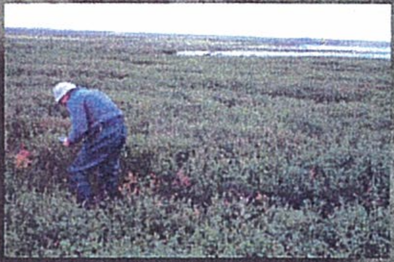
STARFIELD RESOURCES INC.

2001 WILDLIFE BASELINE STUDIES

FERGUSON LAKE, NUNAVUT






April, 2002

Submitted to:
Starfield Resources Inc.
Vancouver, BC

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Prepared b
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Yellowknife, N

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2001 WILDLIFE BASELINE STUDIES
FERGUSON LAKE, NUNAVUT

Prepared by:

EBA ENGINEERING CONSULTANTS LTD.
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Submitted To:

STARFIELD RESOURCES INC.
Vancouver, B.C.

0701-01-14863

April, 2002

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EXECUTIVE SUMMARY

During the summer of 2001 Starfield Resources Inc. (SRI) initiated baseline wildlife studies in the Ferguson Lake area, Nunavut (NU). The overall objective of the study program was to select and survey Valued Ecosystem Components (VECs) for the SRI exploration program in preparation for ongoing environmental management and future environmental assessment, should the program advance to the development stage. This report present the results of the initial wildlife and inventory studies completed during the summer of 2001.

Between 30 June and 02 July 2001 and 16 and 20 August 2001, two field trips were carried out to survey caribou, muskoxen and raptors and to conduct a vegetation assessment. Incidental wildlife observations were also documented. This report presents the survey methodology used and the results observed on the wildlife and habitat assessments.

The following is a brief summary of highlights of the 2001 baseline wildlife study program in the Ferguson Lake area of Nunavut.

Wildlife Species

A total of 39 different wildlife species were documented as occurring across the Ferguson Lake wildlife study area during the 2001 field program. This included 7 mammal species and 32 bird species. Caribou densities were estimated at 37,950 (± 21,600) on 01 July and 107 (± 18) on 17 August. More caribou were observed this year in the wildlife study area than in previous years. Muskoxen densities were estimated at 173 (± 65) in July and 22 (± 6) in August.

Peregrine Falcons and Rough-legged Hawks were the only raptor species documented as nesting on site. Six active Peregrine Falcon and two active Rough-legged Hawk sites were documented in the study area. There were 18 pairs of Sandhill Cranes documented across the study area. The five most frequently observed species included caribou, Canada Geese, Greater White-fronted Geese, muskoxen and Sandhill Cranes.

Habitat Assessment

During 2001, habitat assessment was initiated on a 1,600 km^2 study area surrounding Ferguson Lake. A total of 60 site assessments were conducted representing 12 different ecosystem units: *Betula – Ledum, Saxifraga – Silene, Betula – Empetrum, Betula – Rubus chamaemorus, Betula – Calamagrostis, Eriophorum vaginatum – Andromeda, Carex chordorhiza – E. russeolum, Salix – Rubus arcticus, Carex aquatilis – E. angustifolium, Arctophila – Ranunculus*, lichen – boulder field, and exposed bedrock.

Five hundred and forty three (543) plant observations were documented comprising of 138 plant species. These ecosystem units and plant species are typical of the barrenlands. No rare or endangered plant species were found during the 2001 field survey program.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Introduction

Starfield Resources Inc. (SRI) began an exploration program at the Ferguson Lake property in Nunavut in the spring of 1999. This site is part of an older mineral exploration site originally discovered and explored by International Nickel Company (INCO).

During 2001, in preparation for possible program advancement to the development phase, SRI retained EBA Engineering Consultants Ltd. (EBA) to initiate the collection of baseline wildlife, wildlife habitat and vegetation cover information in the immediate area of the company's Ferguson Lake exploration site.

The study program conducted in 2001 focused on terrestrial wildlife species and habitats considered to be important to communities (Rankin Inlet and Baker Lake), regulators and other stakeholders with an interest in the area. The species or species groups selected for study included those that were most likely to interact with current exploration activities or possible future development of a mine at this location.

Of particular interest were potential effects on the Qamanirjuaq Caribou Herd, with an estimated population in 1994 of approximately 496,000 animals, that pass through the region during their annual cycle (Beverly and Qamanirjuaq Caribou Management Board 2002). To address these concerns, baseline wildlife studies were initiated in 2001.

The wildlife studies focused on wildlife species and terrestrial areas understood to be important to stakeholders and government regulators, which have been previously identified in other environmental assessments (EAs) as Valued Ecosystem Components (VECs). These included current industrial developments in other parts of the north, *e.g.* Ekati Diamond Mine™, the Diavik Diamond Mine, the Kennady and Snap Lake projects, Lytton Minerals and activities related to the Tibbitt to Contwoyto winter road. The VECs selected for the study included caribou, muskoxen, carnivores, birds of prey (raptors) and wildlife habitats.

1.2 Objectives

The 2001 field program at Ferguson Lake, NU represented the first year of the SRI wildlife studies program. Consequently, a preliminary reconnaissance of the flora and fauna occurring in the region was required. The primary objectives of the 2001 field program included:

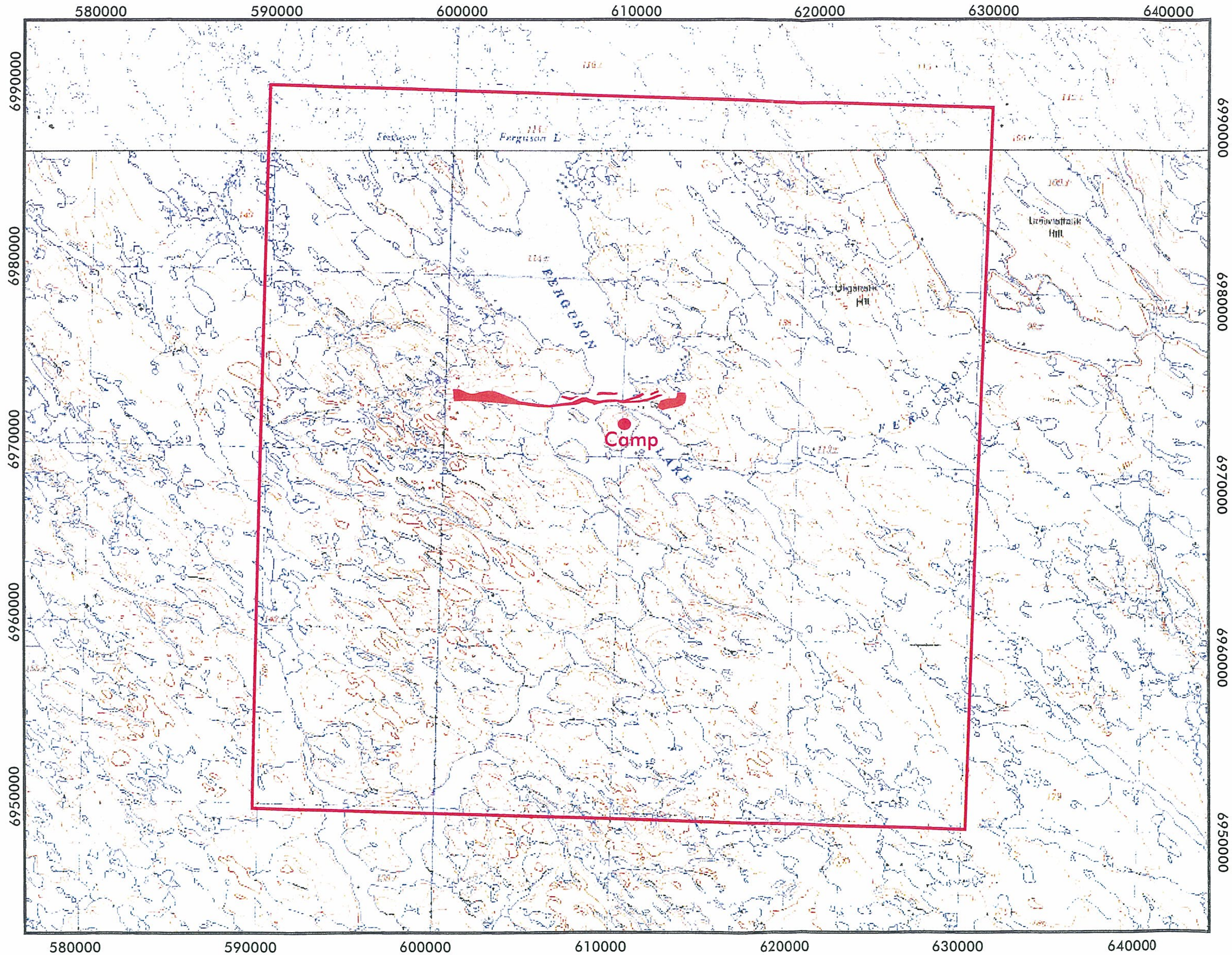
- The collection of baseline information on the wildlife resources and terrestrial ecosystems of the Ferguson Lake area.
- The completion of two aerial caribou surveys and one raptor survey;
- The completion of ecosystem classification for representative habitats types within the SRI study area; and
- The documentation of carnivore presence on an opportunistic basis.

1.3 Study Area

The SRI study area is located approximately 235 km southwest of Rankin Inlet, NU and measures approximately 40 km by 40 km, totaling 1,600 km^2. The wildlife study area is centered around the current camp and exploration area (Plate 1) (Figure 1), to capture the home range of species living within the potential zone of influence, while encompassing a region of sufficient size to adequately cover wildlife species with larger home ranges. These boundaries were used to define the study area for the baseline program.

Plate 1 Starfield Resources Exploration Camp at Ferguson Lake

Figure 1: 2001 Ferguson Lake Wildlife Study Area



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Projection: UTM, Zone 14
Company: EBA Engineering Consultants Ltd.
Project #: 01-14863

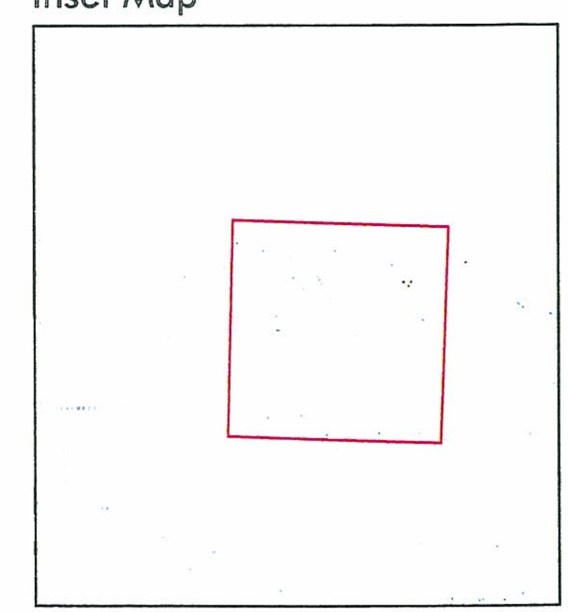
Legend

Interpreted UTEM Conductors (Project Exploration Area)

Camp Location

Study Area Boundary

Inset Map



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1.3.1 Climate

No weather station is maintained at the SRI exploration camp. However, Rankin Inlet, the nearest community, is located approximately 235 km to the northeast, of Ferguson Lake and records weather parameters at the airport.

The SRI wildlife study area straddles two ecoregions known as the Maguse River and Kazan River Uplands. The Maguse River Upland is a smaller unit of the Western Taiga Shield Ecozone, while the Kazan River Upland is a smaller unit of the Southern Arctic Ecozone. These smaller units are part of a larger ecological hierarchy as defined by the Canada Committee on Ecological Land Classification. Ecoregions comprise portions of ecozones and are characterized by distinctive regional ecological factors, including climate, physiography, vegetation, soil, water, fauna and land use (Ecological Stratification Working Group 1995).

The climate of the Maguse River Upland ecoregion is marginally more extreme than that of the Kazan River Upland ecoregion and hence, is highlighted here. In general, the Maguse River Upland ecoregion is classified as having a low arctic ecoclimate. Regional weather patterns are influenced by the open waters of Hudson Bay during the late summer and early fall prior to freeze-up. Winters are long and cold, marked by short days and light precipitation followed by short, cool summers. Cold arctic air influences the area for most of the year.

The mean temperatures for summer and winter are 4°C and -24°C, respectively. The average annual precipitation in the region of the wildlife study area is approximately 200 mm.

1.4 Valued Ecosystem Components

The EIA process requires the identification of Valued Ecosystem Components (VECs) (Beanlands and Duinker 1983). However, it is impossible for an impact assessment to address all potential environmental effects of a project. Therefore, it is necessary that the environmental attributes considered to be important in project decisions be identified and addressed during initial baseline work.

VECs for this study were selected from species known to occur or of probable occurrence in the wildlife study area, and species that have been previously identified as being important at other northern project sites. Data on the distributional range of species were determined from past reports and the scientific literature. Species, or species groups, considered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 1997) as being endangered, threatened or vulnerable were automatically considered as potential VECs. VECs that were selected for this baseline study included:

- caribou
- muskoxen
- carnivores (grizzly bears, wolves and wolverines)
- raptors.

