5 Results

5.1 Overview of Wildlife Populations

5.1.1 Wildlife Species Presence in the RSA

Wildlife studies specific to the Kiggavik Project have been conducted since 1979, with 16 mammal species and 64 bird species identified and recorded. No amphibians or reptiles have been observed to date. A complete list of species observed since 1979, including common and Latin names, and species codes, and a summary of the status (permanent or seasonal resident, or migrant) and abundance (common, uncommon or scarce) of each species is included in Attachment E.

Eighteen (18) wildlife species were observed and recorded for the first time during 2007 to 2010 baseline studies. The recently added species include:

- Wolverine (was always known to be present — *it is grizzly bear country, wolverine country* (EN-BL HTO Mar 2009) — but does not appear to have been recorded as part of RSA surveys until 2007);
- Three species of raptor (bald eagle [*Haliaeetus leucocephalus*], golden eagle [*Aquila chrysaetos*], and northern harrier [*Circus cyaneus*]);
- Nine waterbird species (cackling goose [*Branta hutchinsii*], common merganser [*Mergus merganser*], greater white-fronted goose [*Anser albifrons*], green winged teal [*Anas crecca*], king eider[4] [*Somateria spectabilis*], ruddy turnstone [*Arenaria interpres*], stilt sandpiper, tundra swan [*Cygnus columbianus*], and Wilson's snipe [*Gallinago delicata*]); and
- Five species of upland birds (American robin [*Turdus migratorius*], common redpoll [*Carduelis flammea*], hoary redpoll [*Carduelis hornemanni*], northern flicker [*Colaptes auratus*], and white-crowned sparrow [*Zonotrichia leucophrys*]).

[4] King eider was observed in 1979 (see Attachment E), but in the Sandhills area which is not within the current RSA.

Wildlife observations from aerial surveys for the RSA and LSA in 2007 and 2008 are provided in Figures 5.1-1A to H, and for 2009 (RSA only) in Figure 5.1-2. Incidental ground observations were recorded throughout the RSA in 2007 (Figure 5.1-3). For the road LSAs, wildlife observations were made for the All-Season Road (summer data in Figure 5.1-4 and winter data in Figure 5.1-5), the Winter Road (Figure 5.1-6), and the previously considered South AWAR option (2008 to 2010 data in Figure 5.1-7). Specific surveys completed for proposed crossings of the Thelon River, and proposed docks at Baker Lake are also provided (Figure 5.1-8 and 5.1-9, respectively); these surveys were done for the purposes of waterbird observation, but mammal presence was also recorded.

Wildlife presence fluctuates over the course of each field season (late May to September), as observed in summary data for HOL surveys from 2008 to 2010 in the Mine LSA (Tables 5.1-1 and Table 5.1-2). HOL data are not comparable across years, because of different levels of effort on HOL surveys each year, but do demonstrate seasonality over the course of the active field season. The HOL dataset does not provide information on winter use but Table 5.1-3 summarizes data from a winter survey conducted in 2010 along the All-Season Road (see also Figure 5.1-5).

Attachment F provides a list of all species observed during each of the various surveys conducted during the current baseline program. Baseline data and information for each VEC are provided in subsequent sections.

5.1.2 Biodiversity and Species Interaction

Although field studies, historical information and IQ have identified a broad diversity of mammal and bird species in the RSA, the number of species observed is considerably lower than what can be found in southern regions of Canada. Some species groups such as amphibians and reptiles have no representative species in the region while others, such as invertebrates are abundant during July and August but represented by fewer species than in southern areas. As well, only a handful of sensitive species (e.g., peregrine falcon, short-eared owl, grizzly bear etc.) are present, partially due to the extensive amount of similar habitats (and few rare or spatially limited habitats) across a broad geographic area. In southern regions, human encroachment into sensitive geographically limited habitats has resulted in a much higher diversity of species considered to be at risk by COSEWIC, *SARA*, and the provinces. The lower biodiversity in the Kivalliq region is also due in part to the lower structural habitat heterogeneity (e.g., no trees, tall shrubs etc.), the extreme climate, and a short growing season. Only a few species have adapted to these conditions.

Biodiversity is expected to change over time due to a number of factors, but climate change may be one of the primary factors. In the AREVA diet survey (see Section 5.1.5.4), comments were made during interviews about how some different bird species are now being seen in Baker Lake, including northern flicker and kingfisher. In Coral Harbour, hunters have *observed new animal species in the area that they believe are evidence of climate change. They reported seeing a burrowing owl a few summers ago, as well as occasional swallows and butterflies in May or June* (IQ-CHAH 2009). Such species had not been seen historically. Some residents have noticed changes in the Kiggavik area. *Way in 50s and 60s animals that we never saw are around today; we even lived near the present Kiggavik now; we never saw those animals before* (EN-BL CLC Oct 2008).

Table 5.1-1 Field Season Observations of Mammals (Excluding Caribou) and Birds in the Mine Local Study Area (from Height-of-Land Surveys, 2008 to 2010)

Wildlife Species	2008 HOL Results (17 total survey days)					2009 HOL Results (48 total survey days)					2010 HOL Results (8 total survey days)						2008 to 2010
	Jun	Jul	Aug	Sep	Total	May	Jun	Jul	Aug	Total	Apr	May	Jun	Jul	Dec	Total	Total
Muskox	0	152	8	0	160	0	29	12	101	142	0	7	5	16	0	58	330
Wolverine	0	0	0	0	0	2	7	0	0	9	0	0	0	0	0	0	9
Wolf	0	0	0	0	0	0	2	0	1	3	2	1	1	0	0	4	7
Arctic fox	4	0	0	0	4	5	17	1	0	23	2	0	0	0	2	4	31
Arctic ground squirrel	0	1	0	0	1	1	1	1	4	7	0	0	0	0	0	0	8
Arctic hare	2	0	0	1	3	15	16	0	7	38	5	6	4	0	3	18	59
Total mammals (excluding caribou)	**6**	**153**	**8**	**1**	**168**	**23**	**72**	**14**	**113**	**222**	**9**	**14**	**10**	**16**	**5**	**54**	**444**
Bald eagle	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	7
Gyrfalcon	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Northern harrier	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1
Peregrine falcon	0	0	0	1	1	1	2	0	1	4	0	0	1	0	0	1	6
Rough-legged hawk	0	2	0	0	2	0	5	2	4	11	0	0	0	0	0	0	13
Short-eared owl	1	1	0	0	2	0	1	0	0	1	0	0	1	1	0	2	5
Raptors (all)	1	2	0	1	4	1	15	3	5	24	0	0	1	0	0	1	29
Waterbirds and Upland Birds (all)	725	162	170	16,490	17,547	172	679	126	2,970	3,947	64	129	215	3	1	412	21,906

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

Additional details for seasonal HOL results for upland breeding birds and waterbirds are provided in Section 5.4 and 5.5, respectively.

