described to provide additional information on the natural level of variability associated with each plant community type. Plant association names and terminology were developed to provide meaningful associations for other disciplines, such as wildlife, and followed to some extent existing vegetation classification systems developed for other projects (e.g., Rowe et al. 1977; Thompson 1980; BHP/Diamet 1996; Burt 1997).

Table 4-3: Meliadine Plant Community Classification System

Land Cover Class	Plant Community Type	Map Unit	Map Unit #	Plant Community Associations (not mapped)	Landscape Unit Classification*
Vegetated Units					
Wetlands	Sedge Community	SC	1	Sedge association - emergent (Se)	Wet drainage areas, pond margins; sedge meadows
				Non-tussock sedge (Snt)	
				Tussock sedge (St)	
				Sedge association - frost scars (Sfs)	n/a

Table 4-3: Meliadine Plant Community Classification System (continued)

Land Cover Class	Plant Community Type	Map Unit	Map Unit #	Plant Community Associations (not mapped)	Landscape Unit Classification*
Wetlands	Birch Seep	BS	2	n/a	n/a
Wetlands	Riparian Willow	RW	3	n/a	n/a
Terrestrial Vegetation	Heath Tundra	HT	4	Heath tundra - uplands (HTu)	Smooth slopes w/mixed lichens & heaths
				Heath tundra - solifluction slopes (HTsolif)	Rough slopes with *Dryas sp.* & heaths
				Heath tundra - frost scars (HTfs)	Frost mounds on ridges/upper slopes, mixed lichen-heath
				Heath tundra - boulders (HTb/LRb)	Turf-rimmed mud circles with *Dryas sp.*
					Frost fissures with moss, peat
					Frost fissures with *Eriophorum* & *Carex*
				Ridge or esker slope (RCsl)	n/a
Terrestrial Vegetation	Lichen-Heath - Cetraria	LHc	5	Ridge or esker crest (RCc)	Slopes with *Cetraria sp., Luzula sp., Empetrum sp.*
Terrestrial Vegetation	Lichen-Heath - Hair Lichen	LHh	6	Ridge or esker crest (RCc)	Bouldery/sandy ridge crests with mixed lichen-heath
Terrestrial Vegetation	Lichen Rock	LR	7	Boulder fields/streams, felsenmeer, heath tundra - boulders(LRb/HTb)	Bouldery crests of ridges with mixed lichens, heaths
				Cobbles/gravel on ridges (LRb/RCc)	Broad crests/flats, hair lichens, *Empetrum sp.,* and heaths; Bouldery crests of ridges with mixed lichens & heaths
				Rounded/polished bedrock outcrops (LRrpol)	n/a
				Fractured bedrock outcrops and shattered bedrock (LRrf)	Rock outcrops with *Racomitrium sp./ Dryopteris sp.*
				Cliff faces (LRrcf)	n/a
Un-vegetated Units					
Un-Vegetated	Un-vegetated (e.g., Sand)	U	8	n/a	n/a
Disturbance	Disturbances	DS	9	Den sites (DSd)	n/a
				Caribou trails	n/a
				Avian nesting areas (DSng/DSnr)	n/a
				Faces of solifluction lobes (Dssolif)	n/a
				Hillside slumps (DSls)	n/a
				Drill sites (Dsdrill)	n/a
				Roads or ATV trails (DSr)	n/a
				Camps (DSc)	n/a

Table 4-3: Meliadine Plant Community Classification System (continued)

Land Cover Class	Plant Community Type	Map Unit	Map Unit #	Plant Community Associations (not mapped)	Landscape Unit Classification*
				Greywater outflows (Dsgrey)	Wet drainage areas, pond margins; sedge meadows
Un-vegetated	Water	W	10	n/a	n/a
Non-Mappable Units					
n/a	n/a	n/a	n/a	Transitions - Hummocks (Th)	Hummock nets on wet seepages with *Dryas sp.* and sedges
n/a	n/a	n/a	n/a	Transitions - Hummocks with frost scars (Th+fs)	Stony earth mounds with *Dryas* spp and heaths
n/a	n/a	n/a	n/a	Transitions - Gradual intergradation on slopes (Tsl)	Sedge meadows to heath tundra
n/a	n/a	n/a	n/a	Transitions - Solifluction ridges (Tsolif)	Turf ridges & "strings"; wet sedge "paddies"
n/a	n/a	n/a	n/a	Moss community (MS)	n/a
n/a	n/a	n/a	n/a	Snowbank community (SB)	Snowpatch lower slopes with *Cassiope sp.*

*Adapted from: Rowe et al. (1977).
n/a = not applicable

4.1.3 Baseline Plant Tissue and Soils Metals Analysis

4.1.3.1 Background

Some metals in trace amounts (i.e., boron, chlorine, copper, iron, manganese, molybdenum, and zinc) provide essential sources of nutrients to many organisms, including plants and animals (Pais and Jones 1997). However, a large number of metal elements are known to have adverse or toxic effects on plant or animal tissue at high concentrations depending on the nature of the metal, environmental conditions, and the species affected (Pais and Jones 1997; Kabata-Pendias 2001). In some cases, certain plant species may accumulate toxic elements or compounds, but the rate and effectiveness by which plants uptake nutrients and trace elements, including metals, is quite variable (Greger 2004).

Generally, the uptake of metals in plants occurs from the soil matrix via the roots or from the atmosphere through direct absorption through the leaf cuticle (Kabata-Pendias 2001). Absorption of metals from the soil matrix requires that metals be present in solution for them to be taken up by plants (Greger 2004). The availability of metals is governed by soil properties like moisture, pH, and organic matter content. The result is that soils containing higher amounts of organic matter, clay content, and pH levels will typically bind metals to the soil matrix making them unavailable for uptake by plants (Greger 2004). Plant uptake of metals through the leaves can occur through deposition of dry materials (i.e., dust or airborne particles containing metal elements) or wet materials (i.e., precipitation containing metal ions in solution) (Greger 2004). In most cases, uptake of toxins in plant tissues is proportional to availability in the surrounding environment (Greger 2004).

To effectively assess the potential effects of dust borne contaminants containing metals originating from a proposed road sites and gold mine at Meliadine, it is critical to have a good understanding of the baseline concentration of metals. Establishing a baseline sampling program for estimating background concentrations of metals in soils and plant tissues provides a basis for evaluating potential effects and for implementing a monitoring program to assess changes to metal concentrations in plant tissue and soils over the duration of the project.

4.1.3.2 Data Collection Methods

Establishing baseline metal concentrations in plant tissue and soil in the LSA was undertaken in the fall of 2008 and completed in the fall of 2009. Sample sites were selected to represent the range of vegetation types in the vicinity of the proposed mine site and road. Seventeen permanent sampling sites were established in the vicinity of the proposed mine site and along the proposed all-weather road, and an additional 12 sites were established along the road to the Discovery area (Figure 4-1). All sites were permanently marked with a metal stake and a tag denoting the site name, as well as a painted rock, and GPS waypoints were obtained. These sites were established as permanent plots that can be re-visited as part of a project monitoring program.

Tissue samples from at least 2 different plant species and a soil sample were collected from each site. Two equal sub-samples of soil were taken from the rooting zone and combined into one composite sample of approximately 200 g. Plant species for tissue analysis were selected based on their relative abundance in the area and their relative importance to human or wildlife consumption. The species selected for tissue analysis are summarized in Table 4-4.

Table 4-4: Plant Species Selected for Metal Concentration Baseline and Monitoring in 2008 and 2009

Scientific Name	Common Name
Shrubs	
Arctostaphylos alpina	Alpine manzanita
Betula nana	Swamp birch
Empetrum nigrum	Black crowberry
Ledum palustre ssp. *decumbens*	Marsh Labrador tea
Salix planifolia	Tealeaf willow
Salix lanata ssp. *richardsonii*	Lanate willow
Vaccinium uliginosum	Alpine blueberry
Vaccinium vitis-idaea	Mountain cranberry
Forbs	
Oxytropis arctica var. *bellii*	Bell's Point-vetch
Grasses and Sedges	
Carex aquatilis	Water sedge
Carex misandra	Shortleaf sedge
Poa sp.	Bluegrass
Non-vasculars	
Aulacomnium sp.	n/a
Flavocetraria nivalis(formerly *Cetraria nivalis*)	Crinkled snow lichen

n/a = not applicable

Only healthy plants were collected; plant specimens with obvious signs of disease, such as yellowing leaves, holes in leaves, or lack of foliage were not collected. Leaves and new growth were obtained from all woody plants by taking cuttings from the tips of the plants and placing samples in a Ziploc bag, while all above ground tissues of forbs and grasses were collected and placed in Ziploc bags. Non-vascular plants were collected from the ground surface and placed in a Ziploc bag. Composite tissue samples for each species were taken from collected plant materials.

All plant tissue and soil samples were frozen in the field and later transported to ALS Laboratories for subsequent metals analysis. Plant tissue samples collected in 2008 were analyzed using Inductively Coupled Plasma Mass Spectrometry (ICPMS) for 28 metals (Table 4-5), and the Metals-Canadian Council of Ministers of Environment (CCME) package was used to assess for 19 metals in the soil samples (Table 4-5). In 2009, plant tissues and soil samples were analyzed for metals using the Inductively Coupled Plasma Optical Emission Spectrometry (ICPOES) and ICPMS packages (Table 4-5).

Table 4-5: Selected Metals Assessed in Plant Tissue and Soil Samples in 2008 and 2009

2008 Plant Tissue (mg/kg)	2008 Soil Matrix (mg/kg)	2009 Plant Tissue (mg/kg) and Soil Matrix (mg/kg)
Aluminum (Al)	Antimony (Sb)	Aluminum (Al)
Antimony (Sb)	Arsenic (As)	Antimony (Sb)
Arsenic (As)	Barium (Ba)	Arsenic (As)
Barium (Ba)	Beryllium (Be)	Barium (Ba)
Beryllium (Be)	Cadmium (Cd)	Beryllium (Be)
Cadmium (Cd)	Chromium (Cr)	Bismuth (Bi)
Calcium (Ca)	Cobalt (Co)	Cadmium (Cd)
Chromium (Cr)	Copper (Cu)	Calcium (Ca)
Cobalt (Co)	Lead (Pb)	Chromium (Cr)
Copper (Cu)	Mercury (Hg)	Cobalt (Co)
Iron (Fe)	Molybdenum (Mo)	Copper (Cu)
Lead (Pb)	Nickel (Ni)	Iron (Fe)
Magnesium (Mg)	Selenium (Se)	Lead (Pb)
Manganese (Mn)	Silver (Ag)	Lithium (Li)
Mercury (Hg)	Thallium (Tl)	Magnesium (Mg)
Molybdenum (Mo)	Tin (Sn)	Manganese (Mn)
Nickel (Ni)	Uranium (U)	Mercury (Hg)
Phosphorus (P)	Vanadium (V)	Molybdenum (Mo)
Potassium (K)	Zinc (Zn)	Nickel (Ni)
Selenium (Se)		Phosphorus (P)
Silver ((Ag)		Potassium (K)
Sodium (Na)		Selenium (Se)
Strontium (Sr)		Sodium (Na)
Thallium (Tl)		Strontium (Sr)
Tin (Sn)		Thallium (Tl)
Titanium (Ti)		Tin (Sn)
Vanadium (V)		Titanium (Ti)
Zinc (Zn)		Uranium (U)
		Vanadium (V)
		Zinc (Zn)

4.2 Regional Study Area Results

4.2.1 Overview

The regional ELC identifies 8 land cover classes (Table 4-6). Figure 4-2 depicts the distribution of land cover classes across the RSA. This regional coverage includes 4 heath classes, 2 wetlands and riparian classes, and 2 miscellaneous land cover classes, which together covers an area of 849 484 ha. Heath vegetation encompasses 445 926 ha (52%) of the RSA, while wetlands and riparian areas are distributed over 122 575 ha (14%) of the RSA (Table 4-6). The remaining 280 983 ha (33%) of the RSA are classified as water, predominantly lakes and the tidal basin of Hudson's Bay, and a small percentage of bare ground and rock outcrops.

Descriptions of land cover types mapped within the RSA are provided in the following subsections. Common names are generally provided in the vegetation descriptions below. In cases where there are no common names or the common name can be confused with 2 or more species, a scientific name is given.

Table 4-6: Total Area and Percent Cover of Land Cover Classes within the Regional Study Area

Regional Land Cover Class	Regional Study Area	
	Area of RSA (ha)	Percent of RSA
Heath		
Heath boulder	141 484	17%
Heath lichen - hair lichen	18 339	2%
Heath lichen - *Cetraria*	12 414	1%
Heath tundra	273 690	32%
Heath vegetation subtotal	*445 926*	*52%*
Wetlands/Riparian		
Low shrub	12 662	1%
Tussock-hummock	109 913	13%
Wetlands /riparian subtotal	*122 575*	*14%*
Miscellaneous		
Bare ground (rock outcrop)	19 273	2%
Water	261 710	31%
Miscellaneous subtotal	*280 983*	*33%*
Total	**849 484**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values. ha= hectares

LEGEND

- Camp
- Proposed Mine Site
- Road - Existing
- Proposed Road
- Watercourse
- Terrestrial Regional Study Area
- Waterbody

Ecological Land Cover Classification

- Bare Ground (Rock Outcrop)
- Heath Boulder
- Heath Lichen - Cetraria
- Heath Lichen - Hair Lichen
- Heath Tundra
- Low Shrub
- Tussock - Hummock
- Water

SCALE 1:600,000 — 12 0 12 KILOMETRES

REFERENCE

Base data obtained from Comaplex Minerals Corporation. Ecological land cover classification derived from landsat 5 imagery.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

REGIONAL STUDY AREA ECOLOGICAL LAND COVER CLASSIFICATION

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	LV	29 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	29 Oct. 2009		
CHECK	LV	22 Nov. 2009		
REVIEW	CO	22 Nov. 2009		

FIGURE 4-2

N:\Bur-Graphics\Projects\2007\1373\07-1373-0055\Mapping\MXD\2009\Vegetation\figure-04-02_elcc-vegetation.mxd

4.2.2 Regional Land Cover Classes

4.2.2.1 Heath Boulder

The heath boulder land cover class occurs on rapidly to well-drained sites that contain a high proportion of boulder deposits in association with bedrock outcrops. This land cover class is more common in the northeastern portion of the RSA, although, it does occur in scattered clusters in northern and southern parts of the RSA. The heath boulder land cover class is dominated by heath tundra vegetation interspersed with the occasional graminoid tussock-hummock community in low-lying wet areas. Typically, vegetation is characterized by heath shrubs, such as marsh Labrador tea, black crowberry, and arctic bell heather (*Cassiope tetragona*), as well as moss campion (*Silene acaulis*) and an abundance of crinkled snow lichen (*Flavocetraria nivalis*). Other species that may be encountered include arctic blueberry (*Vaccinium uliginosum*), purple mountain saxifrage (*Saxifraga oppositifolia*), swamp birch (*Betula glandulosa*), and sweet grass (*Hierochloe* sp). Boulders encrusted with various rock lichens (e.g., *Umbilicaria* sp., *Arctoparmelia* sp., and *Rhizocarpon geographicum*) may cover more than a third of the area in these communities and are often widely distributed across the landscape. This land cover class is generally associated with the lichen rock plant association and covers 141 484 ha (17%) of the RSA (Table 4-6, Figure 4-2).

4.2.2.2 Heath Lichen – Hair Lichen

The heath lichen – hair lichen land cover class is found on eskers and the crests and upper slopes of small ridges with poorly developed, rapidly drained soils. These areas may be associated with bedrock outcrops and tend to be found in isolated pockets that are more prevalent in the eastern portion of the RSA. Much of the vegetation in this area is composed of lichens, particularly *Bryocaulon* sp., *Alectoria* sp., and various rock lichens including *Umbilicaria* sp. and *Rhizocarpon geographicum.* Shrubs, such as swamp birch, mountain cranberry (*Vaccinium vitas-idea*), and black crowberry, are also commonly associated with this land cover class, whereas forbs, grasses, or mosses are uncommon to absent. The abundance of black hair lichen (*Alectoria nigricans)* in these areas has the effect of turning the landscape a dark, almost black colour that is very distinctive from both the air and the ground. The heath lichen – hair lichen land cover class covers 18 339 ha (2%) of the RSA and is associated with the lichen heath – hair lichen plant community at the LSA (Table 4-6, Figure 4-2).

4.2.2.3 Heath Lichen - Cetraria

The heath lichen – **Cetraria** land cover class is an uncommon landscape unit that typically occurs on the lower slopes of ridges and eskers or as veneers over flat rocky plains characterized by frost boils. This land cover class is sparsely distributed across the RSA and is primarily concentrated in eastern portions of the RSA, with isolated occurrences along the Hudson's Bay coast. Vegetation is typically composed of abundant lichens, primarily snow lichen and *Alectoria* sp., as well as reindeer lichens (*Cladina* sp.) and *Cladonia* sp., all of which may make up more than 50% of the vegetation cover. Heath shrubs, such as arctic blueberry, mountain cranberry, and arctic bell heather, as well as moss campion, are also common, as well as limited occurrences of forbs, willow, and sedge species. The heath lichen – *Cetraria* land cover class is similar to the lichen heath *Cetraria* plant community in the LSA and covers 12 414 ha (1%) of the RSA (Table 4-6, Figure 4-2).

4.2.2.4 Heath Tundra

The heath tundra land cover class is found on a range of upland sites, from small ridges to flat plains characterized by well-drained soils. This is the most common land cover class in the RSA and extends throughout the region, though it is less common in the northeastern sections of the RSA. Vegetation in this class is composed of abundant heath shrubs, including marsh Labrador tea, black crowberry, bearberry, entireleaf mountain-avens (*Dryas integrifolia*), and arctic blueberry. Other plant species that may be found include Arctic

crazy-weed or oxytrope (*Oxytropis* sp.), louseworts (*Pedicularis* sp.), and saxifrages, as well as various lichen species such as crinkled snow lichen and *Alectoria* sp. At the local scale, the heath tundra land cover class is equivalent to the heath tundra plant community association. The heath tundra land cover class covers 273 690 ha (32%) of the RSA (Table 4-6, Figure 4-2).

4.2.2.5 Low Shrub

The low shrub land cover class is associated with imperfectly to poorly drained soils characteristic of riparian areas and depressions. This land cover class is characterized by 2 different plant community types: willow dominated shrub communities along the banks of major streams and waterbodies, and swamp birch shrub communities found in low-lying areas. Typically, various willow species and swamp birch form the dominant vegetation cover in these communities, often forming dense low growing mats over the ground that shade out other plant species. Marsh Labrador tea, black crowberry, arctic blueberry, and mountain cranberry may also occur, but are less common. This land cover class is most strongly associated with the birch seep and willow riparian plant community associations at the local scale. The low shrub land cover class is very uncommon on the landscape and only covers 12 662 ha (1%) of the RSA (Table 4-6, Figure 4-2).

4.2.2.6 Tussock - Hummock

The tussock-hummock land cover class is typically found in flat to low-lying areas, where soils are poorly to very poorly drained. This land cover class includes wet sedge meadows, which are too small to be mapped as a separate unit in the RSA. Vegetation associated with the tussock-hummock class tends to be dominated by sedges, including water sedge, as well as various species of cottongrass (*Eriophorum* sp.) that form low-lying hummocks. Sphagnum mosses and *Aulacomnium* moss species commonly occur between the hummocks. Willow species, swamp birch, and other heath shrubs may occur on hummock tops, but with low abundance. The tussock-hummock land cover class is widely distributed across the RSA covering 109 913 ha (13%) of the RSA (Table 4-6, Figure 4-2).

4.2.2.7 Bare Ground (Rock Outcrop)

The bare ground land cover class represents areas with limited to no vegetation cover. This class is typically associated with eskers, steep sandy slopes, and the tidal and inter-tidal beaches along Hudson's Bay. It can be associated with the sand plant community association at the local scale. The bare ground land cover class makes up a small proportion of the landbase covering 19 273 ha (2%) of the RSA (Table 4-6, Figure 4-2).

4.2.2.8 Water

The water land cover class includes all rivers and lakes within the RSA, as well as portions of Hudson's Bay. This class covers 261 710 ha (31%) of the RSA (Table 4-6, Figure 4-2).

4.3 Local Study Area Results

4.3.1 Plant Community Classification and Mapping

Ten plant community types were classified and mapped in the LSA (Table 4-7, Figure 4-3). These include 4 upland terrestrial vegetation classes, 3 wetlands classes, and 3 un-vegetated classes, which together cover an area of 8251 ha. Upland vegetation encompasses 4468 ha (54%) of the LSA, with the heath tundra community type dominating the landscape. Wetlands are distributed over 2273 ha (27%) of the LSA (Table 4-7) and the remaining 1509 ha (18%) of the LSA is classified as un-vegetated units that are predominantly composed of

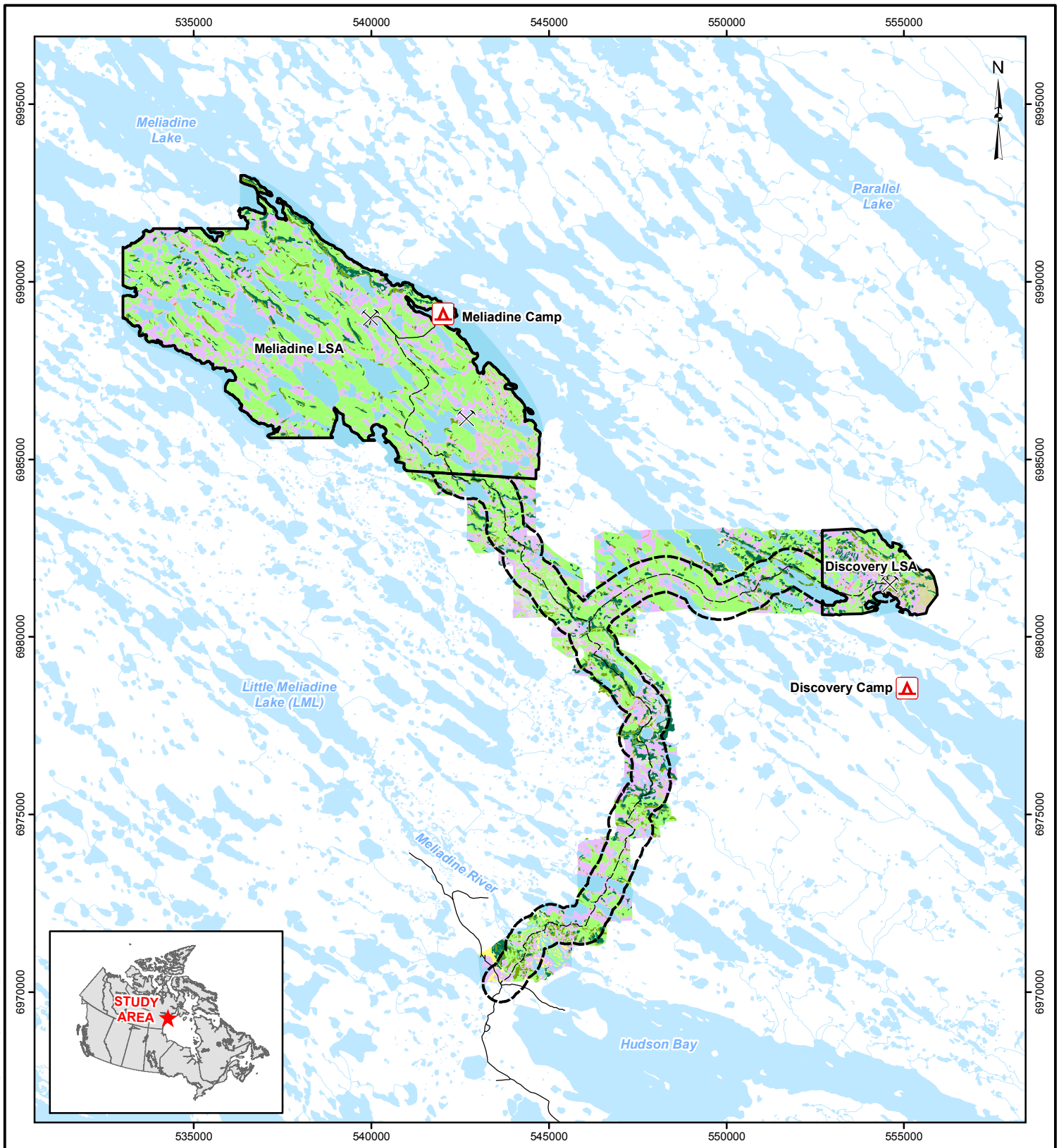
waterbodies and rivers. Disturbance features and un-vegetated sand areas represent <1% of the total LSA (Table 4-7).

Descriptions of the mapped plant community types are presented below, while descriptions of non-mappable plant associations are presented in Appendix A7. Representative photographs of different plant communities and associations from 1998 and 2008 are presented in Sub-appendix A7a, 1998 and Sub-appendix A7b, 2008. Appendix A8 provides a summary of plant species by plant community type.

Common names are generally provided in the vegetation descriptions below. In cases where there is no common name, or the common name can be confused with 2 or more species, a scientific name is given. For a reference to common and scientific names, refer to Appendices A2, A4, and A5. Due to taxonomic changes in plant species names over the last number of years, all plant species lists have been updated to the most current taxonomic standards consistent with the NatureServe on-line database (NatureServe 2009).

Table 4-7: Total Area and Percent Cover of Plant Community Types within the Local Study Area

Map Code	Description	Meliadine and F Zone Mine Areas		Discovery Mine Area		Road Area		Total Area of LSA (ha)	Total Percent of LSA
		Area of LSA (ha)	Percent of LSA	Area of LSA (ha)	Percent of LSA	Area of LSA (ha)	Percent of LSA		
Vegetated Units									
SC	Sedge Community	1136	23%	202	36%	642	24%	1980	24%
BS	Birch Seep	105	2%	79	14%	94	4%	278	3%
RW	Riparian Willow or Birch	7	<1%	2	<1%	5	<1%	14	<1%
HT	Heath Tundra Community	2262	45%	144	26%	935	35%	3341	40%
LHc	Lichen-Heath (*Cetraria* Lichen)	216	4%	48	8%	199	8%	463	6%
LHh	Lichen-Heath (Hair Lichen)	210	4%	65	11%	255	10%	530	6%
LR	Lichen-Rock Community	21	<1%	10	2%	104	4%	134	2%
Vegetated subtotal		*3957*	*78%*	*550*	97%	*2234*	84%	*6741*	*82%*
Un-vegetated Units									
U	Un-vegetated (Sand)	1	<0.1%	1	<0.1%	25	1%	27	<1%
DS	Disturbed	<1	<0.1%	0	*0%*	0	0%	<1	<0.1%
W	Water	1083	21%	13	2%	385	15%	1482	18%
Un-vegetated subtotal		*1084*	*22%*	*14*	*3%*	*411*	16%	*1509*	*18%*
Total		**5041**	**100%**	**565**	**100%**	**2645**	**100%**	**8251**	**100%**



LEGEND

- Camp
- Proposed Mine Site
- Road - Existing
- Proposed Road
- Watercourse
- Local Study Area - Mine
- Local Study Area - Road
- Waterbody

Plant Community Classification

- Sedge Community
- Birch Seep
- Riparian Willow or Birch
- Heath Tundra Community
- Lichen-Heath (Cetraria Lichen)
- Lichen-Heath (Hair Lichen)
- Lichen-Rock Community
- Unvegetated (Sand)
- Disturbed
- Water

SCALE 1:150,000 — 3 0 3 KILOMETRES

REFERENCE

Base data obtained from Comaplex Minerals Corporation. Vegetation data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

LOCAL STUDY AREA PLANT COMMUNITY CLASSIFICATION

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	LV	29 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	29 Oct. 2009		
CHECK	LV	22 Nov. 2009		
REVIEW	CO	22 Nov. 2009		

FIGURE 4-3

N:\Bur-Graphics\Projects\2007\1373\07-1373-0055\Mapping\MXD\2009\Vegetation\figure-04-03_plant-community-classification-vegetation.mxd

4.3.1.1 Sedge Community

The sedge community is found adjacent to lakes and streams on very poorly drained soils and in low-lying areas between upland ridges or plateaus, where substantial amounts of water drain from the uplands and accumulate on poorly to very poorly drained soils. The presence of surface water is essential to the maintenance of sedge communities (Bliss et al. 1973) and in most cases, sedge wetlands develop where the percentage of boulders in the soil is less than 40%. However, in some cases, sedge communities may blend into the surrounding heath tundra as heath species from the adjacent heath tundra invade the edges of the sedge basins as these basins infill and become drier. Sedge communities are widely distributed across the study area, covering 1980 ha (24%) of the Project and road LSAs, and often form extensive interconnecting networks between ponds, lakes, and streams (Table 4-7, Figure 4-3).

Associated vegetation is typically composed of a mix of tussock-forming species, such as various cotton grasses and sedges (e.g., *Eriophorum vaginatum*, *Carex atrofusca,* and *C. membranacea*) and carpet forming species, such as *C. bigelowii*, *C. rariflora*, E*. angustifolium* that grow individually. Forbs, such as Sudetan lousewort (*Pedicularis sudetica*) and viviparous knotweed (*Polygonum viviparum*) are common in all sedge areas, as are several willows, including *Salix lanata* sp. *calcicola*.

Within the sedge community, 4 non-mappable plant association units were identified as follows:

- Sedge association – emergent (Se);
- Non-tussock sedge association (Snt);
- Tussock sedge association (St); and
- Sedge association – frost scars (Sfs).

These plant associations have developed as a result of variations in landscape topography that influences the amount of water available for plant growth.

4.3.1.2 Birch Seep Community

The birch seep community type occurs in a variety of landscapes on imperfectly to poorly drained soils, such as the edges of solifluction lobes, on the slopes of some eskers where water flows out of the esker materials, and in stream valleys. Birch seeps may also occur at the transition to some sedge associations and as shrublands in slightly drier habitats, such as on esker slopes. The birch seep community is uncommon in the study area and only accounts for 278 ha (3%) (Table 4-7, Figure 4-3).

The birch seep community is characterized by dense mats of swamp birch (*Betula nana*), which can form extensive miniature forests over the surface of the tundra landscape. Where birch cover is extremely dense, there may be little to no understory vegetation, just ground covered with old birch leaf litter. In exposed areas, swamp birch may occasionally form prostrate shrubs over fairly large areas as a result of the pruning actions of wind and blowing snow.

Birch seep communities are typically associated with an understory of black crowberry, arctic blueberry, and occasionally arctic wintergreen (*Pyrola grandiflora*), one-side wintergreen (*Orthilia secunda*), as well as various lichen species including *Cladonia squamosa* and *Lecidea* sp. Willows such as Lanate Willow (*Salix lanata* ssp. *richardsonii*) may also occur, though this is uncommon and is more often replaced by the related *Salix calcicola* in this area. In areas between the birch mats, sedge species characteristic of the non-tussock sedge association may occur, along with simple Kobresia (*Kobresia simpliciuscula),* two-flower rush *(Juncus biglumis), mountain* foxtail *(Alopecurus magellanicus*), and arctic woodrush *(Luzula arctica),* and in some cases health vegetation, such as arctic blueberry, mountain cranberry, Labrador tea, and bog rosemary, where conditions are slightly drier.

4.3.1.3 Willow Riparian Community

The willow riparian community type occurs along the banks of stream courses may extend the entire width of a valley in a mix of multiple braided channels. The term “riparian” generally refers to the interface between a stream and the surrounding landscape, where water is bounded by a defined channel (as opposed to sheet flow). These areas are typically characterized by imperfectly drained, nutrient enriched soils and tend to be associated with landscapes that contain a high percentage of boulders. Willow riparian communities are very uncommon in both the Project and road LSAs and only account for 14 ha (<1%) of the total area (Table 4-7, Figure 4-3).

The dominant species present in this community are willows, including *Salix calcicola, S. arctophila, S. glauca, S. lanata* ssp. *richardsonii,* and *S. planifolia,* as well as the less common *S. planiofolia* ssp. *tyrrellii).*These willow communities can grow quite tall, up to 1.5 metres, and typically contain an understory of swamp birch and various sedge species (e.g., *Carex aquatilis, C. chordorrhiza, and C. saxatilis)* and cotton grasses*.* Health species, such as arctic blueberry, mountain cranberry, or crowberry, may also occur, along with forbs, such as marsh five-finger (*Comarum palustre*), Sudetan lousewort, yellow marsh saxifrage (*Saxifraga hirculus*), yellow anemone (*Anemone richardsonii)*, and viviparous knotweed (*Polygonum viviparum*).

4.3.1.4 Heath Tundra Community

The Heath tundra community type is found throughout the uplands and slopes of most ridges in the study area and is by far the most abundant and widespread community, covering 3341 ha (40%) of the Project and road LSAs (Table 4-7, Figure 4-3). Much of the health tundra landscape is characterized by gently rolling to undulating terrain that may contain a high percentage of boulders and, as a result, these areas tend to be associated with rapidly to well-drained soils that can be quite dry. Plant species assemblages within the heath tundra community are also very strongly influenced by microtopography, as permafrost and freeze-thaw cycles create microhabitats that can exhibit considerable variation in moisture availability to plants. Microtopography, coupled with wind exposure and other factors, such as solar insulation, may have a tremendous impact on the prevalence and distribution patterns of particular plant species or assemblages.

The most common species associated with the heath tundra community type are marsh Labrador tea, bearberry (*Arctostaphylos alpina* and *A. rubra*), arctic bell heather, arctic blueberry, mountain cranberry, bog rosemary, and black crowberry, along with various lichen species including *Cetraria* sp., *Cladonia* sp., reindeer lichens (*Cladina* sp.), and hair lichens (*Alectoria* sp.). Scattered occurrences of viviparous knotwed and Richardson’s bittercress *(Cardamine digitata),* as well as the occasional sedge species *(*e.g., *Carex scirpoidea, C. bigelowii*,

and *C. capillaris)* may also occur. Drier, more elevated areas are usually characterized by mats of mountain-avens or alpine-azalea *(Loiseleuria procumbens),* and on more exposed sites, small mats of *Diapensia lapponica*may occur. In areas with more moisture and less wind exposure (i.e., in troughs between high-centre polygons, frost cracks, and hummocks) species such as bog rosemary, northern buttercup (*Ranunculus pedatifidus*), Lapland lousewort, and arctic bell heather commonly occur, as well as a range of more moisture loving lichens including *Peltigera aphthosa*, and pixie cups (e.g., *Cladonia coccifera* and *C. cervicornis*).

Within the heath tundra community, 5 non-mappable plant association units could be differentiated based on variations in terrain features and soil moisture, or exposure to wind, frost heaving, and movement of the active soil layer:

- Heath tundra - uplands (HTu);
- Heath tundra - solifluction slopes (HTsolif);
- Heath tundra - frost scars (HTfs);
- Heath tundra - boulders (HTb/LRb); and
- Ridge or esker slope (RCsl).

4.3.1.5 Lichen-Heath – Cetraria Community

The lichen-heath – Cetraria[1] community tends to occur on lower slope positions, often below the lichen-health – hair lichen community, on more rapidly drained sandy substrates. It is characterized by a mosaic of small heath tundra plant communities growing in a larger matrix dominated by *Cetraria* lichen (primarily *Flaviocetraria nivalis* and *F. cucullata)* that is readily distinguished from the air by its pale yellow colour. Typical vascular plants that commonly occur include mountain cranberry, marsh Labrador tea, and black crowberry, as well as *Arctagrostis latifolia* and northern woodrush *(Luzula confusa*). Occasionally, glove lichen and worm lichen can be found intermingled in the mat of lichen, along with isolated occurrences of various sedges, such as *Carex bigelowii*, *C. capillaris*, *C. misandra*, *C. scirpoi*dea, and *C. vaginata*. Though widely distributed across the mine and road LSAs, the lichen-heath – Cetraria community is not common and only represents a total of 463 ha (6%) of the Project LSA (Table 4-7, Figure 4-3).

Only one non-mappable plant association unit was associated with the lichen-heath – Cetraria community:

- Ridge or esker crest (RCc).

4.3.1.6 Lichen-Heath – Hair Lichen Community

The lichen-heath – hair lichen community is found almost exclusively on the higher ridges of slopes and on drumlin and esker crests, where the ground cover consists of a high percentage of black and green hair lichens. Typically, black hair lichen species[2] (either a colour variation of *Alectoria ochroleuca,* or *A. nigricans, A. fuscescens* or *Bryocaulon divergens)* form a thin carpet on the more exposed ridge tops, while the green hair lichen *(A. ochroleuca)* dominates on more sloping terrain. Vitt et al. (1998) noted that *A. ochroleuca* areas

[1] The taxonomy of *Cetraria cucullata* and *C. nivalis* have been revised to be included in the genus *Flaviocetraria* and renamed as *Flaviocetraria cucullata* and *F. nivalis,* respectively. In this case, the original name ("Cetraria") is part of the name of the plant community and as such is treated as a common name.

[2] The identification of the very common black hair lichen is difficult, as some literature refers to green and black forms of *Alectoria ochroleuca*, while others note the presence of *A. nigricans* or *Cornicularia divergens*, which seems to have been revised to the genus *Bryocaulon* (Vitt et al. 1998).

exposed to “solar radiation” turn dark green, while those with less exposure to sunlight remain lighter in colour. Interspersed among the lichen are occurrences of mountain cranberry, arctic blueberry, or *Diapensia lapponica*, and mats of bearberry, black crowberry, and mountain avens. Prickly saxifrage (*Saxifraga tricuspidata*) also commonly grows in clumps in this community. The lichen-heath – hair lichen community is scattered throughout the Project and road LSAs and covers a total of 530 ha (6%) (Table 4-7, Figure 4-3).

Only one non-mappable plant association unit was associated with the lichen-heath – hair lichen community:

- Ridge or esker crest (RCc).

4.3.1.7 Lichen Rock Community

The lichen rock community is characterized by crustose lichens growing on the boulders or rocks that predominate on eskers or rocky plateaus. The lichen rock community is typically interspersed among other community types where boulder fields may be common (e.g., the heath tundra community or lichen-health – Cetraria community) but this community type refers to the specific plant community that is defined by lichens growing on rock surfaces. Thus, the most common lichens that are encountered include map lichen (*Rhizocarpon geographicum* and *R. geminatum*), sunburst lichen (*Arctoparmelia centrifuga*), rock tripe (*Umbilicaria* sp.), and blood spot lichen (*Haematomma lapponicum*). Calcicolous lichens, such as jewel lichens (*Xanthoria* sp. and *Caloplaca* sp.), tend to occur on glacial erratics with a high level of calcium carbonate or on rocks used as bird roosts or mammal scent posts. The lichen rock community is an uncommon unit that is only found on 134 ha (2%) of the Project and road LSAs (Table 4-7, Figure 4-3).

Within the lichen rock community, 5 non-mappable plant association units could be differentiated as follows:

- Boulder fields/streams, felsenmeer, heath tundra - boulders(LRb/HTb);
- Cobbles/gravel on ridges (LRb/RCc);
- Rounded/polished bedrock outcrops (LRrpol);
- Fractured bedrock outcrops and shattered bedrock (LRrf); and
- Cliff faces (LRrcf).

4.3.1.8 Un-vegetated (Sand)

Un-vegetated units in the LSA not associated with Lichen Rock communities are represented by sandy areas with limited to no vegetation cover. This unit is typically associated with steep sandy slopes and the margins of rivers and lakes. The un-vegetated (sand) unit makes up a small proportion of the Project and road LSAs, covering only 27 ha (<1%) (Table 4-7, Figure 4-3).

4.3.1.9 Disturbances

Disturbances in the LSA are represented by cleared areas and access roads associated with the Meliadine main and Discovery areas, camp and other facilities, as well as various natural disturbance features. The current extent of the disturbance unit is <1 ha (<0.1%) (Table 4-7, Figure 4-3).

Within the disturbance class, 9 non-mappable associations could be differentiated based on anthropogenic and natural disturbance features:

- Den sites (DSd);
- Caribou trails;
- Avian nesting areas (DSng/DSnr);
- Faces of solifluction lobes (Dssolif);
- Hillside slumps (DSls);
- Drill sites (Dsdrill);
- Roads or ATV trails (DSr);
- Camps (DSc); and
- Greywater outflows (Dsgrey).

4.3.1.10 Water

The open water unit is represented by all waterbodies and watercourses that are present in the LSA and includes major waterbodies, such as Meliadine Lake, Lake B7, Lake A8, Lake B5, and Lake A6, as well as the Meliadine River. This unit covers a large proportion of the LSA at 1482 ha (18%), with most of the major waterbodies occurring in and around the proposed mine sites in the Meliadine and F Zone mine LSA (Table 4-7, Figure 4-3).

4.3.2 Rare Plants

Four rare plant species designated as “Sensitive” by the government of Nunavut (Government of Nunavut 2005) were observed within the LSA during the 1998, 2008, and 2009 field programs (Table 4-8). Among the 4 species (3 forbs and one shrub), there were 5 total rare plant occurrences observed in the LSA (Table 4-8). One species, *Salix planifolia s*sp. *tyrrellii*, was initially recorded as “Threatened” by COSEWIC (1997) but has since been delisted (COSEWIC 2008). This species was formerly known to occur only around the Lake Athabasca sand dunes, with no previously known occurrences in the NWT or Nunavut (Dr. George Argus, 1998, 1999, pers. comm.). With more recent data collected in Nunavut for this project and others (e.g., , the Meadowbank project, Bathurst Port and Road Project, and the Doris North Project), the distribution of *S. planifolia* ssp. *tyrrellii* is more common than initially thought. No other territorial or federally listed plant species (Government of Nunavut 2005; COSEWIC 2008) were documented in the LSA. Two species, moor rush (*Juncus stygius*) and false chamomile (*Tripleurospermum maritimum*) have no previous documented records in Nunavut, as they were not included in the *Draft General Status Ranks of Vascular Plants in Nunavut* (Government of Nunavut 2005) and are considered as rare for purposes of this report.

It is important to note that the absence of rare plant observations does not preclude the potential for rare plants to inhabit the area. Therefore, a rare plant survey cannot confirm the absence of rare plants or rare plant communities; it can only confirm their presence.

Table 4-8: Rare Plants Observed within the Local Study Area

Scientific Name	Common Name	Strata	Rank		
			Nunavut[a]	COSEWIC[b]	Nature-Serve[c]
Astragalus eucosmus	Pretty milkvetch	Forb	Sensitive	Not listed	G5
Descurainia sophioides	Northern Tansy-mustard	Forb	Sensitive	Not listed	G5
Pinguicula villosa	Hairy butterwort	Forb	Sensitive	Not listed	G4
Salix lanata ssp. *calcicola)*(also S. *calcicola)*	Lanate willow	Shrub	Sensitive	Not listed	G4T4
Juncus stygius	Moor rush	Grass	No record found	Not listed	G5
Tripleurospermum maritimum	False chamomile	Forb	No record found	Not listed	G5T4T5

[a] Government of Nunavut (2005)
[b] COSEWIC (2008)
[c] NatureServe (2009)

Additionally, there are 13 species of rare plants not encountered during the 1998, 2008, and 2009 surveys that may have the potential to occur in the LSA (Table 4-9). These are all listed as "Sensitive" by the Government of Nunavut (2005), with the exception of autumn bluegrass (*Poa autumnalis*), which has been ranked as "Undetermined" due to insufficient data.

Table 4-9: Rare Plants that may Occur in the Local Study Area

Scientific Name	Common Name	Strata	Habitat	Rank		
				Nunavut[a]	COSEWIC[b]	Nature-Serve[c]
Argentina egedii	Egede'scinquefoil	Forb	Marine shores, silty or sandy; tidal marshes; occasionally freshwater meadows and marshes	Sensitive	Not listed	G5
Calamagrostis deschampsioides	Circumpolar small-reedgrass	Grass	Littoral, damp tundra, low seacoasts	Sensitive	Not listed	G4
Dendranthema arcticum	Arctic daisy	Forb	Moist, saline meadows, moist gravel, seashores	Sensitive	Not listed	G5
Montia fontana (also *M. lamprosperma*)	Fountain miner's-lettuce	Forb	Damp pond edges	Sensitive	Not listed	G5
Parnassia palustris	Marsh grass-of-Parnassus	Forb	Low areas along coast	Sensitive	Not listed	G5
Pinguicula vulgaris	Common butterwort	Forb	Wetlands	Sensitive	Not listed	G5
Ranunculus cymbalaria	Seaside crowfoot	Forb	Seashores, mudflats	Sensitive	Not listed	G5
Ranunculus longirostris (also *R. aquatilis*)	Eastern white water crowfoot	Forb	Shallow water, ponds	Sensitive	Not listed	G5
Ranunculus pallasii	Pallas' buttercup	Forb	Brackish meadows, coast	Sensitive	Not listed	G5
*Puccinellia deschampsioides (*also *P. nuttaliana)*	Polar alkali grass	Grass	Littoral, coastal	Sensitive	Not listed	G5
Sibbaldia procumbens	Arizona cinquefoil	Forb	Sheltered slopes, near snowbanks	Sensitive	Not listed	G5
Woodsia alpina	Northern woodsia	Forb	Uncommon, rock crevices, calcareous rocks	Sensitive	Not listed	G4
Poa autumnalis (also *Poa laxa)*	Autumn bluegrass	Grass	Gravelly, not too dry sites, often pioneering disturbed sites	Undetermined	Not listed	G5

[a] Government of Nunavut (2005)
[b] COSEWIC (2008)
[c] NatureServe (2009)

4.3.3 Baseline Metals Assessment in Soils and Plant Tissue

4.3.3.1 Soil Metal Concentrations

Metals concentrations for the collected soil samples were assessed relative to the CCME (2007) criteria for contaminated soils to determine if any metals exceeded acceptable limits for agricultural sites under the existing baseline conditions. The soil quality guidelines for agricultural sites were used, as the site in its current state is considered unaltered at baseline.

The majority of soil metal concentrations in 2008 sample plots were within acceptable guidelines, with the exception of Arsenic (As), which exceeded CCME limits on 10 plots (Table 4-10). Most of these plots were found in the immediate vicinity of the proposed Meliadine main site or along the proposed road near the main site. The exception was plot 08-015, which was located southwest of the main mine site near the proposed Discovery area road. One plot, 08-010, had borderline values for Arsenic at 11.8. mg/kg. Cobalt (Co), Copper (Cu) and Selenium (Se) also exceeded CCME agricultural criteria on 2 sites (Table 4-10). Soil plot 08-002 had high levels of copper and selenium, whereas plot 08-005 had levels of cobalt and copper above CCME criteria. Both sites are located near the proposed Meliadine main mine site.

Table 4-10: Soil Metal Concentrations (mg/kg) Associated with each 2008 Sample Plot

	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
	(Sb)	(As)	(Ba)	(Be)	(Cd)	(Cr)	(Co)	(Cu)	(Pb)	(Hg)	(Mo)	(Ni)	(Se)	(Ag)	(Tl)	(Sn)	(U)	(V)	(Zn)
Detection Limits	0.2	0.2	5	1	0.5	0.5	1	2	5	0.05	1	2	0.2	1	1	5	2	1	10
2007 CCME Guideline (agricultural)	20	12	750	4	1.4	64	40	63	70	6.6	5	50	1	20	1	5	23	130	200
2008 Soil Sample Plots																			
08-001	<0.2	**51.8**[a]	36	<1	<0.5	32.7	14	31	10	<0.05	<1	38	<0.2	<1	<1	<5	<2	22	50
08-002	<0.2	**59.9**	53	<1	0.5	11.1	9	**66**	8	0.05	<1	48	**1.2**	<1	<1	<5	<2	9	60
08-003	<0.2	**47.3**	93	<1	<0.5	16	19	30	<5	<0.05	2	20	0.4	**<1**	<1	<5	<2	15	20
08-004	<0.2	**13**	118	<1	<0.5	12.3	6	8	<5	0.16	<1	10	0.2	<1	<1	<5	<2	8	70
08-005	<0.2	**51.1**	117	<1	<0.5	10.7	**45**	**72**	<5	<0.05	7	39	0.8	<1	<1	<5	<2	9	40
08-006	<0.2	**26.9**	22	<1	<0.5	25.6	5	18	7	0.08	<1	20	0.2	<1	<1	<5	<2	15	50
08-007	<0.2	**13.9**	24	<1	<0.5	31.6	5	8	<5	0.09	<1	12	0.2	<1	<1	<5	<2	18	30
08-008	<0.2	**23.3**	31	<1	<0.5	22	6	9	<5	<0.05	<1	13	0.2	<1	<1	<5	<2	15	40
08-009	<0.2	1.2	51	<1	<0.5	5.2	1	5	<5	0.11	<1	4	0.4	<1	<1	<5	<2	4	20
08-010	<0.2	**11.8**	81	<1	0.8	23.1	9	18	<5	0.19	<1	19	0.4	<1	<1	<5	<2	15	60
08-011	<0.2	7	73	<1	<0.5	29.4	10	15	<5	<0.05	<1	24	0.2	<1	<1	<5	<2	39	40
08-012	<0.2	**49.7**	35	<1	<0.5	26.9	15	30	10	<0.05	1	31	<0.2	<1	<1	<5	<2	18	40
08-013	<0.2	5.9	40	<1	<0.5	27.4	7	18	<5	<0.05	1	15	<0.2	<1	<1	<5	<2	29	30
08-014	<0.2	8.4	64	<1	<0.5	29.1	8	29	<5	<0.05	1	24	0.4	<1	<1	<5	<2	25	30
08-015	<0.2	**19.5**	72	<1	<0.5	51.3	11	13	6	<0.05	<1	22	<0.2	<1	<1	<5	<2	38	50
08-016	<0.2	1.3	113	<1	<0.5	32.2	5	8	<5	0.16	<1	13	0.4	<1	<1	<5	<2	30	40
08-017	<0.2	2.7	74	<1	<0.5	31.8	7	7	<5	<0.05	<1	16	<0.2	<1	<1	<5	<2	27	30
08-018	<0.2	1.4	18	<1	<0.5	8.5	2	5	<5	<0.05	<1	5	<0.2	<1	<1	<5	<2	9	20
08-019	<0.2	1.1	22	<1	<0.5	12.7	3	2	<5	<0.05	<1	7	<0.2	<1	<1	<5	<2	14	20
08-020	<0.2	8.3	50	<1	<0.5	23	15	29	<5	<0.05	<1	26	<0.2	<1	<1	<5	<2	23	40

[a] Values in bold and shaded refer to soil metal concentrations that exceed CCME limits. Note: mg/kg= milligrams per kilograms; <= less than

Table 4-11: Soil Metal Concentrations (mg/kg) Associated with each 2009 Sample Plot

Metal		Detection Limits	2007 CCME Guideline (agricultural)	2009 Soil Sample Plots							
				09-D01	09-D02	09-D03	09-D04	09-D05	09-D06	09-D08	09-D09
Aluminum	(Al)	10	n/a	9670	9530	1240	9580	6370	3550	5820	8460
Antimony	(Sb)	0.05	20	<0.050	<0.050	0.113	0.056	<0.050	0.067	<0.050	<0.050
Arsenic	(As)	0.05	12	6.66	**12.6** [a]	4.52	8.91	1.85	1.80	**20.3**	4.03
Barium	(Ba)	0.1	750	71.3	72.7	61.9	73.6	119	99.9	51.7	64.0
Beryllium	(Be)	0.2	4	3.11	3.71	0.24	2.74	1.73	0.92	2.11	2.73
Bismuth	(Bi)	0.3	n/a	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Cadmium	(Cd)	0.5	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Calcium	(Ca)	10	n/a	5530	6760	26700	1950	3270	4100	7680	5810
Chromium	(Cr)	0.5	64	39.3	39.5	2.98	37.0	33.0	10.5	23.2	36.2
Cobalt	(Co)	0.5	40	11.1	18.4	3.75	6.80	4.89	3.68	10.9	8.95
Copper	(Cu)	0.5	63	53.4	42.6	31.1	22.7	13.5	12.9	32.5	19.4
Iron	(Fe)	5	n/a	17900	21300	1700	16100	10300	5170	11600	15300
Lead	(Pb)	0.1	70	5.31	4.35	5.29	3.98	2.92	2.87	4.06	3.67
Lithium	(Li)	0.5	n/a	12.0	13.1	0.83	9.40	3.24	1.45	7.16	12.6
Magnesium	(Mg)	5	n/a	6740	6550	1060	5200	3850	1770	4520	7080
Manganese	(Mn)	0.2	n/a	238	425	271	90.6	138	50.9	237	251
Mercury	(Hg)	0.01	6.6	0.113	0.023	0.202	0.169	0.180	0.161	0.015	0.025
Molybdenum	(Mo)	0.05	5	0.679	0.688	1.34	0.648	0.484	0.322	0.297	0.244
Nickel	(Ni)	0.5	50	26.8	33.0	20.6	16.3	10.5	6.97	17.2	16.9
Phosphorus	(P)	20	n/a	658	672	939	885	1070	872	619	596
Potassium	(K)	100	n/a	2670	1970	1090	1330	2300	680	1110	2530
Selenium	(Se)	1	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sodium	(Na)	100	n/a	320	310	130	<100	120	100	210	230
Strontium	(Sr)	0.3	n/a	31.5	41.2	195	19.4	17.8	29.8	32.2	28.6
Thallium	(Tl)	0.03	1	0.174	0.214	0.066	0.106	0.137	0.043	0.090	0.124
Tin	(Sn)	0.2	5	0.47	0.42	0.28	0.25	0.30	0.25	0.31	0.37
Titanium	(Ti)	0.5	n/a	824	945	67.6	446	666	300	574	878
Uranium	(U)	0.01	23	1.97	1.37	0.634	0.647	0.592	0.353	0.527	0.688
Vanadium	(V)	0.5	130	27.7	26.1	3.67	16.3	19.2	6.91	17.7	26.6
Zinc	(Zn)	0.5	200	46.7	48.9	53.5	39.7	44.7	32.5	32.3	36.3

[a] Values in bold and shaded refer to soil metal concentrations that exceed CCME guidelines. Note: mg/kg= milligram per kilogram; <= less than.

For the 2009 samples, only soil plots 09-D02 and 09-D08 had elevated levels of Arsenic (As) at 12.6 mg/kg and 20 mg/kg respectively, compared to the CCME guideline value of 12 mg/kg (Table 4-11). All other soil metal concentrations in the 2009 sample plots were below applicable CCME guidelines (Table 4-11).

4.3.3.2 Plant Tissue Metal Concentrations

Metal concentrations in tissue from selected plant species were also analyzed to provide an understanding of baseline levels of various metals that may be concentrated in plant tissue. The results of the plant tissue metals analyses for 2008 and 2009 indicate that there was a wide variability in the range of metal concentrations (Tables 4-12 and 4-13). Alpine manzanita and snow lichen tissue were found to have some the highest concentrations of Aluminium (Al) and Iiron (Fe) in both 2008 and 2009 sample plots, with black crowberry also showing high levels of Aluminium (Al) in the 2009 plots. In the 2008 samples, Nickel (Ni) concentrations were found to be highest in *Oxytropis arctica var. belliii*, whereas flat-leaved willow and mountain cranberry had some of the highest levels for Zinc (Zn) and Manganese (Mn), respectively (Table 4-12). This is in contrast to the 2009 samples taken along the proposed Discovery Road alignment, which showed high levels of nickel (Table 4-13). The highest levels of arsenic were found in alpine manzanita, along with water sedge on 2 plots located near the proposed Meliadine main site (Table 4-12).

Table 4-12: Range of Selected Metal Concentrations in Collected Plant Tissue in 2008

Scientific Name	Common Name	# of samples	Aluminum (Al) (mg/kg)	Arsenic (As) (mg/kg)	Iron (Fe) (mg/kg)	Manganese (Mn) (mg/kg)	Nickel (Ni) (mg/kg)	Zinc (Zn) (mg/kg)
Arctostaphylos alpina	Alpine manzanita	3	450 to 1890	0.7 to 2.1	266 to 1210	47.8 to 243	1.6 to 4.6	81.9 to 140
Aulacomnium moss	n/a	1	390	<0.2	256	749	3.8	48.6
Betula nana	Swamp birch	4	30 to 130	0.2 to 0.7	48 to 125	67.9 to 554	0.9 to 6	73.6 to 174
Carex aquatilis	Water sedge	3	190 to 520	1.8 to 3.7	245 to 1050	211 to 301	1.9 to 3.9	18.6 to 29.2
Carex misandra	Shortleaf sedge	1	170	0.5	187	121	4.1	17.5
Flavocetraria nivalis	Crinkled snow lichen	11	180 to 2090	0.2 to 1.4	140 to 1600	79.2 to 235	1 to 4.3	17.9 to 27.5
Empetrum nigrum	Black crowberry	11	30 to 880	0.2 to 1.1	33 to 628	271 to 860	2.1 to 4.9	11.7 to 19.8
Ledum paulstre ssp. *decumbens*	Marsh Labrador tea	2	70 to 80	<0.2 to <0.2	52 to 63	170 to 264	0.7 to 1	25.8 to 30.6
Oxytropis arctica var. belliii	Bell's Point-vetch	1	120	0.3	112	107	10	16.9
Poa sp.	Bluegrass	1	170	0.7	214	38.7	1.3	12.9
Salix planifolia	Tealeaf willow	1	40	<0.2	105	295	1.9	523
Salix lanata ssp. *richardsonii*	Lanate willow	1	220	1.7	389	136	2.6	378
Vaccinium uliginosum	Arctic blueberry	2	230 to 280	0.2 to 0.5	83 to 154	685 to 1160	1.2 to 1.6	39.3 to 46.3
Vaccinium vitis-idaea	Mountain cranberry	2	100 to 180	0.2 to 0.2	67 to 130	398 to 682	2.1 to 3.7	24.3 to 30.1

Table 4-13: Range of Selected Metal Concentrations in Collected Plant Tissue in 2009

Scientific Name	Common Name	# of samples	Aluminum (Al) (mg/kg)	Arsenic (As) (mg/kg)	Iron (Fe) (mg/kg)	Manganese (Mn) (mg/kg)	Nickel (Ni) (mg/kg)	Zinc (Zn) (mg/kg)
Arctostaphylos alpina	Alpine manzanita	1	155	0.398	281	1.09	47.2	55.3
Betula nana	Swamp birch	2	16 to 26	0.097	49.4 to 53.9	0.63 to 9.72	126 to 1330	49.2 to 222
Flavoetraria nivalis	Crinkled snow lichen	2	186 to 511	0.389 to 0.405	238 to 317	1.74 to 3.05	99.8 to 123	19.6 to 32.3
Empetrum nigrum	Black crowberry	6	91 to 222	0.085 to 0.257	104 to 251	2.55 to 5.73	253 to 659	12.3 to 21.1
Ledum paulstre ssp. *decumbens*	Marsh Labrador tea	3	43 to 46	0	32.3 to 42.6	0.81 to 0.94	579 to 1020	31.5 to 37.5
Vaccinium uliginosum	Arctic blueberry	1	48	0.057	42.1	6.07	1470	31.3
Vaccinium vitis-idaea	Mountain cranberry	1	91	0	45.8	1.02	2380	25.8

Note: mg/kg= milligram per kilogram

It is not known if these metal levels are of concern for these particular species, as there is no known literature available on the levels of metals that would be toxic to the plant species selected. At the time of sampling, there were no indications of disease or toxicity symptoms observed in the areas studied, with some rare exceptions of a fungus infection called “rust” affecting swamp birches. This condition is seen throughout the mainland arctic (P. Burt, 2008, pers. comm.), and is not particular to this area.

4.4 Summary and Conclusions

In summary, this report section describes the terrestrial vegetation and wetlands communities in the RSA and LSA, and provides a basis for evaluating the potential effects of the Project on terrestrial resources. The vegetation baseline report section represents a synthesis of all data collected during the 1998 to 2009 field programs and provides a summary of baseline conditions concerning the abundance and distribution of plant communities, occurrence of rare plants, and metal concentrations present in soils and plant tissues. Mapping of plant communities within the LSA was based on interpretation of 1:10 000 air photos or orthophotographs in conjunction with results from field data. The regional land cover classification map was developed using satellite imagery, remote sensing software, and GIS to provide information on the relative abundance and distribution of vegetation types within the RSA. Field data were collected over the summers of 1998, 2008, and 2009 on 416 sites across the range of vegetation types within the Project area, including 337 plots in 1998, 59 plots in 2008, and 20 plots in 2009.

The RSA boundary was established to assess the importance of the Project within a broader regional context, as it forms the foundation for quantifying potential effects of the Project on regional vegetation resources and wildlife habitat. The RSA was defined as a 52 km radius from the proposed Project and covers an area of approximately 850 000 ha. The RSA falls within the Maguse River Upland Ecoregion portion of the Southern Arctic Ecozone and is characterized by an abundance of waterbodies surrounded by uplands with terrestrial vegetation underlain by areas of continuous permafrost. Eight land cover classes were identified for the regional ELC. Heath vegetation represents the dominant vegetation cover in the RSA at 445 926 ha (52%) of the RSA, whereas wetlands and riparian areas are distributed over 122 575 ha (14%) of the RSA. The remaining 280 983 ha (33%) of the RSA are classified as water (predominantly lakes and the tidal basin of Hudson’s Bay) and a small percentage of bare ground and rock outcrops.

The LSA boundary encompasses the Meliadine main site, F Zone area, and Discovery area and was defined by the expected spatial extent of the immediate direct (e.g., Project footprint) and indirect effects (e.g., dust deposition) of the Project on surrounding soil, vegetation, and wildlife resources. The LSA for the anticipated mine sites was defined by the extent of the potential effects of the Project and is characteristic of regional habitat conditions and vegetation within the Maguse River Upland Ecoregion. However, the major landforms in the LSA are dominated by a large esker that runs northwest/southeast and numerous drumlins or drumlinoid ridges. The LSA for the proposed all-weather road was defined by the expected limit of direct and indirect effects from the road on the surrounding vegetation and was delineated by a 1 km buffer on either side of the anticipated right-of-way surrounding the proposed road alignment. The LSA for the road contains vegetation and landscape terrain features that are typical of the regional conditions. However, the proposed road is located primarily on high ground and tends to follow the ridge lines of eskers and bedrock outcrops.

In total, 10 plant community types were classified and mapped in the 8251 ha mine and road LSA, including 4 upland terrestrial vegetation classes, 3 wetlands classes, and 3 un-vegetated classes. Upland terrestrial vegetation encompasses 4468 ha (54%) of the LSA, with the heath tundra community type dominating the landscape. Wetlands are distributed over 2273 ha (27%) of the LSA, and the remaining 1509 ha (18%) of the LSA is classified as un-vegetated units that are predominantly composed of waterbodies and rivers. Disturbance features and un-vegetated sand areas represent <1% of the total LSA.

During the 1998, 2008, and 2009 vegetation field programs, 4 rare plant species designated as “Sensitive” by the government of Nunavut (Government of Nunavut 2005) were observed within the LSA. One other species commonly encountered in the area, *Salix planifolia ssp. tyrellii*, was initially recorded as “Threatened” by COSEWIC (1997) but has since been delisted (COSEWIC 2008). No other territorial or federally listed species (Government of Nunavut 2005; COSEWIC 2008) were documented as occurring in the LSA. There are an additional 13 species of rare plants that may have the potential to occur in the LSA, though they were not encountered during the 1998, 2008, or 2009 surveys. These are all listed as “Sensitive” (Government of Nunavut 2005), with the exception of autumn bluegrass (*Poa autumnalis*), which has been ranked as “Undetermined” due to insufficient data.

Assessments of baseline metal concentrations in plant tissue and soil in the LSA was undertaken in the fall of 2008 and completed in the fall of 2009, to provide a basis for evaluating potential effects of dust borne contaminants containing metals originating from the proposed mine sites and all-weather road in support of the Screening Level Risk Assessment- Country Foods Evaluation. In total, 29 permanent sample sites were established in the vicinity of the mine site and along the road at which plant tissue samples from at least 2 different plant species and a soil sample were collected from each site. Most of the soil metal concentrations were within acceptable guidelines, with the exception of Arsenic (As), which exceeded CCME (2007) guidelines for agricultural use on 12 plots, all but 3 of which were found in the immediate vicinity of the proposed Project main site or along the proposed road near the mine site. Metal concentrations in tissue from selected plant species were also analyzed to provide an understanding of baseline levels of various metals that may be concentrated in plant tissue. The results of the plant tissue metals analyses indicated a wide variability in the range of metal concentrations, with highest levels of Arsenic (As)found in alpine manzanita, and water sedge on 2 plots located near the proposed Meliadine main mine site.

5.0 WILDLIFE BASELINE

5.1 Methods

5.1.1 Barren-ground Caribou Aerial Surveys

The objective of the barren-ground caribou aerial surveys was to document the seasonal distribution, behaviour, habitat associations, and abundance of caribou within the study area. From 1998 to 2000, aerial surveys were completed along 10 parallel lines in a 121 400 ha regional study area encompassing the Project site (Figure 5-1). Survey transects oriented east-west were spaced 4 km apart and 500 m on either side of the aircraft (i.e., 1 km wide transects) were scanned for caribou, resulting in 25% coverage of the study area. In 2008 and 2009, the surveys were completed over a larger study area (Figure 5-1). Observations were made along 15 north-south transects, spaced 6 km apart over a 849 500 ha study area (i.e., within a 52 km radius of the Project site), resulting in 15% coverage of the study area. Johnson et al. (2005) found that the potential zone of influence (ZOI) for caribou affected by mining activities may extend up to 30 km from a development. The larger study area was designed to capture potential mine-related effects on caribou (i.e., includes the ZOI) and provide control data outside the ZOI. Due to the large area, aerial surveys were completed over 2 days for 2 of the 3 aerial surveys in 2008. Surveys were classified, based on the time of year, as either 'spring migration and calving', 'post-calving through to fall migration and rut', or 'early winter.' This is based on the Qamanirjuaq caribou annual life history phases (Table 5-1, BQCMB 1999).

Table 5-1: Qamanirjuaq Barren-Ground Caribou Herd Life History Periods

Life Cycle Period	Dates	Remarks on Timing and Location
Spring migration	16 March to 25 May	May be delayed if snow is deep. Timing depends on distance travelled. Route taken depends on winter distribution.
Calving	26 May to 25 June	Condition of cows affects timing. Most calves are born between 5 and 15 June. The same general area is used for calving each year, but the specific place where calves are born varies from year to year.
Post-calving	26 June to 31 July	Animals gather in large groups to reduce harassment by mosquitoes on calm days. Habitat used for escaping insects (sand, gravel, hills, lakeshore) is important. The post-calving period ends when caribou migrate south to near tree line.
Late summer	1 August to 15 September	Groups break up when harassment by mosquitoes decreases and that by warble flies and nose bots increases. Caribou begin to regroup in late August and September. Little is known about movement patterns.
Fall migration and rut	16 September to 31 October	Migration timing is influenced by weather, particularly early snowfall and ice formation. Rut occurs in late October.
Early winter	1 November to 31 December	Rapid movements occur in some years. Animals generally move away from areas with deep snow.
Late winter	1 January to 15 March	Forest-dwelling caribou generally stay in areas where snow is 40 to 60 cm deep. Movements decrease as snow deepens. Caribou wintering on tundra seek range where the snow is relatively shallow, such as on the tops of hills.

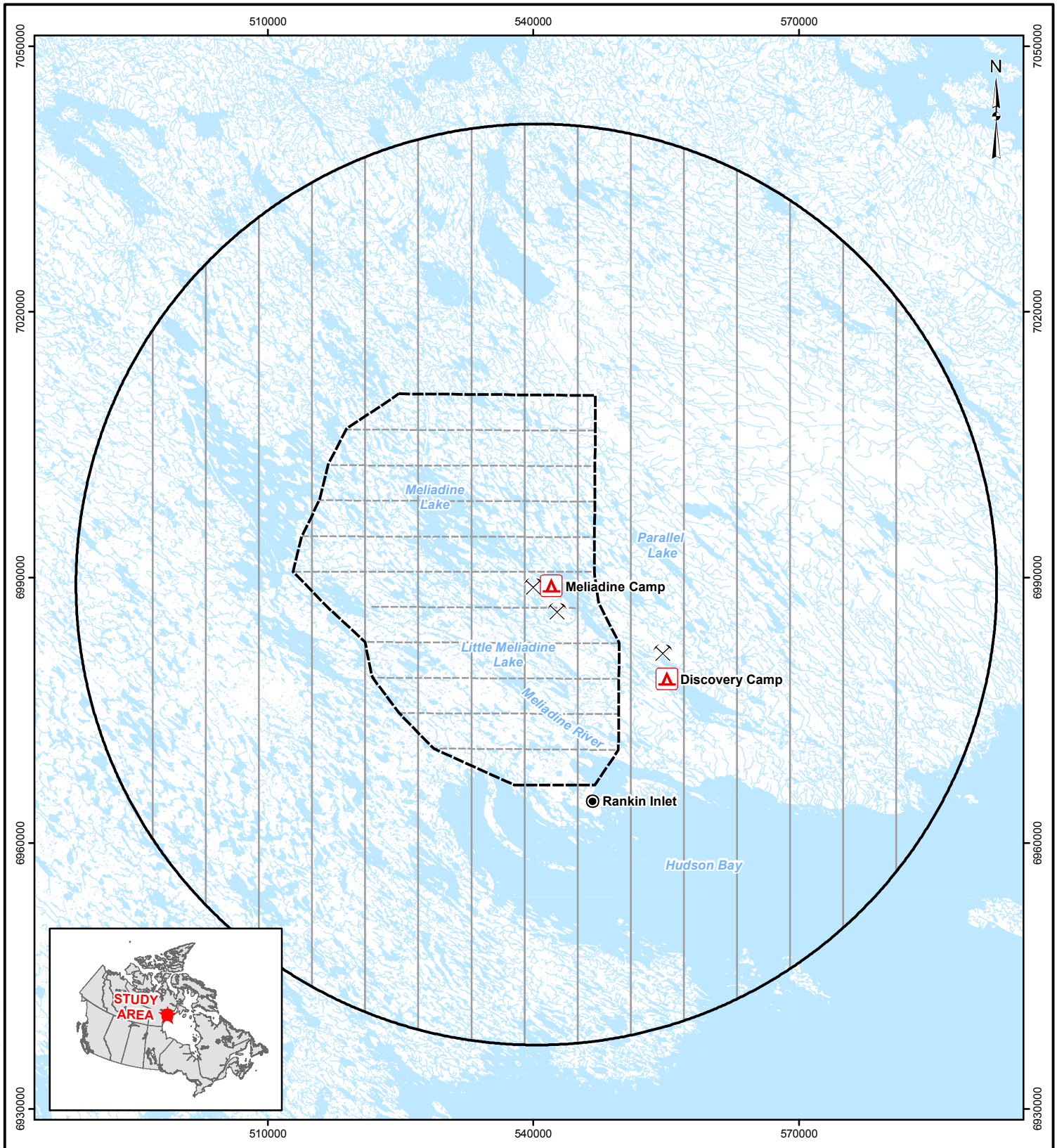
From BQCMB 1999

Surveys were completed in either a helicopter or a fixed-wing aircraft. For all surveys, transects were flown at a minimum altitude of 200 m above ground level (AGL) at a speed of 150 to 185 km/h. When surveys were completed in a helicopter, the search area was a 500 m wide strip on each side of the transect line, resulting in a transect width of 1 km. When surveys were completed from a fixed-wing aircraft, due to lack of visibility under the aircraft, the search area was 2 parallel 500 m wide transects on either side of the aircraft, again resulting in coverage totalling 1 km per transect. Strip width was calibrated by visual reference to landmarks at known distances. Survey crew included the pilot, an observer/navigator/recorder, and 2 rear-seat observers. Navigation was by GPS following the predetermined route based on waypoints at the beginning and end of each transect line. Location was confirmed on a regular basis by the pilot or an observer with the use of a 1:250 000 scale topographic map.