Breeding birds were originally selected as a VEC. However, the necessary permits for conducting breeding bird surveys were unfortunately not issued until after the breeding season was over. As a result, breeding bird surveys were not conducted during 2001. Sandhill Cranes are not typically considered a VEC, but were common throughout the study area. Since monitoring data for these cranes were easy to collect while conducting aerial caribou surveys, Sandhill Crane results have also been presented in this report.

1.5 Report Organization

This report summarizes wildlife and wildlife habitat field data collected in the SRI study area during the summer 2001. The report is divided into six sections including an executive summary, introduction, wildlife VECs, habitat VECs and literature cited.

The wildlife section describes the fieldwork conducted and the study results obtained for ungulates (caribou and muskoxen), carnivores (grizzly bears, wolverines and wolves) and birds (raptors and Sandhill cranes). The wildlife habitat section focuses on identification of the plant species occurring in the area, and classifying vegetation patterns in relation to community types. Field methodologies are presented in the respective subsections for each of the VECs.

2.0 WILDLIFE

2.1 Caribou

2.1.1 Background

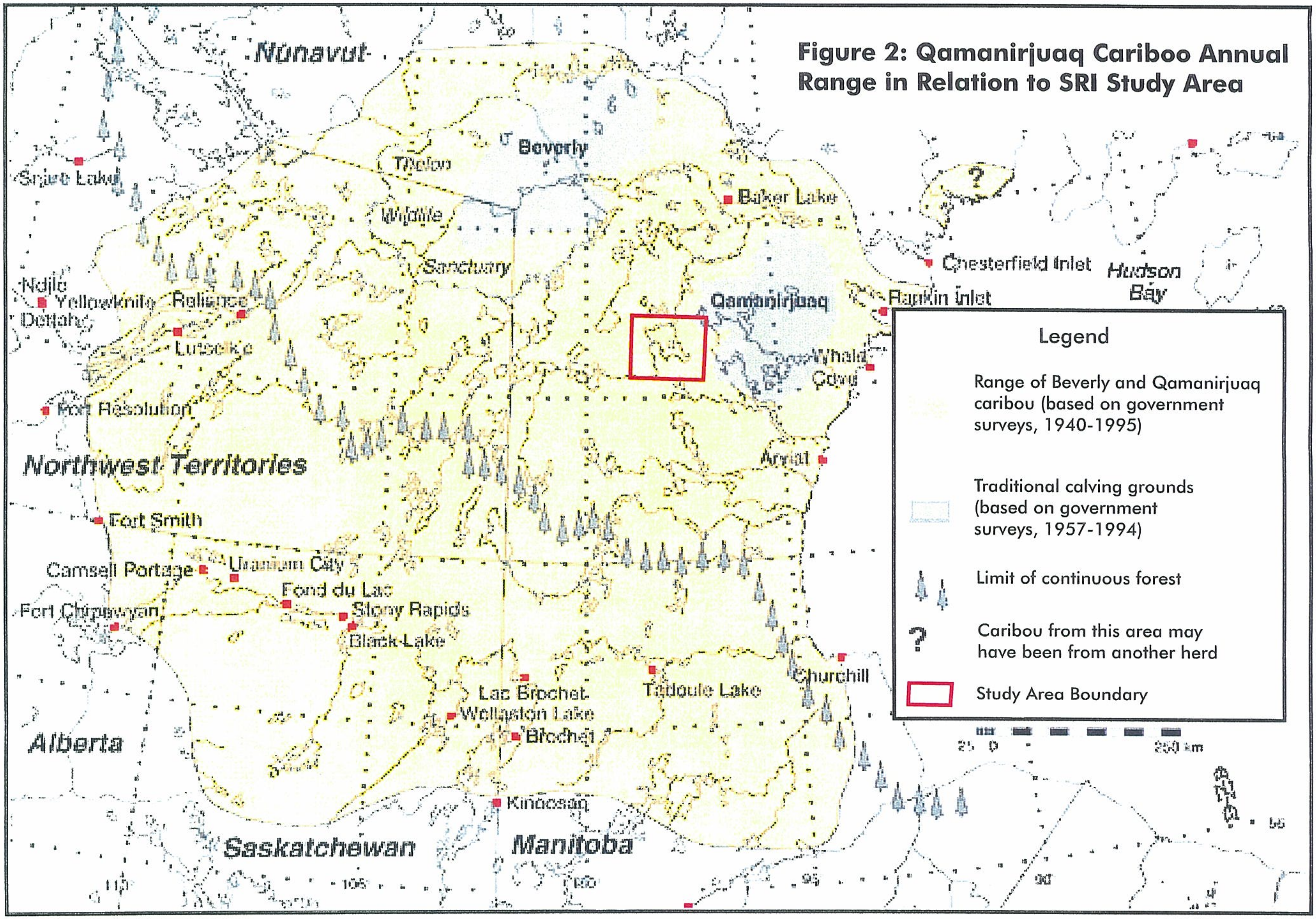
The Qamanirjuaq caribou herd passes through the region of the SRI study area during their annual migration from their winter range below the treeline in northern Manitoba to their calving grounds located south of Baker Lake (Figure 2). The last survey of the herd, conducted in 1994, estimated the herd size to be around 496,000 animals (Beverly and Qamanirjuaq Caribou Management Board 2002). However, the size of the herd has varied over the years. During the 1940's and 50's, herd size was estimated to be greater than 100,000 animals. In 1985 the herd size was greater than 200,000, and by 1994 it approached almost 500,000 animals (Wakelyn 1999).

The size of the herd's range is not known with certainty as it overlaps with that of the Beverly herd and differentiation of individuals between the two herds is problematic. However, its boundaries can be approximated as being the western shoreline of Hudson Bay, northward to Wager Bay, southward to Brochet, Manitoba (northern Manitoba) and approximately 350 km inland. The calving grounds are located south of Baker Lake and the wintering range typically extends to below the treeline in northern Manitoba. Caribou distribution and density in the SRI study area varies from year to year.

In general, spring migration northward begins in late March and continues throughout May. However, for the adult bulls, spring migration typically occurs about one month after other caribou in the herd have begun to migrate. Fall migration southward typically occurs between late September through to the end of October.

Calving typically occurs between late May and late June, and the specific timing is influenced by the condition of the cows. Most calves are born between 5 and 15 of June. During post-calving (late June throughout July) the caribou gather in large groups to reduce harassment by mosquitoes (Plate 2).

Once the incidence of insect harassment diminishes in late summer (early August) caribou groups begin to break up. At this time, their movement patterns are not well known. Fall migration is influenced by the weather but typically occurs between mid-September to mid-October. The rut occurs in late October (Beverly and Qamanirjuaq Caribou Management Board 1999).



Source: Base map from Beverly and Qamanirjuaq Caribou Management Board, 1999.

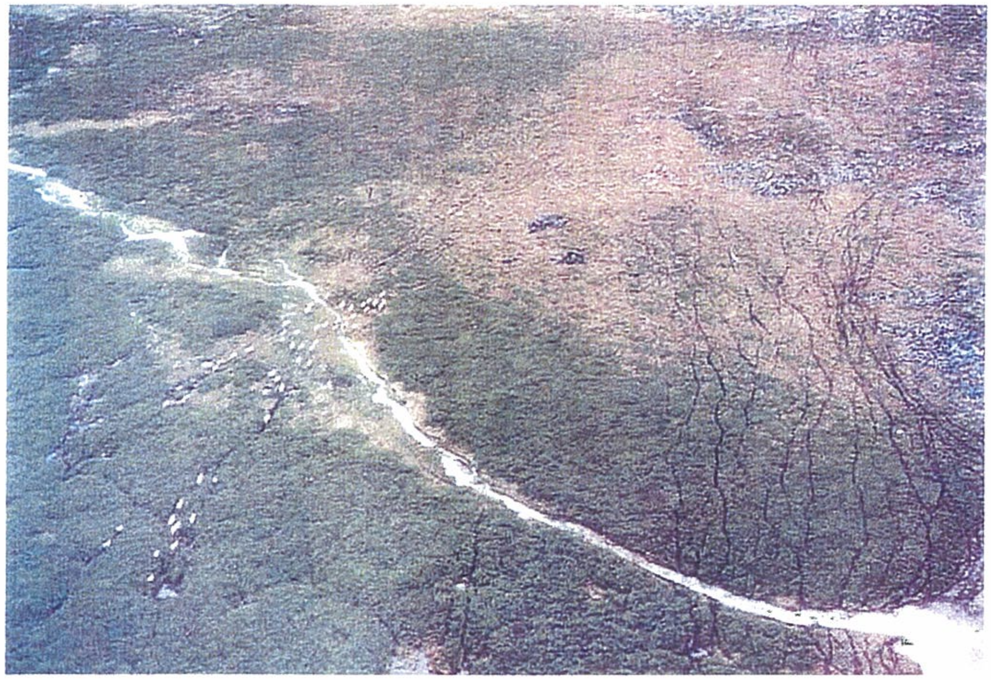


Plate 3 Small Group of Caribou Moving Through a Riparian Zone (SR)

2.1.2 Studies Completed in 2001

Caribou baseline studies carried out during 2001 included two aerial surveys. These surveys were designed to determine the abundance, density and distribution of caribou across the SRI study area in relation to the location of current exploration activities at Ferguson Lake.

2.1.3 Methods

Nine systematic transects were flown twice during the summer, on 01 July and 17 August, respectively. The distance between each transect was 5 km (Figure 3); thus, the effective survey width for each transect was 1 km, comprising 500 m on each side of the helicopter. This study design provided 23% coverage of the study area.

An A-Star helicopter was used for both surveys. Three personnel flew on each survey: a pilot on the right, a navigator/observer on the left and one additional observer in the rear right seat. The pilot concentrated on maintaining altitude, ground speed and adherence to flight lines and, in addition, helped to spot animals. The navigator/observer monitored the flight path, collected waypoints for each observation, pointed out animals,

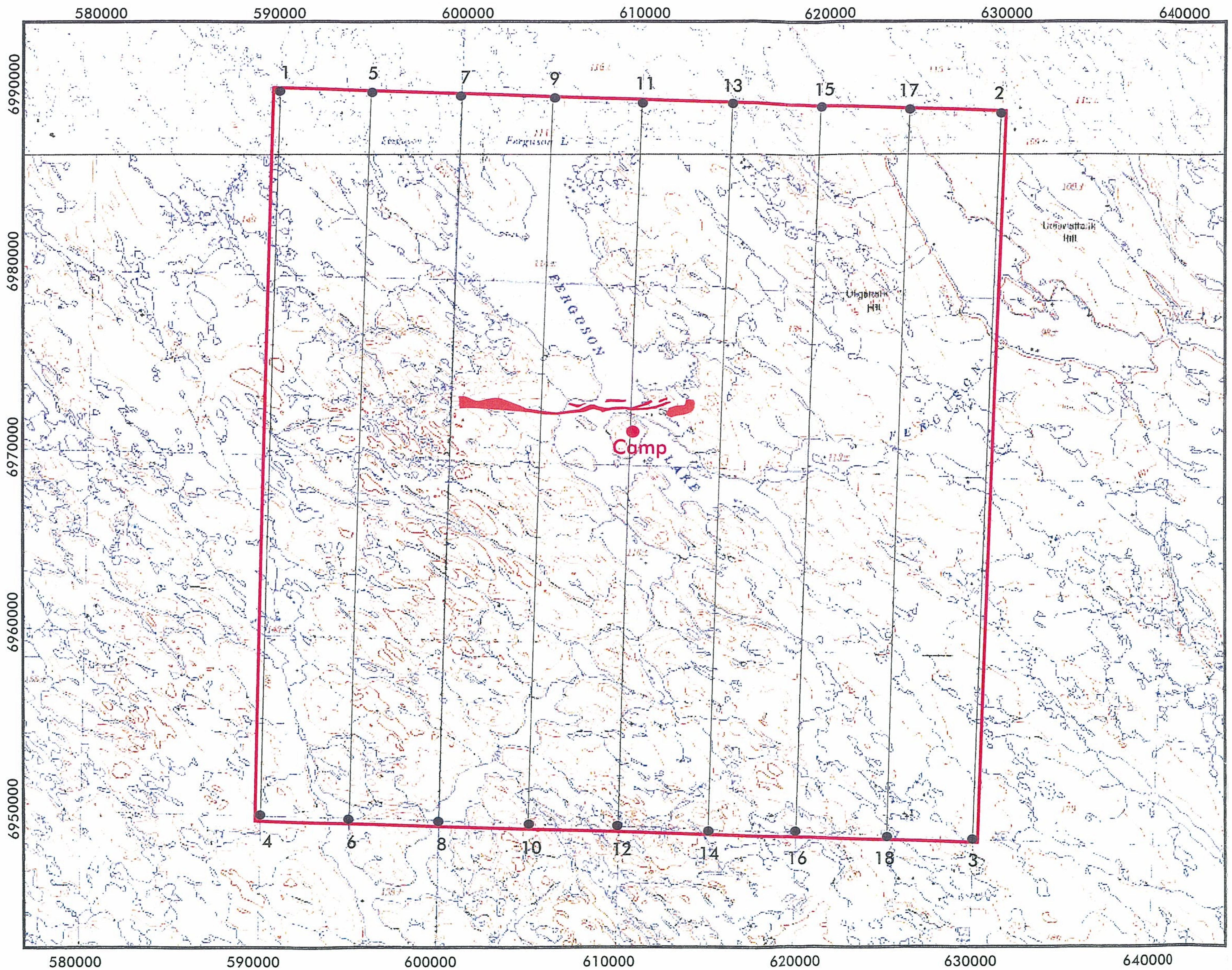


Figure 3: Aerial Survey Flight Paths

0 km 10 km

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Legend

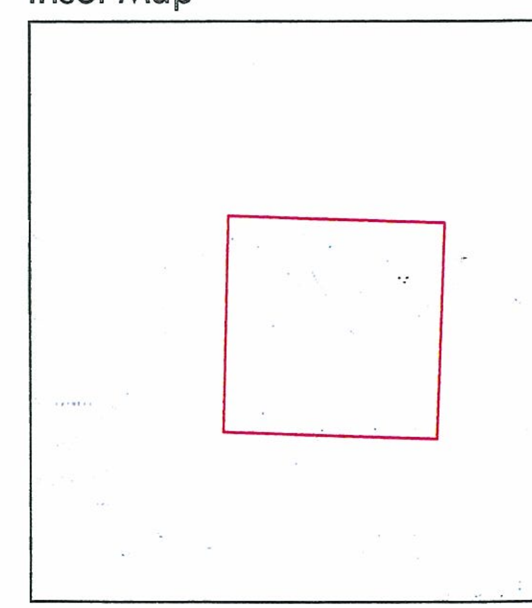
Interpreted UTEM Conductors (Project Exploration Area)

Caribou Transects

Camp Location

Study Area Boundary

Inset Map



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decades the population in the central mainland of Nunavut and the Northwest Territories has been steadily growing (Graves and Hall 1988), and more recently, muskoxen have been expanding their distribution further south.