ND = No data

Table 5.1-2 Field Season Observations of Caribou in the Mine Local Study Area (from Height-of-Land Surveys, 2008 to 2010)

Caribou Season	2008 (17 total survey days)			2009 (48 total survey days)			2010 (8 total survey days)		
	No. Caribou Observed	No. Survey Days	No. Caribou per Survey Day	No. Caribou Observed	No. Survey Days	No. Caribou per Survey Day	No. Caribou Observed	No. Survey Days	No. Caribou per Survey Day
Late Winter (Jan 1–Mar 31)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Spring Migration (Apr 1–May 25)	ND	ND	ND	2	2	1.0	374	4	93.5
Calving (May 26–Jun 25)	47	5	9.4	74	18	4.1	43	2	21.5
Post Calving (Jun 26–Jul 31)	95	8	11.9	30	6	5.0	20	1	20
Late Summer (Aug 1–Sep 15)	122	4	30.5	1,887	22	85.8	ND	ND	ND
Fall (Sep 16–Oct 31)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Rut (Oct 15–31)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Early Winter (Nov 1–Dec 31)	ND	ND	ND	ND	ND	ND	2	1	2

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

ND = No data (no surveys conducted during this time period)

Table 5.1-3 Winter Observations of Mammals along the All-Season Road and Winter Road (2010)

Wildlife Species	All-Season Road (7 survey days)							Winter Road (2 survey days)		Total Animals Observed in Winter Season
	Apr 15	Apr 28	Apr 30	May 7	May 9	May 18	May 20	Dec 7	Dec 9	
Caribou	57	58	41	174	55	78	137	0	0	600
Muskox	0	0	0	0	0	13	0	0	0	13
Wolverine	0	0	1	1	1	0	0	0	0	3
Wolf	0	0	0	0	0	0	0	0	0	0
Arctic fox	0	1	3	1	0	0	0	0	0	5
Arctic ground squirrel	0	0	0	0	0	0	0	0	0	0
Arctic hare	2	0	1	1	3	0	0	0	0	7
Total mammals	59	59	46	177	59	91	137	0	0	628
Rock ptarmigan	0	0	0	0	0	0	0	5	0	5
Results presented are for winter survey routes conducted on the All-Season Road as shown in Figure 4.3-2.										

The three large predatory species (i.e., grizzly bear, wolverine, and wolf) are at the top of the food chain with wolf and wolverine feeding primarily on key larger prey species including caribou and rarely muskox. These predators, along with Arctic fox, ermine, falcons, hawks, eagles, and owls feed on species lower on the food chain including small mammals (i.e., Arctic hare, sik sik, voles, and lemmings) and birds (i.e., eggs, ptarmigan, waterbirds, and songbirds). Prey selection is largely dependent on season. Scavenging bird species include common raven (year-round) and bald eagle (rare in the growing season). Further information on habitat and food preferences of predatory species is provided in species-specific sections later in this report.

5.1.3 Species of Conservation Concern

Species of conservation concern are ranked federally through COSEWIC and *SARA*. COSEWIC is an arms-length committee of wildlife experts that designates rare species as being Extinct, Extirpated, Endangered, Threatened, or of Special Concern. Extinct species no longer exist anywhere in the world, whereas Extirpated species no longer exist in the wild in Canada, but occur elsewhere. Endangered species face imminent extirpation or extinction, Threatened species are likely to become endangered if limiting factors are not reversed, and species of Special Concern are particularly sensitive to human activities or natural events but are not yet Endangered or Threatened. *SARA* officially lists certain species ranked by COSEWIC on Schedule 1, which requires measures to be implemented that protect and recover the listed species. Only species that have been formally added to Schedule 1 receive full federal protection. If a Schedule 1 species is identified in a development project, special measures to protect and recover such a listed species would be required for projects reviewed under territorial and federal review processes.

SARA Schedule 2 and 3 identify species that need to be assessed by COSEWIC within a particular timeframe. These species are not yet legally protected under *SARA*, but are of special concern from a wildlife management perspective. Within a project review process, Schedule 2 and 3 species may require proactive special measures in case their status changes and they become legally protected under *SARA* Schedule 1.

The Canadian Endangered Species Conservation Council (CESCC) is an inter-governmental council responsible for overseeing the listing and recovery of species at risk. CESCC is responsible for five-year reporting on the status of all species and has identified certain bird and mammal species in Nunavut as regionally ‘Sensitive’ (CESCC 2011, internet site). Although species identified by CESCC provide no legal protection, status ranks are useful in identifying species of higher priority for study and management in Nunavut.

Species observed or expected to occur in the RSA and at risk or of concern according to these relevant listings and rankings are presented in Table 5.1-4. Eskimo curlew (*Numenius borealis*), an endangered species that may have migrated through the area historically, has not been observed in decades. Based on their status, grizzly bear, wolverine, and short-eared owl have been selected as indicator species for the mammal VEC, and peregrine falcon was selected as the indicator species for the birds of prey VEC (as discussed in Section 1.4).

Table 5.1-4 Sensitive Species or Species at Risk Observed or Expected in the Regional Study Area

Wildlife Species	Scientific Name	Nunavut Status Rank[(a)]	COSEWIC Status[(b)]	SARA Status[(c)]
Mammals				
Grizzly bear	*Ursus arctos*	Sensitive	Special Concern	No status
Wolverine	*Gulo gulo*	Secure	Special Concern	No status
Birds				
American golden plover	*Pluvialis dominica*	Sensitive	No status	No status
American pipit	*Anthus rubescens*	Sensitive	No status	No status
American tree sparrow	*Spizella arborea*	Sensitive	No status	No status
Arctic tern	*Sterna paradisaea*	Sensitive	No status	No status
Black-bellied plover	*Pluvialis squatarola*	Sensitive	No status	No status
Dunlin	*Calidris alpina*	Sensitive	No status	No status
Golden eagle	*Aquila chrysaetos*	Sensitive	Not at Risk	No status
Gyrfalcon	*Falco rusticolus*	Sensitive	Not at Risk	No status
Hoary redpoll	*Acanthis hornemanni*	Sensitive	No status	No status
King eider	*Somateria spectabilis*	Sensitive	No status	No status
Least sandpiper	*Calidris minutilla*	Sensitive	No status	No status
Long-tailed duck	*Clangula hyemalis*	Sensitive	No status	No status
Peregrine falcon	*Falco peregrinus* ssp. *tundrius*	Secure	Special Concern	Schedule 1
Red-necked phalarope	*Phalaropus lobatus*	Sensitive	No status	No status
Red knot	*Calidris canutus*	At Risk	*Rufa* subsp Endangered *Islandica* subsp Special Concern	*Rufa and Islandica* subsp Schedule 1

Table 5.1-4 Sensitive Species or Species at Risk Observed or Expected in the Regional Study Area

Wildlife Species	Scientific Name	Nunavut Status Rank[a]	COSEWIC Status[b]	SARA Status[c]
Rough-legged hawk	*Buteo lagopus*	Sensitive	Not at Risk	Not at Risk
Ruddy turnstone	*Arenaria interpres*	Sensitive	No status	No status
Semipalmated sandpiper	*Calidris pusilla*	Sensitive	No status	No status
Short-eared owl	*Asio flammeus*	Sensitive	Special Concern	Schedule 1
Snow bunting	*Plectrophenax nivalis*	Sensitive	No status	No status
Thayer's gull	*Larus thayeri*	Sensitive	No status	No status
White-crowned sparrow	*Zonotrichia leucophrys*	Sensitive	No status	No status
Wilson's snipe	*Gallinago delicata*	Sensitive	No status	No status

Shaded areas identify species not observed during baseline studies that have the potential to occur.

[a] Wild Species 2010 status ranks (CESCC 2011, internet site)

[b] COSEWIC 2014, internet site

[c] *SARA* 2014, internet site

5.1.4 Hunter Harvest Data

Hunter harvest data are an important component in assessing baseline conditions within and adjacent to the Kiggavik RSA. Harvest data can provide information on wildlife population levels and trends, animal movements, and important use areas (e.g., traditional hunting grounds). Wildlife resources (particularly caribou) are an important food source for Baker Lake residents, and are closely tied to cultural and economic livelihoods. *Hunters emphasized that most people in Baker Lake still depend on caribou for food* (IQ-BLH 2009; IQ-BLHT 2011). Development in remote areas can affect hunting patterns and any potential change to availability of wildlife resources must be well understood.

