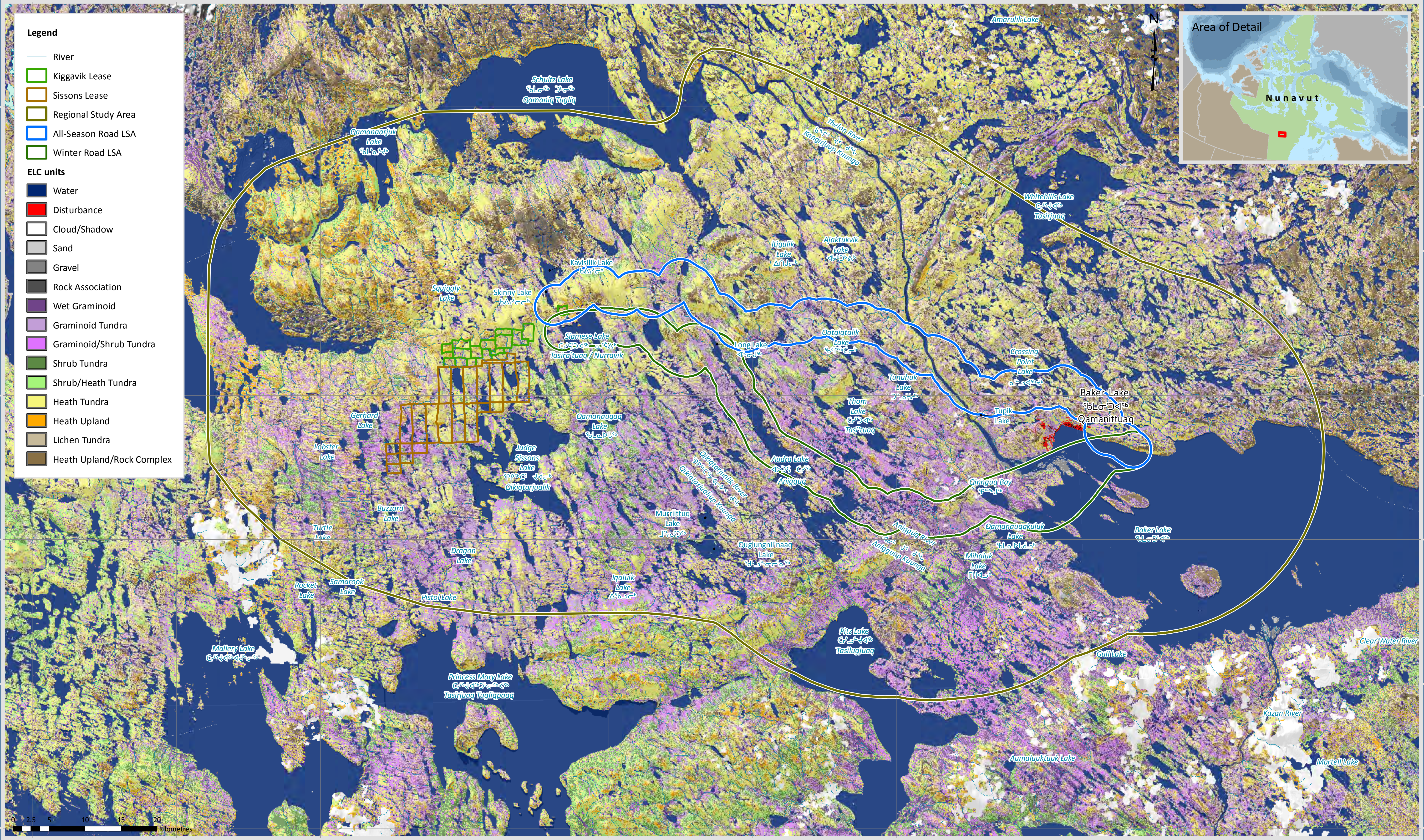
Legend
River
Kiggavik Lease
Sissons Lease
Regional Study Area
All-Season Road LSA
Winter Road LSA
ELC units
Water
Disturbance
Cloud/Shadow
Sand
Gravel
Rock Association
Wet Graminoid
Graminoid Tundra
Graminoid/Shrub Tundra
Shrub Tundra
Shrub/Heath Tundra
Heath Tundra
Heath Upland
Lichen Tundra
Heath Upland/Rock Complex
Area of Detail
Nunavut
N
Kilometres
500000
520000
540000
560000
580000
600000
620000
640000
660000
680000
7180000
7160000
7140000
7120000
7100000
7080000
Amarulik Lake
Schultz Lake
Qamaniq Tugliq
Qamanaarjuk Lake
Thelon River
Kangiqliup Kuunga
Whitehills Lake
Tasirjuaq
Itigulik Lake
Ajaktukvik Lake
Kavisilik Lake
Squiggly Lake
Skinny Lake
Siamese Lake
Tasirq'luaq / Nurravik
Long Lake
Qatqiqtalik Lake
Crossing Point Lake
Baker Lake
Qamanittuaq
Tunuhuk Lake
Thom Lake
Tas'tuaq
Tupik Lake
Gerhard Lake
Qamanaugaq Lake
Lobster Lake
Judge Sissons Lake
Qikiqtarjualik
Audra Lake
Aniggug
Qinngua Bay
Buzzard Lake
Mucrittuq Lake
Turtle Lake
Aniguq River
Aniggugub Kuunga
Qamanaugakuluk Lake
Dragon Lake
Quglungnil'naag Lake
Mihaluk Lake
Baker Lake
Rocket Lake
Samarook Lake
Pistol Lake
Iqaluk Lake
Pitz Lake
Tasiluqjuaq
Mallery Lake
Clear Water River
Gull Lake
Princess Mary Lake
Tasirjuaq Tugliqpaaq
Kazan River
Aumaluuktuuk Lake
Martell Lake

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/06/2014 Scale: 1:500,000
File: 5.1-10_ELC_in_RSA_Access_Road_LSAs.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.1-10

ECOLOGICAL LAND CLASSIFICATION UNITS IN THE REGIONAL STUDY AREA

KIGGAVIK PROJECT - EIS

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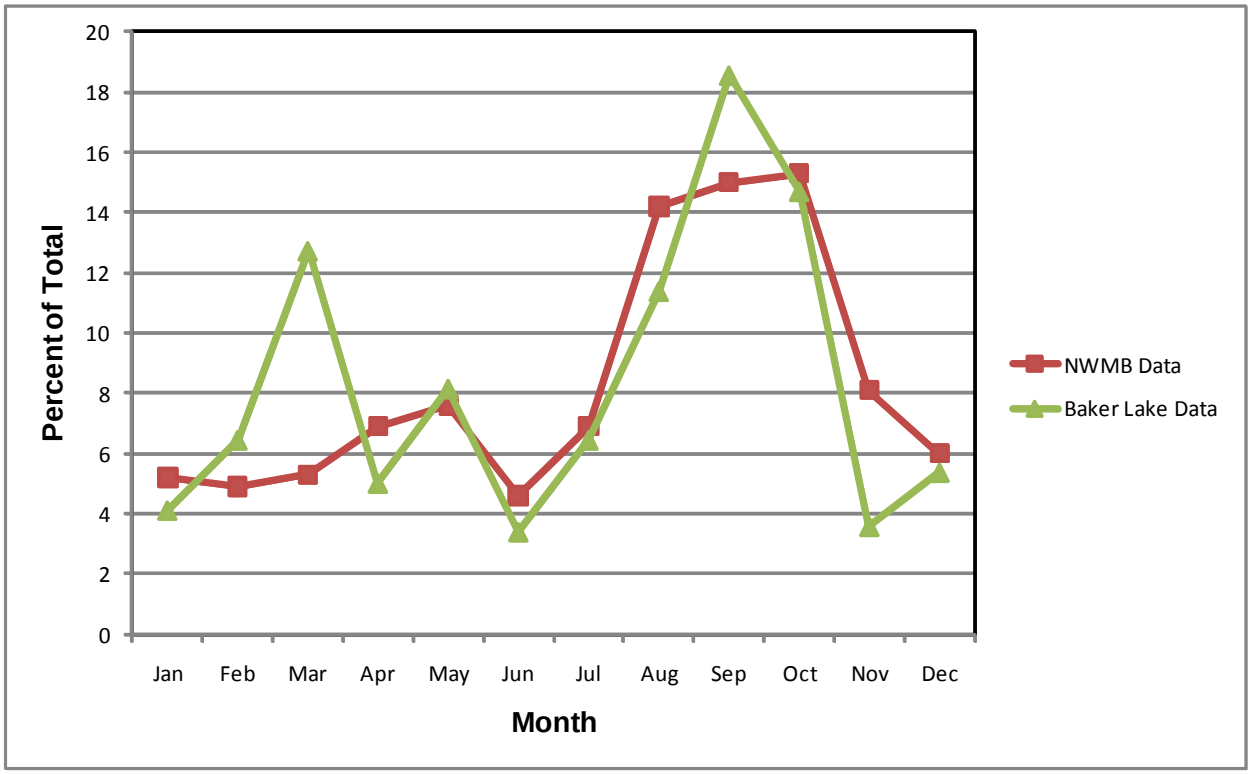
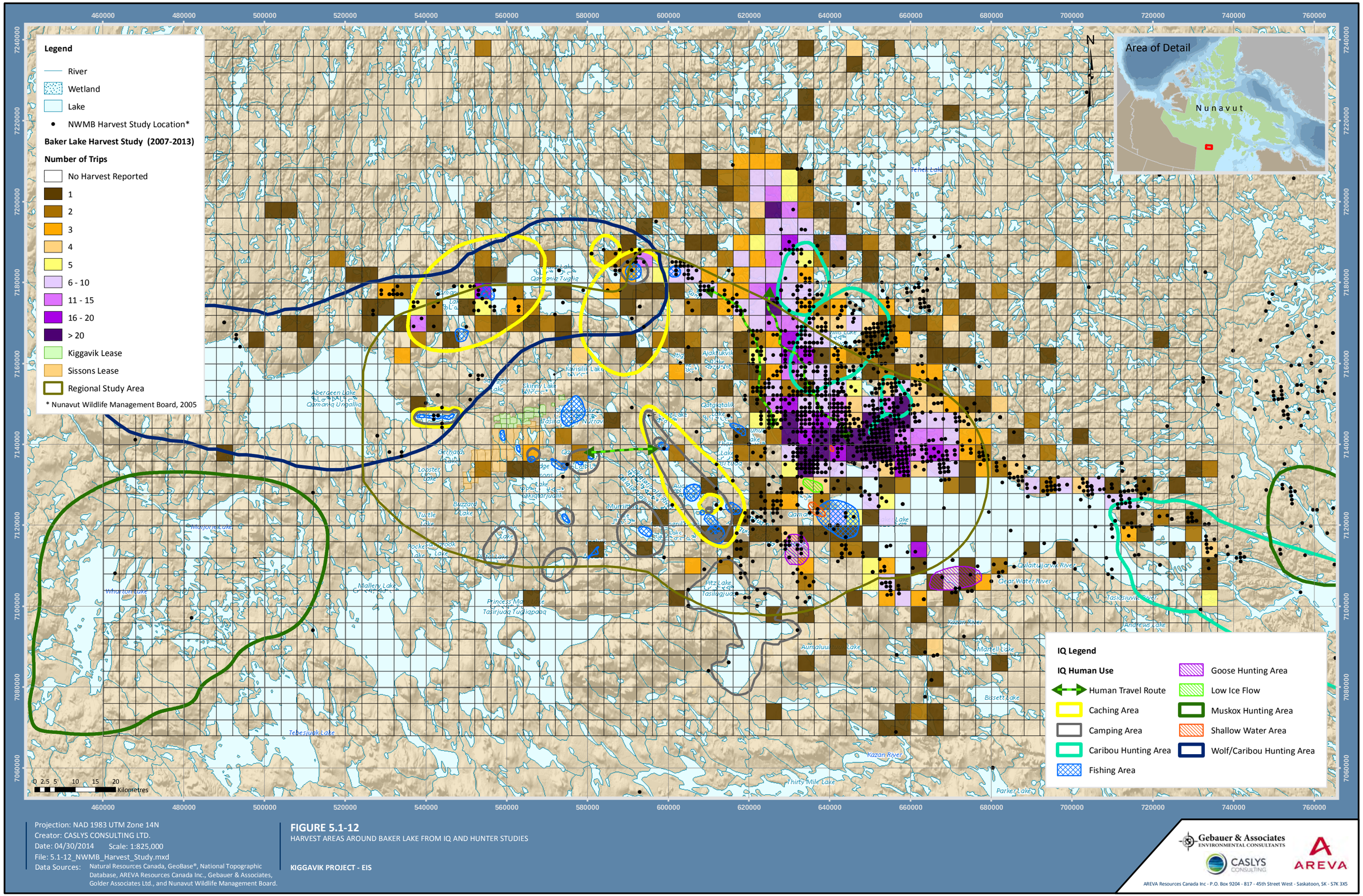