Wildlife observed within the 500 m strip on each side of the aircraft were identified, counted, and recorded in a notebook or on a field data sheet. In some years, large congregations of barren-ground caribou were photographed and later counted. In these cases, at least 3 photographs were taken of each congregation and the highest count was used. For all observations, the location and the time were recorded using a hand-held GPS. Following the survey, locations of observations were downloaded. When possible, barren-ground caribou were identified as cows, calves, or bulls. “Cows” included all barren-ground caribou that are one year or older, and that were not large-antlered. Groups were classified during the post-calving period (July) as nursery (i.e., adults with calves) or non-nursery (i.e., adults without calves) herds.

During the 2008 and 2009 surveys, the dominant behaviour of the group (i.e., bedded, feeding, alert, walking, trotting, running, standing, or courting/sparring) was recorded, as was the habitat type of each location. Habitat type was classified based on land cover classification as defined in Matthews et al. (2001). Matthews et al. (2001) classified vegetation within the Kitikmeot/Slave Geological Province. Although the Project study area falls outside of the Kitikmeot/Slave Geological Province, this classification encompasses the Southern Arctic ecozone and the Project study area is located in that ecozone. Therefore, this classification is representative of the vegetation that occurs within the Project study area. At the regional scale, vegetation cover in the Project area is dominated by heath tundra and heath boulder habitat types (See Section 4.2).

During all surveys, barren-ground caribou observed off-transect were recorded as incidental observations, with the number of individuals and a waypoint recorded. Although the surveys targeted barren-ground caribou, observations of other non-migratory wildlife species and incidental wildlife sign (e.g., dens) were also documented. These observations are discussed in their respective sections.



LEGEND

- Camp
- Proposed Mine Site
- Aerial Survey Transect (2008-2009)
- Aerial Survey Transect (1998-2000)
- Watercourse
- Caribou Study Area (1998-2000)
- Terrestrial Regional Study Area
- Waterbody

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

15 0 15
SCALE 1:600,000 KILOMETRES

PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
CARIBOU AERIAL SURVEY TRANSECTS AND SURVEY AREA

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-1

N:\Bur-Graphics\Projects\2007\1373\07-1373-0055\Mapping\MXD\2009\Wildlife\figure-5-1_caribou-aerial-survey-transects.mxd

5.1.2 Fox Den Surveys

The objective of the fox den surveys was to determine the locations of arctic fox den sites and monitor for occupancy and productivity within the study area, focusing on a 10 km radius from the Project site. The study area had a 10 km radius as these surveys were on foot, and focused on collecting data in the area of the preliminary perimeter for the Project footprint. Surveys were completed in the spring season (June) when pup emergence from the den occurs and in the summer season (July) when pup survival can be monitored.

In 1998, searches for carnivore dens were conducted by unstructured ground and helicopter surveys between June and September. All potential denning areas, such as eskers, ridges, and boulder fields, within 10 km of camp were identified using aerial photographs. Eskers were targeted as these are common locations for dens. These areas were searched on foot using 2 observers. One observer walked along the foot of slopes while the second walked closer to or along the height of land to ensure that all dens were located. During other helicopter surveys through the field season, valleys within the study area were continually surveyed for potential denning areas. Each possible den site was inspected on foot. Careful observation was made to confirm that arctic ground squirrel burrows were not incorrectly identified as fox dens. When den sites were located, a survey of the immediate area was conducted to look for recent signs of occupancy (e.g., digs, fresh scat, tracks, hair, bedding material, and recent prey items), and a GPS waypoint of the location was taken. Detailed site characteristics were recorded.

In 1999, 2000, and 2008, fox den surveys were limited to incidental observations. Dens were recorded opportunistically during all wildlife surveys, including aerial surveys and while on foot. Observations by Project staff were also recorded. Most dens were recorded within 10 km of camp, other than 3 that were recorded in 2008 during the barren-ground caribou aerial surveys.

5.1.3 Raptor Nest Surveys

The objective of the raptor nest surveys was to determine the distribution, occupancy rate, and productivity of raptors nesting in the study area.

Between 1998 and 2000, and in 2008 and 2009, unstructured ground and aerial surveys were used to search for raptor nesting sites within approximately 10 km of the Project. The first survey determined occupancy of the historical nest sites and identified new nest sites. The second survey monitored for productivity.

In 1998 and 1999, intensive ground searches were completed in June, and aerial surveys were completed in July. In 2000, unstructured helicopter surveys were done in July and August. In 2008, unstructured ground surveys occurred in June and aerial surveys occurred in July. During the initial June survey, all nests were found opportunistically either during the upland breeding bird surveys or during aerial surveys for barren-ground caribou and waterfowl. In 2009, nest surveys occurred in mid-June. Nests were surveyed during a brief aerial survey or were surveyed opportunistically during other ground and aerial surveys. No raptor nest surveys were completed during the July 2009 field program due to inclement weather.

In all years, special attention was paid to cliffs, rock outcrops, boulders, and eskers. During aerial surveys, the helicopter was flown close to the elevation of the top of each cliff, at 20 to 50 km/h. Observers searched for flushing raptors, as well as whitewash and dense orange lichen growth. The locations of all nests and suspected nests were recorded and waypoints taken. Reports of raptor sightings by Project staff were recorded and investigated.

Proof of occupancy of a nest was determined by observing at least one adult bird at the nest, 2 birds in flight in close proximity to the nest, or finding a nest containing eggs or young. Any new nest sites located during these surveys and during other wildlife surveys were recorded. Although recorded, unoccupied nests within 200 m of an occupied nest were considered alternate nest sites within the same territory of that nesting pair (Court et al. 1988). In late summer, nests were considered successful only if young birds were observed at the site. Productivity was calculated both as the number of young per occupied nest, as well as per successful nest.

It is recognized that, due to the proximity of the study area to Rankin Inlet, many of the raptor nests within the study area are subject to sources of disturbance other than the Project (i.e., boats, snow machines, ATVs and cabins), which compromises the usefulness of raptor nest monitoring as a tool for Project-related impact monitoring. As such, only known sites within a 10 km radius of the Project and the all-weather road were considered relevant to the site monitoring, and other nests, observed beyond the 10 km radius, were recorded but considered control sites.

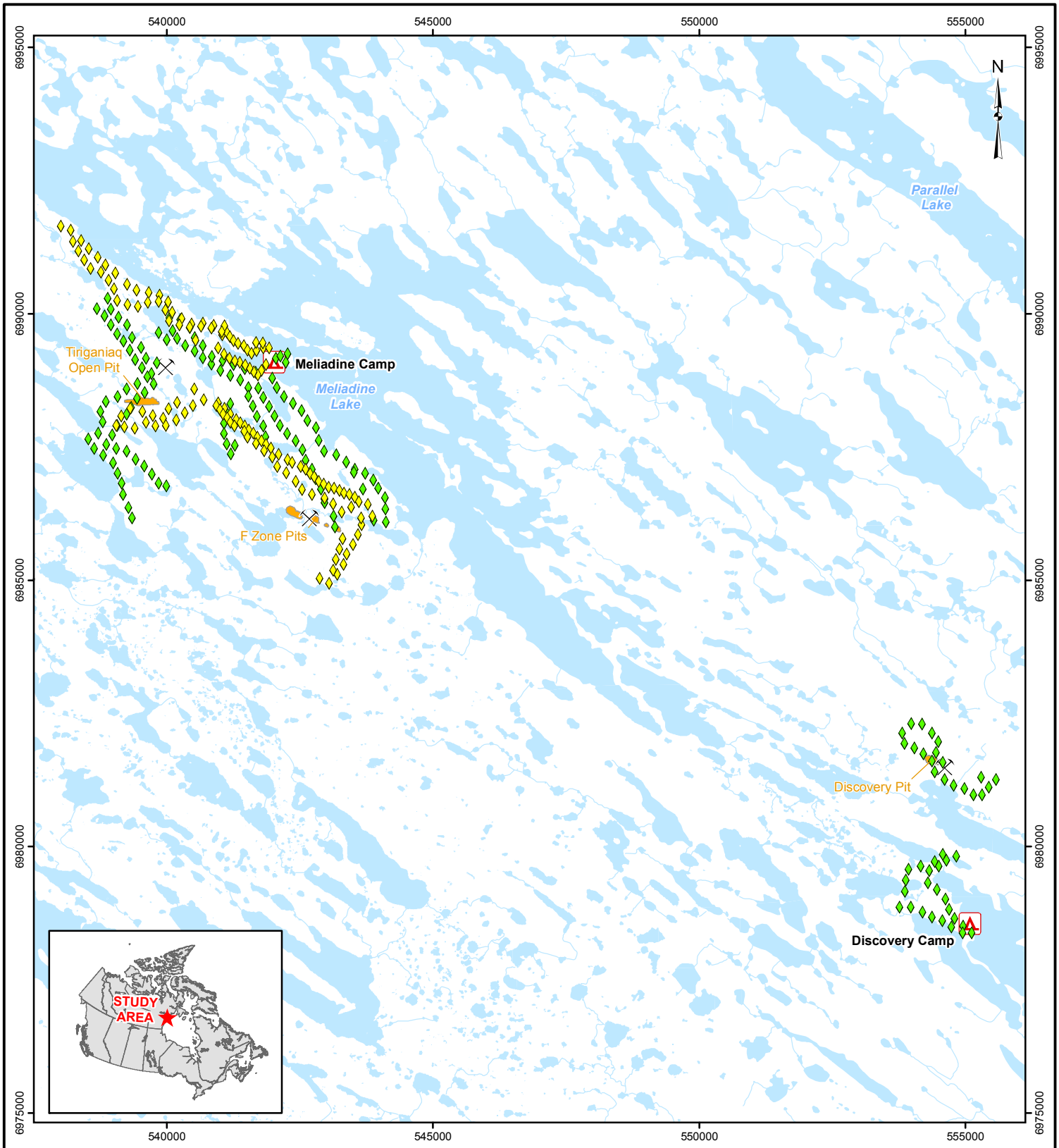
The number of nesting sites monitored each year varied, as new nest sites at previously monitored locations were included in 2008 and most nests surveyed between 1998 and 2000 were not located in subsequent years because of restrictions on helicopter flying time.

5.1.4 Upland Bird Point Count Surveys

The objective of upland game bird point count surveys was to determine the composition and abundance of upland bird species and their habitat associations inside and outside the Project footprint. Point counts are best suited for collecting data on songbirds because they primarily detect birds by sound (i.e., singing birds). Upland bird (i.e., songbird and shorebird) surveys estimate population densities and species composition of the bird community (Robbins 1970). Breeding bird censuses also provide habitat-specific density data and can be used to measure the effect of land-use practices on breeding bird populations. For example, a recent 8 year study at the Ekati Diamond Mine tracked temporal changes in the richness and density of bird species associated with landscape scale and population level effects (Smith et al. 2005).

Prior to 2008, no upland bird baseline data had been collected in the Project area. Therefore, these data would establish benchmarks for upland bird species relative abundance and richness in habitats potentially affected by the Project.

In 2008 and 2009, 136 and 145 point counts or plots were completed, respectively, within and immediately adjacent to the potential mine footprint (Figure 5-2). Plots radiated out from the potential mine footprint and included the Tiriganiaq and F Zone areas. In 2008, another 30 plots were completed near the Discovery area deposit. Plots were located a minimum of 100 m apart on each transect with approximately 100 m between transects. The distance between plots and between transects reduced the likelihood of re-counting individuals from adjacent plots, which would artificially inflate the number of birds in the area.



LEGEND

- Camp
- Proposed Mine Site

Bird Plot

- 2008
- 2009

- Watercourse
- Open Pit
- Waterbody

SCALE 1:100,000

2.5 0 2.5

KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

UPLAND BIRD PLOT LOCATIONS

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-2

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Surveys were performed using standard point count procedures between the hours of 2 a.m. and 10 a.m. to coincide with peak bird activity (i.e., actively singing males). All birds seen or heard in the 50 m radius plot within 3 and 5 minute intervals were recorded. Birds recorded within 3 minutes can be used to supply data to the annual North American Breeding Survey (Environment Canada 2004). Birds recorded within 5 minutes were used for analysis and to create a species list for the Project. Flyovers and birds observed outside of the plot were recorded as incidentals and used to develop a comprehensive species list, but were excluded from the analysis of plot data. Data recorded included plot location, observation number, time of observation, species, number of individuals, habitat (based on dominant landcover type; Matthews et al. 2001), and behavioural activity (i.e., flushed, territorial calls or displays, nest or nest with eggs, flyovers). Six habitat types were surveyed (Table 5-2). The numbers of plots per habitat type were selected based on relative proportions of habitats within the potential mine footprint; therefore, most plots were in heath tundra habitat.

Table 5-2: Plot Habitat Types Surveyed, 2008 and 2009

Habitat Type	2008		2009		Total	
	n	%	n	%	n	%
Heath boulder	3	2	5	0	8	3
Heath bedrock	2	1	0	3	2	1
Heath tundra	95	57	73	50	168	54
Sedge wetland	34	21	4	3	38	12
Tussock hummock	30	18	42	29	72	23
Esker	2	1	21	15	23	7
Total	**166**	**100**	**145**	**100**	**311**	**100**

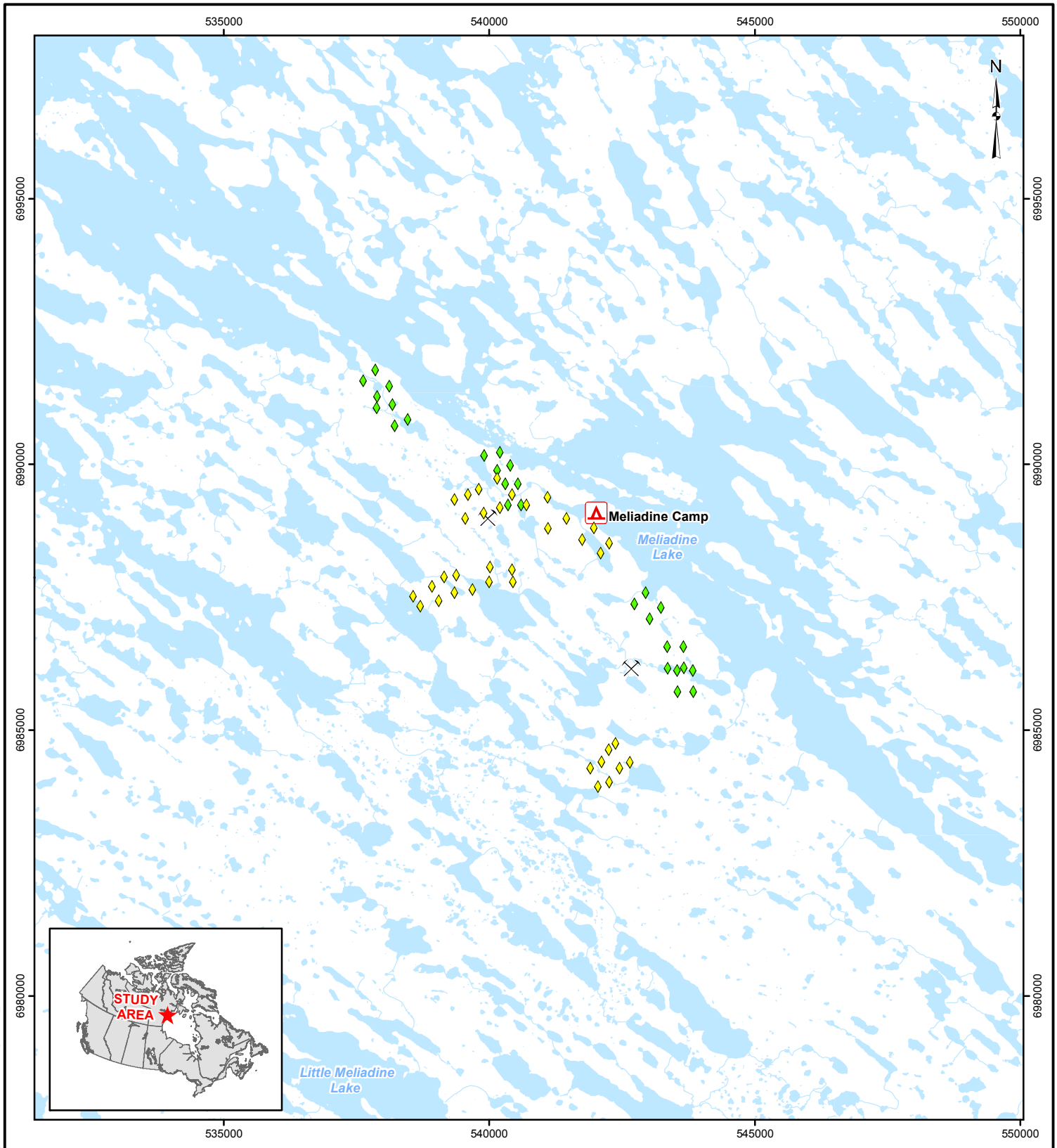
Note: n = number of plots surveyed, % = percent

Species richness was calculated as the maximum number of bird species observed within a habitat type. Observations where birds were counted in the plot, but could not be identified to species were included in density estimates but excluded from the species richness estimate.

5.1.5 Shorebird Surveys

The objective of the 2008 and 2009 shorebird surveys was to determine shorebird species presence in the study area and their habitat associations following Program for Regional and International Shorebird Monitoring (PRISM) survey methods. The objective of PRISM is to estimate the size of breeding populations of shorebirds, describe the distribution, abundance, and habitat relationships of shorebird species, monitor trends in shorebird population size, monitor shorebird numbers at migration stopover locations, and assist managers in conservation goals (Bart et al. 2005). The PRISM survey methods are consistent across North America so data can be compiled and compared across the continent. Trends in population size can be monitored during the breeding season on the breeding grounds, as populations are stable rather than mobile (i.e., territorial not migrating) (Bart et al. 2005).

In 2008 and 2009, shorebird surveys were completed following the rapid survey method as described in the 2008 PRISM manual (CWS 2008) (Figure 5-3). Plot size was 300 m by 400 m (12 ha area) with plots falling as much as possible into monotypic habitat types. Habitat types were classified based on shorebird habitat suitability: good (sedge wetland), fair (tussock/hummock, heath tundra, esker), and poor (heath bedrock, heath boulder) (CWS 2008).



LEGEND

- Camp
- Proposed Mine Site
- Shorebird PRISM Plot Location
  - 2008
  - 2009
- Watercourse
- Waterbody

2.5 0 2.5

SCALE 1:100,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

SHOREBIRD PRISM PLOT LOCATIONS

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-3

N:\Bur-Graphics\Projects\2007\1373\07-1373-0055\Mapping\MXD\2009\Wildlife\figure-04_shorebird-prism-locations.mxd

Sixteen plots were selected based on proximity to camp and shorebird habitat suitability (Figure 5-3). To complete the rapid survey, each plot was systematically investigated by a pair of surveyors, recording all bird sign (i.e., birds, nests, other sign) on a plot map. Each survey took approximately one hour to complete. Surveyors walked slowly through the plot along a 400 m long transect. At the end of each 400 m transect, surveyors walked 50 m along the plot perimeter and then made another pass through the plot along another 400 m transect (CWS 2008). Surveyors were separated by approximately 25 m while walking transects so that any bird on transect was never further than 12.5 m from one of the 2 surveyors. During these 4 transect passes (i.e., 2 by each observer), each observer focused on the immediate 12.5 m on either side of their transects (i.e., the immediate 25 m surrounding area) providing 33% coverage of each plot. In contrast to the passive upland bird point counts, which detected birds by sound, the shorebird surveys relied on actively flushing birds, as shorebirds tend to be more cryptic than songbirds.

For each survey, plots were drawn on map sheets provided by the Canadian Wildlife Service (CWS) and GPS coordinates for plot corners were recorded. Maps included boundaries of habitat types, pond outlines, and other prominent features. Each shorebird and songbird observation record was designated as a pair, male, female, or individual of unknown sex. Presence was also recorded for bird species other than shorebirds or songbirds that were encountered in the plot. Nests and probable nests, including a description of nest characteristics, were documented using another data sheet. Habitat data sheets were also completed for each plot describing the major habitat type(s) in the plot.

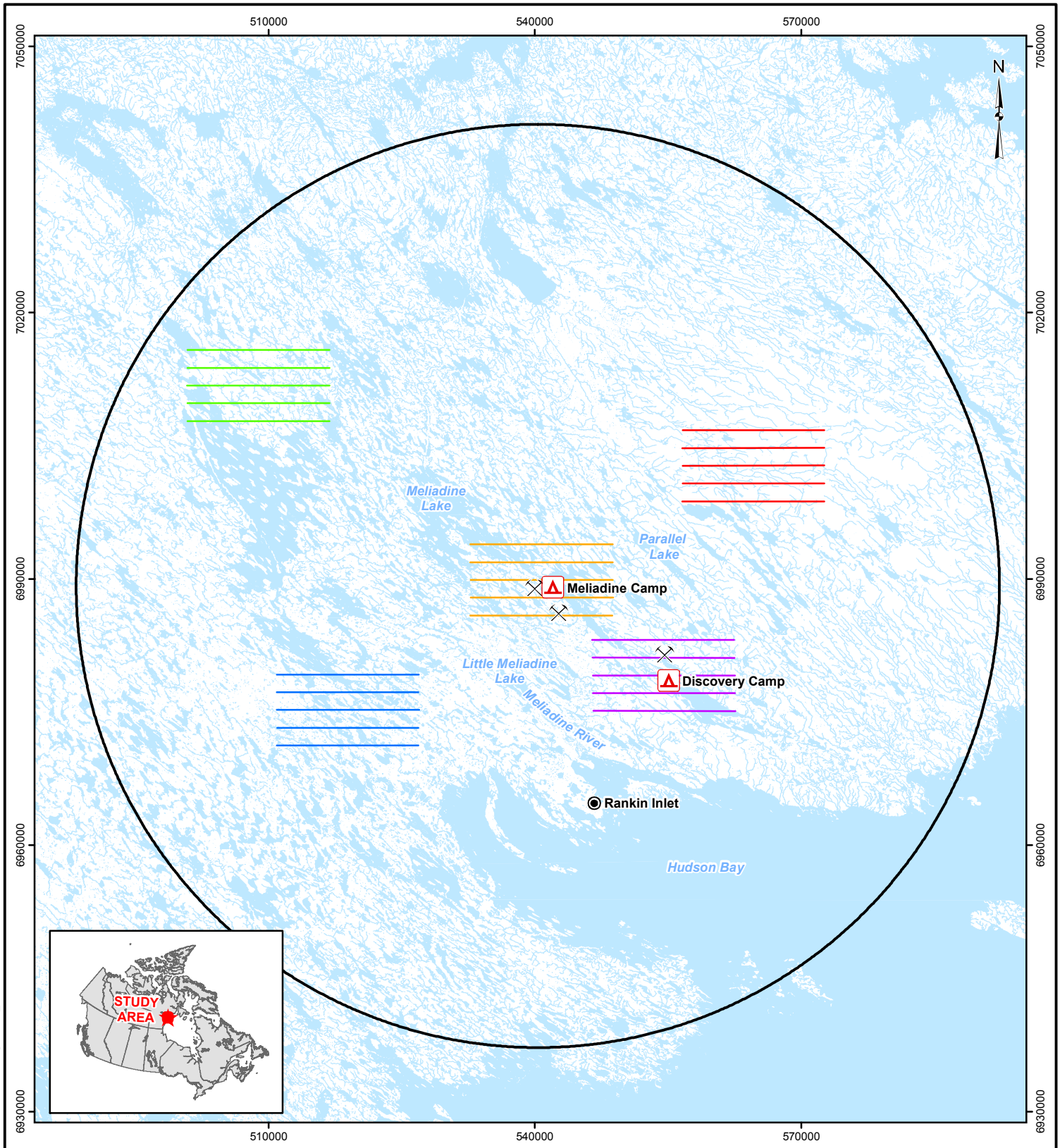
After each survey, a rapid survey summary form was prepared from the information recorded. On this form, observed nests, probable nests (based on bird behaviour), pairs and singles of each songbird and shorebird species were recorded. This summary provides the total number of resident birds recorded for each plot during the summer.

5.1.6 Waterfowl Aerial Surveys

The objectives of the waterfowl aerial surveys was to document waterfowl occupancy and productivity, providing a baseline data set describing the existing migrant and breeding waterfowl distribution, abundance, and productivity in the Project area.

In 2008 and 2009, aerial surveys were used to determine the composition of breeding waterfowl in the area and to identify areas of high use during migration, nesting, and brood-rearing. Aerial surveys were completed in June (spring/migration) and July (summer/rearing) in both years. Each survey covered 5 separate strata: Mine, North, South, East, and Discovery (Figure 5-4). The ‘Mine’ stratum encompasses the potential mine site footprint. The other 4 strata serve as undisturbed reference areas, representative of the study area. The North and South strata were surveyed in both years, whereas the East stratum was only surveyed in 2008. It was not surveyed again in 2009 because very few waterfowl were present due to poor habitat so instead, the Discovery stratum was surveyed.

Each stratum is comprised of 5 16 km long transects oriented in an east-west direction, spaced 2 km apart. Transects were flown by helicopter at a speed of 80 to 100 km/h at an altitude of 45 m (Hines et al. 2000, 2003), following previous baseline aerial waterfowl survey techniques (Jalkotzy 1999, 2000a, 2000b). Each stratum took approximately one hour of flying time to complete.



LEGEND

- Camp
- Proposed Mine Site
- Watercourse
- Terrestrial Regional Study Area
- Waterbody

Waterfowl Transect
- East Stratum (2008)
- Mine Stratum (2008 and 2009)
- North Stratum (2008 and 2009)
- South Stratum (2008 and 2009)
- Discovery Stratum (2009)

15 0 15
SCALE 1:600,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
WATERFOWL AERIAL TRANSECTS AND SURVEY STRATA

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-4

N:\Bur-Graphics\Projects\2007\1373\07-1373-0055\Mapping\MXD\2009\Wildlife\figure-5-4_waterfowl-aerial-transects.mxd

Two observers recorded all waterfowl, Sandhill Cranes (*Grus canadensis*), and Herring Gulls (*Larus argentatus*), plus incidental wildlife sightings, within 200 m on either side of the aircraft following techniques described by Larned et al. (2003). The number of young waterfowl in each brood was also recorded during the brood rearing period (July survey).

Observations of all waterfowl were recorded according to established survey protocols (USFWS and CWS 1987). Observations of lone ducks or swans were recorded as singles or pairs. Two geese or swans in close association were recorded as a pair. A hen (i.e., female duck) and 2 drakes (i.e., male duck) were recorded as a pair and a lone drake, whereas a drake and 2 hens were recorded as one pair and the second hen was not recorded. Groups of 4 or less were separated into singles and pairs if the associations were evident. Groups of 5 or more were recorded as mixed groups. Gulls were recorded due to the possibility of an increase in population size following development. Sandhill cranes were also recorded.

The population index was calculated for each stratum for each year using standard protocols (USFWS and CWS 1987). Waterfowl population index is calculated using the following equation:

$$P = A*(T/S)*V$$

Where P = population index
A = total area in stratum
T = indicated total birds
S = area of transect sample
V = visibility correction factor.

The visibility index is a standard correction factor developed for waterfowl species in tundra habitats (Table 5-3) (Conant et al. 1991; Smith 1995).

Table 5-3: Visibility Correction Factor (VCF) for Species Observed during Waterfowl Aerial Surveys

Species	Scientific Name	VCF
Red-throated Loon	*Gavia stellata*	1
Pacific Loon	*Gavia pacifica*	1
Common Loon	*Gavia immer*	1
Red-breasted Merganser	*Mergus serrator*	1.27
Tundra Swan	*Cygnus columbianus*	1
Canada Goose	*Branta canadensis*	1
Lesser Snow Goose	*Chen caerulescens*	1
Northern Pintail	*Anas acuta*	3.05
Scaup species	*Aythya marila / affinis*	1.93
Long-tailed Duck	*Clangula hyemalis*	1.87
Sandhill Crane	*Grus canadensis*	1
Herring Gull	*Larus argentatus*	1
Common Eider	*Somateria mollissima*	1
Greater White-fronted Goose	*Anser albifrons*	1

VCF = 1 indicates that no visibility correction factor is to be applied
From Conant et al. (1991), Smith (1995)

Statistical procedures followed Smith (1995), where duck and goose population indices were based on indicated birds. Indicated bird estimates were calculated from observations based on the following formula:

$$T = 2*(S + P) + G$$

Where T = indicated total birds
S = the number of lone drakes observed
P = the number of pairs observed
G = the number of birds in groups

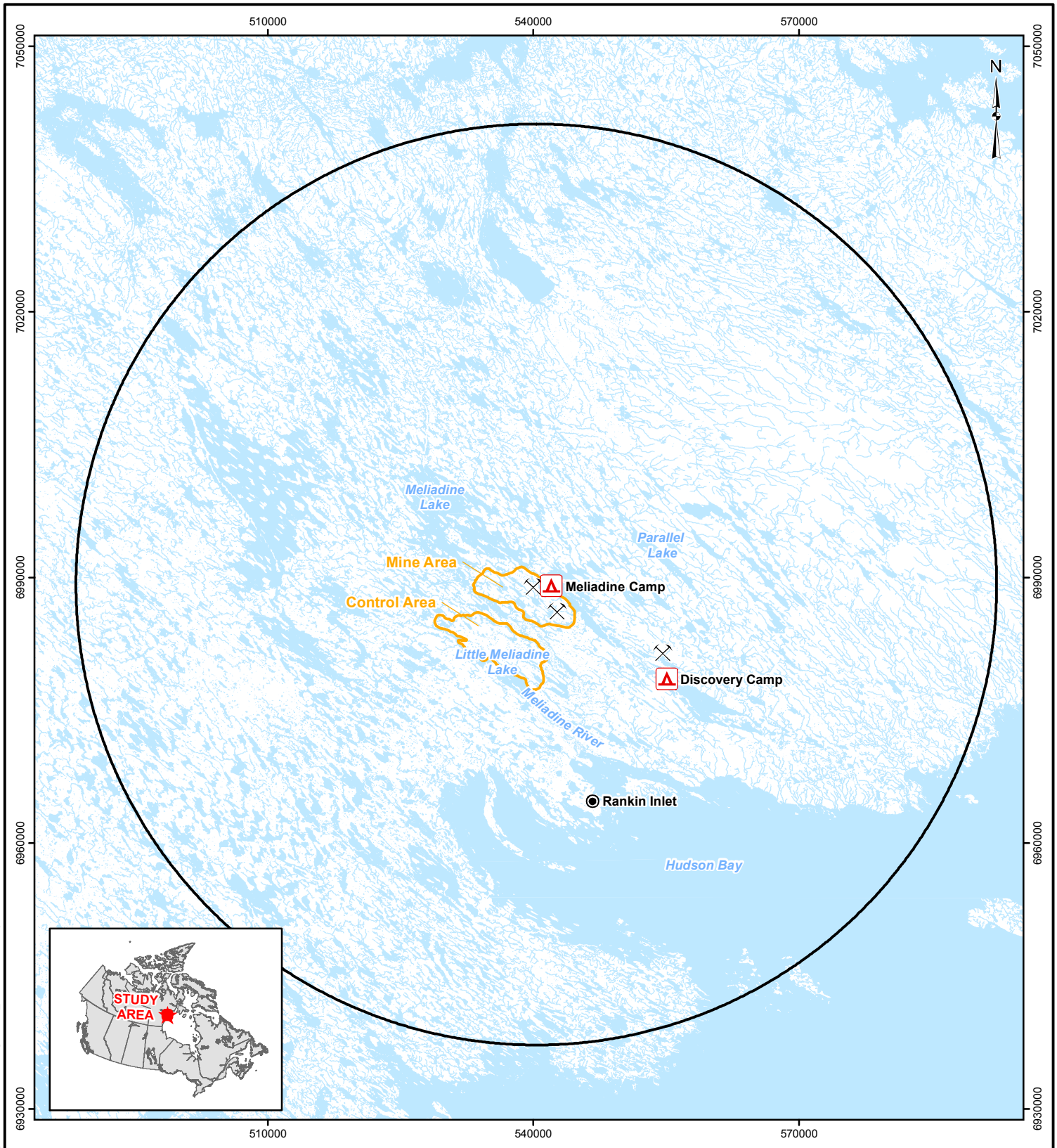
For this calculation, drakes in groups smaller than 5 were considered as singles (S), except for scaup species, whereas 5 or more grouped drakes, including scaup or any individual scaup, were considered as a group (G). Population indices of the non-duck and non-goose species were based only on the total number of birds observed.

5.1.7 Loon and Swan Nest Surveys

Loon and swan nest surveys were completed to provide productivity data on Tundra Swans and the Pacific Loons. The objectives were to compare Tundra Swan and Pacific Loon occupancy and productivity between 2 study areas, the area potentially affected by mine development and a control area nearby among years, and to determine if mine-related activities influence nest site selection.

Loon and swan nest surveys were completed in 1998, 1999, 2000, and 2009. The area potentially affected by mine development, the mine area, encompasses the anticipated Project footprint. The control area was located to the immediate south of the mine area (Figure 5-5). The mine survey area is approximately 3900 ha and contains 209 lakes, whereas the control area is approximately 5100 ha and contains 210 lakes. In 1998, the control area was not surveyed and the mine area was slightly larger, approximately 5500 ha. The sizes of the lakes are similar in the 2 areas, although there is greater variation in the size of the lakes within the mine area. Aerial surveys consisted of total-coverage helicopter surveys of the mine area and the control area. All lakes and wetlands were searched, with special attention paid to shorelines. During the aerial surveys, the crew included the pilot, an observer/navigator/recorder, and 2 rear-seat observers. Navigation was by GPS, with frequent checks on the 1:50 000 scale topographical map of the area. All observations of loons and swans were recorded and a GPS waypoint of the location was taken. During the spring surveys (June or early July), adults on nests were counted to determine occupancy (Table 5-4). During the summer surveys (mid- to late July or early August), young were counted to determine productivity (Table 5-4).

In 1998, 1999, and 2000, systematic total-coverage ground searches also occurred to confirm species and occupancy. For these surveys, 2 observers systematically walked the entire area and recorded all observations of loons and swans. The shorelines of all lakes and wetlands were searched intensively to confirm nesting and loon species.



LEGEND

- Camp
- Proposed Mine Site
- Watercourse
- Loon and Swan Survey Area
- Terrestrial Regional Study Area
- Waterbody

15 0 15

SCALE 1:600,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

LOON AND SWAN SURVEY AREA

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-5

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Table 5-4: Timing of Loon and Swan Nest Surveys, 1998 to 2000, 2009

Year	Survey Type	Mine Area	Control Area
1998 (aerial and ground)	Occupancy	18, 20 to 23 June	-
	Productivity	18 July	-
1999 (aerial and ground)	Occupancy	12 to 13 June	12 to13 June
	Productivity	25 July	25 July
2000 (aerial and ground)	Occupancy	11 to 15 July	11 to15 July
	Productivity	12 to 17 August	12 to17 August
2009 (aerial only)	Occupancy	16 June	-
	Productivity	31 July	31 July

Note: - =surveys not conducted

5.1.8 Incidental Wildlife Observations

The objective of incidental observations was to document important additional information on wildlife occurrence within the Project area. Incidental wildlife observations were recorded during all visits to the Project area. During all aerial and ground surveys, observations of non-target species were recorded including GPS coordinates, number of individuals, and group composition, if applicable.

Between 1998 and 2000, WMC environmental staff and Project staff completed a wildlife sightings log, which provided additional incidental wildlife data. A sightings log was also used in 2008 and 2009, but with little to no participation. Instead, personal communications with Project staff about wildlife observations were recorded and compiled by Golder personnel.

5.2 Barren-ground Caribou

Baseline survey data documenting the distribution of barren-ground caribou during the early winter, spring migration and calving, and post-calving through fall migration and rut periods suggest that the study area lies within the seasonal range of the Qamanirjuaq (Kaminuriak) barren-ground caribou herd (Jalkotzy 1999, 2000a, 2000b, Golder 2008). The year-round range of this herd occupies an area from northern Manitoba and Saskatchewan in the south to south-western Nunavut and south-eastern Northwest Territories in the north (BQCMB 1999, Nagy 2011, Figure 5-6). The Qamanirjuaq calving grounds/sites are located in south western Nunavut (Nagy 2011). Barren-ground caribou are migratory, and movements and range use varies annually (Wakelyn 1999). The annual distribution and life history of this population has been previously documented (Banfield 1954; Kelsall 1968; Thomas 1969; Parker 1972; Heard 1983). A portion of the Qamanirjuaq herd may pass through the Project area very quickly in summer but may linger in some years from later October through March (Hubert and Associates 2007).

Migration from the southern winter range to the calving grounds occurs mid-March to late May (BQCMB 1999). The traditional calving grounds of the Qamanirjuaq herd are located west of the Project study area, and south of Baker Lake (BQCMB 2008; Figure 5-6). Specific calving areas can vary from year to year. However, the traditional calving grounds have historically remained in the same general location (BQCMB 2008; Figure 5-6). After calving in early June, barren-ground caribou form larger groups and by mid-July, aggregations of many thousands may move over the tundra landscape en masse. The herds occupy the calving ground and post-calving areas until the end of July when a rapid summer migration to the treeline occurs. In some years, a migration north back towards the calving grounds can take place in August in response to flies. The timing of the fall migration south of the treeline occurs from October to December (BQCMB 2008).

Over 5 years of monitoring, 195 groups of barren-ground caribou were observed during 16 aerial surveys, comprising a total of 10 254 individual animals (Appendix B1; Table 5-5 and Table 5-6; Figures 5-7, 5-8, and 5-9). Mean group size (± standard error) was 53 ± 15 individuals for all periods and all years combined. Mean group size was higher during the post-calving through fall migration and rut period, and the largest groups were observed during this period (Table 5-6). In some cases, in excess of 2000 individual caribou were observed during the post-calving through fall migration and rut period of 2008 (Figure 5-8).

LEGEND

- Proposed Mine Site
- Annual Range
- Traditional Calving Ground
- Terrestrial Regional Study Area
- Waterbody

REFERENCE

Base data obtained from NTDB. Caribou ranges obtained from BQCMB (2008).
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

TRADITIONAL CALVING GROUND AND ANNUAL RANGE OF THE QAAMANIRJUAQ CARIBOU HERD

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-6

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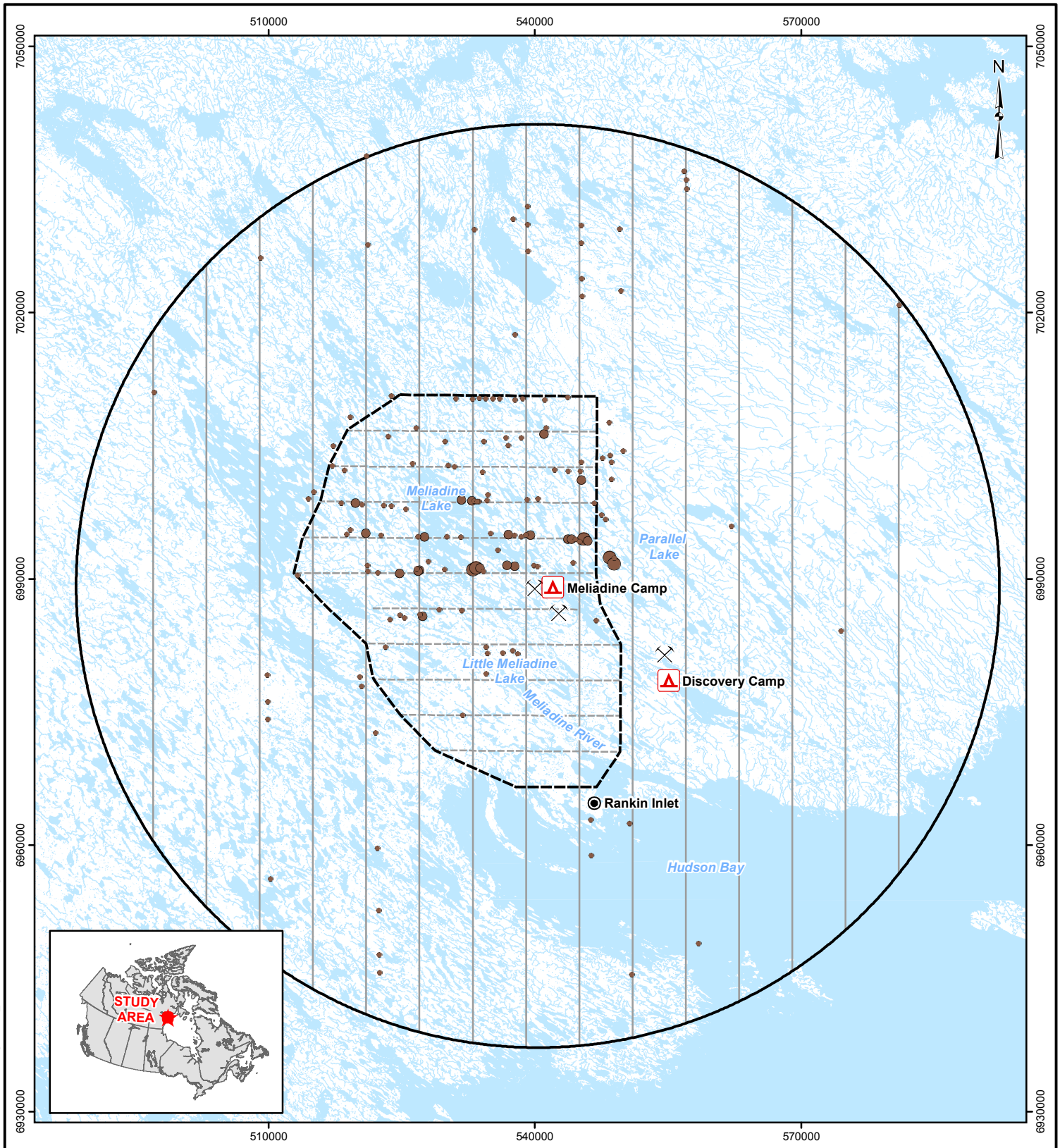

LEGEND

- Camp
- Caribou Observed
  - 1 - 50
  - 51 - 100
  - 101 - 500
  - 501 - 1000
  - 1001 - 2000
- Proposed Mine Site
- Aerial Survey Transect (2008-2009)
- Aerial Survey Transect (1998-2000)
- Watercourse
- Caribou Study Area (1998-2000)
- Terrestrial Regional Study Area
- Waterbody

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

SCALE 1:600,000

15 0 15

KILOMETRES

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

CARIBOU OBSERVATIONS, SPRING MIGRATION/CALVING PERIOD

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-7

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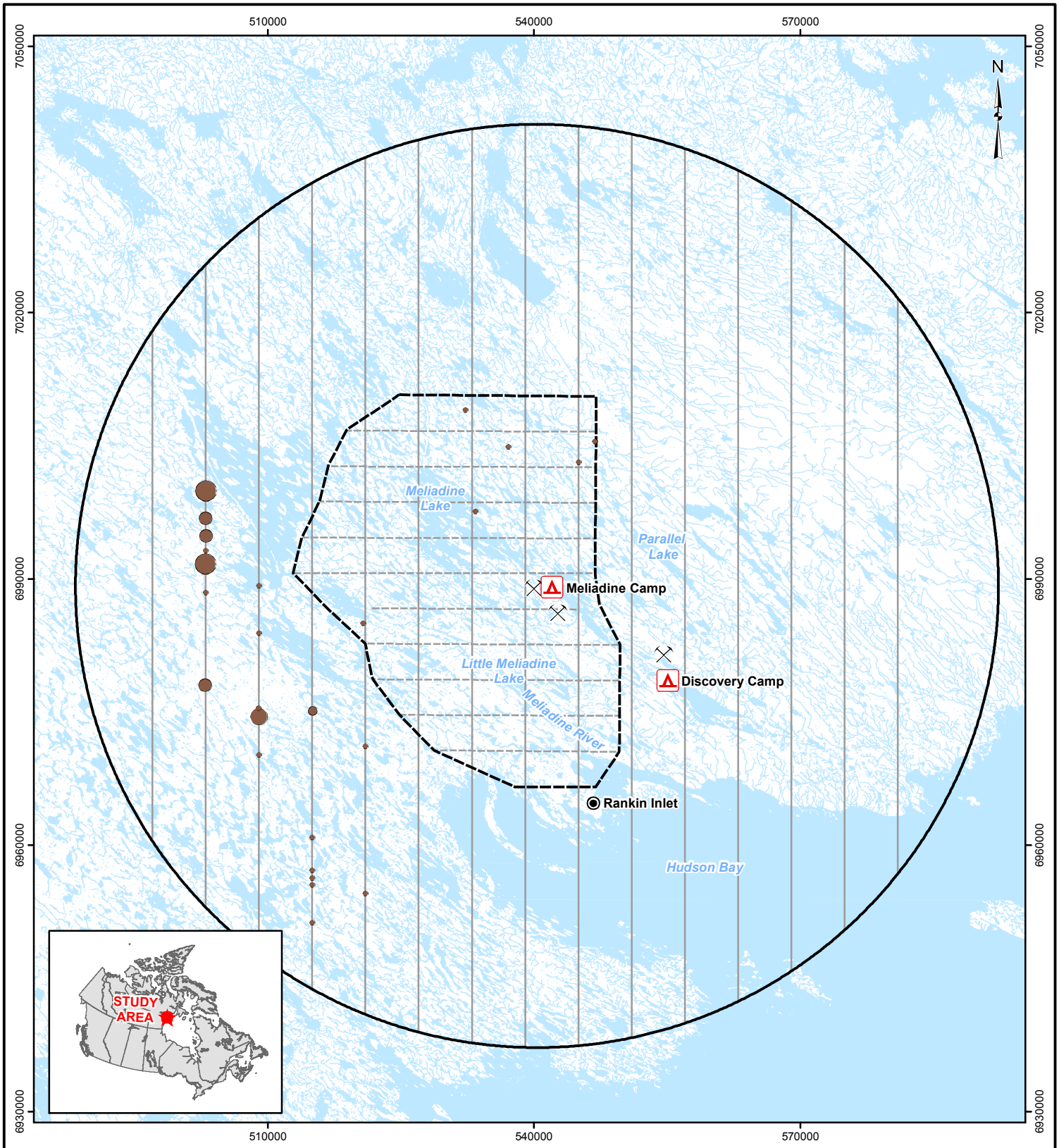

LEGEND

- Camp
- Caribou Observed
  - 1 - 50
  - 51 - 100
  - 101 - 500
  - 501 - 1000
  - 1001 - 2000
- Proposed Mine Site
- Aerial Survey Transect (2008-2009)
- Aerial Survey Transect (1998-2000)
- Watercourse
- Caribou Study Area (1998-2000)
- Terrestrial Regional Study Area
- Waterbody

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

SCALE 1:600,000

15 0 15

KILOMETRES

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

CARIBOU OBSERVATIONS, POST-CALVING THROUGH FALL MIGRATION AND RUT PERIOD

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-8

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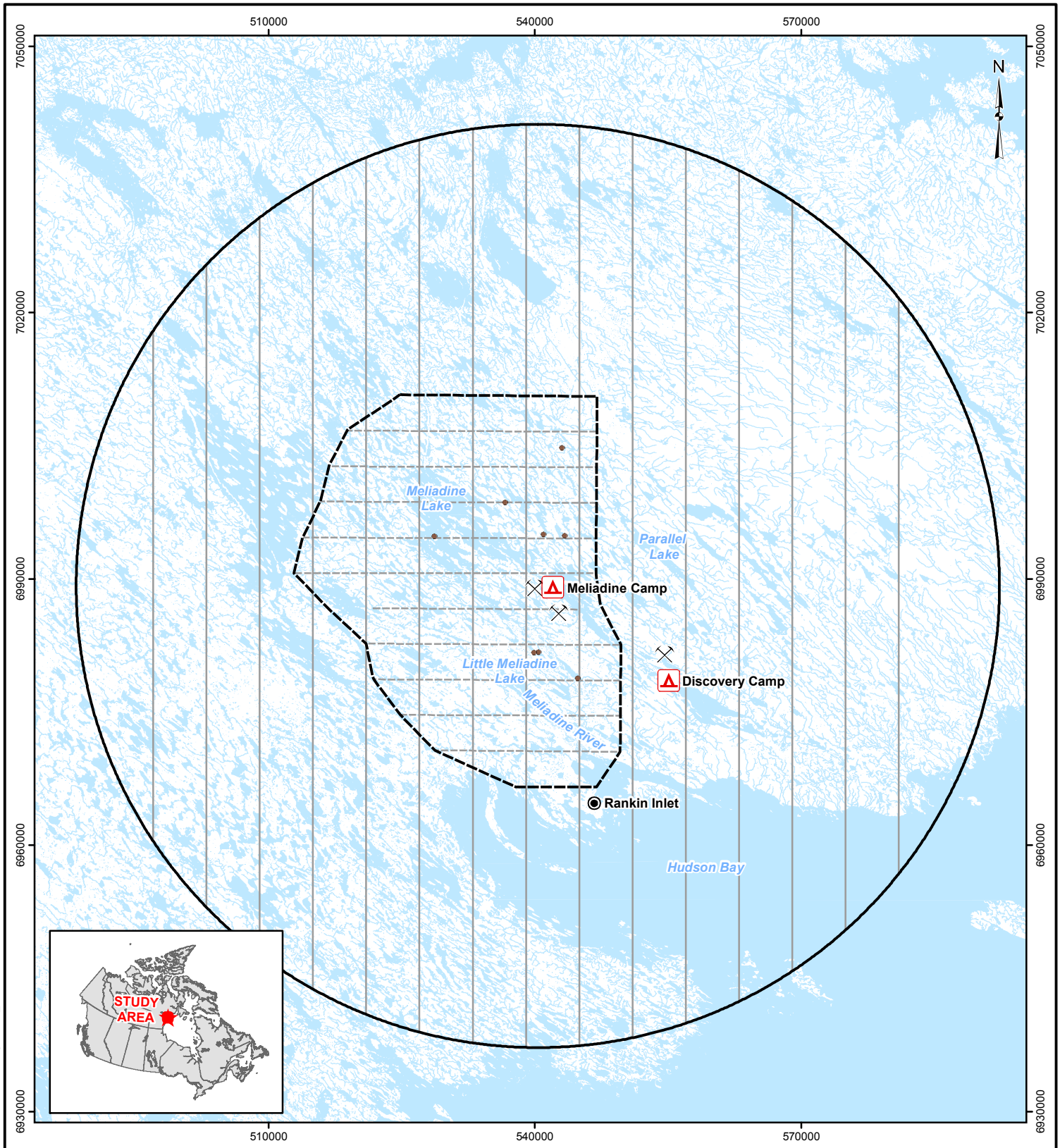

LEGEND

- Camp
- **Caribou Observed**
  - 1 - 50
  - 51 - 100
  - 101 - 500
  - 501 - 1000
  - 1001 - 2000
- Proposed Mine Site
- Aerial Survey Transect (2008-2009)
- Aerial Survey Transect (1998-2000)
- Watercourse
- Caribou Study Area (1998-2000)
- Terrestrial Regional Study Area
- Waterbody

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

SCALE 1:600,000

15 0 15

KILOMETRES

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

CARIBOU OBSERVATIONS, EARLY WINTER PERIOD

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-9

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Table 5-5: Barren-ground Caribou Aerial Survey Observations, 1998 to 2000, 2008, and 2009

Period	Month	Year									
		1998		1999		2000		2008		2009	
		Date	# Caribou Observed	Date	# Caribou Observed	Date	# Caribou Observed	Date	# Caribou Observed	Date	# Caribou Observed
Spring migration/calving	March	-		20	0	28	3926	-		-	
	April	-		12	0	-		-		-	
	May	20	19	-		-		-		19	4
	June	19	15	12	3	-		12/13	36	-	
								17	81		
Post-calving through fall migration and rut	July	17	4	23	162	-		21/22	5920	-	
	August	-		-		-		-		-	
	September	6	0	4	11	-		-		-	
	October	24	0	-		-		-		-	
Early winter	November	-		-		16	73	-		-	

Note: "-" indicates no survey was conducted

Table 5-6: Number of Caribou Groups Observed and Mean Group Size, 1998 to 2000, 2008, and 2009

Year	Spring Migration/Calving		Post-calving through Fall Migration and Rut		Early Winter	
	Number of Groups	Mean Group Size ±SE	Number of Groups	Mean Group Size ±SE	Number of Groups	Mean Group Size ±SE
1998	8	4.3 ± 1.7	1	4.0 ± 0.0	-	-
1999	1	3.0 ± 0.0	6	28.8 ± 26.6	-	-
2000	113	34.7 ± 3.8	-	-	8	9.1 ± 2.8
2008	36	3.3 ± 0.5	21	281.9 ± 133.5	-	-
2009	1	4.0 ± 0.0	-	-	-	-
Overall	159	25.7 ± 2.9	28	217.8 ± 101.9	8	9.1 ± 2.8

Note: "-" indicates surveys not conducted; "±" indicates plus or minus; SE = standard error

Barren-ground caribou observations were used to extrapolate an estimate of the total number of caribou in the study area during each survey. The estimated value was based on the proportion of the study area surveyed (i.e., 25% for surveys between 1998 and 2000, and 15% for surveys in 2008 and 2009). As mentioned, barren-ground caribou could be abundant in the study area during the post-calving migration, with large groups recorded in 2008 and many smaller groups recorded during a spring migration/calving survey in 2000 (Table 5-7). Based on these estimates, barren-ground caribou presence in the study area appears to be quite variable among years. Recorded peaks likely were migration pulses where large numbers of animals quickly move through the study area.

Table 5-7: Estimated Number of Barren-ground Caribou in the Study Area, 1998 to 2000, 2008, and 2009

Year	Spring Migration/calving	Post-calving through Fall Migration and Rut	Early Winter
1998	136	16	0
1999	12	692	-
2000	15 704	-	292
2008	780	39 467	-
2009	27	-	-
Overall	16 659	40 175	292

Note: "-" indicates no survey conducted

The mean density of barren-ground caribou observed during aerial surveys ranged from zero to 0.13 caribou/ha. The highest density was observed during the spring migration/calving survey in 2000 where barren-ground caribou were distributed throughout the study area. Although large groups were observed during the post-calving through fall migration and rut survey in 2009, the study area was much larger reducing the mean density of barren-ground caribou/ha.

Dominant behaviour of barren-ground caribou was classified as standing, running, walking, bedded, feeding, or trotting. The dominant behaviour of barren-ground caribou groups observed was standing (Figure 5-10).

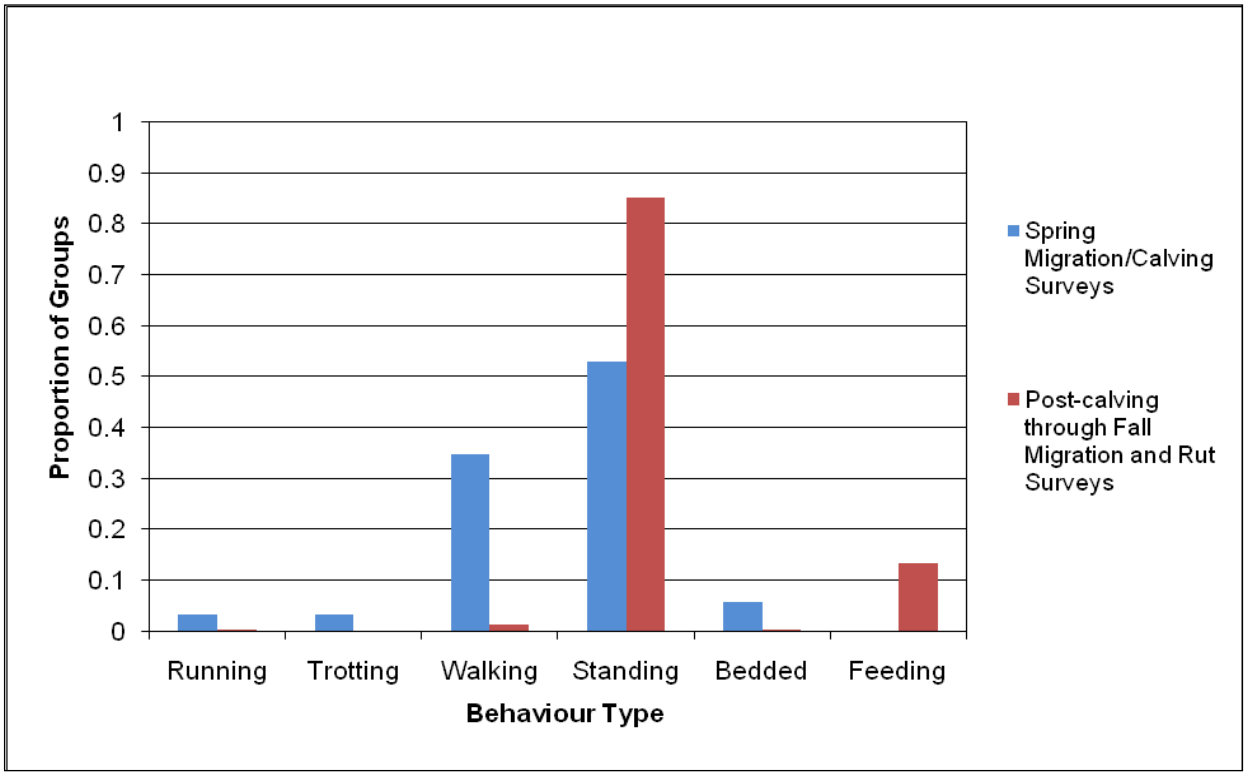


Figure 5-10: Proportion of Caribou Behaviour during Spring Migration/calving and Post-calving through Fall Migration and Rut Surveys

Habitat associations were recorded, and habitat was classified as heath tundra, sedge wetland, heath boulder, or esker. Barren-ground caribou were most frequently observed in heath tundra during the 2008 and 2009 surveys (Figure 5-11). Use of esker habitat was observed during the post-caving through fall migration and rut survey but not during the spring migration/calving surveys.

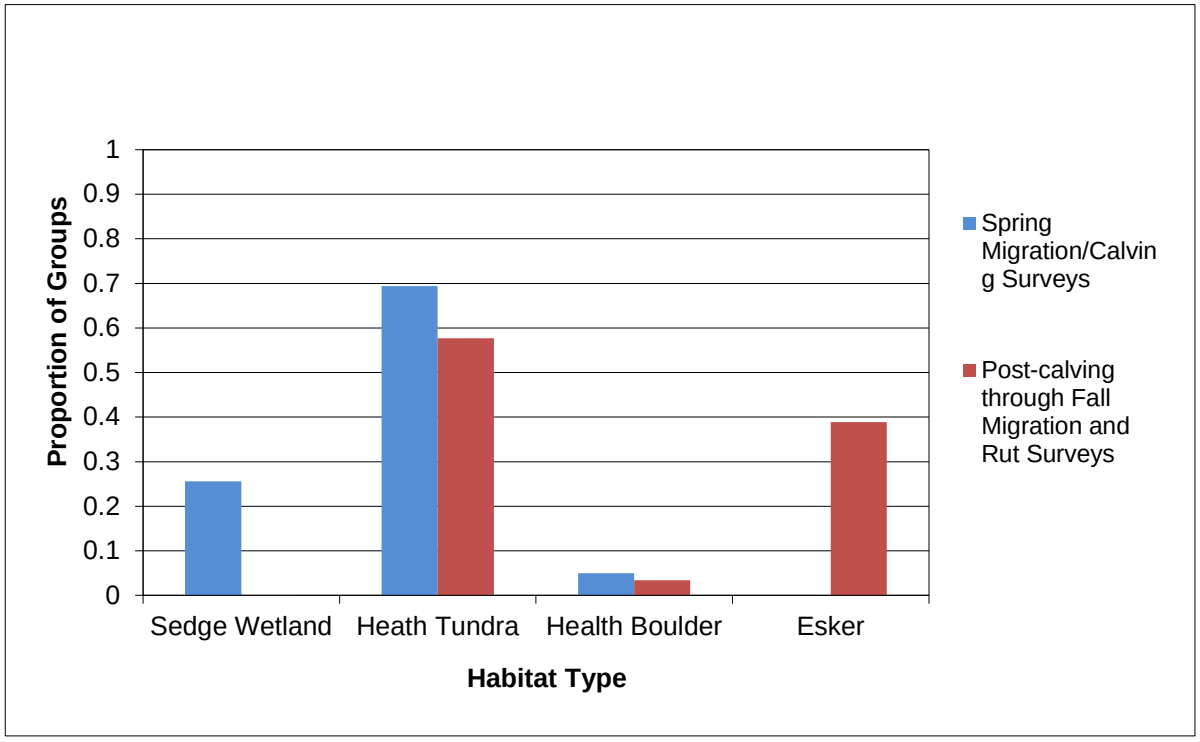


Figure 5-11: Proportion of Barren-ground Caribou Groups and Habitat Type Use during Spring Migration/calving and Post-calving through Fall Migration and Rut Surveys

5.3 Fox Dens

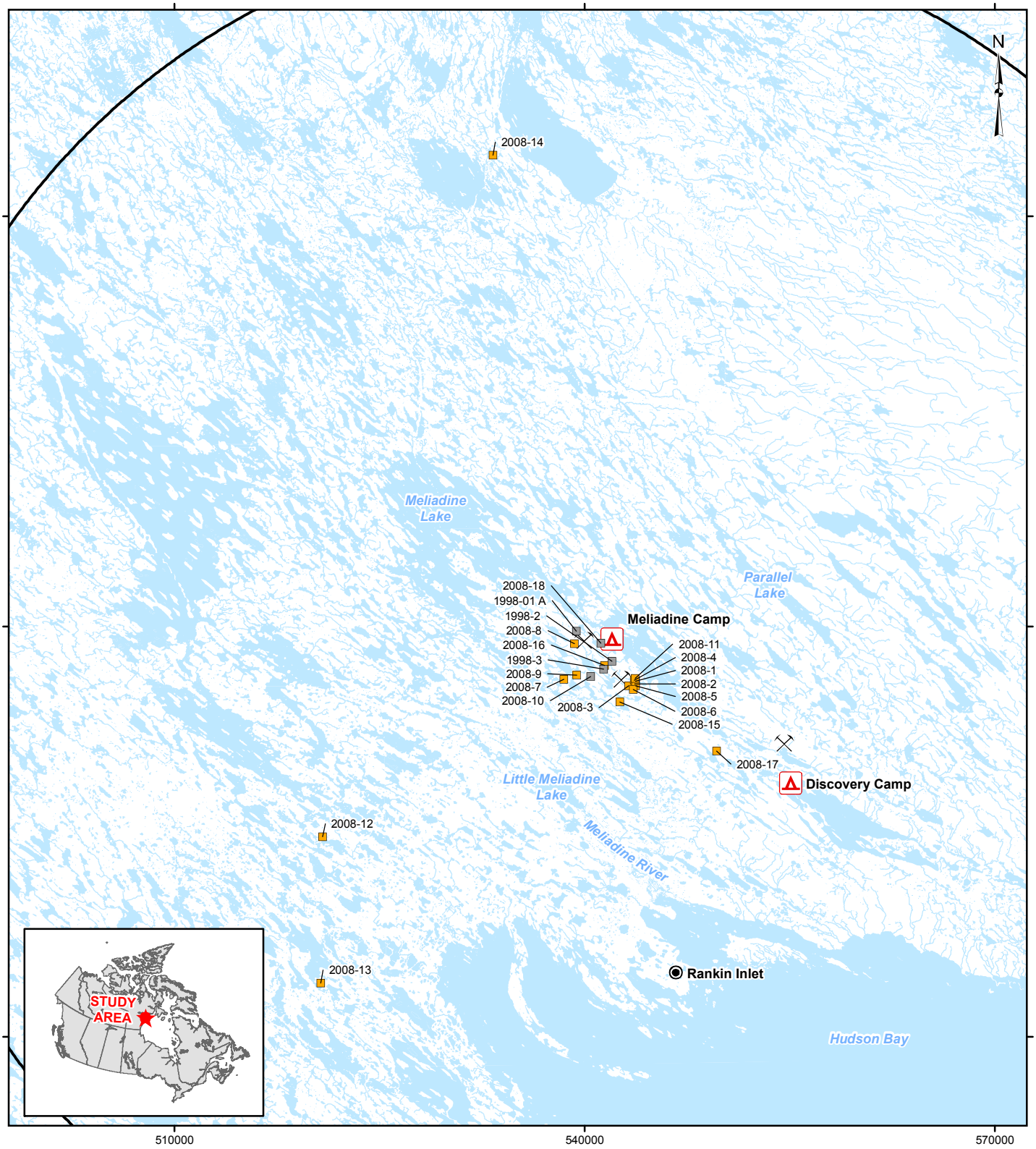
Arctic foxes are a common terrestrial carnivore species in the Project area (Jalkotzy 1999, 2000a, 2000b; Golder 2008), and dens have previously been identified in the study area (Hubert and Associates 2007; Golder 2008).

Arctic foxes are dependent on den sites for reproduction and generally use the same den throughout a breeding season, unless disturbed (Angerbjörn et al. 1997). Eberhardt et al. (1983) found that some adult and juvenile foxes have den fidelity in successive years. Dens are often large and well-defined structures that can be used for generations (Frafjord 2003). In tundra habitat, dens are generally large and conspicuous with lush vegetation, which makes them easily detectable (Smits et al. 1988). Dens could be inactive due to low prey concentrations in the area, disturbance, or instability of the burrow (Dalerum et al. 2002).

Four fox dens were located during the 1998 field season (Appendix B2; Figure 5-12). Three of the 4 dens (1998-01, 1998-02, 1998-04) were located on southerly aspects; the fourth (1998-03) was under a large boulder in flat terrain. All were in substrates that were easy to dig, such as sand or gravel. Den site 1998-01 was located at the base of a large esker. Water was within 250 m in all cases. All 4 dens appeared used during the summer of 1998 based on the presence of fresh scats, feathers, hair, and egg shells. At least 5 pups were raised at den site 1998-01 northwest of camp, and at least another 2 were raised at den site 1998-03 southwest of camp. Arctic foxes were frequently observed in the study area but additional surveys for active dens were not completed in 1999, 2000, or 2009.

In 2008, 21 fox den sites were observed in the study area (Figure 5-12). One report of an occupied den near a drill site in the vicinity of the mine was obtained from Project employees. No dens observed in June appeared to have pups but due to the limited amount of time spent on observations, it is possible that pups were present at some but not observed. No active dens (i.e., with pups) were recorded during the July aerial wildlife survey or were recorded by Project employees. The July survey of dens was conducted during the aerial wildlife survey, so some of these dens may have been used successfully to rear young, although no definitive evidence was observed from the air. Two dens noted as being active during the June surveys did not show evidence of activity in July.

Results and incidental observations from 1998 to 2000, 2008, and 2009 indicate that arctic fox were common within 10 km of camp and persistent scavengers around camp in some years (Jalkotzy 1999, 2000a, 2000b; Golder 2008). Specific observations are noted in Section 5.9 Incidental Observations. Although observations suggest that arctic foxes are common residents of the survey area, no conclusions can be made about population size and productivity.



LEGEND

- Camp
- Fox Den - Active
- Fox Den
- Proposed Mine Site
- Watercourse
- Terrestrial Regional Study Area
- Waterbody

10 0 10

SCALE 1:400,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

FOX DEN LOCATIONS

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-12

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5.4 Raptors

Some raptors have been identified as indicators of environmental change to assess the impact of human activities (Bildstein 2001). Population declines in nesting raptors can occur due to disturbance from human activity and development (Newton 1979). The selection of a breeding site in the spring is a sensitive stage of the raptor reproductive period. Effects of disturbance may become evident with reduced nest site occupancy (Fyfe and Oldendorff 1976). The Rankin Inlet area supports the highest density of breeding Peregrine Falcons in the arctic region (Ferguson 1987, Franke et al. 2011). Nesting occurs on cliffs surrounding the community, and has been the subject of long-term and intensive studies (Johnstone 1998; Court et al. 1988). The Peregrine Falcon and Short-eared Owl are listed as "Special Concern" by COSEWIC (2008) and SARA (2008), and are listed as "May be at Risk" and "Sensitive", respectively, by the Government of Nunavut (2000).