Available HHS results are discussed in the context of IQ and engagement data, historical data from a multi-year study conducted by Interdisciplinary Systems (IDS) in the late 1970s (IDS 1978), and the five-year Nunavut Wildlife Harvest Study completed by the Nunavut Wildlife Management Board (NWMB) in the 1990s (NWMB 2005). Data from a 2009/10 diet survey completed by AREVA, which investigated consumption of country foods in the Hamlet of Baker Lake, provided additional information pertinent to local area wildlife harvest levels. Detailed results-to-date of the HHS are also available in Meadowbank annual reports (AEM 2009 to 2014, internet site).

5.1.4.1 Hunting Levels in Baker Lake

Available historical data on hunting activity in and around Baker Lake provide some indication of harvest trends over time, although direct comparisons between studies and years are limited by differences in methodologies and response rates.

In 1978, IDS completed a study to identify potential effects of exploration activities in and around Baker Lake. The study suggested that summer months as well as early and late winter were the most important times for caribou hunting. NWT Fish and Wildlife Service records (1970 to 1977) were collected (Table 5.1-5), and interviews were conducted with 43 randomly selected Baker Lake households. Based on these data and interviews, as well as the number of hunters, household members and hunting frequencies, an annual caribou harvest of 4,100 animals was estimated for Baker Lake. An annual total harvest of 400 geese and 2,800 ptarmigan species was also estimated. Data accuracy reportedly varied widely between years given that harvest declarations were made from memory at the time the license was returned, and since many licenses were either not returned or not included in records. The report also stated that hunters may have deliberately underestimated their harvest in fear of imposition of quotas or other restrictive actions (IDS 1978).

Table 5.1-5 Historical Hunter Harvest Data for the Baker Lake Area (1969 to 2001)

Species Harvested	IDS 1978[a]								NWMB 2005[b][c]				
	1969–1970	1970–1971	1971–1972	1972–1973	1973–1974	1974–1975	1975–1976	1976–1977	1996–1997	1997–1998	1998–1999	1999–2000	2000–2001
Caribou	2,030	1,763	1,586	2,378	2,000	1,346[d]	494[d]	1,078[d]	2,856 ±260	2,846 ±246	2,269 ±249	2,374 ±179	2,057 ±173
Grizzly	ND	ND	ND	ND	ND	ND	ND	ND	1 ±2	0	0	3 ±3	4 ±4
Muskox	ND	ND	ND	ND	ND	ND	ND	ND	0	0	7 ±7	5 ±4	10 ±6
Wolverine	ND	ND	ND	ND	ND	ND	ND	ND	5 ±4	2 ± 2	8 ±5	22 ±9	22 ±10
Wolf	ND	10	9	8	9	7	1	9	72 ±36	97 ±32	147 ±56	46 ±19	92 ±31
Wolf (bounty)[e]	13	12	27	20	34	23	ND	ND	ND	ND	ND	ND	ND
Arctic fox[f]	281	1,194	703	389	2,284	361	436	674	314 ±100	116 ±62	64 ±34	87 ±58	29 ±15
Geese (all)	23	41	28	127	136	662	34[d]	853	ND	ND	ND	ND	ND
Canada goose	ND	ND	ND	ND	ND	ND	ND	ND	106 ±39	50 ±37	43 ±36	34 ±30	62 ±87
Snow goose	ND	ND	ND	ND	ND	ND	ND	ND	15 ±12[f]	28 ±30	91 ±115	58 ±75	3 ±4
Ducks	1	2	46	38	17	0[d]	12[d]	13[d]	ND	ND	ND	ND	ND
Ptarmigan	499	792	984	849	1,525	332	110[d]	207[d]	26 ±36	185 ±167	150 ±151	184 ±134	324 ±190

[a] Data from General Hunting License (GHL) returns (see text for data limitations)

[b] Data from hunting calendars recorded by approximately 226 hunters (see text for data limitations)

[c] Sampling error, displayed as 95% Confidence Interval of the annual estimates for each species

[d] Incomplete data due to incomplete GHL returns

[e] Wolf bounty was discontinued in 1975

[f] Data from Fur Export Tax Returns and Traders Fur Record Book

ND = No data

From June 1996 to May 2001, harvest data were collected on a monthly basis from Inuit hunters by NWMB, as mandated by the Nunavut Land Claim Agreement (NCLA). The study recorded data on various terrestrial wildlife including big game, furbearers, small game, waterfowl, other birds, and eggs. Approximately 226 hunters in Baker Lake participated in the study (one of the lowest participation rates of communities in the study). Decreasing caribou harvests were reported for Baker Lake during that time period (Table 5.1-5), which was attributed to a decline in the number of hunters interviewed and a declining response rate (i.e., 81% in 1996/'97 to 55% in 2000/'01), as opposed to an actual decline in hunting activity. Both sampling error and intentional non-response bias were considered to be important factors affecting data from Years 2 to 5 of the study (NWMB 2005).

In 2007, the Baker Lake HHS commenced and initially reported low harvest rates as a result of generally low participation rates. With each subsequent study year, overall numbers of hunters interviewed and response rates have steadily increased (Table 5.1-6). Changes in study parameters since 2007 (i.e., quarterly visits to participants' residences, building a rapport with prospective and current study participants, and awarding prizes at the end of each year) likely contributed to the increasing success of the HHS. Harvest data for caribou, muskox, and wolverine were recorded.

Table 5.1-6 Total Harvest Statistics from the AREVA/AEM Baker Lake Hunter Harvest Study for Caribou, Muskox and Wolverine (2007 to 2013)

Year	Number of Participants	Caribou	Muskox	Wolverine
2007	40	238	4	2
2008	17	296	4	4
2009	36	587	2	11
2010	42	628	1	15
2011	46	685	1	9
2012	62	496	4	7
2013	49	420	4	2

In 2011, 685 harvested caribou were reported by study participants, the most of any study year. Yet, according to the IQ, *this year [2010/11] the caribou were not using their normal migration routes. There were fewer caribou this year* (IQ-BLHT 2011; IQ-RIJ 2011). In 2008, 296 harvested caribou were reported. Lower reported harvest numbers may be a reflection of participant fatigue and declining response rate over time, given the length of time the study has been ongoing (similar to trends observed in the NWMB study). But harvest variability is also reflected in IQ and engagement data. Some say *there are more caribou being taken and the town is growing, and there are many community feasts with caribou* (EN-BL OH Oct 2012). Whereas others say their *diet was fish only, as caribou were scarce after moving to Baker Lake* (IQ-BL06 2008), and that in more recent years, *since Meadowbank started caribou hunting has been hard* (EN-BL OH Nov 2013).

The average number of caribou harvested annually over the course of the HHS (2007 to 2013) is 479 animals. Assuming 10% of all Baker Lake hunters are actively participating in the study, extrapolation of these values suggests approximately 5,000 caribou are harvested each year in the Hamlet of Baker Lake.