Nunavut Wildlife Harvest Study data from NWMB (2005)

Figure 5.1-11 Percent of Annual Caribou Harvest from January to December for the Baker Lake Hunter Harvest Study (2007 to 2009) and the Nunavut Wildlife Harvest Study (1996 to 2001)



Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 04/30/2014 Scale: 1:825,000
File: 5.1-12_NWMB_Harvest_Study.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Gebauer & Associates, Golder Associates Ltd., and Nunavut Wildlife Management Board.

FIGURE 5.1-12
HARVEST AREAS AROUND BAKER LAKE FROM IQ AND HUNTER STUDIES

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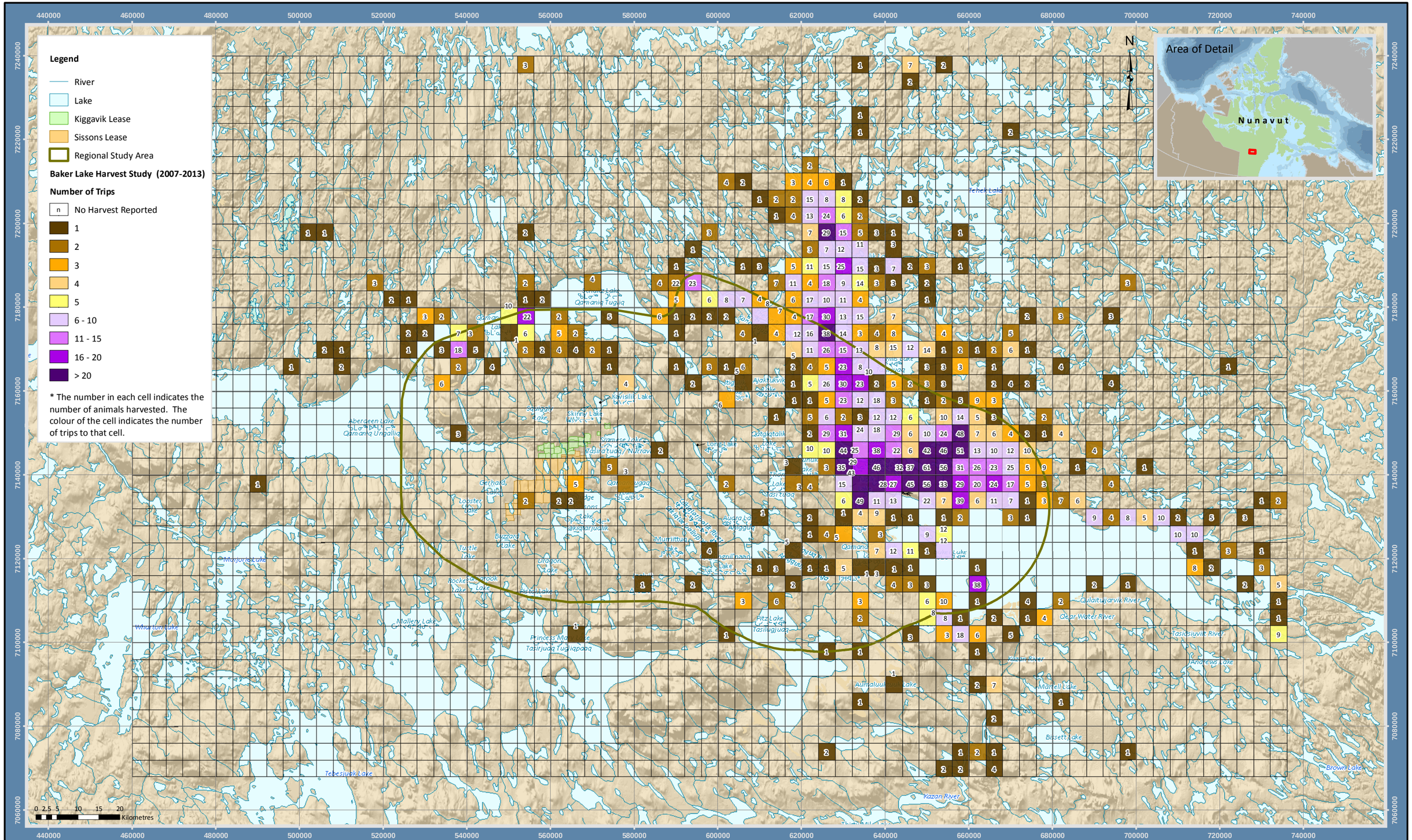

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/09/2014 Scale: 1:825,000
File: 5.1-13_Hunter_Harvest_Study_BLHS.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Golder Associates Ltd., and Gebauer & Associates.

FIGURE 5.1-13
LOCATION AND NUMBER OF HARVESTS IN THE BAKER LAKE AREA FOR 2007 TO 2013

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5.2 Invertebrates

Incidental invertebrate observations were recorded while conducting field surveys in the RSA from 2007 to 2010. Invertebrate species commonly observed included various butterflies, Arctic wolf spider (*Pardosa glacialis*), Arctic bumblebee (*Bombus polaris*), mosquitoes, black flies, mayflies, and large swarms of midges. Butterfly species were identified using photographs and verified in consultation with butterfly experts. Coral Harbour residents have also reported *seeing occasional butterflies in May or June* (IQ-CHAH 2009). The following butterfly species were identified during field surveys:

- Arctic fritillary (Boloria chariclea sp. arctica);
- mountain fritillary (Bolaria alaskensis);
- paleano sulphur (Colias paleano sp. chippewa); and
- red-disked alpine (Erebia discoidalis).

5.3 Small Mammals

5.3.1 Status and Traditional Use

Small mammals most commonly observed since wildlife studies began in the RSA include ermine (Mustela erminea), Arctic hare, sik sik (Arctic ground squirrel), brown lemming (Lemmus sibiricus), collared lemming (Dicrostonyx torquatus), northern red-backed vole (Clethrionomys rutilus), and meadow vole (Microtus pennsylvanicus). Other small mammal species, such as red fox (Vulpes vulpes) and American marten (Martes americana), have been reported in the Baker Lake area by community members, but have not yet been observed during field surveys in the RSA. All of the small mammals known to occur within the RSA are considered to be secure or undetermined in Nunavut (CESCC 2011, internet site) and none are listed federally by COSEWIC (2014) or SARA (2014). No other sensitive small mammal species are expected to occur in the area.

Small mammal population cycles are a well-known phenomenon in northern systems and their importance as a prey species means that their population levels can often directly affect the status of more sensitive raptor and predatory mammal species. Rankin Inlet residents noted they are currently seeing a change in sik-sik (Arctic ground squirrel) populations (EN-RI NIRB May 2010). Collared lemming is particularly known for its population cycles (Ehrlich et al. 2001; Wilson and Bromley 2001), although Krebs et al. (1995) and Predavec et al. (2001) provide evidence of non-cyclic populations. Ermine also exhibit population fluctuations in relation to changes in prey abundance (King 1983). Small mammals are not a regular food source for indigenous people. In recent IQ studies, Elders indicated that hare were eaten when caribou were scarce (IQ-BL01 2008).

5.3.2 Population Data

Although not identified as a VEC, small mammals and evidence of their presence were often recorded incidentally during ground surveys. Arctic hares and sign (scat, browse) were frequently observed, including around the proposed Baker Lake dock sites (Figure 5.1-8). Ground squirrel burrows were commonly observed during ground surveys, especially along the All-Season Road and previously considered South AWAR option (Figures 5.1-3 and 5.1-5, respectively), and ermine scat was observed along the All-Season Road during a survey of proposed quarry sites (Figure 5.1-3). Small mammals are present throughout the RSA, and no area of critical importance has been identified.