2.2.2 Studies Completed in 2001

Muskoxen were surveyed concurrently with the aerial caribou surveys and, consequently, the same survey methodology was employed (See Section 2.1.3).

2.2.3 Results

A total of 6.5 hours were flown on systematic surveys across the SRI study area on 01 July and 17 August. Thirty-nine (39) and 5 muskoxen were counted on transect during the July and August aerial surveys, respectively. The estimated abundance of muskoxen within the study area for each survey date was 173 (± 65) on 01 July and 22 (± 6) on 17 August (Plate 4).

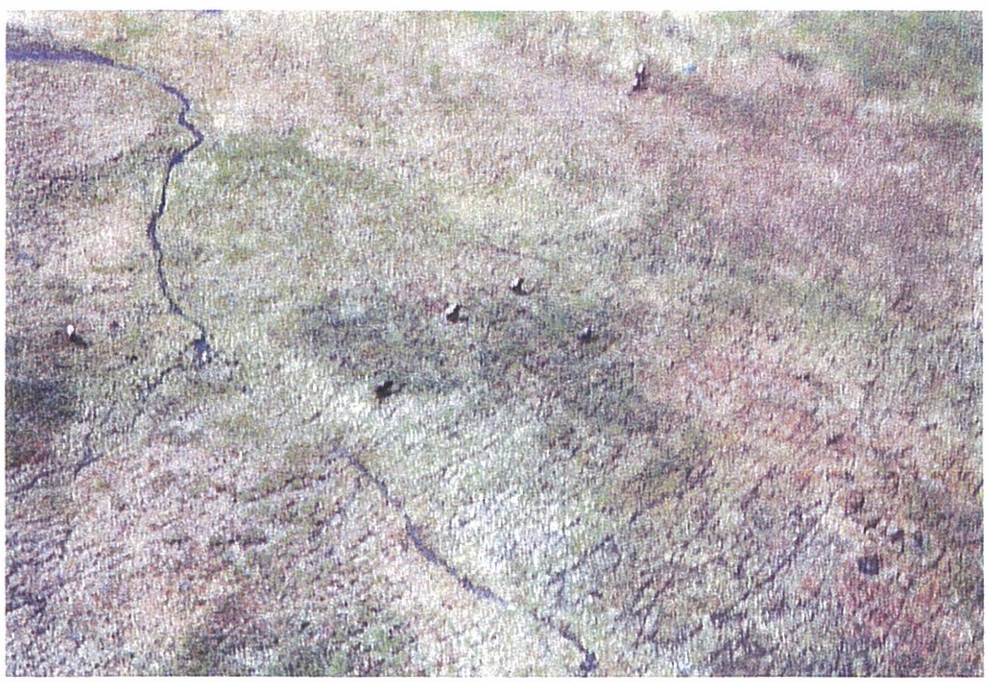

Plate 4 Small Group of Muskoxen Feeding in a Sedge Meadow (CE)

2.3 Carnivores

2.3.1 Background

The primary carnivore species that frequent the SRI study area include grizzly bear (*Ursus arctos*), wolf (*Canis lupus*), and wolverine (*Gulo gulo*). Although there are differences in their biology and population resilience levels, grizzly bear, wolf, and wolverine have some common characteristics that make them vulnerable to human-associated disturbance.

Grizzly bears and wolverines are typically wilderness species, with low population density and low fecundity, resulting in poor ability to respond to negative population pressures (Weaver *et al.* 1996). Even more resilient species such as wolves can suffer population reductions in the face of extensive habitat loss and alienation. Large carnivores are the first to disappear with fragmentation and loss of habitats due to settlement and industrial activity (Weaver *et al.* 1996).

However, despite these recognized sensitivities to development, no specific field studies were conducted on carnivores during 2001. The reasons for this were two-fold. First, carnivores in the SRI study area occur at lower densities than in many other areas above the treeline in Nunavut and the Northwest Territories, making it difficult to acquire enough data for meaningful analysis. Second, carnivore studies are very costly, considering the limited amount of data a researcher can reasonably expect to obtain over such a short field program. Consequently, information on carnivores was obtained primarily on an opportunistic basis, *i.e.* through the recording of incidental observations. No carnivore-specific surveys were flown. However, some eskers were flown in search of dens when opportunities arose, such as when flying back to camp following the completion of each of the two aerial caribou surveys.

Arctic fox (*Alopex lagopus*) and red fox (*Vulpes vulpes*) were not identified as VECs but their presence was recorded. Foxes are plastic in their behaviour and are very tolerant of human disturbance, as evident from the active dens commonly established adjacent to other northern exploration and/or sites.

2.3.2 Results

Very few observations of carnivores and carnivore sign were observed during the 2001 field program. No grizzly bear sightings were recorded. However, grizzly bear sign was observed in a few areas of the SRI study area, and one set out side the study area. (Figure 4).

The first observation (waypoint 99) consisted of an attempted bear den in the northeastern portion of the study area (Plate 5). Three other sets of observations were recorded around Ferguson Lake that consisted of relatively fresh bear diggings. These excavations are a result of grizzly bears digging for arctic ground squirrels (Plate 6).

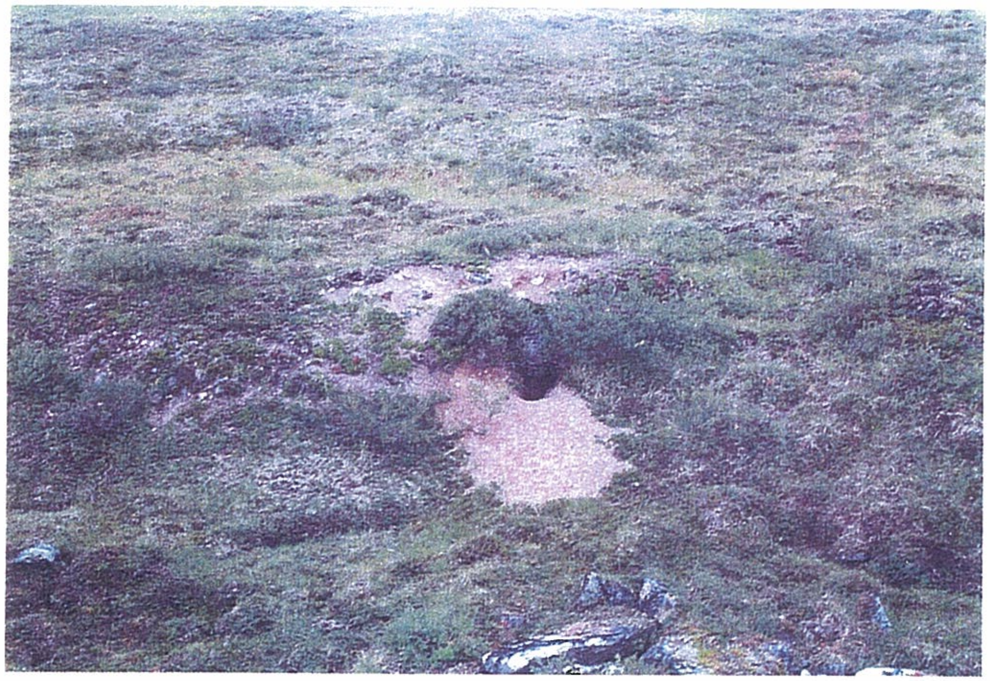

Plate 5 Freshly Dug Grizzly Bear Den Located 15 km East of Ferguson Lake

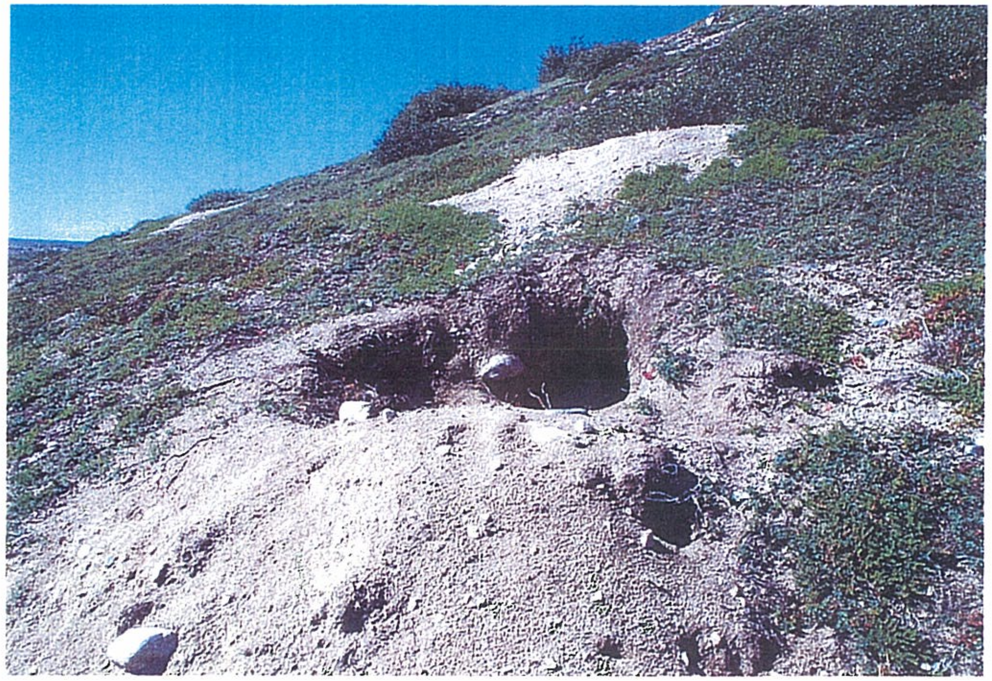

Plate 6 Grizzly Bear Sign, Digging for Arctic Ground Squirrels

Wolves were only observed on two occasions during the field program, once during the aerial caribou survey in July and once during the habitat work. During the July caribou survey, five (5) wolves were seen along the western edge of the SRI study area (Figure 4). However, once the caribou passed through the study area, the wolves also appeared to leave the area. Another wolf was documented leaving what appeared to be an active den site (Plate 7) (Figure 4).

Although no wolf pups were documented at this location it is suspected to be an active den based on the number of entrance holes, fresh tracks, observation on one adult leaving the site, fresh bone fragments and scat.

No wolverines or wolverine sign were observed during the 2001 field program, but are expected to occur in the area in low densities. One family of foxes was spotted by a drill rig crew and was reported to the wildlife crew.

Plate 7 Wolf Den 28 km South of Ferguson Lake

2.4 Birds

2.4.1 Background

Nunavut and the Northwest Territories are home to few year-round resident birds but host immense numbers of migratory species during the brief snow-free period. The importance of the arctic regions for nesting and brood-rearing is evident in the 16 migratory bird sanctuaries that have been established across Nunavut and the Northwest Territories, covering 11 million hectares of arctic coastal habitat (Graves and Hall 1988).

Most of these sanctuaries are for the protection of waterfowl. One-fifth of the North American population of all ducks, geese and swans nest in the Northwest Territories and Nunavut (Graves and Hall 1988).

Although many migratory species use arctic habitats for only a few months of the year, these areas are important because birds depend on them for breeding and nesting. SRI's project area is small compared to the length and breadth of the bird migratory pathways. Birds in the SRI study area and the region are considered to be VECs because of their relatively high species diversity in each habitat type and their general sensitivity to development.