During the Nunavut Wildlife Harvest Study, between 2,057 and 2,856 caribou were harvested each year between 1996 and 2001 (NWMB 2005). The IDS report (1978) estimated an annual caribou harvest in Baker Lake of 4,100 during the 1970s. The recent AREVA diet survey concluded that approximately 5,020 caribou were harvested annually by the residents of Baker Lake in 2009 and 2010. Based on the results of these other studies, the annual HHS results are anticipated to be a relatively accurate predictor of total caribou harvested each year.

The average number of caribou harvested per month per participant has remained fairly constant each year of the HHS (average of 3.0 to 3.5 caribou per month per person). The maximum number of caribou harvested per participant during the busy fall hunting season was 9.3 caribou per person (in October 2007, the first year of the HHS). From the IQ, it has been reported that *two or three caribou [are hunted] each week. Sometimes we share with other families. Caribou meat doesn't last long, especially if you have a family. A biologist took all the meat from a number of caribou and on average there was 50lbs of edible meat per caribou. So some people need to go out every week* (IQ-BLHT 2011). It is not clear from IQ whether this estimated weekly harvest rate was for busy hunting seasons such as fall and spring, and/or for particularly prolific hunters. This harvest rate is likely not indicative of all households in Baker Lake. Even if this harvest rate was for only four months of the year, the total harvest would be 35 animals per person, which is much higher than estimates of average annual caribou harvest per participant in the HHS (from 6.8 to 17.4 animals per year). Assuming approximately 375 hunters in Baker Lake (as other studies have), an estimated annual catch of over 13,000 caribou would be predicted, which is a much higher number than the harvest reported in previous studies and thought to actually be occurring in the Hamlet.

Participation has been variable over the seven years of the study but has averaged approximately 42 participants per year. The number or frequency of hunting trips has also been variable. In 2010, participants averaged 9.4 trips each (the maximum number during the study), whereas in 2013, the average number of trips had decreased to 4.8. Certain hunters have reported hunting less frequently compared to previous years as a result of increasingly busy work schedules; however, other hunters have reported hunting more frequently as a result of increased income. Results appear to be in general agreement with the 2010 AREVA diet survey.

To date, Baker Lake HHS study counts for muskox and wolverine have been low (Table 5.1-6). Based on IQ, it is likely that these harvests are under reported. *Yes [wolves are hunted], the fur is big bucks. When it is really cold they come into town. Some people hunt [for wolves, wolverines]*

depending on the time of year (IQ-BLHT 2011). *[Wolverine] are seen around and can be caught but they are hard to trap and can break small traps apart and escape. A few people are trapping fox now and they are catching foxes* (IQ-RBJ 2011). *The number of wolves and grizzly bears harvested has increased, pelts are very valuable* (AEM 2005b; IQ-BLHT 2011).

Given the low densities of muskox and wolverine (relative to caribou) as well as their general aversion to human activities, changes in local area hunting distribution or hunting patterns are not anticipated to adversely affect these species.

5.1.4.2 Diet Survey

AREVA surveyed 189 residents as part of socio-economic baseline studies (see Tier 3 Technical Appendix 9A), representing 89 households (20% of all households, or 23% of the total adult population in Baker Lake). The 2010 AREVA diet survey compared its findings to the 1996 to 2001 NWMB data (NWMB 2005) and to diet data collected in 1998 and 1999 by the Centre for Indigenous People's Nutrition and Environment (CINE). The survey results indicated that traditional harvesting activities did not appear to have declined in Baker Lake over the last decade, the number of hunters remained stable, and traditional harvesting activities were still valued in the community. These results are in agreement with IQ and engagement data. People have noted that caribou are a main source of food (eat mainly native foods) and they do not eat a lot of food from the stores (EN-BL NIRB Apr 2010). Consuming country food is not considered 'ritual food' but the daily way of life (IQ-CIHT 2009). People say we have not changed our diet. We feed off the land. We live seasonally as long as I can remember up till now (EN-BL NPC June 2007).

Approximately 40% of residents surveyed felt as though they were consuming less country food in 2010 relative to 1995, which may be offset by those eating more country food than before, maintaining levels over time. IQ and engagement data did not indicate that less country food was consumed, although there was a comment that since Meadowbank started caribou hunting has been hard (EN-BL OH Nov 2013). Recent increased employment opportunities and associated shift work in Baker Lake may be changing the frequency, duration and intensity of hunting activities. For example, the survey concluded that there were higher harvest rates for those employed for greater than six months in the previous year. Increased disposable income for fuel and associated hunting and fishing equipment were likely factors in the increased hunting rates. Some generational differences may also be reflected since it has been noted that we (older adults) like caribou and wild meat, but younger people do not eat so much (EN-BL OH Oct 2012).

5.1.4.3 Seasonal Hunting Patterns

August, September and October have traditionally been the months of highest total caribou harvest (Table 5.1-7A; Figure 5.1-11). IQ describes similar seasonal hunting patterns. We do hunt by season: August to November before the rut we hunt bulls. After the rut, we hunt barren (non-

pregnant) cows (IQ-BLHT 2011). There are times when you hunt certain caribou. When caribou are pregnant, they are very skinny and we do not hunt these. Some calves were hunted in the past but today, not really, but some elders like the tender meat from calves (IQ-BLHT 2011). In Repulse Bay, people noted that people here hunt male caribou during the spring and females in the fall (ones without calves) (EN-RB OH Nov 2010). In the fall, people from Chesterfield Inlet moved back from the shores to hunt caribou further inland (Freeman 1976). Despite some contradictions, the seasonality of hunting preferences has not changed markedly and, not surprisingly, reflects caribou movements since Baker Lake/Rankin Inlet hunters go wherever the caribou go (IQ-BLHT 2011, IQ-RIJ 2011). Historical studies have noted that barren-ground caribou were often hunted late fall or early spring when herds were using river crossings (Riewe 1992).

Table 5.1-7A Monthly Caribou Harvest Statistics from the Baker Lake Hunter Harvest Study (2007 to 2013) and the Nunavut Wildlife Harvest Study (1996 to 2001)

Study/Year	Number of Caribou Reported Harvested												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Yearly Total**
Nunavut Wildlife Harvest Study – Nunavut Wildlife Management Board[(a)]													
1996/97 (n=208)	ND	ND	ND	ND	ND	141	190	490	428	435	202	178	2,856
	118	144	146	167	217	-	-	-	-	-	-	-	
1997/98 (n=186)	-	-	-	-	-	159	162	354	322	553	295	196	2,846
	137	124	192	193	159	-	-	-	-	-	-	-	
1998/99 (n=218)	-	-	-	-	-	85	163	153	272	407	254	135	2,269
	137	131	99	211	222	-	-	-	-	-	-	-	
1999/2000 (n=176)	-	-	-	-	-	111	148	433	528	409	74	66	2,374
	96	86	75	135	213	-	-	-	-	-	-	-	
2000/01 (n=172)	-	-	-	-	-	76	187	333	309	98	186	163	2,057
	150	126	146	156	127	ND	ND	ND	ND	ND	ND	ND	
Average monthly harvest	128	122	55	172	188	114	170	353	372	380	202	148	200
% of Total	5.2	4.9	5.3	6.9	7.6	4.6	6.9	14.2	15.0	15.3	8.1	6.0	100%

Table 5.1-7A Monthly Caribou Harvest Statistics from the Baker Lake Hunter Harvest Study (2007 to 2013) and the Nunavut Wildlife Harvest Study (1996 to 2001)

Study/Year	Number of Caribou Reported Harvested												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
Baker Lake Hunter Harvest Study (Agnico-Eagle Mines Ltd. and AREVA Canada Resources Inc.)													
2007	0	7	89	22	44	6	6	6	37	14	5	2	238
2008	13	15	14	10	19	14	25	34	56	47	24	25	296
2009	42	52	41	28	28	18	30	88	114	102	11	33	587
2010	27	35	34	66	47	41	46	67	82	117	48	18	628
2011	14	47	64	53	78	39	42	35	123	108	2	75	680
2012	43	30	60	71	41	44	13	19	39	37	72	27	496
2013	5	47	55	28	18	18	20	46	76	40	35	32	420
Average monthly harvest	24	33	51	40	39	26	26	42	75	66	28	30	478
% of Total	4.3	7.0	10.7	8.3	8.2	5.4	5.4	8.8	15.8	13.9	5.9	6.3	100%

NOTE:

Details on study participants in Table 5.1-6.