Small mammals were trapped for tissue chemistry sampling in 2009 (see Section 5.1-5 for results). Eight locations were sampled within the Mine LSA plus one reference location in the RSA (trap locations are identified in Figure 4.3-14B). Trapping results are presented in Table 5.3-1. Capture index was lowest at the reference site (0.00), and highest at station KIG3 (3.02). In comparison, a small mammal survey conducted in the 1990s to record population levels across NWT and Nunavut recorded an annual capture index near Baker Lake ranging from 0.22 to 2.82 from 1991 to 1997 (Carriere 1999). Only four species were caught at the Baker Lake survey station during this study: red-backed vole, meadow vole, brown lemming, and collared lemming. Small mammals were also captured near the RSA by URG (1981). Data are included for comparison in Table 5.3-2.

Table 5.3-1 Summary of Small Mammal Capture for Tissue Chemistry Analysis (2009)

Sampling Location	Date (2009)	Number Trap Nights[(a)]	Capture Index[(b)]	Species Trapped
KIG 1	Jul 31 – Aug 7	409	1.22	4 red-backed vole 1 collared lemming
KIG 2	July 24 – Aug 5	385	0.52	2 collared lemming
KIG 3	Aug 24 – Aug 30	232	3.02	7 collared lemming
KIG 4	Jul 24 – Aug 5	414	1.69	4 red-backed vole 2 collared lemming 1 brown lemming
SIS 2	Aug 9 – Aug 13	556	0.90	2 red-backed vole 2 collared lemming 1 brown lemming
SIS 3	Aug 22 – Aug 28	488	1.02	4 red-backed vole 1 brown lemming 1 savannah sparrow
SIS 4	Aug 29 – Aug 30	190	0.53	1 brown lemming

Table 5.3-1 Summary of Small Mammal Capture for Tissue Chemistry Analysis (2009)

Sampling Location	Date (2009)	Number Trap Nights[(a)]	Capture Index[(b)]	Species Trapped
SIS 5	Aug 14 – Aug 19	654	0.46	1 red-backed vole 2 collared lemming 1 savannah sparrow
REF 1	Aug 23 – Aug 27	431	0.00	1 savannah sparrow

Results presented are for samples collected at locations shown in Figure 4.3-14B.

(a) Trap nights calculated from the number of traps set every night multiplied by the number of sampling nights less misfires and non-target species capture

(b) Capture index equals the total number of target species captured divided by the number of trap nights. In comparison, capture indices for Baker Lake ranged from 0.00 to 2.82, from 1991 to 1997 (Carriere 1999)

Table 5.3-2 Summary of Available Historical Data on Small Mammal Capture Near the Kiggavik Mine Local Study Area

Small Mammal Species	1979		1980	
	Mean	Capture Index	Mean	Density (#/ha)
Northern red-backed vole	11.5	3.44	3.5	1.85 ±0.87
Brown lemming	7.0	2.1	9.1	5.56 ±6.11
Collared lemming	4.1	1.22	1.9	1.23 ±0
Meadow vole	2.2	0.67	1.3	1.23 ±0

SOURCE: URG 1981

Mean = average number of individuals per 1,000 trap nights.

5.4 Upland Breeding Birds

5.4.1 Status and Traditional Use

Some upland breeding bird species observed in the RSA are considered 'Sensitive' in Nunavut (CESCC 2011, internet site), including the American pipit, American tree sparrow, hoary redpoll, snow bunting, and white-crowned sparrow (see Table 5.1-4). No upland bird species observed or expected to occur in the RSA to date is listed federally in the *SARA* or by COSEWIC.

IQ and engagement data relating to most upland birds are limited and general. People remembered *a time when it was so cold that many nesting birds died* (IQ-ARVJ 2011), and some noted that *birds are now starting to travel further to nest and speculate it is because the bird population is growing* (IQ-ARVJ 2011). In other regional studies, observations have been made that *there have been many effects of climate change including a decrease in spring small bird populations (*McDonald et al. 1997*).*

Ptarmigan is one of the only upland birds specifically referenced in IQ, likely because it is a harvested species. One Elder explained that *caribou and ptarmigan were their main food source, as they did not have fishing rods to catch fish in the summer* (IQ-BL08 2008). *Ptarmigan are seen all year round, and hunted all the time except for spring; eggs are collected if they can find them* (IQ-RBJ 2011). Historically, ptarmigan were hunted everywhere in the region (Freeman 1976). Baseline field surveys concur: rock ptarmigan (*Lagopus muta*) and willow ptarmigan (*Lagopus lagous*) are present throughout the RSA, in apparently similar abundance, and were one of the most frequently observed upland birds. Historical hunter data indicate a variable ptarmigan harvest in the 1970s and late 1990s (see Table 5.1-5), and ptarmigan were identified as a harvested species in the AREVA diet survey conducted in 2009 and 2010. A total catch for Baker Lake of 700 birds (no breakdown by species) was estimated by this study, compared to annual estimates of 262 birds per year in historical data (NWMB 2005). Overall, surveyed households indicated a very low preference for ptarmigan, with only 8% of households indicating it as part of their winter season diet. Other small birds and bird eggs are also gathered. Comments were made about how some different bird species are now being seen in Baker Lake, including northern flicker and kingfisher.

Population data on upland breeding birds were collected from HOL surveys, aerial surveys, breeding bird plots (PRISM plots), transect surveys, checklist surveys, and camp wildlife logs. A particular emphasis was placed on collecting data for study areas potentially targeted by preferred design alternatives, including the Mine LSA and the All-Season Road. Data from upland breeding bird surveys and a brief interpretation of results are presented below. Maps for upland bird observations from aerial surveys (see Figure 5.1-1A, B) and other ground-based surveys (see Figures 5.1-3 to 5.1-9) have been presented in Section 5.1. Any incidental upland bird observations made during waterbird surveys are summarized in Section 5.5.

5.4.2 Population Data

5.4.2.1 Height-of-Land Ground Surveys

Numerous upland bird species were identified during HOL surveys (summarized in Table 5.4-1); however, the survey focused on larger animals and in many cases small birds were not recorded by observers. As such, results provide information on presence and absence, and should not be compared between years and seasons. Cumulative monthly counts for upland breeding bird species encountered during the HOL surveys were divided by the number of survey days per month to calculate standardized encounters for each species per survey day. Total counts per year were also divided by the total number of survey days to evaluate the total number of encounters per survey day per year. These results are provided in Table 5.4-2 and illustrated graphically in Figure 5.4-1.

In all three survey years, the most commonly observed species were rock ptarmigan and willow ptarmigan, together comprising between 96% (2008) and 100% (2010) of the total observed upland bird species. Many more ptarmigan species were observed per survey day in 2010 than in previous years (see Figure 5.4-1). Other upland bird species observations were relatively low every year. This is an expected result, given that the surveyor is stationary for the duration of the HOL survey, which is intended primarily for larger animals or groups of animals, and the surveyor does not typically record small birds. As well, unless smaller passerine species are flying or calling relatively close to the surveyor, detection is anticipated to be limited. In contrast, birds such as ptarmigan species and common raven are larger and can be spotted at a greater distance.

5.4.2.2 Aerial Surveys

Aerial surveys conducted in 2007 did not record upland birds. Ptarmigan were the only upland breeding bird species recorded during aerial surveys for the Mine LSA (Figure 5.1-1A) and RSA (Figure 5.1-1B). Ptarmigan were not identified to species level in any aerial survey, and their presence varied widely between the Mine LSA and RSA surveys. This variation is likely due to the occasional collection of data for this commonly occurring species.

5.4.2.3 Breeding Bird Plot Surveys (PRISM)

Breeding bird (PRISM) plot surveys were conducted in the Mine LSA and a Control Area in the RSA (centered approximately 8 km northwest of the Mine LSA; see Figure 4.3-12) in 2008 and 2009 to determine presence/absence of upland breeding birds, including all passerines (migratory song birds), ptarmigan, waterbirds, and raptors. Data are provided in Table 5.4-3.

Table 5.4-1 Height-of-Land Ground Survey Results (Monthly) for Upland Breeding Birds (2008 to 2010)

Bird Species[(a)]	Number Upland Birds Observed (2008)					Number Upland Birds Observed (2009)					Number Upland Birds Observed (2010)					
	Jun	**Jul**	**Aug**	**Sep**	**Total**	**May**	**Jun**	**Jul**	**Aug**	**Total**	**Apr**	**May**	**Jun**	**Jul**	**Dec**	**Total**
CORA	2	0	0	0	**2**	0	0	0	2	**2**	0	0	0	0	**0**	**0**
CORE	1	0	0	0	**1**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
HOLA	2	0	0	0	**2**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
LALO	1	0	0	0	**1**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
ROPT	67	2	0	4	**73**	120	168	0	0	**288**	15	30	64	0	**0**	**109**
WIPT	40	0	0	29	**69**	51	32	0	0	**83**	49	29	36	0	**0**	**114**
PTAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Bird Totals	**113**	**2**	**0**	**33**	**148**	**171**	**200**	**0**	**2**	**373**	**64**	**59**	**100**	**0**	**1**	**224**

Results presented are for all HOL surveys conducted at locations shown in Figure 4.3-1.

(a) List of species names and codes provided in Attachment E

Table 5.4-2 Height-of-Land Ground Survey Results (Daily) for Upland Breeding Birds (2008 to 2010)

Bird Species[(a)]	Number Observed / Survey Day (2008)					Number Observed / Survey Day (2009)					Number Observed / Survey Day (2010)					
	Jun	Jul	Aug	Sep	Total	May	Jun	Jul	Aug	Total	Apr	May	Jun	Jul	Dec	Total
# Survey Days	**5**	**8**	**2**	**2**	**17**	**6**	**14**	**6**	**22**	**48**	**2**	**2**	**2**	**1**	**1**	**8**
CORA	0	0	0	0	**0**	0	0.1	0	0	**0.1**	0	0	0	0	0	**0**
CORE	0.2	0	0	0	**0.1**	0	0	0	0	**0**	0	0	0	0	0	**0**
HOLA	0.4	0	0	0	**0.1**	0	0	0	0	**0**	0	0	0	0	0	**0**
LALO	0.2	0	0	0	**0.1**	0	0	0	0	**0**	0	0	0	0	0	**0**
ROPT	13	0.3	0	2	**4.3**	20	12	0	0	**6.0**	7.5	15	32	0	0	**13.6**
WIPT	8.0	0	0	15	**4.1**	8.5	2.3	0	0	**1.7**	24.5	14.5	18	0	0	**14.3**
PTAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**0.1**
Bird Totals	**21.8**	**0.3**	**0**	**17**	**8.7**	**28.5**	**14.4**	**0**	**0**	**7.8**	**32**	**29.5**	**50**	**0**	**0**	**28**

Results presented are for all HOL surveys conducted at locations shown in Figure 4.3-1.