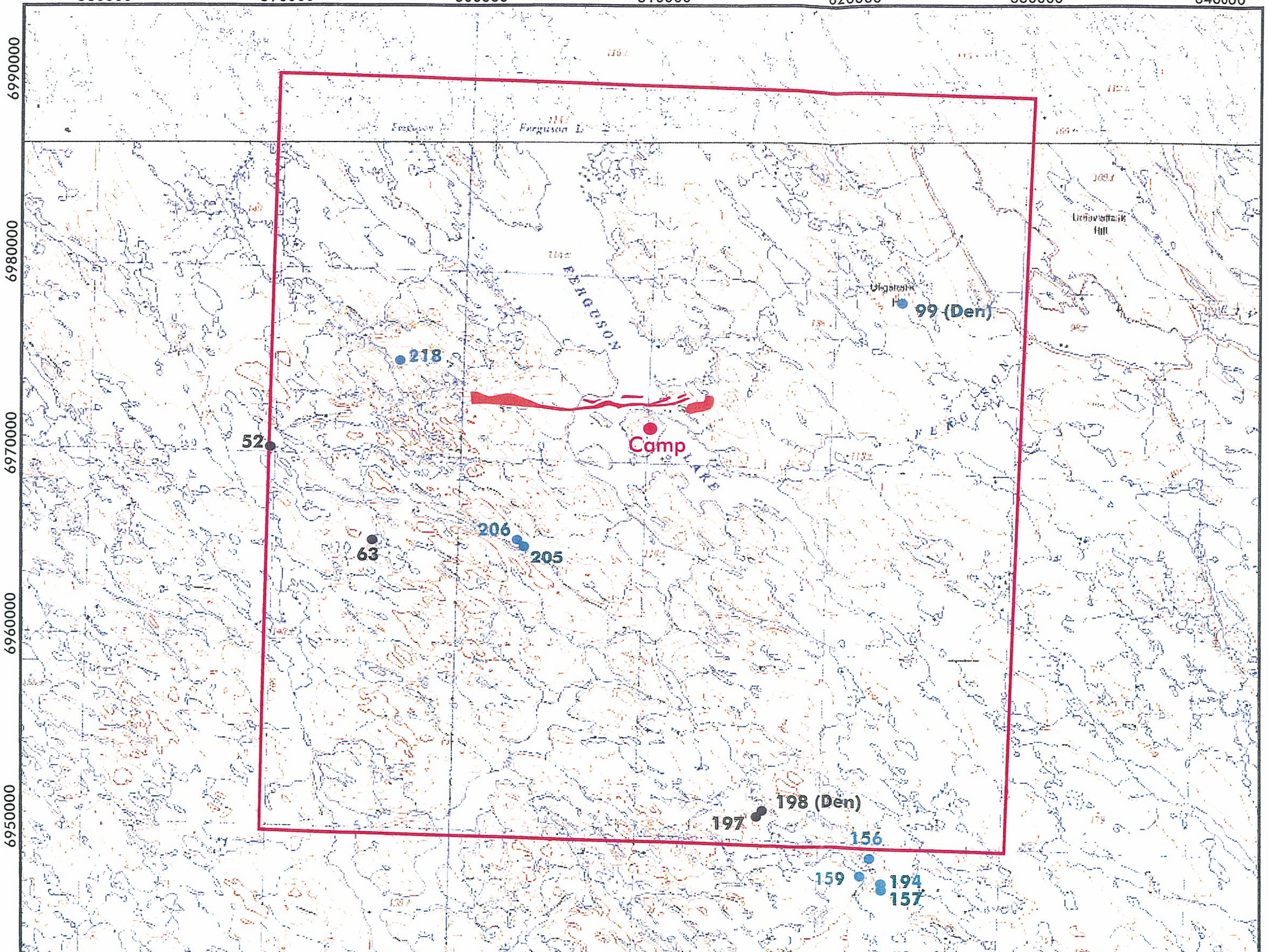

Figure 4: Carnivore Observations Documented During 2001

0 km 10 km

Scale - 1 : 227,500

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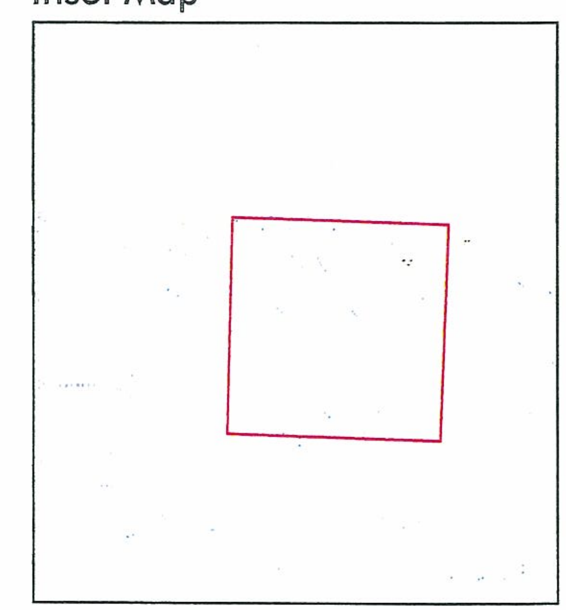
Legend

- Grizzly Bear Observation
- Wolf Observation
- Interpreted UTEM Conductors (Project Exploration Area)
- Camp Location
- Study Area Boundary

Note: Observation label denotes waypoint number.

Inset Map



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Some species, in particular waterfowl and ptarmigan, are also very important to the Aboriginal and other residents of the surrounding region for food. The presence of bird species has been used as an ecological indicator to monitor environmental health.

The rationale for most monitoring activities is a recognition of the potential for change. The contribution of monitoring programs is to provide confirmation of their value in the form of early warning signals from the effects of human impacts. Monitoring of birds can be a valuable tool for determining the state of the environment, or changes in the environment (Baillie 1991). Birds are often used in monitoring programs since they are usually high in the food chain and, consequently, are particularly susceptible to environmental changes. Species feeding on fish, such as loons and colonial waterbirds, and birds of prey are at the top of their food chains. A shift in prey abundance as a result of human -caused disturbance can affect bird populations at the local level.

Breeding bird surveys were originally planned for early June but because the permitting process had not been completed in time, these surveys could not be conducted. However, in lieu of these breeding bird surveys, birds present in the area were documented during the vegetation/habitat assessment component of the program. A total of 32 different species of birds were documented as occurring in the wildlife study area during the 2001 field program (Appendix B).

A raptor survey was conducted in July. Raptors and Sandhill Cranes were also documented during the caribou surveys, conducted in July and August. Waterfowl were documented on an opportunistic basis.

2.4.2 Raptors

2.4.2.1 Background

Raptors are commonly used as indicators of environmental quality. Occupying a top trophic level, they are indicative of general ecological integrity; impacts on raptor populations can be reflected throughout the ecosystem (Kennedy 1980). They are also known to be sensitive to disturbance, particularly during breeding. Declines in raptor populations have been attributed to human activities and developments (*e.g.,* Craighead and Mindell 1981).

The *tundrius* subspecies of the peregrine falcon (the subspecies occurring in the Ferguson Lake area) is listed as "species of special concern" by the

Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2000). Peregrine populations in the Canadian arctic (*tundrius* subspecies) have increased in recent years in response to the decline in the use of organochlorine pesticides in their wintering areas (Shank *et al.* 1993).

The gyrfalcon is a high-profile species and the official bird of the Northwest Territories. The gyrfalcon is also of interest as one of the few possible year-round resident bird species in the study area (Platt 1976; Kuyt 1980; Poole and Bromley 1988*a*). Both peregrines and gyrfalcons are listed by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) under Appendix I, indicating that globally they are threatened with extinction that may be influenced by trade.

Raptors in Nunavut/Northwest Territories have been the subject of monitoring programs conducted by the GNWT and others (Shank and Poole 1994; Shank, 1997) over several decades, and the perpetuation of monitoring contributes to the value of such long-term studies. Because raptors tend to exhibit fidelity to nesting sites (Newton 1979), they lend themselves to monitoring. Long-term monitoring can be used to observe and measure the effects of changes to the landscape as a result of human induced or natural causes.

Ravens are passerines, but have been called "functional raptors" (Poole and Bromley 1988*b*) and are included in this section. Ravens commonly nest on cliffs, which may preclude falcons from using those sites. Conversely, raven stick nests may be used by gyrfalcons (Poole and Bromley 1988*a*). One raptor survey was conducted across the SRI study area during 2001. The specific objectives of the survey were to locate and assess the status of raptor territories and nesting sites within the SRI study area.

2.4.2.2 Methods

The raptor survey route used for the SRI program focused on areas with potentially favourable nesting sites, as noted during systematic aerial caribou surveys, and known locations of previously occupied territories, as reported by the SRI field crew.

The survey was conducted from an A-Star helicopter and involved a slow fly-by of known, suspected, or potential nest sites. The survey crew consisted of a pilot, a front-seat navigator/observer, and a rear-seat observer/recorder. The helicopter flew past potential sites at a distance of 25 m, and a prominent cliff face was inspected for active nests. In most cases, this permitted a thorough evaluation of the site with a single pass, and the helicopter was able to depart the scene in under a minute. Site locations were marked on 1:50,000 topographic maps and GPS coordinates were recorded.

The status of raptor territories was determined according to the following criteria:

- NS Nest not seen; no birds seen
- OT Occupied territory but no nest seen. One or more adults present
- UU Unoccupied and unproductive. Nest seen but was not productive. No adults present
- OU Occupied nest but known to be unproductive
- OP Occupied nest; productivity likely but uncertain
- OC Occupied nest during courtship with no eggs yet
- OE Occupied with eggs
- OY Occupied with young.

Nest productivity was evaluated on the basis of a single site visit. As a result, reported productivity may not reflect the final status of each site. In some cases, nests that appeared non-productive may have produced young later (although this is unlikely given the late date of the survey), and more likely, some nests, which appeared productive, may have sustained mortality that was undetected.

2.4.2.3 Results

Twenty-six sites were located and investigated in the study area. Eight raptor territories were established and at least seven of these involved occupied nests.

Peregrine Falcons occupied five territories in the study area and one just outside the study area boundaries (Figure 5). Two of the six sites were confirmed as occupied with eggs (OE); while the remaining four sites were occupied nests with reproduction likely (OP). Confirmation of successful fledging requires multiple visits and ground searching. To minimize stress to birds, ground searches were avoided. The results suggest that at least six pairs of Peregrine Falcons were successful in reproducing eggs and/or offspring during 2001, based on the observed presence of eggs and territorial behaviour (Plate 8).

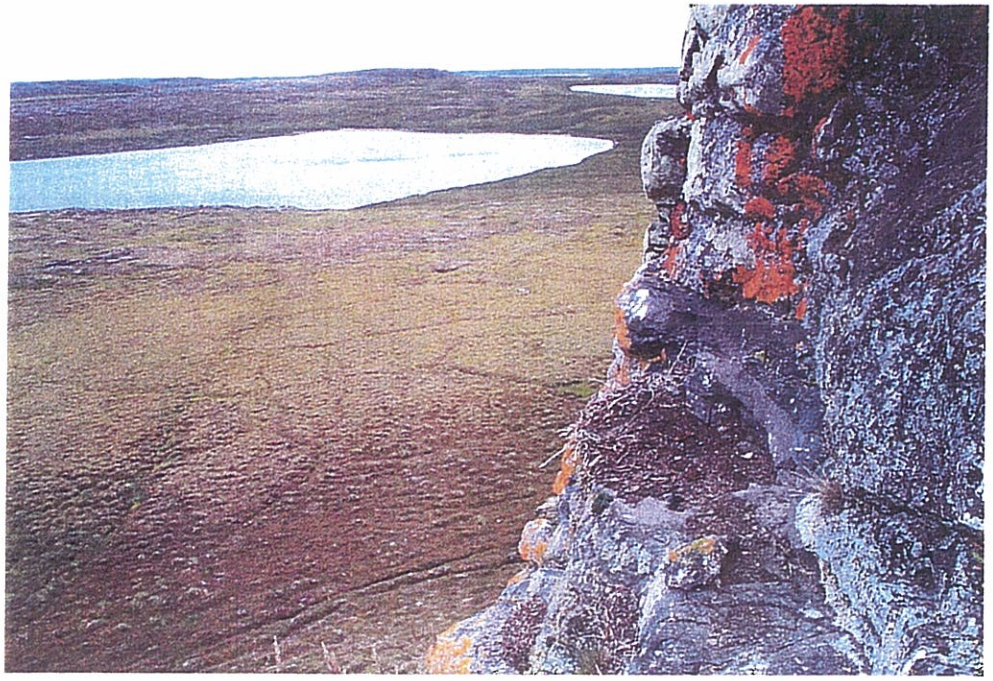


Plate 8 This Peregrine Falcon Scrape (Nest) was Believed to Have Been Used During the Previous Year

Rough-legged Hawk territories were observed at two sites. One of these included a nest with two young that appeared close to fledging (Figure 5). The second site contained a pair exhibiting territorial behaviour, but no nest was found.

Habitat Use

Consistent with most studies of habitat use by raptors, cliffs are the main feature of raptor habitat in the SRI study area (Plate 9). Peregrines and Rough-legged Hawks hunt in a variety of habitat types according to those frequented by their prey, but they have stringent requirements for nesting sites. Typically, nesting sites are established in the most rugged terrain available in the area. All active raptor nest sites documented in the study area were located on cliffs. Often, lakes are associated with the base of the cliffs. Most sites are well protected against access by humans or wildlife predators.