(a) NWMB (2005)

ND = No data (study not conducted during this period)

n = Number of participants

'-' = Data included under next survey year

Muskox and wolverine harvest counts from the Baker Lake HHS are lower but within range of data from the NWMB study (NWMB 2005). As discussed, harvest records for these species are likely under reported (Tables 5.1-7B and 5.1-7C).

Table 5.1-7B Monthly Muskox Harvest Statistics from the Baker Lake Hunter Harvest Study (2007 to 2013) and the Nunavut Wildlife Harvest Study (1996 to 2001)

Study/Year	Number of Muskox Reported Harvested												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
Nunavut Wildlife Harvest Study – Nunavut Wildlife Management Board (NWMB)[(a)]													
1996/97 (n=208)	ND	ND	ND	ND	ND	0	0	0	0	0	0	0	0
	0	0	0	0	0	-	-	-	-	-	-	-	
1997/98 (n=186)	-	-	-	-	-	0	0	0	0	0	0	0	0
	0	0	0	0	0	-	-	-	-	-	-	-	
1998/99 (n=218)	-	-	-	-	-	0	0	0	0	0	0	0	7
	0	0	5	0	2	-	-	-	-	-	-	-	
1999/2000 (n=176)	-	-	-	-	-	0	0	0	0	0	3	0	5
	0	0	2	0	0	-	-	-	-	-	-	-	
2000/01 (n=172)	-	-	-	-	-	0	4	2	0	0	0	0	10
	0	0	4	0	0	ND	ND	ND	ND	ND	ND	ND	
Baker Lake Hunter Harvest Study (Agnico-Eagle Mines Ltd. And AREVA Canada Resources Inc.)[(b)]													
2007	0	0	0	3	0	0	0	0	0	0	0	1	4
2008	0	0	3	0	0	0	0	1	0	0	0	0	4
2009	0	0	1	1	0	0	0	0	0	0	0	0	2
2010	0	0	0	0	0	0	0	0	0	0	0	1	1
2011	0	0	0	1	0	0	0	0	0	0	0	0	1
2012	0	0	0	0	1	0	0	0	2	0	1	0	4
2013	1	0	0	0	0	0	0	0	0	0	1	0	2

NOTE:

Details on study participants in Table 5.1-6.

[(a)] NWMB (2005)

ND = No data (study not conducted during this period)

n = Number of participants

'-' = Data included under next survey year

Table 5.1-7C Monthly Wolverine Harvest Statistics from the Baker Lake Hunter Harvest Study (2007 to 2013) and the Nunavut Wildlife Harvest Study (1996 to 2001)

Study/Year	Number of Wolverine Reported Harvested												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Yearly Total**
Nunavut Wildlife Harvest Study – Nunavut Wildlife Management Board (NWMB)[a]													
1996/97 (n=208)	ND	ND	ND	ND	ND	0	0	0	0	0	1	0	5
	0	0	2	2	0	-	-	-	-	-	-	-	
1997/98 (n=186)	-	-	-	-	-	0	0	0	0	0	0	0	2
	0	0	0	0	2	-	-	-	-	-	-	-	
1998/99 (n=218)	-	-	-	-	-	0	0	0	0	0	0	1	8
	0	0	5	2	0	-	-	-	-	-	-	-	
1999/2000 (n=176)	-	-	-	-	-	0	0	0	2	0	3	2	22
	0	3	6	2	4	-	-	-	-	-	-	-	
2000/01 (n=172)	-	-	-	-	-	0	0	0	0	2	0	0	22
	1	4	2	13	0	ND	ND	ND	ND	ND	ND	ND	
Baker Lake Hunter Harvest Study (Agnico-Eagle Mines Ltd. and AREVA Canada Resources Inc.)[b]													
2007	0	0	2	0	0	0	0	0	0	0	0	0	2
2008	0	1	0	1	2	0	0	0	0	0	0	0	4
2009	2	1	0	4	0	1	0	0	0	0	1	2	11
2010	2	1	3	5	0	0	0	0	0	0	1	3	15
2011	2	1	0	2	1	0	0	0	1	0	2	0	9
2012	0	1	2	2	0	0	0	1	0	0	0	1	7
2013	0	0	0	0	0	0	0	0	1	0	0	1	2

NOTE::

Details on study participants in Table 5.1-6.

(a) NWMB (2005)

ND = No data (study not conducted during this period)

n = Number of participants

'-' = Data included under next survey year

5.1.4.4 Geographic Hunting Distribution

IQ on harvest areas around the RSA is illustrated in Figure 5.1-12, along with the approximate location of harvest data collected during the Nunavut Wildlife Harvest Study (NWMB 2005) and the Baker Lake HHS. These multiple sources of information show definite patterns in human use areas around the region. Most hunting trips were located east of the Thelon River and in close proximity to the Hamlet of Baker Lake. IQ mapped on Figure 5.1-12 identifies specific caribou harvest areas around Whitehills Lake and the east shore of Baker Lake. In the past, when caribou wintered in the Whitehills Lake and Tehek Lake areas, hunting and trapping was done from fall through spring near Whitehills Lake and also around the northeast shore of Baker Lake in summer and fall (Riewe 1992). Hunting areas along the south and east shores of Baker Lake were identified on IQ maps. *In December we hunt south of Baker when the Qamanirjuak herd moves through* (IQ-BLHT 2011). Lifetime harvesting maps of both Arviat and Baker Lake show that Elders and active hunters have used the area along Chesterfield Inlet and further south for hunting caribou; north of Chesterfield Inlet was less intensely used (Kendrick and Manseau 2008).

No particular caribou hunting area was identified close to the Hamlet of Baker Lake, but both harvest data and comments from IQ and engagement data show more hunting trips close to town. People noted they *hunt in a 50 mile radius around Baker Lake, and are sometimes limited by fuel* (IQ-BLHT 2011), and that they *hunt a lot near town and mostly north now* (EN-BL OH Nov 2013). Baker Lake hunters said *they do not go as far as they used to for caribou. While they used to travel large distances to harvest caribou, they now hunt close to the community and do not need to go further than 40 miles, as caribou were 'just there'* (IQ-BLH 2009). This opinion was not universal, as others said *the caribou are far from here now, there are too many wolves around, and we have to travel far with tents to camp to get caribou* (EN-BL OH Nov 2013). Harvest data collected since 1995 indicate that most hunters seem to hunt in close proximity to Baker Lake (Figure 5.1-12).