(a) List of species names and codes provided in Attachment E

Table 5.4-3 Breeding Bird (PRISM) Plot Survey Results for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

Bird Species[(a)]	2008				2009			
	Total Bird Count		Count / Survey Day	Relative Abundance (Mean Birds/Plot)	Total Bird Count		Count / Survey Day	Relative Abundance (Mean Birds/Plot)
	Control Area (RSA)	Mine LSA			Control Area (RSA)	Mine LSA		
AMGP	1	8	0.9	0.03	0	1	0.1	0.18
AMPI	4	0	0.4	0.20	4	1	0.5	0.02
ATSP	0	0	0	0.03	1	0	0.1	0
CAGO	0	2	0.2	0.05	2	2	0.4	0.08
CORE	36	29	6.5	1.33	17	13	3	0.84
DUNL	1	4	0.5	0.03	0	8	0.8	0.24
GWFG	4	0	0.4	0.15	2	4	0.6	0.08
GWTE	2	0	0.2	0.05	0	0	0	0
HOLA	20	14	3.4	1.25	30	15	4.5	0.58
HORE	3	1	0.4	0.23	6	6	1.2	0.14
LALO	158	163	32.1	7.98	161	151	31	6.28
LTDU	5	5	1	0.23	4	3	0.7	0.16
LTJA	2	0	0.2	0.10	2	0	0.2	0
NOPI	2	0	0.2	0.10	2	0	0.2	0
PESA	1	0	0.1	0.03	0	0	0	0
RBME	2	0	0.2	0.05	0	0	0	0
REDP	15	24	3.9	0.38	0	1	0.1	0.5
RNPH	1	0	0.1	0.03	0	0	0	0
ROPT	14	24	3.8	0.68	13	20	3.3	0.88
SACR	0	3	0.3	0.05	2	3	0.5	0.12
SAVS	33	92	12.5	1.75	37	47	8.4	2.78
SESA	19	7	2.6	0.85	15	14	2.9	0.42
SNGO	0	0	0	0.30	12	0	1.2	0
STSA	0	2	0.2	0.00	0	4	0.4	0.12
WCSP	1	3	0.4	0.10	3	0	0.3	0.06

Table 5.4-3 Breeding Bird (PRISM) Plot Survey Results for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

Bird Species[(a)]	2008				2009			
	Total Bird Count		Count / Survey Day	Relative Abundance (Mean Birds/Plot)	Total Bird Count		Count / Survey Day	Relative Abundance (Mean Birds/Plot)
	Control Area (RSA)	Mine LSA			Control Area (RSA)	Mine LSA		
WIPT	5	28	3.3	0.30	7	25	3.2	1.06
Totals	**329**	**409**	**73.8**	**16.23**	**320**	**318**	**71**	**14.54**

Results presented are for breeding bird PRISM plots conducted at locations shown in Figure 4.3-12.

(a) List of species names and codes provided in Attachment E

By far the most common breeding bird species encountered on PRISM survey plots was Lapland longspur, comprising 48% of the total breeding birds observed within the Control Area (RSA) in 2008, and 50% of the birds observed in 2009. Similarly, Lapland longspurs comprised 40% and 47% of the total breeding birds observed within the Mine LSA in 2008 and 2009, respectively. Other commonly encountered species were savannah sparrow (*Passerculus sandwichensis*), horned lark (*Eremophila alpestris*), and common redpoll. The most common waterbird species observed on PRISM plots was semipalmated sandpiper. PRISM plot results were similar to the breeding bird transect results (Section 5.3.3.5).

In 2008, total number of breeding birds counted at the Control Area (n=329) and Mine LSA (n=318) were similar; however, the Mine LSA counts increased in 2009 (n=409) relative to the Control Area (n=320). The variation is not anticipated to be the result of survey timing as both surveys effectively occurred concurrently. Instead, a nearly three-fold increase in savannah sparrow observations at the Mine LSA in 2009 is anticipated to be the predominant factor in the increase in total counts between years, which is discussed in additional detail below. Relative abundance of each species (the mean number of birds counted per plot) was calculated for the Control Area (RSA) and Mine LSA based on the average total number of birds counted per year (Table 5.4-4 and Figure 5.4-2).

Species relative abundance values were generally in agreement between plot locations. Similarly, the total relative abundance values (mean of all bird species counted for per plot) were similar between the Control Area (16.23) and Mine LSA (14.54).

Each PRISM plot constitutes an area of 120,000 m² (0.12 km²). When multiplied by the total number of PRISM plots for each area (25 plots in the Mine LSA and 20 plots in the Control Area), the resulting area traversed for the Mine LSA and Control Area (RSA) is 3 km² (300 hectare [ha]) and 2.4

km² (240 ha), respectively. On this basis, breeding bird density was calculated per 100 ha (1 km²). Results are summarized in Table 5.4-5 and illustrated in Figure 5.4-3.

The density of birds per 100 ha (1 km²) was higher at the Mine LSA in both 2008 and 2009 relative to the Control Area; however, the density between years varied marginally at the Control Area (2.8%) relative to the Mine LSA (28.6%). As discussed in the previous section, the higher density of birds at the Mine LSA in 2009 is largely the result of a higher savannah sparrow density relative to the Control Area in the RSA, which may be the result of natural population fluctuations, weather conditions, surveyor bias, or a combination of factors.

The percentage breakdown of ELC units between PRISM plots in the Mine LSA and the Control Area (RSA) are comparable, and are generally representative of the ELC breakdown for the entire Mine LSA and RSA (Table 5.4-6). A greater percentage of graminoid-type units were found in the Mine LSA plots, while the Control Area plots had more heath-type units. The percentage of water is much higher for the entire Mine LSA and RSA as water surfaces were not targeted in PRISM plots.

Table 5.4-4 Breeding Bird (PRISM) Plot Survey Relative Abundance for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

Bird Species[a]	Control Area (RSA)		Mine LSA	
	Total Count per Year[b]	Relative Abundance (Mean Birds / Plot)	Total Count per Year[b]	Relative Abundance (Mean Birds / Plot)
AMGP	0.5	0.03	4.5	0.18
AMPI	4	0.20	0.5	0.02
ATSP	0.5	0.03	0	0
CAGO	1	0.05	2	0.08
CORE	26.5	1.33	21	0.84
DUNL	0.5	0.03	6	0.24
GWFG	3	0.15	2	0.08
GWTE	1	0.05	0	0
HOLA	25	1.25	14.5	0.58
HORE	4.5	0.23	3.5	0.14
LALO	159.5	7.98	157	6.28
LTDU	4.5	0.23	4	0.16
LTJA	2	0.10	0	0
NOPI	2	0.10	0	0

Table 5.4-4 Breeding Bird (PRISM) Plot Survey Relative Abundance for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

Bird Species[a]	Control Area (RSA)		Mine LSA	
	Total Count per Year[b]	Relative Abundance (Mean Birds / Plot)	Total Count per Year[b]	Relative Abundance (Mean Birds / Plot)
PESA	0.5	0.03	0	0
RBME	1	0.05	0	0
REDP	7.5	0.38	12.5	0.5
RNPH	0.5	0.03	0	0
ROPT	13.5	0.68	22	0.88
SACR	1	0.05	3	0.12
SAVS	35	1.75	69.5	2.78
SESA	17	0.85	10.5	0.42
SNGO	6	0.30	0	0
STSA	0	0.00	3	0.12
WCSP	2	0.10	1.5	0.06
WIPT	6	0.30	26.5	1.06
Totals	**324.5**	**16.23**	**363.5**	**14.54**

Results presented are for breeding bird PRISM plots conducted at locations shown in Figure 4.3-12.

(a) List of species names and codes provided in Attachment E

(b) Based on the total number of each species counted in 2008 and 2009

Table 5.4-5 Breeding Bird Density Results for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

Bird Species[(a)]	Control Area (RSA)				2008 and 2009 Average Density /100 ha	Mine LSA				2008 and 2009 Average Density /100 ha
	2008		2009			2008		2009		
	#	Density /100 ha	#	Density /100 ha		#	Density /100 ha	#	Density /100 ha	
AMGP	1	0.3	0	0.0	**0.2**	1	0.4	8	3.3	**1.9**
AMPI	4	1.3	4	1.3	**1.3**	1	0.4	0	0.0	**0.2**
ATSP	0	0.0	1	0.3	**0.2**	0	0.0	0	0.0	**0.0**
CAGO	0	0.0	2	0.7	**0.3**	2	0.8	2	0.8	**0.8**
CORE	36	12.0	17	5.7	**8.8**	13	5.4	29	12.1	**8.8**
DUNL	1	0.3	0	0.0	**0.2**	8	3.3	4	1.7	**2.5**
GWFG	4	1.3	2	0.7	**1.0**	4	1.7	0	0.0	**0.8**
GWTE	2	0.7	0	0.0	**0.3**	0	0.0	0	0.0	**0.0**
HOLA	20	6.7	30	10.0	**8.3**	15	6.3	14	5.8	**6.0**
HORE	3	1.0	6	2.0	**1.5**	6	2.5	1	0.4	**1.5**
LALO	158	52.7	161	53.7	**53.2**	151	62.9	163	67.9	**65.4**
LTDU	5	1.7	4	1.3	**1.5**	3	1.3	5	2.1	**1.7**
LTJA	2	0.7	2	0.7	**0.7**	0	0.0	0	0.0	**0.0**
NOPI	2	0.7	2	0.7	**0.7**	0	0.0	0	0.0	**0.0**
PESA	1	0.3	0	0.0	**0.2**	0	0.0	0	0.0	**0.0**
RBME	2	0.7	0	0.0	**0.3**	0	0.0	0	0.0	**0.0**
REDP	15	5.0	0	0.0	**2.5**	1	0.4	24	10.0	**5.2**
RNPH	1	0.3	0	0.0	**0.2**	0	0.0	0	0.0	**0.0**
ROPT	14	4.7	13	4.3	**4.5**	20	8.3	24	10.0	**9.2**
SACR	0	0.0	2	0.7	**0.3**	3	1.3	3	1.3	**1.3**
SAVS	33	11.0	37	12.3	**11.7**	47	19.6	92	38.3	**29.0**
SESA	19	6.3	15	5.0	**5.7**	14	5.8	7	2.9	**4.4**
SNGO	0	0.0	12	4.0	**2.0**	0	0.0	0	0.0	**0.0**
STSA	0	0.0	0	0.0	**0.0**	4	1.7	2	0.8	**1.3**
WCSP	1	0.3	3	1.0	**0.7**	0	0.0	3	1.3	**0.6**
WIPT	5	1.7	7	2.3	**2.0**	25	10.4	28	11.7	**11.0**