Between 1998 and 2000, and in 2008 and 2009, 37 nest sites were observed in the RSA (Appendix B3, Figure 5-13). All nests belonged to one of the following 4 raptor species:

- Rough-legged Hawk (*Buteo lagopus*);
- Peregrine Falcon (*Falco peregrinus*);
- Gyrfalcon (*Falco rusticolus*); and
- Short-eared Owl (*Asio flammeus*).

In 1998, Peregrine Falcons, Gyrfalcon, and Rough-legged Hawks and their sign were recorded within approximately a 10 km radius of the Project location (Table 5-8). Eyries or nests for all 3 species were identified. Nests or potential nesting areas identified by Project staff were also documented. Seven eyries that were occupied by Peregrine Falcons in 1998 or were occupied by Peregrine Falcons in previous years were documented (nests H98-01, H98-02, G98-01, G98-02, A98-02, A98-03, and A98-05; Figure 5-13; Appendix B3). One historic Gyrfalcon eyrie was identified by Project staff but was unoccupied in 1998 (nest A08-01). Another Gyrfalcon eyrie was identified by Project staff but was located farther than 10 km from the Project and therefore was not visited. Three Rough-legged Hawk nests were identified during barren-ground caribou aerial surveys in June and July or by Project staff (nests G98-03, J98-01, and J98-02; Figure 5-13; Appendix B3). These nests were not checked for productivity, as they were located farther than 10 km from the Project.

Table 5-8: Raptor Nest Sites Surveyed and Occupancy, 1998 to 2000, 2008, and 2009

Species	1998		1999		2000		2008		2009		Average Occupancy Rate per Species (%)
	# Nests Surveyed	# Nests Occupied	# Nests Surveyed	# Nests Occupied	# Nests Surveyed	# Nests Occupied	# Nests Surveyed	# Nests Occupied	# Nests Surveyed	# Nests Occupied	
Peregrine Falcon	7	3	3	3	3	1	3	3	1	1	65
Rough-legged Hawk	3	2	2	2	5	3	8	5	5	3	65
Gyrfalcon	1	0	0	0	1	0	0	0	0	0	0
Short-eared Owl	0	0	0	0	0	0	1	0	0	0	0
Unidentified Raptor	0	0	0	0	0	0	6	0	0	0	0
TOTAL	11	5	5	5	9	4	18	8	6	4	-
Occupancy Rate (%)	45		100		44		44		67		-

Note: % = percent; "-" indicates not applicable

In 1999, Peregrine Falcons were observed, likely nesting, and successfully raised fledglings about 2 km north of the Project across Meliadine Lake (Jalkotzy 2000a). Two Peregrine Falcon eyries were found by Project staff. One eyrie was located 25 km west of the Project (later named K99-01), whereas the other was 24 km northwest (later named M99-01) and fledglings were raised at both of these sites. No specific coordinates or locations were noted. Two Rough-legged Hawk nest sites were found in 1999. One was approximately 3.5 km north of the Project, situated on a large boulder (nest later named A08-01). This location fledged young. The second nest site was also located on a large boulder, located northwest of Peter Lake and contained young when surveyed in July (later named N99-01, unknown coordinates). Gyrfalcons were not observed during the 1999 field program.

During the summer of 2000, Peregrine Falcons and Rough-legged Hawks and their sign were observed. A Peregrine Falcon nest south of the Project (nest H98-01) was occupied in July; the eyries 3 km north of the Project were not occupied (nests A98-01, A98-02, and A98-03). Five Rough-legged Hawk nests were located in 2000. Three of these nests were occupied (nests J98-01, J98-02, and A08-01), and 2 were unoccupied (nests C00-01 and J00-01). Short-eared Owls were seen twice during surveys in July. Snowy Owls (*Bubo scandiacus*) were recorded twice in the wildlife log by Project staff. Nests for either species were not observed. Gyrfalcons were not observed during the 2000 field program.

In 2008, 3 raptor species were identified in the study area, including Short-eared Owl, Rough-legged Hawk, and Peregrine Falcon. Eight occupied nests were located within the study area based on the presence of at least one adult at the nest, 2 adults in close proximity to the nest, or presence of eggs or young. Most nests were found during the July survey and were located on cliffs along Meliadine Lake, north and east of the Project. Ten unoccupied nests were recorded within the study area. Two unoccupied nests had sign of species presence and were classified as occupied based on feathers and scat present in the area (nests E08-01 and C08-01). Four unoccupied nests were found within 200 m of occupied nests and were considered alternate nest sites within an occupied territory (Court et al. 1988) (nests A08-04A, A08-05A, D08-02, and F08-03). All occupied raptor nests belonged to Peregrine Falcons (3) or Rough-legged Hawks (5). Two unoccupied nests had sign of species presence. One nest located in the Discovery area was classified as an unoccupied Rough-legged Hawk nest (E08-01), and one nest located west of the Project was classified as an unoccupied Short-eared Owl nest (C08-01). One Short-eared Owl was observed during a waterfowl aerial survey in June, confirming species presence in the area. Other unoccupied nests were likely either Rough-legged Hawk or Peregrine Falcon nests, but confirmation could not be made without sign or adult presence.

Peregrine Falcons nested successfully at 3 sites in the Project area in 2008. One nest potentially contained young because an adult peregrine refused to leave the nest during a flyover; however, young were not observed. A second nest was considered successful because it contained 4 nestlings during the July survey. A third Peregrine Falcon nest was attended to by 2 adults and contained 3 eggs during the July survey. Due to the late presence of eggs in July, this nest may not have been successful. All 3 occupied Peregrine Falcon nests were located on cliffs.

Eight Rough-legged Hawk nests were located and 5 were considered occupied. One large stick nest was found on top of a large boulder, approximately 3 m above the ground, with 4 nestlings occupying it in July (A08-1). Five of 5 occupied nests produced 19 fledglings, for a productivity rate of 3.8 fledglings/nest. Five of 8 were located on cliffs.

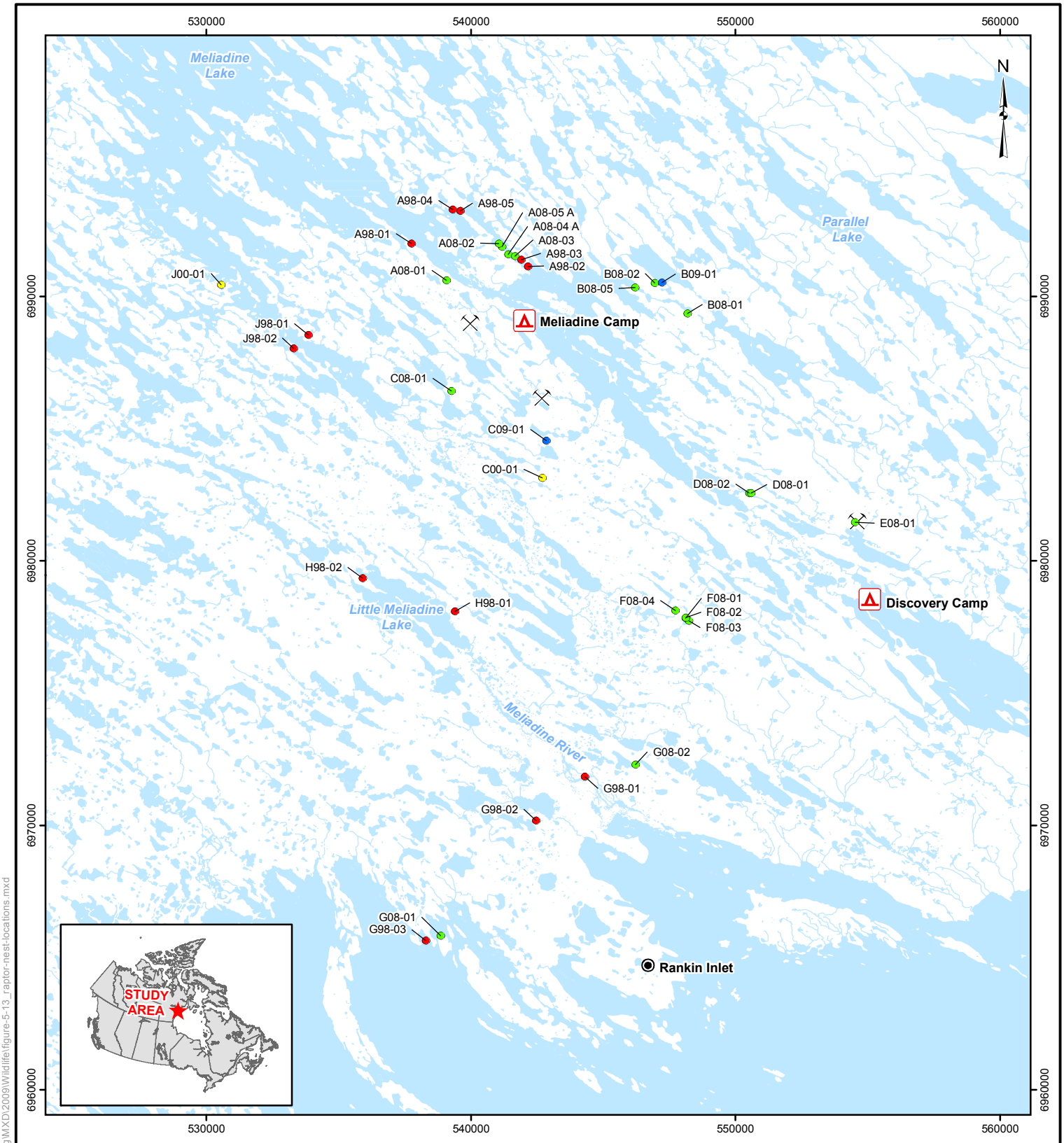
Gyrfalcons were not observed in the study area during the 2008 field program.

In June 2009, 6 nest sites were surveyed during a brief aerial survey. The raptor eyries on the cliffs north and northeast of the Project on Meliadine Lake were surveyed along with the raptor stick nest on the large boulder northwest of the Project. Of the 6 nests located, 3 Rough-legged Hawk nests were occupied (A08-04A, A08-05A, and C09-01), one Peregrine Falcon nest was occupied (B09-01), and 2 Rough-legged Hawk nests were unoccupied (B08-02, A08-01), (Figure 5-13). Gyrfalcons were not observed during the 2009 field program.

Few nests were observed in June 2009 due to a combination of cold weather conditions and late spring that occurred and reduced survey effort. An aerial raptor survey did not occur in July due to inclement weather conditions. The survey was not conducted to prevent flushing adults off nests exposing the fledglings to cold and wet conditions.

Overall, Rough-legged Hawks, Peregrine Falcons, Gyrfalcons, and Short-eared Owl were confirmed breeding in the study area. However, nest productivity and success varied considerably between years (Table 5-8). Late springs and cold, wet weather can affect nesting success. Variability is likely compounded by natural population fluctuations, which are thought to occur at regular intervals in Rough-legged Hawk and Gyrfalcon populations (Hagen 1969; White and Cade 1977; Swartz et al. 1974; Mindell 1983). However, variability in effort was likely the main factor affecting observations of nesting Peregrine Falcons, as breeding populations are consistent between years (Court et al. 1988; Johnstone 1998).

Snowy Owls, although observed in the Project area, were not documented breeding in the area in any study year. Nests, typically scrapes on bare ground with no insulating lining of vegetation or feathers (Watson 1957), are difficult to detect and were not observed.



LEGEND

- Camp
- Proposed Mine Site
- Raptor Nest (1998)
- Raptor Nest (2000)
- Raptor Nest (2008)
- Raptor Nest (2009)
- Watercourse
- Waterbody

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT

COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

RAPTOR NEST LOCATIONS

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	CDB	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-13

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5.5 Upland Birds

In 2008, 9 species of upland songbirds and shorebirds were recorded within the plots, and 6 species were recorded within the plots in 2009 (Table 5-9). Seven songbird and 2 shorebird species were recorded within the plots in 2008, whereas 5 species of songbird and one shorebird species were recorded in 2009 (Table 5-9; Appendix B4). Lapland Longspurs (*Calcarius lapponicus*), Horned Larks, and Savannah Sparrows (*Passerculus sandwichensis*), were the most common birds observed in both years (Table 5-9). In 2008 and 2009, no birds were recorded at 69 and 35 plots, respectively. This was likely due to cold temperatures and windy conditions during bird surveys in both years as well as low densities of upland birds in the area. Birds may have been present within these plots but were silent or birds were completely absent if they had not yet arrived due to a late spring.

Table 5-9: Total Number of Individual Observations and Species Richness inside Plots, 2008 and 2009

Species	Scientific Name	2008	2009	Total
Lapland Longspur	*Calcarius lapponicus*	50	34	84
Horned Lark	*Eremophila alpestris*	48	36	84
Savannah Sparrow	*Passerculus sandwichensis*	39	26	65
American Pipit	*Anthus rubscens*	6	13	19
Redpoll species	*Carduelis sp.*	1	0	1
Snow Bunting	*Plectrophenax nivalis*	3	1	4
White-crowned Sparrow	*Zonotrichia leucophrys*	1	0	1
Semipalmated Plover	*Charadruis semipalmatus*	2	0	2
Least Sandpiper	*Calidris minutilla*	4	1	4
Unidentified Songbird	-	3	0	3
Species Richness	-	9	6	9

Note: - = not applicable

Upland bird density ranged from zero to 8.9 individuals/ha, with the highest densities being recorded in heath tundra (Table 5-10). This may be due to effort; heath tundra was the most frequently surveyed habitat type in both years.

Table 5-10: Density (Individuals per Hectare) of Observed Upland Birds per Habitat Type

Habitat	Total Number of Plots	Density	
		Mean ± SE	Min-Max [a]
Heath Tundra	168	1.0 ± 0.1	0.0 – 8.9
Heath Bedrock	2	0.6 ± 0.6	0.0 – 1.3
Heath Boulder	8	1.8 ± 0.8	0.0 – 6.4
Sedge Wetland	38	1.2 ± 0.3	0.0 – 6.4
Tussock Hummock	72	1.4 ± 0.2	0.0 – 6.4
Esker	23	0.8 ± 0.2	0.0 – 3.8
Total	**311**	**1.1 ± 0.1**	**0.0 – 8.9**

Note: ± = plus or minus; SE = standard error
[a] minimum to maximum values

Variation in species richness among habitat types was moderate. Species richness ranged from one to 6 across the 6 different habitat types (Figure 5-14). When species richness was examined by habitat type, more species were observed in heath tundra, tussock/hummock, and heath boulder compared to the other habitat types (Figure 5-14). Species richness was highest in habitat types with moderate habitat dryness and moderate vegetation cover (Figure 5-14). These habitat types dominate this arctic ecozone and were the most frequently

surveyed. Lapland Longspur and Horned Lark observations were highest in heath tundra, and Savannah Sparrow observations were highest in sedge wetland.

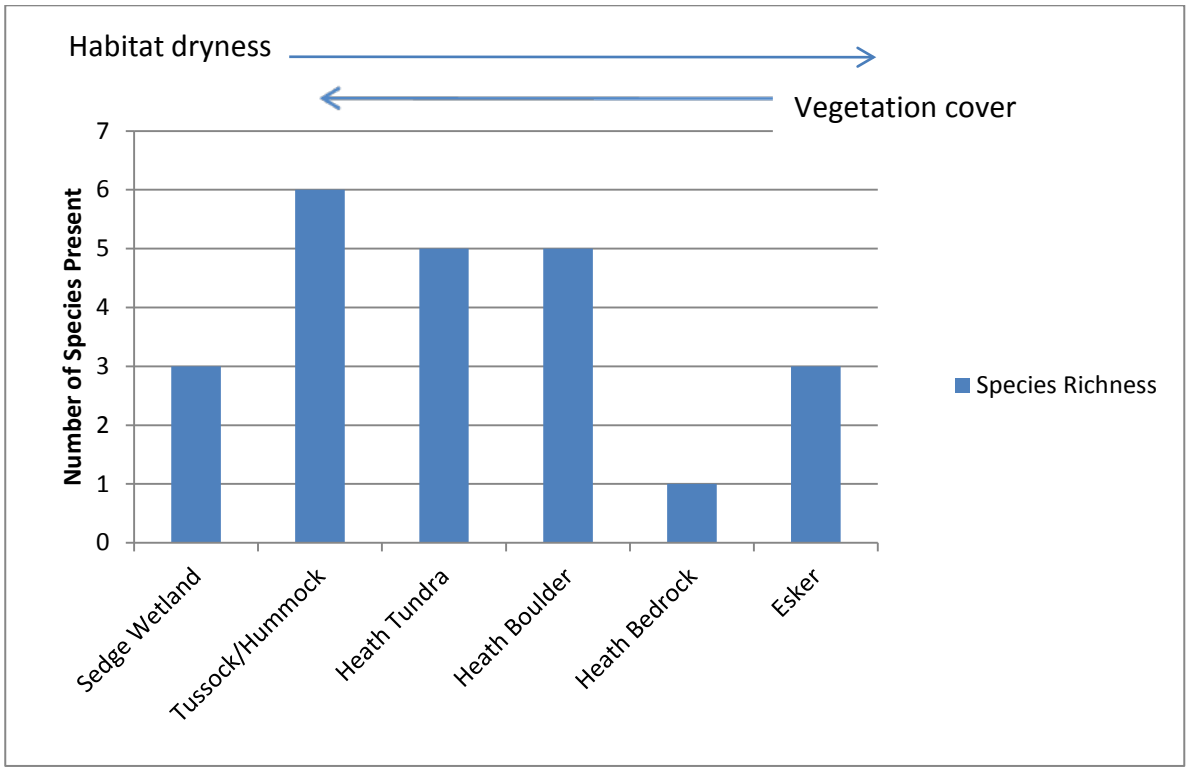


Figure 5-14: Species Richness According to Habitat Type

The number of species and densities of individual species were generally higher in 2008 than in 2009 (Table 5-11). As previously mentioned, this was likely due to the colder temperatures during bird surveys in 2009 relative to 2008. However, the American Pipit and the Savannah Sparrow had higher densities in 2009 than in 2008.

Table 5-11: Mean Density of Upland Bird Species, combined 2008 and 2009

Species	Mean Density (Range[a]) [Individuals per Hectare]
Lapland Longspur	0.3 (0.0 – 3.8)
Horned Lark	0.3 (0.0 – 6.4)
American Pipit	0.1 (0.0 – 3.8)
Savannah Sparrow	0.3 (0.0 – 5.1)
Redpoll species	<0.1 (0.0 – 1.3)
White-crowned Sparrow	<0.1 (0.0 – 1.3)
Snow Bunting	<0.1 (0.0 – 3.8)
Least Sandpiper	<0.1 (0.0 – 2.5)
Semipalmated Plover	<0.1 (0.0 – 1.3)
Unidentified	<0.1 (0.0 – 1.3)

Note: < indicates less than
[a] minimum to maximum values

5.6 Shorebirds

In 2008, 4 shorebird species were recorded in the Project area, including Least Sandpiper, Semipalmated Sandpiper, American Golden Plover (*Pluvialis dominica*), and Semipalmated Plover. However, only Semipalmated Plovers were recorded during PRISM surveys. In 2009, Least Sandpiper, Semipalmated Sandpiper, and Semipalmated Plovers were again observed along with one additional species observed, Dunlin (*Calidris alpina*). All 4 species were recorded during PRISM surveys in 2009. Seven PRISM plots were surveyed in June 2008 and 9 plots were surveyed in June 2009 (Appendix B5; Table 5-12; Figure 5-3). The highest number of individuals counted in one plot was 3 in 2009.

Table 5-12: PRISM Survey Observations, 2008 and 2009

Habitat Type	Habitat Quality	Shorebird Species Observed	Number	Sex
Tussock/hummock	Fair	Semipalmated Plover	2	Pair
Heath tundra	Fair	Semipalmated Plover	1	Unknown
Sedge wetland	Good	Least Sandpipers	2	Pair
Sedge wetland	Good	Dunlin	1	Unknown
Heath tundra	Fair	Semipalmated Sandpiper	1	Unknown

Density of shorebirds/ha ranged from 0 to 0.05 (Table 5-13). The mean Simpson's inverse index for diversity was similar between years (Table 5-13). This index is a measure of species richness, but is more sensitive to evenness (i.e., the abundance of individuals from each species). The value of this index ranges from 1 to 5, with the higher values indicating greater diversity. This result, with a maximum value of 1.6 in 2009, indicates that shorebird diversity in the study area is low.

Table 5-13: Species Richness, Total Abundance, Density, and Diversity within PRISM plots, 2008 and 2009

Year	Species Richness		Total Abundance			Density (per ha)		Diversity[a]	
	Total	Range	Total	Mean ± SE	Range	Mean ± SE	Range	Mean ± SE	Range
2008	1	0-1	2	0.3 ± 0.3	0-2	0.02 ± 0.02	0.0-0.2	1.0 ± 0.0	1
2009	4	0-2	5	0.6 ± 0.3	0-3	0.05 ± 0.03	0.0-0.3	1.2 ± 0.2	1-1.6
Overall	4	0-2	7	0.4 ± 0.2	0-3	0.04 ± 0.02	0.0-0.3	1.1 ± 0.1	1-1.6

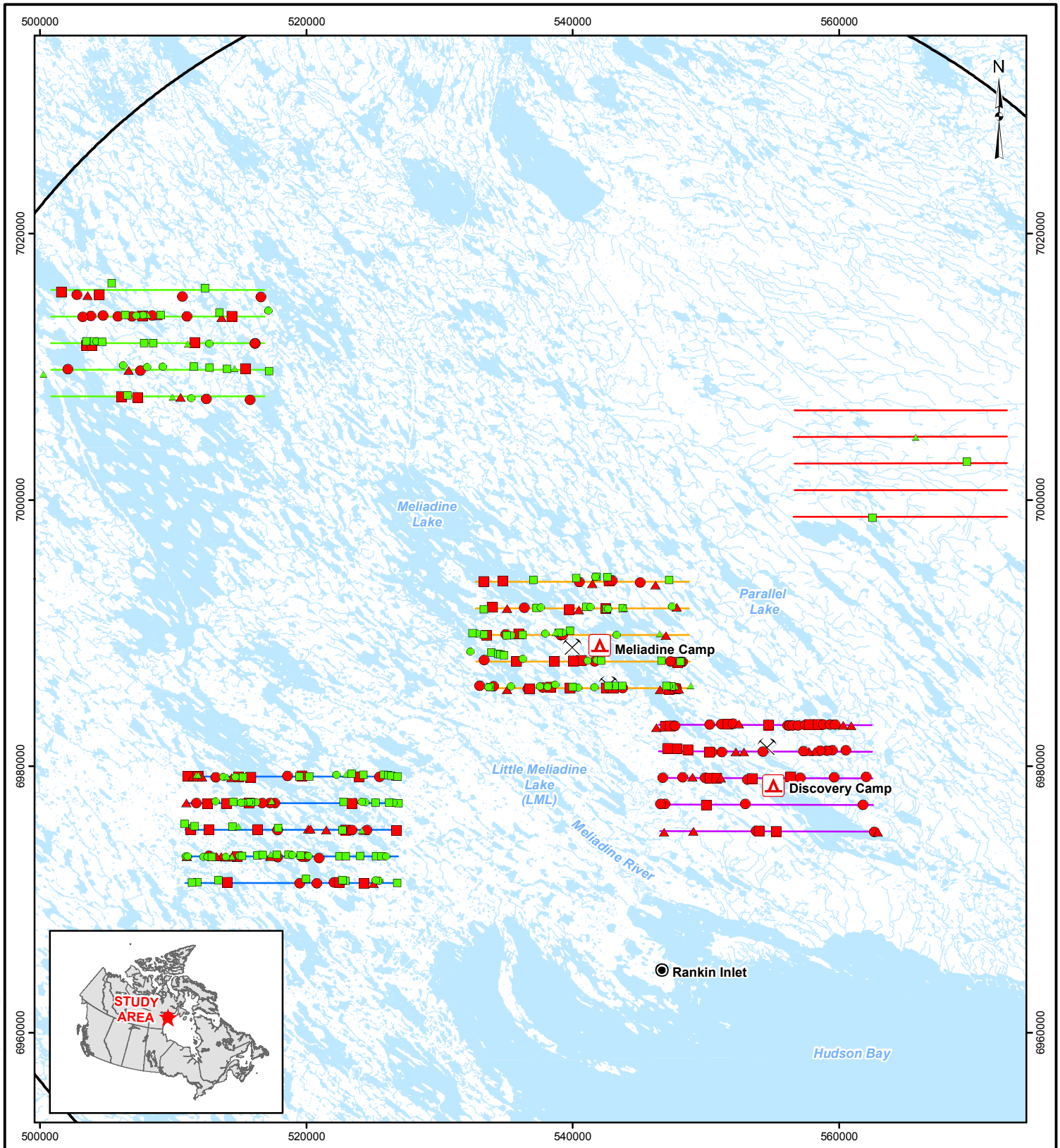
Note: ha= hectare; PRISM=Program for Regional and International Shorebird Monitoring; ± = plus or minus
[a] Simpson's Inverse Index

No shorebird species were confirmed as breeding because shorebird nests were not observed during PRISM surveys or during other surveys. The small number of observations and lack of breeding confirmation of any shorebird species may be related to the relative lack of good shorebird nesting habitat in the area as well as the small number of plots surveyed.

5.7 Waterfowl

The Project area is made up of numerous lakes, ponds, and wetlands. These water bodies provide habitat for migratory waterfowl, and breeding habitat for geese, ducks, and Herring Gulls. Aerial surveys can be used to index the abundance of waterfowl in extensive, inaccessible arctic breeding areas (McLaren and Alliston 1985; Conant et al. 2006; Conant et al. 2007). Monitoring for disturbance to breeding waterfowl is important, as disturbance can result in a decline in the number of breeding pairs, increased desertion of nests, reduced hatching success, and decreased duckling survival (Korschgen and Dalhgren 1992). Sandhill Cranes were also counted during these surveys due to their common presence across the tundra in the area.

Waterfowl aerial surveys in June and July of 2008 and 2009 recorded 3 to 12 species within the 5 different strata (Appendix B6; Tables 5-14 and 5-15). The population indices were higher for June than July, and higher in 2009 than in 2008. In both years, many lakes and wetlands still had ice cover in June, whereas in July, all water was ice-free. In June 2008 and 2009, and July 2008, the South stratum had the highest density of birds. In July 2009, the Mine stratum had the highest density. Densities were similar within strata between years. Overall, waterfowl density was greater in June 2009 than in June 2008 and, conversely, greater in July 2008 than July 2009 (Figures 5-15 and 5-16).



LEGEND

- Camp
- Proposed Mine Site

Waterfowl Observation (June 2008)
- Group
- Pair
- Single

Waterfowl Observation (June 2009)
- Group
- Pair
- Single

- Watercourse

Waterfowl Transect
- East Stratum (2008)
- Mine Stratum (2008 and 2009)
- North Stratum (2008 and 2009)
- South Stratum (2008 and 2009)
- Discovery Stratum (2009)
- Terrestrial Regional Study Area
- Waterbody

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

10 0 10
SCALE 1:400,000 KILOMETRES

PROJECT
COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

JUNE WATERFOWL OBSERVATIONS

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-15

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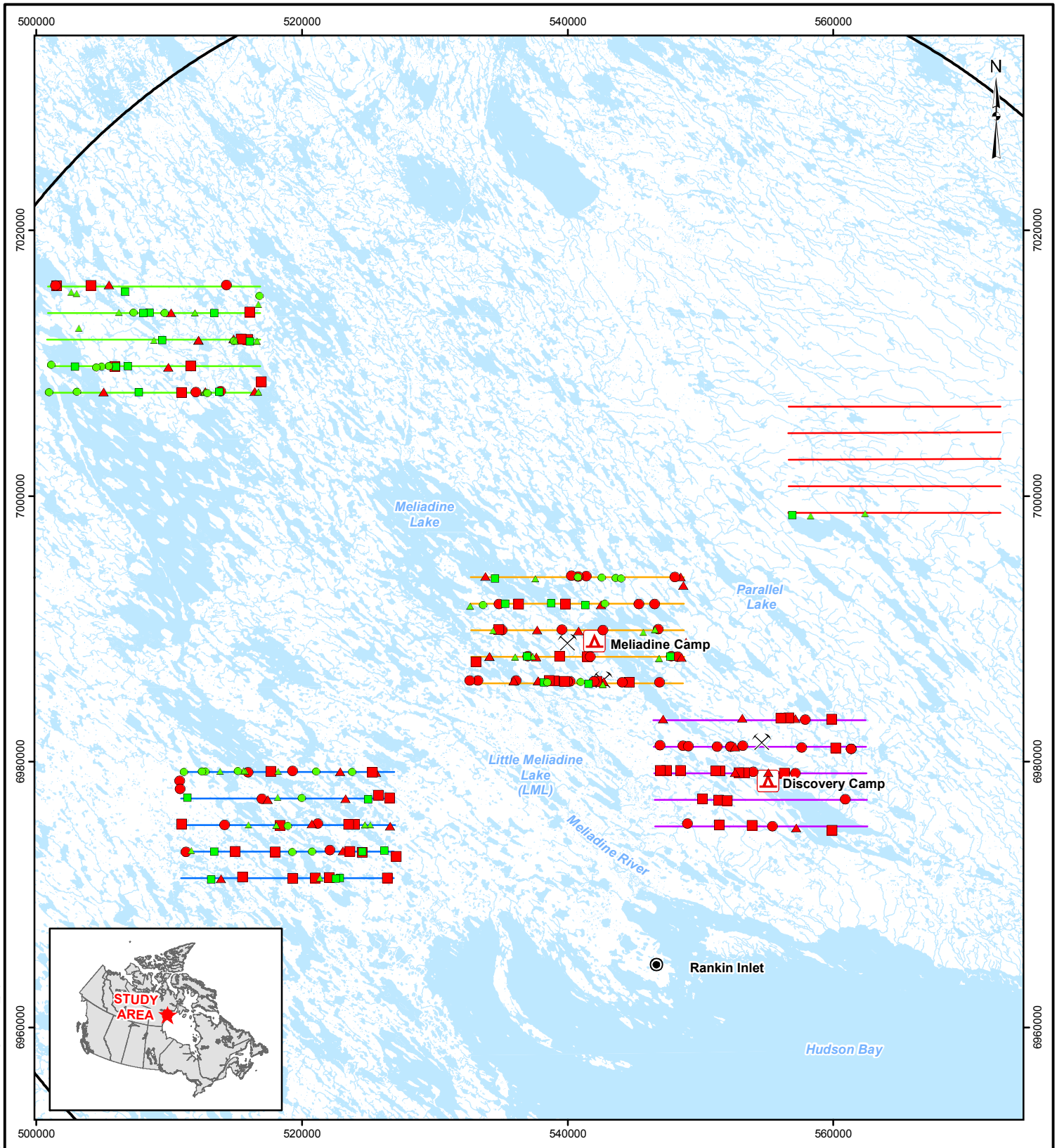

LEGEND

- Camp
- Proposed Mine Site

Waterfowl Observation (July 2008)
- Group
- Pair
- Single

Waterfowl Observation (July 2009)
- Group
- Pair
- Single

- Watercourse

Waterfowl Transect
- East Stratum (2008)
- Mine Stratum (2008 and 2009)
- North Stratum (2008 and 2009)
- South Stratum (2008 and 2009)
- Discovery Stratum (2009)
- Terrestrial Regional Study Area
- Waterbody

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

10 0 10
SCALE 1:400,000 KILOMETRES

PROJECT
COMAPLEX MINERALS CORP

COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-16

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Table 5-14: Waterfowl Population Index and Species Richness among Survey Strata, June 2008 and 2009

Species	Mine Stratum		North Stratum		South Stratum		East Stratum	Discovery Stratum
	2008	2009	2008	2009	2008	2009	2008	2009
Red-throated Loon	0	21	0	0	0	0	0	0
Pacific Loon	42	42	42	0	21	0	0	0
Common Loon	0	21	0	0	0	0	0	0
Red-breasted Merganser	53	107	0	0	0	0	0	0
Tundra Swan	231	567	0	0	0	0	21	609
Canada Goose	588	1239	441	1134	1218	1008	42	987
Snow Goose	0	147	0	1995	0	2709	0	1239
Northern Pintail	256	1025	0	128	128	128	0	641
Scaup species	81	324	0	0	0	162	0	324
Long-tailed Duck	628	471	432	314	1100	1100	0	1924
Sandhill Crane	147	189	84	84	483	504	0	189
Herring Gull	168	105	63	168	273	567	21	882
Common Eider	0	0	0	0	0	0	0	105
Greater White-fronted Goose	0	0	0	0	0	0	0	0
Unidentified duck species	42	0	0	0	0	0	0	42
TOTAL	**2237**	**4258**	**1062**	**3823**	**3223**	**6178**	**84**	**6942**
Species Richness	**9**	**12**	**5**	**6**	**6**	**7**	**3**	**9**
Density/km^2	**16.6**	**31.5**	**7.9**	**28.3**	**23.9**	**45.8**	**0.6**	**51.4**

Table 5-15: Waterfowl Population Index and Species Richness among Survey Strata, July 2008 and 2009

Species	Mine Stratum		North Stratum		South Stratum		East Stratum	Discovery Stratum
	2008	2009	2008	2009	2008	2009	2008	2009
Red-throated Loon	0	0	21	21	63	0	0	0
Pacific Loon	0	147	84	42	0	0	0	189
Common Loon	42	0	42	0	0	0	0	0
Red-breasted Merganser	0	0	160	107	0	0	0	0
Tundra Swan	483	882	0	42	0	0	0	504
Canada Goose	546	945	2583	2016	2100	882	1995	210
Snow Goose	0	21	21	0	0	42	315	0
Northern Pintail	0	0	0	0	0	0	0	0
Scaup species	0	0	0	0	0	0	0	0
Long-tailed Duck	79	353	0	157	236	314	0	393
Sandhill Crane	63	441	105	168	336	567	21	189
Herring Gull	63	126	105	84	252	294	0	315
Common Eider	0	0	0	0	0	0	0	0
Greater White-fronted Goose	0	105	0	0	0	0	0	0
Unidentified duck species	42	105	42	0	84	42	0	210
TOTAL	**1318**	**3125**	**3163**	**2637**	**3071**	**2141**	**2331**	**2010**
Species Richness	**6**	**8**	**9**	**8**	**6**	**5**	**3**	**6**
Density/km^2	**9.2**	**23.2**	**24.1**	**19.6**	**22.7**	**15.9**	**17.3**	**14.9**

Canada Geese, Snow Geese, Tundra Swans, and Long-tailed Ducks accounted for a large proportion of waterfowl in each stratum. Common Eiders were only recorded during the July 2009 survey in the Discovery stratum and Greater White-fronted Geese were only recorded in the Mine stratum the same year. Greater Scaup (*Aythya marila*) and Lesser Scaup (*Aythya affinis*) were not differentiated due to the similarities in appearance.

In both years, only Tundra Swans and Canada Geese were observed with broods during waterfowl aerial surveys. More broods were recorded in 2008 (14 broods) than in 2009 (7 broods) (Table 5-16). This could be due to the late break-up that occurred in 2009. During June 2009 surveys, most small ponds and wetlands were frozen whereas at the same time in 2008, break-up was further advanced and there was more open water. This could affect the brood production in July because when spring is late, waterfowl may not attempt to nest (Marshall 1952; Ryder 1970). Overall, Canada Geese had the most broods and the highest number of young.

Table 5-16: Waterfowl Productivity (Number of Broods and Young Observed) within Survey Strata, July 2008 and 2009

Species	Mine Stratum		North Stratum		South Stratum		East Stratum	Discovery Stratum
	2008	2009	2008	2009	2008	2009	2008	2009
Tundra Swan	4 (12)	2 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
Canada Goose	3 (11)	2 (7)	4 (15)	1 (3)	3 (15)	0 (0)	0 (0)	1 (1)
Total	**7 (23)**	**4 (10)**	**4 (15)**	**1 (3)**	**3 (15)**	**0 (0)**	**0 (0)**	**2 (2)**
Mean	**5.5 (16.5)**		**2.5 (9.0)**		**1.5 (0)**		**0 (0)**	**2 (2)**

Note: number in parentheses indicates total number of young observed.

5.8 Loons and Swans

Pacific, Red-throated, and Common loons have all been documented in the study area, with Pacific Loons being the only species commonly recorded as breeding. Pacific Loons nest on small, quiet, fish-bearing lakes and ponds with sloping shorelines (Ruggles 1994). Tundra Swans occur in the study area, are regularly documented as breeding, and are easily observed due to their large size and white colour. Tundra Swan breeding territories are comprised of a lake, used for refuge and foraging, and adjacent terrestrial habitats and ponds near the lake's perimeter used for foraging and nesting (Earnst and Rothe 2004). The lake provides important refuge for cygnets during brood-rearing (Limpert and Earnst 1994).

Nesting Pacific Loons and Tundra Swans were not randomly distributed within the mine study area. In all survey years, breeding pairs were concentrated in the northwest and southeast ends of the areas (Appendix B7; Figures 5-17 to 5-20). Nest locations in the same immediate areas were used in consecutive years based on repeated observations of nests and lake use by adults with fledglings (Figures 5-17 to 5-20).

Loons

Pacific, Red-throated, and Common loons are summer residents in the study area. In all years, Pacific Loons were the most-frequently observed loon species, whereas Red-throated and Common loons were uncommon. In 2000, Red-throated Loons were not recorded in the mine or control study areas. In 1998, based on the intensive ground survey in June and follow-up ground checks on selected lakes in June and July, there were one, 2, and 11 breeding pairs of Common, Red-throated, and Pacific Loons, respectively, within the mine study area. Occupancy and productivity varied, with the number of adult nesting pairs ranging from 7 to 16 in the mine area and from 7 to 14 in the control area. Nesting was likely delayed in 2000 and 2009 due to cold temperatures and a late break-up. Observations were similar in 1998 to 2000 but the number of breeding pairs in both survey areas was lower in 2009 (Table 5-17). This is likely not a Project effect, but rather due to reduced survey effort in 2009 because no ground searches or follow up surveys occurred. Productivity can vary between years due to

predation. Kertell (1996) found that the principal cause of reproductive failure in Pacific Loons appeared to be predation by arctic fox during incubation.

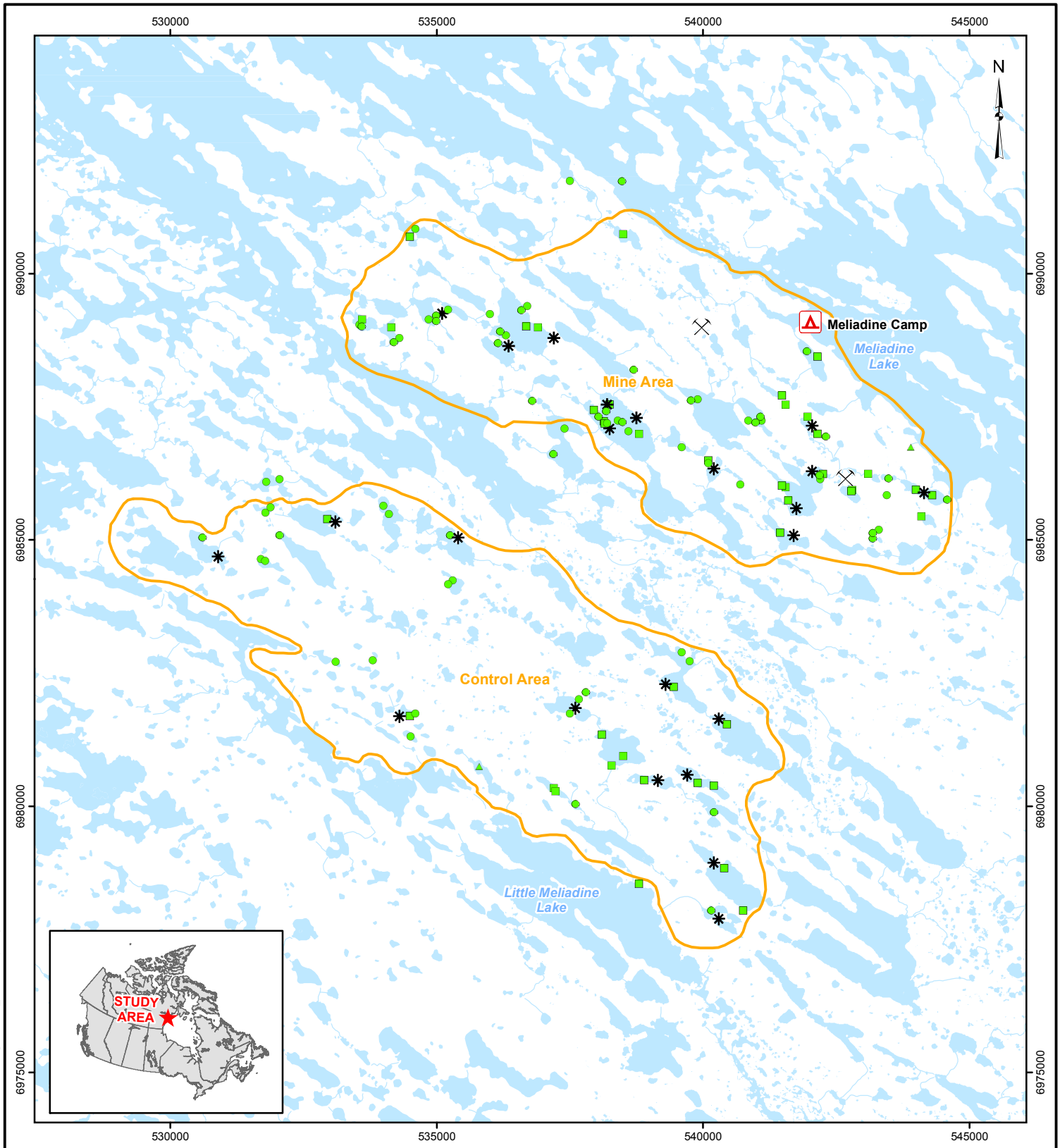
Table 5-17: Pacific Loon Occupancy and Productivity, 1998 to 2000, and 2009

Year	Mine Study Area		Control Study Area	
	# Adult Nesting Pairs	# Broods (Mean # of Fledglings per brood)	# Adult Nesting Pairs	# Broods (Mean # of Fledglings per brood)
1998	11	Unknown	-	-
1999	16	4 (1.3)	14	3 (1.5)
2000	14	8 (1.5)	14	4 (1.0)
2009	7	3 (>1.3)	7	3 (>0.7)
Mean[a]	12.0	5 (1.4)	11.7	3.3 (>0.9)

Note: "#" indicates number;" -" indicates area not surveyed;" >" indicates nests were still being incubated during July survey, accurate brood count not possible

[a] mean based on total number of fledglings

Density for breeding pairs of Pacific Loons was higher for all years in the mine area than the control area (Table 5-18). This may be due to habitat suitability, as there is more variability in the size of lakes in the mine area. Predation upon eggs and young is often high, and loons avoid predation by breeding at low densities, nesting on islands, and using nesting ponds to escape from predators. Adults may also actively defend eggs and chicks against small predators (Petersen 1979; Davis 1972). Again, reduced density observed in 2009 compared to previous years is likely not a Project effect but directly related to reduced survey effort.



LEGEND

- Camp
- Pacific Loon Observation
  - Pacific Loon - Group
  - Pacific Loon - Pair
  - Pacific Loon - Single
  - Pacific Loon - Nest
- Proposed Mine Site
- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

2.5 0 2.5
SCALE 1:100,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
PACIFIC LOON OCCUPANCY JUNE/JULY

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-17

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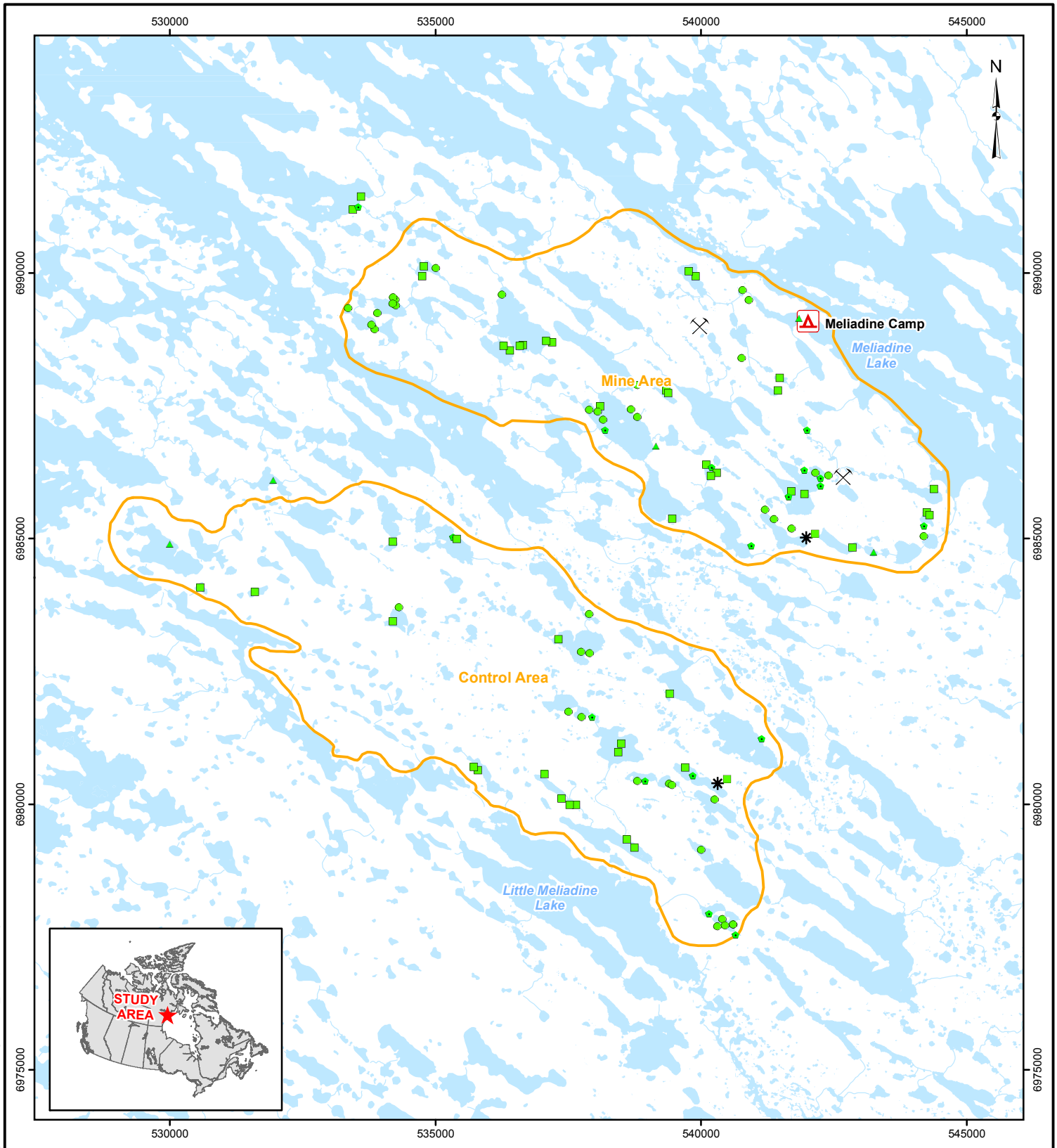

LEGEND

- Camp
- Pacific Loon Observation
  - Pacific Loon - Group
  - Pacific Loon - Brood
  - Pacific Loon - Pair
  - Pacific Loon - Single
  - Pacific Loon - Nest
- Proposed Mine Site
- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

2.5 0 2.5
SCALE 1:100,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
PACIFIC LOON PRODUCTIVITY JULY/AUGUST

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-18

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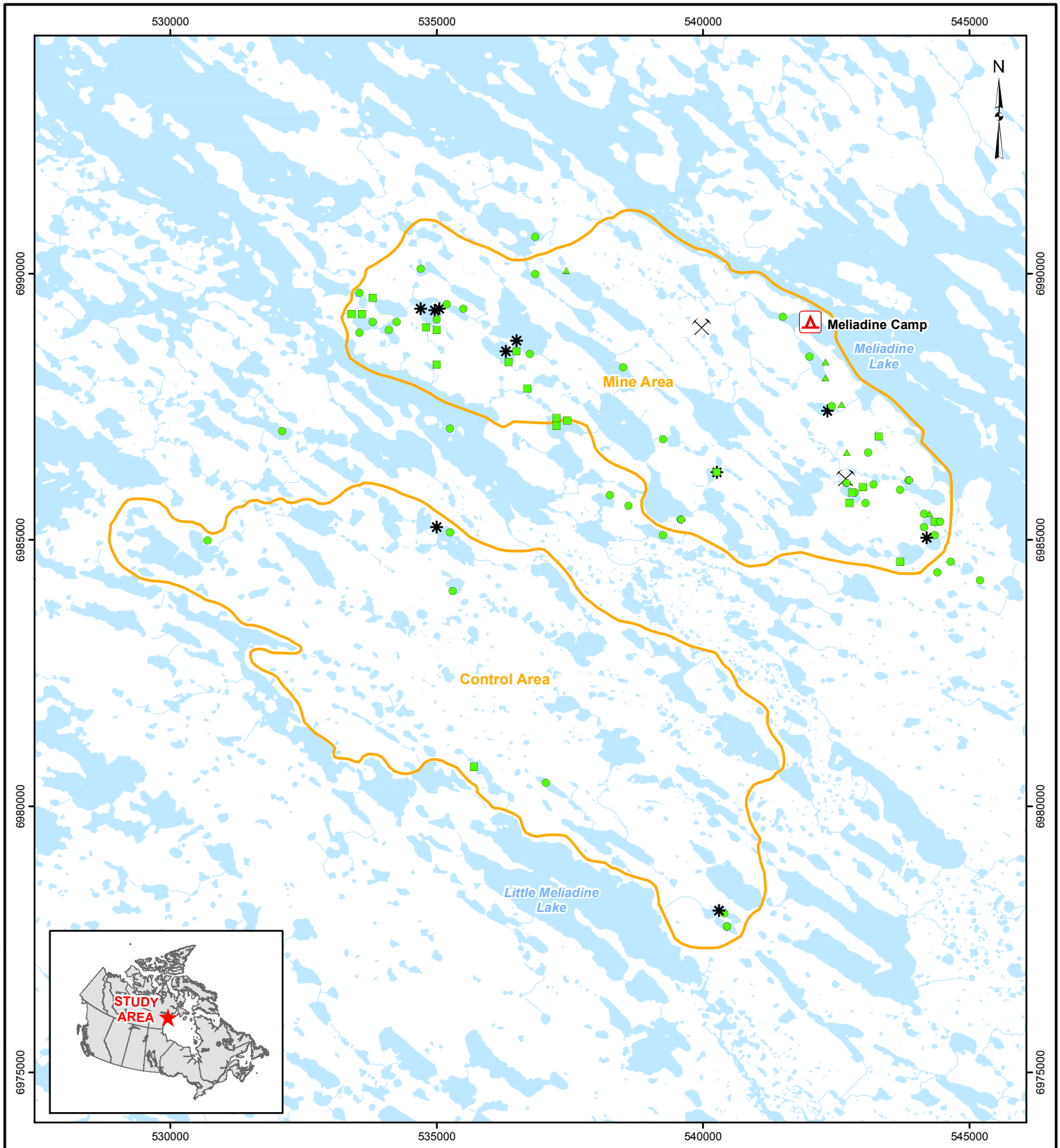

LEGEND

- Camp
- Proposed Mine Site
- Tundra Swan Observation
  - Tundra Swan - Group
  - Tundra Swan - Pair
  - Tundra Swan - Single
  - Tundra Swan - Nest
- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

2.5 0 2.5
SCALE 1:100,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
TUNDRA SWAN OCCUPANCY JUNE/JULY

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-19

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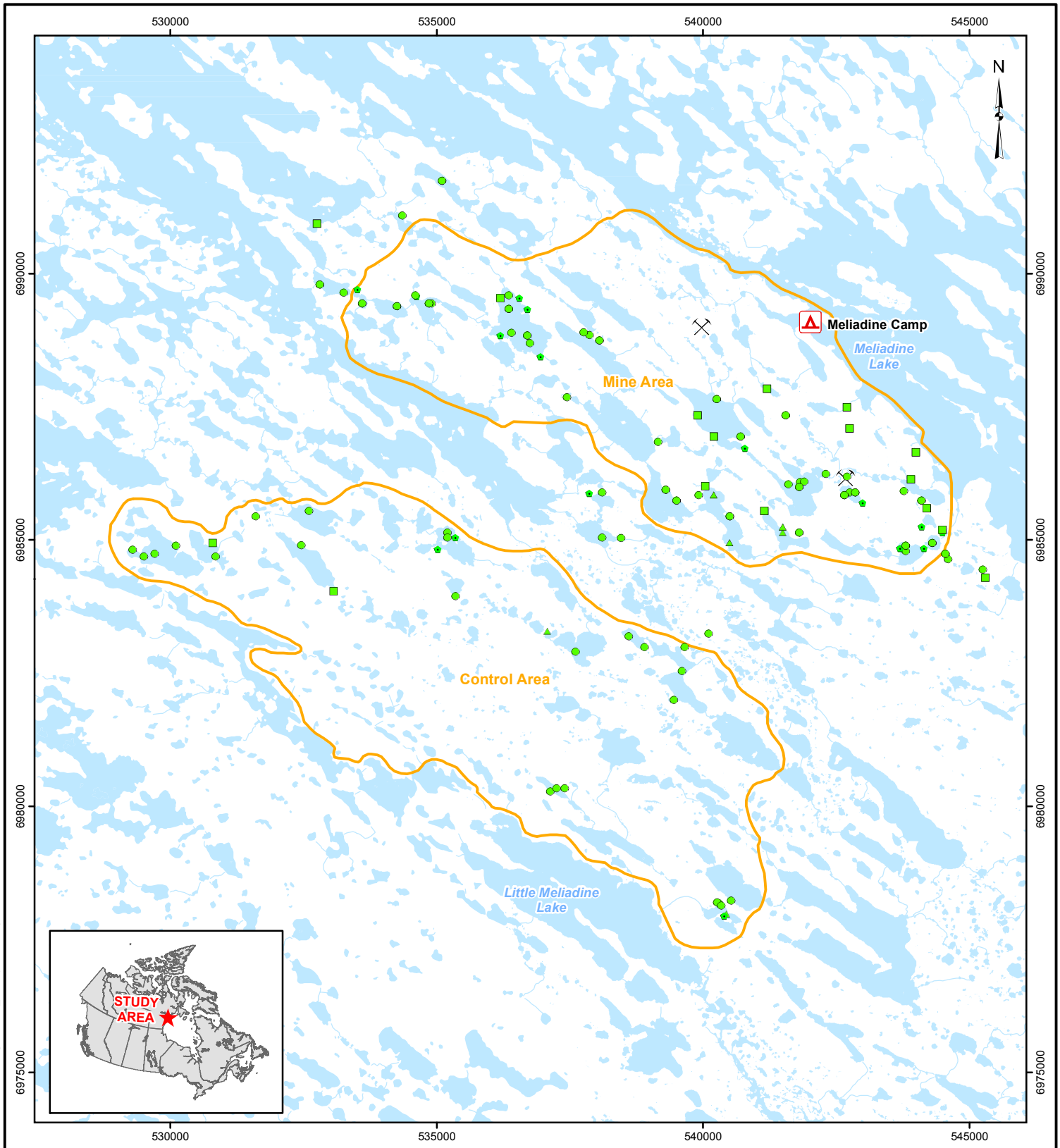

LEGEND

- Camp
- Proposed Mine Site
- Tundra Swan Observation
  - Tundra Swan - Group
  - Tundra Swan - Brood
  - Tundra Swan - Pair
  - Tundra Swan - Single
- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

2.5 0 2.5
SCALE 1:100,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
TUNDRA SWAN PRODUCTIVITY JULY/AUGUST

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-20

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Table 5-18: Pacific Loon Breeding Density, 1998 to 2000 and 2009

Year	Breeding Density (Breeding Pairs per hectare)	
	Mine	Control
1998	0.0028	-
1999	0.0041	0.0027
2000	0.0036	0.0027
2009	0.0018	0.0014
Mean density	0.0029	0.0023

Note: "-" indicates area not surveyed

During all survey years, lakes occupied by Pacific Loons ranged in area from 0.80 to 95.1 ha (Table 5-19). Petersen (1979) found ponds with nests to be on average 1.8 ha in size, with less than 1% of occupied ponds being greater than 9.6 ha and only 24% of occupied ponds being less than 0.3 ha. Ruggles (1994) found that Pacific Loons used lakes as small as 4 ha.

Table 5-19: Comparison of Size Range in Hectares of Occupied Lakes by Pacific Loons in Project Area and Control Area, 1998 to 2000 and 2009

1998	1999		2000		2009	
Project Area	Mine Area	Control Area	Mine Area	Control Area	Mine Area	Control Area
0.80 to 12.5	1.0 to 87.1	1.0 to 44.9	1.0 to 85	1.0 to 65	21.1 to 49.9	16.2 to 95.1

Tundra Swans

Tundra Swans are regular summer breeders in the study area. Tundra Swan occupancy and productivity was variable during the 4 years surveys were conducted between 1998 and 2009. The number of adult nesting pairs ranged from 5 to 8 in the Project area and from one to 5 in the control area (Table 5-20). In all survey years, the number of broods ranged from zero to 7, and the Project area was consistently more successful with more broods and fledglings than the control area.

Table 5-20: Tundra Swan Occupancy and Productivity, 1998 to 2000 and 2009

Year	Project Study Area		Control Study Area	
	# Adult Nesting Pairs	# Broods (Mean # of Fledglings)	# Adult Nesting Pairs	# Broods (Mean # of Fledglings)
1998	8	3 (unknown)	-	-
1999	5 to 7	6 (1.7)	1	0 (0)
2000	7	3 (3)	5	2 (3)
2009	7	7 (2)	1	1(3)
Mean	6.8 to 7.3	4.8 (2.1)[a]	2.3	1.0 (2.3)[a]

Note: "#" indicates number; "-" indicates area not surveyed
[a] mean based on total number of fledglings

Density for breeding pairs of Tundra Swans was higher for all years in the Project area than the control area (Table 5-21). This may be due to habitat suitability, as there is more variability in the size of lakes in the Project area. Nesting was likely delayed in 2000 and 2009 due to cold temperatures and a late break-up. Lensink (1973) found that between 15% and 47% of adult swans on territories produced young in any one year and that the proportion of cygnets surviving autumn migration was much greater in years with early springs than in years with late springs.

Table 5-21: Tundra Swan Breeding Density, 1998 to 2000 and 2009

Year	Breeding Density (per hectare)	
	Project Study Area	Control Study Area
1998	0.0015	-
1999	0.0013 to 0.0018	0.0002
2000	0.0018	0.0013
2009	0.0018	0.0002
Mean density	0.0017	0.0006

Note: "-" indicates area not surveyed

The lakes in the Project study area used for nesting were larger than in the control study area. Earnst and Rothe (2004) found that larger lakes likely provide better refuge for cygnets and may have more foraging and nesting sites on the lake proper and adjacent habitats.

The distribution of lakes occupied by nesting swans relative to drill locations was also not random. An analysis of distances from active drill locations to the nearest suitable sized lake compared with the nearest lake occupied by Tundra Swans showed that occupied lakes were significantly farther from drill sites than would be expected by chance (Jalkotzy 2000a). The mean distance from active drill locations to the closest lakes with nesting swans was 3729 m (95% C.I. = 3476 to 3981 m, median 3761 m) (Jalkotzy 2000a). In contrast, the mean distance from active drill locations to the closest suitable-sized lake without swans was 617 m (95% C.I. = 564 to 670 m, median 621 m). This documented "avoidance" is likely the result of the location of drills relative to traditional swan nesting sites. In 1998 and 1999, the drilling program was concentrated in the Tiriganiaq Zone away from areas that were traditionally used by Tundra Swans for nesting (Jalkotzy 2000a). It appears that the type and level of mining activity in spring and early summer did not affect the use of traditional nesting sites in 1998 and 1999 but these findings should be considered preliminary due to small sample size and other factors which could affect swan nesting distributions (Jalkotzy 2000a).

5.9 Incidental Wildlife Observations

Mammals recorded incidentally during summer surveys in all years included arctic ground squirrels, barren-ground caribou (recorded either off-transect during caribou aerial surveys or during other surveys), arctic hare (*Lepus arcticus*), as well as sign of lemmings and ermine (*Mustela ermine*). All incidental data are presented in Appendix B8.

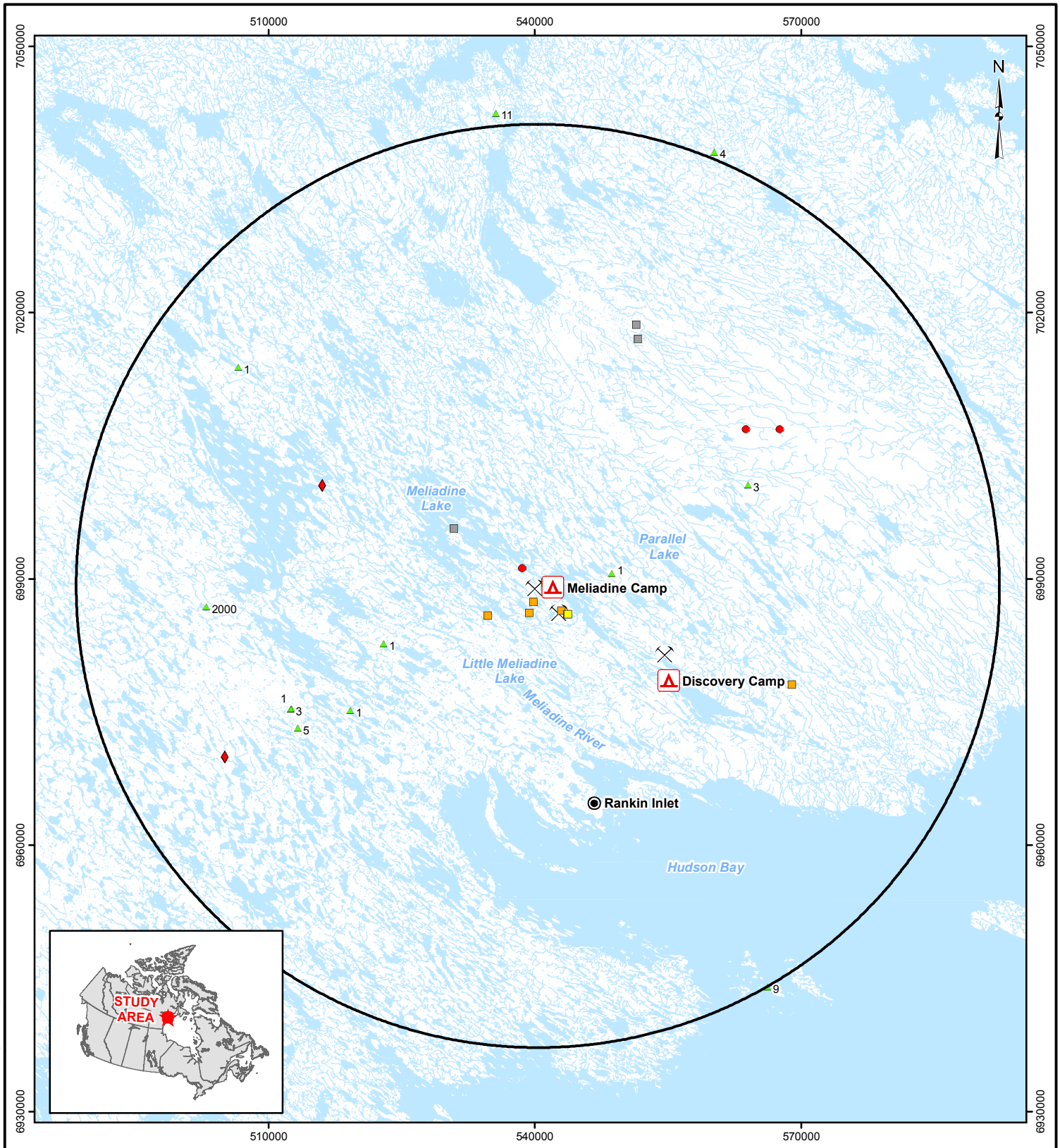
Polar bears (*Ursus maritimus)* have been recorded in the study area and around the Meliadine Camp in 1998, 1999, and 2000 (Table 5-22). In 1998, a female with a single cub was observed travelling north along Meliadine Lake, and in 1999, a single polar bear was observed 18 km north of the camp (Jalkotzy 1999, 2000a). On 8 July 2000 a single polar bear was observed 10 km east of the Discovery camp (Jalkotzy 2000b). One muskox (*Ovibos moschatus*) and 3 wolves (*Canis lupus*) were observed in the Project study area in 2008 (Figure 5-21). Approximately 26 muskox were observed while completing waterfowl aerial surveys in July 2009 (Figure 5-21). Grizzly bears, wolverine *(Gulo gulo)* or their sign have not been documented in the RSA during baseline studies.

Table 5-22: Incidental Observations of Wildlife Species, 1998 to 2000, 2008 and 2009

Year	Barren-ground Caribou	Polar Bear	Grey Wolf	Arctic Fox	Muskox	Ermine	Arctic Hare
1998	19	2	0	Present[a]	0	0	Present
1999	~6000	1	0	Present	0	0	Present
2000	~370	1	0	Present	0	1	Present
2008	~2000	0	3	Present	1	0	Present
2009	9	0	0	Present	26	0	Present

Note: "~" indicates approximately
"Present[a]" indicates multiple sightings, common in study area

A list of bird species observed in the RSA during all field programs in 1998-2000, 2008 and 2009 is presented in Appendix B9. Species recorded only as incidentals included Short-eared Owl, American Wigeon (*Anas americana*), Northern Shoveler (*Anas clypteata*), King Eider, Willow Ptarmigan, American Golden Plover, Long-tailed Jaeger (*Stercorarius longicaudus*), Common Raven (*Corvus corax*) and American Tree Sparrow. These incidental species were recorded during the waterfowl and upland bird surveys or were recorded in the hamlet of Rankin Inlet.



LEGEND

- Camp
- Arctic Fox
- Arctic Fox (Dead)
- Arctic Hare
- Caribou*
- Muskox
- Wolf
- Proposed Mine Site
- Watercourse
- Terrestrial Regional Study Area
- Waterbody

* Number indicates caribou group size

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

DRAFT

15 0 15
SCALE 1:600,000 KILOMETRES

PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE

INCIDENTAL WILDLIFE OBSERVATIONS

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-21

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5.10 Summary and Conclusion

Baseline wildlife studies at the Meliadine Gold Project were initiated by Arc Wildlife Services Ltd. in May 1998 and continued through 2000. Further studies were completed in 2008 and 2009 by Golder. The 2008 and 2009 wildlife studies were designed to update and augment the existing baseline data for all major categories of terrestrial wildlife present, including species at risk. Also in 2009, additional data were collected to address data gaps in the Tiriganiaq, Discovery, and F Zone deposit areas and survey duration for some components. The studies were designed to collect baseline data within the terrestrial study area, including the proposed 2009 Project footprint and the proposed all-weather road corridor. Baseline data collected over 5 years (1998, 1999, 2000, 2008, and 2009) encompasses the following species or species groups:

- barren-ground caribou;
- arctic fox;
- raptors;
- upland birds;
- shorebirds;
- waterfowl; and
- loons and swans.

Key baseline findings in the Project study area include the following:

- barren-ground caribou of the Qamanirjuaq herd are regular but transient visitors during their spring migration and calving periods;
- Peregrine Falcon, Rough-legged Hawk, and Gyrfalcon have been documented and confirmed as breeding;
- Short-eared Owls have been documented, and nest observations indicate that they are likely breeding;
- 37 bird species have been observed including 14 species of waterfowl, 5 species of shorebird, 3 species of raptor, and 2 owl species;
- the more common species of upland birds are Lapland Longspur, Horned Lark, and Savannah Sparrow;
- shorebirds are uncommon and have not been documented breeding;
- Pacific Loons and Tundra Swans are confirmed, regular breeding summer residents;
- Sandhill Cranes occur throughout the study area in summer and are confirmed as breeding;
- arctic fox and arctic hare are common residents;
- wolves, muskox, and polar bears are infrequently observed;
- grizzly bears, wolverines, or their sign were not seen in the study area during wildlife surveys; and
- polar bear and Peregrine Falcon are the only species that are listed under COSEWIC as “Special Concern” that have been documented in the study area.

Closure

We trust the information contained in this report is sufficient for your present needs. Should you have any questions regarding the project, please do not hesitate to contact the undersigned at (780) 483-3499.

Yours very truly,

GOLDER ASSOCIATES LTD.

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APPENDIX A

Vegetation

The vascular plant list summarized below includes all species encountered during the field programs competed for the project and any other potential species that are represented by previous collections or adjacent reported ranges. Plant species that were encountered in the local or regional study area are designated by an 'X' under the Family column. Any species that was identified as having a "Sensitive" status under "Draft Status of Vascular Plants in Nunavut" is identified as such under the Notes column.