The location and number of harvests from the Baker Lake HHS (2007 to 2013) are provided in Figure 5.1-13. Caribou harvest densities were highest adjacent and east of Baker Lake (equal to a 20 km radius from cumulative harvest data collected during the HHS), and up to the Thelon River, beyond which harvest rates drop off sharply (Table 5.1-8; Figure 5.1-13).The Judge Sissons Lake area has been described as an area infrequently used for hunting, trapping, and as a travel route in the past (Riewe 1992), which supports the harvest data and the IQ and engagement data. The number of trips and harvest rates (to date) are lower (typically only one to three harvests) west of the Thelon River (Figure 5.1-13). Feedback from IQ interviews and engagement does identify some human use in the RSA, especially camping and caching to the north and south (also noted in Riewe 1992), and caribou hunting around the Schultz and Qamanaajuk Lake. Some hunters said they *travel the route along the proposed Kiggavik winter road often to hunt* (EN-BL OH Nov 2013).

From 1996 to 2001, an estimated 18% of the total caribou harvest was within five kilometres of the Meadowbank road (Table 5.1-8). In 2007, prior to completion of the Meadowbank AWAR, 34% of the

caribou harvest was within five kilometres of the road. From 2008 (post-construction) to 2013, hunting pressure has increased to 39% of total harvest within five kilometres of the AWAR. Although some hunters may continue to adhere to traditional hunting grounds, a number of hunters interviewed have explicitly stated that the AWAR has provided easy access to caribou and is used preferentially to reduce time spent 'on the land'. *There are at least 40 ATVs some days on the Meadowbank road. Likely more (caribou) are taken because of the ease* (EN-BL OH Oct 2012). *We hunt in the area including around the north of Baker Lake and off the [Meadowbank] road* (EN-BL OH Nov 2013).

Reported harvest rates within the RSA and Winter Road LSA have remained fairly constant since 1996 (Table 5.1-8). The percentage of caribou harvested from within the All-Season Road LSA has increased slightly over time, in particular in areas east of the Thelon, which is closer to the Meadowbank road.

Table 5.1-8 Location of Caribou Harvest within the Meadowbank and Kiggavik Regional Study Areas

Area	1996 to 2001[(a)]		2007 to 2013	
	% of Total Caribou Harvested	Number of Caribou Harvested	% of Total Caribou Harvested	Number of Caribou Harvested
Harvest within 5 km of Meadowbank road	18%	1,188	38%	1,285
Harvest within Meadowbank road LSA	7%	451	22%	749
Harvest within Meadowbank RSA	67%	4,471	77%	2,572
Harvest within 5 km of the All-Season Road	21%	1,379	30%	1,016
Harvest within 5 km of the All-Season Road LSA	32%	2,109	35%	1,159
Harvest within the All-Season Road LSA	8%	546	19%	634
Harvest within the All-Season Road, east of Thelon River	8%	523	19%	624
Harvest within the All-Season Road, west of Thelon River	0%	23	0%	10
Harvest within 5 km of the Winter Road LSA	14%	910	15%	491
Harvest within the Winter Road LSA	2%	131	3%	117
Harvest within the RSA	70%	4,635	74%	2,484

(a) from NWMB (2005)

AWAR = All-Weather Access Road (this road is a private, but hunters are permitted access)

5.1.5 Tissue Chemistry

Tissue data are summarized in Tables 5.1-9 (insects), 5.1-10 (small mammals and birds), 5.1-11 (caribou), and 5.1-12 (muskox). The mean, standard deviation, and range of concentrations are provided for each tissue type, for the Mine LSA and reference (RSA) sampling locations. Data for individual samples are provided in Attachment F. For a discussion of VEC health and contaminant loadings, refer to the Ecological Risk Assessment (ERA) found in Technical Appendix 8A of the EIS.

Minimal historical data were available for comparison. In 1989, tissue samples were collected from various species (including wolf, ptarmigan, Arctic hare (*Lepus arcticus*), caribou, and Arctic ground squirrel [*Spermophilus parryi*]) and tissue types (including bone) (Beak 1990). Only comparable tissue types were included in Tables 5.1-10 and 5.1-11. Historical data for hare and squirrel muscle tissue are provided for comparative purposes only as these samples were for muscle tissue only, not whole body analysis.

Mean concentrations for harvested caribou are for all tissue types, including bone. This average may account for some high standard of deviations. For example, zinc concentrations are much higher in bone samples compared to muscles and organs, resulting in a wide data range for this parameter.

Raw data for individual samples and tissue types are provided in Attachment C for caribou samples. Only whole tissue wet weight was collected in the field prior to submission the laboratory, as samples were collected from already harvested specimens. Details on wet weight are also provided in Attachment C.

Table 5.1-9 Summary of Insect Tissue Chemistry Data for the Mine Local Study Area (2008/09)

Parameter	Mine LSA			Mean	Standard Deviation	Range	
	2008[(a)] (n=)	2009[(b)] (n=)	2008/2009 Total (n=)			Min	Max
Metals (µg/g)							
Aluminum	3	1	4	45	±29	20	84
Antimony	3	1	4	0.07	±0.02	0.06	0.09
Arsenic	3	1	4	0.04	±0.02	0.03	0.085
Barium	3	1	4	93	±47	52	160
Beryllium	3	1	4	0.06	±0.06	<0.01	<0.3
Boron	0	1	1	2.0	n=1		
Cadmium	3	1	4	1.1	±0.51	0.57	1.8
Chromium	3	1	4	1.9	±2.1	0.44	5.0
Cobalt	3	1	4	0.08	±0.04	<0.06	0.13
Copper	3	1	4	28	±2.8	24	30
Iron	0	1	1	190	n=1		
Lead	3	1	4	0.43	±0.30	0.15	0.83
Manganese	3	1	4	79	±28	45	113
Mercury	3	0	3	0.04	±0.004	0.04	0.05
Molybdenum	3	1	4	0.76	±0.19	0.59	1.0
Nickel	3	1	4	0.97	±1.0	0.32	2.5
Selenium	3	1	4	0.70	±0.12	0.52	0.80
Silver	0	1	1	0.22	n=1		
Strontium	3	1	4	25	±8.2	15	35
Thallium	3	1	4	0.02	±0.01	0.02	0.03
Tin	3	1	4	0.04	±0.03	<0.05	<0.15
Titanium	0	1	1	0.44	n=1		
Uranium	3	1	4	0.03	±0.02	0.01	0.06
Vanadium	3	1	4	0.10	±0.06	<0.1	<0.3
Zinc	3	1	4	278	±282	109	700

Table 5.1-9 Summary of Insect Tissue Chemistry Data for the Mine Local Study Area (2008/09)

Parameter	Mine LSA			Mean	Standard Deviation	Range	
	2008[(a)] (n=)	2009[(b)] (n=)	2008/2009 Total (n=)			Min	Max
Radionuclides (Bq/g)							
Lead-210	0	1	1	<0.3	n=1		
Polonium-210	0	1	1	<0.07	n=1		
Radium-226	0	1	1	<0.06	n=1		
Thorium-230	0	1	1	<0.1	n=1		
Thorium-232	0	1	1	<0.1	n=1		

Percent moisture measured in two samples (18.1% and 35.6%).