Table 5.4-5 Breeding Bird Density Results for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

Bird Species[a]	Control Area (RSA)				2008 and 2009 Average Density /100 ha	Mine LSA				2008 and 2009 Average Density /100 ha
	2008		2009			2008		2009		
	#	Density /100 ha	#	Density /100 ha		#	Density /100 ha	#	Density /100 ha	
Total	**329**	**109.7**	**320**	**106.7**	**108.2**	**318**	**132.5**	**409**	**170.4**	**151.5**
1980 average density RSA (Schultz Lake)[b]					**26.6**	**1980** average density Mine LSA[b]				**69.7**
1979 average density RSA (Schultz Lake)[c]					**20.8**	**1979** average density Mine LSA[c]				**47.2**

Results presented are for breeding bird PRISM plots conducted at locations shown in Figure 4.3-12.

[a] List of species names and codes provided in Attachment E

[b] URG 1981

[c] Speller et al. 1979

ha = hectare

Table 5.4-6 Comparison of Ecological Land Classification Units for PRISM Plots in the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

ELC Units	% ELC Units in Entire Mine LSA	Mine LSA		% ELC Units in Entire RSA	Control Area (RSA)	
		Area Surveyed by PRISM Plots (m^2)	% ELC Units in Mine LSA PRISM Plots		Area Surveyed by PRISM Plots (m^2)	% ELC Units in RSA PRISM Plots
Water	13.5%	21,250	1%	25.6%	17,500	1%
Sand and Gravel	0.2%	17,500	0.5%	1%	94,375	4%
Rock Association	0.1%	17,500	0.5%	1%	132,500	5.5%
Wet Graminoid	6.9%	314,375	10%	7.2%	70,625	3%
Graminoid Tundra	13.2%	468,125	16%	12.5%	68,750	3%
Graminoid/Shrub Tundra	10.3%	389,375	13%	8.1%	122,500	5%
Shrub Tundra	6%	136,250	5%	4.2%	180,625	7.5%
Shrub/Heath Tundra	8.3%	163,750	5%	6%	221,875	9%
Heath Tundra	36%	981,875	33%	24.6%	721,875	30%
Heath Upland	2.8%	141,875	5%	3.2%	365,000	15%

Table 5.4-6 Comparison of Ecological Land Classification Units for PRISM Plots in the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

ELC Units	% ELC Units in Entire Mine LSA	Mine LSA		% ELC Units in Entire RSA	Control Area (RSA)	
		Area Surveyed by PRISM Plots (m^2)	% ELC Units in Mine LSA PRISM Plots		Area Surveyed by PRISM Plots (m^2)	% ELC Units in RSA PRISM Plots
Lichen Tundra	1.3%	65,625	2%	1.6%	67,500	3%
Heath Upland/Rock Complex	1.5%	282,500	9%	4.7%	336,875	14%
Totals	100%	3,000,000	100%	100%	2,400,000	100%
Shaded lines are those ELC units most often used by upland breeding birds. ha = hectare						

5.4.2.4 Checklist Records

In 2008, 54 bird species were recorded on checklists over 35 field days. In 2009, 47 bird species were recorded over 67 field days, and in 2010, 40 species were observed over 14 field days. The top 10 most common bird species observed from 2008 to 2010 are provided in Table 5.4-7. A list of all bird species and estimated numbers of individuals sighted each field day in the RSA from 2008 to 2010 is provided in Table 5.4-8.

The most common species observed, in order of abundance (cumulative number across all days in both years), consisted of snow goose (*Chen caerulescens*; 9,247 individuals or 33.1%), Lapland longspur (3,943 individuals or 14.1%), Canada goose (*Branta* canadensis; 3,324 individuals or 11.9%), savannah sparrow (1,679 individuals or 6.0%), herring gull (*Larus argentatus*; 1,196 individuals or 4.3%), willow ptarmigan (1,051 or 3.8%), and rock ptarmigan (1,018 individuals or 3.6%). The two most common breeding passerines, Lapland longspur and savannah sparrow, represent approximately 20% of all birds recorded on checklist surveys. The two most common migratory waterfowl, snow goose and Canada goose, represent 45% of all sightings. These tallies included observations of large migratory flocks of these species. Together, these four species make up 65% of all individuals recorded on checklist surveys.

Table 5.4-7 Most Common Bird Species on Checklist Records (2008 to 2010)

Ranking	Species	2008 Total	Species	2009 Total	Species	2010 Total
1	Lapland longspur	1,364	Snow goose	9,229	Lapland longspur	255
2	Herring gull	764	Lapland longspur	2,324	Canada goose	245
3	Canada goose	758	Savannah sparrow	945	Herring gull	183
4	Savannah sparrow	651	Greater white-fronted goose	684	Long-tailed duck	88
5	Common redpoll	492	Rock ptarmigan	656	Rock ptarmigan	86
6	Snow goose	463	Willow ptarmigan	633	Savannah sparrow	83
7	Willow ptarmigan	357	Sandhill crane	553	Sandhill crane	82
8	Rock ptarmigan	276	Long-tailed duck	448	Willow ptarmigan	61
9	Sandhill crane	217	Redpoll (unidentified sp)	289	Greater scaup	44
10	Horned lark	206	Horned lark	284	American golden plover	31

5.4.2.5 Breeding Bird Transect Surveys

Breeding bird transect survey results for the All-Season Road LSA are provided in Table 5.4-9 and Figure 5.4-4. Detailed analyses on bird transect data can be conducted in the future if the All-Season Road is constructed, and then as part of a long-term monitoring strategy. The most common species was Lapland longspur, followed by savannah sparrow, redpoll species (common and hoary redpoll), and horned lark, which were also the most common species observed on breeding bird (PRISM) surveys at the Mine LSA and Control Area (RSA) (Section 5.4.2.2). The total number of species observed (defined as species richness) and the total number of birds encountered (defined as species abundance) within each of the 10 transects were compiled for 2008 and 2009. Results are provided in Table 5.4-10, and Figures 5.4-5 and 5.4-6.

The total number of species observed in 2008 and 2009 were similar suggesting that the same bird species use the survey area on an annual basis. In contrast, the total number of birds observed in 2009 decreased relative to the total birds observed in 2008. Some of the largest variation between years occurred along Transects 3 and 8, which correspond to transects that were shifted to reflect the revised All-Season Road alignment. Transect 10 was also shifted to accommodate the new alignment; however, the shift resulted in one of the few instances where transect abundance increased in 2009. Although transect location is anticipated to play a contributing role in species abundance between years, other causative factors, including annual variability, weather, and local and regional climatic conditions, also likely play a role.

Table 5.4-8 Summary of Bird Checklist Records for the Kiggavik Regional Study Area (2008 to 2010)

Bird Species[(a)]	2008 Checklist Results	2009 Checklist Results	2010 Checklist Results	2008 to 2010 Checklist Total	Observations per Field Day (2008)	Observations per Field Day (2009)	Observations per Field Day (2010)	Observations per Field Day (2008 to 2010)
AMGP	159	199	31	389	4.5	3.0	2.2	3.4
AMPI	15	38	10	63	0.4	0.6	0.7	0.5
AMRO	0	1	0	1	0.0	0.01	0.0	0.0
ARTE	6	2	0	8	0.2	0.0	0.0	0.0
ATSP	8	4	0	12	0.2	0.1	0.0	0.1
BAEA	0	9	0	9	0.0	0.1	0.0	0.1
BASA	0	2	3	5	0.0	0.0	0.2	0.0
CKGO	17	30	2	49	0.5	0.4	0.1	0.4
CAGO	758	2,321	245	3,324	21.7	34.6	17.5	28.7
COLO	2	5	0	7	0.1	0.1	0.0	0.1
COME	0	1	0	1	0.0	0.0	0.0	0.0
CORA	6	8	1	15	0.2	0.1	0.1	0.1
CORE	492	208	8	708	14.1	3.1	0.6	6.1
DEJU	0	1	0	1	0.0	0.0	0.0	0.0
DUNL	33	52	13	98	0.9	0.8	0.9	0.8

Table 5.4-8 Summary of Bird Checklist Records for the Kiggavik Regional Study Area (2008 to 2010)

Bird Species[(a)]	2008 Checklist Results	2009 Checklist Results	2010 Checklist Results	2008 to 2010 Checklist Total	Observations per Field Day (2008)	Observations per Field Day (2009)	Observations per Field Day (2010)	Observations per Field Day (2008 to 2010)
EAGL	0	2	0	2	0.0	0.0	0.0	0.0
GLGU	56	2	8	66	1.6	0.0	0.6	0.6
GOEA	2	0	0	2	0.1	0.0	0.0	0.0
GOOS	7	197	0	204	0.2	2.9	0.0	1.8
GRSC	17	13	44	74	0.5	0.2	3.1	0.6
GWFG	53	684	11	748	1.5	10.2	0.8	6.4
GWTE	3	3	0	6	0.1	0.0	0.0	0.1
GYRF	2	0	0	2	0.1	0.0	0.0	0.0
HERG	764	249	183	1,196	21.8	3.7	13.1	10.3
HOLA	206	284	14	504	5.9	4.2	1.0	4.3
HORE	11	38	2	51	0.3	0.6	0.1	0.4
JAEG	1	5	0	6	0.0	0.1	0.0	0.1
KIEI	0	9	0	9	0.0	0.1	0.0	0.1
LALO	1,364	2,324	255	3,943	39.0	34.7	18.2	34.0
LESA	2	3	7	12	0.1	0.0	0.5	0.1

Table 5.4-8 Summary of Bird Checklist Records for the Kiggavik Regional Study Area (2008 to 2010)