Table A1-1: Vascular Plant Species List

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
Ferns	**Polypodiaceae**			
X	*Cystopteris fragilis*	Fragile fern	Damp rocky slopes	
X	*Dryopteris fragrans*	Fragrant cliff woodfern	Non-calcareous rocks, cliffs and screes	
	Woodsia alpina	Northern woodsia	Uncommon, rock crevices, calcareous rocks	
X	*W. glabella*	Smooth woodsia	Uncommon, moist calcareous slopes, crevices	
Horsetails	**Equisetaceae**			
X	*Equisetum arvense*	Field horsetail	Damp areas, stream or banks	
X	*E. variegatum*	Giant horsetail	Wet alluvial sand and clay, sometimes in moss	
Club-moss	**Lycopodiaceae**			
X	*Huperzia selago* (Syn: *Lycopodium selago*)	Fir clubmoss	Heath tundra, turfy, mossy tundra, wet meadows, depressions of low-centre polygons	
X	*Lycopodium annotinum*	Stiff clubmoss	Moist areas, gravel, sand, till, noncalcareous, often under birches and willows, riparian associations	
Pondweed	**Potomogetonaceae**			
	Potamogeton filiformis (syn: *Stuckenia filiformis*)	Slender pondweed	Submergent/emergent in ponds	
Grasses	**Poaceae (Formerly: Graminae)**			
X	*Alopecurus alpinus(*Syn*: A.magellanicus)*	Mountain foxtail	Wet tundra, lakeshores, brooks mostly seacoast, nitrophilous	
X	*Hierochloe alpina (*Syn:*Anthoxanthum monticola)*	Alpine sweet grass	Dry tundra, rocky places, acidic rocks	
X	*Hierochloe pauciflora (*Syn*: Anthoxanthum arcticum)*	Arctic sweet grass	In sphagnum, wet tundra, not littoral but coastal lowland	
X	*Arctagrostis latifolia*	Broadleaf arctagrostis	Damp turfy tundra	
X	*Arctophila fulva*	Pendantgrass	Wet meadows, edges of ponds, marshes, streams, rivers	
	Calamagrostis deschampsioides	Circumpolar small-reedgrass	Littoral, damp tundra, low seacoasts	
X	*C. stricta* ssp. *stricta*	Northern reedgrass	Well-drained calcareous sand or stony areas	
	Deschampsia caespitosa (Syn.: D. pumila)	Tufted hairgrass	Wet meadows, stony/gravelly shores including river banks	

Table A1-1: Vascular Plant Species List (continued)

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
X	*Dupontia fisheri*	Fisher's Duponita	Wet meadows, littoral, brackish	
	Elymus alaskansus ssp. *latiglumis (*Syn*: Agropyron violaceum)*	Alaska wild rye	Well-drained calcareous sand or clay	
	Festuca brachyphylla	Shortleaf fescue	Sandy, gravelly, rocky	
X	*Leymus mollis (*Syn.*: Elymus arenarius* ssp. *mollis)*	American dunegrass; beach rye grass	Beaches, dunes, sea shores, marine backshores	
	Pleuropogon sabinei	Sabine-grass	Shallows, small sheltered ponds	
X	*Poa alpina*	Alpine bluegrass	Calciphile, dry tundra, owl perches	
X	*Poa arctica*	Arctic bluegrass	Not too moist tundra, lake shores and brooks	
	*Poa autumnalis (*Syn.*: P. flexuosa)*	Autumn bluegrass	Gravelly, not too dry sites, often pioneering disturbed sites	possible range extension
	Poa glauca	White bluegrass	Open, sandy, gravelly spots	
X	*Poa pratensis (*Syn.*: P. alpigena)*	Kentucky bluegrass	Strongly nitrophilous, so often at bird perches, old campsites, damp sand along shores, creek floodplains, gravel beach ridges	
	Puccinellia deschampsioides	Polar alkali grass	Littoral, likely along coast of RSA	"Sensitive"
	P. phryganodes	Creeping alkali grass	Littoral, likely along coast of RSA	
	P. tenella ssp. *langeana*	Tundra Alkali grass	Littoral, likely along coast of RSA	
X	*Trisetum spicatum*	Narrow false oats	Rocky, gravelly spots	
Sedges	**Cyperaceae**			
X	*Carex aquatilis*	Water sedge	Wet tundra, shallow ponds, emergent	
	Carex aquatilis var. *aquatilis*	Water sedge	Shallow water, margins of ponds/lakes	
	C. aquatilis var. *stans*	Water sedge	Wet tundra, shallow ponds, emergent	
X	*C. atrofusca*	Scroched alpine sedge	Drooping female flowers, wet places, snowbanks	
X	*C. bigelowii*	Bigelow's sedge	Small in dry spots, larger in wet	
X	*C. capillaris*	Hair-like sedge	Moist pond margins	
X	*C. chordorrhiza*	Creeping sedge	Pond margins, sometimes on sand beaches	
	C. glareosa	Weak-clust sedge	Seashore plant, flat tussocks, at seabird nesting sites	
	C. maritima	Seaside sedge	Mostly littoral, sandy, gravelly, sometimes inland	
X	*C. membranacea*	Fragile-seed sedge	Xeric, turfy places, dry tundra	
X	*C. misandra*	Shortleafsedge	Xeric, dry turfy places, rocky spots	
X	*C. nardina*	Nard sedge	Xeric, calcareous sands, gravels, dry slopes	
X	*C. rariflora*	Loose-flowered sedge	Wet peaty spots, wet moss by brooks and ponds	
X	*C. rotundata*	Roundfruit sedge	Moist, turfy tundra, mostly western	
X	*C. rupestris*	Rock sedge	Xeric, dry turfy places, rocky ledges, often with Dryas	

Table A1-1: Vascular Plant Species List (continued)

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
X	*C. saxatilis*	Russet sedge	Shallow water, acid tundra ponds, lakeshores	
X	*C. scirpoidea*	Bulrush sedge	Xeric, dry turfy places, calcareous soil	
	C. subspathacea	Hoppner's sedge	Seacoast, wet clay on beaches	
	C. ursina	Bear sedge	Littoral, seashores, inundated at high tide	
X	*C. vaginata*	Sheathed sedge	Moist, calcareous, rocky, turfy places	
X	*Eriophorum angustifolium*	Narrowleaf cotton-grass	Shallows of ponds, lakes, streams	
	E. brachyantherum	Short anther cotton-grass	Lowland muskeg and tundra, tussock-former	
	E. callitrix	Sheathed cotton-grass	Calcareous, turfy, tussockgrass	
X	*E. scheuchzerii*	Scheuchzer's cotton-grass	Wet meadows, shallows, non-tussock	
X	*E. vaginatum*	Tussock cotton-grass	Peaty soils, tussock former	
X	*Kobresia myosuroides*	Pacific kobresia	Calciphile, dry ridges	
X	*Kobresia simpliciuscula*	Simple kobresia	Damp calcareous gravels	
X	*Trichophorum caespitosum* (Syn.: *Scirous caespitosus)*	Tufted clubrush	Wetlands	
Rushes	***Juncaceae***			
X	*Juncus albescens* (Syn.: *J. triglumis* ssp. *albescens)*	Northern white rush	Calcareous clay or sand, pond edges	
X	*J. arcticus*	Arctic rush	Wet sand/clay shores, lakes/rivers, sometimes strand flats	
X	*J. biglumis*	Two-flowered rush	Wet sand or clay	
X	*J. castaneus*	Chestnut rush	Wet sand or clay lakeshores	
X	*J. stygius* ssp. *americanus*	Moor rush	Wet margins of seepages, bog pools, western	possible range extension
X	*Luzula arctica* (Syn.: *L. nivalis)*	Arctic woodrush	Heath and not too dry tundra, snowbanks	
X	*L. confusa*	Northern woodrush	Xeric, dry turfy places, rocky slopes and ledges	
	L. wahlenbergii	Wahlenberg's woodrush	Sphagnum bogs in tundra, mossy shorelines	
Lilies	**Nartheciaceae (Formerly: Liliaceae)**			
X	*Tofieldia coccinea*	Purple featherling	Calcareous soils, often dry sites	
X	*T. pusilla*	Scotch false asphodel	Moist calcareous turfy places	
	Orchidaceae			
X	*Corallorhiza trifida*	Early coralroot orchid	Turfy open places, calcareous soils, often associated with Dryas integrifolia	
X	*Platanthera obtusata* (Syn.: *Habenaria obtusata)*	Small northern bog orchid	Lowland heath tundra, along low shores	
Willows	**Salicaceae**			

Table A1-1: Vascular Plant Species List (continued)

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
X	*Salix arctica*	Arctic willow	Extremely variable in form and habitat, highly used by Inuit	
X	*S. arctophila*	Arctic willow	Wet mossy tundra, eastern	
X	*S. lanata ssp. calcicola* (Syn.*:*)	Lanate willow	Shrub, calcareous rocky, gravelly places	"Sensitive"
	S. brachycarpa ssp. *niphoclada*	Short-fruit willow	Moist, stony lakeshores, barrens	Endemic to Hudson Bay
X	*S. fuscescens*	Alaska bog willow	Damp, mossy tundra	
X	*S. glauca* var. *callicarpaea*	Gray willow	Often prostrate, sand/cobbles in granite boulders, sandy alluvium, exposed eskers, sometimes w/Empetrum	
X	*S. herbacea*	New England dwarf willow	Snowbank indicator species, tiny, snowflush assns.	
X	*S. lanata* ssp. *Richardsonii* (Syn.*:*)	Lanate willow	Well-watered sandy, gravelly places	
X	*S. planifolia*	tealeafed willow	Snowpatches, and sheltered slopes	
X	*S. planifolia* ssp. *tyrrellii*	Tealeaf willow	*Very* similar to *S. planifolia*; delisted from COSEWIC list as result of this project.	Range extension, but much larger range than originally thought.
X	*S. reticulata*	Net-veined willow	Calcareous soils, sandy, turfy not-to-dry spots	
Birch	**Betulaceae**			
X	*Betula nana* (Syn.*: B. glandulosa)*	Swamp birch	Very common throughout project. Some affiliation with acidic rocks, but ubiquitous in this area.	
Smartweed	**Polygonaceae**			
X	*Oxyria digyna*	Mountain-sorrel	Snowbanks, cool moist ravines, below bird cliffs, etc.	
X	*Polygonum viviparum*	Viviparous pondweed	Turfy, rocky, moist grassy areas, animal dens	
Purslanes	**Portulaceae**			
	Montia fontana (Syn.*: M. lamprosperma)*	Fountain miner's - ettuce	Wet places, mossy lakeshores, sedge assns, pond edges	"Sensitive"
Pinks	**Caryophyllaceae**			
	Arenaria humifusa	Creeping sandwort	Moist calcareous gravels, crevices	
X	*Cerastium alpinum*	Alpine chickweed	Rocky, sandy, gravelly, bird cliffs and animal dens	
X	*Honckenya peploides*	Seabeach sandwort	Sandy or gravelly beaches, seaside mud flats	
X	*Minuartia rubella*	Boreal sandwort	Dry, sandy, gravelly places, exposed	
	Sagina caespitosa	Tufted pearlwort	Seepage slopes	
X	*Silene acaulis*	Moss campion	Well-drained gravelly or turfy places	
X	*Silene involucrata* (Syn.*: Melandrium affine)*	Arctic catchfly	Not too dry, stony, gravelly, animal dens	
X	*Silene uralensis* (Syn.*: Melandrium apetalum)*	Apetalous catchfly; red bladder campion	Wet tundra, lakeshores	

Table A1-1: Vascular Plant Species List (continued)

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
X	*Stellaria humifusa*	Creeping sandwort	Salt flats, seashores, mud flats	
X	*S. longipes* (includes: *S. monantha* and *S. edwardsii)*	Long-stalked stitchwort (inc. blue-green chickweed)	Wide variety of habitats, wet meadows to dry slopes; animal dens, disturbed sites, grassy/gravelly moist tundra	
Buttercups	**Ranunculaceae**			
X	*Anemone richardsonii*	Yellow anemone	Moist tundra, often under willows, near snowbanks	
	Ranunculus cymbalaria	Seaside crowfoot	Seashores, mud flats	"Sensitive"
X	*R. flammula var. filiformis*	Lesser spearwort	Pond edges	
X	*R. gmelinii*	Small yellow water crowfoot	Ponds, shallow water	
	R. hyperboreus	Arctic buttercup	Shallow fresh or brackish water, among sedges/grasses	
	R. longirostris (Syn.: *R. aquatilis)*	Eastern white water-crowfoot	Shallow water ponds	"Sensitive"
	R. pallasii	Pallas' buttercup	Wet, brackish meadows, sloughs, coastal	"Sensitive"
X	*R. pedatifidus*	Northern buttercup	Calcareous gravelly, sandy or grassy spots	
	R. pygmaeus	Dwarf buttercup	Snowbank communities	
Poppies	**Papaveraceae**			
X	*Papaver radicatum*	Greenish yellow	Wet calcareous gravelly spots	
Mustards	**Brassicaceae (Formerly: Cruciferae)**			
X	*Arabis arenicola*	Arctic Rockcress	Calcareous sand/gravel, lake shores or river banks	
X	*Cardamine bellidifolia*	Apline Bittercress	Wet mossy places, shady crevices	
X	*C. digitata*	Richardson's bittercress	Moist, turfy places, hummocks, strongly nitrophilous	
X	*C. pratensis*	Cuckoo-flower	Sedge meadows	
X	*Cochlearia groenlandica* (Syn.: *C. officinalis)*	Greenland cochlearia	Rocky islands, coasts, bird nesting areas	
X	*Descurainia sophioides*	Northern tansy-mustard	Disturbed sites, dens, roadsides	"Sensitive"
	Draba alpina	Alpine whitlow-grass	Snowbeds, moist tundra, clay in wet gravelly barrens	
X	*D. glabella*	Rock whitlow-grass	Rocky grassy situations, strongly nitrophilous, nest/den sites	
X	*D. lactea*	Milky whitlow-grass	Not too dry turfy places, snowbanks	
X	*D. nivalis*	Yellow Arctic whitlow	Dry, rocky gravelly places, should be present	
X	*Eutrema edwardsii*	Edward's euterma	Calcareous soils, nitrophilous, not too dry turfy tundra	
Saxifrages	**Saxifragaceae**			
X	*Parnassia kotzebuei*	Kotzebue grass-of-Parnassus	Edges of wetlands, low coasts, lee slopes of eskers	
	P. palustris	Marsh grass-of-Parnassus	Low areas along coast	

Table A1-1: Vascular Plant Species List (continued)

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
X	*Saxifraga aizoides*	Yellow mountain saxifrage	Edges of lakes or ponds	
X	*S. cernua*	Nodding saxifrage	Moist ledges, moss or wet sand by brooks or lakeshores	
X	*S. cespitosa*	Tufted saxifrage	Rocky, gravelly situations	
X	*S. foliolosa*	Leafy saxifrage	Mossy, springy places, lakeshores, brooks, wet tundra	
X	*S. hirculus*	Yellow marsh saxifrage	Sedge meadows	
X	*S. oppositifolia*	Purple mountain saxifrage	Moist calcareous gravels, wet cliffs.	
X	*S. rivularis*	Alpine Brook saxifrage	Wet gravelly mossy places, nitrophilous, bird nesting areas	
X	*S. tricuspidata*	Prickly saxifrage	Dry rocky gravelly spots.	
Roses	**Rosaceae**			
X	*Argentina egedii (*Syn.*: Potentilla egedii)*	Egede's cinquefoil	Seashores, littoral	"Sensitive"
X	*Comarum palustre*	Marsh cinquefoil	Pond and stream edges, shallow water	
X	*Dryas integrifolia*	Entireleaf mountain-avens	Rocky, gravelly spots, exposed ridges	
	Potentilla nana (Syn: *Potentilla hyparctica*)	Arctic cinquefoil	Rocky places, ravines, talus slopes	
X	*P. nivea*	Snow cinquefoil	Rocky sunny spots, animal burrows, cliffs	
X	*P. pulchella*	Pretty cinquefoil	Sandy, gravelly, dry tundra, sometimes strandflats	
X	*Rubus chamaemorus*	Cloudberry, aaqpiq	Edges of wetlands, hummocks	
X	*Sibbaldia procumbens*	Arizona cinquefoil	Sheltered slopes, near snowbanks	
Peas	**Fabaceae (Formerly: Leguminosae)**			
X	*Astragalus alpinus*	Alpine milkvetch	Well-watered calcareous sand or gravel	
X	*A. eucosmus*	Pretty milkvetch	Calcareous gravels, often among willows on sand/gravel bars, sheltered lakeshores	"Sensitive"
X	*Hedysarum alpinum*	Apline sweet-vetch	Calcareus sands/gravels, sheltered lake or river shores	
X	*H. boreale* ssp. *mackenzeii (*Syn.*: H. mackenzeii)*	Boreal sweet-vetch	Calcareous clays and gravels, sheltered lakeshores	
X	*Oxytropis arctica var. bellii (*Syn.*: O. bellii)*	Arctic crazy-weed	Dry, gravelly slopes and in rocky tundra	
X	*Oxytropis borealis (*Syn.*: O. hudsonica)*	Boreal locoweed	Not too dry, calcareous sand and gravels	
X	*Oxytropis maydelliana*	Maydell's point-vetch	Dry, turfy tundra, many places	
Crowberry	**Empetraceae**			
X	*Empetrum nigrum*	black crowberry	Dry uplands, ridge crests, eskers	
Evening Primrose	**Onagraceae**			

Table A1-1: Vascular Plant Species List (continued)

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
X	*Chamerion angustifolium* (Syn.: *Epilobium angustifolium*)	Fireweed	Disturbed sites, roadsides	
X	*Chamerion latifolium* (Syn.: *Epilobium latifolium*)	River beauty	Dry gravels, sandbars in rivers, dry slopes	
X	*Epilobium palustre*	Marsh willowherb	Uncommon and easily missed, wet clay on tundra barrens	
Water milfoil	**Haloragaceae**			
X	*Hippuris vulgaris*	Mare's tail	Emergent, shallow ponds, lake bays	
Wintergreen	**Pyrolaceae**			
X	*Orthilia secunda* (Syn.: *Pyrola secunda*)	one-sided wintergreen	Moist thickets and under willows/birches	
X	*Pyrola grandiflora*	Arctic wintergreen	Shady areas under willows	
Heaths	**Ericaceae**			
X	*Andromeda polifolia*	Bog rosemary	Hummocky areas, edges of wetlands	
X	*Arctostaphylos alpina*	Alpine manzanita; alpine bearberry	Acid, rocky to gravelly, dry areas	
X	*Arctostaphylos rubra*	Red Manzanita, Red bearberry,	Moist slopes, edges of wetlands, hummock areas	
X	*Cassiope tetragona*	Arctic bell-heather	Tundra, snowbank edges	
X	*Ledum palustre* (Syn.: *L. decumbens* and *L. palustre decumbens*)	Marsh Labrador tea	Shrub moss-lichen heath, ledges	
X	*Loiseleuria procumbens*	Alpine-azalea	Open tundra, well-drained uplands	
X	*Phyllodoce caerulea*	Blue mountain heath	Snowbank areas, sheltered lee slopes	
X	*Rhododendron lapponicum*	Lapland azalea	Dry rocky tundra,stony slopes	
X	*Vaccinium uliginosum*	Alpine blueberry	Acid soil, great variety of habitats	
X	*Vaccinium vitis-idaea*	Mountain cranberry	Well-drained areas, hummocky terrain, widespread	
Diapensia	**Diapensiaceae**			
X	*Diapensia lapponica*	Lapland diapensia	Exposed ridges	
Primrose	**Primulaceae**			
X	*Androsace septentrionalis*	Pygmy-flower rock-jasmine	Disturbed sites, sandy, dry sites	
	Primula egaliksensis	Greenland primrose	Moist pond edges	
	P. stricta	Stiff primrose	Moist pond edges, edges of wetlands	
Leadwort	**Plumbaginaceae**			
X	*Armeria maritima* (Syn.: *Armeria maritima* ssp. *labradorica*)	Thrift seapink	Gravelly tundra, floodplains, lake shores	
Borage	**Boraginaceae**			
	Mertensia maritima	Seaside bluebells,	Gravels or sands, by seashore	
Snapdragon	**Scrophulariaceae**			
	Castilleja raupii	Raup's Indian-paintbrush	Riverbanks, lakeshores	
X	*Pedicularis capitata*	Capitate lousewort	Gravelly, calcareous tundra or heath	
X	*P. flammea*	Red-tiplousewort	Moist calcareous tundra, snowbeds	

Table A1-1: Vascular Plant Species List (continued)

Family	Scientific Name[a]	Common Name[a]	Habitat	Notes
X	*P. labradorica*	Labrador lousewort	Open upland tundra	
X	*P. lanata* ssp. *lanata*	Woolly lousewort	Moist stony tundra	
X	*P. lapponica*	Northern lousewort	Sheltered slopes, sometimes under willows	
X	*P. sudetica*	Sudetan lousewort	Wetlands, sedge associations, pond edges	
Bladderwort	**Lentibulariaceae**			
X	*Pinguicula villosa*	Hairy butterwort, small butterwort	Found *only* in Sphagnum moss, in small hillside seeps	"Sensitive"
X	*P. vulgaris*	Common butterwort	Wetlands	"Sensitive"
Harebells	**Campanulaceae**			
X	*Campanula uniflora*	Arctic harebell	Calcareous slopes and gravelly ridges	
Composite	**Asteraceae (formerly: Compositae)**			
X	*Artemisia campestris* (Syn.*: A. borealis)*	Pacific wormwood	Sandy areas on eskers	
X	*Antennaria alpina*	Alpine pussytoes	Dry slopes	
X	*A. friesiana*	Fries' pussytoes	Rocky lichen-covered slopes	
X	*Dendranthema arcticum* (Syn.*: Chrysanthemum arcticum* &*Leucanthemum arcticum)*	Arctic daisy	Moist, saline meadows, moist gravel, seashores	
	Erigeron uniflorus ssp.*eriocephalus* (Syn.*: E. eriocephalus)*	One-flower fleabane	Dry, gravelly, calcareous soils	
X	*E. humilis*	Arctic alpine fleabane	Below snowbank associations, damp slopes	
X	*Saussurea angustifolia*	Narrow-leaved saw-wort	Open upland tundra	
	Taraxacum officinale (Syn.*: T. lacerum)*	Common dandelion	Moist, mineral soils seashores, den sites, bird cliffs, etc.	
X	*Senecio congestus*	Mastodon flower	Seashores, salt marshes, wetlands	
X	*Tripleurospermum maritimum* ssp. *phaeocephala* (Syn.*: Matricaria ambigua)*	False chamomile	Moist sandy seashores, salt marshes	

[a] Source: NatureServe (2009)

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Tentative list of possible lichens present in the Meliadine area, Kivilliq Region derived from field identifications and literature on the Rankin Inlet area.

Scientific Name	Common Name
Alectoria nigricans	Black hair lichen
A. ochroleuca	Green hair lichen
Arctoparmelia centrifuga (Syn.: Parmelia centrifuga)	Sunburst lichen
Asahinea chrysantha	Arctic rag lichen
Aspicilia cinerea (Syn.:Lecanora cinerea)	Cinder lichen
Bryoria nitidula	Tundra horsehair lichen
Bryocaulon divergens (Syn.:Cornicularia divergens)	Antler lichen
Cetraria ericetorum	Iceland lichen
C. islandica	True Iceland lichen
Cetrariella delisei	Snowbed Iceland lichen
Cladina arbuscula	Reindeer lichen
C. mitis	Green reindeer lichen
C. rangiferina	Grey reindeer lichen
C. stellaris	Star-tipped reindeer lichen
Cladonia borealis	Boreal pixie-cup
C. cervicornis ssp. *verticillata*	Ladder lichen
C. chlorophaea	Mealy pixie-cup
C. cornuta	Bighorn cladonia
C. crispata	Organ-pipe lichen
C. pyxidata	Pebbled pixie-cup
C. squamosa	Dragon-funnel
C. uncialis	Thorn cladonia
Collema tenax	Tar-jelly
Dactylina arctica	Arctic finger lichen
Flavocetraria cucullata (Syn.: Cetraria cucullata)	Curled snow lichen
*F. nivalis (*Syn.*: Cetraria nivalis)*	Crinkled snow lichen
Haematomma lapponicum	Bloodspot lichen
Hypnogymnia physodes	Hooded tube lichen
Icmadophila ericetorum	Candy lichen
Masonhalea richardsonii	Arctic tumbleweed
Melanelia stygia	Alpine camouflage lichen
Nephroma arcticum	Arctic kidney lichen

Scientific Name	Common Name
Ophioparma ventosa	Arctic bloodspot lichen
Parmelia sulcata	Hammered shield lichen
Peltigera aphthosa	Common frecklepelt
Peltigera didactyla	Alternating dog-lichen
Pertusaria dactylina	Finger wart lichen
Porpidia flavocaerulescens	Orange boulder lichen, Halloween lichen
Pseudephebe pubescens	Fine rockwool, brushcut lichen
Rhizocarpon geminatum	Twinned map lichen
Rhizocarpon geographicum	Yellow map lichen
Sphaerophorus fragilis	Fragile coral lichen
Stereocaulon tomentosum	Gray mealy lichen
Tremolecia atrata (= Lecidia atrata)	Rusty rock lichen
Thamnolia vermicularis	Whiteworm lichen
Umbilicaria hyperborea	Blistered rock tripe
Xanthoria elegans	Jewel lichen

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Brodo, I.M., Sharnoff, S.D., and S. Sharnoff. 2001. Lichens of North America. Yale University Press, New Haven, CT.

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Korol, J.B. 1992. The vascular plant flora of Rankin Inlet, District of Keewatin, Northwest Territories. Canadian Field-Naturalist. 106(3): 342-347 (July – Sept., 1992).

Porsild, A.E. and Cody, W.J. 1980. Vascular Plants of the Continental Northwest Territories, Canada. National Museum of Natural Sciences, National Museums of Canada. 667 pp.

Rowe, J.S., Cochrane, G.R., and Anderson, D.W. 1977. The tundra landscape near Rankin Inlet, N.W.T. Musk-Ox 20: 66-82.

Vitt, D.H., Marsh, J.E., and Bovey, R.B. 1998. Mosses, Lichens, and Ferns of Northwest North America. Lone Pine Publishing, Edmonton, AB. 296 pp.

The following are mosses and liverworts reported in the literature for the Rankin Inlet/lower Meliadine River area.

Scientific name	Common name
Abietinella abietina	Abietinella moss
Aulacomnium palustre var. imbricatum	Light aulacomnium moss
A. turgidum	Stiff aulacomnium moss
Ceratodon purpureus	Ceratodon moss
Dicranum elongatum	Tall dicranum moss
D. groenlandicum	Greenland dicranum moss
Drepanocladus revolvens revolvens	–
Hylocomium splendens	Splendid feather moss
Hypnum callichroum	Hypnum moss
H. hamulosum	
Oncophorus wahlenbergii	Wahlenberg's oncophorus moss
Pohlia nutans	Pohlia moss
Polytrichum juniperinum	Juniper polyrtichum moss
Ptilidium ciliare	–
Racomitrium lanuginosum	Grey moss, woolly hair-moss
Sphagnum fimbriatum	Sphagnum moss
S. girgensohnii	–
S. rubellum	Red sphagnum moss
Tomenthypnum nitens	–
Marchantia polymorpha	Common liverwort

REFERENCES:

Cochrane, G.R., and Rowe, J.S. 1969. Vegetation studies in the Rankin Inlet region, NWT, Canada. Musk-Ox 5: 41-44.

Rowe, J.S., Cochrane, G.R., and Anderson, D.W. 1977. The tundra landscape near Rankin Inlet, N.W.T. Musk-Ox 20: 66-82.

Vitt, D.H., Marsh, J.E., and Bovey, R.B. 1998. Mosses, Lichens, and Ferns of Northwest North America. Lone Pine Publishing, Edmonton, AB. 296 pp.

The following list was taken directly from a note on botanical research done at Rankin Inlet by Finnish botanist E. Ohenoja, who visited Rankin Inlet 9 to 24 August 1971. No attempt has been made to determine current taxonomy for the fungi.

Mycorrhizal fungi living in association with roots of woody plants, especially *Betula nana* and the willows:

Hebeloma
Inocybe
Dermocybe
Cortinarius
Lactarius
Russula
Amanita nivalis
Leccinum scabrum

Fungi living in association with algae:

Omphalina ericetorum

Saprophytes:

Helvella
Peziza
Sepultaria
Thuemendidium
Hygrocybe
Hygrophorus
Clitocybe
Laccaria
Omphalina
Mycena
Rhodophyllus
Calvata
Lycoperdon
Marasmius epidryas
Calvatia
Corynetes arenarius

Wet places:

Scutinellia
Leptoglossum lobatum
Omphalina philonotis
Galerina

REFERENCES:

Ohenoja, E. 1972. Preliminary note on botanical research at Rankin Inlet, 1971. Musk-Ox 10: 67.

Date: Y 2008	M: 09	D:	Plot #: 08-	Code: Meliadine W	Notes:
Team: Page Burt,					Perm. Plot#:
Location:					

Photos	Card:	Photo #'s:
Coordinates:		Lat./Northing	Long/West	Elevation:
Wpt:	UTM:			

SITE INFO:					
Slope:		Aspect:		Moist:	Nutrients:

Terrain:	(Circle)		Microtopography:		(X)	
esker/ridge crest		cliff:	hummocky		frost fiss.	
ridge slope		stream	frost boils		flat	
valley bottom		delta	solifluct		br. outcrop	
lakeshore			circles		boulders	
floodplain, river			bould strm		bould field	
upland			polygon		shattered br.	

Substrate:						
Organics:		Mineral soil:		Water:		
Bedrock		% Sand	% Gravel	Standing	Flowing	
Rocks:						
% of surf. covered:		Moisture:				
dist betw stones:		Wet	Wet-mesic	Mesic	Mesic-Dry	Dry
type of stones:						

Perm. Plot species coll:	a.	b.
c.	d.	
e.	f.	

Soils notes (for soil plots only):

Misc. notes

Vegetation:										
									Veg. Code 1:	
Representing:									Veg. Code 2:	
% Cover by layer:		Organics: fr other side: ____		Tree/erect shrub:_____				**Lichens:**	%
Dwarf Shrub:	_____	Herb:	_____	Moss/Lichen:	_____			cetrniva	
Shrubs:	%	**Non-flow:**	%	**Saxifrages**	%			cetrtile	
betunana		cystfrag		chrytetr				Cladina	
salirich		equiarve		saxiaizo				Cladonia	
Salix _____		Equisetum		saxicaes				stertome	
ledupalu		Lycopodium		saxicern				thamsubu	
Dwarf shr.	%	dryorrag		saxifoli				Alectoria	
saliarct				saxihirc				dactarct	
saliherb		**Forbs:**	%	saxiniva				**Rock lichens**	
salireti		Tofieldia ____		saxioppo				map	
Salix _____		oxyrdigy		saxirivu				jewel	
Arcto _____		polyvivi		saxitric				rock tripe	
andrpoli		ceraalpi		Saxi._____				bloodspot	
vaccviti		potenivi		Saxi._____				blk crustose	
vacculig		Potentilla ____		epillati				sunburst	
casstetr		melaaffi		hippvul					
rhodlapp		melaapet		pyrogran					
dryainte		Minuartia		armemari				**Mosses**	
Sedges:	%	sileacau		Pedic._____				racolanu	
careaqua		Stellaria		pediarct				Sphagnum	
caremisa		ranuniva		pedicapi				str. mosses	
carebige		ranupygm		pedihirs				cushion	
carecapi		ranulapp		pedilana					
carememb		Ranunculus sp.		pedisude				**Biol. crust.**	
carenard		paparadi		**Composite**					
carescir		**Mustards**	%	Antennaria	%			**Other:**	%
carerupe		Arabis		leucinte				Campanula	
Cottongr:	%	Braya		Erigeron				loisproc	
erioangu		carddigi		matrambi				diaplapp	
eriocalli		cardprat		senecong				empenigr	
erioruss		cochoffi		Taraxacum					
eriosche		Draba		**Grasses:**					
eriovagi		drabalpi		arctlati				**Legumes:**	
Rushes:	%	drabglab		Cala._____				Astr._____	
luzuconf		Eutrema		alopalpi				Oxyt:_____	
luzuniva		lesqarct		Hier._____				Hedy._____	
Juncus				Poa _____					
WILDLIFE NOTES:		Sighting/heard	Scats	Dens/burrows	Runs/trails	Nests	Other		
ARCHAEOLOGY NOTES:									

Confusion Matrix

	RSA Classes							
User \ Reference Classes	Heath Tundra	Bare Ground	Heath Boulder	Heath Lichen-Cetraria	Low Shrub	Tussock-Hummock	Heath Lichen - Hair Lichen	Total
Heath Tundra	10	0	0	0	0	2	1	**13**
Bare Ground	0	6	0	0	0	0	0	**6**
Heath Boulder	0	2	7	2	0	2	1	**14**
Heath Lichen-Cetraria	0	0	1	7	0	1	0	**9**
Low Shrub	0	0	0	0	10	0	0	**10**
Tussock-Hummock	0	0	2	1	0	7	1	**11**
Heath Lichen - hair lichen	0	0	0	0	0	0	5	**5**
Unclassified	0	2	0	0	0	0	0	**2**
Total	**10**	**10**	**10**	**10**	**10**	**12**	**8**	

Accuracy

	RSA Classes						
	Heath Tundra	Bare Ground	Heath Boulder	Heath Lichen-Cetraria	Low Shrub	Tussock-Hummock	Heath Lichen - Hair Lichen
Producer	1	0.6	0.7	0.7	1	0.5833	0.625
User	0.7692	1	0.5	0.7778	1	0.6364	1
Hellden	0.8696	0.75	0.5833	0.7368	1	0.6087	0.7692
Short	0.7692	0.6	0.4118	0.5833	1	0.4375	0.625
KIA per Class	1	0.5625	0.625	0.6557	1	0.5056	0.5962

Totals

Overall Accuracy	**0.7429**
KIA	**0.7006**

1.0 INTRODUCTION

Plant community types represent mappable units at a scale of 1:10 000 and correspond to major vegetation units that are often associated with distinct terrain features. Within each plant community type, a series of subgroups, or plant associations, have been described that are based on field level observations. These units are not mappable, but have been described to provide additional information on the natural level of variability associated with each plant community type and are summarized in the following sections.

2.0 SEDGE COMMUNITY

The sedge community is found adjacent to lakes and streams on very poorly drained soils and in low-lying areas between upland ridges or plateaus, where substantial amounts of water drain from the uplands and accumulate on poorly to very poorly drained soils. Within the sedge community, 4 non-mappable plant association units were identified as follows:

- Sedge association – emergent (Se);
- Non-tussock sedge association (Snt);
- Tussock sedge association (St); and
- Sedge association – frost scars (Sfs).

2.1 Sedge Association – Emergent (Se)

This association includes vegetation that is rooted in shallow water (less than 30 cm), in small tundra ponds (2008, PHOTOS 1 and 2), and in the shallow bays of larger ponds or lakes. It also occurs around the shores of some larger ponds or lakes where it forms a narrow band along the shore depending on the slope of the lake bottom.

Emergent vegetation consists predominantly of *Carex aquatilis*, which does not form tussocks or tufts, but instead grows in loose stands with plants connected by underground or underwater rhizomes. In shallower water, smaller sedges, such as *C. saxatilis* or *C. rariflora*, form small stands, along with pendantgrass (*Arctophila fulva*). The narrowleaf cotton-grass (*Eriophorum angustifolium)* also occurs along the edges of ponds. Occasionally, shallow ponds support a uniform growth of mare's tail (*Hippuris vulgaris*) or a few plants of *Ranunculus gmelinii*. Rarely, small rushes (*Juncus albescens, J. biglumis*) grow among the sedges where the water is less than 10 cm deep, or among plants at the edges, and the grass *Arctophila fulva* grows in tufts at the edges or on small ridges on the shore. Variegated horsetail (*Equisetum variegatum*) and the lesser spearwort, *Ranunculus flammula* var. *filiformis* sometimes occur where there are small mudflats. The cuckoo-flower (*Cardamine pratensis*) often occurs in this association. Occasionally, the insectivorous butterwort *Pinguicula vulgaris*, grows in the damp edges of small ponds, but it is not common along the west coast of Hudson Bay.

In some cases, a dense brownish green scum, likely the cyanobacteria *Nostoc,* develops on the bottom of ponds. This species is often stranded by receding water levels in ruffled lettuce-like pieces on the shores and is an important species to these communities as it not only adds oxygen to the water through photosynthesis, but is

also a “nitrogen fixer,” contributing to the fertility of the pond and adjacent soils (Rowe et al. 1977; Pielou 1994). Little other vegetation occurs in the small ponds.

Representative photos of this community association are identified below:

- 1998, PHOTO 1, Plot 98-235
- 2008, PHOTO 1, Plot 08-025, small pond near Meliadine River crossing
- 2008, PHOTO 2, Near Plot 08-040, small pond, interior
- 2008, PHOTO 3, Near Plot 08-025, *Eriophorum angustifolium.*

2.2 Drainage Basin Non-tussock Sedge Association (Snt)

This plant association occurs where water forms shallow dendritic drainage patterns (in which case it occupies the channels or their edges) or flows slowly across the land in a thin sheet (see A7-1). In watercourses, such as the one to the west of the Meliadine West camp, the flow of water in the channels varied in depth from 40 cm in June to 20 cm in August (1998, PHOTO 2).

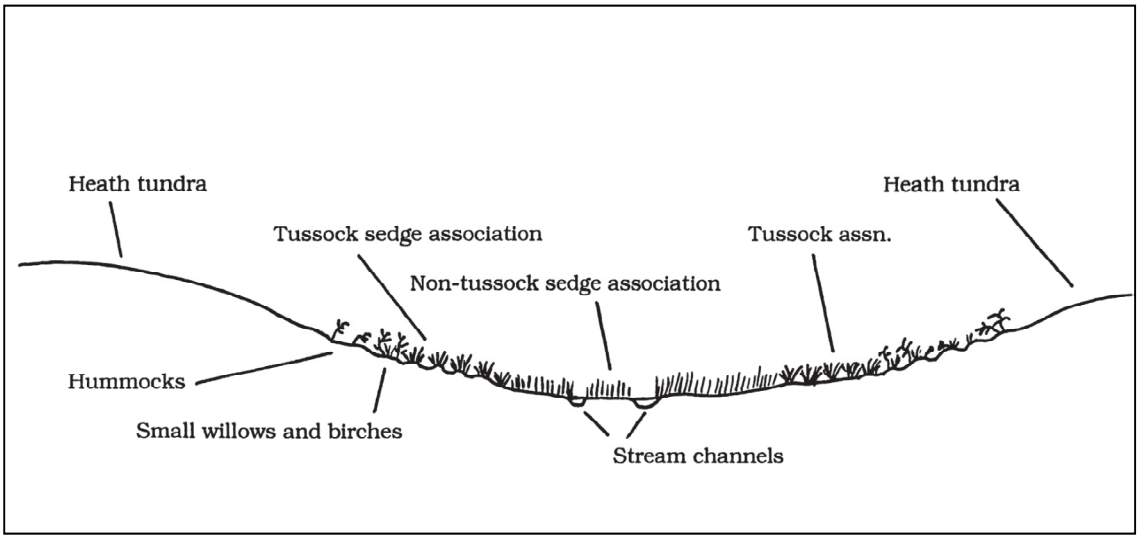

Figure A7-1: Sedge Associations in a Drainage Basin

Most of the sedges in this association do not form tussocks, but have a uniform growth of upright leaves and stems, though some tussock-forming sedge species may be present. Characteristic species of this area include *Eriophorum angustifolium*, *E. scheuchzeri, Juncus albescens, J. arcticus,* and *J. biglumis, Carex aquatilis*, *C. atrofusca*, *C. membranacea*, *C. rariflora*, *C. rotundata*, and others. Small, prostrate willows are common in this association, mostly the trailing type, especially *Salix arctophila*, *S. glauca* var. *callicarpaea* is often present in this association, and *S. planifolia* sp. *tyrrellii* was found at the edge of the association in several locations. Common forbs include *Saxifraga hirculus*, *S. foliolosa*, *Cardamine pratensis*, *Silene uralensis*, *Parnassia kotzebuei*, and *Comarum palustre*. A few of the larger sedge basins enclose a fairly thick growth of willows, and could be considered to grade into riparian willow communities.

In wide, gently sloping terrain, this association often occurs upslope from small solifluction ridges that are represented by peaty ridges enclosing small sedge mats and occasionally, small ponds. Since the ridges develop across the slope of the land, the sedgy depressions appear to be roughly aligned behind or upslope of the ridges. Rowe et al. (1977) use the interesting analogy that these resemble rice "paddies." Occasionally, the transition from sedge association to lichen-heath is quite abrupt and distinct (2008, PHOTO 6). This is a small transitory pond with non-tussock sedges in the basin, a distinct lip to the pond, and lichen-heath with black hair lichen right to the edge.

Representative photos of this community association are identified below:

- 1998, PHOTO 2. Watercourse to west of camp
- 1998, PHOTO 3, Plot 98-225
- 2008, PHOTO 4, Plot 08-018, non-tussock association at edge of lake
- 2008, PHOTO 5, Plot 08-052, area south of Lake A54
- 2008, PHOTO 6, Near Plot 08-035, small transitory pond showing abrupt transition non-tussock sedge to lichen-heath.

2.3 Tussock Sedge Association (St)

Tussock-forming species tend to become established toward the edges of the sedge basins, in places where water flow is more sporadic, or where flowing water forms a sheet less than 2 cm in depth. These include members of the genera *Eriophorum,* mostly *E. vaginatum,* as well as *Carex atrofusca, C. membranacea, C. misandra,* and *C. scirpoidea*. The tussock growth form is thought to be an adaptation to exposure to frost injury and desiccation and erosion due to wind and wind-borne ice crystals as the old leaves and fruiting stalks persist for several years, protecting the sheathed growing points (Savile 1972). Tussock sedge associations are much less common in the Meliadine area than was expected. They do occur, but are relatively small, and most are well on the way to becoming hummocks, invaded by heaths and forbs.

Due to the compact growth form, each tussock provides a little "island" microclimate, surrounded by a wetter "matrix" through which water often flows. The elevated heads of the tussocks provide more mesic (dry) conditions in summer. This permits heaths, such as blueberry (*Vaccinium uliginosum*), marsh Labrador tea (*Ledum palustre*), bog rosemary (*Andromeda polifolia*), mountain cranberry (*Vaccinium vitis-idaea*), and arctic white heather (*Cassiope tetragona*) to become established. Also, small shrubs, including mountain avens (*Dryas integrifolia*), willows and birches, and forbs, such as the Lapland lousewort (*Pedicularis lapponica*), *Cardamine digitata* (and others), may also be found growing on top of the tussocks. Grasses, such as *Arctagrostis latifolia*, and the blue-grasses, *Poa arctica* and P*. alpina,* also become established in the tussocks, especially in the drier areas.

A different type of tussock is often found at the edges of tiny ponds, in areas high in peat. In these cases, almost pure stands of *Trichophorum caespitosum* extend for a metre or so from the edge (2008, PHOTO 7). These likely become established in areas subject to occasional flooding due to summer rains, and may also be associated with calcareous soils (Porsild and Cody 1980).

Representative photos of this community association are identified below:

- 1998, PHOTO 4, Plot 98-307
- 2008, PHOTO 7, Plot 08-033

2.4 Sedge Association – Frost Scars (Sfs)

Very rarely, frost scars (frost boils, mud boils, and sorted circles) occur in the tussock zone, but these are not mappable. The areas between the tussocks are often occupied by a peaty organic matter, which appears to be mostly dead moss, flattened to the ground. There is evidence (flotsam and bent stems) of a seasonal flow of water among the tussocks, but this flow does not persist nearly as long as the flow in the non-tussock areas. The centres of these boils usually have little vegetation due to the movement of the soil. The rims are usually elevated, and in sedge areas, are usually colonized with heaths and sometimes *Rubus chamaemorus*.

3.0 SEDGE-HEATH TUNDRA TRANSITIONS

In many cases, the margins of the sedge communities are not always clearly delineated, and there is an ecotone several metres wide between the sedge community and adjacent heath tundra. In this ecotone or transitional zone, sedges communities are intermixed with heath communities, blending gradually into the typical heath tundra in drier areas. The exception is the transition between sedges and boulder, which tends to be quite abrupt. These transition types are not mapped as distinct communities, but are recognized as unique plant associations that are usually included as part of the sedge community.

3.1 Transitions – Hummocks (Th)

At the edges of many sedge associations, especially those in which a well-defined tussock zone is present, the transition to heath tundra occurs in a turf hummock zone. A turf hummock is defined as “a hummock (mound) consisting of vegetation and organic matter with or without a core of mineral soil or stones” (van Everdingen 1998). Turf hummocks change size with the seasons, enlarging as ice within them expands and accumulates by capillary action and ice needles form, lifting the crown of the hummock. When the crown extends above the snow line in winter, plant cover is eroded away, and the soil is exposed. The heat from the sun in summer penetrates more deeply melting the frost layer, and water percolates to the surface, raising the moisture content there. Frost heaving increases, pushing any rocks out the top of the hummock, causing a scar, often called a frost boil. When the frost needles melt in summer, the centre of the boil collapses slowly. Plants invade from the edges, eventually forming a complete cover, and the cycle begins again (Zwinger and Willard 1972).

Turf hummocks may originate as sedge tussocks invaded by the heaths and other species more typical of heath tundra. According to Bird (1967), this is the most common form of hummock in northern Canada -- a mound developed initially from the tight mat of stalks, leaves, and roots of certain sedges (*Carex aquatilis, C. atrofusca, C. scirpoidea,* and others) and cotton-grasses (*Eriophorum* sp.). Colonization of the mound by heaths usually occurs on the sides of the tussocks, with blueberries, Labrador tea, and mountain cranberries growing amongst the leaves of the sedge or cotton-grass (2008, PHOTO 9). Mosses cover the ground between the tussocks and

extend up the sides of the tussocks, while cloudberries (*Rubus chamaemorus*) often become established in the moss.

An alternate origin of the hummocks may be moss mats that become established in the sedge meadows (Pielou 1994). These insulate the ground, and miniature ice lenses form within the growing hummock, enlarging with its growth. Heaths invade the moss cushion, and other plants, like cardamines (*Cardamine digitata)* and viviparous pondweed (*Polygonum viviparum*) also become established in the mounds. The tops of the larger hummocks may be quite dry, with swamp birch (*Betula nana*) and mountain-avens (*Dryas integrifolia*) becoming firmly established.

Rowe et al. (1977) mentioned that 3 classic types of hummock formation (soil injection, erosion, and plant growth) were all found between Rankin Inlet and the Meliadine River, near Nipisar Lake. They also state that "in a few places beyond the study site, *Sphagnum fimbriatum*, *S. girghensonii*, and *S. rubellum* formed hummocks on wet slopes. However, *Sphagnum* spp. are typically uncommon in the region and contribute little to the vegetation and to the microtopographic forms.

Representative photos of this community association are identified below:

- 1998, PHOTO 5, Plot 98-257
- 2008, PHOTO 8, Plot 08-046, hummocky terrain
- 2008, PHOTO 9, Plot 08-046, close-up of hummock.

3.2 Transitions – Hummocks with Frost Scars (Th+fs)

Hummocky areas may also include frost scars, like mud boils or solifluction ridges. The mud or frost boils usually have a centre, sometimes containing a high percentage of sand, with little vegetation growth. This centre is often saturated with water and any shock, such as stomping on it, will cause it to go to an unstable jelly-like consistency. These boils often have a raised rim occupied by sedges, as well as heaths, especially blueberry, lingonberry, and Labrador tea, with bog rosemary and cloudberry on the perimeter (2008, PHOTO 14). These are usually not mappable as they are incorporated in the hummock area, which usually intergrades with the sedge community and heath tundra on the hillsides.

Along the perimeters of a sedge basin, the soil is less saturated, and as a result, less prone to frost heaving activity. In these areas, colonization by heaths is more complete, and each tussock or moss mound seems to lose its identity, becoming a cushion covered with heaths. Closer to the margins of these sedge basins, even the spaces between cushions are filled with heaths and related species, and the surface becomes merely undulating. Where it merges with the surrounding heath tundra, the hummocks are barely visible, and the sedges are represented only by small individual plants.

3.3 Transitions – Gradual Intergradation on Slopes (Tsl)

Hummocks do not commonly form on most slopes, particularly those that have a stepper gradient. In this transitional type, the change from sedge association to heath tundra is simply one of replacement of sedges by

heaths and related species, such as black crowberry (*Empetrum nigrum*). The more gradual or steep the slope gradient is, the wider or narrower the ecotone band becomes.

Representative photos of this community association are identified below:

- 1998, PHOTO 6, Plot 98-285
- 2008, PHOTO 10, Plot 08-050, Ecotone on slope.

3.4 Transitions – Solifluction Ridges (Tsolif)

Solifluction ridges are another transition zone characterized by long narrow ridges usually extending across the slope of the land (Figure A7-2). Solifluction ridges typically have a frozen core of stony, sandy soil capped by mosses, sedges and heaths and they slowly migrate downslope, rolling over and over, incorporating organic matter as they move (Rowe et al. 1977). According to Bird (1967) solifluction ridges develop as the plant cover moves downslope with the active layer, creating steplike ridges.

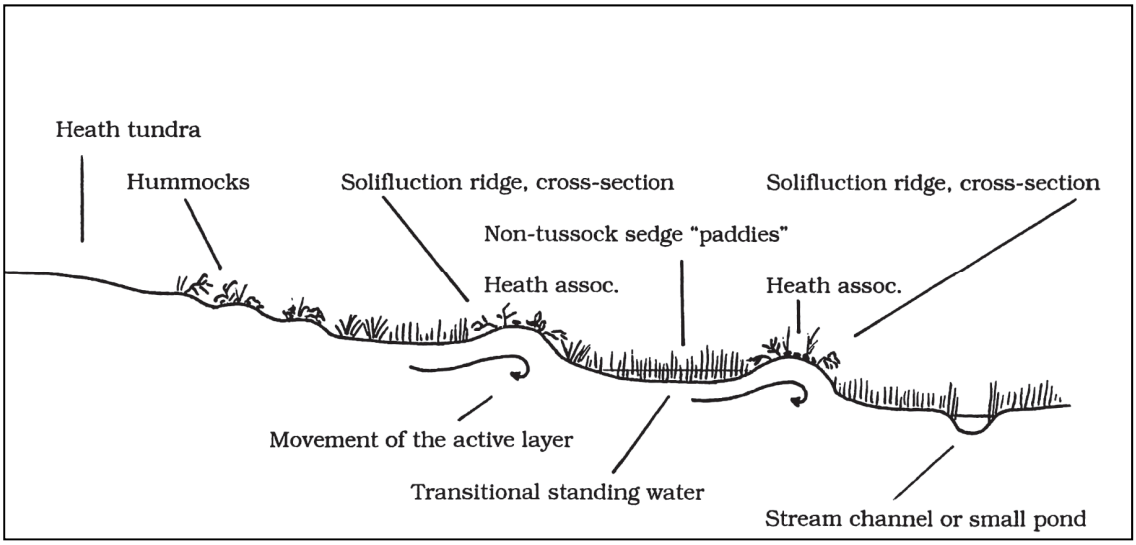

Figure A7-2: Cross Section of Solifluction Ridge

Since solifluction ridges tend to be elevated, they are better drained, and are occupied by heaths and other species more typical of the heath tundra than of the sedge associations. They provide a foothold where willows (*Salix arctica* and *S. arctophila*) and swamp birches (*Betula nana*) become established, as well as a few sedges (*Carex atrofusca*, *C. rariflora,* and others). Small solifluction lobes often have a wet area where the soil has pulled away from the hillside, forming a dam that collects water. These small "pools" are sometimes filled with sphagnum moss, and occasionally, the hairy butterwort (*Pinguicula villosa*).

Upslope of each solifluction ridge, a sedge community may occupy a flat or slightly depressed area. After a rainfall, these depressions retain water, sometimes for several days. The sedges occupying these areas are usually loosely-tufted species, such as *Carex membranacea* and *C. scirpoidea,* and a dark gelatinous algae (*Nostoc* sp.) often coats the ground, or drifts into the low areas (Rowe et al. 1977). At the interface of the flat

sedge area and the ridge, there is a narrow, meandering transition zone where the sedge community and heath tundra overlap.

A representative photo of this community association is identified below:

- 1998, PHOTO 7, Plot 98-009

4.0 HEATH TUNDRA

The Heath tundra community type is found throughout the uplands and slopes of most ridges and is characterized by gently rolling to undulating terrain that may contain a high percentage of boulders; as a result, these areas tend to be associated with rapidly to well-drained soils that can be quite dry. Within the heath tundra community, 5 non-mappable plant association units could be differentiated based on variations in terrain features and soil moisture, or exposure to wind, frost heaving, and movement of the active soil layer:

- Heath tundra - uplands (HTu);
- Heath tundra - solifluction slopes (HTsolif);
- Heath tundra - frost scars (HTfs);
- Heath tundra - boulders (HTb/LRb); and
- Ridge or esker slope [(RCsl) described further in Section 6.0].

4.1 Heath Tundra – Uplands (Htu)

On the rolling uplands and gentle, well-drained slopes, much of the land is covered with a dense carpet of vegetation that is often 10 to 40 cm thick. The dominant plant cover is a mixture of heaths (blueberry, cranberry, Labrador tea, white arctic heather, and often bearberry) and related groups (crowberry) interspersed with the occasional occurrence of small sedges and grasses. Forbs, such as narrow leaved saw-wort (*Saussurea angustifolia*), thrift seapink (*Armeria maritima*), arctic harebell (*Campanula uniflora*), Labrador lousewort (*Pedicularis labradorica*), red-tip lousewort (*P. flammea*), and capitate lousewort (*P. capitata),* are common, and arctic wintergreen (*Pyrola grandiflora*) can be found beneath the willows. Grasses, such as *Anthoxanthum monticola, Poa arctica*, *P. alpina*, *Arctagrostis latifolia*, and *Trisetum spicatum,* do not form dense stands, but grow as scattered individuals throughout the heath tundra. Sedges, such as *Carex misandra*, *C. scirpoidea*, *C. vaginata*, and wood-rushes (*Luzula arctica* and *L. confuse)* also occur in this association. Occasionally, thick growths of the alpine sweet-vetch (*Hedysarum alpinum*) are found on gentle slopes, especially along the Meliadine River.

Lichens, especially hair lichen (*Alectoria* sp.), *Flavocetraria nivalis*, *Cladonia* sp., and *Cladina* sp., form small patches or are intermingled with the vascular plants, and glove (*Dactylina arctica*) and worm lichen (*Thamnolia subuliformis*) occur as isolated small tufts throughout. The yellowish green club moss, *Huperzia selago*, grows on drier slopes, whereas a mixture of mosses underlies much of the vegetation in moister areas.

Representative photos of this community association are identified below:

- 1998, PHOTO 8, Plot 98-133
- 1998, PHOTO 9, Plot 98-270 (Close-up)
- 2008, PHOTO 11, Plot 08-D01, plot on Discovery deposit
- 2008, PHOTO 12, Plot 08-022 (Close-up)

4.2 Heath Tundra – Solifluction Slopes (Htsolif)

Solifluction slopes occur where the soil in the active layer is creeping downhill over the permafrost and the terrain appears as a series of ridges, or a long slope with a lobed front. In some cases, the downslope movement exposes mineral soil on the upslope side of the ridges. This is in an earlier stage of succession and supports a different flora, with fewer heath plants, more exposed subsoil, and a higher percentage of sedges. Further uphill, the plant communities are more mature, with thicker vegetation, and more heath species or woody plants on soil that has been exposed longer.

The plant associations that occur on heath tundra–solifluction slopes are represented by a mixture of members of the heath family (*Ericaceae*), with other species (especially black crowberry). Pioneer species, including mustards, such as northern tansy-mustard (*Descurainea sophioides*), and *Cardamine digitata* are also common inhabitants of solifluction slopes. Woody plants, such as willows and birches, can survive the movement of the active layer and are often found growing on solifluction slopes along with mountain-avens and arctic wintergreen (*Oxytropis hudsonicus)*, *Carex scirpoidea,* and occasionally the small one-sided wintergreen (*Orthilia secunda).*

Representative photos of this community association are identified below:

- 1998, PHOTO 10, Plot 98-327
- 1998, PHOTO 11, Plot 98-331 (top of lobe)
- 2008, PHOTO 13, near Plot 08-007 solifluction lobe on opposite slope

4.3 Heath Tundra – Frost Scars (Htfs)

The term “frost scar” is used as a collective term for small landforms developed by frost action and includes mud boils and frost boils. Mud boils are defined as “nonsorted circles developed in fine-grained materials” (van Everdingen 1998) and form where conditions allow the establishment of convection currents in the active layer, (French and Slaymaker 1993). These circular structures occur on moist slopes, in silty or finely sandy soil and are comprised of an elevated ridge with a centre comprised of exposed mineral soil, rocks, or a combination of both and can have diameters of 1.0 to 2.5 m (1998, PHOTO 12). In spring, the fine material in the centre of these circles is often saturated with water, and the whole structure will turn almost fluid when shocked. In fall and early winter, layers of ice form, and ice needles grow, elevating the surface of the boil. Frost heaving within the boil causes rocks to be pushed to the surface and ejected. If the dome is high enough, they tumble down the sides to form a ring around the boil, otherwise, they accumulate in the surface soil (Zwinger and Willard 1972). Where these structures occur in soils that once were below sea level, marine shells are usually incorporated in the sediments, and pushed to the surface (Bird 1967).

The terrain features of mud boils results in a mosaic of plant associations within a single structure. Sedge associations often encircle the outside perimeter of the boil (1998 PHOTO 13 and 2008, PHOTO 13). An elevated rim is occupied by a thick growth of heaths and scattered grasses (e.g., *Arctophila latifolia*), *Juncus albescens*, and sedges, including *Carex membranacea*, *C. rariflora*, and *C. vaginata*. In the relatively dry environment of the ridge, small shrubs (including *Salix calcicola* and dwarf birches), Maydell's point-vetch (*Oxytropis maydelliana*), and mountain-avens become established. Inside the rim, there is a centre disk of mineral soil churning so actively that plants cannot become strongly established. Usually the centre disk is bare or occupied by mats of alpine milkvetch (*Astragalus alpinus)*, *Carex vaginata*, and occasionally scattered plants of yellow mountain saxifrage (*Saxifraga aizoides*). Purple mountain saxifrage (*Saxifraga oppositifolia*) often occurs on either the rim or the central disk (Figure A7-3).

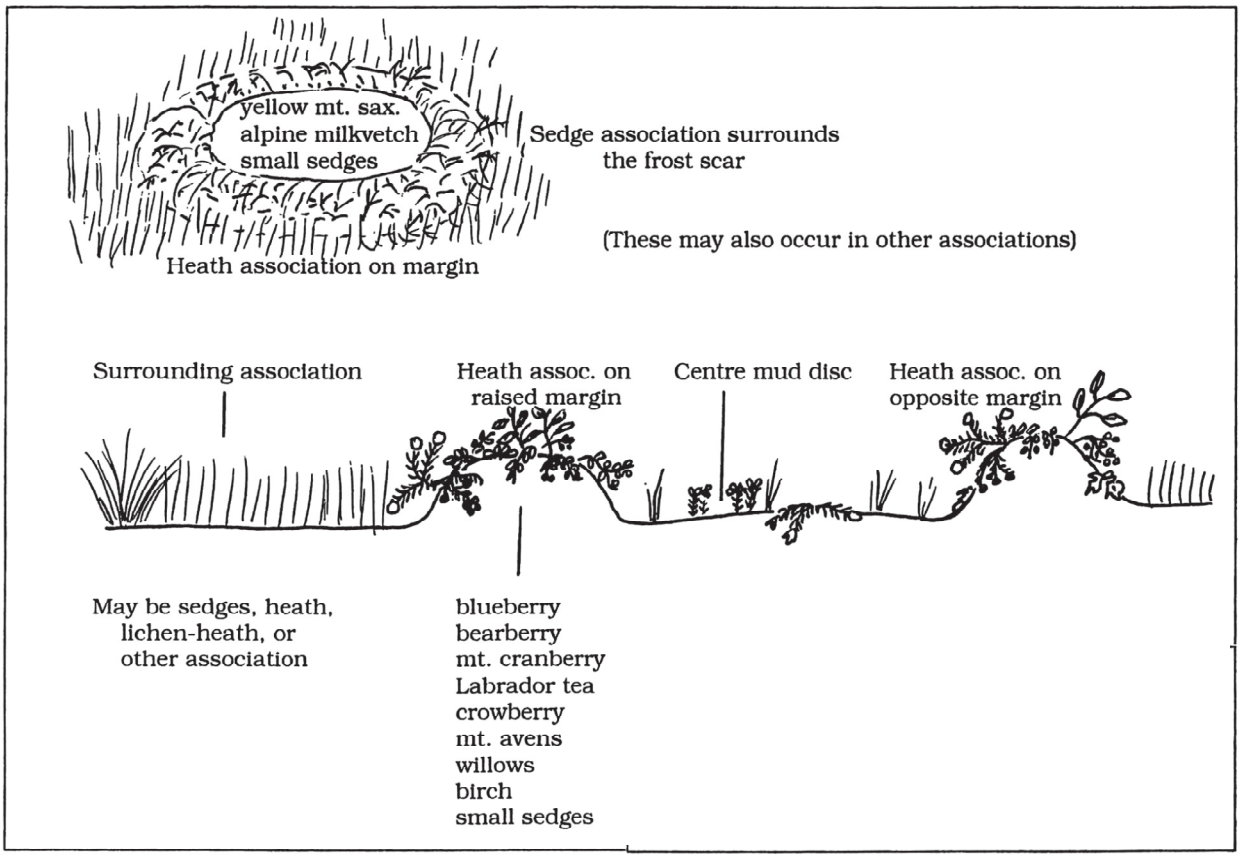

Figure A7-3: Heath Tundra on Mud Boil

Frost boils or "earth mounds" occur where small lenses of ice are trapped in, or just below, the active layer. In the fall, when temperatures hover around freezing and there is a lot of water percolating through the soil, these ice lenses can rapidly expand. Capillary action allows water to move into small interstices in the soil matrix, and when water contacts the ice lenses, it freezes, expanding the lens and pushing up the overlying vegetation. This vertical "growth" can push the small mound above the usual snow level in winter, where the harsh winter winds and blowing snow crystals can then erode the vegetative cover on the mound, exposing the soil (Zwinger and

Willard 1972; Pielou 1994). This erosion results in frost boils that will not liquefy by shocking, as the ice core provides support to the pushed up subsoil.

Rowe et al. (1977) identifies one type of frost boil as “frost mounds with mixed lichen-heath.” Located on moist slopes and higher areas in lowlands, this is a complex association, with a mixture of lichens (both *Alectoria* and Cetraria), heaths (Labrador tea, red bearberry, blueberry, and mountain cranberry) and alpine holy-grass (*Hierochloe alpina*) growing on the edges of the mounds. A sedge/heath mixture also occurs in the lower (wetter) areas surrounding the mounds. Rowe et al. (1977) noted that “the mosses *Dicranum groenlandicum*, *D. elongatum*, and *Tomenthypnum nitens* play an important role” in the formation of these frost boils. This community association is rare in the Local Study Area, but is noted to occur on the long ridge extending south from the green fuel tanks on the hill to the west of Meliadine West camp.

A second type of mound, “stony earth mounds with *Dryas*-heaths,” was also described by Rowe et al. (1977). This is one of the most prominent terrain types in the LSA, occurring on convex slopes below the crests of ridges, where snow cover is thin. These structures are larger (1 to 2.5 m in diameter, and 30 to 60 cm in height), and consist of slightly domed stony earth disks surrounded by a trench filled with heaths and mosses. The mounded centres are sparsely vegetated, with low sedges (*Carex vaginata, C. rariflora,* or *C. scirpoidea*), a few grasses (*Arctogrostis latifolia*), mountain avens, Lapland rosebay (*Rhododendron lapponicum*), and black bearberry. Occasionally, several species of oxytrope (*Oxytropis arctica* var. *bellii*, *O. maydelliana*, and less commonly *O. borealis)* occur on these structures.

Representative photos of this community association are identified below:

- 1998, PHOTO 12, Plot 98-181
- 1998, PHOTO 13, Plot 98-127
- 2008, PHOTO 14, Plot 08-D03, margin of frost boil

4.4 Heath Tundra – Boulders (Htb)

Heath tundra with embedded or perched glacial boulders, or small bedrock outcrops occurs over large areas of the Regional Study Area, as well as the Local Study Area. The Laurentide ice sheet vanished from the area to the west of Hudson Bay only about 7000 years ago (Riley 2003), leaving the land denuded of vegetation and interspersed with glacial erratics (i.e., boulders) of varying sizes. In some areas, there are more boulders than vegetation, and in others, the heath tundra surrounds the boulders, leaving them either embedded in the till or perched on gravely ridges. The heath tundra – boulders association grades into the Lichen-rock community, depending on the amount of boulders, such that when the percentage of boulders constitute less than 60% of the ground cover, it is considered part of the heath tundra - boulders association, and if more than 60%, it is considered to be part of the Lichen-rock community type.

5.0 MOSS COMMUNITY (MS)

A thick blanket of moss occurs at the bases of some slopes, especially those along lake shorelines, where the terrain can be somewhat hummocky, but it is mostly characterized by an undulating blanket of moss. In these areas, several species of moss may be present, including *Hypnum*, *Aulicomnium*, and perhaps *Sphagnum,* and this community is also occupied by either sedges or heath species, depending on the amount of moisture available. In general, cloudberry, mountain cranberry, Labrador tea, blueberry, and bog rosemary are common occurrences. A few small willows (mostly *Salix glauca* var. *callicarpaea* and *S. reticulata*) and dwarf birch may also occur, and *Salix tyrrellii* was occasionally found in association with this community. Forbs often include northern buttercup (*Ranunculus pedatifidus*), viviparous pondweed, Lapland lousewort, and *Cardamine digitata*. Lichens are infrequent, but if present, grow on the tops of mounds, where conditions are drier, and include such species as *Peltigera* sp and *Nephroma arcticum*. Very few representatives of the moss community were present in the LSA.

Moss communities may occasionally occur below a snowbank community, where the seepage of water from the late-lying snowbank provides uniform humidity through most of the summer season. Where there is sufficient shelter, forbs, such as Arizona cinquefoil (*Sibbaldia procumbens*), blue mountain heather (*Phyllodoce caerulea*), and Kotzebue grass-of-Parnassus (*Parnassia kotzebuei*), may occur (2008, PHOTO 26).

Moss associations are also found at the base of cliff faces, in areas that receive a reliable runoff of moisture from the cliff face. In the mossy areas below cliffs*, Saxifraga rivularis, Stellaria longipes*, and *Oxyria digyna* often occur. None of these cliff associations were found in the Local Study Area, but such moss communities could be expected to be present where cliffs occur in the Regional Study Area.

Representative photos of this community association are identified below:

- 1998, PHOTO 20, Plot 98-047
- 1998, PHOTO 21, Plot 98-047
- 2008, PHOTO 26, near Plot 08-015, moss association on esker with *Sibbaldia procumbens* and *Parnassia kotzebuei*

6.0 RIDGE COMPLEXES

Ridge complexes include a range of plant associations that form on esker and drumlin ridges. Eskers are large ridges that snake across the landscape, formed as streambeds in reverse during the retreat of the Laurentide ice sheet. They are composed of varying amounts of sand and gravel, which tends to be sorted, with particles of one size deposited together. Eskers often include several different habitats, from ponds and birch seeps to very dry gravel crests (Figure A7-4) Side slopes are usually covered with heath tundra, but may also include snowbank communities, where deep snow accumulation has occurred. In contrast, drumlins are glacially-streamlined hills oriented in the direction of glacial movement that are composed of till deposited by the ice (Zoltai et al.1980). Since these soils are ice-laid, they are generally unsorted (i.e., a mixture of particle sizes).

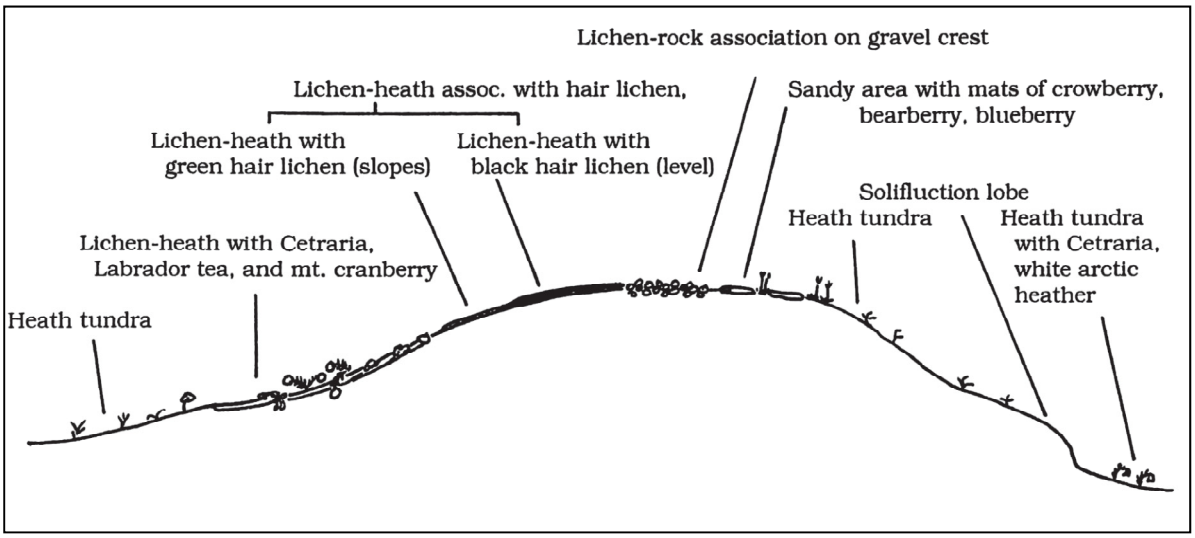

Figure A7-4: Profile of Ridge with Typical Vegetation

6.1 Ridge Crests (RCc)

The land within the study area has risen due to isostatic rebound (upward movement of the land) after it was relieved of the weight of the Laurentide ice sheet. Some ridge crests "appear to have been wave washed and eroded, leaving a surface that in places is about half-covered with dark protruding boulders" (Rowe et al. 1977). This is covered by a lichen-heath association or heath tundra. Heath tundra occupies the lower ridges with less well-defined crests, areas that are usually covered with an insulating blanket of snow in winter. The crests of ridges are very exposed and windswept, with little accumulation of snow in winter. The plant cover is thin, usually characterized by a lichen-heath–Cetraria and lichen-heath–hair lichen communities, mats of heaths on sand, or unvegetated sand, gravel, cobbles, or even boulders in heath or lichen-heath tundra (Figure A7-4). The ridge crest association is affiliated with the lichen-heath–Cetraria and lichen-heath–hair lichen communities.