(a) Samples collected at sample locations KIG3, KIG4, KIG5, as shown in Figure 4.3-14A

(b) Samples collected at sample location KIG4, as shown in Figure 4.3-14A

Table 5.1-10 Summary of Small Mammal and Bird Tissue Chemistry Data for the Mine Local Study Area and Regional Study Area (2009)

Parameter	Small Mammals					Small Birds				
	Mine LSA (n=27)[a]				Historical Data (n=2)[b]	Mine LSA (n=2)[c]				RSA (n=1)
	Mean	Std Dev	Range			Mean	Std Dev	Range		
			Min	Max				Min	Max	
Metals (µg/g)										
Aluminum	13	±18	1.2	63	ND	8.9	±10	1.8	16	14
Antimony	0.03	±0	<0.05	<0.05	ND	0.03	±0	<0.05	<0.05	<0.05
Arsenic	0.02	±0.02	<0.02	0.11	<0.1 to 0.22	0.01	±0	<0.02	<0.02	<0.02
Barium	20	±12	4.2	53	ND	12	±11	4.8	20	4.2
Beryllium	0.003	±0.0007	<0.005	0.005	ND	0.003	±0	<0.005	<0.005	<0.005
Boron	0.51	±0.35	<0.5	1.4	ND	0.25	±0	<0.5	<0.5	<0.5
Cadmium	0.04	±0.04	<0.005	0.17	<0.01 to 0.06	0.01	±0.01	0.005	0.015	0.02
Chromium	0.11	±0.04	<0.2	0.3	<0.2	0.10	±0	<0.2	<0.2	<0.2
Cobalt	0.08	±0.04	0.03	0.18	<0.2	0.03	±0.01	0.019	0.036	0.01
Copper	2.4	±0.58	1.6	5	1.4 to 2.47	2.4	±0.21	2.2	2.5	2.9
Iron	83	±27	45	160	ND	95	±21	80	110	100
Lead	0.06	±0.05	0.02	0.22	3.26 to 16	0.02	±0.002	0.018	0.021	0.03
Manganese	10	±5.1	2.1	24	ND	2.5	±0.07	2.4	2.5	1.7
Mercury	ND	ND	ND	ND	0.02 to 0.04	ND	ND	ND	ND	ND
Molybdenum	0.22	±0.30	<0.05	1.4	ND	0.11	±0.04	0.08	0.13	0.08
Nickel	0.17	±0.07	0.07	0.37	<0.2 to <0.3	0.08	±0.01	0.07	0.09	0.18
Selenium	0.09	±0.07	0.03	0.27	0.22 to 0.49	0.19	±0.15	0.08	0.29	0.35
Silver	0.003	±0	<0.005	<0.005	ND	0.003	±0	<0.005	<0.005	<0.005
Strontium	16	±9.2	2.8	32	ND	7.2	±3.4	4.8	9.6	2.6
Thallium	0.01	±0	<0.02	<0.02	ND	0.01	±0	<0.02	<0.02	<0.02
Tin	0.01	±0	<0.02	<0.02	ND	0.01	±0	<0.02	<0.02	<0.02
Titanium	0.40	±0.36	0.09	1.4	ND	0.32	±0.18	0.19	0.44	0.74
Uranium	0.05	±0.16	<0.002	0.73	0.006 to 0.30	0.001	±0	<0.002	<0.002	<0.002
Vanadium	0.04	±0.04	<0.05	0.21	ND	0.04	±0.02	<0.05	0.06	<0.05

Table 5.1-10 Summary of Small Mammal and Bird Tissue Chemistry Data for the Mine Local Study Area and Regional Study Area (2009)

Parameter	Small Mammals					Small Birds				
	Mine LSA (n=27)[a]				Historical Data (n=2)[b]	Mine LSA (n=2)[c]				RSA (n=1)
	Mean	Std Dev	Range			Mean	Std Dev	Range		
			Min	Max				Min	Max	
Zinc	28	±4.8	16	37	19 to 28.1	25	±4.9	21	28	17
Radionuclides (Bq/g)										
Lead-210	0.08	±0.06	<0.004	0.29	0.001 to 0.001	0.02	±0.01	0.02	0.029	0.08
Polonium-210	0.01	±0.01	0.001	0.037	0.0005	0.02	±0.01	0.006	0.025	0.01
Radium-226	0.02	±0.11	<0.001	0.58	0.0004 to 0.001	0.002	±0.001	0.001	0.002	0.002
Thorium-230	0.001	±0.001	<0.002	0.006	<0.0002 to 0.0007	0.001	±0	<0.002	<0.002	<0.002
Thorium-232	0.001	±0.0002	<0.002	<0.002	<0.0002 to <0.0001	0.001	±0	<0.002	<0.002	<0.002

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

[a] Including nine composite samples of two same-species specimens each

[b] Hare and squirrel, muscle only (n=2, composite samples from total of 7 animals), LSA (Beak 1990)

[c] Including one composite sample of two same-species specimens

ND = No data

Table 5.1-11 Summary of Caribou Tissue Chemistry Data for the Regional Study Area (2009)

Parameter	RSA				Historical Data[b] (n=1)
	Mean[s]	Std Dev	Range		
			Min	Max	
Metals (µg/g)					
Aluminum	1.1	±1.1	0.005	5.4	ND
Antimony	0.01	±0.03	<0.02	0.22	ND
Arsenic	0.02	±0.01	<0.01	0.06	ND
Barium	106	±165	0.05	440	ND
Beryllium	0.002	±0.002	<0.002	<0.01	ND
Boron	0.17	±0.14	<0.2	1.2	ND
Cadmium	0.74	±1.4	<0.002	5.8	ND
Chromium	0.07	±0.03	<0.1	0.20	2.46
Cobalt	0.04	±0.03	0.002	0.10	<DL
Copper	6.3	±10	<0.02	41	5.19
Iron	110	±201	0.47	980	ND
Lead	0.93	±1.3	0.002	5.8	2.8
Manganese	1.5	±1.2	0.08	4.5	ND
Mercury	ND	ND	ND	ND	ND
Molybdenum	0.17	±0.21	<0.02	0.74	ND
Nickel	0.08	±0.10	<0.01	0.61	0.2
Selenium	0.36	±0.40	<0.02	1.40	ND
Silver	0.03	±0.06	<0.002	0.38	ND
Strontium	67	±105	0.03	287	ND
Thallium	0.007	±0.002	<0.01	0.01	ND
Tin	0.008	±0.005	<0.01	0.03	ND
Titanium	0.60	±0.39	0.04	1.4	ND
Uranium	0.02	±0.08	<0.001	0.65	ND
Vanadium	0.02	±0.007	<0.02	<0.05	ND
Zinc	52	±36	10	140	28.8

Table 5.1-11 Summary of Caribou Tissue Chemistry Data for the Regional Study Area (2009)

Parameter	RSA				Historical Data[(b)] (n=1)
	Mean[(s)]	Std Dev	Range		
			Min	Max	
Radionuclides (Bq/g)					
Lead-210	0.36	±0.48	<0.001	2.0	ND
Polonium-210	0.36	±0.29	0.0042	1.3	ND
Radium-226	0.02	±0.03	<0.00005	0.087	ND
Thorium-230	0.002	±0.005	<0.00007	0.040	ND
Thorium-232	0.001	±0.001	<0.00007	0.0050	ND

Results presented are for caribou samples collected at locations shown in Figure 4.3-15.

Wet weight for each sample included in Attachment C.