Plate 9 Much of the Quality Raptor Habitat is Located in the Southwest Corner of the Wildlife Study Area

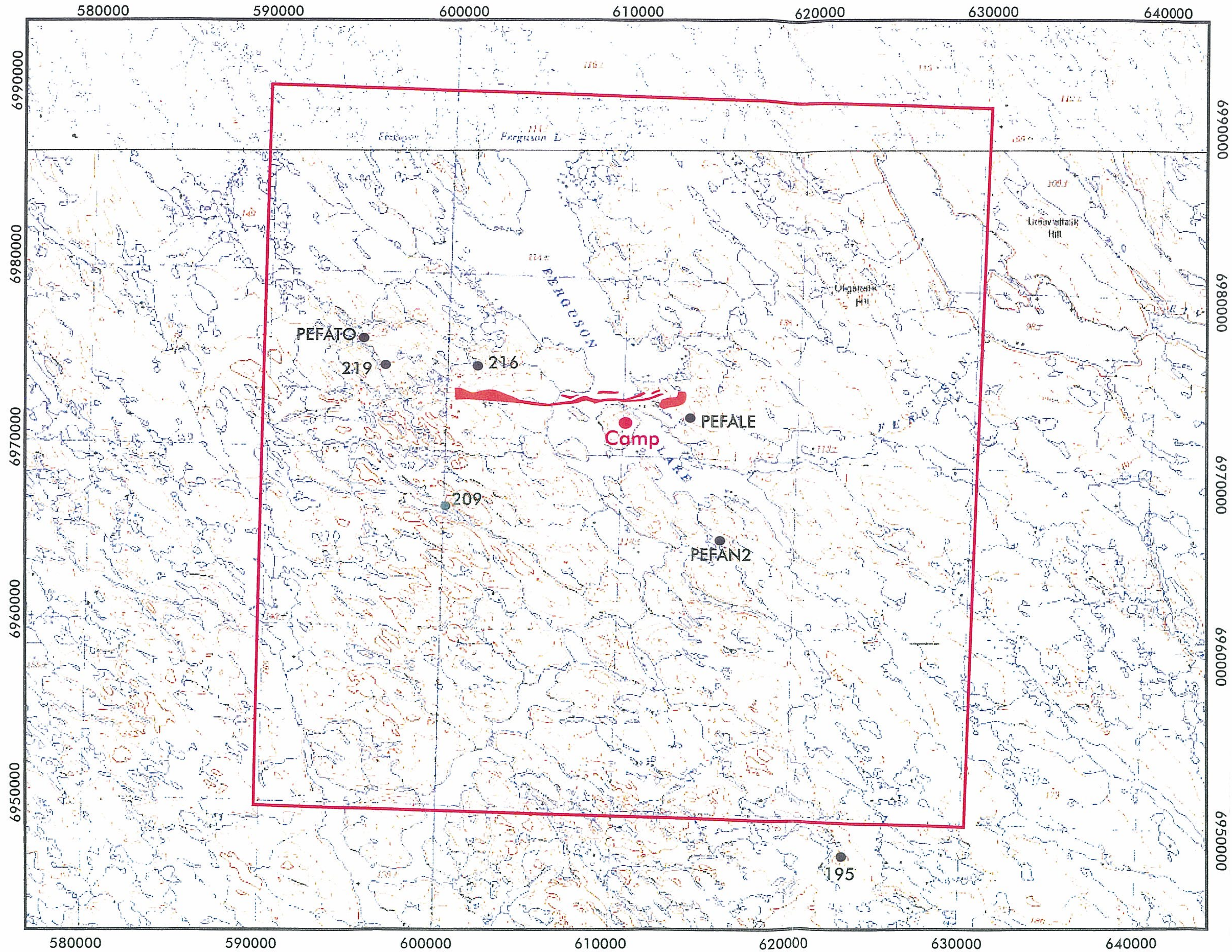
2.4.3 Sandhill Cranes

2.4.3.1 Background

Sandhill Cranes were not a selected VEC for this project. However, they are commonly distributed throughout the wildlife study area, and were highly visible during aerial caribou surveys. Consequently, they were included in the 2001 wildlife study program.

Sandhill Cranes are large birds and are highly conspicuous when standing on the low-open tundra. They nest on higher ground adjacent to wetland communities.

Figure 5: Raptor Nests Surveyed, 2001



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Scale - 1 : 227,500

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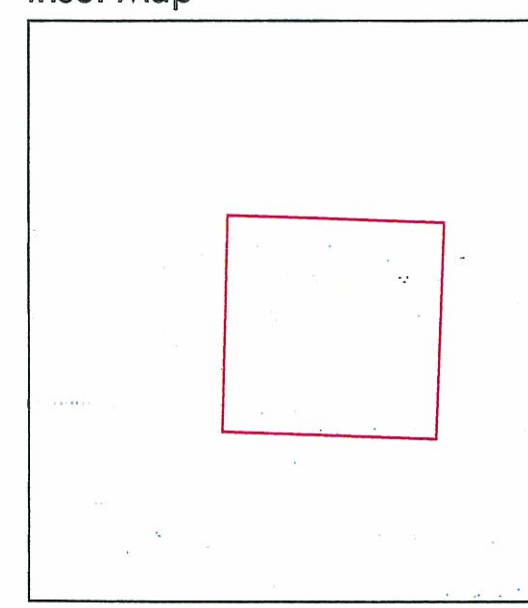
Company: EBA Engineering Consultants Ltd.
Project #: 01-14863

Legend

- Peregrine Falcon
- Rough-legged hawk
- Interpreted UTEM Conductors (Project Exploration Area)
- Camp Location
- Study Area Boundary

Note: Observation label denotes waypoint ID

Inset Map



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2.4.3.2 Methods

Sandhill Cranes were documented during aerial caribou surveys. The methodology used for these surveys is discussed in Section 2.1.3. This technique is suitable for large crane-like birds nesting on open tundra.

2.4.3.3. Results

Sandhill Crane territories were documented during the two caribou surveys completed on 01 July and 17 August. A total of 58 cranes were recorded, consisting of single and paired observations. Paired observations were interpreted as being a territorial pair and, hence, a suspected breeding pair. Paired birds were much more visible during August than in July. During the August survey, 18 of 20 observations consisted of pairs, while in early July only 6 of 16 observations consisted of pairs (Plate 10).

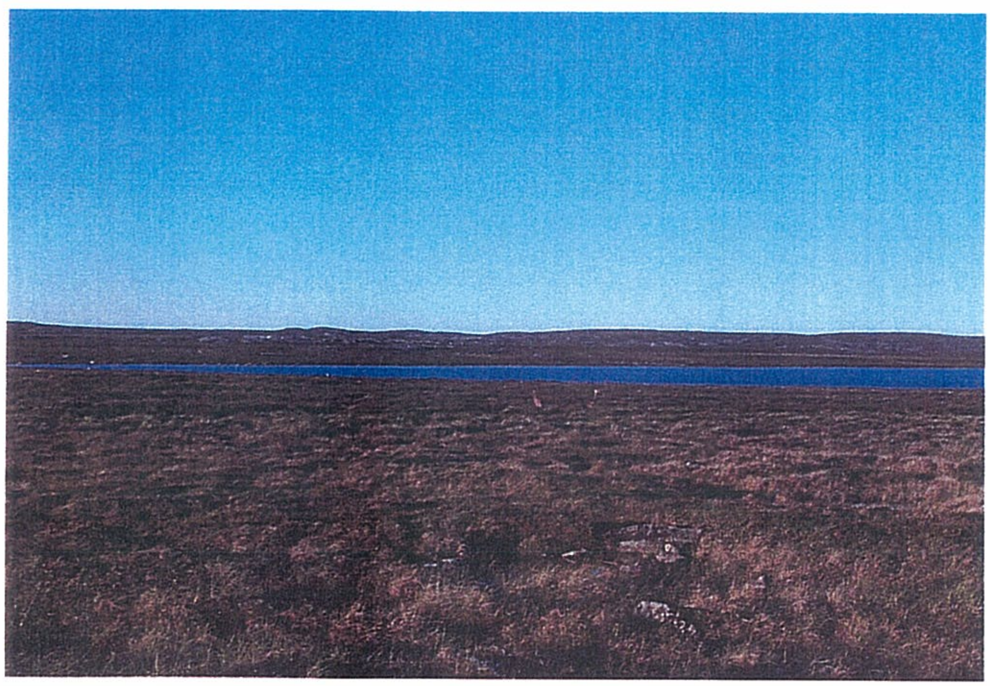


Plate 10 This Pair of Sandhill Cranes (Center) Fledged One Young on the Same Island Where the SRI Camp is Situated

Presumably the lower pair counts in early July were a result of one of the parents in a given pair being more difficult to detect because of sitting and incubating activities. In contrast, during August, the young birds would have fledged, resulting in both parents standing and being more visible. The data obtained support this statement, as there was almost exactly twice the number of individuals counted in August compared to early July during the incubation period.

The results documented in August are presumed to be more reflective of the true number of territories than those recorded in July and, consequently, are the data set used to estimate the number of territories in the SRI study area. Consequently, there were 18 pairs (territories) of Sandhill Cranes documented across the study area during 2001.

3.0 WILDLIFE HABITAT

3.1 Background

In the summer of 2001, preliminary biogeoclimatic ecosystem classification was conducted of the SRI study area. Representative habitats within the study area were assessed and classified. The primary objectives were to

- sample representative sites for each community type
- document the flora and fauna
- classify the habitat
- provide an annotated list of the flora species.

Vegetation studies help to document the current baseline conditions and determine potential project effects on different habitats. The results obtained will assist in providing the basis for designing future wildlife habitat studies and for collecting further habitat-based information.

The classification scheme employed for the SRI wildlife study program was based on the principles of biogeoclimatic ecosystem classification or BEC. The fundamental unit of BEC is the ecosystem; a portion of the landscape which is uniform in the plants and animals inhabiting it, in terrain, soil, hydrology and microclimate and in the interactions between all these aspects. Habitats were initially examined and delineated on aerial photographs.

3.2 Literature Review and Interviews

Prior to implementation of the fieldwork, a literature search was conducted to identify the existence of material relevant to the SRI wildlife study area, and to consolidate and evaluate available literature. A search was conducted at the RWED and Canadian Wildlife Service (CWS) libraries. Additional libraries and databases were searched via the Internet and included the following locations: Environment Canada's library, Arctic Science and Technology Information System (ASTIS), which contains abstracts and indexes on literature about the North; and the Canada Institute for Science and Technical Information (CISTI), which contains abstracts and indexes.

Procite, a computerized database, was also utilized to search for relevant articles in the following journals: *Auk, Bird-Banding, Condor, Ecological Applications, Ecological Monographs, Ecology, Journal of Field Ornithology, Journal of Vegetation Science, Journal of Wildlife Management, Ornithological Monographs, Studies in Avian Biology, Wildlife Monographs, Wildlife Society Bulletin* and the *Wilson Bulletin*.

From the literature review, a preliminary list of species was developed for the flora and fauna of the region. This list was important in helping to define the preliminary scope of work to be undertaken, and should not be considered complete, as certain species will likely be added or removed as our knowledge of the area grows.

3.3 Methods

3.3.1 Sampling Methodology for Flora

Prior to field sampling, a species list was generated for plants based on range maps found in taxonomic guides. For plant species, the list was created using *Vascular Plants of Continental Northwest Territories* (Porsild and Cody 1980) and *Rare Vascular Plants in the Northwest Territories* (McJannet *et al.* 1995). The list was based on plants that have been collected in the general region, within a 200 km radius of Ferguson Lake. Using this approach a species list was generated containing plants known to occur, or hypothetically occur, in the SRI study area. Species hypothetically occurring in an area include species whose known distribution covers, or are adjacent to, Ferguson Lake but have not yet been documented on site.

This study conducted habitat assessments at two different levels of intensity: detailed vegetation plots and ground/air checks. Detailed vegetation plots involved accessing representative sites on foot. The composition of plant communities was determined from visual inspection of sites and subjectively assessed as being representative of a particular community type. The selection of specific sample sites was guided by the physiognomy of the plant cover and the dominance of certain species.

Ground/air checks entailed briefer assessments. Once the field crew became familiar with the ecosystem units, a number of sites were assessed by simply landing and assessing from the helicopter. Ground/air checks were only performed on a limited number of sites that were large and homogenous in vegetation cover.

Each site assessment entailed filling out a standardized data sheet that documented general site information, topographic and site descriptors, and detailed sections on vegetation coverage. For each site the following information was entered onto standardized forms:

- Site number and location
- UTM coordinates using a GPS
- date
- topographic position

- slope
- aspect
- type of dominant vegetation
- percent closed canopy
- ground cover
- moisture regime
- texture of surficial deposits
- landform
- elevation
- plant community type
- plant species
- animal and animal signs.