Lichens cannot become established where the ridge is composed of sand, and subject to extensive wind erosion. In these areas, mats of bearberry, blueberry, or crowberry cling to the ground. Isolated plants of prickly saxifrage, alpine pussytoes (*Antennaria alpina*), Pacific wormwood (*Artemisia campestris*), thrift seapink (*Armeria maritima*), or moss campion (*Silene acaulis*) occur where their roots can gain a foothold. The legume, *Oxytropis arctica* var. *bellii* (2008, PHOTO 29) forms tight tufts of silky leaves on dry crests, and the closely related *Oxytropis borealis* is also often found in this habitat, mostly where the ground is covered with pebbles.

On many ridge crests covered with lichen-heath–Cetraria and lichen-heath–hair lichen communities, the land surface is a network of small depressions, forming large polygons. These are frost fissures, formed by thermal contraction in winter's intense cold, which causes deep fissures to form. When the snow thaws, water runs down through the sandy soil, and freezes in the fissure, causing a frost wedge to grow by accretion to its outside margins (Pewe 1966; Bird 1967; van Everdingen 1998). The water carries some soil with it, which causes a depression to develop over the frost wedge. In winter, this depression collects snow, which protects the plants that happen to be growing there, allowing them to survive. Over time, a relatively lush plant flora develops in the shallow crevice that follows the frost wedges in their polygon shapes. This flora includes heaths, such as

mountain cranberry, arctic white heather, and Lapland rosebay. Lichens, such as antler lichen (*Bryocaulon/Cornicularia divergens*) and green hair lichen, also more readily become established in this protected microclimate (Rowe et al.1977).

Some ridge crests, especially those of eskers, morainal ridges, or drumlins, have areas that are covered with cobbles, fist-sized rounded rocks that abut each other without any soil showing. The “fines” (fine soil and sand) have long since been blown off these areas of the ridges, leaving the rocks behind. This type of crest is usually occupied by a Lichen-rock Community with a high percentage of crustose lichens (see Lichen-rock section below). In other areas, there is little vegetation at all on the sandy tops of ridges, or sometimes on the sides of the ridges.

Representative photos of this community association are identified below:

- 1998, PHOTO 22, Plot 98-035
- 1998, PHOTO 23, Plot 98-323
- 1998, PHOTO 24, Plot 98-016
- 2008, PHOTO 27, Plot 08-015 esker with hair lichen crest and crowberry
- 2008, PHOTO 28, Plot 08-041 crowberry, black berry, or *Empetrum nigrum*
- 2008, PHOTO 29, Plot 08-030 *Oxytropis arctica* var. *bellii*, on ridge crest
- 2008, PHOTO 30, Plot 08-043 cobble crest of ridge

6.2 Ridge Slopes (RCsl)

The slopes of eskers and drumlins are typically associated with heath tundra, but may be composed of boulder fields, lichen-heath–Cetraria and lichen-heath–hair lichen communities with a high percentage of *Cetraria* lichens, birch seep associations, or even specialized snowbank communities. The plant association occupying a particular ridge slope is affected by the amount of moisture and the texture of the soil. Where solifluction creates ridges or terraces on the slopes, water can accumulate, allowing a different plant association to develop. These different associations often form distinct bands across the slopes (2008, PHOTO 31). Here, hair lichen is on the most exposed area, Labrador tea in the depression, bearberry on the slope, and black crowberry on the next crest.

Representative photos of this community association are identified below:

- 1998, PHOTO 25, Plot 98-115
- 2008, PHOTO 31, Plot 08-D06, bands of vegetation on terraced slope, hair lichen, Labrador tea, bearberry, and crowberry

7.0 SNOWBANK COMMUNITY (SB)

Snowbank communities are small, but distinct plant associations that usually occur on a steep slope where large snowdrifts accumulate on lee slopes in winter. These deep snowdrifts persist long into the summer, creating unique conditions that prevent most plants from growing there**.** The growing season for plants under the snowdrift is much shorter than that of the rest of the area. In addition, the plants growing adjacent to the shrinking snowbank are supplied with abundant water early in the season when the snow is available, then have limited access to water for the remainder of the growing season. Two photos (1998, PHOTO 26 and 1998, PHOTO 27) illustrate the variability of a snowbank community at different times of the season. The 1998, PHOTO 26 was taken in mid-June while the snowbank remained, and the 1998, PHOTO 27 was taken in mid-July after the snow was gone.

Due to the unique habitat characteristics of the snowbank community, a number of specialized species occur on these sites, but no where else, as they cannot compete with other species in locations where the snow does not accumulate. These include New England dwarf willow (*Salix herbacea*) (1998, PHOTO 28), blue mountain heather (*Phyllodoce caerulea*) (2008, PHOTO 32), and a grey mealy lichen (*Stereocaulon tomentosum)* (2008, PHOTO 33). Other plants that often occur in snowbank communities include snow cinquefoil (*Potentilla nivalis*), alpine chickweed (*Cerastium alpinum*), yellow anemone (*Anemone richardsonii*), dwarf buttercup (*Ranunculus pygmaeus*), arctic alpine fleabane (*Erigeron humilis*) and mountain sorrel (*Oxyria digyna*). A few sedge plants may occur on these slopes, mostly *Carex membranacea* and *C. scirpoidea*, and the fine arctic blue-grass, *Poa arctica,* often grows in small tufts in the heaths (Figure A7-5). At the edges of the snowbank community, where the growing season may be significantly longer, net-veined willow (*Salix reticulata*), white arctic heather, and Marsh Labrador tea may form dense patches. Where a snowbank community is adjacent to a wetland, cloudberries often carpet the ground (2008, PHOTOS 34 to 36). Around the persistent snowbank, taller willows (such as *Salix calcicola*) and swamp birch occur on the steeper parts of the slopes. Blueberries and crowberries may form an understory beneath these taller plants. In the wettest areas, sedges (such as *Carex atrofusca, C. scirpoidea, and C. rariflora*) are the only plants that can survive.

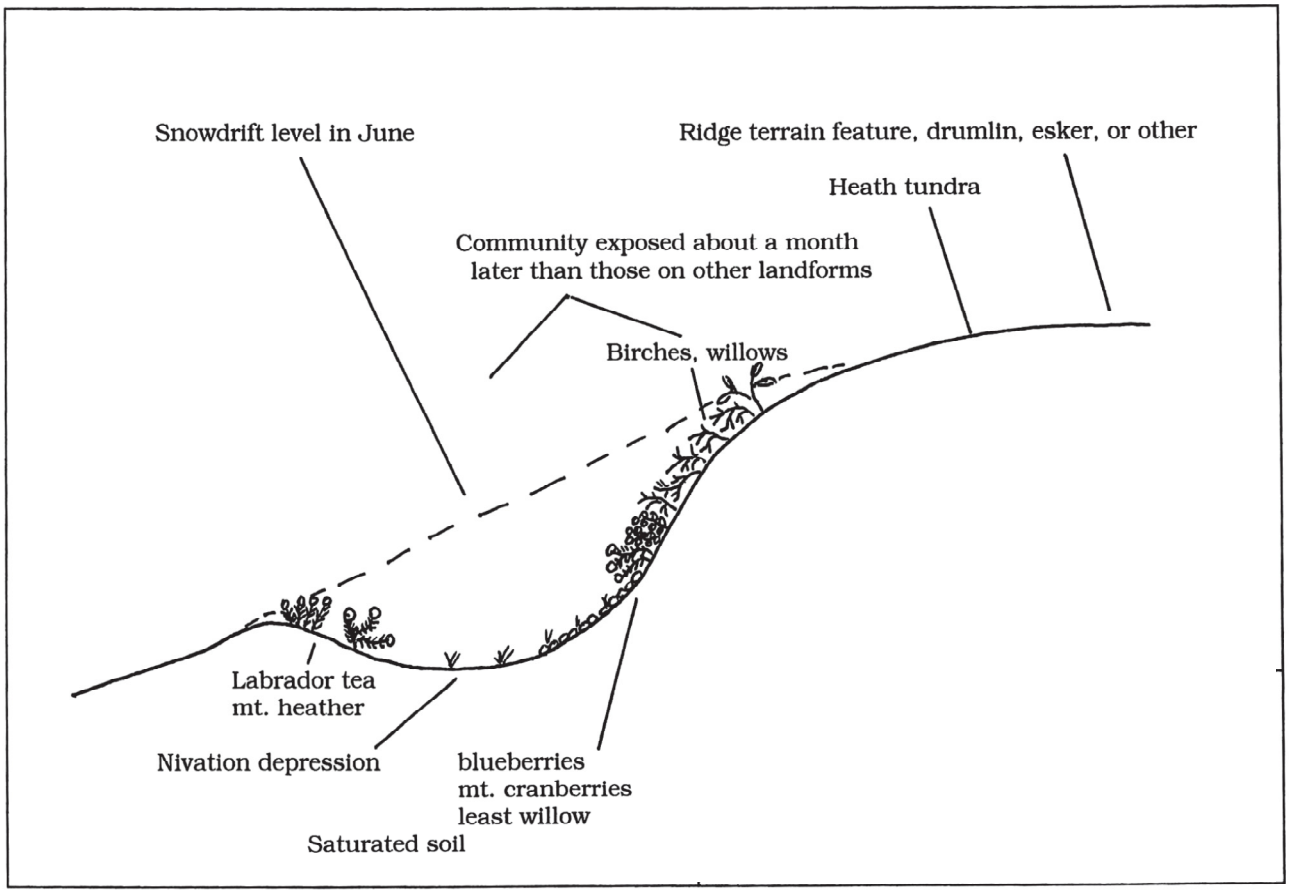

Figure A7-5: Profile of Snowbank Community

In the LSA, the relief of the land is so slight that long-lasting snowdrifts are rare, as they are not of sufficient size to persist into late July or August. Hence, snowdrift communities, though present, are neither abundant nor easy to identify, except in late June, when most of the snow cover has melted, but the drifts remain. As the prevailing winds in winter along the Hudson Bay coast are usually from the northwest, snowbank associations are typically found on southeast- or south-facing slopes.

Representative photos of this community association are identified below:

- 1998, PHOTO 26, Plot 98-011
- 1998, PHOTO 27, Plot 98-038
- 1998, PHOTO 28, Plot 98-227, New England dwarf willow (*Salix herbacea*)
- 2008, PHOTO 32, near Plot 08-015, blue mountain heather (*Phyllodoce coerulea*) in lee of esker
- 2008, PHOTO 33, Plot 08-048, *Stereocaulon tomentosum* lichen
- 2008, PHOTO 34, Plot 08-048, snowbank community in lee of small bedrock ridge
- 2008, PHOTO 35, Plot 08-048, cloudberry, least willow, and moss in snowbank community
- 2008, PHOTO 36, Plot 08-048, aqpiq berry, also cloudberry (*Rubus chamemorus*)

8.0 LICHEN-ROCK COMMUNITIES (LR)

The lichen rock community is characterized by crustose lichens growing on the boulders or rocks that predominate on eskers or rocky plateaus. The lichen rock community is typically interspersed among other community types where boulder fields may be common (e.g., the heath tundra community or lichen-health – Cetraria community), but this community type refers to the specific plant community that is defined by lichens growing on rock surfaces. Within the lichen rock community, 5 non-mappable plant association units could be differentiated as follows:

- Boulder fields/streams, felsenmeer, heath tundra - boulders(LRb/HTb);
- Cobbles/gravel on ridges (LRb/RCc);
- Rounded/polished bedrock outcrops (LRrpol);
- Fractured bedrock outcrops and shattered bedrock (LRrf); and
- Cliff faces (LRrcf).

Representative photos are identified below:

- 1998, PHOTO 29, Plot 98-028
- 1998, PHOTO 30, Plot 98-028 (Close-up)
- 2008, PHOTO 37, Plot 08-027, sunburst lichen (*Arctoparmelia centrifuga*)
- 2008, PHOTO 38, Plot 08-035, rock tripe (*Umbilcaria* sp.)
- 2008, PHOTO 39, Jewel lichen (*Xanthoria elegans*)

8.1 Boulder/Shattered Rock Associations (Lrb)

Boulder associations include plants growing on and among rocks larger than cobbles, which cover areas of varying sizes. These plant associations may occupy boulder fields, boulder streams, or felsenmeer (Figure A7-6). For the purposes of this study, “boulders” have been defined as rocks rounded by movement in the continental ice sheets or in water, and have used the term “rocks” or “felsenmeer” to refer to rocks shattered by frost action. Boulder fields are usually composed of rocks rounded by action within the continental ice sheet, or by abrasion in water. Whatever the origin, the rocks are isolated by wind or water removal of the smaller particles, leaving the larger pieces stranded in a mass that may cover many hundreds of square metres (1998, PHOTO 31). Felsenmeer (from the German for a “sea of rocks”) is defined as an expanse of broken, angular rocks (Pielou 1994), usually from frost weathering of bedrock. If the weathered-out chunks of bedrock do not tumble downslope or are not otherwise removed, the “intense mechanical weathering will bury the bedrock beneath frost-riven debris”, called “felsenmeer” (Bird 1967) (1998, PHOTO 32).

In some areas, boulders or angular rocks are concentrated by frost action that due to repeated freezing and thawing in the ground, causes formation of ice crystals that grow and melt, fracturing rocks and loosening the soil. Fine materials sift downward, and frost action forces larger particles upward, resulting in terrain features composed mostly of boulders or rock particles. On slopes, the rocks forced out in this way (or fractured due to

frost action) become arranged into rock stripes or boulder streams (running up and down the hill) or into rock polygons or rock circles on level areas. Boulder streams often have water running deep beneath the boulders.

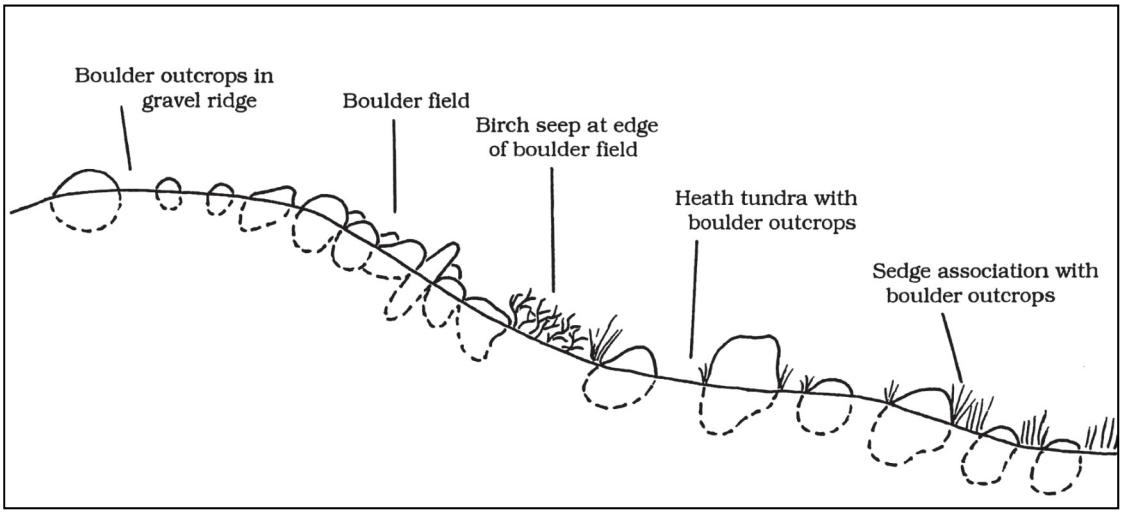

Figure A7-6: Boulder Field and Scattered Boulders

Typically, the rocks or boulders are usually about 80 to 90% covered with crustose lichens, including map lichen, rock tripe, bloodspot lichen, sunburst lichen, *Rhizocarpon geminatum*, *R. geographicum*, *Tremolecia atrata*, *Pseudephebe pubescens*, *Lecidia*, and *Lecanora*. As the crustose lichens thicken, they begin to collect dust and plant fragments. Eventually foliose lichens like *Cladina rangiferina, C. stellaris*, *Flavocetraria nivalis, Cetraria islandica*, *Asahinia chrysantha*, and *Cladonia* form mats between boulders, webbing the boulders together. These mats in turn collect more dust, and seeds of vascular plants, and gradually begin to support a rooted flora.

Crevice-rooted plants like fragrant shield fern (*Dryopteris fragrans*), and prickly saxifrage are among the first to become established, and several heaths, such as black bearberry and mountain cranberry, soon follow. Grasses, such as *Arctagrostis latifolia* and *Hierochloe alpina*, wood-rush (*Luzula arctica*), and sedges (*Carex membranacea*), also become established in the vegetative mats, which by this time form islands among the boulders. The delicate harebell *Campanula uniflora* is occasionally found at the edges of boulder fields. Eventually, vegetation may cover the entire boulder field, at which point the larger boulders appear as outcrops in the tundra.

Smaller rocks like cobbles or gravel often are exposed on the tops of ridges, as the finer materials have blown away. These are covered by 70 to 80% crustose lichens, and often have perched mats of rooted vegetation in small depressions where there is some protection from the wind. These cobble/gravel areas fall into the Lichen-rock boulder association, but also are often part of the Ridge Complex, forming the crest of the ridge.

Representative photos of this community association are identified below:

- 1998, PHOTO 31, Plot 98-099
- 1998, PHOTO 32, Plot 98-087
- 2008, PHOTO 40, Plot 08-035, lichens on old storage cache in boulder field

8.2 Boulders with Heath Tundra (Lrb Or Htb)

The boulders with heath tundra association is defined as being more than 60% boulders, and, in some cases, the boulder fields are almost completely covered with plant matter, to the extent that only the largest boulders are visible. This creates the appearance of heath tundra studded with boulders. The vegetation surrounds the boulders, growing up to their bases, and, in some cases, over part of the rock. In some areas, these boulders are so common that there seem to be more boulders than tundra. In other cases, the ground is littered with glacial erratic boulders, dropped by the ice sheets, and now perched on the surface of the land. In both cases, the plant communities are similar, with heath tundra or sedge associations surrounding the boulders, and lichen associations on the boulders.

Where boulders are scattered, micro-communities exist at the bases of many boulders, with more grasses and slightly taller vegetation growing there. This is likely caused by a slightly higher level of moisture around the boulders due to runoff from the boulder itself or due to the fact that the boulder creates its own snowdrift, which melts, supplying extra water. In some cases, the lush plant growth around these boulders is due to animal activity, especially of arctic ground squirrels (sik siks), arctic hares, and Arctic foxes. Raptors also use large boulders as places to rest, survey for prey, and feed. There are many references to “bird stones” in the literature, referring to these perches and the plant associations that grow up around them. There is one large erratic in the Regional Study Area, which is a traditional rough-legged hawk nesting site, quite unusual, but used almost every year.

Representative photos of this community association are identified below:

- 1998, PHOTO 33, Plot 98-317
- 2008, PHOTO 41, Plot 08-016, boulders in heath and lichen-heath tundra

8.3 Bedrock Outcrops (Lrr)

In the Local Study Area, there are few bedrock outcrops. However, bedrock outcrop landforms are common in the Regional Study Area, particularly on the peninsulas across Meliadine Lake to the northeast of the camp, where the bedrock emerges in outcrops that are weathered, but not reduced to rubble. Most plants occupying the flat rock outcrops are lichens except where heath tundra patches are perched on the rock, or where plants are rooted in cracks in the bedrock. The exposed bedrock in the Meliadine area is approximately 60 to 80% covered by crustose lichens.

8.4 Rounded Bedrock Exposures (Lrrpol)

Rounded bedrock outcrops were sculpted by the passage of the continental ice sheets, and the resulting polished surfaces make it difficult for plants to establish. As a result, crustose lichens, such as map lichen, rock tripe, and sunburst lichen, cover about 60% of the surface of these outcrops. Soil may accumulate in small cracks caused by weathering or frost action and permit rooted plants to grow. Fragrant shield ferns, prickly saxifrage, star chickweed (*Stellaria longipes*), bearberry, and various mustards like *Draba glabella* and *D. lactea* often occur on these outcrops.

A grey-green moss occurs frequently on glacially-rounded outcrops and other bedrock exposures. Rowe et al. (1977) evidently identified it as "*Rhacomitrium lanuginosum.*" However, Vitt et al. (1988) list a *Racomitrium lanuginosum* as "a common moss of drier acidic alpine habitats throughout the western cordillera....not found at lower elevations east of the continental divide." Whatever its identity, this moss is certainly common. It grows in domed colonies loosely attached to the rock; indeed, it often slides down slope slowly, inhibiting the growth of lichens as it moves, and leaving a distinct path denuded entirely of all lichen growth.

Representative photos of this community association are identified below:

- 2008, PHOTO 42, Plot 08-D04, monitoring plot markers on bedrock with lichens

8.5 Fractured Bedrock Outcrops (Lrrf)

In the Meliadine area, the edges of relatively small outcrops may form small cliffs or a series of crevices. Fractured bedrock outcrops on relatively level ground can blend into felsenmeer, which is similar to a boulder field, except that the rocks are frost-shattered more or less in place and are sharp-sided and angular, not water or ice-rounded. In the crevices, moisture accumulates, and supports the growth of marsh Labrador tea, black crowberry, arctic manzanita (*Arctostaphylos alpina*), mountain sorrel, nodding saxifrage (*Saxifraga cernua*), and occasionally alpine brook saxifrage (*Saxifraga rivularis)*. Fragrant cliff woodfern, prickly saxifrage, and *rock whitlow grass (Draba glabella* take advantage of small cracks in these outcrops. Occasionally *Woodsia* or *Cystopteris* ferns grow under) overhangs where moisture is present throughout the summer, raising the humidity to the level that will permit these shade ferns to grow. Fractured bedrock outcrops also provide areas where soft snow accumulates and provides winter shelter for some burrowing predators, such as weasels and wolverines.

8.6 Cliff Faces (LRcl)

The edges of larger outcrops may form sheer (or almost sheer) vertical faces interspersed with horizontal ledges. Depending on their exposure to wind, cliff faces and accompanying ledges support a varying flora of lichens, with small mats of heath tundra or grasses on ledges, and fragrant shield ferns or prickly saxifrage rooting in small crevices. These are important nesting sites for raptors, such as peregrine falcons, gyrfalcons, and roughlegged hawks. Nest sites are typically marked by the presence of orange lichens like *Caloplaca* and *Xanthoria*, growing where the rock surface is enriched by the "whitewash" from the nesting birds. Major cliff faces do not occur in the Local Study Area, but are present to the northeast, on the north side of Meliadine Lake, and in the vicinity of Peter Lake.

9.0 DISTURBED SITES (DS)

This is a generalized category characterized by distinct plant associations where the surface of the land has been disturbed or nutrients added by animals or man.

9.1 Animal-Disturbed Sites

Animals disturb the soil in several ways, including the creation of burrows, dens, and trails. They also affect plant communities through feeding damage to individual plants, and through the addition of nutrients to frequently used trails, den sites, roosts, feeding, and nesting sites. In certain situations, the influx of nutrients from the decay of a single large animal can affect the plant associations for years to come.

9.1.1 Den Sites (DSd)

Burrowing animals disturb the soil during the creation and use of their burrows. They are selective in their choice of areas for burrows, preferring sandy or loamy soil that can be excavated, and that will support the roof of the burrow. Because conditions that permit burrowing are rare in the Meliadine area, den sites are often re-used over many generations. This traditional use not only maintains the disturbed aspect of the sites, but also continuously adds nutrients to the soil, through the decay of feces, nesting material, deceased animals, and prey items brought to the den by predators.

Within the Local Study Area, most dens found are those of ground squirrels (locally called sik siks) and arctic foxes, as well as a few possible dens of the short-tailed weasel. These are usually located in drumlin or esker material, on the edge of a solifluction ridge, or around large boulders. Burrows of ground squirrels are used year after year, and the animals deposit nutrients regularly, enriching the soil around the burrow entrance. Burrow sites are readily recognizable from a distance, as they are often covered with dense plant growth, and sometimes dwarf birches and willows (*Salix arctica*, *S. brachycarpa* sp. *niphoclada*) (2008, PHOTO 43), but most often, clumps of tall grasses (2008, PHOTO 45).

The loosening of the soil and addition of nutrients permits growth of a number of plant species that may not otherwise exist here. These include blue-green chickweed (*Stellaria longipes*) and several species of grass, including American dunegrass (*Leymus mollis)*, northern reed grass (*Calamagrostis stricta* ssp. *stricta)*, alpine sweet grass (*Hierochloe alpina*), mountain foxtail (*Alopecurus alpinus*), and blue-grass (*Poa alpigena*, *P. alpina*, and *P. arctica*). Heaths, forbs, and small shrubs add to the mix, especially around the openings of the burrows. Northern chickweed (*Cerastium alpinum*), *Draba glabella*, *D. lutea*, snow cinquefoil (*Potentilla nivalis*), mountain sorrel, river beauty (*Chamerion latifolia*), mountain-avens, *Ranunculus pedatifidus*, arctic alpine fleabane (*Erigeron humilis*), and alpine pussy-toes (*Antennaria alpina*) were also typical of these areas. White bladder campion or arctic catchfly (*Silene involucrata*) is sometimes found on the sides of denning mounds (Figure A7-7).

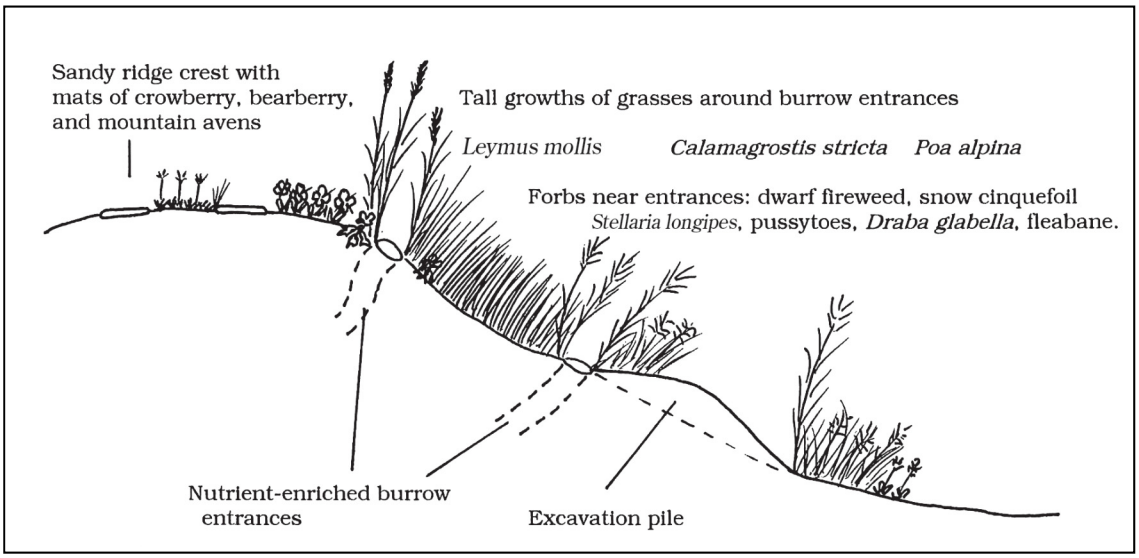

Figure A7-7: Disturbed site, Den Site of Ground Squirrels

Representative photos of this community association are identified below:

- 1998, PHOTO 34, Plot 98-068
- 1998, PHOTO 35, Plot 98-249
- 2008, PHOTO 43, Plot 08-028, burrow hill with birches, note soil fan
- 2008, PHOTO 44, Plot 08-028, close-up of burrow of sik siks (arctic ground squirrel)
- 2008, PHOTO 45, Plot 08-023, burrow hill with dense grasses
- 2008, PHOTO 46, Plot 08-023, heaths around burrow entrance
- 2008, PHOTO 47, Plot 08-035, alpine manzanita (*Arctostaphylos alpina*), fall foliage

9.1.2 Caribou Trails (DStrail)

Caribou trails take on a characteristic appearance depending on the plant community they traverse. Trails in lowland sedge communities tend to be trenches filled with standing water and are most distinct where they pass near the shore, or in wet years. Caribou trails crossing heath tundra or along the sides or tops of the ridges usually appear as light lines through the darker heath-lichen tundra. Up close, it is apparent that the black hair lichen has been worn away, and that the trail is filled with heaths that have grown in from the sides, usually Labrador tea, or the green form of the hair lichen. This creates a light green line through the black lichen (2008, PHOTO 48). Where trails are actively used, and where annual migrations of caribou both churn the soil and add significant fecal material, rich green plant communities develop along the trails, especially in moist areas where rapid decomposition makes the nutrients available to plants on an annual basis. This was not observed in the Local Study Area. Based on the growth of plants in the trails, it is likely that most of the incised trails in the Local Study Area were made when there were much larger herds moving through the area, likely in the 1950s.

Representative photos of this community association are identified below:

- 1998, PHOTO 36, Plot 98-179
- 2008, PHOTO 48, Plot 08-019, caribou trail in heath tundra

9.1.3 Bird Nesting/Feeding Sites, Gulls and Geese (DSng)

Gulls and geese tend to nest on islands in lakes, likely due to some amount of protection from foxes afforded by the open water. Gulls nest on rocky islands, and create little “gardens” around each nest, as they build the nest of pieces of moss and other plant materials, then fertilize the area by defecating while sitting on the nest. Snow cinquefoil (*Potentilla nivea*), common dandelion (*Taraxacum officinale*), blue-green chickweed (*Stellaria longipes*), brooklet saxifrage (*Saxifraga rivularis*), and other forbs form dense growths around each nest, and traditional perching rocks become covered with “whitewash,” making each island obvious. Near the sea, northern bitter cress (*Cardamine digitata*) and scurvy-grass (*Cochlearia groenlandica*) may grow near the nests or in protected areas nearby.

Geese (snow geese and Canada geese) and tundra swans nest on low islands or on narrow peninsulas. Both build nest platforms from mosses, sedges, and other vegetation, and destruction of vegetation is substantial, due to nest-building and foraging activities (Kerbes et. al.1990). The density of nesting geese is not nearly as high in the Rankin area as it is around Arviat and along the southern end of Hudson Bay, but there are some sites with nesting geese.

Geese tend to remain around in the vicinity of the nest while the female is incubating. Their defecation encourages a lush growth of grasses and sedges. They then graze on the vegetation, further encouraging dense growth, and creating a lawnlike effect. This effect was observedin the Local Study Area, mostly in grassy areas, sedge meadows or mossy areas on lakeshores or peninsulas. Geese feed on sedges, especially *Eriophorum vaginatum*, which occasionally grows in mossy shorelines, and through feeding, damage the surrounding moss, but do not feed directly on the mosses. Where there are colonies of snow geese nesting together, the cumulative damage to the vegetation due to overgrazing is substantial (Alisauskas et.al. 2006). Often the mastodon flower (*Senecio congestus*) tends to become common in these areas.

9.1.4 Bird Nesting Sites, Raptors (DSnr)

Many raptors, such as peregrine and gyrfalcons, rough-legged hawks, and ravens nest on ledges on cliff faces if such sites are locally available, although some raptors will nest on the tops of large rocks if there are no cliffs nearby. In each case, the birds not only add nutrients to the area immediately around the nest, but also fertilize traditional outlooks or perching sites. “Whitewash” from birds is high in calcium and nitrogen, and creates miniature areas where specialized plants can grow. Most obvious and characteristic of these are the jewel lichens, *Xanthoria elegans,* and other lichen species, which form bright orange patches on the cliffs around traditional perching sites. In addition, regurgitated pellets as well as bits of dropped prey also decompose in the area, adding nutrients to the site and influencing plant growth. Thus, such species as cinquefoils (*Potentilla* sp.), prickly saxifrage, dandelions, and bluegrasses (*Poa* sp.) tend to develop lush growth in the vicinity of the nests.

Isolated large boulders, especially those on ridges, as well as some inukshuks on ridges, tend to be utilized by raptors (including falcons, hawks, and owls, but also jaegers, gulls, and ravens) as perches. Areas around these stones, occasionally referred to in the literature as “bird stones” (Polunin 1948), are enriched by the addition of nutrients from bird feces, pellets, and prey, and thick clumps of grasses often grow up around the base of the stone. Arctic hares often use these boulders as shelter, crouching at the base, depositing fecal pellets, which further add to the nutrients.

9.1.5 Faces of Solifluction Slopes - Disturbed by Movement of the Active Layer (DSsolif)

On more distinct solifluction slopes, the face of the moving material churns around, and is occupied by a different plant community that is dominated by a greater percentage of grasses, and blueberries. A number of forbs, including mouse-ear chickweed and chamomile (*Matricaria ambigua*), also occur on these sites.

9.1.6 Hillside Slumps (DSls)

These are similar to solifluction slopes, but are much more limited in nature, most often occurring as a single event rather than an ongoing process. Hillside slumps tend to occur on steeper slopes where a soil mass has slipped downhill, exposing the subsoil. The accumulated mass at the base of the slope usually supports a plant community typical of a disturbed site, with a high percentage of grasses, star chickweed, tansy-mustard, and dwarf fireweed (*Chamerion latifolium*). The exposed slip face is generally characterized by having little to no vegetation cover.

9.2 Sites Disturbed by Human Activity

Human activity disturbs the land in several ways: by the removal of plant cover through abrasion or erosion; by the deposition of additional material; by chemical disruption of the plant cover; or by the changing of the water supply due to construction upslope. Disruption may involve either destruction of plants or addition of nutrients, water, or both, causing the development of a lush flora. It can also involve the uptake (by plants) of larger quantities of metals and other elements than were otherwise available to plants, but this has not yet occurred. Tracking metals uptake by plants and in the soil will be part of the monitoring plan.

9.2.1 Drill Sites (DSdrill)

Areas where diamond drilling activities have taken place are characterized by accumulations of drill mud on the surface of the land, and downslope from the location of the drillhole. Although many of these sites are too recent to have new plant material growing on the drill mud, in cases where the mud was less than 5 cm thick, plants were growing up through the drill mud from below. These are the plants originally covered by the mud, not plants from germinating seeds. Most commonly, it is the willows and the heaths (Labrador tea, white arctic heather, and blueberry) that are the first to penetrate the coating of drill mud. Many drill sites were remediated by WMC

International Ltd. in the early years of the project, and by removing most of the drill mud and adding sterilized peat to the ground, re-colonization by plants was accelerated.

9.2.2 Road/Trail Sites (DSrd)

There are several all-terrain vehicle trails ("Honda trails") through the Local Study Area, which existed before exploration efforts began, and are still being used by area residents to access outpost camps and cabins. There are also a few traces of overland paths created when heavy loads are moved to the exploration camp over the snow by winter road. Honda trails on the uplands generally create an area where the plant cover is worn away, exposing the subsoil or gravel, which is often moved by the tires, creating a ridge along the outside and inside of each track. In sedge associations, trails produce dark lines on the land, where the plant cover is removed or ground into the peat. Hubert (1998) illustrates this effect particularly well with a photo of a trail running from sedge meadow onto a drumlin (1998, Print #28). During snowmelt and rainy periods, these become flooded ruts.

Plant communities are non-existent in the active trails. Willow roots persist for a while, but are eventually worn through or rot due to damage to their surfaces. Where roads are built, the edges are disturbed but not compressed by traffic, and it is expected that these areas will quickly be invaded by pioneer species like tansy-mustard (*Descurainia sophioides*), dwarf fireweed (*Chamerion latifolium*), and, in sandy areas, Pacific wormwood (*Artemisia campestris)*.

Representative photos of this community association are identified below:

- 1998, PHOTO 37, Plot 98-021
- 1998, PHOTO 38, Hubert Photo #28
- 2008, PHOTO 49, near Plot 08-034, active Honda trails through wetland

9.2.3 Building Sites/Campsites/Fuel Tank Sites (DSc)

Where camps are built, original plant communities are damaged or destroyed in the campsite and in any area where there is extensive human traffic, either vehicular or foot traffic. Comaplex has correctly prohibited the use of wheeled vehicles on the land around the camp, and has constructed boardwalks to reduce the effects of foot traffic on the land, thus minimizing the damage. These reduce but do not entirely prevent the wearing away of the plant communities. In high traffic areas, the plant cover tends to be worn away on the higher, drier sites, and pressed into the peat on the wetter areas. In general, the longer the camp operates, the more effect there is on the vegetation.

The areas where the original vegetation is worn away do not remain unvegetated as "Pioneer species" typical of disturbed sites appear in these areas, often growing in great profusion. In the case of the Meliadine camp, this includes a number of grasses, including *Arctagrostis latifolia*, *Calamagrostis stricta* ssp. *stricta*, *Alopecurus magellanicus*, and several species of bluegrass (*Poa* sp.). Liverworts, small mosses and soil algae also become established, once the competition from heaths and other plants is reduced. Forbs, such as dwarf fireweed (*Chamerion latifolium*), fireweed (*C. angustifolium*), and northern tansy-mustard (*Descurainia sophioides*), are gradually becoming established.

Representative photos of this community association are identified below:

- 2008, PHOTO 50, Meliadine West Gold Project camp

9.2.4 Wastewater Outflows (DSgrey)

"Anthropogenic ecosystems" are those established by human activity, examples include sewage lagoons gravel pits and/oror construction areas. These, especially sedge wetlands associated with sewage lagoons, and the artificially enriched environment at refuse dumps, tend to allow the propagation of plant species that were originally not common in the area. The increase in potential food sources or cover (as well as possible protection from predators) can foster an increase in the number of birds and/or mammals using these "urban environments" (Staniforth 2002). Around sewage wetlands, there would likely be a great increase in the diversity and quantity of sedges and cottongrasses, as well as algae, creating a "eutrophic oasis" that certainly benefits waterfowl and other birds.

At Meliadine West camp, there is one outflow, below the kitchen and the "dry." The greywater outflows from kitchens and washing areas both add water to the land and provide nutrients, fertilizing the soil in the immediate area. Over a period of several years, this can encourage the development of a lush growth of vegetation in the outflow area. A lush sedge association has developed there, due to the increased nutrient load. Among the heath species that predated the outflow, there are several species of sedges, including *Carex aquatilis* and *C. membranacea*, a new growth of arctic cotton (*Eriophorum angustifolium*), and several grass species. A filamentous green alga has also become established, and is growing in the little pools of the outflow.

Adjacent to the greywater outflow area, there is an area where a building burned. All debris has been removed; all that is left is the bare spot where it once stood. This is occupied by a thin film of green algae on the soil, some tiny birches, a small white fireweed (*Epilobium palustre*), and a lush growth of liverwort (*Marchantia polymorpha*) including fruiting bodies (2008, PHOTO 53). There are numerous reports in the literature of the tendency of *Marchantia polymorpha* to colonize areas after fire (Matthews 1993), so its presence here is not surprising.

Representative photos of this community association are identified below:

- 2008, PHOTO 51, Plot 08-049, greywater outflow area below kitchen building
- 2008, PHOTO 52, Plot 08-049, marsh willowherb (*Epilobium palustre*)
- 2008, PHOTO 53, Plot 08-049, liverwort (*Marchantia polymorpha*)

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APPENDIX A.
SUB-APPENDIX 1 (1998).
MELIADINE WEST GOLD PROJECT
REPRESENTATIVE PHOTOS, INFRASTRUCTURE AREA

PHOTOS FROM 1998

The following are photos from the 1998 vegetation baseline studies, which illustrate the various plant communities and associations found in the infrastructure area at the Meliadine West Gold Project.

Taken before digital cameras were in wide usage, the pages of the original sub-appendix have been scanned from original prints from 35 mm film.

The captions text has not been changed from the original.

In the text, we have retained the original photo designations, adding 1998 before the photo listing and adding “98” to the plot designation (example: **1998, PHOTO 1, Plot 98-235, emergent sedge association**).

Aqpiq, or cloudberry, *Rubus chamaemorus*. This plant is typical of hummock areas, and at the edges of sedge associations.

PHOTO 1. Sedge community. Emergent vegetation association. Plot 98-235; text reference 1.1.1.

PHOTO 2. Sedge community. Non-tussock sedge association in riparian area to west of camp. Plot 98-4 (phenology plot); text reference 1.1.2.

PHOTO 3. Sedge community. Non-tussock sedge association with distinct stream channels. Plot 98-225, text reference 1.1.2.

PHOTO 4. Sedge community. Tussock association. Plot 98-307, text reference 1.2.

PHOTO 5. Sedge-heath tundra transition. Tussock zone. Plot 98-257; text reference 2.1.

PHOTO 6. Sedge to heath tundra gradual transition on slope. Plot 98-285; text reference 2.2.

PHOTO 7. Heath tundra on solifluction ridges in sedge community. Plot 98-9; text reference 2.3.

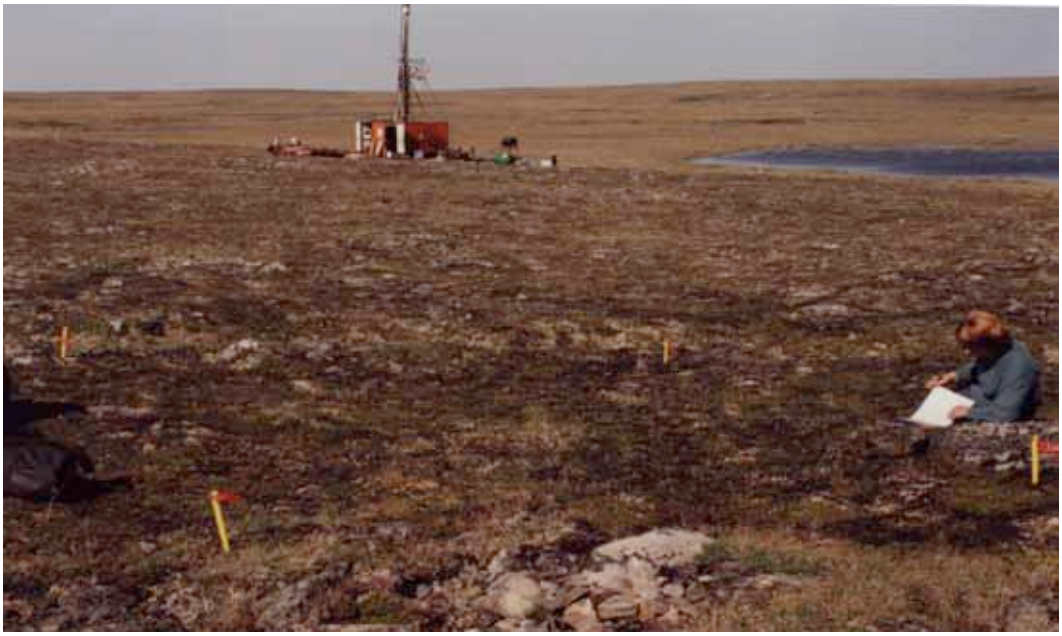

PHOTO 8. Upland heath tundra. Plot 98-133; text reference 3.1.

PHOTO 9. Upland heath tundra, detail with mountain cranberries, bearberry, Labrador tea. Plot 98-270, text reference 3.1.

PHOTO 10. Heath tundra on solifluction slope, showing distinct solufluction lobe. Near Plot 98-327; text reference 3.2.

PHOTO 11. Heath tundra on crest of solifluction lobe. Plot 98-331; text reference 3.2.

PHOTO 12. Heath tundra on frost scar, “turf-rimmed mud circle”. Plot 98-181; text reference 3.3.

PHOTO 13. “Mud boil” in sedge community. Plot 98-127; text reference 3.3.

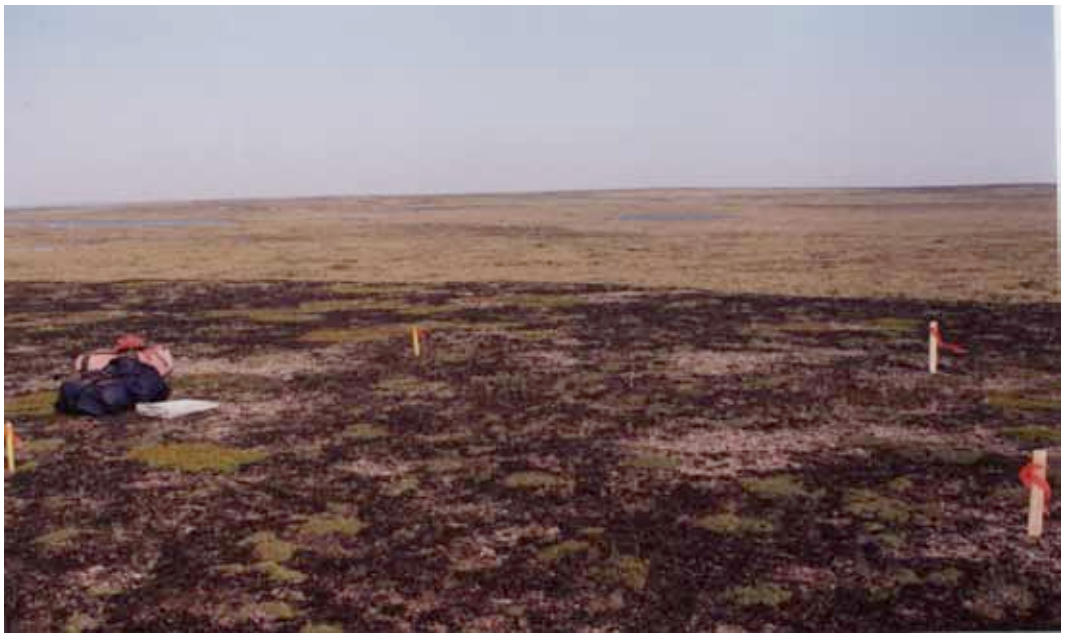

PHOTO 14. Lichen-heath tundra, hair lichen association. Plot 98-88; text reference 4.1.

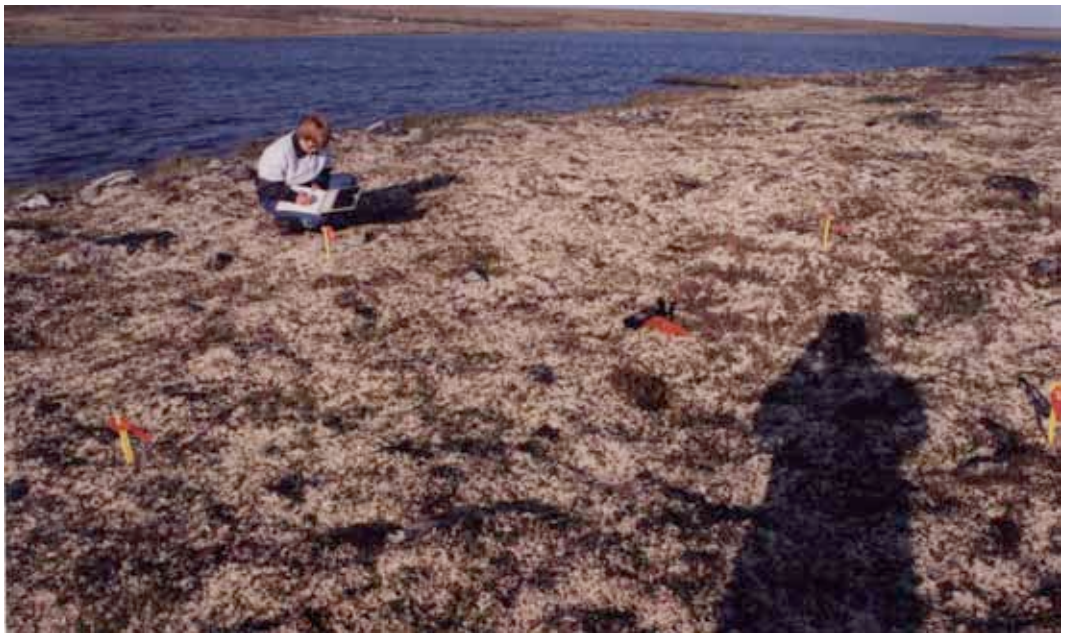

PHOTO 15. Lichen-heath tundra, *Cetraria* lichen association. Plot 98-157; text reference 4.2.

PHOTO 16. Lichen-heath tundra, detail of *Cetraria* lichen assocation. Plot 98-157; text reference 4.2.

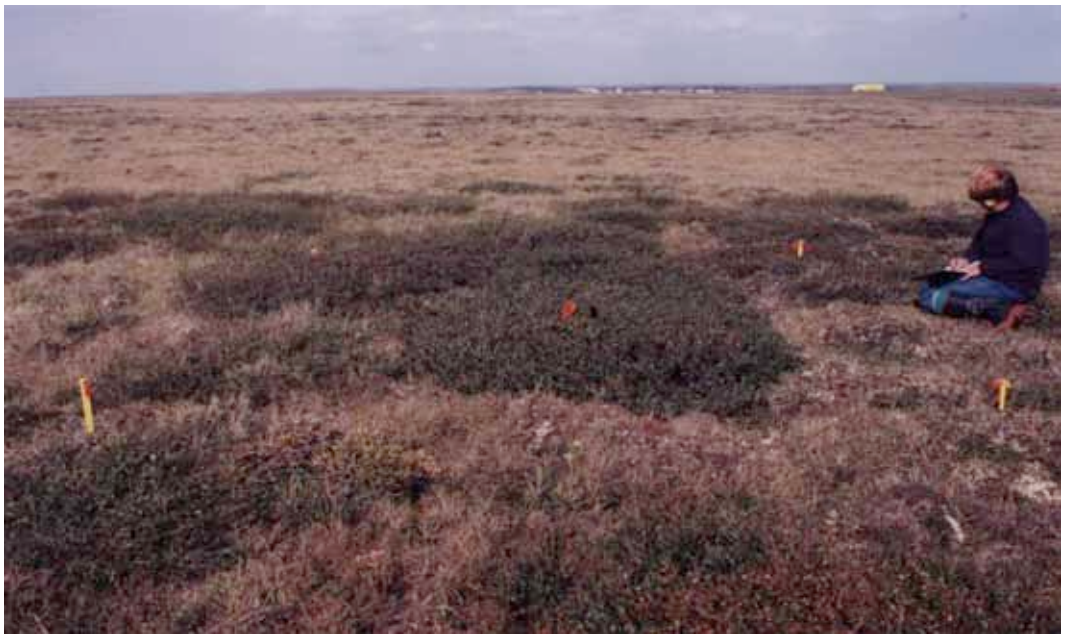

PHOTO 17. Birch “seep” community. Plot 98-183; text reference 5.

PHOTO 18. Birch “seep” community; detail. Plot 98-109; text reference 5.

PHOTO 19. Willow riparian community. Plot 98-279; text reference 6.

PHOTO 20. Shoreline moss association with cloudberries in bloom. Plot 98-47; text reference 7.

PHOTO 21. Cloudberries, detail. Plot 98-47; text reference 7.

PHOTO 22. Lichen-rock community; ridge crest cobbles. Plot 98-16; text reference 8.1.

PHOTO 23. Ridge complex, crest with vegetation mats in gravel. Plot 98-323; text reference 8.1.

PHOTO 24. Ridge complex; sandy ridge crest with bearberry and crowberry mats. Plot 98-35; text reference 8.1.

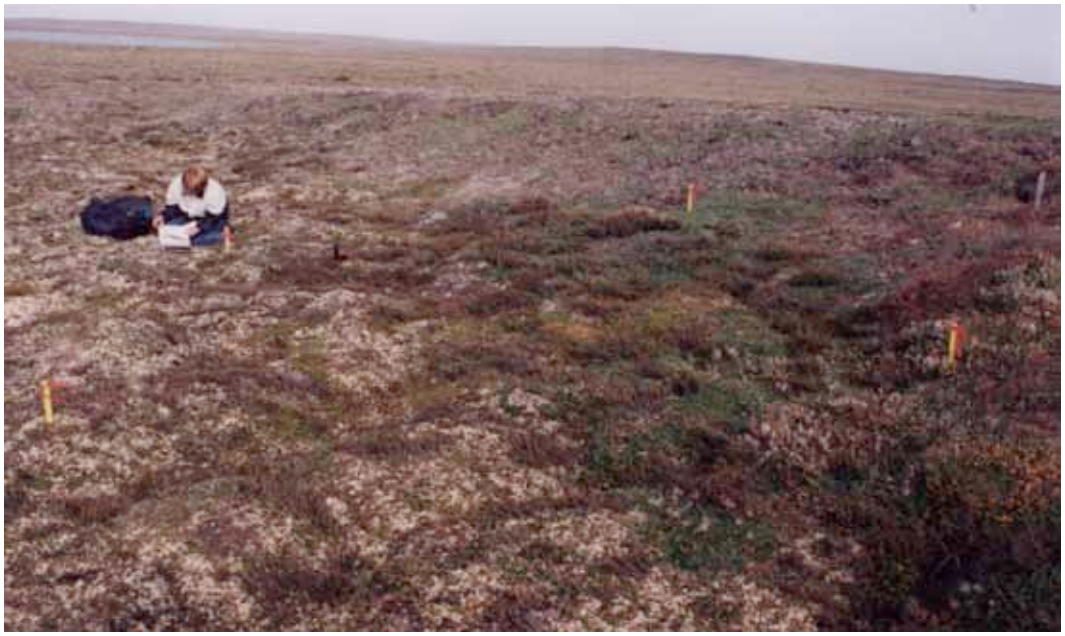

PHOTO 25. Ridge complex; slope with lichen-heath/*Cetraria* association and birch seep. Plot 98-115; text reference 8.2.

PHOTO 26. Snowbank in lee of ridge in June, showing approximate extent of snowbank community. Plot 98-11/38; text reference 9.

PHOTO 27. Snowbank community in July. Plot 98-11/38; text reference 9.

PHOTO 28. "Typical" snowbank plant, least willow (*Salix herbacea*). Plot 98-227; text reference 9.

PHOTO 29. Large glacial boulder partially buried, with heath tundra extending onto the top surface, otherwise lichen-covered. Plot 98-28; text reference 10.

PHOTO 30. Detail of crustose lichens on rock surface. Near Plot 98-28; text reference 10.

PHOTO 31. Lichen-rock community; boulder field with fragrant shield ferns (*Dryopteris fragrans*) and crowberry (*Empetrum nigrum*) mats. Plot 98-99; text reference 10.1.

PHOTO 32. Frost-shattered boulders in heath tundra. Plot 98-87; text reference 10.1.

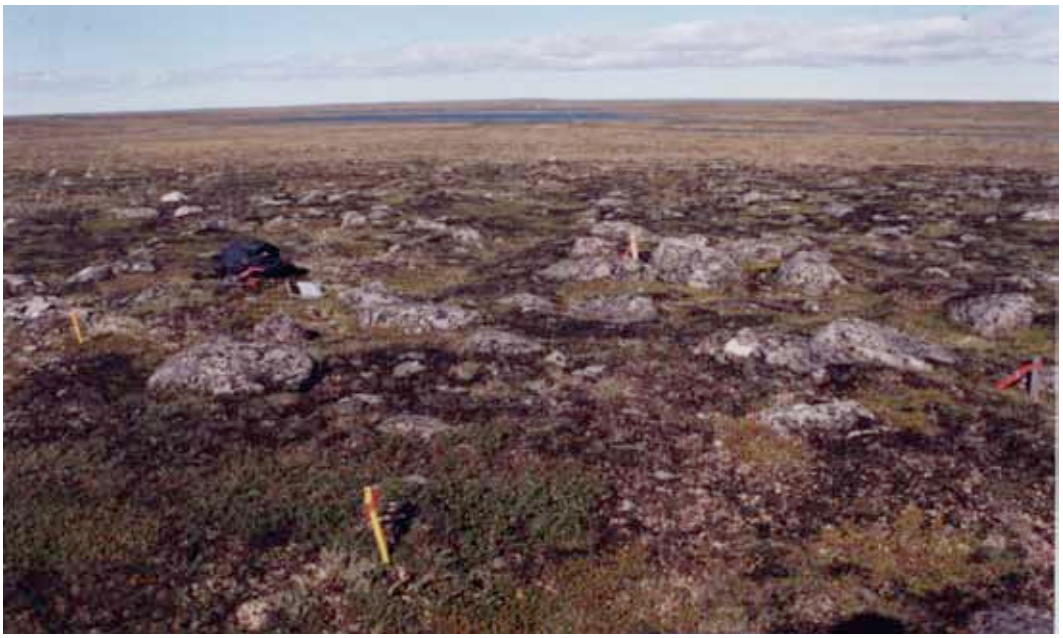

PHOTO 33. Lichen-covered boulders in heath tundra. Plot 98-317; text reference 10.2.

PHOTO 34. Grassy den site on top of ridge, in heath tundra. Plot 98-68; text reference 11.1.1.

PHOTO 35. Grassy den site on small drumlin ridge above pond. Plot 98-249; text reference 11.1.1.

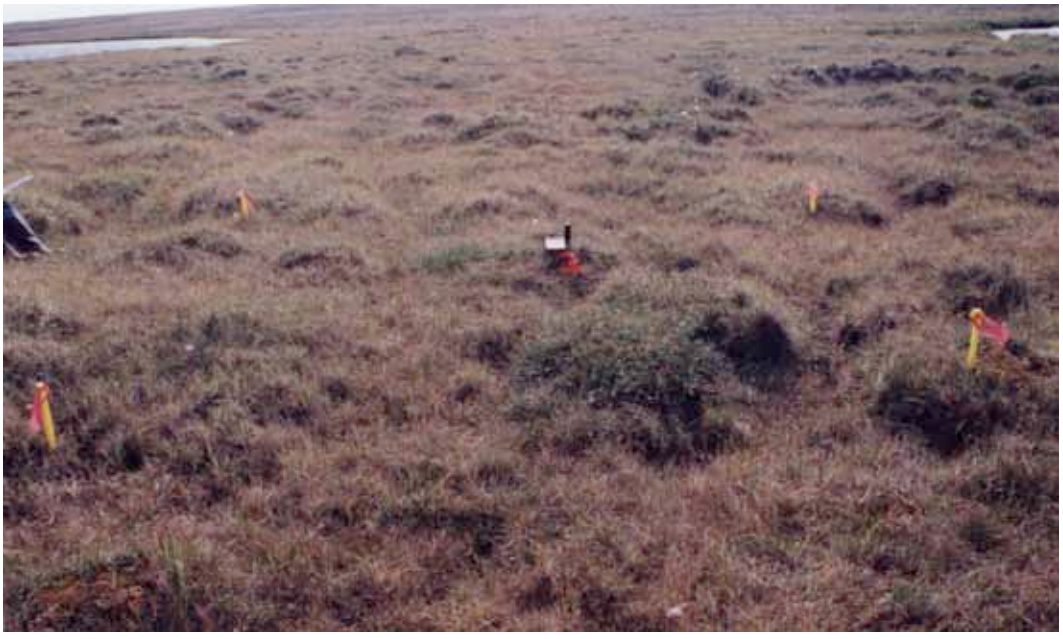

PHOTO 36. Old caribou trails in sedge community. Plot 98-179; text reference 11.1.2.

PHOTO 37. Disturbed site; Honda trail on top of ridge, through lichen-heath community. Near Plot 98-21; text reference 11.4.2.

PHOTO 38. Honda trail running from sedge community onto drumlinoid ridge. Photo by Ben Hubert. Text reference 11.4.2.

APPENDIX A.
SUB-APPENDIX 2 (2008).
MELIADINE WEST GOLD PROJECT
REPRESENTATIVE PHOTOS, INFRASTRUCTURE AREA

PHOTOS FROM 2008

The following photos from the 2008 vegetation baseline studies, illustrate the various plant communities and associations found in the Local Study Area at the Meliadine West Gold Project.

Tall cottongrass (*Eriophorum angustifolium*) on the bank of the Meliadine River. Typical non-tussock sedge association species.

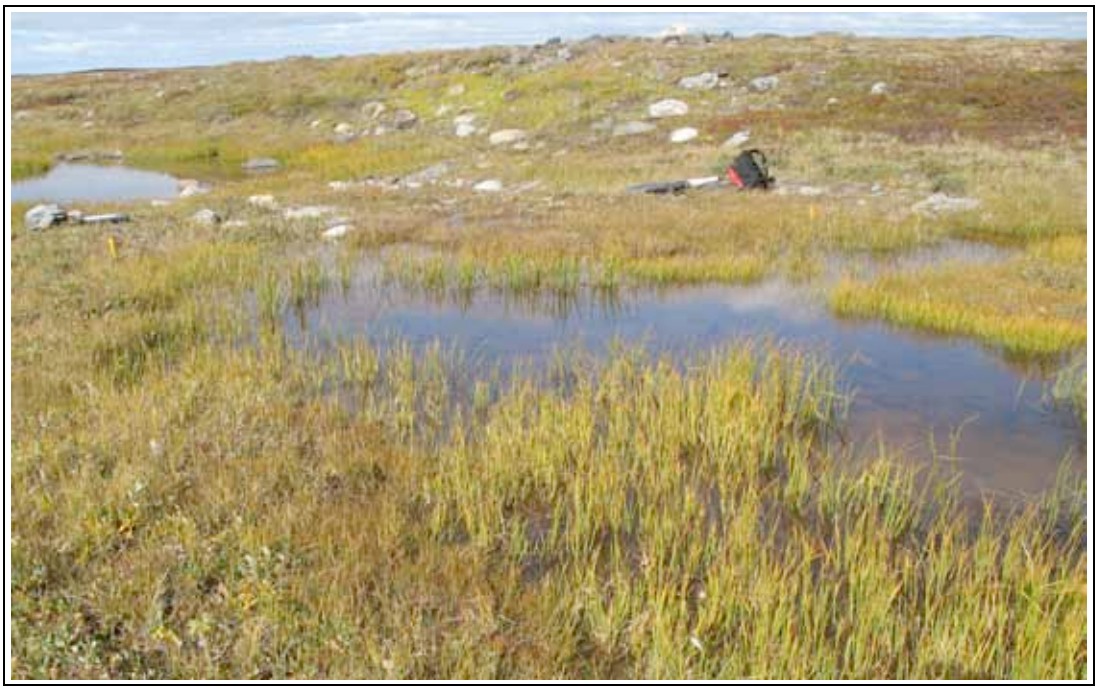

PHOTO 1. Plot 08-025. Emergent sedge association on small pond near Meliadine River crossing.

PHOTO 2. Near Plot 08-040. Emergent sedge association on small pond, interior.

PHOTO 3. Near Plot 08-025. Tall cottongrass (*Eriophorum angustifolium*).

PHOTO 4. Plot 08-018. Non-tussock sedge association at edge of lake.

PHOTO 5. Plot 08-052. Non-tussock sedge association in area south of Peanut Lake.

PHOTO 6. Near Plot 08-035. Small transitory pond showing abrupt transition from non-tussock sedge to lichen-heath on the shore of the pond.

PHOTO 7. Plot 08-033. Tussock sedge association with tufted bulrush (*Trichophorum caespitosum*) at edge of wetland.

PHOTO 8. Plot 08-046. Sedge to heath tundra transitions, hummocky terrain with tufts of *Eriophorum vaginatum*.

PHOTO 9. Plot 08-046. Close-up of tussock, showing colonization by heaths.

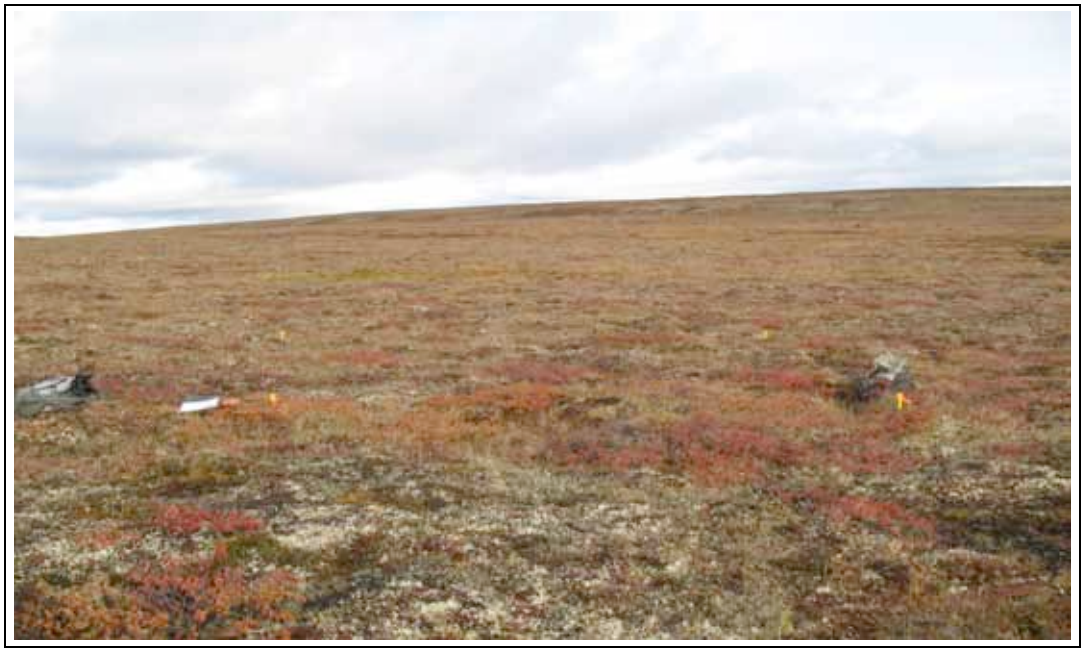

PHOTO 10. Plot 08-050. Sedge to heath transition, gradual change on slope.

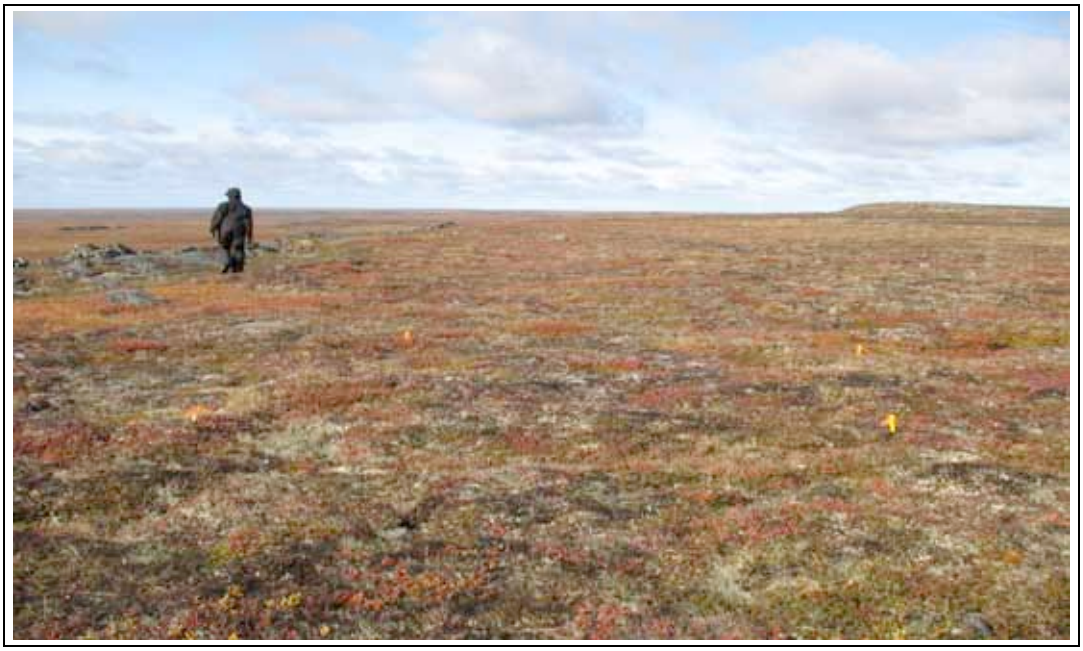

PHOTO 11. Plot 08-D01. Upland heath tundra on the Discovery deposit.

PHOTO 12. Plot 08-022. Close-up of upland heath tundra with blueberries, lingonberries and Labrador tea.

PHOTO 13. Near Plot 08-007. Solifluction lobe on opposite slope of valley. Dark line is shadow of ridge plus darker woody vegetation in the lobe.

PHOTO 14. Plot 08-D03. Frost boil, margin of lichen-heath with both hair and Cetraria lichens, centre without much vegetation at all.

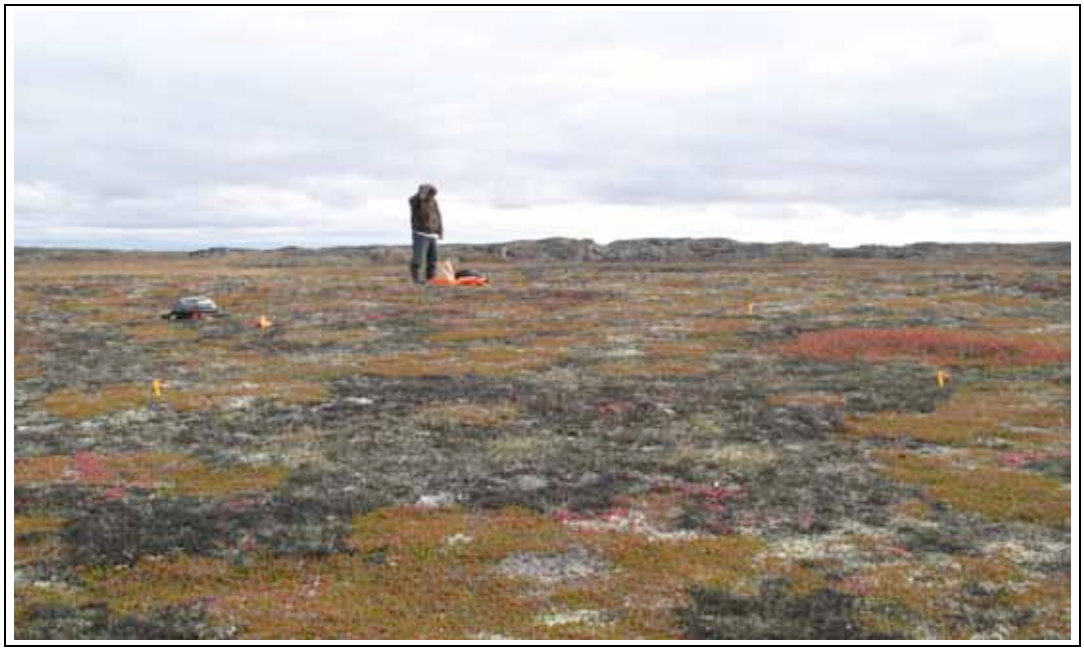

PHOTO 15. Plot 08-042. Lichen-heath with hair lichen dominating, on ridge crest.