Bird Species[(a)]	2008 Checklist Results	2009 Checklist Results	2010 Checklist Results	2008 to 2010 Checklist Total	Observations per Field Day (2008)	Observations per Field Day (2009)	Observations per Field Day (2010)	Observations per Field Day (2008 to 2010)
LOON	0	4	0	4	0.0	0.1	0.0	0.0
LTDU	152	448	88	688	4.3	6.7	6.3	5.9
LTJA	44	44	17	105	1.3	0.7	1.2	0.9
MALL	4	0	0	4	0.1	0.0	0.0	0.0
NOFL	1	0	0	1	0.0	0.0	0.0	0.0
NOHA	0	4	0	4	0.0	0.1	0.0	0.0
NOPI	62	98	11	171	1.8	1.5	0.8	1.5
PAJA	28	52	8	88	0.8	0.8	0.6	0.8
PALO	1	8	0	9	0.0	0.1	0.0	0.1
PASS	123	105	1	229	3.5	1.6	0.1	2.0
PEFA	31	32	1	64	0.9	0.5	0.1	0.6
PESA	2	4	0	6	0.1	0.1	0.0	0.1
PTAR	5	0	0	5	0.1	0.0	0.0	0.0
RBME	26	15	6	47	0.7	0.2	0.4	0.4
RECR	0	4	0	4	0.0	0.1	0.0	0.0

Table 5.4-8 Summary of Bird Checklist Records for the Kiggavik Regional Study Area (2008 to 2010)

Bird Species[(a)]	2008 Checklist Results	2009 Checklist Results	2010 Checklist Results	2008 to 2010 Checklist Total	Observations per Field Day (2008)	Observations per Field Day (2009)	Observations per Field Day (2010)	Observations per Field Day (2008 to 2010)
REDP	22	289	21	332	0.6	4.3	1.5	2.9
RLHA	14	34	2	50	0.4	0.5	0.1	0.4
RNPH	23	48	9	80	0.7	0.7	0.6	0.7
ROPT	276	656	86	1,018	7.9	9.8	6.1	8.8
RTLO	1	8	6	15	0.0	0.1	0.4	0.1
RUTU	1	0	0	1	0.0	0.0	0.0	0.0
SACR	217	553	82	852	6.2	8.3	5.9	7.3
SAVS	651	945	83	1,679	18.6	14.1	5.9	14.5
SEOW	2	2	4	8	0.1	0.0	0.3	0.1
SEPL	0	3	3	6	0.0	0.0	0.2	0.1
SESA	110	219	21	350	3.1	3.3	1.5	3.0
SHOR	6	7	10	23	0.2	0.1	0.7	0.2
SNBU	4	4	0	8	0.1	0.1	0.0	0.1
SNGO	463	8,766	18	9,247	13.2	130.8	1.3	79.7
SNOW	2	0	1	3	0.1	0.0	0.1	0.0

Table 5.4-8 Summary of Bird Checklist Records for the Kiggavik Regional Study Area (2008 to 2010)

Bird Species[(a)]	2008 Checklist Results	2009 Checklist Results	2010 Checklist Results	2008 to 2010 Checklist Total	Observations per Field Day (2008)	Observations per Field Day (2009)	Observations per Field Day (2010)	Observations per Field Day (2008 to 2010)
STSA	5	64	1	70	0.1	1.0	0.1	0.6
TUSW	26	37	22	85	0.7	0.6	1.6	0.7
WCSP	36	29	14	79	1.0	0.4	1.0	0.7
WIPT	357	633	61	1,051	10.2	9.4	4.4	9.1
WISN	1	0	0	1	0.0	0.0	0.0	0.0
Total Birds	**6,680**	**19,809**	**1,413**	**27,902**	**191**	**296**	**101**	**240**

(a) List of species names and codes provided in Attachment E

Table 5.4-9 Breeding Bird Transect Survey Results for the All-Weather Access Road (2008 and 2009)

Bird Species(a)	Birds 2008	Birds 2009	Total 2008 and 2009	Count per Survey Day 2008	Count per Survey Day 2009	Count per Survey Day (2008 and 2009)
Upland Breeding Birds						
AMPI	4	14	18	0.57	1.8	1.2
ATSP	6	0	6	0.86	0	0.40
CORE	83	18	101	12	2.3	6.7
HOLA	59	44	103	8.4	5.5	6.9
HORE	4	6	10	0.57	0.75	0.67
LALO	346	267	613	49	33	41
REDP	91	31	122	13	3.9	8.1
ROPT	10	24	34	1.4	3.0	2.3
SAVS	247	141	388	35	18	26
WCSP	7	3	10	1.0	0.38	0.67
WIPT	27	34	61	3.9	4.3	4.1
Waterbirds						
AMGP	7	3	10	1.0	0.4	0.7
CAGO	100	31	131	14	3.9	8.7
COLO	1	0	1	0.1	0	0.1
DUNL	1	2	3	0.1	0.3	0.2
GRSC	0	4	4	0	0.5	0.3
GWFG	4	0	4	0.6	0	0.3
GWTE	0	2	2	0	0.3	0.1
HERG	25	13	38	3.6	1.6	2.5
LTDU	27	23	50	3.9	2.9	3.3
LTJA	4	5	9	0.6	0.6	0.6
NOPI	9	5	14	1.3	0.6	0.9
PAJA	3	3	6	0.4	0.4	0.4
PALO	0	1	1	0	0.1	0.1
RBME	0	2	2	0	0.3	0.1

Table 5.4-9 Breeding Bird Transect Survey Results for the All-Weather Access Road (2008 and 2009)

Bird Species(a)	Birds 2008	Birds 2009	Total 2008 and 2009	Count per Survey Day 2008	Count per Survey Day 2009	Count per Survey Day (2008 and 2009)
RNPH	4	8	12	0.6	1.0	0.8
SACR	26	25	51	3.7	3.1	3.4
SESA	12	13	25	1.7	1.6	1.7
SNGO	0	51	51	0	6.4	3.4
TUSW	2	1	3	0.3	0.1	0.2
WISN	1	0	1	0.1	0	0.1
Results presented are for transect surveys conducted at locations shown in Figure 4.3-13 (a) List of species names and codes provided in Attachment E						

Table 5.4-10 Species Richness and Species Abundance for Transects Along the All-Season Road (2008 and 2009)

Transect	Species Richness (total species per transect)		Species Abundance (total birds per transect)	
	# of Species 2008	# of Species 2009	Total Birds 2008	Total Birds 2009
1	13	13	124	78
2	9	10	74	51
3	14	10	186	80
4	14	14	117	57
5	15	14	94	123
6	11	12	93	68
7	10	8	112	48
8	12	11	125	68
9	16	13	123	104
10	11	13	72	104
Totals	**28**	**29**	**1,120**	**781**
Results presented are for transect surveys conducted at locations shown in Figure 4.3-13.				

5.4.3 Habitat Suitability

For the purpose of rating ELC units for upland breeding bird habitat suitability, Lapland longspur was used as a representative (or indicator) species for this VEC group. Lapland longspurs are an appropriate indicator species as they are the most abundant upland bird in the RSA and they breed throughout most of the Arctic. Longspurs forage in diverse habitat, including vegetated and non-vegetated areas. Foraging habitats are most often wet tundra meadows that are relatively flat; however, they will also use drier vegetated slopes. Nesting habitat is usually well-vegetated meadows. Nests are often found sheltered within tussocks of graminoids or mosses, or beneath overhanging shrubs (Hussell and Montgomerie 2002).

Suitability of habitats within the RSA for upland breeding birds was determined by ranking each of the ELC habitat units as High, Moderate, or Low for the growing season (see Tables 4.5-2 and 4.5-3B). A summary of the ELC units, ratings and justification is provided in Table 5.4-11. A coarse analysis of bird use by ELC units on the PRISM plots was used as a means of considering preferred habitat in developing the rankings (see Table 5.4-11). The coarse analysis was conducted using ELC data, which is at approximately 30 m resolution, so overall habitat use accuracy is considered to be low. As well, values were not adjusted for availability of habitat.

Total area of High, Moderate, and Low suitability upland bird (Lapland longspur) habitat within the RSA and all LSAs during the growing season is presented in Table 5.4-12. The percentage of High-rated habitats is greatest in the Mine LSA relative to the road LSAs and the RSA. The Winter Road LSA has the least amount of High-rated habitat, and the greatest amount of Low-rated habitat. Distribution of High, Moderate, and Low suitability habitats for the growing season is presented in Figure 5.4-7. Generally, suitable habitat types for upland birds are well distributed throughout the RSA.

Table 5.4-11 Summary of Relative Value of Ecological Land Classification Units to Upland Breeding Birds During the Growing Season

ELC Unit	% Habitat Within PRISM Plots	% of Total Birds Recorded[(a)]	Relative Bird Index[(b)]	Growing Season Ranking[(c)]	Reasoning
Water	0.7%	ND	ND	L	Rated low because it provide no nesting and limited foraging habitat for upland birds.
Sand	0.0%	ND	ND	M	Rated moderate because it provides some foraging habitat for upland birds and is a rare habitat in the RSA
Gravel	2.0%	ND	ND	M	Rated moderate because it provides some foraging habitat for upland birds and is a rare habitat in the RSA
Rock Association	2.8%	4.3%	1.54	M	Rated moderate because it provides some foraging and nesting habitat for upland birds, particularly rock ptarmigan.
Wet Graminoid	7.1%	3.8%	0.54	H	Rated high because it is used as foraging and nesting habitat for upland birds. High prey abundance in this ELC unit warranted a high rating.
Graminoid Tundra	9.9%	7.8%	0.79	H	Rated high because it is used by extensively by upland birds for foraging and nesting. Bird species diversity is also high.
Graminoid/ Shrub Tundra	9.5%	11.3%	1.19	H	Rated high because it is used by extensively by upland birds for foraging and nesting. Bird species diversity is also high.
Shrub Tundra	5.9%	5.2%	0.88	H	Rated high because it is used by extensively by upland birds for foraging and nesting. Structural heterogeneity provides nest sites for redpolls and other species.
Shrub/Heath Tundra	7.1%	ND	ND	H	Rated high because it is used by extensively by upland birds for foraging and nesting. Structural heterogeneity provides nest sites for redpolls and other species.
Heath Tundra	31.6%	38.8%	1.23	H	Rated high because it is used by extensively by upland birds for foraging and nesting, particularly Lapland longspurs, the most common breeding bird.