Site slope was determined using a clinometer (on detailed site assessments only). Moisture regime was subjectively ranked following Walmsley *et al.* (1980) as very xeric, xeric, subxeric, submesic, mesic, subhygric, hygric and hydric. Appendix C describes each moisture regime, their definition, primary water source and relative slope position. Elevation was determined from topographic maps. Detailed information on percent coverage of shrub and ground strata was visually estimated. An attempt was made to identify all vascular plants at each site. Representative samples were collected for species that were difficult to identify in the field, such as willows, sedges and grasses. These were returned to the EBA office for identification under magnification with the aid of taxonomic guides.

Not any one taxonomic plant key is sufficiently comprehensive to adequately address all genera. Certain plant keys provide better treatment of select genera than other texts, and are typically based on the author's personal experience. Consequently, an array of plant keys and general plant books were utilized to identify plant species. Specific technical taxonomic plant keys were used to identify problematic species and included Cody (2000), Argus (1973), Cobb and Annas (1963), Douglas (1982), Johnson *et al.* (1995), Moss (1977), and Porsild and Cody (1980). Other literature of a more general nature, was also relied on for photographic attributes, including Burt (1991), Courtenay and Zimmerman (1972), Scotter and Flygare (1986) and Trelawny (1983).

Datasheets were completed for each site sampled. Photographs were taken to capture the most representative aspects of a given ecosystem unit. UTM coordinates were obtained and stored using a Garmin 12 XL GPS and subsequently recorded on the datasheets.

3.3.2 Sampling Methodology for Wildlife Habitat

The field method employed for observing and recording wildlife information was an extension of the process used for documenting the flora, and was conducted concurrently. The presence of wildlife (based on actual observations, or inferred from tracks, burrows, browse, animal remains and droppings or scat) was recorded during vegetation surveys. Additional information was noted on the habitat features associated with wildlife sign and how the suspected wildlife frequenting these sites were likely interacting with the habitat, such as browsing, digging, etc. In addition, some SRI site personnel, *i.e.* Allen Cole, with extensive field experience, were interviewed.

Wildlife observations were recorded using the same datasheets used for vegetation assessments. Photographs were taken where appropriate, *i.e.* grizzly bear diggings for arctic ground squirrels. UTM coordinates were obtained for each observation of sign. Wildlife and wildlife sign observed on an opportunistic basis were also documented as encountered during the investigations, *i.e.* outside of the formal habitat assessments.

3.4 Results

A total of 60 sites were assessed: 46 formal ground assessments and 14 ground/air assessments from the helicopter (Figure 6). Plant data were also collected at 14 additional sites during other work, *i.e.* wildlife-focused activities. A total of 543 plant observations were documented, comprising 138 different species (Appendix D). No rare or endangered plant species were found during the 2001 field survey report.

The classification for the SRI study area is comprised of 12 ecosystem units (Table 1). A description of each ecosystem unit is presented below and is summarized in Table 2. The mesic tundra ecosystem (BL) is the 'zonal' ecosystem. It represents average soil conditions for a given region and describes a site that is intermediate in the availability of soil moisture nutrients. All other ecosystem units are considered to be wetter, drier, richer, or poorer than this zonal site. This vegetation unit is typically a well-developed mat of low shrubs including dwarf birch, willow, Labrador-tea, crowberry, and bearberry. BL is the most common habitat type in the study area (Plates 11 and 12, Section 3.5.1).

Upon close examination, the BL ecosystem unit can be further subdivided into three subdivisions based on the composition of the subdominant species. For example, as already mentioned, BL is the most common ecosystem unit comprising of *Betula* and *Ledum*, with *Betula* and *Ledum* making up the dominant and subdominant covers, respectively. Two other subdivisions exist, based on their subdominant species, which consist of *Vaccinium* and *Empetrum*. However, these two subdivisions cannot be distinguished or separated through satellite imagery or aerial photographs, only through close field inspection. To compound the issue further, various levels of integration of these three subdominants can occur in the field. Because these three subdivisions cannot be reliably separated through satellite imagery or aerial photography, they have been combined into one ecosystem unit, namely BL.

Table 1

Habitat Classification of the SRI Study Area - Ferguson Lake, NU

Ecosystem	Formal Name	Common Name	Map Code
1	*Betula – Ledum*	Mesic Tundra	BL
2	*Saxifraga – Silene*	Esker Top	SS
3	*Betula – Empetrum*	Esker sides, tundra crests	BE
4	*Betula – Rubus chamaemorus*	Birch Hummock	BR
5	*Betula – Calamagrostis*	Birch Seep	BC
6	*Eriophorum vaginatum – Andromeda*	Cottongrass Tussock	EA
7	*Carex chordorhiza – E. russeolum*	Sedge Meadow	CE
8	*Salix – Rubus arcticus*	Willow Riparian	SR
9	*Carex aquatilis – E. angustifolium*	Sedge Fen	CA
10	*Arctophila – Ranunculus*	Emergent Marsh	AR
11	Lichen	Lichen – Boulder Field	BF
12	Exposed Bedrock		RB
Modifiers:			
B	30% or more of the surface cover is boulders		
R	30% or more of the surface cover is bedrock		
S	Slope is 15% or greater		
E	Unit occurs on an esker		
G	Unit has more than 30% cover of shrubs greater than 50 cm in height		

Xerophytic herb tundra (SS) occurs almost entirely on the top of eskers and is referred to as esker tops. A large portion of these units is sparsely vegetated, due to the dry nature of the sites. The most critical ecological factor influencing these ecosystems is their coarse soils and exposure to strong winter winds, which limit the availability of soil moisture and the capacity of plants to become established. Saxifrage and moss-campion are common plant species with scattered crowberry and bearberry (Plates 13 and 14, section 3.5.1).

The *Betula-Empetrum* (BE) habitat type occupies esker side slopes and morainal veneers on slope crests. Vegetation is typically an open mat of dwarf birch, crowberry and bearberry with significant lichen cover (Plates 13 and 14, Section 3.5.1).

Table 2
Description of Ecosystem (Landscape) Units Within the Ferguson Lake Area

Ecosystem Unit	Description	Plate
Heath Tundra	Includes bouldery tundra (BLb), rocky tundra (BLr) and non-esker *Betula-Empetrum* (BE) habitats. All typically have a mat of dwarf birch and prostrate shrub vegetation.	Plates 11 and 12
Esker complex	All ecosystem units occurring on esker landforms; SSe on esker tops, BEe on side-slopes, and BLe and occasionally BRe at the base of eskers.	Plates 13 and 14
Birch hummock	All polygons typed as BR.	Plates 15 and 16
Birch seep	All polygons typed as BC.	Plates 17 and 18
Willow riparian	All polygons typed as SR.	Plates 19 and 20
Wetland complex	A complex of cotton-grass tussock (EA), sedge meadow (CE), and occasionally sedge fens (CA) and emergents (AR).	Plates 21 - 24
Tussock tundra	All polygons typed as EA.	Plate 21
Bedrock and boulder fields	Includes exposed bedrock (RB), which is relatively rare, and boulder fields (BF), which are more common. Both support little vegetation other than lichens and have generally low capability for wildlife.	Plates 25 and 26

Birch hummock (BR) habitats comprise the typical hummocky terrain of the tundra. Dwarf birch is abundant, with a well-developed moss layer composed of sphagnums. Cloudberry and Labrador lousewort are also common. Where depressions occur, these often support vegetation typical of the cottongrass tussock (EA) ecosystem unit. BR, EA and sedge meadow units (CE) often occur together in complexes (Plates 15 and 16, Section 3.5.1).

Two riparian habitat types occur: birch seeps (BC) and willow riparian (SR). They differ in structure, and in their value to wildlife. Birch seeps (BC) are dominated by dwarf birch often achieving heights of 1 - 1.5 m. Low amounts of willow are also present. This unit occurs in areas of active seepage through boulder lag deposits (Plates 17 and 18, Section 3.5.1). It is often found on the edges of and surrounding willow riparian (SR) ecosystem units.

SR habitats occur along actively flooding stream channels where relatively thick veneers of fine-textured materials have been deposited. The productive soil medium and constant flowing water support a tall shrub community (up to 2.5 m) of willow. A few SR habitats contain a high percentage of green alder in the western portion of the study area. The herb layer is well developed. This habitat is the most productive of all in the study area. In terms of area, however, it occupies only a fraction of the entire wildlife study area (Plates 19 and 20, Section 3.5.1).

Cotton-grass tussock (EA) consists of the tussock-forming sheathed cotton-grass. A well-developed sphagnum layer is typical (Plates 21 and 22 [outer edges of light green zone], Section 3.5.1). Within a wetland complex, sedge meadows (CE) occupy the lowest depressions (Plates 22 [inner zone of light green area] and 23, Section 3.5.1). This unit has the appearance of grassy meadows, as opposed to the hummocky appearance of BR and EA. The primary vegetation consists of sedges.

Sedge fens (CA) are mostly restricted to lake and stream margins where the water table is above or near the surface during the growing season. The vegetation is predominately water sedge (*Carex aquatilis*). Emergent marsh (AR) occurs in shallow lakes and shoreline areas. This ecosystem unit is rare in the study area, only one occurrence was documented (Plates 23 and 24, Section 3.5.1).

The lichen-boulder field ecosystem unit (BF) can dominate large areas. Vegetation is sparse and consists of various lichen species and vascular plants where thin organic layers have developed in crevasses among boulders (Plates 25, Section 3.5.1).

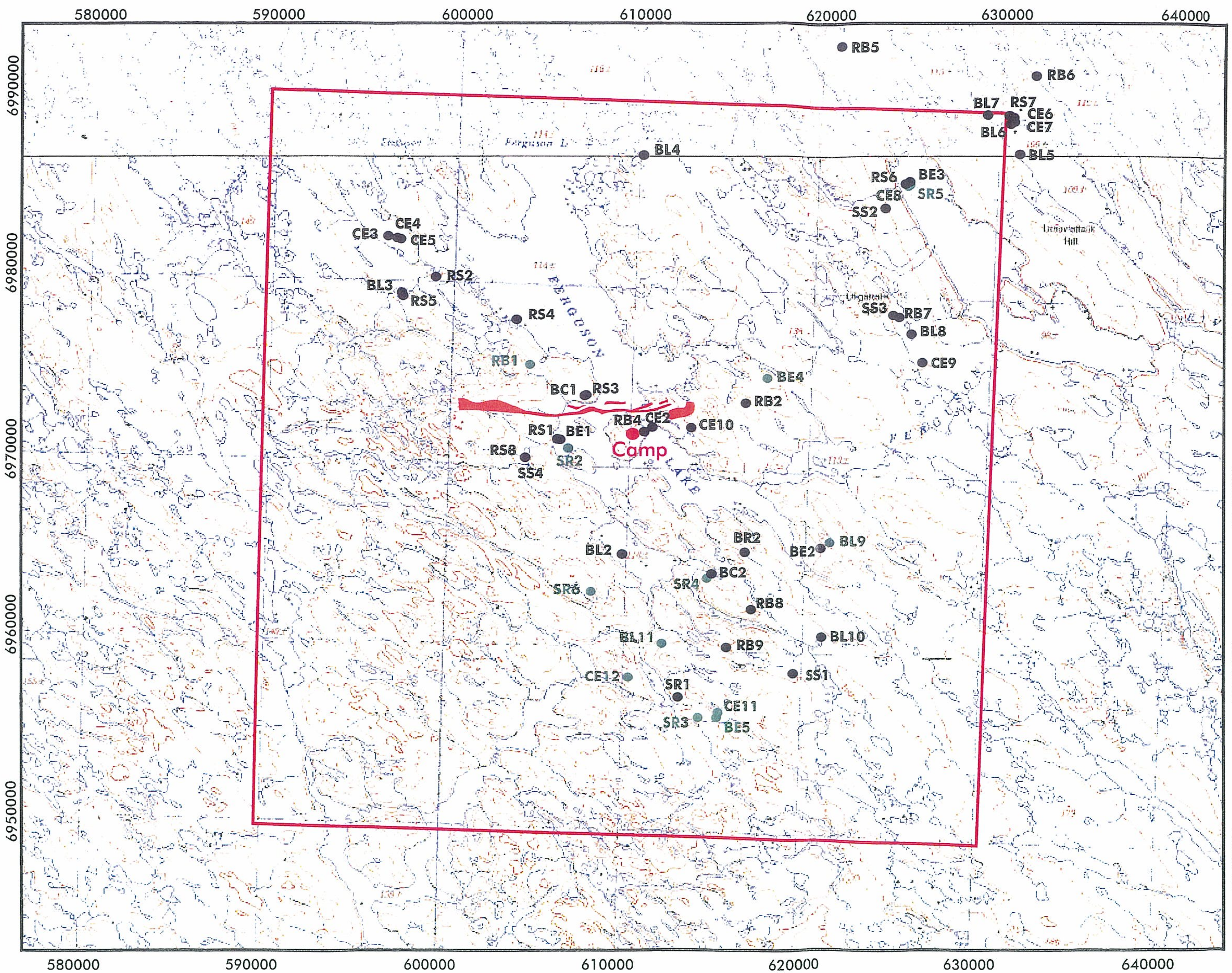
Exposed bedrock ecosystem unit (RB) is often associated with ridge tops. These sites are dominated by exposed bedrock with small amounts of soil occurring in crevasses. Environmental conditions determine what species occur on site. The most critical ecological factor influencing these ecosystems is their solid rock face and exposure to strong winter winds, which limit the availability of soil moisture and the capacity of plants to become established. This habitat supports very little vegetation other than rock lichens (Plates 26, Section 3.5.1).