PHOTO 16. Plot 08-D07. Lichen-heath with hair lichen. Caribou trails outlined in green hair lichen.

PHOTO 17. Plot 08_D07. Lichen-heath with hair lichen, close-up.

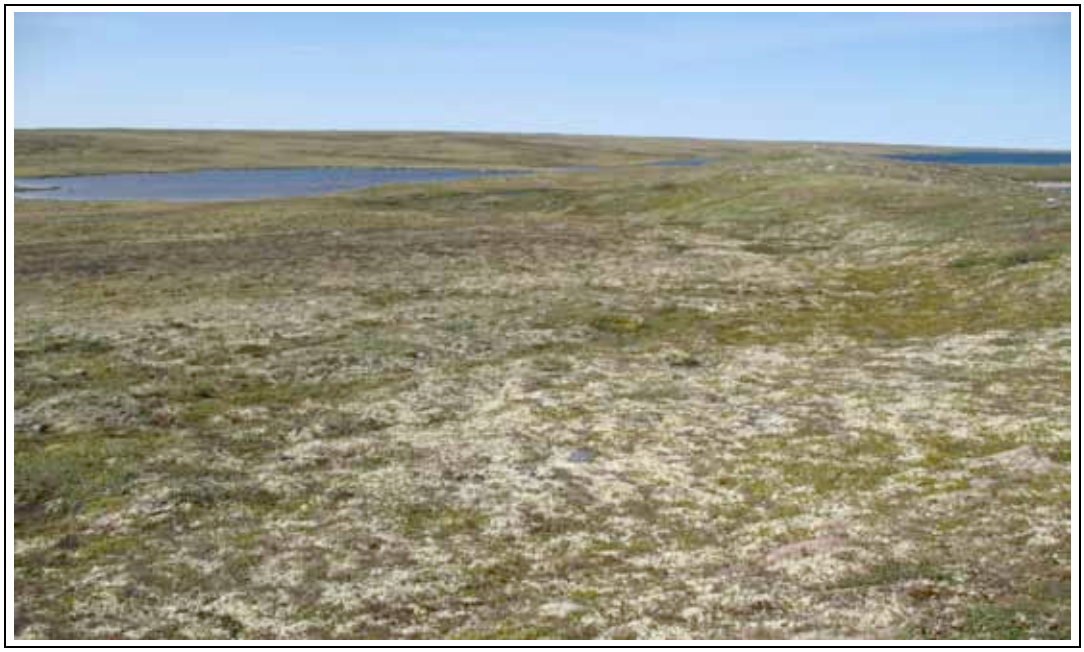

PHOTO 18. Near Plot 08-015. Lichen-heath with *Cetraria nivalis*.

PHOTO 19. Plot 08-040. Birch seep between pond and Honda trail.

PHOTO 20. Dwarf birch (*Betula nana*) leaves in fall.

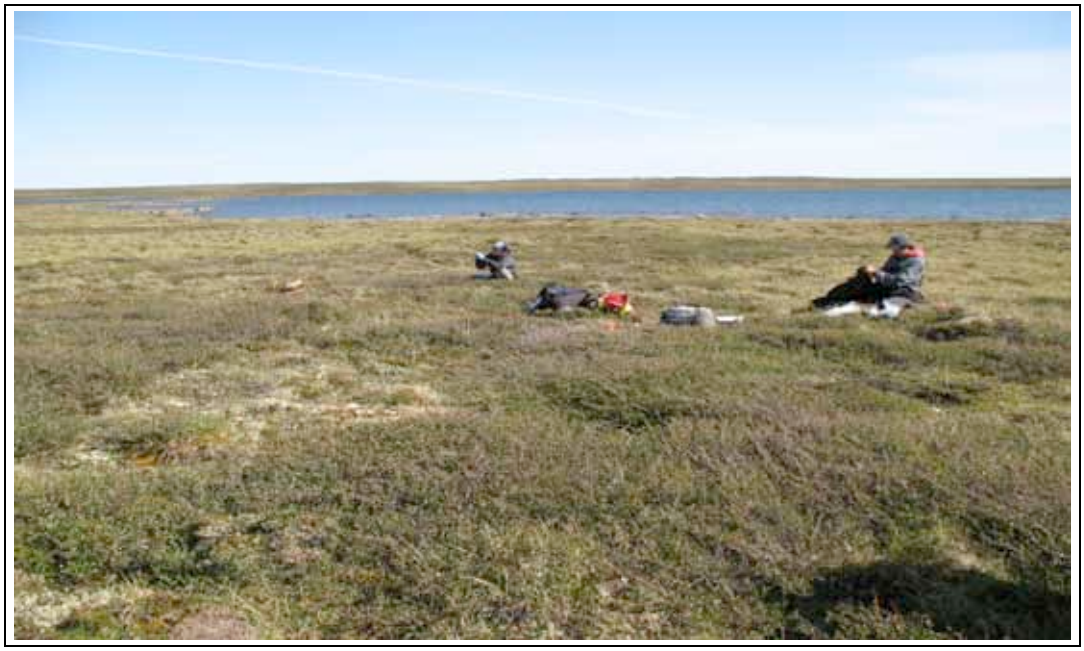

PHOTO 21. Plot 08-013. Birch seep on gentle slope on esker, birches wind-pruned.

PHOTO 22. Plot 08-015. Birch seep on steep esker slope, birches taller due to protection.

PHOTO 23. Plot 08-045. Riparian willow below small lake.

PHOTO 24. Plot 08-018. Tyrrell's willow (*Salix tyrrellii*)

PHOTO 25. Plot 08-005. Feltleaf willow (*Salix calcicola*).

PHOTO 26. Near Plot 08-015. Moss association on esker with S*ibbaldia procumbens* and *Parnassia kotzebuei*

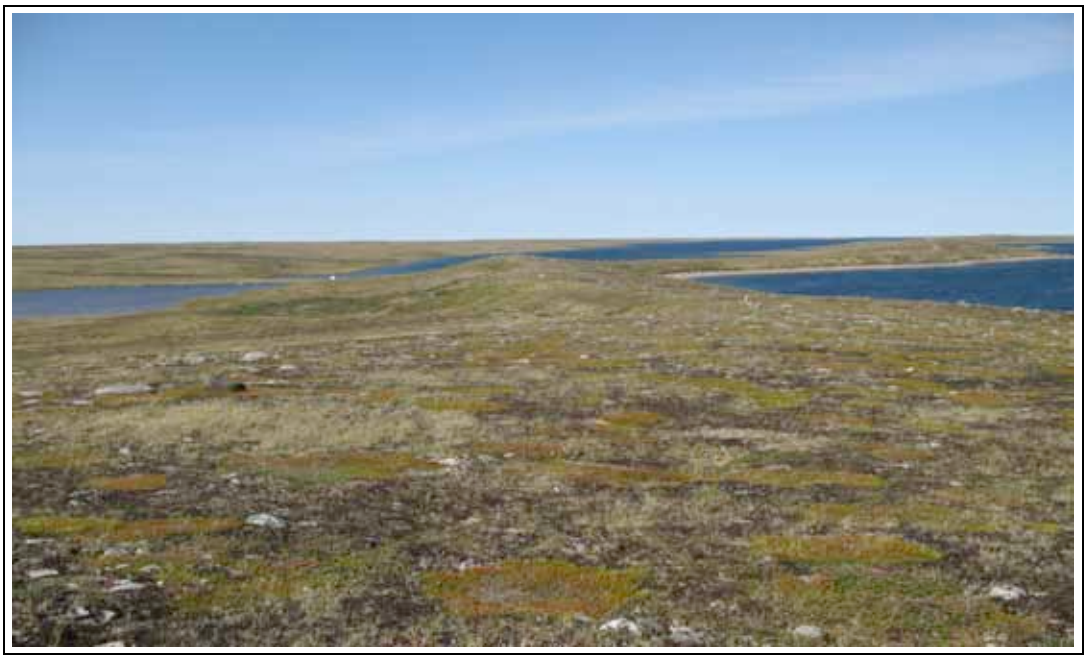

PHOTO 27. Plot 08-015. Esker with hair lichen crest and crowberry (*Empetrum nigrum*)

PHOTO 28. Plot 08-041. Crowberry, black berry, or *Empetrum nigrum*.

PHOTO 29. Plot 08-030. *Oxytropis arctica* var. *bellii* on stony ridge crest.

PHOTO 30. Plot 08-043. Cobble crest of ridge, few rooted plants, much *Umbilicaria*.

PHOTO 31. Plot 08-D06. Bands of vegetation on terraced slope: hair lichen, Labrador tea, bearberry, and crowberry.

PHOTO 32. Near Plot 08-015, mountain heather (*Phyllodoce coerula*).

PHOTO 33. Plot 08-048, *Stereocaulon tomentosum* lichen.

PHOTO 34. Plot 08-048. Snowbank community in lee of small bedrock ridge.

PHOTO 35. Plot 08-048. Cloudberry (*Rubus chamaemorus*), least willow (*Salix herbacea*), and moss in snowbank community.

PHOTO 36. Plot 08-048. Aqpiq berry, also cloudberry (*Rubus chamaemorus*).

PHOTO 37. Plot 08-027. Sunburst lichen (*Arctoparmelia centrifuga*).

PHOTO 38. Plot 08-035. Rock tripe lichen (*Umbilicaria sp*.).

PHOTO 39. Jewel lichen (*Xanthoria elegans*).

PHOTO 40. Plot 08-035. Lichens on old storage cache in boulder field.

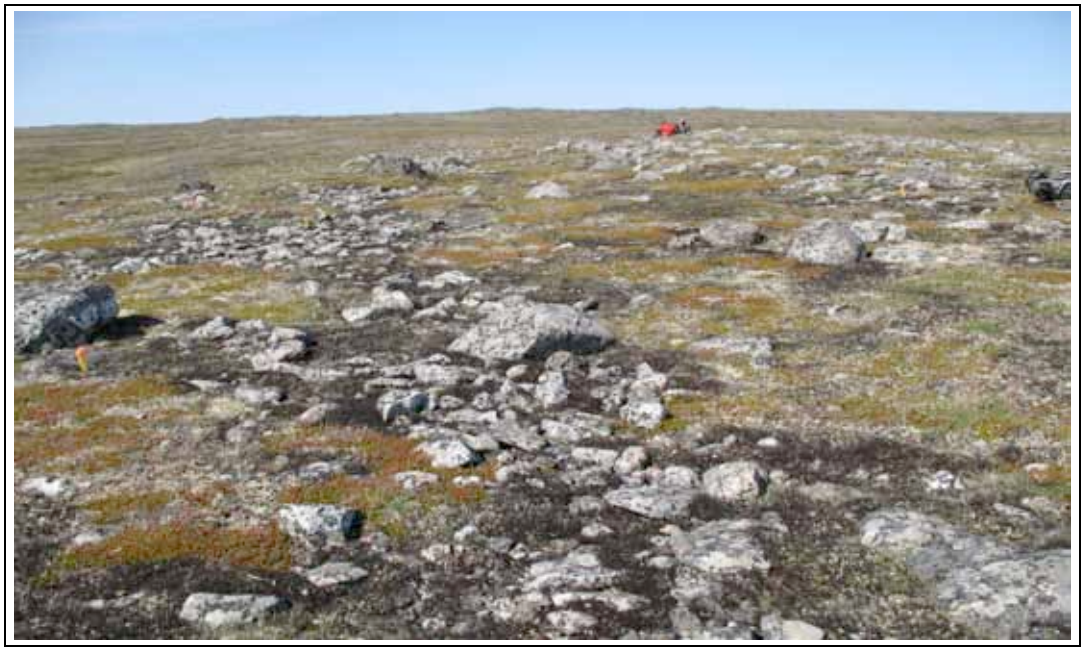

PHOTO 41. Plot 08-016. Boulders in heath and lichen-heath tundra.

PHOTO 42. Plot 08-D04. Monitoring plot markers on bedrock with lichens.

PHOTO 43. Plot 08-028. Domed burrow system of arctic ground squirrels, with birches and fan of excavated soil.

PHOTO 44. Plot 08-028. Sik sik (ground squirrel) burrow, close-up.

PHOTO 45. Plot 08-023. Burrow hill with dense grasses.

PHOTO 46. Plot 08-023. Heaths around burrow entrance.

PHOTO 47. Plot 08-035. Bearberry (Arctostaphylos alpina), fall foliage.

PHOTO 48. Plot 08-019. Caribou trail in heath tundra, partly regrown; only the depression is visible.

PHOTO 49. Near Plot 08-034. Active Honda trails through wetland.

PHOTO 50. Meliadine West Gold Project, camp. Darker green near buildings is vegetation that has developed since the camp has been built.

PHOTO 51. Plot 08-049. Greywater outflow area below kitchen building.

PHOTO 52. Plot 08-049. Small white fireweed (*Epilobium palustre*).

PHOTO 53. Plot 08-049. Liverwort (*Marchantia polymorpha*).

PHOTO 54. Plot 08-D01. Marking system for monitoring plots, with tube system to discourage sik siks from chewing tags.

This list outlines representative plant species typical of each plant community type or association found in the Meliadine area, Kivalliq region based on occurrence in plots. Dominant species for each are underlined. Lichens are included.

Plant community types represent mappable units at a scale of 1:10 000 and correspond to major vegetation units that are often associated with distinct terrain features. Common species associated with these mapped units are presented in the following tables.

Sedge Community	
Anthoxanthum arcticum (Syn.: *Hierochloe pauciflora*)	*J. castaneus*
Arctogrostis latifolia	*J. stygius ssp. americanus*
Arctophila fulva	*Kobresia simpliciuscula*
Cardamine digitata	*Luzula arctica* (Syn.: *L. nivalis ssp. nivalis*)
C. pratensis	*Luzula sp.*
Calamagrostis stricta ssp. *stricta*	*Parnassia kotzebuei*
Carex aquatilis	*Pedicularis lapponica*
C. atrofusca	*P. sudetica*
C. bigelowii	*Poa* sp.
C. rariflora	*P. alpina*
C. rotundata	*P. arctica*
C. rupestris	*Polygonum viviparum*
C. saxatilis	*Ranunculus flammula* var. *filiformis*
Comarum palustre (Syn.: *Potentilla palustris*)	*R. gmellini*
Dupontia fisheri	*Salix arctophila*
Equisetum arvense	*S. calcicola*
E. variegatum	*S. glauca* var. *callicarpaea*
Eriophorum angustifolium	*S. tyrrellii*
E. scheuchzeri	*Saxifraga hirculus*
Hippuris vulgaris	*S. foliolosa*
Juncus albescens	*Silene uralensis* (Syn.: *Melandrium apetalum*)
J. arcticus	*Tofieldia pusilla*
J. biglumis	

Lichen-Heath – Cetraria and Hair Lichen Communities	
Alectoria ochroleuca	*C. nivalis*
A. fuscescens	*C. tilesii*
A. nigricans	*Dactylina arctica*
Anthoxanthum monticola (Syn.: *Hierochloe alpina*)	*Diapensia lapponica*
Arctagrostis latifolia	*Dryas integrifolia*
Artemisia campestris (Syn.: *A. borealis*)	*Eriophorum scheuchzeri*
Bryocaulon divergens	*Luzula arctica* (Syn.: *L. nivalis*)
Carex bigelowii	*L. confusa*
C. capillaris	*Poa arctica*
C. misandra	*Saxifraga caespitosa (?)*
C. scirpoidea	*S. tricuspidata*

Lichen-Heath – Cetraria and Hair Lichen Communities	
C. vaginata	*Silene involucrate* (Syn.: *Melandrium affine*)
Flavocetraria cucullata	*Thamnolia subuliformis*

Heath Tundra Community	
Anthoxanthum monticola (Syn.: *Hierochloe alpina*)	*K. simpliciuscula*
Alectoria ochroleuca	*Ledum decumbens*
A. nigricans (?)	*Loiseleuria procumbens*
Andromeda polifolia	*Huperzia selago* (Syn.: *Lycopodium selago*)
Arctagrostis latifolia	*Luzula* sp.
Arctostaphylos alpina	*L. confusa*
A. rubra	*L. arctica* (Syn.: *L. nivalis*)
Armeria maritima	*Orthilia secunda* (Syn.: *P. secunda*)
Artemisia campestris (Syn.: *A. borealis*)	*Oxytropis arctica var. bellii*
Astragalus alpinus	*O. borealis* (Syn.: *O. hudsonica*)
A. eucosmus	*O. maydelliana*
Betula nana (Syn.: *B. glandulosa*)	*Pedicularis capitata*
Calamagrostis stricta ssp. *stricta*	*P. flammea*
Campanula uniflora	*P. labradorica*
Cardamine digitata	*P. lapponica*
Carex atrofusca	*Pelitgera apthosa*
C. bigelowii	*Poa sp.*
C. membranacea	*P. alpina*
C. rariflora	*P. arctica*
C. rupestris	*Polygonum viviparum*
C. scirpoidea	*Pyrola grandiflora*
C. vaginata	*Ranunculus pedatifidus*
Cassiope tetragona	*Rhododendron lapponicum*
Flavocetraria nivalis	*Rubus chamaemorus*
Cladina sp.	*Salix arctica*
Cladonia cervicornis	*S. arctophila*
C. coccifera	*Saussurea angustifolium*
Dactylina arctica	*Saxifraga aizoides*
Diapensia lapponicum	*S. oppositifolia*
Dryas integrifolia	*Thamnolia subuliformis*
Empetrum nigrum	*Tofieldia coccinea*
Eriophorum angustifolium	*T. pusilla*
E. scheuchzeri	*Trichophorum caespitosum* (Syn.: *Scirpus caespitosus*)
Eutrema edwardsii	*Trisetum spicatum*
Hedysarum alpinum	*Vaccinium uliginosum*
Juncus albescens	*V. vitis-idaea*
Kobresia myosuroides	

Birch "Seep" Communities	
Anemone richardsonii	*Eriophorum angustifolium*
Andromeda polifolia	*Empetrum nigrum*
Arctagrostis latifolia	*Equisetum arvense*
Betula nana (Syn.: *B. glandulosa*)	*Hypnogymnia* sp. *(?)*
Carex aquatilis	*Juncus biglumis*
C. atrofusca	*Kobresia simpliciuscula*
C. bigelowii	*Lecidea sp.*
C. capillaris	*Ledum palustre* (Syn.: *L. decumbens*)
C. rariflora	*Luzula arctica* (Syn.: *L. nivalis*)
C. rotundata	*Orthilia secunda* (Syn.: *Pyrola secunda*)
C. saxatilis	*Peltigera apthosa*
C. scirpoidea	*Pyrola grandiflora*
C. vaginata	*Vaccinium uliginosum*
Cladonia squamosa	*V. vitis-idaea*

Lichen-rock Communities	
Anthoxanthum monticola (Syn.: *Hierochloe alpina*)	*Haematomma lapponicum*
Arctogrostis latifolia	*Pseudephebe pubescens*
Arctoparmelia centrifuga	*Lecanora* sp.
Arctostaphylos alpina	*Lecidea* sp.
Caloplaca sp. *(?)*	*Luzula arctica* (Syn.: *L. nivalis*)
Campanula uniflora	*Racomitrium lanuginosum*
Carex sp.	*Rhizocarpon geminatum*
C. membranacea	*R. geographicum*
Cetraria islandica	*Saxifraga cernua*
C. nivalis	*S. rivularis*
C. tilesii	*S. tricuspidata*
Cladina rangiferina	*Stellaria longipes* (Syn.: *S. edwardsii*)
C. stellaris	*Tremolecia atrata*
Cladonia sp.	*Umbilicaria* sp.
Cystopteris fragilis	*Vaccinium vitis-idaea*
Draba glabella	*Woodsia* sp.
D. lactea	*Xanthoria* sp.
Dryopteris fragrans	

Within each plant community type a series of subgroups, or plant associations, have been described that are based on field level observations. These units are not mappable, but data have been collected on representative plant species that are commonly associated with these non-mappable units and are presented in the following tables.

Ridge Complex, Crests	
Alectoria ochroleuca	*Luzula arctica (*Syn.*: L. nivalis)*
A. nigricans	*L. confusa*
Androsace septentrionalis	*Minuartia rubella*
Antennaria canescens	*Papaver radicatum*
Arabis arenicola	*Poa alpina*
Arctostaphylos alpina	*P. glauca*
Artemisia borealis	*Saxifraga tricuspidata*
Carex rupestris	*Silene acaulis*
C. nardina	*Trisetum spicatum*
Dryas integrifolia	*Umbilicaria* sp.
Empetrum nigrum	*Vaccinium uliginosum*
Festuca brachyphylla	*V. vitis-idaea*
*Ledum palustre (*Syn.*: L. decumbens)*	

Moss Communities	
Andromeda polifolia	*Peltigera apthosa*
Aulicomium sp. *(?)*	*Pinguicula villosa*
Cardamine digitata	*Polygonum viviparum*
Carex sp.	*Rubus chamaemorus*
Hypnum sp. *(?)*	*Sphagnum* sp. *(?)*
*Ledum palustre (*Syn. *L. decumbens)*	*Ranunculus pedatifidus*
Nephroma arcticum	*Vaccinium uliginosum*
Pedicularis lapponica	*V. vitis-idaea*

Snowbank Communities	
Anemone richardsonii	*Phyllodoce coerulea*
*Betula nana (*Syn.*: B. glandulosa)*	*Poa arctica*
Carex membranacea	*Potentilla nivalis*
C. scirpoidea	*Ranunculus pygmaeus*
Cassiope tetragona	*Salix calcicola*
Cerastium alpinum	*S. herbacea*
Empetrum nigrum	*S. reticulata*
Ledum decumbens	*Vaccinium uliginosum*
Oxyria digyna	*V. vitis-idaea*

Disturbed Sites (Nutrient-rich)	
Antennaria alpina (Syn.: *A. canescens*)	*Luzula arctica* (Syn.: *L. nivalis*)
Astragalus alpinus	*Tripleurospernum maritimum* (Syn.: *Matricaria ambigua*)
Calamagrostis stricta var. *stricta*	*Oxyria digyna*
Carex aquatilis	*Oxytropis arctica* ssp. *bellii* (Syn.: *O. bellii*)
C. scirpoidea	*O. maydelliana*
Cerastium alpinum	*Poa alpigena*
Descurainia sophioides	*P. alpina*
Draba glabella	*P. arctica*
Draba lutea	*Potentilla nivalis*
Dryas integrifolia	*Ranunculus pedatifidus*
Leymus mollis (Syn.: *Elymus arenarius* ssp. *mollis*)	*Salix calcicola*
Chamerion latifolium (Syn.: *Epilobium latifolium*)	*Salix* sp.
Erigeron humilis	*Stellaria longipes* (Syn.: *S. monantha*)
Anthoxanthum monticola (Syn.: *Hierochloe alpina*)	*Taraxacum officinale* (Syn.: *T. lacerum*)

APPENDIX B

Wildlife

Table B1-1: Caribou Aerial Survey Data - 1998

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
20-May-98	4	-	-	-	528001	6991991
20-May-98	15	-	-	-	519201	6995541
19-Jun-99	1	-	-	-	521151	6991542
19-Jun-99	1	-	-	-	526601	7006991
19-Jun-99	1	-	-	-	517151	7002741
19-Jun-99	2	-	-	-	534701	6999491
19-Jun-99	5	-	-	-	547601	7003592
19-Jun-99	5	-	-	-	518551	7002241
17-Jul-99	4	-	-	-	533401	6997591
6-Sep-99	0	n/a	n/a	n/a	n/a	n/a
24-Oct-99	0	n/a	n/a	n/a	n/a	n/a

Note: "-" indicates not recorded, n/a = not applicable

Table B1-2: Caribou Aerial Survey Data - 1999

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
20-Mar-99	0	n/a	n/a	n/a	n/a	n/a
12-Apr-99	0	n/a	n/a	n/a	n/a	n/a
12-Jun-99	3	-	-	-	545201	6999292
23-Jul-99	162	-	-	-	547351	6974242
4-Sep-99	1	-	-	-	520571	6974992
4-Sep-99	3	-	-	-	545001	7003142
4-Sep-99	2	-	-	-	546851	7005492
4-Sep-99	2	-	-	-	532251	7009042
4-Sep-99	3	-	-	-	537101	7004892

Note: "-" indicates not recorded, n/a = not applicable

Table B1-3: Caribou Aerial Survey Data – 2000

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
28-Mar-00	15	-	-	-	523851	7010641
28-Mar-00	2	-	-	-	531101	7010291
28-Mar-00	15	-	-	-	532951	7010241
28-Mar-00	4	-	-	-	534451	7010291
28-Mar-00	6	-	-	-	535251	7010291
28-Mar-00	25	-	-	-	536001	7010291

Table B1-3: Caribou Aerial Survey Data – 2000 (continued)

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
28-Mar-00	12	-	-	-	533751	7010391
28-Mar-00	13	-	-	-	537751	7010141
28-Mar-00	2	-	-	-	538600	7010291
28-Mar-00	8	-	-	-	541100	7010141
28-Mar-00	10	-	-	-	543700	7010491
28-Mar-00	12	-	-	-	523451	7006041
28-Mar-00	4	-	-	-	519201	7008241
28-Mar-00	8	-	-	-	517251	7004991
28-Mar-00	5	-	-	-	531851	6974642
28-Mar-00	23	-	-	-	520251	6978992
28-Mar-00	10	-	-	-	520451	6977892
28-Mar-00	5	-	-	-	513251	6990392
28-Mar-00	19	-	-	-	514501	6999041
28-Mar-00	22	-	-	-	515101	6999791
28-Mar-00	16	-	-	-	518201	6998541
28-Mar-00	59	-	-	-	519751	6998541
28-Mar-00	18	-	-	-	520501	6998391
28-Mar-00	23	-	-	-	522951	6998291
28-Mar-00	25	-	-	-	523851	6998241
28-Mar-00	11	-	-	-	525451	6997891
28-Mar-00	23	-	-	-	529851	7005491
28-Mar-00	29	-	-	-	534251	7005491
28-Mar-00	50	-	-	-	536751	7005891
28-Mar-00	9	-	-	-	538450	7005891
28-Mar-00	56	-	-	-	541000	7006291
28-Mar-00	12	-	-	-	548350	7007641
28-Mar-00	6	-	-	-	526201	7002991
28-Mar-00	30	-	-	-	534101	7002041
28-Mar-00	15	-	-	-	542200	7002291
28-Mar-00	30	-	-	-	543750	7002141
28-Mar-00	23	-	-	-	545200	7003141
28-Mar-00	16	-	-	-	545100	7002141
28-Mar-00	70	-	-	-	545200	7001141
28-Mar-00	38	-	-	-	530251	7002791
28-Mar-00	8	-	-	-	530951	7002641
28-Mar-00	10	-	-	-	541250	7006991
28-Mar-00	3	-	-	-	537001	7005041

Table B1-3: Caribou Aerial Survey Data – 2000 (continued)

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
28-Mar-00	30	-	-	-	548450	7003891
28-Mar-00	5	-	-	-	548600	7003141
28-Mar-00	15	-	-	-	548600	7001241
28-Mar-00	25	-	-	-	527451	6998491
28-Mar-00	70	-	-	-	531701	6998891
28-Mar-00	100	-	-	-	532851	6998791
28-Mar-00	25	-	-	-	533101	6998791
28-Mar-00	28	-	-	-	533301	6998741
28-Mar-00	18	-	-	-	533501	6998741
28-Mar-00	43	-	-	-	533701	6998741
28-Mar-00	5	-	-	-	534601	6998841
28-Mar-00	10	-	-	-	539100	6998941
28-Mar-00	37	-	-	-	540350	6999041
28-Mar-00	8	-	-	-	546700	6998541
28-Mar-00	9	-	-	-	518801	6995041
28-Mar-00	65	-	-	-	520951	6995141
28-Mar-00	39	-	-	-	522651	6994941
28-Mar-00	22	-	-	-	526801	6994791
28-Mar-00	100	-	-	-	527551	6994741
28-Mar-00	30	-	-	-	530101	6994791
28-Mar-00	6	-	-	-	531651	6994741
28-Mar-00	19	-	-	-	535001	6995141
28-Mar-00	60	-	-	-	537000	6994991
28-Mar-00	25	-	-	-	537700	6994941
28-Mar-00	47	-	-	-	538450	6994791
28-Mar-00	19	-	-	-	538950	6994991
28-Mar-00	55	-	-	-	539450	6994941
28-Mar-00	70	-	-	-	543700	6994441
28-Mar-00	20	-	-	-	544550	6994441
28-Mar-00	11	-	-	-	545000	6994191
28-Mar-00	150	-	-	-	545500	6994541
28-Mar-00	75	-	-	-	545950	6994241
28-Mar-00	3	-	-	-	547500	6997191
28-Mar-00	3	-	-	-	547950	6996691
28-Mar-00	17	-	-	-	521201	6990841
28-Mar-00	50	-	-	-	522301	6990691
28-Mar-00	60	-	-	-	524751	6990592

Table B1-3: Caribou Aerial Survey Data – 2000 (continued)

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
28-Mar-00	30	-	-	-	526651	6991142
28-Mar-00	80	-	-	-	526801	6990841
28-Mar-00	100	-	-	-	527001	6990941
28-Mar-00	28	-	-	-	529801	6991042
28-Mar-00	180	-	-	-	533001	6991041
28-Mar-00	120	-	-	-	533401	6991242
28-Mar-00	49	-	-	-	535801	6993241
28-Mar-00	75	-	-	-	533801	6991192
28-Mar-00	10	-	-	-	534201	6990841
28-Mar-00	70	-	-	-	536850	6991541
28-Mar-00	80	-	-	-	537700	6991441
28-Mar-00	15	-	-	-	539900	6991541
28-Mar-00	15	-	-	-	540300	6991441
28-Mar-00	66	-	-	-	544100	6994441
28-Mar-00	36	-	-	-	544300	6991842
28-Mar-00	250	-	-	-	548400	6992441
28-Mar-00	50	-	-	-	548900	6992342
28-Mar-00	200	-	-	-	548900	6991741
28-Mar-00	15	-	-	-	523651	6985442
28-Mar-00	25	-	-	-	524801	6985942
28-Mar-00	25	-	-	-	525301	6985642
28-Mar-00	40	-	-	-	527051	6985992
28-Mar-00	70	-	-	-	527351	6985792
28-Mar-00	28	-	-	-	529201	6986542
28-Mar-00	10	-	-	-	531751	6986442
28-Mar-00	4	-	-	-	546900	6985342
28-Mar-00	3	-	-	-	523151	6982342
28-Mar-00	5	-	-	-	534501	6982342
28-Mar-00	45	-	-	-	534651	6981592
28-Mar-00	6	-	-	-	534501	6979342
28-Mar-00	9	-	-	-	537501	6981942
28-Mar-00	12	-	-	-	538050	6981542
28-Mar-00	1	-	-	-	536401	6981642
16-Nov-00	9	-	-	-	544800	6978842
16-Nov-00	12	-	-	-	539900	6981692
16-Nov-00	14	-	-	-	540400	6981742
16-Nov-00	3	-	-	-	543350	6994891

Table B1-3: Caribou Aerial Survey Data – 2000 (continued)

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
16-Nov-00	25	-	-	-	540950	6995041
16-Nov-00	1	-	-	-	536651	6998641
16-Nov-00	5	-	-	-	528651	6994841
16-Nov-00	4	-	-	-	543050	7004791

Note: "-" indicates not recorded

Table B1-4: Caribou Aerial Survey Data – 2008

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
12-Jun-08	3	adult	S	HT	509840	6979198
12-Jun-08	1	adult	S	HT	509082	7026191
12-Jun-08	2	adult	R	HT	522387	6952652
13-Jun-08	4	adult	W	HT	533195	7029392
13-Jun-08	3	adult	B	HT	537519	7030532
13-Jun-08	1	adult	S	HT	537729	7017534
13-Jun-08	3	adult	B	HT	545194	7029842
13-Jun-08	1	adult	S	SW	545227	7027842
13-Jun-08	3	adult	S	HT	545324	7021842
13-Jun-08	1	adult	W	SW	549551	7029434
13-Jun-08	1	adult	S	SW	549664	7022435
13-Jun-08	2	adult	S	HT	549955	7004436
13-Jun-08	2	adult	S	HT	555800	6979442
13-Jun-08	2	adult	W	SW	557350	7015641
13-Jun-08	3	adult	W	SW	556850	7032741
13-Jun-08	2	adult	S	HT	562148	6995938
13-Jun-08	1	adult	S	HT	574469	6984140
13-Jun-08	1	adult	W	HT	581032	7020841
17-Jun-08	11	adult	S	HT	497115	7011043
17-Jun-08	7	adult	W	SW	510210	6956202
17-Jun-08	6	adult	W	HBo	509921	6974200
17-Jun-08	2	adult	W	SW	509888	6976199
17-Jun-08	2	adult	R	HT	522499	6945653
17-Jun-08	3	adult	S	HT	522467	6947653
17-Jun-08	2	adult	S	HT	522275	6959651
17-Jun-08	1	adult	B	HT	522066	6972650
17-Jun-08	8	adult	S	HT	521179	7027642
17-Jun-08	1	adult	S	HT	521017	7037641

Table B1-4: Caribou Aerial Survey Data – 2008 (continued)

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
17-Jun-08	2	adult	S	SW	539163	7031942
17-Jun-08	5	adult	S	HT	539195	7029942
17-Jun-08	16	adult	W	HT	539243	7026942
17-Jun-08	3	adult	S	SW	546339	6958849
17-Jun-08	1	adult	S	SW	546275	6962849
17-Jun-08	3	adult	S	SW	545292	7023843
17-Jun-08	5	adult	S	SW	558451	6948949
17-Jun-08	3	adult	S	HT	557065	7034941
21-Jul-08	2000	nursery	S	E	503027	6999915
21-Jul-08	300	adult	F	E	503020	6996865
21-Jul-08	200	adult	F	HBo	503037	6994885
21-Jul-08	3	adult	W	HT	503020	6993209
21-Jul-08	2000	nursery	S	HT	503017	699168
21-Jul-08	2	nursery	W	HT	508986	6970182
21-Jul-08	1000	nursery	S	HT	508982	6974478
21-Jul-08	36	nursery	S	HT	508995	6989225
21-Jul-08	12	adult	W	HT	515003	6956326
21-Jul-08	1	adult	F	HT	520297	6954596
21-Jul-08	18	adult	R	HT	520994	6971145
21-Jul-08	40	nursery	F	HT	503008	6988488
21-Jul-08	120	nursery	F	HT	503000	6978074
21-Jul-08	12	nursery	B	HT	508959	6975487
21-Jul-08	1	adult	W	HT	508983	6983878
21-Jul-08	70	nursery	F	HT	515033	6975127
21-Jul-08	50	nursery	W	HT	515013	6960886
21-Jul-08	25	nursery	F	HT	515008	6957179
21-Jul-08	25	nursery	F	HT	515011	6955550
21-Jul-08	4	nursery	F	SW	514993	6951297
22-Jul-08	1	nursery	F	SW	545022	7042065

Note: B=bedded, F=feeding, W=walking, R=running, S=standing; HT=heath tundra, SW=sedge wetland, HBo=heath boulder, E=esker

Table B1-5: Caribou Serial Survey Data 2009

Date	Number	Group Composition	Behaviour	Habitat	UTM Zone 15 NAD 83	
					Easting	Northing
19-May-09	4	adult	T	Snow	556810	7035923

Table B2-1: Fox Den Survey Data

Fox Den Number	UTM Zone 15 NAD 83		Observed		Active		Pups Raised	
	Easting	Northing	1998	2008	1998	2008	1998	2008
1998-01	543742	6986022	√		√		√	
1998-02	543687	6985809	√		√			
1998-03	543219	6985676	√		√		√	
2008-01	543742	6986022		√		√		
2008-02	543687	6985809		√				
2008-03	543219	6985676		√				
2008-04	543654	6986075		√				
2008-05	543727	6985682		√				
2008-06	543570	6985417		√				
2008-07	538494	6986145		√				
2008-08	539257	6988764		√				
2008-09	539455	6988764		√				
1998-04 / 2008-10	540462	6986349	√	√	√			
2008-11	543695	6986236		√				
2008-12	520851	6974642		√				
2008-13	520701	6963943		√				
2008-14	533301	7024490		√				
2008-15	542584	6984482		√				
2008-16	541479	6987180		√				
2008-17	549668	6980893		√				
2008-18	541201	6988792		√		√		
2008-19	517305	6975377		√				
2008-20	528064	6975693		√				
2008-21	564391	6998709		√				

Table B3-1: Raptor Survey Data

Field Name of Nest	Species	Report Name of Nest	UTM Zone 15 NAD 83		1998	1999	2000	2008	2009
			Easting	Northing					
RLHA1	Rough-legged Hawk	A08-01	539067	6990610	Occupied	Occupied	Occupied	Occupied	Unoccupied
UNKN4	Rough-legged Hawk	A08-05 A	541180	6991881	-	-	-	Unoccupied	Occupied
UNKN3	Rough-legged Hawk	A08-04 A	541413	6991587	-	-	-	Unoccupied	Occupied
PEFA4	Peregrine Falcon	B09-01	547223	6990519	-	-	-	-	Occupied
RLHA7	Rough-legged Hawk	C09-01	542854	6984546	-	-	-	-	Occupied
SHOW1	Short-eared Owl	C08-01	539253	6986433	-	-	-	Unoccupied	-
RLHA2	Rough-legged Hawk	E08-01	554519	6981459	-	-	-	Unoccupied	-
UNKN2	Unknown raptor	G08-02	546212	6972309	-	-	-	Unoccupied	-
UNKN1	Unknown raptor	G08-01	538851	6965842	-	-	-	Unoccupied	-
PEFA1	Peregrine Falcon	F08-01	548111	6977843	-	-	-	Occupied	-
RLHA3	Rough-legged Hawk	A08-02	541061	6992004	-	-	-	Occupied	-
RLHA4	Rough-legged Hawk	A08-03	541663	6991524	-	-	-	Occupied	-
RLHA5	Rough-legged Hawk	B08-01	548190	6989362	-	-	-	Occupied	-
RLHA6	Rough-legged Hawk	B08-02	546950	6990506	-	-	-	Occupied	Unoccupied
UNKN5	Unknown raptor	B08-05	546195	6990334	-	-	-	Unoccupied	-
UNKN6	Unknown raptor	D08-02	550527	6982569	-	-	-	Unoccupied	-
PEFA2	Peregrine Falcon	D08-01	550593	6982562	-	-	-	Occupied	-
UNKN7	Unknown raptor	F08-03	548226	6977732	-	-	-	Unoccupied	-
PEFA3	Peregrine Falcon	F08-02	548107	6977852	-	-	-	Occupied	-
UNKN8	Unknown raptor	F08-04	547729	6978126	-	-	-	Unoccupied	-

Table B3-1: Raptor Survey Data (continued)

Field Name of Nest	Species	Report Name of Nest	UTM Zone 15 NAD 83		1998	1999	2000	2008	2009
			Easting	Northing					
13	Peregrine Falcon	H98-01	539401	6978092	Occupied/ Unoccupied*	-	Occupied	-	-
4	Peregrine Falcon	H98-02	535901	6979342	Unoccupied	-	-	-	-
14	Peregrine Falcon	G98-01	544301	6971842	Occupied/ Unoccupied*	-	-	-	-
15	Peregrine Falcon	G98-02	542451	6970192	Occupied/ Unoccupied*	-	-	-	-
6	Rough-legged Hawk	G98-03	538301	6965643	-	-	-	-	-
1	Gyrfalcon	A98-01	537751	6991992	Unoccupied	-	Unoccupied	-	-
2	Peregrine Falcon	A98-02	542151	6991142	Unoccupied	Occupied	Unoccupied	-	-
5	Peregrine Falcon	A98-03	541901	6991392	Unoccupied	-	Unoccupied	-	-
10	Rough-legged Hawk	J98-01	533851	6988542	Occupied/ Unoccupied*	-	Occupied	-	-
8	Rough-legged Hawk	J98-02	533301	6988042	Unoccupied	-	Occupied	-	-
11	Gyrfalcon	A98-04	539301	6993292	Unoccupied	-	-	-	-
12	Peregrine Falcon	A98-05	539601	6993242	Unoccupied	-	-	-	-
-	Rough-legged Hawk	C00-01	542701	6983142	-	-	Unoccupied	-	-
-	Rough-legged Hawk	J00-01	530551	6990442	-	-	Unoccupied	-	-
-	Peregrine Falcon	K99-01	unknown		-	Occupied	-	-	-
-	Peregrine Falcon	M99-01	unknown		-	Occupied	-	-	-
-	Rough-legged Hawk	N99-01	unknown		-	Occupied	-	-	-

Note: "-" indicates not located; "*" indicates nest occupied early in the season (May/June) but unoccupied by July

Table B4-1: Upland Breeding Bird Point Count Data – 2008

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8001	541533	6988623	HT	12-Jun-08	03:56	5	2	E	0-1	Horned Lark	HOLA	2	<50 m (0-3 min)	Meliadine West
CM8001	541533	6988623	HT	12-Jun-08	03:56	5	2	E	0-1	Horned Lark	HOLA	1	<50 m (3-5 min)	Meliadine West
CM8001	541533	6988623	HT	12-Jun-08	03:56	5	2	E	0-1	Unidentified bird spp.	UNKN	1	fly-over (0-3 min)	Meliadine West
CM8001	541533	6988623	HT	12-Jun-08	03:48	0	2	W	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8002	541669	6988908	HT	12-Jun-08	03:48	0	2	W	1	Horned Lark	HOLA	2	<50 m (0-3 min)	Meliadine West
CM8003	541379	6988763	HT	12-Jun-08	04:14	5	2	E	2	Horned Lark	HOLA	1	>50 m (3-10 min)	Meliadine West
CM8003	541379	6988763	HT	12-Jun-08	04:14	5	2	E	2	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8003	541379	6988763	HT	12-Jun-08	04:14	5	2	E	2	Lapland Longspur	LALO	1	<50 m (3-5 min)	Meliadine West
CM8004	54146	6988978	HT	12-Jun-08	04:04	0	10	N	1	Horned Lark	HOLA	2	>50 m (0-3 min)	Meliadine West
CM8004	54146	6988978	HT	12-Jun-08	04:04	0	10	N	1	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	Meliadine West
CM8005	541194	6988852	HT	12-Jun-08	04:30	8	5	E	1	Horned Lark	HOLA	1	<50 m (3-5 min)	Meliadine West
CM8005	541194	6988852	HT	12-Jun-08	04:30	8	5	E	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8005	541194	6988852	HT	12-Jun-08	04:30	8	5	E	1	Lapland Longspur	LALO	2	fly-over (3-5 min)	Meliadine West
CM8005	541194	6988852	HT	12-Jun-08	04:30	8	5	E	1	Lapland Longspur	LALO	1	fly-over (0-3 min)	Meliadine West
CM8005	541194	6988852	HT	12-Jun-08	04:30	8	5	E	1	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8006	541260	6989053	HT	12-Jun-08	04:18	0	5	N	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8006	541260	6989053	HT	12-Jun-08	04:18	0	5	N	1	Lapland Longspur	LALO	2	<50 m (0-3 min)	Meliadine West
CM8007	541008	6988940	HT	12-Jun-08	04:43	8	0		1	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8007	541008	6988940	HT	12-Jun-08	04:43	8	0		1	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8007	541008	6988940	HT	12-Jun-08	04:43	8	0		1	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8007	541008	6988940	HT	12-Jun-08	04:43	8	0		1	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8007	541008	6988940	HT	12-Jun-08	04:43	8	0		1	Savannah Sparrow	SAVS	1	fly-over (0-3 min)	Meliadine West
CM8008	541052	6989131	HT	12-Jun-08	04:32	2	5	N	0	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8008	541052	6989131	HT	12-Jun-08	04:32	2	5	N	0	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8009	540845	6989059	HT	12-Jun-08	05:03	7	5	E	2	Horned Lark	HOLA	2	>50 m (0-3 min)	Meliadine West
CM8009	540845	6989059	HT	12-Jun-08	05:03	7	5	E	2	Lapland Longspur	LALO	2	<50 m (0-3 min)	Meliadine West
CM8009	540845	6989059	HT	12-Jun-08	05:03	7	5	E	2	Lapland Longspur	LALO	1	fly-over (0-3 min)	Meliadine West
CM8010	540853	6989210	HT	12-Jun-08	04:44	2	15	N	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8010	540853	6989210	HT	12-Jun-08	04:44	2	15	N	1	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8011	540684	6989178	HT	12-Jun-08	05:12	7	-1	W	2	Lapland Longspur	LALO	1	fly-over (0-3 min)	Meliadine West
CM8011	540684	6989178	HT	12-Jun-08	05:12	7	-1	W	2	Unidentified bird spp.	UNKN	2	fly-over (3-5 min)	Meliadine West
CM8012	540677	6989411	TH	12-Jun-08	04:59	2	<5	N	1	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8012	540677	6989411	TH	12-Jun-08	04:59	2	<5	N	1	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8013	540523	6989304	TH	12-Jun-08	05:37	7	0		2	Horned Lark	HOLA	1	<50 m (3-5 min)	Meliadine West
CM8013	540523	6989304	TH	12-Jun-08	05:37	7	0		2	Lapland Longspur	LALO	1	<50 m (3-5 min)	Meliadine West
CM8013	540523	6989304	TH	12-Jun-08	05:37	7	0		2	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	Meliadine West
CM8013	540523	6989304	TH	12-Jun-08	05:37	7	0		2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8014	540528	6989565	HT	12-Jun-08	05:16	3	5	NW	1	Redpoll Species	RESP	1	fly-over (0-3 min)	Meliadine West
CM8014	540528	6989565	HT	12-Jun-08	05:16	3	5	NW	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8014	540528	6989565	HT	12-Jun-08	05:16	3	5	NW	1	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8015	540348	6989406	HT	12-Jun-08	05:52	7	0		2	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8015	540348	6989406	HT	12-Jun-08	05:52	7	0		2	Unidentified bird spp.	UNKN	2	>50 m (0-3 min)	Meliadine West
CM8016	540433	6989748	HT	12-Jun-08	05:35	3	5	N	1	American Pipit	AMPI	3	<50 m (0-3 min)	Meliadine West
CM8016	540433	6989748	HT	12-Jun-08	05:35	3	5	N	1	White-Crowned Sparrow	WCSP	1	<50 m (0-3 min)	Meliadine West
CM8017	540195	6989543	SW	12-Jun-08	06:05	8	0		1	Horned Lark	HOLA	2	<50 m (3-5 min)	Meliadine West
CM8017	540195	6989543	SW	12-Jun-08	06:05	8	0		1	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8017	540195	6989543	SW	12-Jun-08	06:05	8	0		1	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8017	540195	6989543	SW	12-Jun-08	06:05	8	0		1	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8018	540260	6989900	HBou	12-Jun-08	06:00	4	20	N	2	Horned Lark	HOLA	2	<50 m (3-5 min)	Meliadine West
CM8018	540260	6989900	HBou	12-Jun-08	06:00	4	20	N	2	Snow Bunting	SNBU	3	<50 m (0-3 min)	Meliadine West
CM8019	539999	6989519	HT	12-Jun-08	06:24	8	0		2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8020	540051	6989933	HBou	12-Jun-08	06:12	3	20	N	3	Semipalmated Plover	SEPL	1	<50 m (0-3 min)	Meliadine West
CM8021	539850	6989659	HT	12-Jun-08	06:39	7	0		2	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8022	540110	6989687	HT	12-Jun-08	06:29	5	5	W	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8022	540110	6989687	HT	12-Jun-08	06:29	5	5	W	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8022	540110	6989687	HT	12-Jun-08	06:29	5	5	W	2	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	Meliadine West
CM8023	539754	6988688	SW	13-Jun-08	02:56	5	<5	NE	2	Unidentified bird spp.	UNKN	1	>50 m (0-3 min)	Meliadine West
CM8024	539642	6988829	SW	13-Jun-08	02:53	3	0		2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8025	539587	6988526	HT	13-Jun-08	03:11	5	5	E	2	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8026	539454	6988695	HT	13-Jun-08	03:04	3	<5	N	2	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8027	539443	6988421	HT	13-Jun-08	03:23	5	5	W	2	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8028	539251	6988594	HT	13-Jun-08	03:16	2	0		1	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8028	539251	6988594	HT	13-Jun-08	03:16	2	0		1	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8029	539334	6988248	HT	13-Jun-08	03:37	5	2	SW	2	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8029	539334	6988248	HT	13-Jun-08	03:37	5	2	SW	2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8030	539081	6988450	HT	13-Jun-08	03:29	2	5	S	2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8031	539246	6988123	SW	13-Jun-08	03:57	6	0		3	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8031	539246	6988123	SW	13-Jun-08	03:57	6	0		3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8032	538857	6988357	HT	13-Jun-08	03:42	3	<5	N	3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8033	539069	6987908	SW	13-Jun-08	04:12	6	0		2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8033	539069	6987908	SW	13-Jun-08	04:12	6	0		2	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	Meliadine West
CM8033	539069	6987908	SW	13-Jun-08	04:12	6	0		2	Unidentified bird spp.	UNKN	1	fly-over (3-5 min)	Meliadine West
CM8034	538755	6988175	SW	13-Jun-08	03:40	3	0		2	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8034	538755	6988175	SW	13-Jun-08	03:40	3	0		2	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8034	538755	6988175	SW	13-Jun-08	03:40	3	0		2	Savannah Sparrow	SAVS	3	<50 m (0-3 min)	Meliadine West
CM8035	538979	6987729	SW	13-Jun-08	04:32	6	0		2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8035	538979	6987729	SW	13-Jun-08	04:32	6	0		2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8035	538979	6987729	SW	13-Jun-08	04:32	6	0		2	Savannah Sparrow	SAVS	2	<50 m (0-3 min)	Meliadine West
CM8036	538796	6987979	SW	13-Jun-08	04:06	3	0		2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8036	538796	6987979	SW	13-Jun-08	04:06	3	0		2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8037	538866	6987555	HT	13-Jun-08	04:47	7	0		2	Lapland Longspur	LALO	3	<50 m (0-3 min)	Meliadine West
CM8037	538866	6987555	HT	13-Jun-08	04:47	7	0		2	Unidentified bird spp.	UNKN	2	fly-over (3-5 min)	Meliadine West
CM8038	538719	6987769	SW	13-Jun-08	04:23	2	0		2	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8039	539052	6987475	HT	13-Jun-08	;05:15	6	<5	SW	3	Lapland Longspur	LALO	3	<50 m (0-3 min)	Meliadine West
CM8040	538532	6987658	HT	13-Jun-08	04:35	2	0		2	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8041	539250	6987427	HT	13-Jun-08	05:29	6	2	W	3	Lapland Longspur	LALO	3	>50 m (3-5 min)	Meliadine West
CM8042	538636	6987477	HT	13-Jun-08	04:51	2	<5	S	2	Savannah Sparrow	SAVS	2	<50 m (0-3 min)	Meliadine West
CM8043	539418	6987272	HT	13-Jun-08	05:44	7	1	E/SE	3	Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8043	539418	6987272	HT	13-Jun-08	05:44	7	1	E/SE	3	Lark Sparrow	LASP	3	fly-over (3-5 min)	Meliadine West
CM8044	538810	6987348	HT	13-Jun-08	05:04	2	<5	S	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8045	539580	6987147	HT	13-Jun-08	06:02	7	5	SW	4	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8046	538991	6987207	TH	13-Jun-08	05:20	2	<5	s	2	Horned Lark	HOLA	1	<50 m (3-5 min)	Meliadine West
CM8046	538991	6987207	TH	13-Jun-08	05:20	2	<5	s	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8046	538991	6987207	TH	13-Jun-08	05:20	2	<5	s	2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8047	539721	6986993	HT	13-Jun-08	06:17	7	3	SW	5	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8048	539083	6987015	TH	13-Jun-08	05:32	2	0		2	Least Sandpiper	LESA	2	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8048	539083	6987015	TH	13-Jun-08	05:32	2	0		2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8049	539852	6986830	HT	13-Jun-08	06:35	7	0		4-5	Unidentified bird spp.	UNKN	2	>50 m (3-5 min)	Meliadine West
CM8050	539153	6986826	SW	13-Jun-08	05:45	0	0		3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8051	539994	6986772	SW	13-Jun-08	06:48	8	0	NW	4-5	Unidentified bird spp.	UNKN	1	<50 m (0-3 min)	Meliadine West
CM8052	539181	6986614	HT	13-Jun-08	05:58		<5	SW	3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8053	541719	6988610	HT	14-Jun-08	04:58	6	0		1	Horned Lark	HOLA	5	<50 m (0-3 min)	Meliadine West
CM8053	541719	6988610	HT	14-Jun-08	04:58	6	0		1	Lapland Longspur	LALO	2	fly-over (3-5 min)	Meliadine West
CM8053	541719	6988610	HT	14-Jun-08	04:58	6	0		1	Lapland Longspur	LALO	2	<50 m (0-3 min)	Meliadine West
CM8054	539280	6986373	TH	14-Jun-08	06:21	0	5	sw	3	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8055	541814	6988435	HT	14-Jun-08	05:16	6	1	s/se	1	Horned Lark	HOLA	2	<50 m (3-5 min)	Meliadine West
CM8055	541814	6988435	HT	14-Jun-08	05:16	6	1	s/se	1	Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8055	541814	6988435	HT	14-Jun-08	05:16	6	1	s/se	1	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8055	541814	6988435	HT	14-Jun-08	05:16	6	1	s/se	1	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8055	541814	6988435	HT	14-Jun-08	05:16	6	1	s/se	1	Lapland Longspur	LALO	1	<50 m (3-5 min)	Meliadine West
CM8056	539353	6986171	HT	14-Jun-08	06:33	0	5	sw	5	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8057	541920	6988262	HT	14-Jun-08	05:35	8	0		0	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8057	541920	6988262	HT	14-Jun-08	05:35	8	0		0	Lapland Longspur	LALO	1	<50 m (3-5 min)	Meliadine West
CM8057	541920	6988262	HT	14-Jun-08	05:35	8	0		0	Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8057	541920	6988262	HT	14-Jun-08	05:35	8	0		0	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8057	541920	6988262	HT	14-Jun-08	05:35	8	0		0	Savannah Sparrow	SAVS	2	>50 m (3-5 min)	Meliadine West
CM8058	541986	6988804	HT	14-Jun-08	04:46	2	10	N	1	American Pipit	AMPI	1	<50 m (3-5 min)	Meliadine West
CM8058	541986	6988804	HT	14-Jun-08	04:46	2	10	N	1	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8058	541986	6988804	HT	14-Jun-08	04:46	2	10	N	1	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8059	542023	6988085	HT	14-Jun-08	05:49	6	0		1	Lapland Longspur	LALO	2	>50 m (3-5 min)	Meliadine West
CM8059	542023	6988085	HT	14-Jun-08	05:49	6	0		1	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8059	542023	6988085	HT	14-Jun-08	05:49	6	0		1	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8059	542023	6988085	HT	14-Jun-08	05:49	6	0		1	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8060	542072	6988618	HT	14-Jun-08	05:00	1	5	S		Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8060	542072	6988618	HT	14-Jun-08	05:00	1	5	S		Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8060	542072	6988618	HT	14-Jun-08	05:00	1	5	S		Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8061	542130	6987911	HT	14-Jun-08	06:03	61	N/NW	1		Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8061	542130	6987911	HT	14-Jun-08	06:03	61	N/NW	1		Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8061	542130	6987911	HT	14-Jun-08	06:03	61	N/NW	1		Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8062	542202	6988451	HT	14-Jun-08	05:13	2	10	S	1	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8062	542202	6988451	HT	14-Jun-08	05:13	2	10	S	1	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8062	542202	6988451	HT	14-Jun-08	05:13	2	10	S	1	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	Meliadine West
CM8063	542266	6987757	HT	14-Jun-08	06:16	6	1	N/NW	1	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8063	542266	6987757	HT	14-Jun-08	06:16	6	1	N/NW	1	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8064	542370	6988328	HT	14-Jun-08	05:28	2	5	S	3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8064	542370	6988328	HT	14-Jun-08	05:28	2	5	S	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8064	542370	6988328	HT	14-Jun-08	05:28	2	5	S	3	Savannah Sparrow	SAVS	1	fly-over (0-3 min)	Meliadine West
CM8065	542425	6987623	HT	14-Jun-08	06:29	6	0		2-3	Horned Lark	HOLA	1	<50 m (3-5 min)	Meliadine West
CM8065	542425	6987623	HT	14-Jun-08	06:29	6	0		2-3	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8065	542425	6987623	HT	14-Jun-08	06:29	6	0		2-3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8065	542425	6987623	HT	14-Jun-08	06:29	6	0		2-3	Lapland Longspur	LALO	1	fly-over (0-3 min)	Meliadine West
CM8066	542532	6988187	HT	14-Jun-08	05:44	2	5	S	2	Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8066	542532	6988187	HT	14-Jun-08	05:44	2	5	S	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8067	542551	6987455	SW	14-Jun-08	06:42	6	0		2	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8067	542551	6987455	SW	14-Jun-08	06:42	6	0		2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8068	542641	6988002	SW	14-Jun-08	05:58	2	0		2	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8068	542641	6988002	SW	14-Jun-08	05:58	2	0		2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8068	542641	6988002	SW	14-Jun-08	05:58	2	0		2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8069	542614	6987263	HT	14-Jun-08	07:08	6	1	NE	2-3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8069	542614	6987263	HT	14-Jun-08	07:08	6	1	NE	2-3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8069	542614	6987263	HT	14-Jun-08	07:08	6	1	NE	2-3	Unidentified bird spp.	UNKN	1	>50 m (3-5 min)	Meliadine West
CM8070	542803	6987872	TH	14-Jun-08	06:12	8	<5	E	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8070	542803	6987872	TH	14-Jun-08	06:12	8	<5	E	1	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8071	542728	6987092	HT	14-Jun-08	07:21	60	1	N/NW	2-3	Horned Lark	HOLA	1	fly-over (3-5 min)	Meliadine West
CM8071	542728	6987092	HT	14-Jun-08	07:21	60	1	N/NW	2-3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8072	542858	6987627	SW	14-Jun-08	06:28	1	0		3	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8072	542858	6987627	SW	14-Jun-08	06:28	1	0		3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8072	542858	6987627	SW	14-Jun-08	06:28	1	0		3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8072	542858	6987627	SW	14-Jun-08	06:28	1	0		3	Unidentified bird spp.	UNKN	1	fly-over (0-3 min)	Meliadine West
CM8073	542798	6986908	HT	14-Jun-08	07:39	6	0		2-3	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8073	542798	6986908	HT	14-Jun-08	07:39	6	0		2-3	Lapland Longspur	LALO	2	>50 m (3-5 min)	Meliadine West
CM8073	542798	6986908	HT	14-Jun-08	07:39	6	0		2-3	Unidentified bird spp.	UNKN	1	<50 m (0-3 min)	Meliadine West
CM8074	542955	6987432	HT	14-Jun-08	06:48	3	5	E	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8074	542955	6987432	HT	14-Jun-08	06:48	3	5	E	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8075	542895	6986721	HT	14-Jun-08	07:54	7	0	S	2-3	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8075	542895	6986721	HT	14-Jun-08	07:54	7	0	S	2-3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8075	542895	6986721	HT	14-Jun-08	07:54	7	0	S	2-3	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8076	543189	6987363	SW	14-Jun-08	07:06	4	<5	N	2	Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8077	542965	6986462	TH	14-Jun-08	08:19	7	0		3	Lapland Longspur	LALO	2	<50 m (0-3 min)	Meliadine West
CM8078	543371	6987225	SW	14-Jun-08	07:18	4	0		3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8079	543132	6986206	SW	14-Jun-08	08:39	7	0		3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8079	543132	6986206	SW	14-Jun-08	08:39	7	0		3	Least Sandpiper	LESA	1	fly-over (0-3 min)	Meliadine West
CM8079	543132	6986206	SW	14-Jun-08	08:39	7	0		3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8080	543532	6987085	SW	14-Jun-08	07:38	4	0		2	Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8080	543532	6987085	SW	14-Jun-08	07:38	4	0		2	Least Sandpiper	LESA	1	<50 m (0-3 min)	Meliadine West
CM8080	543532	6987085	SW	14-Jun-08	07:38	4	0		2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8081	543159	6986002	HT	14-Jun-08	09:02	7	>5	NW	3	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8082	543729	6987018	HT	14-Jun-08	07:55	4	<5	N	3	Lapland Longspur	LALO	3	<50 m (0-3 min)	Meliadine West
CM8082	543729	6987018	HT	14-Jun-08	07:55	4	<5	N	3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8083	543682	6986714	HT	14-Jun-08	06:00	4	2	NW	3-4	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8084	543884	6986885	HT	14-Jun-08	08:07	3	<5	N	4	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8084	543884	6986885	HT	14-Jun-08	08:07	3	<5	N	4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8085	539719	6988886	HT	14-Jun-08	06:24	2	<5	SE	3-4	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8086	543970	6986735	SW	14-Jun-08	08:18	4	0		3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8086	543970	6986735	SW	14-Jun-08	08:18	4	0		3	Least Sandpiper	LESA	1	<50 m (0-3 min)	Meliadine West
CM8086	543970	6986735	SW	14-Jun-08	08:18	4	0		3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8087	539538	6988990	SW	14-Jun-08	06:38	3	0		3-4	Savannah Sparrow	SAVS	2	<50 m (0-3 min)	Meliadine West
CM8088	544103	6986558	HT	14-Jun-08	08:30	4	5	NW	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8089	539410	6989146	HT	14-Jun-08	06:50	3	2	SE	4-5	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8089	539410	6989146	HT	14-Jun-08	06:50	3	2	SE	4-5	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8089	539410	6989146	HT	14-Jun-08	06:50	3	2	SE	4-5	Unidentified bird spp.	UNKN	1	fly-over (0-3 min)	Meliadine West
CM8090	544108	6986346	HT	14-Jun-08	08:38	4	10	N	4	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8090	544108	6986346	HT	14-Jun-08	08:38	4	10	N	4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8091	539307	6989321	HT	14-Jun-08	04:00	5	1	S/SE	4	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8091	539307	6989321	HT	14-Jun-08	04:00	5	1	S/SE	4	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8092	544116	6986100	ES	14-Jun-08	08:59	4	5	S	4	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8092	544116	6986100	ES	14-Jun-08	08:59	4	5	S	4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8092	544116	6986100	ES	14-Jun-08	08:59	4	5	S	4	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8093	539188	6989490	HT	14-Jun-08	07:10	5	2-3	W	4	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8094	543893	6986131	TH	14-Jun-08	09:14	4	<5	S	4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8094	543893	6986131	TH	14-Jun-08	09:14	4	<5	S	4	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8095	539074	6989630	TH	15-Jun-08	07:22	4	0		4	Herring Gull	HERG	1	fly-over (0-3 min)	Meliadine West
CM8095	539074	6989630	TH	15-Jun-08	07:22	4	0		4	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8095	539074	6989630	TH	15-Jun-08	07:22	4	0		4	Unidentified bird spp.	UNKN	1	>50 m (3-5 min)	Meliadine West
CM8096	543516	6987029	HT	15-Jun-08	05:52	0	5	N	5	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8096	543516	6987029	HT	15-Jun-08	05:52	0	5	N	5	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8097	538951	6989797	HT	15-Jun-08	07:37	5	1	N	4-5	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8098	539812	6989087	SW	15-Jun-08	06:26	0	0		4	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8098	539812	6989087	SW	15-Jun-08	06:26	0	0		4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8099	538832	6989965	TH	15-Jun-08	07:53	6	0		4-5	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8100	539616	6989172	SW	15-Jun-08	06:43	0			4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8100	539616	6989172	SW	15-Jun-08	06:43	0			4	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8101	541196	6988320	TH	15-Jun-08	05:00	4	0		4-5	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8102	539520	6989376	SW	15-Jun-08	06:54	0	0		4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8103	541145	6988119	HT	16-Jun-08	05:13	4	2	N	4-5	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8103	541145	6988119	HT	16-Jun-08	05:13	4	2	N	4-5	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8104	539350	6989562	SW	15-Jun-08	07:07	2	0		4	Lapland Longspur	LALO	1	fly-over (0-3 min)	Meliadine West
CM8104	539350	6989562	SW	15-Jun-08	07:07	2	0		4	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8105	541075	6987955	TH	16-Jun-08	05:23	4	0		4-5	Lapland Longspur	LALO	1	<50 m (3-5 min)	Meliadine West
CM8105	541075	6987955	TH	16-Jun-08	05:23	4	0		4-5	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	Meliadine West
CM8106	539261	6989800	SW	16-Jun-08	07:21	4	0		4	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8106	539261	6989800	SW	16-Jun-08	07:21	4	0		4	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8106	539261	6989800	SW	16-Jun-08	07:21	4	0		4	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8107	541074	6987756	HT	16-Jun-08	05:37	4	4	S	4-5	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8107	541074	6987756	HT	16-Jun-08	05:37	4	4	S	4-5	Lapland Longspur	LALO	2	>50 m (3-5 min)	Meliadine West
CM8108	539100	6989945	TH	15-Jun-08	07:36	3	0		4	Unidentified Bird Spp.	UNKN	0	-	Meliadine West
CM8109	541130	6987563	HT	16-Jun-08	05:48	4	3		4-5	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8109	541130	6987563	HT	16-Jun-08	05:48	4	3		4-5	Lapland Longspur	LALO	3	>50 m (0-3 min)	Meliadine West
CM8109	541130	6987563	HT	16-Jun-08	05:48	4	3		4-5	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8110	538957	6990096	TH	15-Jun-08	07:51	3	<5	S	4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8110	538957	6990096	TH	15-Jun-08	07:51	3	<5	S	4	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8111	541201	6987380	TH	16-Jun-08	06:04	4	0		4-5	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Meliadine West
CM8111	541201	6987380	TH	16-Jun-08	06:04	4	0		4-5	Unidentified Bird Spp.	UNKN	1	>50 m (3-5 min)	Meliadine West
CM8112	538891	6990302	ES	15-Jun-08	07:59	3	10	SE	5	Unidentified Bird Spp.	UNKN	0	-	Meliadine West
CM8113	555114	6978386	HT	18-Jun-08	03:41	3	1	SE	2	American Pipit	AMPI	2	>50 m (0-3 min)	Discovery
CM8114	541536	6988458	TH	16-Jun-08	04:51	1	0		4	Horned Lark	HOLA	2	<50 m (0-3 min)	Meliadine West
CM8114	541536	6988458	TH	16-Jun-08	04:51	1	0		4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8115	554955	6978514	HT	18-Jun-08	03:55	4	0		2	American Pipit	AMPI	2	>50 m (0-3 min)	Discovery
CM8116	541624	6988272	TH	16-Jun-08	05:04	2	<5	N	4	Horned Lark	HOLA	1	>50 m (3-5 min)	Meliadine West
CM8116	541624	6988272	TH	16-Jun-08	05:04	2	<5	N	4	Lapland Longspur	LALO	2	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8117	554796	6978652	HT	18-Jun-08	04:08	4	0		3	American Pipit	AMPI	3	>50 m (3-5 min)	Discovery
CM8117	554796	6978652	HT	18-Jun-08	04:08	4	0		3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Discovery
CM8118	541693	6988082	TH	16-Jun-08	05:13	1	0		4	Lapland Longspur	LALO	2	>50 m (0-3 min)	Meliadine West
CM8118	541693	6988082	TH	16-Jun-08	05:13	1	0		4	Lapland Longspur	LALO	1	fly-over (0-3 min)	Meliadine West
CM8119	554696	6978828	TH	18-Jun-08	04:22	4	0		2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Discovery
CM8119	554696	6978828	TH	18-Jun-08	04:22	4	0		2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8120	541811	6987898	SW	16-Jun-08	05:23	2	0		4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8120	541811	6987898	SW	16-Jun-08	05:23	2	0		4	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8121	554628	6979018	TH	18-Jun-08	04:33	4	0		1-2	Lapland Longspur	LALO	3	>50 m (3-5 min)	Discovery
CM8122	541857	6987697	HT	16-Jun-08	05:36	1	0		4	Unidentified bird spp.	UNKN	0	-	Meliadine West
CM8123	554462	6979196	HT	18-Jun-08	04:47	4	3	N	2	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8123	554462	6979196	HT	18-Jun-08	04:47	4	3	N	2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Meliadine West
CM8124	541277	6987536	HT	16-Jun-08	06:02	2	15	S	4-5	Lapland Longspur	LALO	1	<50 m (0-3 min)	Meliadine West
CM8124	541277	6987536	HT	16-Jun-08	06:02	2	15	S	4-5	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8125	554293	6979321	HT	18-Jun-08	05:01	4	3	N	2	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8125	554293	6979321	HT	18-Jun-08	05:01	4	3	N	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8126	542055	6989172	HT	17-Jun-08	05:55	4	10	W	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8126	542055	6989172	HT	17-Jun-08	05:55	4	10	W	1	Horned Lark	HOLA	1	<50 m (0-3 min)	Meliadine West
CM8126	542055	6989172	HT	17-Jun-08	05:55	4	10	W	1	Lapland Longspur	LALO	1	>50 m (0-3 min)	Meliadine West
CM8126	542055	6989172	HT	17-Jun-08	05:55	4	10	W	1	White-Crowned Sparrow	WCSP	1	>50 m (0-3 min)	Meliadine West
CM8127	554317	6979550	HT	18-Jun-08	05:13	4	0		3	Horned Lark	HOLA	2	>50 m (0-3 min)	Discovery
CM8127	554317	6979550	HT	18-Jun-08	05:13	4	0		3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Discovery
CM8127	554317	6979550	HT	18-Jun-08	05:13	4	0		3	Unidentified bird spp.	UNKN	1	>50 m (0-3 min)	Discovery
CM8128	542241	6989098	TH	17-Jun-08	06:20	4	10	S	1	Horned Lark	HOLA	1	>50 m (0-3 min)	Meliadine West
CM8128	542241	6989098	TH	17-Jun-08	06:20	4	10	S	1	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8129	554500	6979641	HT	18-Jun-08	05:26	4	0		3	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8129	554500	6979641	HT	18-Jun-08	05:26	4	0		3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Discovery
CM8130	542269	6989257	TH	17-Jun-08	06:41	4	10	N	1	American Pipit	AMPI	1	fly-over (0-3 min)	Meliadine West
CM8130	542269	6989257	TH	17-Jun-08	06:41	4	10	N	1	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Meliadine West
CM8131	554646	6979747	SW	18-Jun-08	05:38	4	0		2-3	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8131	554646	6979747	SW	18-Jun-08	05:38	4	0		2-3	Lapland Longspur	LALO	2	>50 m (3-5 min)	Discovery
CM8132	542134	6989217	HT	17-Jun-08	06:52	5	10	NW	1	American Pipit	AMPI	1	<50 m (0-3 min)	Meliadine West