Table 5.4-11 Summary of Relative Value of Ecological Land Classification Units to Upland Breeding Birds During the Growing Season

Heath Upland	9.4%	13.5%	1.44	H	Rated high because it is used by extensively by upland birds for foraging and nesting, particularly Lapland longspurs, the most common breeding bird.
Heath Upland/ Rock Complex	11.5%	15.4%	1.34	M	Rated moderate because it provides some foraging and nesting habitat for upland birds, particularly for rock ptarmigan.
Lichen Tundra	2.5%	ND	ND	M	Rated moderate because it provides some foraging and nesting habitat for upland birds. Overall, bird diversity is lower than other ELC units.

Growing season is approximately June 1 to September 30 (four months).

(a) Based on coarse analysis of bird use by ELC units on PRISM plots

(b) Relative bird index calculated by dividing the % of total birds by the % habitat availability

(c) Indicator species is Lapland longspur

H = High; M = Moderate; L = Low

ND = Not detected

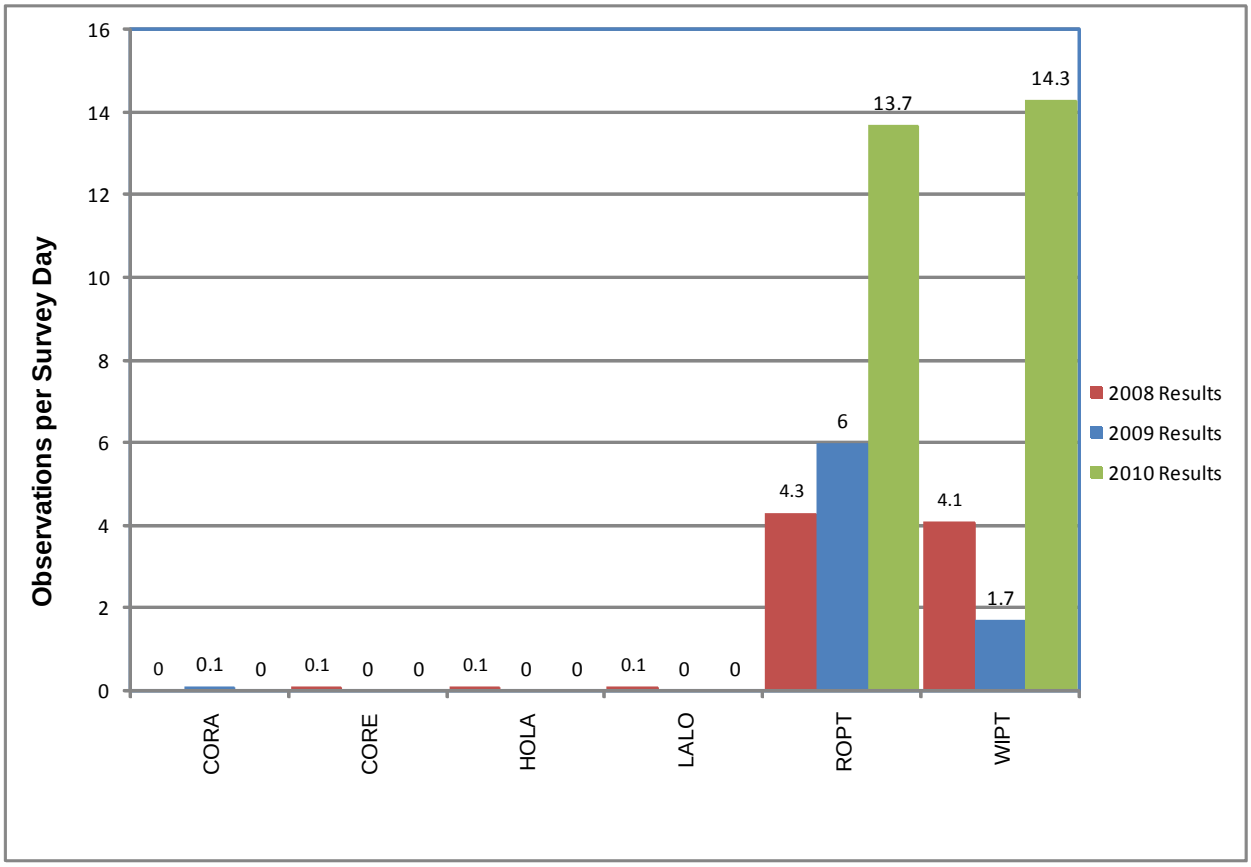
Table 5.4-12 Comparative Percentages of Upland Bird Habitat Suitability in Local and Regional Study Areas

Habitat Suitability – Growing Season[(a)]	Mine LSA		All-Season Road LSA		Winter Road LSA		RSA	
	ha	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**
High	37,553	83.4%	39,542	76.0%	32,355	57.7%	647,795	65.9%
Moderate	1,377	3.1%	4,672	9.0%	2,705	4.8%	81,319	8.3%
Low	6,079	13.5%	7,655	14.7%	20,827	37.1%	251,161	25.6%
No Rating	0	0.0%	162	0.3%	203	0.4%	2,585	0.3%
Totals	**45,009**	**100.0%**	**52,031**	**100.0%**	**56,090**	**100.0%**	**982,859**	**100.0%**

Growing season is approximately June 1 to September 30 (four months).

[(a)] Indicator species is Lapland longspur

ha = hectare

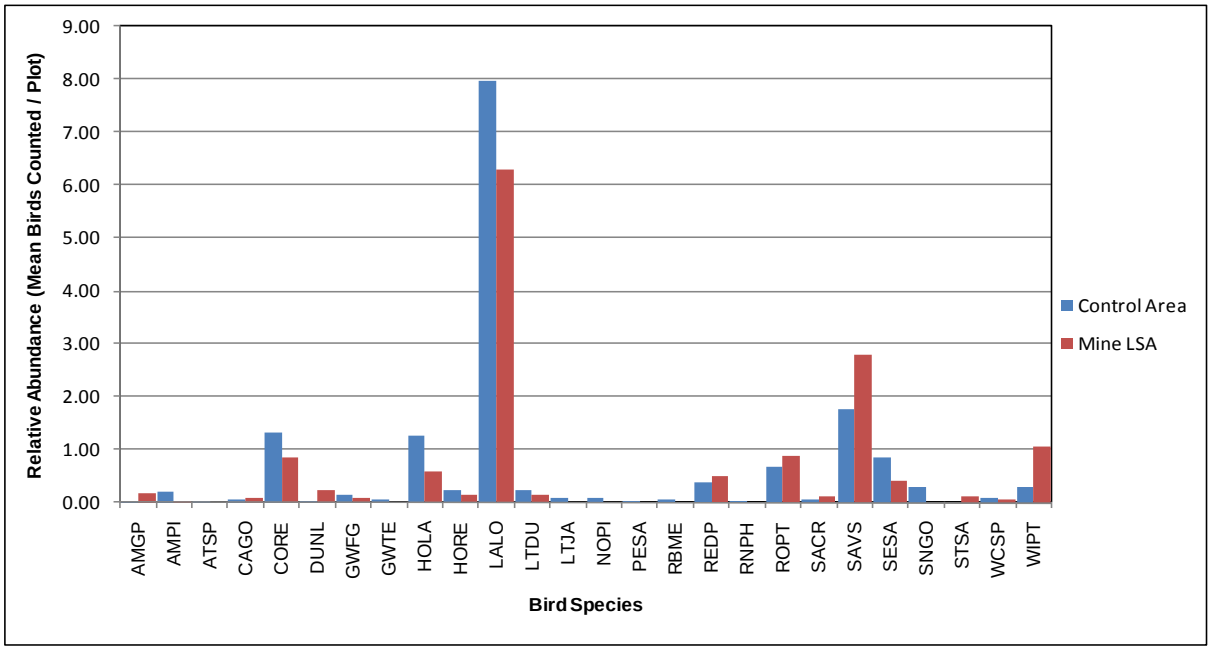


List of species names and codes provided in Attachment E

Note that the 2010 result per survey day for rock ptarmigan includes December 2010 sighting of unidentified ptarmigan species

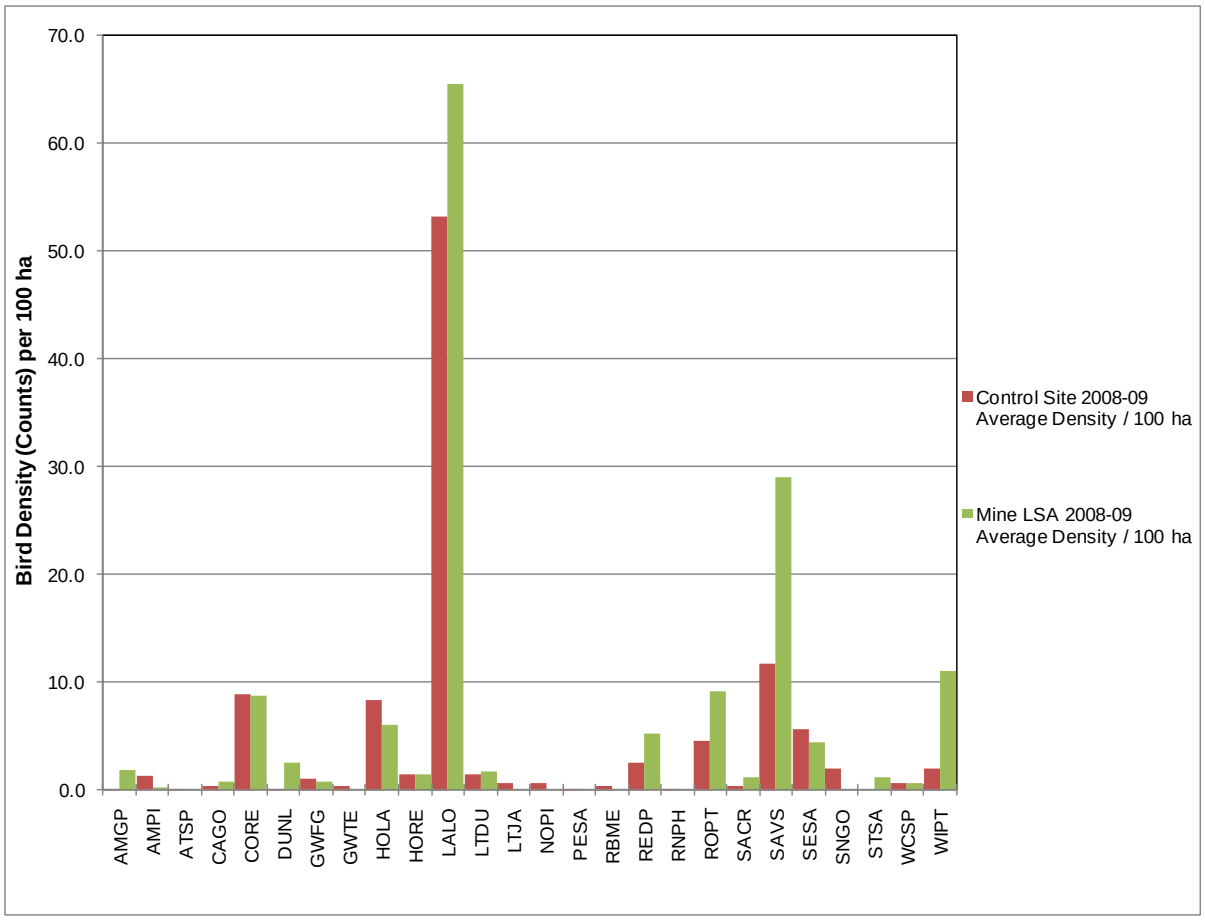
Results presented are for all HOL surveys conducted at locations shown in Figure 4.3-1