3.5 Habitat Communities

Habitats do not occur singly but often as complexes of more than one type. For example, a community named "4BLb3BC3EA" is a complex consisting of 40% bouldery tundra or heath mat, 30% birch seep and 30% cotton-grass tussock. Lakes are not given unique identifiers within the ecosystem process.

The most common ecosystem units within the study area are closed and open mat tundra (BL). The least common ecosystem unit is willow riparian. The importance of a particular habitat association to a wildlife species is a function of many factors including how common or rare it is, its species composition and the value of these plants to wildlife, and its distribution across the landscape, including its juxtaposition in relation to other ecosystem units.

Figure 6: Habitats Assessed Within the Study Area



0 km 10 km

Scale - 1 : 227,500

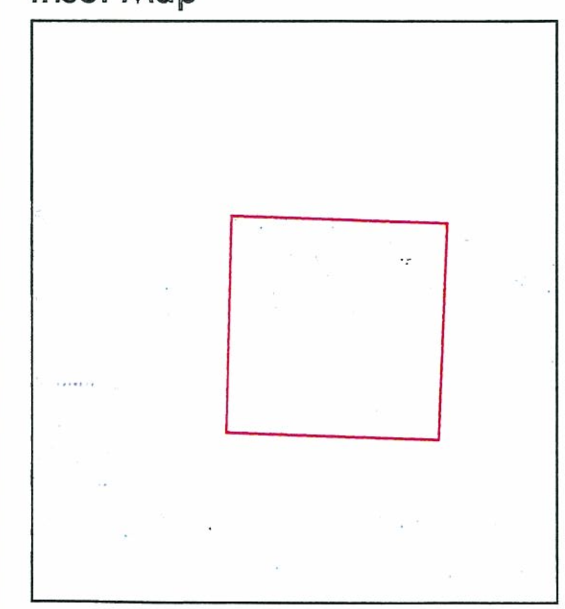
Date: April, 2002
Projection: UTM, Zone 14
Company: EBA Engineering Consultants Ltd.
Project #: 01-14863

Legend

- Ground Assessment
- Ground/Aerial Assessment
- Interpreted UTEM Conductors (Project Exploration Area)
- Camp Location
- Study Area Boundary

Note: Observation label denotes waypoint ID

Inset Map



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3.5.1 Photographs of Representative Ecosystem Units

Plate 11 ***Betula-Ledum*** **Tundra Ecosystem Unit**

Plate 12 **Aerial View of *Betula-Ledum* Tundra Ecosystems (Dark Green) with Patches of Sedge Meadows (Light Green)**

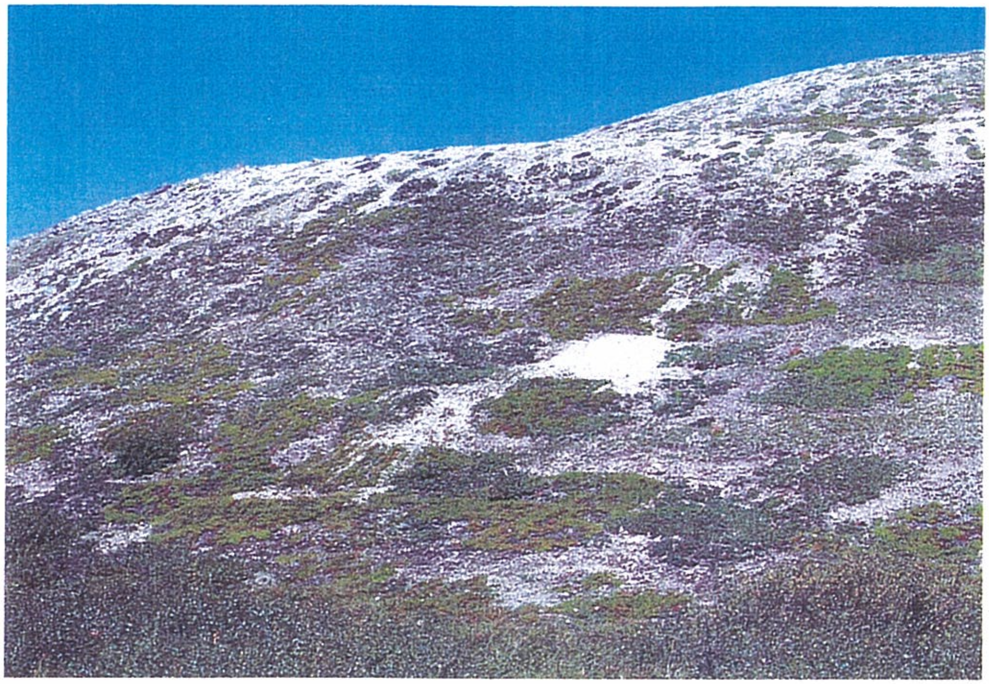

Plate 13 **Esker Complex with *Silene-Saxifraga* (SSe) on Esker Top, *Betula-Empetrum* (BEe) Esker Type on Side Slopes and *Betula-Ledum* Esker Type (BLe) at Base**

Plate 14 **Esker Complex with *Silene-Saxifraga* (SSe)**

Plate 15 **A Birch Hummock, *Betula-Rubus* (BR), Ecosystem Unit**

Plate 16 **A Birch Hummock, *Betula-Rubus* (BR), Ecosystem Unit**

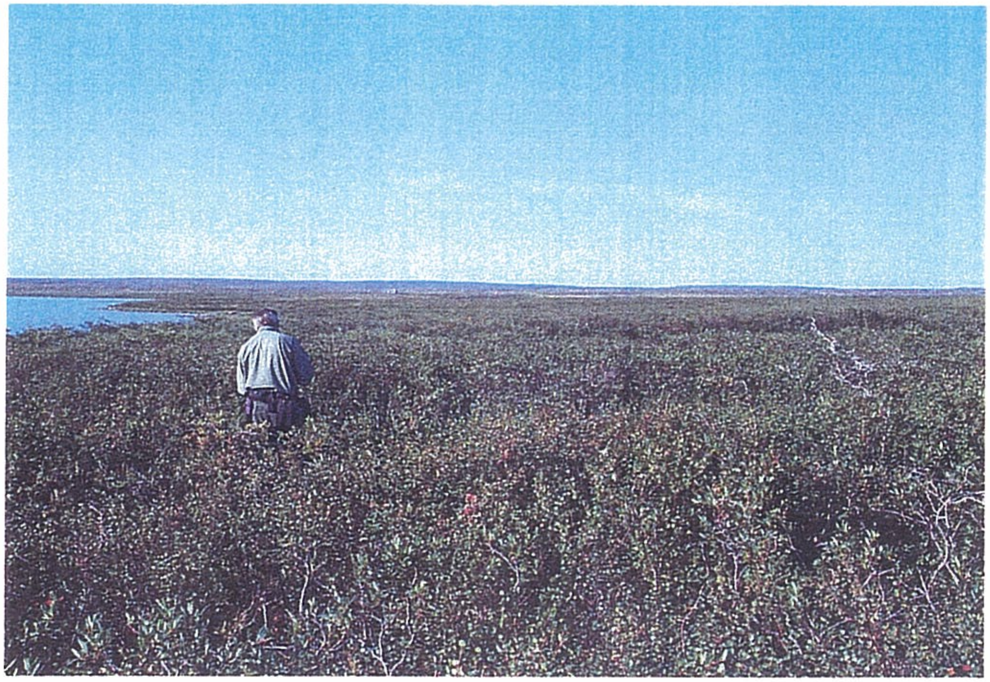

Plate 17 A Birch Seep BC, *Betula-Calamagrostis* (BC), Ecosystem Unit

Plate 18 Aerial View of a Birch Seep BC, *Betula-Calamagrostis* (BC), Ecosystem Unit

Plate 19 A ***Salix-Rubus arcticus*** **or Willow Riparian (SR) Ecosystem Unit**

Plate 20 **Aerial View of a Willow Riparian (SR) Ecosystem (Dark Green Strip of Vegetation)**

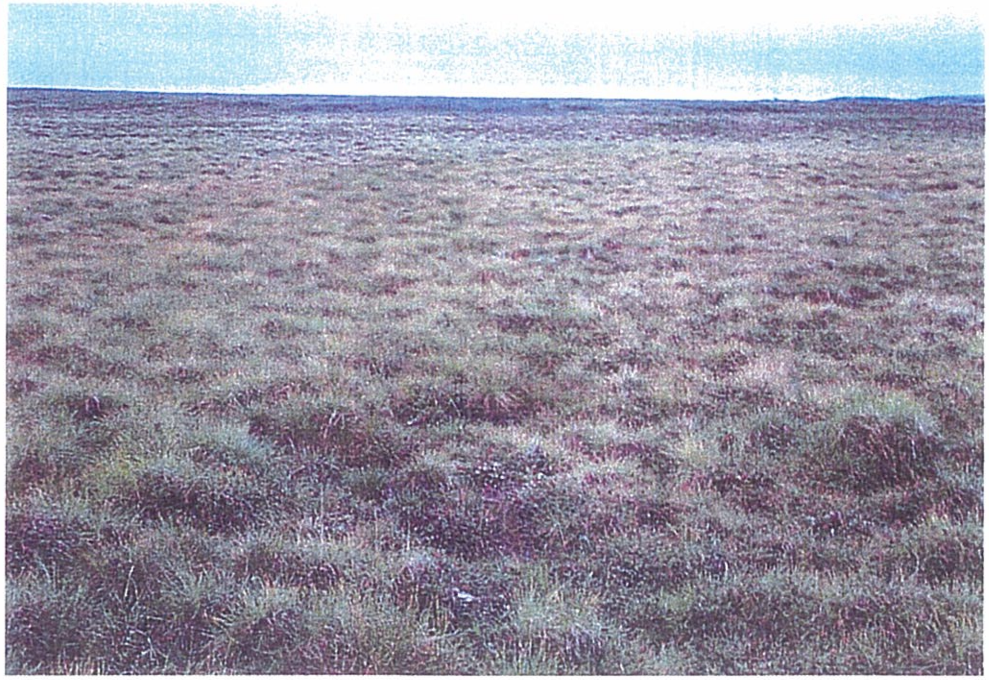

Plate 21 A Wetland Complex (EA) Ecosystem Unit With *Eriophorum* spp. as Dominant Plant Cover

Plate 22 Aerial View of a CE/CA Wetland Complex (Light Green) Ecosystem Unit with *Eriophorum* spp. Tussocks

Plate 23 **A Wetland Complex CA Ecosystem Unit with *Carex* spp. as Dominant Plant Cover**

Plate 24 **Aerial View of a CE Wetland Complex (Light Green on Lake Margins) with BL on Adjacent Higher Ground (Brown)**

Plate 25 A Lichen-Boulder Field (BF) Ecosystem Unit

Plate 26 Exposed Bedrock (RB) Ecosystem Unit

3.6. Conservation Status of Plants

The biological diversity of plants has become increasingly important to researchers and Canadians in general. The lack of protection for rare plants can be detrimental to their populations. The species listed below are part of the rare flora listed in Rare Plants of Northwest Territories (McJannet *et al.* 1995).

A rare species is one that because of its biological characteristics, or because it occurs at the edge of its main range, or, for some other reason, exists in low numbers or in very restricted areas in the region of consideration (McJannet *et al.* 1995).

Within in this context, as it pertains to NU and NWT, rarity is defined as taxon which occur in very few localities or are restricted to a small area of NU or NWT (McJannet *et al.* 1995). The methodology applied for ascribing conservation status to individual plant species was originally devised by The Nature Conservancy (TNC) and applied by McJannet *et al.* (1995) to species occurring in NU and NWT.

The ranking methodology applied on this project is the same as that applied by TNC and McJannet *et al.* (1995). Seven plant species have been listed by McJannet *et al.* (1995) as occurring within a 200 km radius of Ferguson Lake: *Carex rufina*, *Draba norvegica*, *Juncus stygius* ssp. *americanus*, *Pedicularis macrodonta*, *Polygonum caurianum* ssp. *hudsonianum*, *Potamogeton obtusifolius*, and *Puccinellia kurilensis*.

No species recorded in that reference were found on the sites examined.

5.0 REFERENCES

Agriculture and Agri-Foods. 1996. Ecoregions, Soil Landscapes, Base Data. Soil Landscapes of Canada, Ver. 2.2 and Soil Organic Carbon. Digital Database of Canada, National Soils Database, 1:1 Map and associated text pages.

Argus, G.W. 1973. The Genus Salix in Alaska and the Yukon. National Museums of Canada, Ottawa. Publications in Botany, No. 2. 279 pp.

Baillie, S.R. 1991. Monitoring terrestrial breeding bird populations. *in Monitoring for Conservation and Ecology.* Goldsmith, F.B. (Ed.). Chapman and Hall. New York, New York. 275 pp.

Beanlands, G.E. and P.N. Duinker. 1983. An ecological framework for environmental impact assessment in Canada. Institute for Resource and Environmental Studies, Dalhousie Univ., Halifax. 132 pp.