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8132	542134	6989217	HT	17-Jun-08	06:52	5	10	NW	1	Semipalmated Plover	SEPL	1	<50 m (0-3 min)	Meliadine West
CM8133	554833	6979823	HT	18-Jun-08	05:53	4	0		3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Discovery
CM8133	554833	6979823	HT	18-Jun-08	05:53	4	0		3	Lapland Longspur	LALO	1	<50 m (0-3 min)	Discovery
CM8134	554949	6978387	TH	18-Jun-08	03:39	-2	<5	S	2	American Pipit	AMPI	1	>50 m (3-5 min)	Discovery
CM8134	554949	6978387	TH	18-Jun-08	03:39	-2	<5	S	2	American Pipit	AMPI	1	<50 m (0-3 min)	Discovery
CM8135	554426	6981404	TH	18-Jun-08	06:47	4	0		3	Redpoll Species	RESP	1	<50 m (0-3 min)	Discovery
CM8135	554426	6981404	TH	18-Jun-08	06:47	4	0		3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8135	554426	6981404	TH	18-Jun-08	06:47	4	0		3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Discovery
CM8136	554736	6978492	HT	18-Jun-08	03:53	-2	5	N	1	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8137	554606	6981265	SW	18-Jun-08	07:00	4	1	S	3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Discovery
CM8138	554567	6978610	TH	18-Jun-08	04:05	-3	<5	S	3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8138	554567	6978610	TH	18-Jun-08	04:05	-3	<5	S	3	Unidentified bird spp.	UNKN	1	<50 m (0-3 min)	Discovery
CM8139	554781	6981157	TH	18-Jun-08	07:13	4	0		2-3	Redpoll Species	RESP	2	fly-over (0-3 min)	Discovery
CM8139	554781	6981157	TH	18-Jun-08	07:13	4	0		2-3	Lapland Longspur	LALO	1	<50 m (0-3 min)	Discovery
CM8139	554781	6981157	TH	18-Jun-08	07:13	4	0		2-3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Discovery
CM8140	554374	6978680	HT	18-Jun-08	04:15	-3	<5	S	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	Discovery

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8141	554985	6981098	HT	18-Jun-08	07:25	5	1	S	3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8141	554985	6981098	HT	18-Jun-08	07:25	5	1	S	3	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	Discovery
CM8142	554197	6978772	TH	18-Jun-08	04:26	-3	<5	S	3	Redpoll Species	RESP	2	fly-over (0-3 min)	Discovery
CM8142	554197	6978772	TH	18-Jun-08	04:26	-3	<5	S	3	Herring Gull	HERG	1	fly-over (3-5 min)	Discovery
CM8143	555150	6980975	HT	18-Jun-08	07:39	5	0		2-3	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8144	553977	6978867	HT	18-Jun-08	04:38	-3	<5	S	2	Horned Lark	HOLA	1	<50 m (0-3 min)	Discovery
CM8144	553977	6978867	HT	18-Jun-08	04:38	-3	<5	S	2	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8145	555308	6980976	SW	18-Jun-08	07:50	6	0		2-3	Savannah Sparrow	SAVS	3	>50 m (0-3 min)	Discovery
CM8147	555441	6981123	TH	18-Jun-08	08:11	6	1	SE	2-3	Redpoll Species	RESP	1	fly-over (3-5 min)	Discovery
CM8147	555441	6981123	TH	18-Jun-08	08:11	6	1	SE	2-3	Lapland Longspur	LALO	2	fly-over (0-3 min)	Discovery
CM8147	555441	6981123	TH	18-Jun-08	08:11	6	1	SE	2-3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Discovery
CM8147	555441	6981123	TH	18-Jun-08	08:11	6	1	SE	2-3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Discovery
CM8148	553867	6979167	HT	18-Jun-08	05:06	-3	0		3	Unidentified bird spp.	UNKN	0	-	Discovery
CM8149	555571	6981265	HT	18-Jun-08	08:25	7	0		2-3	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8149	555571	6981265	HT	18-Jun-08	08:25	7	0		2-3	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	Discovery
CM8150	553882	6979375	HT	18-Jun-08	05:12	-2	0		3	Horned Lark	HOLA	1	<50 m (0-3 min)	Discovery

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8151	555299	6981310	HT	18-Jun-08	08:45	6	0		3	Horned Lark	HOLA	1	<50 m (0-3 min)	Discovery
CM8151	555299	6981310	HT	18-Jun-08	08:45	6	0		3	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8151	555299	6981310	HT	18-Jun-08	08:45	6	0		3	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	Discovery
CM8151	555299	6981310	HT	18-Jun-08	08:45	6	0		3	Unidentified bird spp.	UNKN	1	>50 m (0-3 min)	Discovery
CM8152	553934	6979576	HT	18-Jun-08	05:25	-2	0		3	Horned Lark	HOLA	1	<50 m (0-3 min)	Discovery
CM8152	553934	6979576	HT	18-Jun-08	05:25	-2	0		3	Lapland Longspur	LALO	1	<50 m (0-3 min)	Discovery
CM8154	554161	6979636	TH	18-Jun-08	05:34	-1	0		2	Unidentified bird spp.	UNKN	0	-	Discovery
CM8156	554426	6979719	TH	18-Jun-08	05:46	2	<5	W	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8156	554426	6979719	TH	18-Jun-08	05:46	2	<5	W	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	Discovery
CM8158	554573	6979860	HT	18-Jun-08	05:56	2	0		2	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8160	554369	6981613	HT	18-Jun-08	06:14	2	5	S	3	American Pipit	AMPI	1	>50 m (0-3 min)	Discovery
CM8160	554369	6981613	HT	18-Jun-08	06:14	2	5	S	3	Redpoll Species	RESP	3	fly-over (0-3 min)	Discovery
CM8160	554369	6981613	HT	18-Jun-08	06:14	2	5	S	3	Horned Lark	HOLA	2	<50 m (0-3 min)	Discovery
CM8160	554369	6981613	HT	18-Jun-08	06:14	2	5	S	3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Discovery
CM8162	559213	6981748	SW	18-Jun-08	06:35	3	0		3	American Pipit	AMPI	1	fly-over (3-5 min)	Discovery
CM8162	559213	6981748	SW	18-Jun-08	06:35	3	0		3	Redpoll Species	RESP	1	fly-over (0-3 min)	Discovery

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8162	559213	6981748	SW	18-Jun-08	06:35	3	0		3	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8162	559213	6981748	SW	18-Jun-08	06:35	3	0		3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Discovery
CM8164	554041	6981854	SW	18-Jun-08	06:45	4	0		3	American Pipit	AMPI	1	>50 m (0-3 min)	Discovery
CM8164	554041	6981854	SW	18-Jun-08	06:45	4	0		3	Redpoll Species	RESP	1	fly-over (0-3 min)	Discovery
CM8164	554041	6981854	SW	18-Jun-08	06:45	4	0		3	Horned Lark	HOLA	1	>50 m (0-3 min)	Discovery
CM8164	554041	6981854	SW	18-Jun-08	06:45	4	0		3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Discovery
CM8166	553855	6981938	HBed	18-Jun-08	06:56	3	5	S	3	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	Discovery
CM8166	553855	6981938	HBed	18-Jun-08	06:56	3	5	S	3	Semipalmated Plover	SEPL	1	>50 m (0-3 min)	Discovery
CM8168	553809	6982136	SW	18-Jun-08	07:08	2	0		3	Horned Lark	HOLA	1	<50 m (0-3 min)	Discovery
CM8168	553809	6982136	SW	18-Jun-08	07:08	2	0		3	Lapland Longspur	LALO	1	>50 m (3-5 min)	Discovery
CM8168	553809	6982136	SW	18-Jun-08	07:08	2	0		3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Discovery
CM8170	553982	6982315	HBed	18-Jun-08	07:26	3	5	S	3	Redpoll Species	RESP	1	fly-over (0-3 min)	Discovery
CM8170	553982	6982315	HBed	18-Jun-08	07:26	3	5	S	3	Horned Lark	HOLA	1	<50 m (0-3 min)	Discovery
CM8170	553982	6982315	HBed	18-Jun-08	07:26	3	5	S	3	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	Discovery
CM8172	554185	6982302	HT	18-Jun-08	07:36	3	10	S	3	Redpoll Species	RESP	2	fly-over (0-3 min)	Discovery
CM8174	554371	6982135	HT	18-Jun-08	07:46	4	10	S	3	Unidentified bird spp.	UNKN	0	-	Discovery

Table B4-1: Upland Breeding Bird Point Count Data – 2008 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind[a]	Species	Species Code	Number	Observation Type	Location
	Easting	Northing												
CM8176	554487	6981978	HBou	18-Jun-08	07:57	3	5	S	3-4	Redpoll Species	RESP	1	fly-over (0-3 min)	Discovery
CM8178	554446	6981771	HT	18-Jun-08	08:07	4	<5	N	3-4	Horned Lark	HOLA	1	<50 m (0-3 min)	Discovery
CM8178	554446	6981771	HT	18-Jun-08	08:07	4	<5	N	3-4	Lapland Longspur	LALO	1	>50 m (0-3 min)	Discovery
CM8180	554575	6981582	SW	18-Jun-08	08:17	4	0		4	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	Discovery

Table B4-2: Upland Breeding Bird Point Count Data – Meliadine Lake 2009

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9001	541867	6989057	TH	13-Jun-09	03:41	0	10	N	2	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9001	541867	6989057	TH	13-Jun-09	03:41	0	10	N	2	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9001	541867	6989057	TH	13-Jun-09	03:41	0	10	N	2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	
CM9002	541777	6988939	TH	13-Jun-09	04:00	0	5	N	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9002	541777	6988939	TH	13-Jun-09	04:00	0	5	N	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9002	541777	6988939	TH	13-Jun-09	04:00	0	5	N	2	Lapland Longspur	LALO	1	<50 m (3-5 min)	
CM9003	541714	6988854	TH	13-Jun-09	04:10	0	3	N	2	Savannah Sparrow	SAVS	4	<50 (0-3 min)	
CM9003	541714	6988854	TH	13-Jun-09	04:10	0	3	N	2	Horned Lark	HOLA	1	<50 (0-3 min)	
CM9004	541632	6988917	TH	13-Jun-09	04:25	0	3	NE	2	Savannah Sparrow	SAVS	1	<50 (0-3 min)	30

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9004	541632	6988917	TH	13-Jun-09	04:25	0	3	NE	2	Lapland Longspur	LALO	1	<50 (0-3 min)	12
CM9004	541632	6988917	TH	13-Jun-09	04:25	0	3	NE	2	Horned Lark	HOLA	1	<50 (0-3 min)	20
CM9004	541632	6988917	TH	13-Jun-09	04:25	0	3	NE	2	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	45
CM9005	541559	6988985	TH	13-Jun-09	04:39	0	3	NE	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	19
CM9005	541559	6988985	TH	13-Jun-09	04:39	0	3	NE	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	42
CM9006	541478	6989042	TH	13-Jun-09	04:48	0	3	NE	2	**No birds on plot**				
CM9007	541378	6989097	HT	13-Jun-09	04:54	0	5	NE	2	American Pipit	AMPI	1	FO (0-3 min)	Un
CM9007	541378	6989097	HT	13-Jun-09	04:54	0	5	NE	2	Lapland Longspur	LALO	1	>50 m (3-5 min)	Un
CM9008	541279	6989117	TH	13-Jun-09	05:06	0	2	NW	2	Redpoll Species	RESP	1	>50 m (3-5 min)	Un
CM9009	541183	6989172	TH	13-Jun-09	05:17	0	1	NE	2	American Pipit	AMPI	1	>50 m (3-5 min)	63
CM9009	541183	6989172	TH	13-Jun-09	05:17	0	1	NE	2	Lapland Longspur	LALO	1	FO (0-3 min)	Un
CM9010	541074	6989249	HT	13-Jun-09	05:32	0	1	NE	2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	25
CM9010	541074	6989249	HT	13-Jun-09	05:32	0	1	NE	2	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	25
CM9010	541074	6989249	HT	13-Jun-09	05:32	0	1	NE	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	24
CM9010	541074	6989249	HT	13-Jun-09	05:32	0	1	NE	2	Horned Lark	HOLA	1	>50 m (3-5 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9011	540966	6989363	HT	13-Jun-09	05:54	0	1	SE	2	**No birds on plot**				
CM9012	541046	6989609	HT	13-Jun-09	06:30	0	5	W	2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	
CM9012	541046	6989609	HT	13-Jun-09	06:30	0	5	W	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9013	541127	6989665	HT	13-Jun-09	06:40	0	0		3	Horned Lark	HOLA	2	<50 m (0-3 min)	25
CM9013	541127	6989665	HT	13-Jun-09	06:40	0	0		3	Unidentified	UNKN	1	FO (0-3 min)	
CM9014	541184	6989580	HT	13-Jun-09	07:08	0	0		3	Horned Lark	HOLA	2	>50 m (0-3 min)	60
CM9015	541257	6989500	HT	13-Jun-09	07:22	0	5	W	3	Lapland Longspur	LALO	1	>50 m (3-5 min)	
CM9016	541342	6989447	HT	13-Jun-09	07:32	0	5	W	3	Horned Lark	HOLA	1	>50 m (0-3 min)	74
CM9017	541448	6989406	HT	13-Jun-09	07:40	0	3	W	3	**No birds on plot**				
CM9018	541515	6989328	TH	13-Jun-09	07:44	0	3	SW	3	Lapland Longspur	LALO	1	FO (0-3 min)	
CM9018	541515	6989328	TH	13-Jun-09	07:44	0	3	SW	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	8
CM9018	541515	6989328	TH	13-Jun-09	07:44	0	3	SW	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	24
CM9018	541515	6989328	TH	13-Jun-09	07:44	0	3	SW	3	Unidentified bird sp.	UNKN	1	>50 m (0-3 min)	
CM9018	541515	6989328	TH	13-Jun-09	07:44	0	3	SW	3	Horned Lark	HOLA	2	<50 m (0-3 min)	24
CM9018	541515	6989328	TH	13-Jun-09	07:44	0	3	SW	3	Lapland Longspur	LALO	1	>50 m (0-3 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9018	541515	6989328	TH	13-Jun-09	07:44	0	3	SW	3	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	
CM9019	541594	6989261	HT	13-Jun-09	08:05	0	1	SW	3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	23
CM9020	541684	6989319	HT	13-Jun-09	08:18	0	3	S	3	American Pipit	AMPI	1	>50 m (0-3 min)	81
CM9021	541810	6989369	HT	13-Jun-09	08:28	0	2	S	3	American Pipit	AMPI	1	FO (0-3 min)	
CM9021	541810	6989369	HT	13-Jun-09	08:28	0	2	S	3	American Pipit	AMPI	1	<50 m (0-3 min)	28
CM9021	541810	6989369	HT	13-Jun-09	08:28	0	2	S	3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	25
CM9022	541927	6989366	HT	13-Jun-09	08:34	0	3	S	3	Horned Lark	HOLA	1	<50 m (0-3 min)	40
CM9022	541927	6989366	HT	13-Jun-09	08:34	0	3	S	3	American Pipit	AMPI	1	>50 m (0-3 min)	84
CM9023	541807	6989463	HT	13-Jun-09	09:08	-2	2	NE	2	Redpoll Species	RESP	1	FO (3-5 min)	
CM9023	541807	6989463	HT	13-Jun-09	09:08	-2	2	NE	2	Lapland Longspur	LALO	1	FO (3-5 min)	
CM9023	541807	6989463	HT	13-Jun-09	09:08	-2	2	NE	2	Horned Lark	HOLA	1	<50 m (3-5 min)	30
CM9024	541676	6989468	HT	13-Jun-09	09:19	0	8	E	4	Lapland Longspur	LALO	1	>50 m (3-5 min)	50
CM9024	541676	6989468	HT	13-Jun-09	09:19	0	8	E	4	Horned Lark	HOLA	1	FO (0-3 min)	
CM9025	540936	6988283	TH	14-Jun-09	02:55	1	0		3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	22
CM9025	540936	6988283	TH	14-Jun-09	02:55	1	0		3	Lapland Longspur	LALO	1	>50 m (3-5 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9026	540971	6988336	TH	14-Jun-09	02:56	0	0		2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	
CM9026	540971	6988336	TH	14-Jun-09	02:56	0	0		2	Lapland Longspur	LALO	1	<50 m (0-3 min)	24
CM9027	541005	6988209	HT	14-Jun-09	03:05	0	1	NW	3	**No birds on plot**				
CM9028	541085	6988228	TH	14-Jun-09	03:10	0	0		2	**No birds on plot**				
CM9029	541063	6988124	HT	14-Jun-09	03:15	0	1	NW	3-4	**No birds on plot**				
CM9030	541194	6988119	HT	14-Jun-09	03:20	0	2	E	3	Redpoll Species	RESP	2	FO (3-5 min)	
CM9030	541194	6988119	HT	14-Jun-09	03:20	0	2	E	3	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9031	541133	6988054	HT	14-Jun-09	03:25	1	2	W	4	**No birds on plot**				
CM9032	541309	6988021	HT	14-Jun-09	03:30	0	3	E	3	Willow Ptarmigan	WIPT	2	FO (3-5 min)	
CM9033	541199	6987970	HT	14-Jun-09	03:39	1	1	W	3	**No birds on plot**				
CM9034	541385	6987958	HT	14-Jun-09	03:40	0	3	E	3	Horned Lark	HOLA	2	<50 m (0-3 min)	23
CM9034	541385	6987958	HT	14-Jun-09	03:40	0	3	E	3	Savannah Sparrow	SAVS	2	<50 m (3-5 min)	8
CM9035	541274	6987898	HT	14-Jun-09	03:50	0	2	W	3-4	**No birds on plot**				
CM9036	541468	6987902	HT	14-Jun-09	03:50	0	3	E	4	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9037	541378	6987856	HT	15-Jun-09	03:03	0	0		3	Horned Lark	HOLA	1	>50 m (0-3 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9038	541544	6987828	HT	14-Jun-09	04:00	0	3	E	4-5	**No birds on plot**				
CM9039	541457	6987796	TH	15-Jun-09	03:11	0	0		3	Horned Lark	HOLA	2	<50 m (0-3 min)	36.5
CM9040	540542	6989513	TH	14-Jun-09	10:11	5	0		3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	29
CM9040	540542	6989513	TH	14-Jun-09	10:11	5	0		3	Common Raven	CORA	1	FO (0-3 min)	
CM9040	540542	6989513	TH	14-Jun-09	10:11	5	0		3	Least Sandpiper	LESA	1	<50 m (0-3 min)	3
CM9040	540542	6989513	TH	14-Jun-09	10:11	5	0		3	Lapland Longspur	LALO	2	<50 m (0-3 min)	21
CM9041	541518	6987690	TH	15-Jun-09	03:20	2	0		3	Horned Lark	HOLA	1	<50 m (0-3 min)	
CM9041	541518	6987690	TH	15-Jun-09	03:20	2	0		3	Horned Lark	HOLA	1	<50 m (3-5 min)	
CM9041	541518	6987690	TH	15-Jun-09	03:20	2	0		3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	40
CM9042	541624	6987766	TH	15-Jun-09	03:12	1	2	E	1	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9043	541680	6987571	HT	15-Jun-09	03:34	1	1	W	0	Lapland Longspur	LALO	1	<50 m (0-3 min)	40
CM9043	541680	6987571	HT	15-Jun-09	03:34	1	1	W	0	Lapland Longspur	LALO	1	<50 m (3-5 min)	45
CM9044	541704	6987692	HT	15-Jun-09	03:20	1	2	E	1	Lapland Longspur	LALO	1	<50 m (0-3 min)	22
CM9045	541831	6987436	HT	15-Jun-09	03:44	1	2	1	0	Lapland Longspur	LALO	1	<50 m (0-3 min)	
CM9045	541831	6987436	HT	15-Jun-09	03:44	1	2	1	0	Lapland Longspur	LALO	1	>50 m (3-5 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9045	541831	6987436	HT	15-Jun-09	03:44	1	2	1	0	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	
CM9046	541780	6987621	HT	15-Jun-09	03:32	1	3	E	0	Redpoll Species	RESP	1	FO (3-5 min)	
CM9046	541780	6987621	HT	15-Jun-09	03:32	1	3	E	0	Willow Ptarmigan	WIPT	1	>50 m (0-3 min)	223
CM9046	541780	6987621	HT	15-Jun-09	03:32	1	3	E	0	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	78
CM9047	541983	6987317	HT	15-Jun-09	03:56	2	1	W	0	**No birds on plot**				
CM9048	541864	6987557	HT	15-Jun-09	03:39	2	2	E	1	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	66
CM9048	541864	6987557	HT	15-Jun-09	03:39	2	2	E	1	Lapland Longspur	LALO	1	>50 m (0-3 min)	78
CM9048	541864	6987557	HT	15-Jun-09	03:39	2	2	E	1	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	107
CM9049	542079	6987141	HT	15-Jun-09	04:07	2	0.5	N	0	Savannah Sparrow	SAVS	2	>50 m (0-3 min)	
CM9049	542079	6987141	HT	15-Jun-09	04:07	2	0.5	N	0	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9050	541954	6987485	TH	15-Jun-09	03:50	1	2	E	1	**No birds on plot**				
CM9051	542246	6987022	HT	15-Jun-09	04:20	2	0		0	Horned Lark	HOLA	1	<50 (3-5 min)	49.5
CM9051	542246	6987022	HT	15-Jun-09	04:20	2	0		0	Lapland Longspur	LALO	1	FO (3-5 min)	
CM9052	542099	6987372	HT	15-Jun-09	04:01	1	2	E	1	**No birds on plot**				
CM9053	542426	6986863	TH	15-Jun-09	04:35	3	0		0	Horned Lark	HOLA	1	<50 m (0-3 min)	49

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9053	542426	6986863	TH	15-Jun-09	04:35	3	0		0	Lapland Longspur	LALO	1	<50 m (0-3 min)	
CM9053	542426	6986863	TH	15-Jun-09	04:35	3	0		0	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	
CM9054	542269	6987264	HT	15-Jun-09	04:12	1	2	E	1	**No birds on plot**				
CM9055	542544	6986703	TH	15-Jun-09	04:50	3	1	W	0	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	1
CM9055	542544	6986703	TH	15-Jun-09	04:50	3	1	W	0	Lapland Longspur	LALO	1	>50 m (3-5 min)	1
CM9055	542544	6986703	TH	15-Jun-09	04:50	3	1	W	0	Horned Lark	HOLA	1	<50 (3-5 min)	48
CM9055	542544	6986703	TH	15-Jun-09	04:50	3	1	W	0	Lapland Longspur	LALO	1	>50 m (3-5 min)	1
CM9056	542360	6987212	HT	15-Jun-09	04:22	1	0		1	Horned Lark	HOLA	1	>50 m (0-3 min)	64
CM9057	542725	6986614	TH	15-Jun-09	05:03	4	1	SE	0	Lapland Longspur	LALO	1	<50 m (0-3 min)	45
CM9057	542725	6986614	TH	15-Jun-09	05:03	4	1	SE	0	Lapland Longspur	LALO	1	<50 m (0-3 min)	49
CM9057	542725	6986614	TH	15-Jun-09	05:03	4	1	SE	0	Horned Lark	HOLA	1	FO (3-5 min)	
CM9057	542725	6986614	TH	15-Jun-09	05:03	4	1	SE	0	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	
CM9058	542521	6987135	HT	15-Jun-09	04:30	1	0		1	Horned Lark	HOLA	1	<50 m (0-3 min)	19
CM9059	542964	6986551	TH	15-Jun-09	05:19	3	1	N	0	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	45
CM9059	542964	6986551	TH	15-Jun-09	05:19	3	1	N	0	Lapland Longspur	LALO	2	>50 m (0-3 min)	147

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9060	542612	6987085	HT	15-Jun-09	04:40	1	0		1	Horned Lark	HOLA	1	<50 m (0-3 min)	49
CM9060	542612	6987085	HT	15-Jun-09	04:40	1	0		1	Horned Lark	HOLA	1	>50 m (0-3 min)	67
CM9061	543129	6986436	TH	15-Jun-09	05:33	4	1	E	0	American Pipit	AMPI	1	<50 m (0-3 min)	24
CM9061	543129	6986436	TH	15-Jun-09	05:33	4	1	E	0	Savannah Sparrow	SAVS	1	FO (0-3 min)	
CM9062	542691	6987005	HT	15-Jun-09	04:50	1	0		1	**No birds on plot**				
CM9063	543284	6986282	TH	15-Jun-09	05:49	3	0		1	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	38.5
CM9063	543284	6986282	TH	15-Jun-09	05:49	3	0		1	Horned Lark	HOLA	1	>50 m (0-3 min)	61.5
CM9064	542773	6986943	HT	15-Jun-09	04:59	1	0		1	Horned Lark	HOLA	1	<50 m (0-3 min)	48
CM9064	542773	6986943	HT	15-Jun-09	04:59	1	0		1	Lapland Longspur	LALO	1	<50 m (0-3 min)	25
CM9065	543466	6986378	TH	15-Jun-09	06:07	4	0		1	American Pipit	AMPI	3	>50 m (0-3 min)	61.5
CM9065	543466	6986378	TH	15-Jun-09	06:07	4	0		1	Savannah Sparrow	SAVS	1	<50 (3-5 min)	50
CM9066	542857	6986858	HT	15-Jun-09	05:07	2	0		1	Lapland Longspur	LALO	1	<50 m (0-3 min)	43
CM9067	543652	6986171	SW	15-Jun-09	06:25	4	1	SE	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9067	543652	6986171	SW	15-Jun-09	06:25	4	1	SE	2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	
CM9068	542948	6986809	HT	15-Jun-09	05:15	2	0		1	Horned Lark	HOLA	1	>50 m (0-3 min)	46

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9069	543860	6986211	TH	15-Jun-09	06:43	4	1	SW	2	**No birds on plot**				
CM9070	543039	6986750	HT	15-Jun-09	05:24	2	3	S	1	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	76
CM9071	543307	6985782	TH	15-Jun-09	07:35	6	1	N	1	Horned Lark	HOLA	1	>50 m (3-5 min)	
CM9071	543307	6985782	TH	15-Jun-09	07:35	6	1	N	1	Lapland Longspur	LALO	1	FO (0-3 min)	
CM9072	543141	6986734	TH	15-Jun-09	05:34	0	2	W	1	Horned Lark	HOLA	1	>50 m (3-5 min)	54
CM9073	543249	6985591	TH	15-Jun-09	07:45	6	1	S	2	**No birds on plot**				
CM9074	543244	6986688	TH	15-Jun-09	05:44	1	1	W	1	**No birds on plot**				
CM9075	543180	6985391	TH	15-Jun-09	07:57	6	1	W	2	**No birds on plot**				
CM9076	543332	6986638	TH	15-Jun-09	05:57	2	0		1	Horned Lark	HOLA	1	>50 m (0-3 min)	6
CM9077	543128	6985193	HT	15-Jun-09	08:09	8	S	1	1	Least Sandpiper	LESA	1	>50 m (0-3 min)	
CM9077	543128	6985193	HT	15-Jun-09	08:09	8	S	1	1	Redpoll Species	RESP	1	FO (3-5 min)	
CM9077	543128	6985193	HT	15-Jun-09	08:09	8	S	1	1	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	
CM9078	543435	6986614	TH	15-Jun-09	06:12	3	0		1	American Pipit	AMPI	1	FO (0-3 min)	
CM9078	543435	6986614	TH	15-Jun-09	06:12	3	0		1	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	12
CM9079	542869	6985036	HT	15-Jun-09	08:30	8	1	S	3	**No birds on plot**				

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9080	543530	6986564	TH	15-Jun-09	06:21	2	2	N	1	American Pipit	AMPI	3	<50 m (0-3 min)	8
CM9081	541037	6989671	ES	16-Jun-09	03:01	1	3	S	2	Horned Lark	HOLA	1	<50 m (0-3 min)	49.8
CM9081	541037	6989671	ES	16-Jun-09	03:01	1	3	S	2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	
CM9082	543609	6986482	TH	15-Jun-09	06:36	4	0		1	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	54
CM9083	540844	6989735	ES	16-Jun-09	03:14	1	5	S	2	Horned Lark	HOLA	1	>50 m (3-5 min)	
CM9083	540844	6989735	ES	16-Jun-09	03:14	1	5	S	2	Savannah Sparrow	SAVS	2	>50 m (0-3 min)	
CM9084	543779	6986429	HT	15-Jun-09	06:48	4	4	W	2	**No birds on plot**				
CM9085	540644	6989777	ES	16-Jun-09	03:33	1	8	S	2	**No birds on plot**				
CM9086	543658	6986051	TH	15-Jun-09	07:12	4	2	N	2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	43
CM9086	543658	6986051	TH	15-Jun-09	07:12	4	2	N	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	31
CM9086	543658	6986051	TH	15-Jun-09	07:12	4	2	N	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	6
CM9087	540431	6989752	HT	16-Jun-09	03:46	1	0		1	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9087	540431	6989752	HT	16-Jun-09	03:46	1	0		1	Horned Lark	HOLA	1	>50 m (3-5 min)	
CM9088	543590	6985858	TH	15-Jun-09	07:30	4	5	E	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	64
CM9089	540236	6989797	ES	16-Jun-09	03:58	0	2	NW	2	Savannah Sparrow	SAVS	1	>50 m (0-3 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9089	540236	6989797	ES	16-Jun-09	03:58	0	2	NW	2	Lapland Longspur	LALO	2	FO (0-3 min)	
CM9089	540236	6989797	ES	16-Jun-09	03:58	0	2	NW	2	Redpoll Species	RESP	1	FO (3-5 min)	
CM9090	543498	6985679	HT	15-Jun-09	07:42	4	5	E	2	Horned Lark	HOLA	1	<50 m (0-3 min)	48
CM9091	540045	6989872	ES	16-Jun-09	04:11	0	4	S	2	Horned Lark	HOLA	1	<50 m (0-3 min)	22
CM9091	540045	6989872	ES	16-Jun-09	04:11	0	4	S	2	Horned Lark	HOLA	2	<50 m (0-3 min)	25
CM9091	540045	6989872	ES	16-Jun-09	04:11	0	4	S	2	Redpoll Species	RESP	1	FO (3-5 min)	
CM9091	540045	6989872	ES	16-Jun-09	04:11	0	4	S	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9092	543381	6985498	HT	15-Jun-09	07:51	5	0		2	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9093	539977	6990077	ES	16-Jun-09	04:21	0	10	SW	3	**No birds on plot**				
CM9094	543320	6985298	HT	15-Jun-09	08:05	4	3	W	2	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9095	539854	6990237	ES	16-Jun-09	04:32	0	5	NE/SW	2	American Pipit	AMPI	2	<50 m (0-3 min)	49
CM9095	539854	6990237	ES	16-Jun-09	04:32	0	5	NE/SW	2	Horned Lark	HOLA	1	<50 m (0-3 min)	42
CM9096	543205	6985120	HT	15-Jun-09	08:20	5	0		2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	32
CM9097	539648	6990218	ES	16-Jun-09	04:44	0	5	W	2	Lapland Longspur	LALO	1	>50 m (3-5 min)	
CM9097	539648	6990218	ES	16-Jun-09	04:44	0	5	W	2	Horned Lark	HOLA	1	<50 m (3-5 min)	43

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9098	543053	6984951	HT	15-Jun-09	08:32	5	0		2	**No birds on plot**				
CM9099	539462	6990141	ES	16-Jun-09	04:56	0	3	W	2	Redpoll Species	RESP	3	FO (3-5 min)	
CM9099	539462	6990141	ES	16-Jun-09	04:56	0	3	W	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9099	539462	6990141	ES	16-Jun-09	04:56	0	3	W	2	Horned Lark	HOLA	1	<50 m (0-3 min)	49
CM9100	541089	6989780	HT	16-Jun-09	03:07	-1	15	NW	1	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	38
CM9100	541089	6989780	HT	16-Jun-09	03:07	-1	15	NW	1	Horned Lark	HOLA	1	<50 m (0-3 min)	24
CM9101	539262	6990182	ES	16-Jun-09	05:12	1	1	SW	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9102	540882	6989793	Bo/HT	16-Jun-09	03:22	-1	15	W	2	American Pipit	AMPI	1	<50 m (0-3 min)	12
CM9102	540882	6989793	Bo/HT	16-Jun-09	03:22	-1	15	W	2	Snow Bunting	SNBU	1	<50 m (0-3 min)	6
CM9103	539072	6990259	ES	16-Jun-09	05:23	1	1	S	2	Horned Lark	HOLA	1	<50 m (3-5 min)	
CM9103	539072	6990259	ES	16-Jun-09	05:23	1	1	S	2	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9103	539072	6990259	ES	16-Jun-09	05:23	1	1	S	2	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	
CM9104	540678	6989832	Bo/HT	16-Jun-09	03:34	-1	15	W	2-3	**No birds on plot**				
CM9105	539013	6990472	ES	16-Jun-09	05:35	1	2	W	2	Horned Lark	HOLA	1	>50 m (0-3 min)	1
CM9105	539013	6990472	ES	16-Jun-09	05:35	1	2	W	2	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	1

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9106	540470	6989819	HT	16-Jun-09	03:48	-1	2	NW	2	Snow Bunting	SNBU	1	>50 m (0-3 min)	131
CM9107	538909	6990640	ES	16-Jun-09	05:45	1	4	W	3	**No birds on plot**				
CM9108	540282	6989917	Bo/HT	16-Jun-09	04:03	-1	15	N	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	19.5
CM9108	540282	6989917	Bo/HT	16-Jun-09	04:03	-1	15	N	2	Redpoll Species	RESP	1	FO (3-5 min)	
CM9109	538769	6990786	ES	16-Jun-09	05:55	1	5/0.5	W/E	2	Horned Lark	HOLA	1	<50 m (0-3 min)	
CM9109	538769	6990786	ES	16-Jun-09	05:55	1	5/0.5	W/E	2	American Pipit	AMPI	1	>50 m (3-5 min)	56
CM9109	538769	6990786	ES	16-Jun-09	05:55	1	5/0.5	W/E	2	Lapland Longspur	LALO	1	>50 m (3-5 min)	
CM9110	540105	6990032	TH	16-Jun-09	04:15	-1	2	N	2	American Pipit	AMPI	2	<50 m (0-3 min)	19.5
CM9110	540105	6990032	TH	16-Jun-09	04:15	-1	2	N	2	Redpoll Species	RESP	1	FO (0-3 min)	
CM9111	538573	6990853	ES	16-Jun-09	06:10	1	3	W	3	**No birds on plot**				
CM9112	540026	6990226	HT	16-Jun-09	04:27	-1	0		2	Lapland Longspur	LALO	1	FO (0-3 min)	
CM9112	540026	6990226	HT	16-Jun-09	04:27	-1	0		2	Redpoll Species	RESP	1	>50 m (0-3 min)	98
CM9113	538450	6991017	ES	16-Jun-09	06:22	2	2	W	3	Horned Lark	HOLA	1	<50 m (0-3 min)	
CM9114	539870	6990357	HT	16-Jun-09	04:38	-1	2	N	2	**No birds on plot**				
CM9115	538339	6991186	ES	16-Jun-09	06:34	1	4	W	3	Lapland Longspur	LALO	1	>50 m (3-5 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9115	538339	6991186	ES	16-Jun-09	06:34	1	4	W	3	Horned Lark	HOLA	2	<50 m (0-3 min)	35
CM9115	538339	6991186	ES	16-Jun-09	06:34	1	4	W	3	Redpoll Species	RESP	1	FO (0-3 min)	
CM9116	539663	6990405	HT	16-Jun-09	04:51	0	2	NW	2	Horned Lark	HOLA	1	>50 m (0-3 min)	65
CM9117	538242	6991362	ES	16-Jun-09	06:47	2	2	W	2	Lapland Longspur	LALO	1	FO (0-3 min)	
CM9118	539439	6990454	HT	16-Jun-09	05:04	0	2	NW	2	Redpoll Species	RESP	1	FO (3-5 min)	
CM9118	539439	6990454	HT	16-Jun-09	05:04	0	2	NW	2	Lapland Longspur	LALO	1	<50 m (0-3 min)	48
CM9119	538197	6991580	ES	16-Jun-09	08:14	3	5	E	3	Horned Lark	HOLA	2	>50 m (0-3 min)	
CM9120	539261	6990559	HT	16-Jun-09	05:17	0	3	NW	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	111
CM9121	538009	6991653	ES	16-Jun-09	08:28	6	2	E/W	3	**No birds on plot**				
CM9122	539039	6990769	HT	16-Jun-09	05:37	0	0		2-3	Redpoll Species	RESP	3	FO (3-5 min)	
CM9123	540695	6988395	HT	17-Jun-09	04:14	0	0		4	Horned Lark	HOLA	2	>50 m (3-5 min)	
CM9123	540695	6988395	HT	17-Jun-09	04:14	0	0		4	Lapland Longspur	LALO	1	<50 m (3-5 min)	
CM9123	540695	6988395	HT	17-Jun-09	04:14	0	0		4	Lapland Longspur	LALO	1	FO (0-3 min)	
CM9124	538847	6990923	HT	16-Jun-09	05:50	1	0		2-3	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	29
CM9124	538847	6990923	HT	16-Jun-09	05:50	1	0		2-3	Savannah Sparrow	SAVS	1	<50 m (3-5 min)	14.5

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9125	540495	6988281	SW	17-Jun-09	04:27	0	0		3	Horned Lark	HOLA	2	>50 m (0-3 min)	
CM9125	540495	6988281	SW	17-Jun-09	04:27	0	0		3	Redpoll Species	RESP	1	FO (3-5 min)	
CM9126	538707	6991065	HT	16-Jun-09	06:03	1	3	NW	3	American Pipit	AMPI	2	<50 m (0-3 min)	24
CM9127	540338	6988147	TH	17-Jun-09	04:38	1	0		3	Horned Lark	HOLA	1	>50 m (3-5 min)	
CM9127	540338	6988147	TH	17-Jun-09	04:38	1	0		3	Lapland Longspur	LALO	1	<50 m (0-3 min)	46
CM9127	540338	6988147	TH	17-Jun-09	04:38	1	0		3	Lapland Longspur	LALO	1	<50 m (0-3 min)	45
CM9128	538541	6991227	TH	16-Jun-09	06:18	1	2	NW	2	American Pipit	AMPI	1	FO (3-5 min)	
CM9128	538541	6991227	TH	16-Jun-09	06:18	1	2	NW	2	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	49
CM9128	538541	6991227	TH	16-Jun-09	06:18	1	2	NW	2	Lapland Longspur	LALO	1	>50 m (0-3 min)	59
CM9129	540176	6988008	SW	17-Jun-09	04:52	2	0		3	Lapland Longspur	LALO	1	<50 m (0-3 min)	20
CM9129	540176	6988008	SW	17-Jun-09	04:52	2	0		3	Lapland Longspur	LALO	2	<50 m (0-3 min)	12
CM9129	540176	6988008	SW	17-Jun-09	04:52	2	0		3	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9129	540176	6988008	SW	17-Jun-09	04:52	2	0		3	Horned Lark	HOLA	1	<50 m (3-5 min)	42
CM9129	540176	6988008	SW	17-Jun-09	04:52	2	0		3	Savannah Sparrow	SAVS	1	>50 m (3-5 min)	
CM9130	538391	6991381	Bo/HT	16-Jun-09	06:30	1	2	NW	2	Redpoll Species	RESP	2	FO (0-3 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9131	539988	6987911	TH	17-Jun-09	05:17	0	1	S	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	25
CM9131	539988	6987911	TH	17-Jun-09	05:17	0	1	S	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	15
CM9131	539988	6987911	TH	17-Jun-09	05:17	0	1	S	3	Lapland Longspur	LALO	1	FO (0-3 min)	
CM9131	539988	6987911	TH	17-Jun-09	05:17	0	1	S	3	Horned Lark	HOLA	1	FO (3-5 min)	
CM9132	540523	6988600	HT	17-Jun-09	04:24	0	2	W	3	Savannah Sparrow	SAVS	1	<50 m (0-3 min)	26
CM9132	540523	6988600	HT	17-Jun-09	04:24	0	2	W	3	Horned Lark	HOLA	1	<50 m (0-3 min)	31
CM9133	539793	6987902	TH	17-Jun-09	05:33	0	1	SW	3	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9134	540397	6988439	TH	17-Jun-09	04:39	0	0		3	**No birds on plot**				
CM9135	539610	6987971	HT	17-Jun-09	05:47	0	1	NE	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	25
CM9135	539610	6987971	HT	17-Jun-09	05:47	0	1	NE	3	Horned Lark	HOLA	1	>50 m (0-3 min)	
CM9135	539610	6987971	HT	17-Jun-09	05:47	0	1	NE	3	Lapland Longspur	LALO	1	>50 m (3-5 min)	
CM9136	540199	6988345	HT	17-Jun-09	04:51	0	0		3	Redpoll Species	RESP	1	FO (3-5 min)	
CM9136	540199	6988345	HT	17-Jun-09	04:51	0	0		3	Lapland Longspur	LALO	1	>50 m (0-3 min)	36
CM9137	539401	6987862	ES	17-Jun-09	06:00	0	1	NE	4	**No birds on plot**				
CM9138	540036	6988224	HT	17-Jun-09	05:02	2	2	E	3	Least Sandpiper	LESA	3	FO (0-3 min)	

Table B4-2: Upland Breeding Bird Point Count Data – 2009 (continued)

Plot Number	UTM Zone 15 NAD 83		Ecotype	Date	Time	Temperature (C)	Slope (°)	Aspect	Wind	Species	Species Code	Number	Observation Type	Distance from Observer (m)
	Easting	Northing												
CM9138	540036	6988224	HT	17-Jun-09	05:02	2	2	E	3	Lapland Longspur	LALO	1	<50 m (0-3 min)	39
CM9138	540036	6988224	HT	17-Jun-09	05:02	2	2	E	3	Savannah Sparrow	SAVS	4	FO (0-3 min)	
CM9139	539207	6987887	HT	17-Jun-09	06:18	0	2	W	4-5	Unidentified bird sp.	UNKN	1	>50 m (0-3 min)	
CM9140	539935	6988045	HT	17-Jun-09	05:12	2	2	W	3	**No birds on plot**				
CM9142	539738	6988095	HT	17-Jun-09	05:26	2	2	W	3	Willow Ptarmigan	WIPT	1	FO (0-3 min)	
CM9142	539738	6988095	HT	17-Jun-09	05:26	2	2	W	3	Lapland Longspur	LALO	1	>50 m (0-3 min)	
CM9144	539544	6988177	HT	17-Jun-09	05:38	0	3	W	3-4	**No birds on plot**				
CM9146	539319	6988232	HT	17-Jun-09	05:50	0	4	W	4	**No birds on plot**				
CM9148	539148	6988086	Bo/HT	17-Jun-09	06:04	0	3	W	4	American Pipit	AMPI	1	<50 m (0-3 min)	17
CM9148	539148	6988086	Bo/HT	17-Jun-09	06:04	0	3	W	4	Lapland Longspur	LALO	1	<50 m (0-3 min)	48
CM9150	539057	6987908	SW	17-Jun-09	06:24	0	0		4-5	**No birds on plot**				

Note: HT=heath tundra, HB=heath bedrock, SW=sedge wetland, HBo=heath boulder, ES=esker, TH=tussock hummock

[a] **Windspeed Classifications**

Beaufort	Wind Speed km/h (mph)	Indicators of Wind Speed
0	< 2 (<1)	Smoke rises vertically
1	2 to 5 (1 to 3)	Smoke drift indicates wind direction, still windvanes
2	6 to 12 (4 to 7)	Wind felt on face, leaves rustle, vanes begin to move
3	13 to 19 (8 to 12)	Leaves and small twigs constantly moving, light flags extended
4	20 to 29 (13 to 18)	Dust, leaves, and loose paper lifted, small tree branches move
5	30 to 38 (19 to 24)	Small trees in leaf begin to sway
6	39 to 49 (24 to 31)	Larger tree branches moving, whistling in wires
7	50 to 61 (31 to 38)	Whole trees moving, resistance felt walking against wind
8	62 to 74 (39 to 46)	Whole trees in motion, resistance felt walking against wind

Table B5-1: Shorebird Survey (PRISM) Data - 2008

Plot Number	UTM Zone 15 NAD 83		Habitat Quality	Habitat Type	Observations
	Easting	Northing			
2008-01	543536	6986128	Good	SW	No shorebirds
2008-02	543661	6986179	Fair	TH	No shorebirds
2008-03	543231	6987315	Fair	HT	No shorebirds
2008-04	538121	6971479	Fair	TH	No shorebirds
2008-05	538180	6991129	Fair	HT	No shorebirds
2008-06	540199	6990233	Fair	TH	2 Semipalmated Plovers
2008-07	540539	6989643	Good	SW	No shorebirds

Note: HT=heath tundra, SW=sedge wetland, TH=tussock hummock

Table B5-2: Shorebird Survey (PRISM) Data - 2009

Plot Number	UTM Zone 15 NAD 83		Habitat Quality	Habitat Type	Observations
	Easting	Northing			
2009-01	541451	6988992	Fair	TH	No shorebirds
2009-02	540431	6909435	Fair	HT	No shorebirds
2009-03	539551	6988992	Fair	TH	No shorebirds
2009-04	542648	6984402	Fair	TH	No shorebirds
2009-05	542118	6984405	Fair	TH	No shorebirds
2009-06	541976	6988809	Fair	HT	1 Semipalmated Plover
2009-07	538881	6987804	Good	SW	2 Least Sandpipers, 1 Dunlin
2009-08	539383	6987925	Fair	HT	1 Semipalmated Sandpiper
2009-09	540013	6988072	Fair	TH	No shorebirds

Note: HT=heath tundra, SW=sedge wetland, TH=tussock hummock

Table B6-1: Waterfowl Survey Data – 2008

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	15-Jun-08	-	547257	6993796	Tundra Swan	1						
Mine	15-Jun-08	-	542619	6993986	Tundra Swan	1						
Mine	15-Jun-08	-	541823	6994010	Sandhill Crane	1						
Mine	15-Jun-08	-	541706	6994005	Canada Goose						1	
Mine	15-Jun-08	-	540283	6993911	Sandhill Crane	1						
Mine	15-Jun-08	-	537070	6993781	Canada Goose	1						
Mine	15-Jun-08	-	533334	6991570	Herring Gull	1						
Mine	15-Jun-08	-	537319	6991696	Canada Goose	1						
Mine	15-Jun-08	-	537621	6991698	Long-tailed Duck						1	
Mine	15-Jun-08	-	541034	6991739	Herring Gull	1						
Mine	15-Jun-08	-	541346	6991743	Canada Goose						1	
Mine	15-Jun-08	-	542553	6991608	Herring Gull	1						
Mine	15-Jun-08	-	542674	6991617	Long-tailed Duck						1	
Mine	15-Jun-08	-	543770	6991637	Northern Pintail			1				
Mine	15-Jun-08	-	543903	6991634	Canada Goose	1					1	
Mine	15-Jun-08	-	547466	6991775	Tundra Swan						1	
Mine	15-Jun-08	57	543748	6985827	Sandhill Crane	1						
Mine	15-Jun-08	58	534168	6985809	Red-breasted Merganser			1				
Mine	15-Jun-08	59	542734	6985827	Scaup species						1	
Mine	15-Jun-08	60	542685	6985823	Herring Gull	1						
Mine	15-Jun-08	61	541649	6985720	Tundra Swan						1	
Mine	15-Jun-08	62	540408	6985688	Canada Goose						1	
Mine	15-Jun-08	63	540019	6985721	Sandhill Crane	1						
Mine	15-Jun-08	63	540019	6985721	Canada Goose						1	
Mine	15-Jun-08	64	538700	6985906	Pacific Loon						1	
Mine	15-Jun-08	65	538104	6985738	Tundra Swan						1	
Mine	15-Jun-08	66	537546	6985784	Long-tailed Duck						1	
Mine	15-Jun-08	67	535378	6985777	Long-tailed Duck						1	
Mine	15-Jun-08	68	533822	6985722	Canada Goose	1						

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	15-Jun-08	69	533689	6985716	Herring Gull						1	
Mine	15-Jun-08	28	546546	6989729	Herring Gull	1						
Mine	15-Jun-08	28	546546	6989729	Long-tailed Duck						1	
Mine	15-Jun-08	29	543300	6989653	Canada Goose						1	
Mine	15-Jun-08	30	539800	6989956	Tundra Swan	1						
Mine	15-Jun-08	31	539257	6989811	Canada Goose						1	
Mine	15-Jun-08	32	538972	6989817	Canada Goose	1						
Mine	15-Jun-08	33	538734	6989815	Canada Goose	3						
Mine	15-Jun-08	34	537948	6989740	Canada Goose						1	
Mine	15-Jun-08	35	536242	6989647	Sandhill Crane	1						
Mine	15-Jun-08	36	535424	6989625	Sandhill Crane						1	
Mine	15-Jun-08	37	535085	6989617	Canada Goose	1						
Mine	15-Jun-08	38	532818	6989765	Long-tailed Duck		1					
Mine	15-Jun-08	39	532818	6989765	Pacific Loon						1	
Mine	15-Jun-08	40	532501	6989785	Canada Goose	1						
Mine	15-Jun-08	41	532336	6988378	Canada Goose						1	
Mine	15-Jun-08	42	533930	6988329	Tundra Swan	1						
Mine	15-Jun-08	43	534428	6988239	Northern Pintail		1					
Mine	15-Jun-08	44	534582	6988198	Canada Goose	1						
Mine	15-Jun-08	45	534856	6988124	Long-tailed Duck	1						
Mine	15-Jun-08	46	536273	6987864	Canada Goose	1						
Mine	15-Jun-08	47	541148	6987725	Canada Goose	1						
Mine	15-Jun-08	48	541828	6987737	Long-tailed Duck			1				
Mine	15-Jun-08	49	542154	6987728	Tundra Swan						1	
Mine	15-Jun-08	50	546686	6987715	Canada Goose						1	
Mine	15-Jun-08	50	546686	6987715	Long-tailed Duck						1	
Mine	15-Jun-08	50	546686	6987715	Tundra Swan	1						
Mine	15-Jun-08	51	548113	6987650	Tundra Swan	1						
Mine	15-Jun-08	52	548900	6985826	Sandhill Crane						1	

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	15-Jun-08	52	548900	6985826	Herring Gull	1						
Mine	15-Jun-08	53	547745	6985801	Canada Goose					5		
Mine	15-Jun-08	54	547428	6985800	Unidentified Duck	1						
Mine	15-Jun-08	55	547237	6985808	Tundra Swan						1	
Mine	15-Jun-08	56	547068	6985814	Herring Gull	1						
North	16-Jun-08	71	535391	7016056	Canada Goose	1						
North	16-Jun-08	72	512415	7015692	Pacific Loon	1						
North	16-Jun-08	73	517154	7013994	Canada Goose						1	
North	16-Jun-08	74	513493	7013875	Herring Gull	1						
North	16-Jun-08	75	509090	7013699	Canada Goose	1						
North	16-Jun-08	76	508126	7013650	Long-tailed Duck			1	3			
North	16-Jun-08	77	507743	7013644	Herring Gull						1	
North	16-Jun-08	78	507239	7013635	Long-tailed Duck						1	
North	16-Jun-08	80	506413	7013673	Canada Goose	1						
North	16-Jun-08	81	503499	7011702	Long-tailed Duck		1					
North	16-Jun-08	82	503997	7011698	Canada Goose						2	
North	16-Jun-08	83	504098	7011699	Canada Goose	1						
North	16-Jun-08	84	504267	7011696	Canada Goose						1	
North	16-Jun-08	85	504693	7011673	Canada Goose	1						
North	16-Jun-08	87	507844	7011563	Canada Goose	1						
North	16-Jun-08	88	508522	7011547	Canada Goose	1						
North	16-Jun-08	89	511132	7011508	Canada Goose	3						
North	16-Jun-08	90	512717	7011527	Long-tailed Duck						1	
North	16-Jun-08	92	517213	7009459	Sandhill Crane	1						
North	16-Jun-08	93	514645	7009619	Canada Goose	3						
North	16-Jun-08	94	514088	7009633	Sandhill Crane	1						
North	16-Jun-08	95	512741	7009745	Canada Goose	1						
North	16-Jun-08	96	511583	7009788	Sandhill Crane	1						
North	16-Jun-08	97	509234	7009791	Pacific Loon						1	

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
North	16-Jun-08	98	508032	7009755	Sandhill Crane						1	
North	16-Jun-08	99	506239	7009911	Long-tailed Duck						1	
North	16-Jun-08	102	506581	7007628	Canada Goose	1						
North	16-Jun-08	104	509981	7007489	Canada Goose						2	
North	16-Jun-08	105	511372	7007436	Herring Gull						1	
South	16-Jun-08	107	511768	6989105	Canada Goose						2	
South	16-Jun-08	108	511909	6979098	Canada Goose						2	
South	16-Jun-08	109	513759	6978985	Long-tailed Duck						1	
South	16-Jun-08	110	514088	6978984	Canada Goose	3						
South	16-Jun-08	111	514693	6978986	Canada Goose						1	
South	16-Jun-08	111	514693	6978986	Sandhill Crane	1						
South	16-Jun-08	112	515256	6978988	Sandhill Crane	1						
South	16-Jun-08	113	519503	6979009	Canada Goose	1						
South	16-Jun-08	114	520245	6979023	Sandhill Crane	1						
South	16-Jun-08	116	522274	6979146	Sandhill Crane						1	
South	16-Jun-08	117	523025	6979198	Sandhill Crane					5		
South	16-Jun-08	117	523025	6979198	Canada Goose						1	
South	16-Jun-08	118	523408	6979205	Sandhill Crane	1						
South	16-Jun-08	119	524304	6979165	Sandhill Crane	1						
South	16-Jun-08	120	525827	6979161	Long-tailed Duck		1					
South	16-Jun-08	121	526167	6979119	Long-tailed Duck		1					
South	16-Jun-08	122	526404	6979082	Herring Gull	1						
South	16-Jun-08	123	526890	6979005	Herring Gull	1						
South	16-Jun-08	124	526928	6977001	Canada Goose	1						
South	16-Jun-08	125	526542	6977040	Canada Goose						1	
South	16-Jun-08	126	526228	6977044	Canada Goose	1						
South	16-Jun-08	127	525233	6977065	Herring Gull	1						
South	16-Jun-08	128	524421	6977096	Herring Gull						1	
South	16-Jun-08	129	524157	6977103	Sandhill Crane						1	

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
South	16-Jun-08	130	522824	6977114	Long-tailed Duck		1					
South	16-Jun-08	132	517422	6977139	Canada Goose	3						
South	16-Jun-08	133	516236	6977082	Long-tailed Duck						1	
South	16-Jun-08	134	515868	6977074	Sandhill Crane	1						
South	16-Jun-08	134	515868	6977074	Long-tailed Duck						1	
South	16-Jun-08	135	515710	6977067	Canada Goose	1						
South	16-Jun-08	136	515259	6977056	Canada Goose						1	
South	16-Jun-08	137	515083	6977062	Canada Goose						1	
South	16-Jun-08	138	514557	6977109	Canada Goose	1						
South	16-Jun-08	139	513205	6977137	Long-tailed Duck		1					
South	16-Jun-08	139	513205	6977137	Sandhill Crane	1						
South	16-Jun-08	141	511492	6975247	Canada Goose						1	
South	16-Jun-08	142	511624	6975274	Long-tailed Duck	1						
South	16-Jun-08	143	512638	6975183	Sandhill Crane	1						
South	16-Jun-08	144	514481	6975264	Herring Gull	1						
South	16-Jun-08	145	514913	6975263	Canada Goose						2	
South	16-Jun-08	147	517901	6975146	Sandhill Crane	1						
South	16-Jun-08	147	517901	6975146	Northern Pintail			1				
South	16-Jun-08	148	522746	6974970	Canada Goose	1						
South	16-Jun-08	148	522746	6974970	Herring Gull	1						
South	16-Jun-08	149	524204	6974937	Canada Goose						2	
South	16-Jun-08	163	526836	6971006	Canada Goose	1						
South	16-Jun-08	164	525479	6971196	Canada Goose						1	
South	16-Jun-08	165	525380	6971205	Canada Goose						1	
South	16-Jun-08	166	525200	6971220	Canada Goose						1	
South	16-Jun-08	167	522956	6971198	Herring Gull	1						
South	16-Jun-08	168	522760	6971207	Canada Goose	1						
South	16-Jun-08	169	519989	6971315	Northern Pintail		1					
South	16-Jun-08	170	513435	6971238	Long-tailed Duck			1				

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
South	16-Jun-08	171	511835	6971084	Sandhill Crane	1						
South	16-Jun-08	172	511432	6971060	Northern Pintail			1				
South	16-Jun-08	173	510952	6973019	Herring Gull	1						
South	16-Jun-08	174	511106	6973014	Long-tailed Duck						1	
South	16-Jun-08	173	510952	6973019	Sandhill Crane	1						
South	16-Jun-08	175	512281	6972992	Canada Goose						1	
South	16-Jun-08	176	512597	6972992	Canada Goose						1	
South	16-Jun-08	177	512938	6972988	Sandhill Crane	1						
South	16-Jun-08	178	513960	6972977	Long-tailed Duck						1	
South	16-Jun-08	179	514452	6972989	Canada Goose					10		
South	16-Jun-08	180	514988	6973036	Long-tailed Duck						1	
South	16-Jun-08	181	515182	6973052	Long-tailed Duck		1					
South	16-Jun-08	182	516350	6973093	Long-tailed Duck		1					
South	16-Jun-08	183	516737	6973114	Sandhill Crane	1						
South	16-Jun-08	183	516737	6973114	Herring Gull	1						
South	16-Jun-08	184	517352	6973145	Canada Goose					11		
South	16-Jun-08	185	517786	6973151	Canada Goose	1						
South	16-Jun-08	185	517786	6973151	Long-tailed Duck		1					
South	16-Jun-08	186	518670	6973137	Sandhill Crane	1						
South	16-Jun-08	187	518948	6973123	Herring Gull	1						
South	16-Jun-08	187	518948	6973123	Sandhill Crane	1						
South	16-Jun-08	188	519577	6973091	Herring Gull	1						
South	16-Jun-08	189	520156	6973069	Herring Gull						1	
South	16-Jun-08	190	522496	6973008	Sandhill Crane	1						
South	16-Jun-08	191	522982	6973024	Canada Goose	1						
South	16-Jun-08	192	524065	6973036	Canada Goose	1						
South	16-Jun-08	193	525263	6973015	Canada Goose	1						
South	16-Jun-08	194	525655	6973011	Herring Gull	1						
South	16-Jun-08	195	526001	6973033	Pacific Loon						1	

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
East	16-Jun-08	153	562526	6998452	Herring Gull	1						
East	16-Jun-08	159	569621	7002646	Tundra Swan	1						
East	16-Jun-08	160	565775	7004484	Canada Goose						2	
Mine	22-Jul-08	1	534541	6993571	Long-tailed Duck		1					
Mine	22-Jul-08	2	537596	6993543	Canada Goose	1						3
Mine	22-Jul-08	3	540800	6993674	Tundra Swan						1	
Mine	22-Jul-08	4	542583	6993637	Tundra Swan						1	
Mine	22-Jul-08	5	543644	6993586	Sandhill Crane						1	
Mine	22-Jul-08	6	544029	6993568	Canada Goose						1	
Mine	22-Jul-08	8	542827	6991664	Tundra Swan						1	
Mine	22-Jul-08	9	541361	6991562	Common Loon	1						
Mine	22-Jul-08	10	538799	6991692	Herring Gull	1						
Mine	22-Jul-08	11	535316	6991654	Herring Gull	1						
Mine	22-Jul-08	12	533638	6991555	Sandhill Crane						1	
Mine	22-Jul-08	13	532697	6991464	Canada Goose					6		4
Mine	22-Jul-08	14	534431	6989636	Tundra Swan						2	
Mine	22-Jul-08	15	545744	6989498	Canada Goose					5		
Mine	22-Jul-08	16	546616	6979703	Tundra Swan						1	3
Mine	22-Jul-08	17	547749	6987684	Unidentified Duck	1						
Mine	22-Jul-08	18	546930	6987540	Tundra Swan						1	4
Mine	22-Jul-08	19	537388	6987677	Tundra Swan	1						2
Mine	22-Jul-08	20	536968	6987719	Common Loon	1						
Mine	22-Jul-08	21	536091	6987649	Canada Goose						2	4
Mine	22-Jul-08	22	538229	6985753	Herring Gull	1						
Mine	22-Jul-08	23	538465	6985754	Tundra Swan						1	
Mine	22-Jul-08	24	540990	6985776	Sandhill Crane						1	
Mine	22-Jul-08	25	541596	6985625	Tundra Swan	1						
Mine	22-Jul-08	26	542668	6985576	Tundra Swan						1	3
North	22-Jul-08	28	502649	7015101	Canada Goose					10		

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
North	22-Jul-08	29	503064	7015007	Canada Goose					12		
North	22-Jul-08	30	506709	7015136	Common Loon	1						
North	22-Jul-08	31	516812	7014829	Sandhill Crane						1	
North	22-Jul-08	32	516740	7014184	Canada Goose						2	
North	22-Jul-08	33	513403	7013536	Pacific Loon	1						
North	22-Jul-08	34	511945	7013554	Canada Goose						1	3
North	22-Jul-08	35	509661	7013537	Sandhill Crane						1	
North	22-Jul-08	36	508530	7013567	Red-breasted Merganser	1						
North	22-Jul-08	37	508070	7013550	Pacific Loon	1						
North	22-Jul-08	38	507319	7013581	Common Loon						1	
North	22-Jul-08	39	506238	7013574	Canada Goose					13		
North	22-Jul-08	40	505407	7013620	Lesser Snow Goose						1	
North	22-Jul-08	41	503210	7012400	Canada Goose					7		
North	22-Jul-08	42	508893	7011494	Canada Goose					20		
North	22-Jul-08	43	509491	7011515	Herring Gull	1						
North	22-Jul-08	44	514884	7011441	Red-breasted Merganser			2				
North	22-Jul-08	45	514970	7011420	Canada Goose					35		
North	22-Jul-08	46	516081	7011414	Herring Gull	1						
North	22-Jul-08	47	516632	7011413	Canada Goose					5		4
North	22-Jul-08	48	513689	7009598	Sandhill Crane	1						
North	22-Jul-08	49	506906	7009544	Herring Gull	1						
North	22-Jul-08	50	506003	7009525	Pacific Loon						1	
North	22-Jul-08	51	505475	7009556	Sandhill Crane						1	
North	22-Jul-08	52	504916	7009532	Unidentified Duck						1	
North	22-Jul-08	53	504522	7009462	Red-breasted Merganser			1				
North	22-Jul-08	54	502904	7009523	Herring Gull						1	

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
North	22-Jul-08	55	501110	7009666	Herring Gull						1	
North	22-Jul-08	56	500959	7007573	Red-throated Loon						1	
North	22-Jul-08	57	503039	7007609	Long-tailed Duck			1				
North	22-Jul-08	58	507724	7007596	Canada Goose						2	6
North	22-Jul-08	59	512715	7007603	Red-breasted Merganser	2						
North	22-Jul-08	60	512888	7007536	Pacific Loon	1						
North	22-Jul-08	61	513794	7007620	Canada Goose						1	2
North	22-Jul-08	62	516752	7007579	Sandhill Crane						1	
South	23-Jul-08	70	522866	6971018	Herring Gull	1						
South	23-Jul-08	71	522560	6970991	Sandhill Crane	1						
South	23-Jul-08	72	521368	6971016	Sandhill Crane					5		
South	23-Jul-08	73	513174	6970918	Sandhill Crane	1						
South	23-Jul-08	74	512982	6970924	Unidentified Duck	2						
South	23-Jul-08	75	511679	6973072	Sandhill Crane						1	
South	23-Jul-08	76	513413	6973012	Herring Gull	1						
South	23-Jul-08	77	519282	6972971	Sandhill Crane						1	
South	23-Jul-08	78	520762	6973020	Canada Goose						1	
South	23-Jul-08	79	524553	6973008	Red-throated Loon	1						
South	23-Jul-08	80	526231	6973070	Herring Gull	1						
South	23-Jul-08	81	525175	6974996	Long-tailed Duck					6		
South	23-Jul-08	82	524755	6974990	Canada Goose	3						6
South	23-Jul-08	85	518949	6974934	Sandhill Crane						1	
South	23-Jul-08	86	518078	6974963	Canada Goose					5		5
South	23-Jul-08	87	515996	6975005	Herring Gull					8		
South	23-Jul-08	89	511402	6977066	Sandhill Crane	1						
South	23-Jul-08	90	518205	6977061	Sandhill Crane						2	
South	23-Jul-08	92	519991	6977023	Sandhill Crane						1	

Table B6-1: Waterfowl Survey Data – 2008 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
South	23-Jul-08	93	525010	6976941	Herring Gull	1						
South	23-Jul-08	94	523784	6979007	Canada Goose					20		
South	23-Jul-08	95	521083	6979051	Red-throated Loon						1	
South	23-Jul-08	96	518215	6979037	Canada Goose					12		
South	23-Jul-08	97	515738	6979050	Canada Goose					28		
South	23-Jul-08	98	515618	6979065	Canada Goose					5		4
South	23-Jul-08	99	515169	6979059	Red-throated Loon						1	
South	23-Jul-08	100	513843	6979042	Canada Goose					10		
South	23-Jul-08	101	512746	6979050	Canada Goose						1	
South	23-Jul-08	102	512463	6979032	Sandhill Crane	1						
South	23-Jul-08	103	511107	6979016	Sandhill Crane	1						
East	23-Jul-08	66	562428	6998441	Canada Goose					45		
East	23-Jul-08	67	558312	6998278	Canada Goose					50		
East	23-Jul-08	67	558312	6998278	Lesser Snow Goose					15		
East	23-Jul-08	68	556939	6998343	Sandhill Crane	1						

Note: "-" indicates not recorded

Table B6-2: Waterfowl Survey Data – 2009

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	13-Jun-09	36	533367	6993886	Herring Gull	1						
Mine	13-Jun-09	37	534779	6993894	Canada Goose	1						
Mine	13-Jun-09	38	540505	6993841	Long-tailed Duck						1	
Mine	13-Jun-09	39	541488	6993740	Canada Goose						1	

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	13-Jun-09	39	541488	6993740	Red-breasted Merganser						1	
Mine	13-Jun-09	41	542750	6993950	Tundra Swan	1						
Mine	13-Jun-09	42	542967	6993930	Canada Goose						1	
Mine	13-Jun-09	43	545062	6993801	Pacific Loon						1	
Mine	13-Jun-09	45	546240	6993650	Canada Goose					10		
Mine	13-Jun-09	45	546240	6993650	Tundra Swan	1						
Mine	13-Jun-09	46	547809	6991979	Tundra Swan						1	
Mine	13-Jun-09	48	543409	6992003	Tundra Swan						1	
Mine	13-Jun-09	49	542513	6991839	Common Loon	1						
Mine	13-Jun-09	50	540470	6991786	Canada Goose						1	
Mine	13-Jun-09	50	540470	6991786	Lesser Snow Goose	1						
Mine	13-Jun-09	51	539757	6991774	Herring Gull	1						
Mine	13-Jun-09	52	536383	6991919	Canada Goose						1	
Mine	13-Jun-09	53	535093	6991879	Canada Goose					16		
Mine	13-Jun-09	54	534009	6991948	Sandhill Crane						1	
Mine	13-Jun-09	56	533572	6989829	Canada Goose	1						
Mine	13-Jun-09	57	534993	6989909	Sandhill Crane						1	
Mine	13-Jun-09	59	535686	6989959	Canada Goose	3						
Mine	13-Jun-09	60	535958	6989933	Canada Goose	1						
Mine	13-Jun-09	61	539104	6989858	Northern Pintail						1	
Mine	13-Jun-09	62	539253	6989868	Canada Goose	1					2	
Mine	13-Jun-09	64	547013	6989847	Canada Goose	3						
Mine	13-Jun-09	65	548271	6987859	Scaup species				2			
Mine	13-Jun-09	66	548115	6987836	Tundra Swan						1	
Mine	13-Jun-09	67	547886	6987823	Canada Goose	1						
Mine	13-Jun-09	68	547363	6987895	Sandhill Crane						1	