Figure 5.4-1 Height-of-Land Ground Survey Results per Survey Day for Upland Breeding Birds (2008 to 2010)



List of species names and codes provided in Attachment E
Results presented are for breeding bird PRISM plots conducted at locations shown in Figure 4.3-12
Bars represent the average number of each species counted per plot per year, from data collected in 2008 and 2009.

Figure 5.4-2 Breeding Bird (PRISM) Relative Annual Abundance per Plot for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)

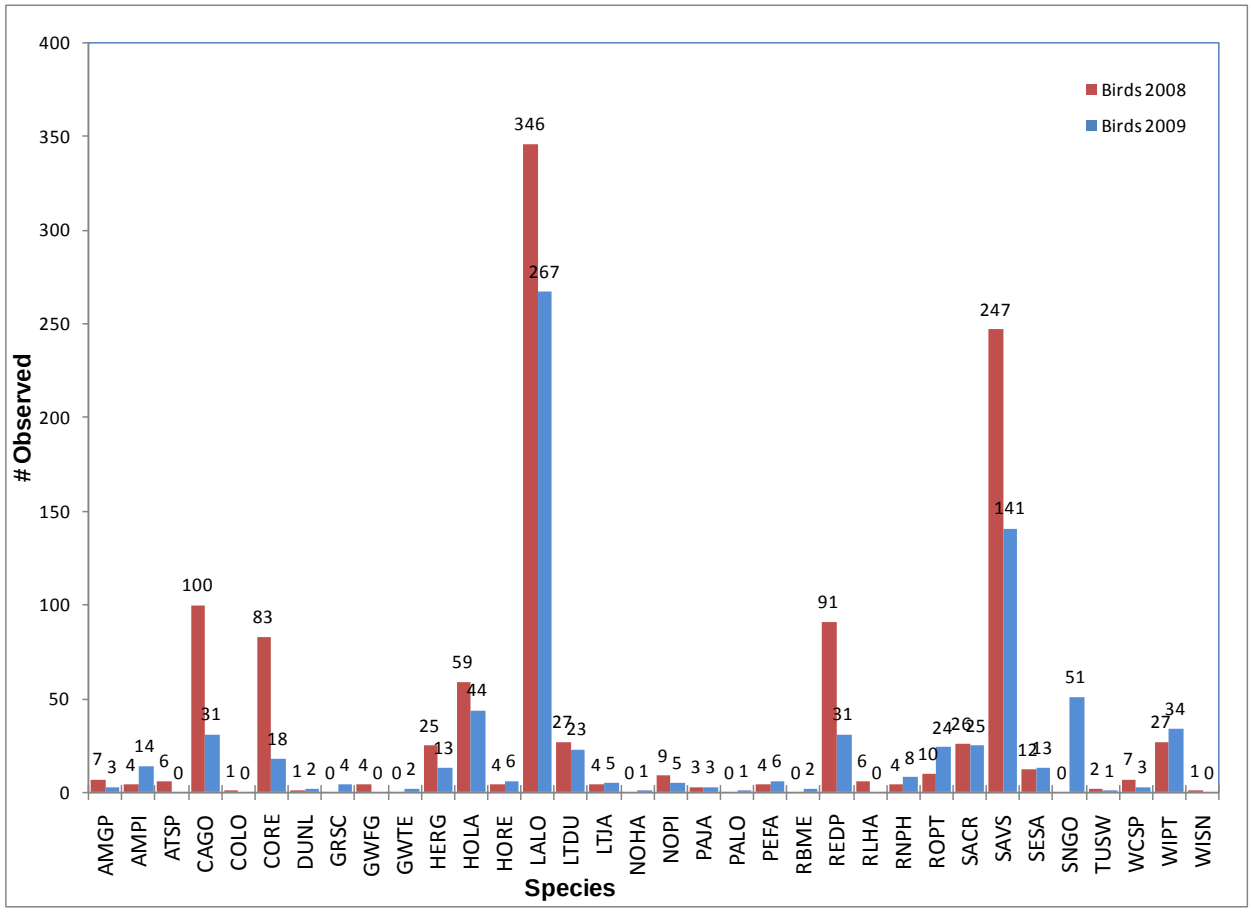


List of species names and codes provided in Attachment E

Results presented are for breeding bird PRISM plots conducted at locations shown in Figure 4.3-12

Bars represent the average annual density (per 100 ha) of each species, from data collected in 2008 and 2009.

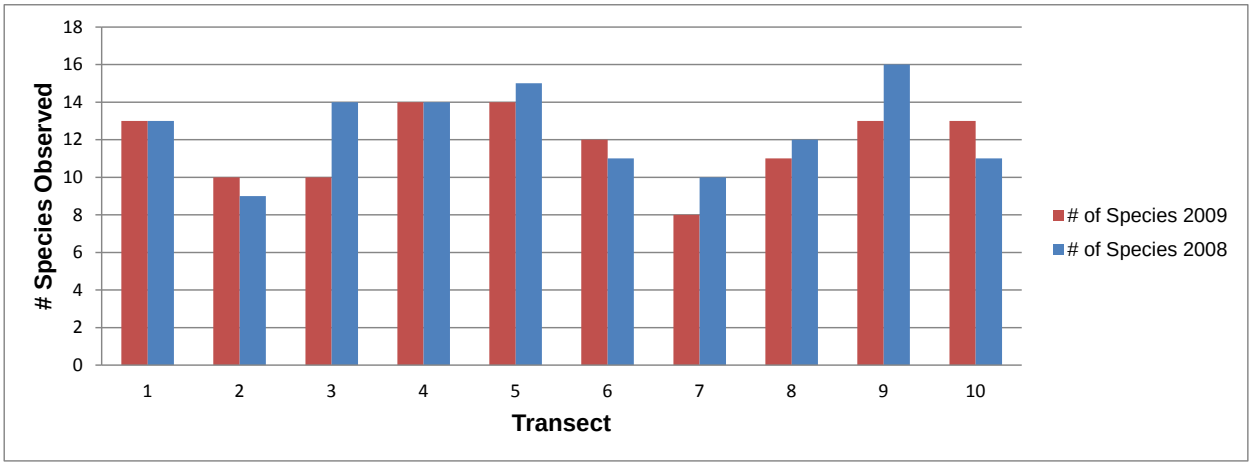
Figure 5.4-3 Breeding Bird (PRISM) Average Annual Density Counts for the Mine Local Study Area and Control Area (Regional Study Area) (2008 and 2009)



List of species names and codes provided in Attachment E

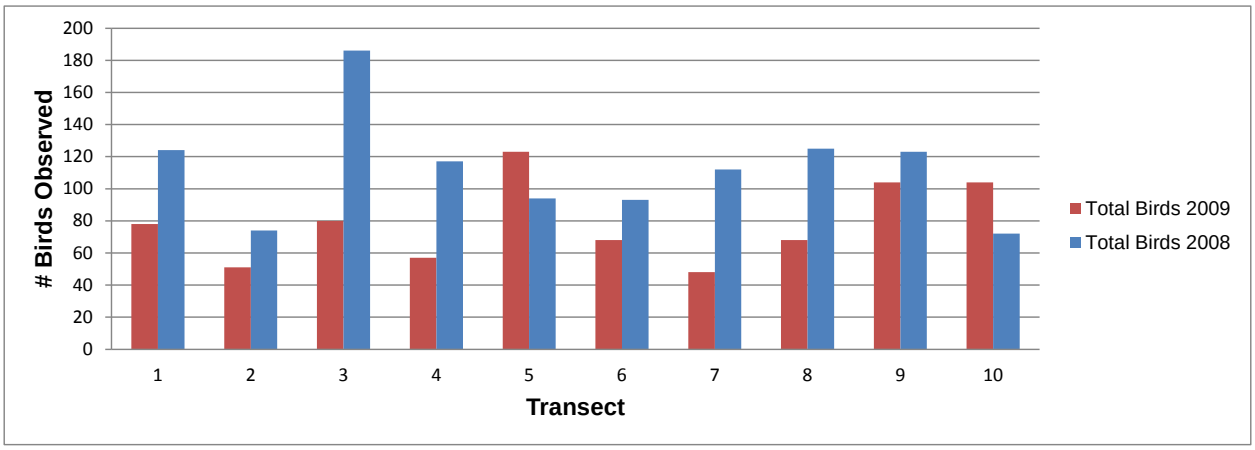
Results presented are for transect surveys conducted at locations shown in Figure 4.3-13

Figure 5.4-4 Breeding Bird Transect Survey Results for the All-Season Road (2008 and 2009)



Results presented are for transect surveys conducted at locations shown in Figure 4.3-13

Figure 5.4-5 Breeding Bird Species Diversity for Transects Along the All-Season Road (2008 and 2009)



Results presented are for transect surveys conducted at locations shown in Figure 4.3-13

Figure 5.4-6 Breeding Bird Species Abundance for Transects Along the All-Season Road (2008 and 2009)