Beverly and Qamanirjuaq Caribou Management Board. 2002. Beverly and Qamanirjuaq Caribou, 1996 – 2002, Management Plan. 12 pp.

Beverly and Qamanirjuaq Caribou Management Board. 1999. Protecting Beverlyand Qamanirjuaq Caribou and Caribou Range. Part I: Background Information. 19 pp.

Burt, P. 1991. Barrenland Beauties. Outcrop Ltd. Yellowknife, NWT. 246 pp.

Cobb, B. 1963. A Field Guide to the Ferns and Their Related Families of Northeastern and Central North America with a Section on Speices also Found in the British Isles and Western Europe. Peterson Field Guide Series No. 10. Houghton Mifflin kCompany. Boston, Masssachusetts. 281 pp.Cody 2000

Cody, W. 2000. Flora of the Yukon Territory. 2nd Ed. National Research Council of Canada, Ottawa. 669 pp.

COSEWIC. 2000. Canadian Species at Risk, May 2000. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

COSEWIC 1999. COSEWIC updates list. *News release, May 7*. Ottawa.

Courtenay, B. and J.H. Zimmerman. 1972. A Guide in Full Color: Wildflowers and Weeds. Van Nostrand Reinhold Company. Toronto, Ontario. 144 pp.

Craighead, F.C. Jr. and D.P. Mindell. 1981. Nesting raptors in western Wyoming, 1947 and 1975. *J. Wildl. Manage.* 45:865-872.

Ecological Stratification Working Group. 1995. *A national ecological framework for Canada.* Agriculture and Agra-Food Canada, Research Branch, Centre for Land and Biological Resources Research, Environment Canada, State of the Environment Directorate, Ecozone Analysis Branch, Ottawa-Hull. 125 pp.

Douglas, G.W. 1982. The Sunflower Family (Asteraceae) of British Columbia. Volume I - Senecioneae. British Columbia Provincial Museum. Occasional Papers Series No. 23. Victoria, British Columbia. 180 pp.

Graves and Hall. 1988. *Arctic Animals*. Department of Renewable Resources, Government of the Northwest Territories, Yellowknife.

Johnson, D., L. Kershaw, A. MacKinnon and J. Pojar. 1995. Plants of the Western Boreal Forest and Aspen Parkland. Lone Pine Publishing. Edmonton, Alberta. 392 pp.

Jolly, G.M. 1969. Sampling Methods for Aerial Census of Wildlife Populations. *E. Afr. Agric. For. J.* 34:46-49.

Kennedy, P.L. 1980. Raptor baseline studies in energy development. *Wildl. Soc. Bull.* 8:129-135.

Kuyt, E. 1980. Distribution and breeding biology of raptors in the Thelon River area, Northwest Territories, 1957-1969. *Can. Field-Naturalist* 94:121-130.

McJannet, C.L., G.W. Argus and W.J. Cody. 1995. Rare Vascular Plants in the Northwest Territories. Canadian Museum of Nature, Ottawa. 104 pp.

Moss, E.H. 1977. Flora of Alberta. University of Toronto Press. Toronto, Ontario. 546 pp.

Newton, I. 1979. *Population ecology of raptors*. Buteo Books, Vermilion, South Dakota.

Platt, J.B. 1976. Gyrfalcon nest site selection and winter activity in the western Canadian arctic. *Can. Field-Naturalist* 90:338-345.

Poole, K.G. and R.G. Bromley. 1988*a*. Natural history of the gyrfalcon in the central Canadian Arctic. *Arctic* 41:31-38.

Poole, K.G. and R.G. Bromley. 1988*b*. Interrelationships within a raptor guild in the central Canadian Arctic. *Can. J. Zoology* 66:2275-2282.

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

Scotter, G.W. and H. Flygare. 1986. Wildflowers of the Canadian Rockies. Hurtig Publishers Ltd. Edmonton, Alberta. 170 pp.

Shank, C. C. 1997. *1996 central Arctic raptor surveys*. Unpubl. Report. Dept. of Resources, Wildlife and Economic Development. 4pp.

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

Shank, C. C., and K. G. Poole. 1994. Status of gyrfalcon *Falco rusticolus* populations in the Northwest Territories, Canada. Pp 421-436 in B.-U. Meyburg and R. D. Chancellor (eds.), *Raptor Conservation Today*. WWGBP/the Pica Press.

Trelawny, J.G. 1983. Wildflowers of the Yukon and North Western Canada Including Adjacent Alaska. Sono Nis Press. Victoria, British Columbia. 214 pp.

Wakelyn, Leslie. 1999. The Qamanirjuaq Caribou Herd – An Arctic Enigma. http://www.arctic-caribou.com/qcs.pdf.

Walmsley, M., G. Utzig, T. Vold and J. van Barneudd (eds). 1980. Describing Ecosystems in the field. B.C. Ministry of Environment, Resouce Analysis Branch, Victoria, B.C. Technical Paper 2.

Weaver, J.L., P.C. Paquet and L.F. Ruggiero. 1996. Resilience and conservation of large carnivores in the Rocky Mountains. *Cons. Biol.* 10: 964-976.

APPENDIX A

INCIDENTAL SPECIES OBSERVED DURING AERIAL CARIBOU SURVEYS, FERGUSON LAKE, NU, 2001

Miscellaneous wildlife observations list in order of frequency during all aerial caribou surveys at Ferguson Lake, NU, 2001.

Species	July	August	*Totals*
Canada Goose	252	77	329
Greater white-fronted Goose	0	167	167
Muskox	79	5	84
Sandhill Crane	10	38	48
Herring Gull	2	27	29
Tundra Swan	7	4	11
Wolf	5	0	5
Long-tailed Jaeger	0	1	1
Rough-legged Hawk	0	1	1
Golden Eagle	1	0	1
Willow Ptarmigan	1	0	1

APPENDIX B

TERRESTRIAL WILDLIFE SPECIES DOCUMENTED AS OCCURING IN THE WILDLIFE STUDY AREA, FERGUSON LAKE, NU, 2001

Number of terrestrial species documented during the 2001 field program at Ferguson Lake, NU, 2001.

Mammalian Species	No. of Species	Avifuana Species	No. of Species
Arctic Fox	1	American Pipit	1
Arctic Ground Squirrel	1	Arctic Tern	1
Arctic Hare	1	Brant	1
Barren-ground Caribou	1	American Tree Sparrow	1
Grizzly Bear	1	Blackpoll Warbler	1
Muskox	1	Canada Goose	1
Wolf	1	Common Merganser	1
		Common Snipe	1
		Gray-cheeked Thrush	1
		Glaucous Gull	1
		Golden Eagle	1
		Greater White-fronted Goose	1
		Green-winged Teal	1
		Harris Sparrow	1
		Herring Gull	1
		Horned Lark	1
		Hoary Redpoll	1
		Lapland Longspur	1
		Least Sandpiper	1
		Lesser Scaup	1
		Long-tailed Duck	1
		Long-tailed Jaeger	1
		Northern Pintail	1

		Peregrine Falcon	1
		Redbreasted Merganser	1
		Rough-legged Hawk	1
		Sandhill Crane	1
		Savannah Sparrow	1
		Tundra Swan	1
		White-crowned Sparrow	1
		Willow Ptarmigan	1
		Yellow Warbler	1
Total Species	*7*	***Total Species***	*32*

APPENDIX D

SPECIES LIST FOR PLANTS KNOWN TO OCCURIN THE AREA OF FERGUSON LAKE, NU

Family, Genus and Species	Common Name
Polypodiaceae	
Cystopteris fragilis	Fragile Fern
Dryopteris fragrans	Fragrant Shield Fern
Woodsia ilvensis	Rusty Woodsia
Equisetaceae	
Equisetum arvense	Common Horsetail
Lycopodiaceae	
Lycopodium annotinum	Bristly Club-Moss
Lycopodium Selago	Mountain Club-Moss
Gramineae	
Agrostis mertensii	No Common Name
Arctogrotis latifolia	"
Arctophila fulva	"
Calamagrostis canadensis	"
Calamagrostis deschampsioides	"
Calamagrostis stricta	"
Festuca brachyphylla	"
Hierochloe alpina	Holy Grass
Poa alpina	No Common Name
Poa arctica	"
Poa glauca	"
Trisetum spicatum	"
Cyperaceae	
Carex aquatilis	Sedge
Carex bigelowii	"
Carex capillaris	"
Carex capitata	"
Carex chordorhiza	"
Carex glacialis	"
Carex gynocrates	"
Carex membranacea	"
Carex obtusata	"
Carex physocarpa	"
Carex rariflora	"
Carex rotundata	"
Carex saxatalis	"
Carex supina	"
Carex vaginata	"
Carex Williamsii	"
Eleocharis acicularis	Spike-Rush
Eriophorum angustifolium	Cotton-Grass
Eriophorum triste	"
Eriophorum brachyantherum	"
Eriophorum callitrix	"
Eriophorum vaginatum	"
Eriophorum russeolum	"
Eriophorum Scheuchzeri	"
Scirpus caespitosus	Bulrush
Juncaceae	
Juncus albescens	Bog-Rush
Juncus biglumis	"
Juncus castaneus	"
Luzula albescens	Wood Rush
Luzula arctica	"
Luzula confusa	"
Luzula nivalis	"
Luzula Whalenbergii	"
Liliaceae	
Tofieldia coccinea	False Asphodel
Tofieldia pusilla	"
Orchidaceae	
Habenaria obtusata	Northern Bog-Orchid
Salicaceae	
Salix arbusculoides	Willow
Salix arctica	"
Salix arctophila	"
Salix glauca	Blue-green Willow
Salix herbacea	Least Willow
Salix lutea	Willow
Salix pedicellaris	"
Salix planifolia	"
Myricaceae	
Myrica Gale	Sweet Gale
Betulaceae	
Alnus crispa	Green Alder
Betula glandulosa	Dwarf Birch
Polygonaceae	
Oxyria digyna	Mountain Sorrel
Polygonum viviparum	Bistort
Caryophyllaceae	
Cerastium alpinum	Mouse-ear Chickweed
Melandrium atfine	Bladder-Compion
Minuartia rossii	Sandwort
Minuartia rubella	"
Sagina caespitosa	Pearlwort
Silene acaulis	Campion

Stellaria longipes	Chickweed
Stellaria monantha	"
Ranunculaceae	
Anemone richardsonii	Anemone
Ranunculus aquatilis	Buttercup
Ranunculus lapponicus	"
Ranunculus pygmaeus	"
Cruciferae	
Arabis arenicola	No Common Name
Cardimine digitata	Bitter Cress
Cardimine bellidifolia	"
Draba cinerea	No Common Name
Draba glabella	"
Draba nivalis	"
Saxifragaceae	
Parnassia Kotzebuei	Grass-of-Parnassus
Saxifraga cernua	Nodding Saxifrage
Saxifraga nivalis	Alpine Saxifrage
Saxifraga rivularis	Purple Saxifrage
Saxifraga tricuspidata	Prickly Saxifrage
Rosaceae	
Dryas integrifolia	Mountain Avens
Potentilla hyparctica	No Common Name
Potentilla nivea	No Common Name
Potentilla palustris	No Common Name
Potentilla tridentata	No Common Name
Rosa chamaemorus	"
Rubus arcticus	Raspberry
Brassicaeae	
Astragalus alpinus	Alpine Milk-Vetch
Oxytropis arctica	No Common Name
Oxytropis arctobia	"
Oxytropis bellii	"
Oxytropis campestris	"
Oxytropis maydelliana	"
Empetraceae	
Empetrum nigrum	Crowberry
Violaceae	
Viola pallens	Violet

Onagraceae	
Epilobium angustifolium	Fireweed
Epilobium davuricum	No Common Name
Pyrolaceae	
Pyrola grandiflora	Large-flowered Wintergreen
Pyrola secunda	One-sided Wintergreen
Ericaceae	
Andromeda polifolia	Andromeda
Arctostaphylos alpina	Alpine Bear Berry
Arctostaphylos rubra	Bear Berry
Cassiope tetragona	White Heather
Kalmia polifolia	Bog-Laurel
Ledum decumbens	Labrador-Tea
Ledum groenlandicum	"
Loiseleuria procumbens	Alpine Azalea
Phyllodoce coerulea	Mountain Heather
Rhododendron lapponicum	Rhododendron
Vaccinium uliginosum	Bilberry
Vaccinium Vitis-idaea	Mountain Cranberry
Diapensiaceae	
Diapensia lapponica	No Common Name
Scrophulariaceae	
Pedicularis flammea	Lousewort
Pedicularis labrodorica	Labrador Lousewort
Pedicularis lanata	Wooly Lousewort
Pedicularis lapponica	Lapland Lousewort
Pedicularis sudetica	Lousewort
Rubiaceae	
Galium trifidum	Bedstraw
Compositae (Asteraceae)	
Antennaria angustata	Everlasting
Antennaria canescens	"
Antennaria isolepis	"
Antennaria nitida	"
Arnica alpina	No Common Name
Artemisia borealis	Wormwood
Erigeron humilis	"
Petasites sagittatus	"
Taraxacum lapponicum	Dandelion
Taraxacum lacerum	"

[1] This list is based on plants which have been collected within the Ferguson Lake wildlife study area, NU, 2001.