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	13-Jun-09	69	541647	6987887	Scaup species				2			
Mine	13-Jun-09	70	540668	6987937	Northern Pintail			1				
Mine	13-Jun-09	71	540083	6987897	Red-throated Loon	1						
Mine	13-Jun-09	72	538638	6987872	Long-tailed Duck		1					
Mine	13-Jun-09	73	535788	6987863	Northern Pintail			1				
Mine	13-Jun-09	75	533355	6987974	Canada Goose						1	
Mine	13-Jun-09	76	533024	6986065	Long-tailed Duck						1	
Mine	13-Jun-09	77	534059	6986024	Sandhill Crane						1	
Mine	13-Jun-09	79	535091	6985787	Lesser Snow Goose					6		
Mine	13-Jun-09	80	536661	6985800	Herring Gull						1	
Mine	13-Jun-09	81	536795	6985809	Long-tailed Duck		1					
Mine	13-Jun-09	82	537771	6985908	Northern Pintail						1	
Mine	13-Jun-09	83	538378	6985946	Tundra Swan	1						
Mine	13-Jun-09	84	539812	6985879	Sandhill Crane	1						
Mine	13-Jun-09	85	542527	6985888	Tundra Swan	1						
Mine	13-Jun-09	86	542767	6985882	Canada Goose						1	
Mine	13-Jun-09	87	543071	6985870	Tundra Swan	1						
Mine	13-Jun-09	88	543746	6985884	Tundra Swan						1	
Mine	13-Jun-09	89	546561	6985781	Canada Goose					6		
Mine	13-Jun-09	90	547232	6985785	Herring Gull	1						
Mine	13-Jun-09	91	547715	6985830	Tundra Swan	1						
Mine	13-Jun-09	92	547771	6985890	Scaup species						1	
Mine	13-Jun-09	93	547980	6985810	Northern Pintail						2	
North	13-Jun-09	2	501629	7015606	Herring Gull	1						

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
North	13-Jun-09	3	502762	7015430	Canada Goose	2						
North	13-Jun-09	4	503603	7015372	Lesser Snow Goose					10		
North	13-Jun-09	5	504466	7015409	Canada Goose	1						
North	13-Jun-09	6	510709	7015271	Canada Goose						1	
North	13-Jun-09	7	516591	7015256	Canada Goose						1	
North	13-Jun-09	1	513657	7013730	Sandhill Crane	1						
North	13-Jun-09	2	513656	7013730	Lesser Snow Goose					7		
North	13-Jun-09	3	511042	7013779	Canada Goose						1	
North	13-Jun-09	5	508853	7013873	Lesser Snow Goose	4						
North	13-Jun-09	6	508417	7013869	Canada Goose						1	
North	13-Jun-09	7	507722	7013838	Herring Gull	1						
North	13-Jun-09	8	506908	7013786	Canada Goose						1	
North	13-Jun-09	9	505869	7013798	Lesser Snow Goose						1	
North	13-Jun-09	11	504728	7013841	Canada Goose						1	
North	13-Jun-09	12	503835	7013817	Canada Goose						1	
North	13-Jun-09	13	503200	7013767	Sandhill Crane						1	
North	13-Jun-09	14	503527	7011599	Northern Pintail			1				
North	13-Jun-09	15	503929	7011586	Northern Pintail		1					
North	13-Jun-09	17	511657	7011821	Long-tailed Duck		1					
North	13-Jun-09	17	511657	7011821	Canada Goose						1	
North	13-Jun-09	18	516152	7011758	Herring Gull						1	
North	13-Jun-09	19	515427	7009854	Canada Goose	1						
North	13-Jun-09	22	507535	7009715	Canada Goose						1	
North	13-Jun-09	23	506683	7009757	Lesser Snow Goose					16		

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
North	13-Jun-09	24	502115	7009843	Canada Goose						1	
North	13-Jun-09	28	506145	7007760	Canada Goose	1						
North	13-Jun-09	29	507352	7007693	Long-tailed Duck		1					
North	13-Jun-09	31	510559	7007714	Lesser Snow Goose					50		
North	13-Jun-09	33	512487	7007584	Long-tailed Duck						1	
North	13-Jun-09	35	515789	7007512	Canada Goose						1	
South	14-Jun-09	104	514077	6971291	Herring Gull	1						
South	14-Jun-09	105	519496	6971213	Canada Goose						1	
South	14-Jun-09	106	520810	6971204	Canada Goose						1	
South	14-Jun-09	107	522089	6971279	Canada Goose						1	
South	14-Jun-09	108	522500	6971277	Herring Gull	1						
South	14-Jun-09	109	524351	6971223	Sandhill Crane	1						
South	14-Jun-09	110	525049	6971228	Sandhill Crane	3						
South	14-Jun-09	112	520977	6973106	Canada Goose						1	
South	14-Jun-09	113	519974	6973220	Herring Gull						1	
South	14-Jun-09	114	519687	6973231	Sandhill Crane						1	
South	14-Jun-09	116	517841	6973185	Herring Gull							
South	14-Jun-09	116	517841	6973185	Scaup species						1	
South	14-Jun-09	117	517313	6973238	Canada Goose						1	
South	14-Jun-09	117	517313	6973238	Long-tailed Duck		1					
South	14-Jun-09	118	514826	6973229	Herring Gull	1						
South	14-Jun-09	119	514404	6973223	Canada Goose						1	
South	14-Jun-09	119	514404	6973223	Long-tailed Duck		1					
South	14-Jun-09	120	513955	6973225	Canada Goose						1	

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
South	14-Jun-09	120	513955	6973225	Long-tailed Duck						1	
South	14-Jun-09	121	513605	6973239	Sandhill Crane	1						
South	14-Jun-09	121	513605	6973239	Long-tailed Duck						1	
South	14-Jun-09	122	513269	6973256	Canada Goose					5		
South	14-Jun-09	123	512702	6973284	Canada Goose						1	
South	14-Jun-09	124	511042	6973241	Long-tailed Duck						2	
South	14-Jun-09	126	511341	6975237	Herring Gull	1						
South	14-Jun-09	127	512715	6975239	Sandhill Crane	1						
South	14-Jun-09	129	516346	6975256	Sandhill Crane	1						
South	14-Jun-09	130	517859	6975221	Canada Goose						1	
South	14-Jun-09	131	520153	6975316	Canada Goose						2	
South	14-Jun-09	132	520320	6975319	Sandhill Crane	3						
South	14-Jun-09	133	521500	6975240	Canada Goose						2	
South	14-Jun-09	134	522967	6975220	Canada Goose	1						
South	14-Jun-09	135	523451	6975224	Sandhill Crane						1	
South	14-Jun-09	136	524362	6975211	Herring Gull					17		
South	14-Jun-09	137	524543	6975227	Canada Goose						1	
South	14-Jun-09	138	526796	6975184	Long-tailed Duck		1					
South	14-Jun-09	140	523437	6977223	Herring Gull	1						
South	14-Jun-09	141	517631	6977246	Sandhill Crane						1	
South	14-Jun-09	142	517269	6977247	Sandhill Crane						1	
South	14-Jun-09	143	516682	6977243	Sandhill Crane						1	
South	14-Jun-09	144	515717	6977235	Canada Goose	1						
South	14-Jun-09	145	514036	6977215	Sandhill Crane	1						
South	14-Jun-09	146	512605	6977189	Canada Goose	1						

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
South	14-Jun-09	147	511760	6977249	Canada Goose						1	
South	14-Jun-09	148	511021	6977272	Lesser Snow Goose					100		
South	14-Jun-09	149	511093	6979227	Canada Goose	1						
South	14-Jun-09	150	511474	6979243	Long-tailed Duck			1	2			
South	14-Jun-09	151	511878	6979238	Herring Gull	1						
South	14-Jun-09	152	512182	6979225	Canada Goose						2	
South	14-Jun-09	153	513197	6979190	Canada Goose						1	
South	14-Jun-09	154	514382	6979183	Lesser Snow Goose					29		
South	14-Jun-09	155	514941	6979194	Sandhill Crane	1						
South	14-Jun-09	156	515839	6979175	Canada Goose	1						
South	14-Jun-09	157	518584	6979289	Long-tailed Duck						1	
South	14-Jun-09	158	519677	6979271	Sandhill Crane	1						
South	14-Jun-09	160	523967	6979210	Northern Pintail		1					
South	14-Jun-09	162	525513	6979208	Herring Gull						1	
South	14-Jun-09	163	526744	6979261	Sandhill Crane	1						
South	14-Jun-09	163	526744	6979261	Canada Goose						1	
Discovery	14-Jun-09	164	546309	6982925	Long-tailed Duck				3			
Discovery	14-Jun-09	165	546991	6983000	Long-tailed Duck			1				
Discovery	14-Jun-09	166	547333	6983027	Tundra Swan	1						
Discovery	14-Jun-09	167	547673	6983048	Canada Goose						1	
Discovery	14-Jun-09	168	550302	6983132	Tundra Swan						1	
Discovery	14-Jun-09	169	551169	6983161	Long-tailed Duck						1	
Discovery	14-Jun-09	170	551698	6983182	Tundra Swan	1						

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Discovery	14-Jun-09	171	552054	6983191	Canada Goose						1	
Discovery	14-Jun-09	172	552487	6983199	Lesser Snow Goose					28		
Discovery	14-Jun-09	173	554725	6983094	Tundra Swan	1						
Discovery	14-Jun-09	174	556153	6983061	Canada Goose						1	
Discovery	14-Jun-09	175	556302	6983068	Tundra Swan						1	
Discovery	14-Jun-09	176	556530	6983076	Long-tailed Duck						1	
Discovery	14-Jun-09	177	556919	6983087	Long-tailed Duck						1	
Discovery	14-Jun-09	178	557469	6983110	Canada Goose						1	
Discovery	14-Jun-09	179	557762	6983129	Herring Gull	1						
Discovery	14-Jun-09	180	558445	6983149	Long-tailed Duck		1					
Discovery	14-Jun-09	181	558830	6983142	Sandhill Crane						1	
Discovery	14-Jun-09	182	559333	6983128	Canada Goose						1	
Discovery	14-Jun-09	183	559711	6983141	Tundra Swan						1	
Discovery	14-Jun-09	184	560318	6983118	Lesser Snow Goose					48		
Discovery	14-Jun-09	185	560922	6983079	Canada Goose					15		
Discovery	14-Jun-09	187	560536	6981192	Tundra Swan						1	
Discovery	14-Jun-09	188	559510	6981209	Canada Goose						1	
Discovery	14-Jun-09	189	559089	6981182	Long-tailed Duck						1	
Discovery	14-Jun-09	190	558584	6981163	Tundra Swan						1	
Discovery	14-Jun-09	191	558202	6981155	Lesser Snow Goose					8		
Discovery	14-Jun-09	192	557752	6981153	Tundra Swan						1	
Discovery	14-Jun-09	192	557752	6981153	Northern Pintail						1	
Discovery	14-Jun-09	193	557327	6981139	Canada Goose						1	

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Discovery	14-Jun-09	194	554304	6981104	Long-tailed Duck						1	
Discovery	14-Jun-09	195	552880	6981115	Long-tailed Duck						1	
Discovery	14-Jun-09	195	552880	6981115	Herring Gull	1						
Discovery	14-Jun-09	196	552266	6981101	Herring Gull					10		
Discovery	14-Jun-09	196	552266	6981101	Long-tailed Duck				2			
Discovery	14-Jun-09	197	551215	6981076	Canada Goose						1	
Discovery	14-Jun-09	198	550470	6981067	Sandhill Crane						1	
Discovery	14-Jun-09	199	550310	6981069	Tundra Swan	1						
Discovery	14-Jun-09	200	548676	6981250	Long-tailed Duck		1					
Discovery	14-Jun-09	201	547869	6981325	Herring Gull	1						
Discovery	14-Jun-09	202	547138	6981344	Herring Gull	1						
Discovery	14-Jun-09	203	546769	6979142	Long-tailed Duck						1	
Discovery	14-Jun-09	204	548260	6979171	Scaup species						1	
Discovery	14-Jun-09	205	548994	6979199	Tundra Swan						2	
Discovery	14-Jun-09	206	549942	6979131	Long-tailed Duck				2			
Discovery	14-Jun-09	207	550319	6979114	Tundra Swan	1						
Discovery	14-Jun-09	208	550849	6979121	Sandhill Crane	1						
Discovery	14-Jun-09	209	551136	6979149	Canada Goose						1	
Discovery	14-Jun-09	209	551136	6979149	Tundra Swan	1						
Discovery	14-Jun-09	210	553145	6979020	Sandhill Crane						2	
Discovery	14-Jun-09	211	553524	6979058	Northern Pintail		1					
Discovery	14-Jun-09	211	553524	6979058	Scaup species						1	
Discovery	14-Jun-09	212	556388	6979217	Unidentified Duck	1						

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Discovery	14-Jun-09	213	557116	6979141	Tundra Swan						1	
Discovery	14-Jun-09	214	559647	6979191	Canada Goose						1	
Discovery	14-Jun-09	216	562045	6979203	Tundra Swan						1	
Discovery	14-Jun-09	217	561799	6977126	Canada Goose						1	
Discovery	14-Jun-09	220	552968	6977192	Tundra Swan						1	
Discovery	14-Jun-09	221	550053	6977060	Herring Gull	1						
Discovery	14-Jun-09	222	546933	6977174	Long-tailed Duck						1	
Discovery	14-Jun-09	223	546609	6977167	Canada Goose						1	
Discovery	14-Jun-09	224	546858	6975062	Common Eider						2	
Discovery	14-Jun-09	225	549087	6975145	Common Eider						2	
Discovery	14-Jun-09	226	553797	6975156	Northern Pintail						1	
Discovery	14-Jun-09	227	554016	6975146	Long-tailed Duck		1					
Discovery	14-Jun-09	228	555316	6975119	Tundra Swan	1						
Discovery	14-Jun-09	230	562671	6975088	Long-tailed Duck						1	
Discovery	14-Jun-09	231	562930	6975094	Canada Goose					6		
Mine	30-Jul-09		546932	6985975	**Tundra Swan**						1	
Mine	30-Jul-09		544672	6985984	**Herring Gull**	1						
Mine	30-Jul-09		544134	6985986	**Tundra Swan**						1	
Mine	30-Jul-09		542734	6986033	**Tundra Swan**						1	2
Mine	30-Jul-09		542209	6986044	**Herring Gull**	1						
Mine	30-Jul-09		541982	6986050	**Tundra Swan**						1	
Mine	30-Jul-09		540178	6986049	**Sandhill Crane**						1	
Mine	30-Jul-09		539976	6986053	**Tundra Swan**						1	
Mine	30-Jul-09		539781	6986055	**Tundra Swan**	1						
Mine	30-Jul-09		538988	6986003	**Tundra Swan**	1						

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	30-Jul-09		538638	6986094	**Pacific Loon**	1						
Mine	30-Jul-09		537800	6986100	**Tundra Swan**						1	1
Mine	30-Jul-09		536112	6986094	**Tundra Swan**						1	
Mine	30-Jul-09		535949	6986096	**Canada Goose**						1	4
Mine	30-Jul-09		533252	6986101	**Sandhill Crane**						1	
Mine	30-Jul-09		532653	6986111	**Sandhill Crane**						1	
Mine	30-Jul-09		533123	6987488	**Herring Gull**	1						
Mine	30-Jul-09		534128	6987951	**Canada Goose**						2	2
Mine	30-Jul-09		536997	6987937	**Pacific Loon**						1	
Mine	30-Jul-09		537640	6987891	**Long-tailed Duck**					5		
Mine	30-Jul-09		539938	6987925	**Herring Gull**	1						
Mine	30-Jul-09		541505	6987908	**Herring Gull**	1						
Mine	30-Jul-09		541716	6987901	**Long-tailed Duck**						1	
Mine	30-Jul-09		547800	6987924	**Sandhill Crane**						1	
Mine	30-Jul-09		548292	6987910	**Tundra Swan**						1	
Mine	30-Jul-09		548597	6987884	**Unidentified Duck**					5		
Mine	30-Jul-09		548922	6989005	**Greater White-fronted Goose**					5		
Mine	30-Jul-09		546815	6989965	**Tundra Swan**						1	
Mine	30-Jul-09		542656	6989885	**Sandhill Crane**						1	
Mine	30-Jul-09		540849	6989861	**Canada Goose**	3						
Mine	30-Jul-09		539565	6989923	**Sandhill Crane**						1	
Mine	30-Jul-09		537726	6989935	**Tundra Swan**						2	
Mine	30-Jul-09		535072	6989915	**Tundra Swan**						1	
Mine	30-Jul-09		534855	6989919	**Sandhill Crane**	1						
Mine	30-Jul-09		534832	6991854	**Tundra Swan**						1	

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Mine	30-Jul-09		536337	6991883	**Tundra Swan**	1						
Mine	30-Jul-09		539865	6991869	**Herring Gull**	1						
Mine	30-Jul-09		542522	6991825	**Canada Goose**					18		
Mine	30-Jul-09		545361	6991872	**Pacific Loon**						1	
Mine	30-Jul-09		546561	6991877	**Pacific Loon**						1	
Mine	30-Jul-09		548731	6993281	**Canada Goose**					8		
Mine	30-Jul-09		548731	6993281	**Lesser Snow Goose**	1						
Mine	30-Jul-09		548731	6993984	**Canada Goose**						2	
Mine	30-Jul-09		548731	6993984	**Tundra Swan**					6		
Mine	30-Jul-09		548089	6993905	**Sandhill Crane**						1	
Mine	30-Jul-09		541394	6993976	**Sandhill Crane**						1	
Mine	30-Jul-09		540814	6993949	**Tundra Swan**						1	
Mine	30-Jul-09		540283	6993999	**Tundra Swan**						1	
Mine	30-Jul-09		533825	6993975	**Sandhill Crane**						2	
North	30-Jul-09		514311	7015871	**Tundra Swan**						1	
North	30-Jul-09		505488	7015900	**Canada Goose**					34		
North	30-Jul-09		504122	7015839	**Sandhill Crane**	1						
North	30-Jul-09		501557	7015821	**Herring Gull**	1						
North	30-Jul-09		501459	7015831	**Red-breasted Merganser**	2						
North	30-Jul-09		510153	7013820	**Canada Goose**					24		
North	30-Jul-09		516083	7013858	**Herring Gull**	1						
North	30-Jul-09		515929	7011794	**Herring Gull**	1						
North	30-Jul-09		515448	7011820	**Red-throated Loon**	1						
North	30-Jul-09		514856	7011839	**Canada Goose**					9		
North	30-Jul-09		512222	7011764	**Canada Goose**	1						3

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
North	30-Jul-09		505928	7009737	**Herring Gull**	1						
North	30-Jul-09		509950	7009710	**Sandhill Crane**					5		
North	30-Jul-09		511627	7009778	**Sandhill Crane**	1						
North	30-Jul-09		516966	7008609	**Sandhill Crane**	1						
North	30-Jul-09		516433	7007893	**Canada Goose**					14		
North	30-Jul-09		513858	7007900	**Pacific Loon**						1	
North	30-Jul-09		512736	7007873	**Canada Goose**	3						
North	30-Jul-09		512017	7007809	**Long-tailed Duck**						1	
North	30-Jul-09		510967	7007787	**Long-tailed Duck**			1				
North	30-Jul-09		505053	70078675	**Canada Goose**					8		
South	30-Jul-09		525600	6979196	**Lesser Snow Goose**					2		
South	30-Jul-09		525600	6979196	**Canada Goose**					16		
South	30-Jul-09		525312	6979212	**Sandhill Crane**	1						
South	30-Jul-09		522878	6979253	**Canada Goose**					6		
South	30-Jul-09		519303	6979290	**Sandhill Crane**						1	
South	30-Jul-09		517665	6979252	**Herring Gull**	1						
South	30-Jul-09		515951	6979199	**Sandhill Crane**						1	
South	30-Jul-09		510805	6978560	**Sandhill Crane**						1	
South	30-Jul-09		510819	6977930	**Sandhill Crane**						1	
South	30-Jul-09		516992	6977208	**Long-tailed Duck**						1	
South	30-Jul-09		417431	6977178	**Sandhill Crane**	3						
South	30-Jul-09		523294	6977240	**Sandhill Crane**						2	
South	30-Jul-09		525745	6977464	**Herring Gull**	1						
South	30-Jul-09		526606	6977258	**Herring Gull**	1						
South	30-Jul-09		526659	6975166	**Sandhill Crane**	3						

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
South	30-Jul-09		523974	6975272	**Sandhill Crane**	1						
South	30-Jul-09		523535	6975279	**Herring Gull**	1						
South	30-Jul-09		521177	6975328	**Sandhill Crane**						1	
South	30-Jul-09		520755	6975325	**Canada Goose**						2	
South	30-Jul-09		518379	6975186	**Herring Gull**	1						
South	30-Jul-09		514170	6975252	**Herring Gull**	1						
South	30-Jul-09		514170	6975252	**Sandhill Crane**						1	
South	30-Jul-09		510969	6975295	**Sandhill Crane**	1						
South	30-Jul-09		511282	6973207	**Canada Goose**						1	
South	30-Jul-09		515006	6973242	**Herring Gull**	1						
South	30-Jul-09		517993	6973200	**Herring Gull**	1						
South	30-Jul-09		522119	6973349	**Sandhill Crane**						1	
South	30-Jul-09		523089	6973291	**Canada Goose**					6		
South	30-Jul-09		523615	6973239	**Herring Gull**	1						
South	30-Jul-09		524551	6973179	**Herring Gull**	1						
South	30-Jul-09		527111	6972857	**Herring Gull**	1						
South	30-Jul-09		526433	6971255	**Unidentified Duck**	1						
South	30-Jul-09		522083	6971286	**Herring Gull**	1						
South	30-Jul-09		521009	6971232	**Herring Gull**	1						
South	30-Jul-09		519313	6971205	**Herring Gull**	1						
South	30-Jul-09		515547	6971298	**Long-tailed Duck**						1	
South	30-Jul-09		513924	6971198	**Canada Goose**					8		
Discovery	30-Jul-09		559931	6974842	**Herring Gull**	1						
Discovery	30-Jul-09		557239	6975022	**Tundra Swan**						2	
Discovery	30-Jul-09		555441	6975129	**Sandhill Crane**						1	
Discovery	30-Jul-09		553915	6975206	**Tundra Swan**	1						

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Discovery	30-Jul-09		551428	6975232	**Herring Gull**	1						
Discovery	30-Jul-09		549042	6975345	**Herring Gull**						1	
Discovery	30-Jul-09		550197	6977191	**Herring Gull**	1						
Discovery	30-Jul-09		551384	6977086	**Sandhill Crane**	1						
Discovery	30-Jul-09		552059	6977050	**Tundra Swan**	1						
Discovery	30-Jul-09		560908	6977170	**Tundra Swan**						1	
Discovery	30-Jul-09		557143	6979140	**Tundra Swan**						1	
Discovery	30-Jul-09		556349	6979142	**Herring Gull**	1						
Discovery	30-Jul-09		555121	6979215	**Canada Goose**	3						
Discovery	30-Jul-09		553966	6979226	**Long-tailed Duck**						1	
Discovery	30-Jul-09		553327	6979169	**Herring Gull**	1						
Discovery	30-Jul-09		552921	6979165	**Tundra Swan**	1						
Discovery	30-Jul-09		552607	6979212	**Pacific Loon**	3						
Discovery	30-Jul-09		551486	6979287	**Herring Gull**	1						
Discovery	30-Jul-09		551173	6979313	**Sandhill Crane**	1						
Discovery	30-Jul-09		548519	697330	**Long-tailed Duck**		1					
Discovery	30-Jul-09		547476	6979339	**Herring Gull**	1						
Discovery	30-Jul-09		546987	6979346	**Herring Gull**	1						
Discovery	30-Jul-09		546962	6981245	**Tundra Swan**						1	
Discovery	30-Jul-09		548684	6981208	**Sandhill Crane**						1	
Discovery	30-Jul-09		549099	6981179	**Tundra Swan**						1	
Discovery	30-Jul-09		551258	6981118	**Sandhill Crane**						1	
Discovery	30-Jul-09		552287	6981136	**Tundra Swan**	1						1
Discovery	30-Jul-09		552603	6981142	**Herring Gull**					5		
Discovery	30-Jul-09		553203	6981203	**Long-tailed Duck**						1	

Table B6-2: Waterfowl Survey Data – 2009 (continued)

Strata	Date	Waypoint Number	UTM Zone 15 NAD 83		Species	Unknown Singles	Lone Drakes	Lone Females	Grouped Drakes	Mixed Groups	Pair	Number of Young
			Easting	Northing								
Discovery	30-Jul-09		557633	6981069	**Tundra Swan**						1	
Discovery	30-Jul-09		560211	6981013	**Pacific Loon**	1						
Discovery	30-Jul-09		561348	6980962	**Canada Goose**						1	1
Discovery	30-Jul-09		559906	6983185	**Sandhill Crane**	1						
Discovery	30-Jul-09		557898	6983174	**Tundra Swan**						1	
Discovery	30-Jul-09		557156	6983247	**Pacific Loon**					5		
Discovery	30-Jul-09		556674	6983282	**Tundra Swan**						1	
Discovery	30-Jul-09		556077	6983275	**Tundra Swan**	1						
Discovery	30-Jul-09		553167	6983308	**Unidentified Duck**					10		
Discovery	30-Jul-09		547203	6983212	**Canada Goose**						2	

Table B7-1: Loon and Swan Nest Survey Data – 1998

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	1998	538700	6990641	Pacific Loon			√	
Exploration	1998	535901	6989192	Pacific Loon			√	
Exploration	1998	540250	6986242	Pacific Loon			√	
Exploration	1998	540650	6985792	Pacific Loon			√	
Exploration	1998	544300	6985492	Pacific Loon			√	
Exploration	1998	539800	6986692	Pacific Loon			√	
Exploration	1998	534201	6988892	Pacific Loon			√	
Exploration	1998	533601	6989092	Pacific Loon			√	
Exploration	1998	537201	6987492	Pacific Loon			√	
Exploration	1998	541900	6987042	Pacific Loon			√	
Exploration	20-23 June 1998	538500	6990741	Pacific Loon	1			
Exploration	20-23 June 1998	534601	6990841	Pacific Loon	2			
Exploration	20-23 June 1998	533601	6989142	Pacific Loon	1			
Exploration	20-23 June 1998	534151	6988992	Pacific Loon	1			
Exploration	20-23 June 1998	536001	6989242	Pacific Loon	2			
Exploration	20-23 June 1998	537401	6987092	Pacific Loon	2			
Exploration	20-23 June1998	538800	6986992	Pacific Loon	1			
Exploration	20-23 June 1998	539600	6986742	Pacific Loon	2			
Exploration	20-23 June 1998	540100	6986442	Pacific Loon	2			
Exploration	20-23 June 1998	540700	6986042	Pacific Loon	2			
Exploration	20-23 June 1998	544100	6985442	Pacific Loon	1			
Exploration	20-23 June1998	543100	6986242	Pacific Loon	1			
Exploration	20-23 June 1998	542000	6987242	Pacific Loon	1			
Exploration	June	542800	6985892	Tundra Swan	1			
Exploration	June	536701	6987841	Tundra Swan	1			
Exploration	June	541500	6989192	Tundra Swan	2			
Exploration	June	544150	6985492	Tundra Swan	2			
Exploration	June	534701	6990092	Tundra Swan	2			
Exploration	June	542600	6987542	Tundra Swan	3			
Exploration	July	543050	6985692	Tundra Swan	2			
Exploration	July	544450	6985342	Tundra Swan	2			
Exploration	July	544650	6984592	Tundra Swan	2			
Exploration	July	539250	6985092	Tundra Swan	2			
Exploration	July	536851	6990691	Tundra Swan	2			
Exploration	July	536851	6989991	Tundra Swan	2			
Exploration	July	535251	6987092	Tundra Swan	2			
Exploration	July	533801	6989091	Tundra Swan	2			
Exploration	July	535101	6989391	Tundra Swan	2			
Exploration	June	542900	6985742	Tundra Swan			√	

Table B7-1: Loon and Swan Nest Survey Data – 1998 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	June	544300	6985492	Tundra Swan			√	
Exploration	June	536851	6989941	Tundra Swan			√	
Exploration	June	534851	6989342	Tundra Swan			√	
Exploration	June	533701	6989042	Tundra Swan			√	

Table B7-2: Loon and Swan Nest Survey Data – 1999

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	1999	538700	6987892	Pacific Loon			√	
Exploration	1999	539850	6987692	Pacific Loon			√	
Exploration	1999	541000	6987242	Pacific Loon			√	
Exploration	1999	540250	6986242	Pacific Loon			√	
Exploration	1999	541350	6985492	Pacific Loon				√
Exploration	1999	542200	6986242	Pacific Loon			√	
Exploration	1999	543200	6985092	Pacific Loon			√	
Exploration	1999	537201	6988792	Pacific Loon				√
Exploration	1999	538200	6987542	Pacific Loon				√
Exploration	1999	538750	6987292	Pacific Loon				√
Exploration	1999	536351	6988642	Pacific Loon				√
Exploration	1999	535051	6989292	Pacific Loon				√
Exploration	1999	533601	6989092	Pacific Loon			√	
Exploration	1999	533951	6989392	Pacific Loon			√	
Exploration	1999	543200	6986092	Pacific Loon			√	
Exploration	1999	541200	6988042	Pacific Loon			√	
Exploration	June	536901	6988992	Pacific Loon	1			
Exploration	June	541550	6985992	Pacific Loon	1			
Exploration	June	542800	6985942	Pacific Loon	1			
Exploration	June	541550	6987542	Pacific Loon	1			
Exploration	June	536701	6989392	Pacific Loon	2			
Exploration	June	536301	6988842	Pacific Loon	2			
Exploration	June	533551	6989042	Pacific Loon	2			
Exploration	June	534851	6989142	Pacific Loon	2			
Exploration	June	535051	6989341	Pacific Loon	2			
Exploration	June	538400	6987992	Pacific Loon	2			
Exploration	June	537501	6991741	Pacific Loon	2			
Exploration	June	538200	6987192	Pacific Loon	2			
Exploration	June	538401	6987242	Pacific Loon	2			
Exploration	June	538600	6987042	Pacific Loon	2			

Table B7-2: Loon and Swan Nest Survey Data – 1999 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	June	540850	6987242	Pacific Loon	2			
Exploration	June	541100	6987242	Pacific Loon	2			
Exploration	June	542200	6986142	Pacific Loon	2			
Exploration	June	543450	6985842	Pacific Loon	2			
Exploration	June	543250	6984992	Pacific Loon	2			
Exploration	June	534301	6988792	Pacific Loon	2			
Exploration	June	539900	6987642	Pacific Loon	2			
Exploration	June	543300	6985192	Pacific Loon	2			
Exploration	June	536351	6988542	Tundra Swan	1			
Exploration	June	536351	6988342	Tundra Swan	1			
Exploration	June	537251	6987292	Tundra Swan	1			
Exploration	June	537451	6987242	Tundra Swan	1			
Exploration	June	535001	6988292	Tundra Swan	1			
Exploration	June	534801	6988991	Tundra Swan	1			
Exploration	June	535001	6988941	Tundra Swan	1			
Exploration	June	533401	6989242	Tundra Swan	1			
Exploration	June	533601	6989241	Tundra Swan	1			
Exploration	June	543000	6985992	Tundra Swan	1			
Exploration	June	542750	6985692	Tundra Swan	1			
Exploration	June	543700	6984592	Tundra Swan	1			
Exploration	June	544350	6985342	Tundra Swan	1			
Exploration	June	543300	6986942	Tundra Swan	1			
Exploration	June	533551	6988892	Tundra Swan	2			
Exploration	June	538600	6985642	Tundra Swan	2			
Exploration	June	544150	6985242	Tundra Swan	2			
Exploration	June	543700	6985942	Tundra Swan	2			
Control	June	538500	6980942	Pacific Loon	1			
Control	June	537201	6980342	Pacific Loon	1			
Control	June	535301	6984242	Pacific Loon	2			
Control	June	534001	6985642	Pacific Loon	2			
Control	June	532051	6986142	Pacific Loon	2			
Control	June	531801	6986092	Pacific Loon	2			
Control	June	531701	6984642	Pacific Loon	2			
Control	June	537501	6981742	Pacific Loon	2			
Control	June	539600	6982892	Pacific Loon	2			
Control	June	533801	6982742	Pacific Loon	2			
Control	June	534601	6981742	Pacific Loon	2			
Control	June	540450	6977742	Tundra Swan	2			
Exploration	July	539900	6989941	Pacific Loon	1			

Table B7-2: Loon and Swan Nest Survey Data – 1999 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	July	537200	6988692	Pacific Loon	1			
Exploration	July	536651	6988642	Pacific Loon	1			
Exploration	July	536401	6988542	Pacific Loon	1			
Exploration	July	534751	6989942	Pacific Loon	1			
Exploration	July	539350	6987792	Pacific Loon	1			
Exploration	July	541450	6987792	Pacific Loon	1			
Exploration	July	540300	6986242	Pacific Loon	1			
Exploration	July	544300	6985442	Pacific Loon	1			
Exploration	July	533851	6988942	Pacific Loon	2			
Exploration	July	534251	6989392	Pacific Loon	2			
Exploration	July	540900	6989491	Pacific Loon	2			
Exploration	July	538050	6987392	Pacific Loon	2			
Exploration	July	538800	6987292	Pacific Loon	2			
Exploration	July	541200	6985542	Pacific Loon	2			
Exploration	July	532751	6990942	Tundra Swan	1			
Exploration	July	541200	6987842	Tundra Swan	1			
Exploration	July	539900	6987342	Tundra Swan	1			
Exploration	July	540200	6986942	Tundra Swan	1			
Exploration	July	541150	6985542	Tundra Swan	1			
Exploration	July	544500	6985192	Tundra Swan	1			
Exploration	July	545300	6984292	Tundra Swan	1			
Exploration	July	544200	6985592	Tundra Swan	1			
Exploration	July	543900	6986142	Tundra Swan	1			
Exploration	July	544000	6986642	Tundra Swan	1			
Exploration	July	542750	6987092	Tundra Swan	1			
Exploration	July	542700	6987492	Tundra Swan	1			
Exploration	July	538050	6988742	Tundra Swan	2			
Exploration	July	536701	6988842	Tundra Swan	2			
Exploration	July	536351	6989341	Tundra Swan	2			
Exploration	July	534851	6989442	Tundra Swan	2			
Exploration	July	534251	6989392	Tundra Swan	2			
Exploration	July	533601	6989442	Tundra Swan	2			
Exploration	July	532801	6989791	Tundra Swan	2			
Exploration	July	535101	6991741	Tundra Swan	2			
Exploration	July	541550	6987342	Tundra Swan	2			
Exploration	July	540250	6987642	Tundra Swan	2			
Exploration	July	540700	6986942	Tundra Swan	2			
Exploration	July	539300	6985942	Tundra Swan	2			
Exploration	July	539500	6985742	Tundra Swan	2			

Table B7-2: Loon and Swan Nest Survey Data – 1999 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	July	540500	6985442	Tundra Swan	2			
Exploration	July	541800	6985992	Tundra Swan	2			
Exploration	July	542650	6985842	Tundra Swan	2			
Exploration	July	542850	6985892	Tundra Swan	2			
Exploration	July	541800	6985142	Tundra Swan	2			
Exploration	July	543800	6984892	Tundra Swan	2			
Exploration	July	544300	6984942	Tundra Swan	2			
Exploration	July	544550	6984742	Tundra Swan	2			
Exploration	July	544100	6985742	Tundra Swan	2			
Exploration	July	541500	6985242	Tundra Swan	3			
Exploration	July	540200	6985842	Tundra Swan	7			
Exploration	July	540500	6984942	Tundra Swan	7			
Control	July	531601	6983992	Pacific Loon	1			
Control	July	538501	6981142	Pacific Loon	1			
Control	July	535801	6980642	Pacific Loon	1			
Control	July	537651	6979992	Pacific Loon	1			
Control	July	538600	6979342	Pacific Loon	1			
Control	July	537901	6982842	Pacific Loon	2			
Control	July	539400	6980392	Pacific Loon	2			
Control	July	540600	6977742	Pacific Loon	2			
Control	July	530801	6984942	Tundra Swan	1			
Control	July	538600	6983192	Tundra Swan	2			
Control	July	538900	6982992	Tundra Swan	2			
Control	July	539600	6982542	Tundra Swan	2			
Control	July	540100	6983242	Tundra Swan	2			
Control	July	537251	6980342	Tundra Swan	2			
Control	July	535201	6985042	Tundra Swan	2			
Control	July	532601	6985542	Tundra Swan	2			
Control	July	531601	6985442	Tundra Swan	2			
Exploration	June	542900	6985742	Tundra Swan			√	
Exploration	June	544300	6985492	Tundra Swan			√	
Exploration	June	533701	6989042	Tundra Swan			√	
Exploration	June	535051	6989341	Tundra Swan				√
Exploration	June	536301	6988542	Tundra Swan				√

Table B7-3: Loon and Swan Nest Survey Data – 2000

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	July	537601	6987542	Pacific Loon	1			
Exploration	July	538201	6987492	Pacific Loon	1			
Exploration	July	538000	6987192	Pacific Loon	1			
Exploration	July	540300	6986342	Pacific Loon	1			
Exploration	July	542200	6988542	Pacific Loon	1			
Exploration	July	542200	6986742	Pacific Loon	1			
Exploration	July	541400	6985242	Pacific Loon	1			
Exploration	July	544100	6986042	Pacific Loon	1			
Exploration	July	543500	6986242	Pacific Loon	1			
Exploration	July	541600	6985742	Pacific Loon	1			
Exploration	July	541650	6986442	Pacific Loon	1			
Exploration	July	538500	6988292	Pacific Loon	2			
Exploration	July	536201	6988591	Pacific Loon	2			
Exploration	July	534701	6990041	Pacific Loon	2			
Exploration	July	542000	6988542	Pacific Loon	2			
Exploration	July	542400	6986642	Pacific Loon	2			
Exploration	July	543100	6986942	Pacific Loon	3			
Exploration	July	538201	6987242	Pacific Loon				√
Exploration	July	541700	6985792	Pacific Loon				√
Exploration	July	542400	6986142	Pacific Loon				√
Exploration	July	541550	6985142	Pacific Loon				√
Exploration	July	544350	6985292	Pacific Loon				√
Exploration	July	537251	6987142	Tundra Swan	1			
Exploration	July	534001	6989141	Tundra Swan	1			
Exploration	July	533801	6989291	Tundra Swan	1			
Exploration	July	538750	6985792	Tundra Swan	2			
Exploration	July	539450	6986792	Tundra Swan	2			
Exploration	July	543350	6985742	Tundra Swan	2			
Exploration	July	542050	6988442	Tundra Swan	2			
Exploration	July	542250	6987492	Tundra Swan	2			
Exploration	July	538750	6988092	Tundra Swan	2			
Exploration	July	542450	6985792	Tundra Swan	2			
Exploration	July	542600	6985892	Tundra Swan	2			
Exploration	July	535351	6989341	Tundra Swan	2			
Exploration	July	534701	6989291	Tundra Swan	2			
Exploration	July	534101	6988842	Tundra Swan	2			
Exploration	July	534001	6989042	Tundra Swan	2			
Exploration	July	533601	6989442	Tundra Swan	2			
Exploration	July	533351	6989591	Tundra Swan	2			

Table B7-3: Loon and Swan Nest Survey Data – 2000 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	July	544000	6984942	Tundra Swan	2			
Exploration	July	544400	6984492	Tundra Swan	2			
Exploration	July	544900	6984492	Tundra Swan	2			
Exploration	July	544150	6985042	Tundra Swan	3			
Exploration	July	542250	6988192	Tundra Swan	4			
Exploration	July	542350	6988442	Tundra Swan	7			
Exploration	July	535051	6989242	Tundra Swan				√
Exploration	July	536751	6988642	Tundra Swan				√
Exploration	July	544300	6985142	Tundra Swan				√
Control	July	535301	6985092	Pacific Loon	1			
Control	July	532951	6985542	Pacific Loon	1			
Control	July	539650	6982192	Pacific Loon	1			
Control	July	540450	6981492	Pacific Loon	1			
Control	July	538300	6981342	Pacific Loon	1			
Control	July	538651	6980492	Pacific Loon	1			
Control	July	539950	6980392	Pacific Loon	1			
Control	July	540300	6980192	Pacific Loon	1			
Control	July	540450	6978842	Pacific Loon	1			
Control	July	540750	6978192	Pacific Loon	1			
Control	July	538551	6978892	Pacific Loon	1			
Control	July	534451	6981342	Pacific Loon	1			
Control	July	532101	6984942	Pacific Loon	2			
Control	July	530651	6984792	Pacific Loon	2			
Control	July	537850	6982192	Pacific Loon	2			
Control	July	540400	6979742	Pacific Loon	2			
Control	July	540200	6978042	Pacific Loon	2			
Control	July	537501	6980142	Pacific Loon	2			
Control	July	535951	6980442	Pacific Loon	3			
Control	July	540150	6978092	Pacific Loon				√
Control	July	530601	6984892	Pacific Loon				√
Control	July	533101	6985392	Pacific Loon				√
Control	July	535301	6985142	Pacific Loon				√
Control	July	537651	6981992	Pacific Loon				√
Control	July	534551	6981592	Pacific Loon				√
Control	July	539050	6980642	Pacific Loon				√
Control	July	539450	6980592	Pacific Loon				√
Control	July	539450	6982142	Pacific Loon				√
Control	July	540450	6981692	Pacific Loon				√
Control	July	540350	6978842	Pacific Loon				√

Table B7-3: Loon and Swan Nest Survey Data – 2000 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Control	July	535651	6981142	Tundra Swan	1			
Control	July	540400	6977692	Tundra Swan	2			
Control	July	537150	6980442	Tundra Swan	2			
Control	July	535951	6983442	Tundra Swan	2			
Control	July	535551	6984692	Tundra Swan	2			
Control	July	530401	6984792	Tundra Swan	2			
Control	July	532301	6986842	Tundra Swan	2			
Control	July	540400	6977992	Tundra Swan				√
Exploration	August	538000	6987442	Pacific Loon	1			
Exploration	August	534051	6991041	Pacific Loon	1			
Exploration	August	533801	6990741	Pacific Loon	1			
Exploration	August	540000	6986242	Pacific Loon	1			
Exploration	August	544150	6985842	Pacific Loon	1			
Exploration	August	541800	6985442	Pacific Loon	1			
Exploration	August	538201	6987242	Pacific Loon	2			
Exploration	August	536201	6989442	Pacific Loon	2			
Exploration	August	535501	6989642	Pacific Loon	2			
Exploration	August	534801	6989292	Pacific Loon	2			
Exploration	August	533501	6989142	Pacific Loon	2			
Exploration	August	533701	6989141	Pacific Loon	2			
Exploration	August	541700	6984992	Pacific Loon	2			
Exploration	August	541500	6985542	Pacific Loon	2			
Exploration	August	541500	6986242	Pacific Loon	2			
Exploration	August	541800	6986242	Pacific Loon	2			
Exploration	August	541700	6988992	Pacific Loon	3			
Exploration	August	539100	6986692	Pacific Loon	4			
Exploration	August	543350	6984842	Pacific Loon	4			
Exploration	August	538350	6986942	Pacific Loon		2		
Exploration	August	541850	6985592	Pacific Loon		1		
Exploration	August	542100	6986342	Pacific Loon		2		
Exploration	August	541800	6986792	Pacific Loon		2		
Exploration	August	542600	6985492	Pacific Loon		1		
Exploration	August	544150	6985542	Pacific Loon		1		
Exploration	August	534701	6990691	Pacific Loon		2		
Exploration	August	537750	6986292	Tundra Swan	1			
Exploration	August	536251	6989592	Tundra Swan	1			
Exploration	August	538600	6984892	Tundra Swan	2			
Exploration	August	539150	6986692	Tundra Swan	2			
Exploration	August	541600	6985692	Tundra Swan	2			

Table B7-3: Loon and Swan Nest Survey Data – 2000 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Exploration	August	542050	6985692	Tundra Swan	2			
Exploration	August	542400	6985942	Tundra Swan	2			
Exploration	August	536551	6988742	Tundra Swan	2			
Exploration	August	536800	6988492	Tundra Swan	2			
Exploration	August	536451	6989642	Tundra Swan	2			
Exploration	August	542550	6985992	Tundra Swan	2			
Exploration	August	534501	6989442	Tundra Swan	2			
Exploration	August	534301	6989442	Tundra Swan	2			
Exploration	August	533051	6989792	Tundra Swan	2			
Exploration	August	534801	6990841	Tundra Swan	2			
Exploration	August	543850	6984842	Tundra Swan	2			
Exploration	August	544550	6984742	Tundra Swan	2			
Exploration	August	544900	6984592	Tundra Swan	2			
Exploration	August	541550	6984892	Tundra Swan	3			
Exploration	August	536701	6989492	Tundra Swan	3			
Exploration	August	536551	6988542	Tundra Swan		2		
Exploration	August	537001	6988492	Tundra Swan		3		
Exploration	August	536301	6989491	Tundra Swan		3		
Exploration	August	544550	6985092	Tundra Swan		3		
Exploration	August	544350	6984742	Tundra Swan		3		
Exploration	August	543950	6984642	Tundra Swan		3		
Control	August	534151	6985142	Pacific Loon	1			
Control	August	539650	6980692	Pacific Loon	1			
Control	August	535101	6985142	Pacific Loon	2			
Control	August	537501	6981792	Pacific Loon	2			
Control	August	537750	6981692	Pacific Loon	2			
Control	August	538900	6980492	Pacific Loon	2			
Control	August	540100	6979942	Pacific Loon	2			
Control	August	540150	6979142	Pacific Loon	2			
Control	August	540200	6977792	Pacific Loon	2			
Control	August	540500	6977742	Pacific Loon	2			
Control	August	529901	6984792	Pacific Loon	3			
Control	August	531801	6985942	Pacific Loon	6			
Control	August	537501	6981742	Pacific Loon		1		
Control	August	538750	6980542	Pacific Loon		1		
Control	August	539700	6980592	Pacific Loon		1		
Control	August	540450	6978092	Pacific Loon		1		
Control	August	537401	6980192	Tundra Swan	2			
Control	August	535151	6985192	Tundra Swan	2			

Table B7-3: Loon and Swan Nest Survey Data – 2000 (continued)

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest Lake	Nest Location
		Easting	Northing					
Control	August	539550	6982892	Tundra Swan	2			
Control	August	529301	6984792	Tundra Swan	2			
Control	August	529751	6984542	Tundra Swan	2			
Control	August	530051	6984792	Tundra Swan	2			
Control	August	530751	6984642	Tundra Swan	2			
Control	August	535401	6984842	Tundra Swan		3		
Control	August	540550	6977742	Tundra Swan		3		

Table B7-4: Loon and Swan Nest Survey Data – 2009

Area	Date	UTM Zone 15 NAD 83		Species	Number of Adults	Number of Young	Nest?
		Easting	Northing				
Exploration	16-Jun-09	542339	6987422	Tundra Swan	1	0	√
Exploration	16-Jun-09	544581	6985754	Pacific Loon	2	0	
Exploration	16-Jun-09	543860	6986119	Tundra Swan	2	0	
Exploration	16-Jun-09	542695	6986069	Tundra Swan	2	0	√
Exploration	16-Jun-09	540261	6986275	Tundra Swan	1	0	√
Exploration	16-Jun-09	539585	6985381	Tundra Swan	2	0	
Exploration	16-Jun-09	538190	6987455	Pacific Loon	4	0	
Exploration	16-Jun-09	538140	6987233	Pacific Loon	2	0	
Exploration	16-Jun-09	536796	6987614	Pacific Loon	2	0	
Exploration	16-Jun-09	534963	6989312	Tundra Swan	1	0	√
Exploration	16-Jun-09	537433	6990060	Tundra Swan	4	0	
Exploration	31-Jul-09	540804	6986494	Tundra Swan	2	2	
Exploration	31-Jul-09	541841	6985858	Tundra Swan	2		
Exploration	31-Jul-09	542274	6985910	Pacific Loon	2	2	
Exploration	31-Jul-09	543016	6985469	Tundra Swan	2	2	
Exploration	31-Jul-09	543784	6985690	Tundra Swan	2		
Exploration	31-Jul-09	544124	6985015	Tundra Swan	2	4	
Exploration	31-Jul-09	544207	6984812	Pacific Loon	2		
Exploration	31-Jul-09	542875	6984607	Pacific Loon	1		
Exploration	31-Jul-09	541997	6984792	Pacific Loon	1		√
Exploration	31-Jul-09	540963	6984639	Pacific Loon	2	2	
Exploration	31-Jul-09	540065	6985783	Tundra Swan	1		
Exploration	31-Jul-09	539937	6985613	Tundra Swan	2		
Exploration	31-Jul-09	539476	6985147	Pacific Loon	1		
Exploration	31-Jul-09	537889	6988617	Tundra Swan	2		
Exploration	31-Jul-09	537773	6988671	Tundra Swan	2		
Exploration	31-Jul-09	538818	6987662	Pacific Loon	2		

Table B7-4 Loon and Swan Nest Survey Data – 2009 (continued)

Exploration	31-Jul-09	536726	6989103	Tundra Swan	2	2	
Exploration	31-Jul-09	534644	6989347	Tundra Swan	2	1	
Exploration	31-Jul-09	534259	6989272	Pacific Loon	2		
Exploration	31-Jul-09	533533	6989475	Tundra Swan	2	1	
Control	31-Jul-09	538475	6984807	Tundra Swan	2		
Control	31-Jul-09	537915	6983352	Pacific Loon	2		
Control	31-Jul-09	539432	6981847	Pacific Loon	1		
Control	31-Jul-09	539469	6981768	Tundra Swan	2		
Control	31-Jul-09	537073	6980340	Pacific Loon	1		
Control	31-Jul-09	537152	6980048	Tundra Swan	2		
Control	31-Jul-09	537395	6979875	Pacific Loon	1		
Control	31-Jul-09	535353	6984799	Pacific Loon	2	1	
Control	31-Jul-09	535043	6984594	Tundra Swan	2	3	
Control	31-Jul-09	530109	6984382	Common Loon	2		
Control	31-Jul-09	529305	6984583	Tundra Swan	2		
Control	31-Jul-09	537458	6987449	Tundra Swan	2		
Control	31-Jul-09	540782	6988164	Pacific Loon	2		
Control	31-Jul-09	537887	6985644	Tundra Swan	2	2	
Control	31-Jul-09	540313	6977946	Tundra Swan	2		
Control	31-Jul-09	540458	6977741	Tundra Swan	3		
Control	31-Jul-09	540282	6977964	Tundra Swan	2		
Control	31-Jul-09	540322	6977477	Pacific Loon	2		
Control	31-Jul-09	540360	6977902	Tundra Swan	2		
Control	31-Jul-09	540896	6978338	Red-throated Loon	2		
Control	31-Jul-09	540545	6978002	Tundra Swan	2		
Control	31-Jul-09	540333	6980164	Pacific Loon	1		√
Control	31-Jul-09	541164	6981008	Pacific Loon	2	1	
Control	31-Jul-09	537606	6982902	Tundra Swan	2		
Control	31-Jul-09	537099	6983055	Tundra Swan	4		
Control	31-Jul-09	537337	6982873	Pacific Loon	1		
Control	31-Jul-09	534327	6983473	Pacific Loon	2		
Control	31-Jul-09	534216	6983216	Pacific Loon	1		
Control	31-Jul-09	532476	6984672	Tundra Swan	2		
Control	31-Jul-09	533085	6983803	Tundra Swan	1		

Table B8-1: Incidental Species Observations - 1998

Date	Species/Track	Units/Sex	Sighting Location	Activity/Comments
22-Feb-98	Arctic fox	2/?	Camp	Examining sewage
16-Mar-98	Arctic fox	1/?	Camp	Scavenging, ran away
26-Mar-98	Arctic fox	1/?	Camp	Hiding over Boart sea container
24-Apr-98	Ptarmigan	6/?	Jet 'A' cache	Flew 20 yds and stayed nearby
24-Apr-98	Arctic hare	1/?	Diesel cache	Hopped around tanks
05-Mar-98	Arctic ground squirrel	1/?	Diesel cache	
06-May-98	Caribou	2/?	Between Tiriganiaq and Lake A8	Running away
06-May-98	Caribou	2/	Esker near camp	Grazing
07-May-98	Caribou	12/	Peter lake	Hunted by human man on machine
07-May-98	Geese	2	Diane River	Flying south
07-May-98	Arctic ground squirrel	2/m, 1/f	Meliadine outlet to bay	Staring at us
10-May-98	Wolf tracks?	1/?	Near tent rings	Long gone
16-May-98	Geese	3/?	Camp	Flying
19-May-98	Geese	2/?	NE end of Lake A8	Flying NE
19-May-98	Sandhill Cranes	2mf	Ridge west of Lake A54	Mating dance, walking
22-May-98	Swans	?	Islands across camp	Grazing
26-May-98	Sandhill Cranes	2	Wolf Lake outcrop (cairn)	Grazing
21-May-98	Caribou	3m	Walking on lake	
16-Jun-98	Caribou	1f	Between drill 3 & 2	Trotting
21-Jun-98	Arctic fox	1/?	Longyear yard	Frolicking
28-Jun-98	Arctic fox	1/?	696494/541108 Lake A8	Frocking
30-Jun-98	Caribou	3	0.6 km west of camp	Spooked by chopper
29-Jul-98	Arctic foxes	6/?	Family of pups at Boart gear	Running around
26-Aug-98	Snow Geese	46/?	Shore on Lake A8	Heading south

Table B8-2: Incidental Wildlife Observations – 1999

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
14-Dec-98	Polar bear	2	Meliadine Lake	Mother and cub, travelling north
17-Apr-99	Ptarmigan	9	Tz 1001	Flying
01-May-99	Arctic hare	5	Behind 16 man sleeper	Not much
02-May-99	Arctic fox	1	Near drill #2 Tiriganiaq	Winter white colour, near drill

Table B8-2: Incidental Wildlife Observations – 1999 (continued)

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
02-May-99	Arctic hare	1	5 m from office door, in camp	Running through camp, white with blk-tipped ears
04-May-99	Ptarmigan	20-30	Out at drills, Tiriganiaq	Flying north at dusk
04-May-99	Arctic hare	1	On winter road, near diesel tanks	Using rock as wind break
09-May-99	Arctic ground squirrel	2	Hill beyond diesel cache	Mating
09-May-99	Ptarmigan	~20	Near survey point TZ1001	Flying SE, 3 shot by local hunter
09-May-99	Arctic fox	1	In camp near kitchen	Roaming about, looking for food
11-May-99	Sandhill Crane	1	Over Boart yard	Flying southwest
11-May-99	Arctic ground squirrel	3	Near drill#3, TZ1001	At entrance to freshly dug out snow tunnels, blood and feces near entrance
12-May-99	Tundra Swan	1	Newy lake	Flying west
12-May-99	Ptarmigan	10	Out at drills	On ground, took to wing
12-May-99	Snow Geese	15-20	Over drills	Flying north
12-May-99	Arctic ground squirrel	5	Around drill sites	Emerging from fresh tunnels
13-May-99	Snow Geese	~25		Flock, flying southwest
14-May-99	Arctic ground squirrel	1	NW of camp, Meliadine Lake	Running
14-May-99	Arctic ground squirrel	1	100 m E of rec tent	Running towards kitchen
15-May-99	Sandhill Crane	2	Flying over camp	Flying north
15-May-99	Ptarmigan	5-10	Near drills, over winter road	Flying
15-May-99	Snow Buntings	20-30	Around camp	Flying
16-May-99	Arctic ground squirrel	2	200 m SE of Lake A54	Running north
16-May-99	Ptarmigan	4	300 m E of Lake A54	Flying north
16-May-99	Sandhill Crane	2	200 m E of Lake A54	Flying north
16-May-99	Arctic ground squirrel	2	800 m E of Lake A8	Running north
17-May-99	Sandhill Crane	6	Flew over camp	Flying north
17-May-99	Sandhill Crane	20	Over camp	Flying, 5 groups of 3-5 birds, calling

Table B8-2: Incidental Wildlife Observations – 1999 (continued)

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
18-May-99	Arctic ground squirrel	2	500 m NE of drill#1	Running, slowly
19-May-99	Arctic hare	1	Near cabins, 4-5 km southeast of camp	Running from under cabin to esker hill top
22-May-99	Arctic fox	1	Camp, near kitchen	0200 hours, wandering around looking for food
26-May-99	Arctic ground squirrel	1	Near diesel tanks	Looking
26-May-99	Sandhill Crane	1	Over camp	Flying west
31-May-99	Ptarmigan	2	Between office and rec tent	On ice patch, courting male and female
04-Jun-99	Pintail Duck	2	West of camp	
10-Jun-99	Arctic ground squirrel	6	Near TZ1001 survey station	1 female and 5 pups, carrying newborns between holes
12-Jun-99	Sandpiper	3-5	In camp	Picking in exposed mud holes
15-Jun-99	Sandpiper	1	Just north of camp, on peninsula	On nest with 4 eggs, she tried to distract me away
19-Jun-99	Arctic fox	1	At drill#3	Walking around drill site
22-Jun-99	Pintail/oldsquaw? Ducks	4	Off-shore, west of camp	Flying and swimming in the open water
25-Jun-99	Golden Plover	1	Near collar location M99-391, N of TZ1001 by 300 m	On nest with 4 eggs, bird distracting me, eggs were mottled green/brown in colour
25-Jun-99	Pintail/oldsquaw? Ducks	3	On lake SE of outcrop	Swimming along shore, feeding
27-Jun-99	Tundra Swan	3	On lake SE of outcrop	Swimming
27-Jun-99	Arctic fox	1	In camp	Walking down boardwalk, near 16 man sleeper
28-Jun-99	Caribou	8	1-2 km north of camp	Heading east
28-Jun-99	Caribou	4	West of camp at DD#3	Heading north
09-Jul-99	Caribou	2	3 km east of Meliadine Lake	Walking east
16-Jul-99	Caribou	5000-6000	Around Parallel Lake	Walking in herds, seem to be herding northeast
18-Jul-99	Tundra Swan	2	On lake SE of outcrop	1 on water, 1 making repeated flying passes over lake, flapping wings-bird on water
18-Jul-99	Sandhill Crane	2	On ridge, near eastern end of lake, at SM005 control point	Seen from 200 m, calling

Table B8-2: Incidental Wildlife Observations – 1999 (continued)

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
19-Jul-99	Sandhill Crane	4	Western edge of lake, near control STA1005, W	2 adults and 2 chicks
21-Jul-99	Peregrine Falcon	1	On top of radio tower, in camp	Sitting, looking around…hunting??
22-Jul-99	Peregrine Falcon	1	In camp	Perched on antenna tower, near ATCO trailer, stayed perched or a long time, has been seen for a few days
23-Jul-99	Peregrine Falcon	1	In camp	Perched on antenna tower, near ATCO trailers, seen in the morning and evening…calling loudly
23-Jul-99	Caribou	1	Near narrows, NW end of Parallel Lake, near archeological site	Lone caribou, waking
24-Jul-99	Pintail/oldsquaw? Ducks	6	On small lake, W of TZ1001 survey point	2nd lake of 3, swimming and diving on my approach, female and 5 ducklings

Table B8-3: Incidental Wildlife Observations – 2000

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
12-Mar-00	Caribou	4	NE of camp on islands-800m	Grazing
20-Mar-00	Caribou	9	N of camp, across from water pump-300m	Grazing
21-24-Mar-00	Caribou	10 to 20	NE of camp, across lake	Grazing on top of eskers
27-Mar-00	Caribou	20 to 30	1 km south of camp	Grazing
31-Mar-00	Caribou	200 to 300?	Islands and shoreline down Meliadine Lake	Grazing
18-May-00	Snow Goose	6?	Flying NE over camp	
18-May-00	Sandhill Crane	2?	Flying NE over camp	
18-May-00	Arctic ground squirrel	1	At Jet B barrels	First of the year, looking around, yawning
28-May-00	Goose	14?	Flying south-north	Going to summer grounds
05-Jun-00	Sandhill Crane	2?	Bay behind camp	Flying/grazing
10-Jun-00	Tundra Swan	2	F zone	Picking out nest site
10-Jun-00	Rough-legged Hawk	1	1.5 miles W of camp	Hunting
11-Jun-00	Canada Goose	40	Flew over camp heading north	Transitting

Table B8-3: Incidental Wildlife Observations – 2000 (continued)

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
11-Jun-00	Snow Goose	10	Flew over camp heading north	Transitting
15-Jun-00	Arctic fox	1?	5 km SW of camp	Zigzagging along shoreline
15-Jun-00	Raptors/hawks?	2?	1 km W of camp	Flying, diving, soaring, 1 perched
15-Jun-00	Canada Goose	20?	3 km SW of camp	Pitched, then to wing, heading NW
15-Jun-00	Pintail/oldsquaw?	2	In bay west of camp	Male/female, on ice at waters edge
15-Jun-00	Ducks?	4	In pond at W end of bay, W of camp	2 mated pairs, swimming together
15-Jun-00	Arctic ground squirrel	1?	In camp, near core racks	Running around near racks
16-Jun-00	Pintail/oldsquaw?	3	In bay W of camp	Territorial dispute
16-Jun-00	Loons	2	In “grayling” pond W of camp	Swimming in pond
16-Jun-00	Canada Goose	7	W of camp, near W end of bay	Flying, pitched
19-Jun-00	Tundra Swan	5?	West bay, near tent rings	Flying north in formation
19-Jun-00	Oldsquaw	2?	West bay, in open water	Swimming, mated pair
19-Jun-00	Merganser	2	West bay	Flying nw toward tent rings
19-Jun-00	Canada Goose	20?	Over esker to W of camp	Flying in formation, westerly direction
20-Jun-00	Tundra Swan	2	Couple of km E of Meliadine headwaters	Mated pair, one on shore, one wading in water
20-Jun-00	Canada Goose	20?	Near headwaters of Meliadine Lake	Flying in formation, heading NW
25-Jun-00	Pintail/oldsquaw?	2	Near water pump at camp	Pair, swimming around, calling
25-Jun-00	Pintail/oldsquaw?	2	On west bay, near west end	Pair, swimming around in open water, flew away at our approach
25-Jun-00	Arctic ground squirrel	1?	In camp on pathway	Sitting, looking around, ran off
28-Jun-00	Snow Goose	100s	Flying south to north	Migration
30-Jun-00	Arctic ground squirrel	1	Camp/office area	Carrying a lemming in its mouth
01-Jul-00	Goose	?	5 km south of camp	At least 20 flocks through the day
07-Jul-00	Tundra Swan	3	1 km S of camp on Meliadine Lake	Flying, swimming along edge of ice

Table B8-3: Incidental Wildlife Observations – 2000 (continued)

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
07-Jul-00	Oldsquaw	2	West of camp, west end of bay	Pair, swimming at lake edge
07-Jul-00	Oldsquaw	2	At shoreline west of camp	Pair, swimming and flying near lake edge
08-Jul-00	Arctic ground squirrel	2	In camp, on walkways	Chasing each other
08-Jul-00	Polar bear	1	10 km east of Discovery Camp	Called in by Comaplex geologist
08-Jul-00	Tundra Swan	1	4 km east of Peter Lake camp	Swimming
08-Jul-00	Sandhill Crane	4	4 km west of Meliadine River	1 running, 3 flying
09-Jul-00	Canada Goose	2	Outlet, 400 m S of camp	Mated pair, flying SE, calling
09-Jul-00	Loon	2	Flying over camp	Flying nw of camp
09-Jul-00	Oldsquaw	4	Just west of camp, on west bay	Swimming in a line, headed north
09-Jul-00	Tundra Swan	2	Behind drill yard on small pond	Swimming
09-Jul-00	Loon	2	Behind drill yard on small pond	Mated pair, swimming, flapping wings
09-Jul-00	Oldsquaw	5	Behind drill yard on small pond	On shore, then swam up and flew east
09-Jul-00	Tundra Swan	1	NAD83; 6989000n 533000e	Sitting on nest, southeast of exploration area
11-Jul-00	Tundra Swan	5	On pond behind drill yard	Swimming
15-Jul-00	Caribou	3	East peninsula, Meliadine Lake	Grazing
15-Jul-00	Tundra Swan	3	Pond, south of drill yard	Wading, swimming in lake
15-Jul-00	Loon	2	Bay east of camp	Swimming, calling
14-Aug-00	Sandhill Crane	2	529500e 6991300n	Walking on island
21-Aug-00	Arctic fox	1	534070e 6989940n	Near drill #1, a den at this location with pups
21-Aug-00	Canada Goose	6	537600e 698900n	Swimming
21-Aug-00	Arctic fox	1	In camp, behind Wing A	Running

Table B8-3: Incidental Wildlife Observations – 2000 (continued)

Date/Time	Species/Track	Number	Sightings Location	Sex/Age/Activity/Comments
22-Aug-00	Raptor (owl?)	1	539130e 6988500n	Sitting on ground, then flew away, white with brown patches (snow owl – mj)
31-Aug-00	Loon	2	Pond behind drill yard	White/grey stripe on back of neck (likely a pair of pacific loons – mj)
01-Sep-00	Loon	2	Pond behind drill yard	White/grey stripe on back of neck (likely a pair of pacific loons – mj)
02-Sep-00	Loon	2	Pond behind drill yard	White/grey stripe on back of neck (likely a pair of pacific loons – mj)
02-Sep-00	Arctic fox	1	Drill #1 (538945E 6988630N)	Grey, no white yet
29 Aug – 03-Sep-00	Canada Goose	100s	Rankin Inlet to Peter Lake	Flying south in flocks
03-Sep-00	Caribou	4	Aurora 517000 5992500	Munchin' on some tundra
08-Sep-00	Weasel	1	In camp, B Wing, N exit	Still brown, had lemming in mouth
22-Sep-00	Snowy Owl	1	Near drill #1, CP5	Flying north, white mottled back
22-Sep-00	Arctic fox	1	Near drill #1, CP5	Looking for food scraps
19-Sep-00	Ptarmigan	1	In camp, beside 16 man sleeper	Sitting
19-Sep-00	Weasel	1	All over camp	Inside and outside of buildings
22-Sep-00	Weasel	1	All over camp	Inside and outside of buildings
28-Sep-00	Peregrine Falcon	2	F Zone outcrop	Flying, soaring
15-30-Sep-00	Arctic fox	2 or 3	Around camp all the time	Foraging
9-23-Aug-00	Weasel	1	All over camp	Foraging
1-20-Oct-00	Arctic fox	2 or 3	Around camp all the time	Foraging, this year's pups

Table B8-4: Incidental Wildlife Observations – 2008

Species	Number	Date	UTM Zone 15 NAD 83	
			Easting	Northing
Muskox	1	30-Jul-08	505113	6969736
Wolf	1	14-Jun-08	530932	6995455
Wolf	1	12-Jun-08	551419	7018410
Wolf	1	12-Jun-08	551419	7018410

Table B8-4: Incidental Wildlife Observations – 2008 (continued)

Species	Number	Date	UTM Zone 15 NAD 83	
			Easting	Northing
Arctic Fox	1	13-Jun-08	539371	6985940
Arctic Fox	1	13-Jun-08	542983	6986231
Arctic Fox	1	14-Jun-08	543761	6985791
Arctic Fox	1	22-Jul-08	568938	6978123
Arctic Hare	1	13-Jun-08	541751	6988742
Arctic Hare	1	16-Jun-08	563771	7006873
Arctic Hare	1	16-Jun-08	567560	7006850
Caribou	11	13-Jun-08	535601	7042441
Caribou	4	13-Jun-08	560201	7038041
Caribou	9	13-Jun-08	566200	6944043
Caribou	3	16-Jun-08	563990	7000566
Caribou	~2000	21-Jul-08	503015	6986822
Caribou	1	22-Jul-08	548672	6990581
Caribou	1	23-Jul-08	519229	6975146
Caribou	1	23-Jul-08	512613	6975376
Caribou	1	23-Jul-08	522971	6982695

Table B8-5: Incidental Wildlife Observations - 2009

Species	Number	Date	UTM Zone 15 NAD 83	
			Easting	Northing
Arctic Fox	1	13-Jun-09	541184	6989580
Arctic Hare	1	13-Jun-09	541128	6989665
Arctic Fox	1	15-Jun-09	543658	6986051
Arctic Hare	1	16-Jun-09	538541	6991227
Arctic Fox	1	16-Jun-09	539824	6987389
Arctic Fox	1	13-Jun-09	534680	6985857
Caribou	1	30-Jul-09	506616	7013822
Muskox	26	30-Jul-09	516049	7000545
Caribou	3	30-Jul-09	512479	6975322
Caribou	5	30-Jul-09	513303	6973190

Table B9-1: List of Bird Species Observed within the Study Area

Complete Species List	*Scientific Name*	Waterfowl Survey	Upland Breeding Bird Survey/PRISM Survey	Raptor Survey	Incidentals
Pacific Loon	*Gavia pacifica*	√			
Common Loon	*Gavia immer*	√			
Red-throated Loon	*Gavia stellata*	√			
Tundra Swan	*Cygnus columbianus*	√			
Lesser Snow Goose	*Chen caerulescens*	√			
Canada Goose	*Branta canadensis*	√			
American Wigeon	*Anas americana*				√
Northern Pintail	*Anas acuta*	√			
Northern Shoveler	*Anas clypeata*				√
Scaup species	*Aythya marila / affinis*	√			
Common Eider	*Somateria mollissima*				√
King Eider	*Somateria spectabilis*				√
Long-tailed Duck	*Clangula hyemalis*	√			
Red-breasted Merganser	*Mergus serrator*	√			
Rough-legged Hawk	*Buteo lagopus*			√	
Peregrine Falcon	*Falco peregrinus*			√	
Gyrfalcon	*Falco rusticolus*				
Willow Ptarmigan	*Lagopus lagopus*				√
Sandhill Crane	*Grus canadensis*	√			
American Golden-Plover	*Pluvialis dominica*				√
Semipalmated Plover	*Charadrius semipalmatus*		√		
Dunlin	*Calidris alpina*		√		
Semipalmated Sandpiper	*Calidris pusilla*				√
Least Sandpiper	*Calidris minutilla*				√
Herring Gull	*Larus argentatus*	√			
Long-tailed Jaeger	*Stercorarius longicaudus*				
Short-eared Owl	*Asio flammeus*	√			
Snowy Owl	*Bubo scandiacus*				√[a]
Common Raven	*Corvus corax*				√
Horned Lark	*Eremophila alpestris*		√		
American Pipit	*Anthus rubescens rubescens*		√		
White-crowned Sparrow	*Zonotrichia leucophrys*		√		
Savannah Sparrow	*Passerculus sandwichensis*		√		
Lapland Longspur	*Calcarius lapponicus*		√		
Snow Bunting	*Plectrophenax nivalis*		√		
Common Redpoll	*Carduelis flammea*		√		
American Tree Sparrow	*Spizella arborea*				√

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