(a) n=76 for all parameters (2009 data) ; the mean is calculated from data for all tissue types and bone

(b) Caribou muscle (n=1), RSA (Beak 1990)

ND = No data

Table 5.1-12 Summary of Muskox Tissue Chemistry Data for the Regional Study Area (2011)

Parameter	RSA[a]				Historical Data[c] (n=1)
	Mean[b]	Std Dev	Range		
			Min	Max	
Metals (µg/g)					
Aluminum	1.65	±1.48	0.6	2.7	ND
Antimony	0.015	±0.009	<0.02	<0.05	ND
Arsenic	0.013	±0.006	<0.02	0.02	ND
Barium	60.14	±103.8	0.05	180	ND
Beryllium	0.0023	±0.002	<0.002	<0.01	ND
Boron	0.15	±0.087	<0.2	<0.5	ND
Cadmium	0.335	±0.58	<0.002	1.0	ND
Chromium	0.067	±0.029	<0.1	<0.2	2.46
Cobalt	0.027	±0.024	0.003	0.05	<DL
Copper	1.20	±1.0	0.21	2.2	5.19
Iron	32.3	±17.5	15	50	ND
Lead	0.305	±0.41	0.037	0.78	2.8
Manganese	0.623	±0.48	0.14	1.1	ND
Mercury	ND	ND	ND	ND	ND
Molybdenum	0.117	±0.13	<0.02	0.26	ND
Nickel	0.087	±0.11	0.01	0.21	0.2
Selenium	0.69	±1.05	0.06	1.9	ND
Silver	0.002	±0.002	<0.002	<0.01	ND
Strontium	50.05	±86.6	0.04	150	ND
Thallium	0.0067	±0.003	<0.01	<0.02	ND
Tin	0.0067	±0.003	<0.01	<0.02	ND
Titanium	0.27	±0.33	0.08	0.65	ND

Table 5.1-12 Summary of Muskox Tissue Chemistry Data for the Regional Study Area (2011)

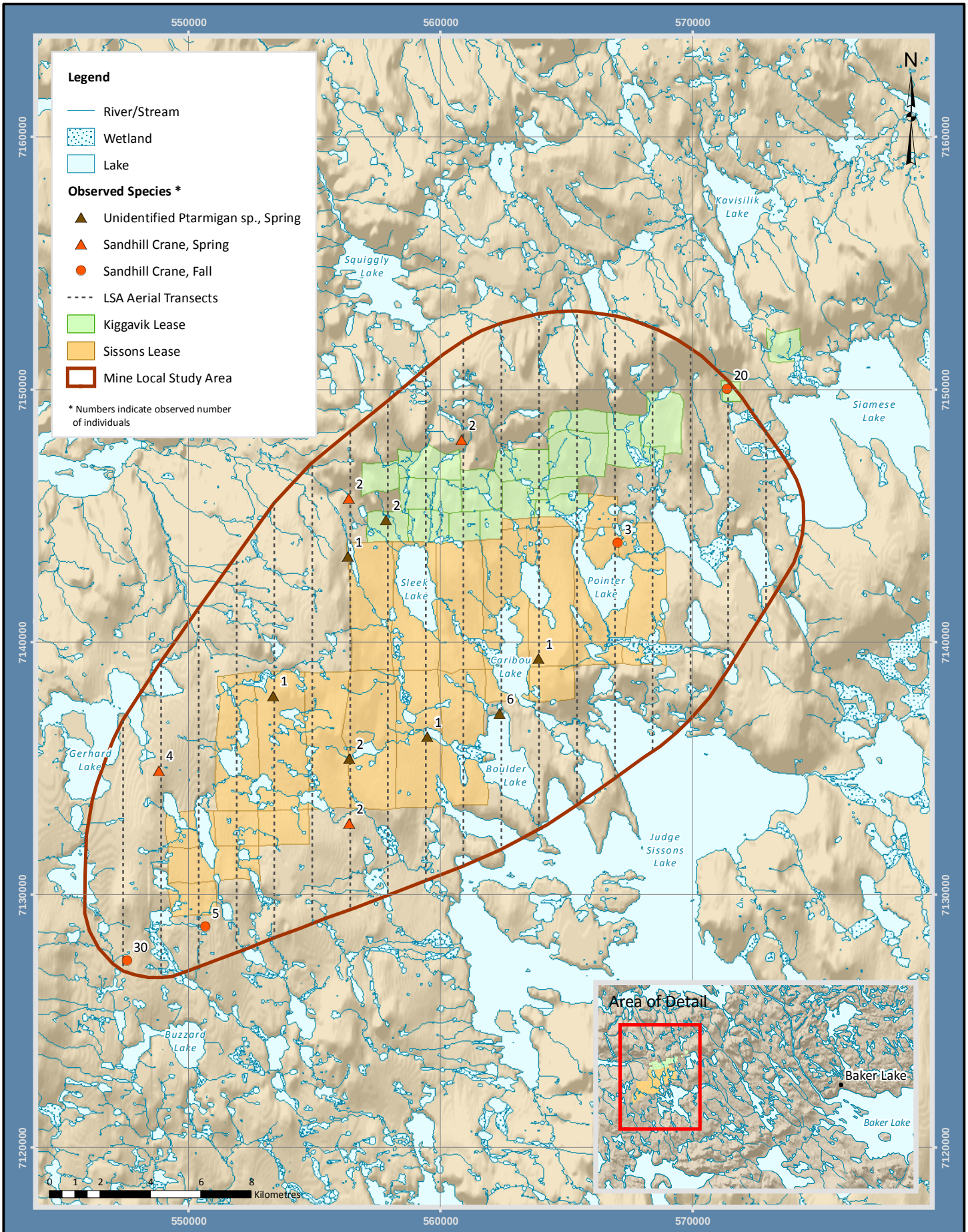
Parameter	RSA[a]				Historical Data[c] (n=1)
	Mean[b]	Std Dev	Range		
			Min	Max	
Uranium	0.018	±0.013	<0.01	0.03	ND
Vanadium	0.015	±0.009	<0.02	<0.05	ND
Zinc	43.3	±15.3	30	60	28.8
Radionuclides (Bq/g)					
Lead-210	0.13	±0.21	0.002	0.37	ND
Polonium-210	0.166	±0.14	0.0087	0.29	ND
Radium-226	0.0024	±0.004	<0.00005	0.007	ND
Strontium-90	0.018	±0.028	<0.001	0.05	ND
Thorium-230	0.0003	±0.0006	<0.0001	<0.002	ND
Cesium-137	0.008	±0.005	<0.004	0.012	ND

(a) Single animal harvested at km 90 along the Meadowbank road

(b) n=3 for all parameters (2011 data) ; the mean is calculated from data for all tissue types (belly meat, kidney) and bone

(c) Caribou muscle (n=1), RSA (Beak 1990)

ND = No data



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File: 5.1-1A_2008_Aerial_Results_Other_Bird_LSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.1-1 A
2008 AERIAL SURVEY RESULTS FOR THE LOCAL STUDY AREA - OTHER BIRD SPECIES

KIGGAVIK PROJECT - EIS

Gebauer & Associates ENVIRONMENTAL CONSULTANTS
CASLYS CONSULTING
AREVA

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Legend

- River
- Lake
- Wetland

Observed Species *

- Common Raven, Fall
- Unidentified Ptarmigan sp., Summer
- Unidentified Ptarmigan sp., Fall
- Sandhill Crane, Spring
- Sandhill Crane, Summer
- Willow Ptarmigan, Summer
- RSA Aerial Transects
- Kiggavik Lease
- Sissons Lease
- Regional Study Area

* Numbers indicate observed number of individuals

Area of Detail

Nunavut

N

0 2.5 5 10 15 20 Kilometres

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/06/2014 Scale: 1:500,000
File: 5.1-1B_2008_Aerial_Results_Other_Bird_RSA1.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.1-1 B
2008 AERIAL SURVEY RESULTS FOR THE REGIONAL STUDY AREA - OTHER BIRD SPECIES

KIGGAVIK PROJECT - EIS

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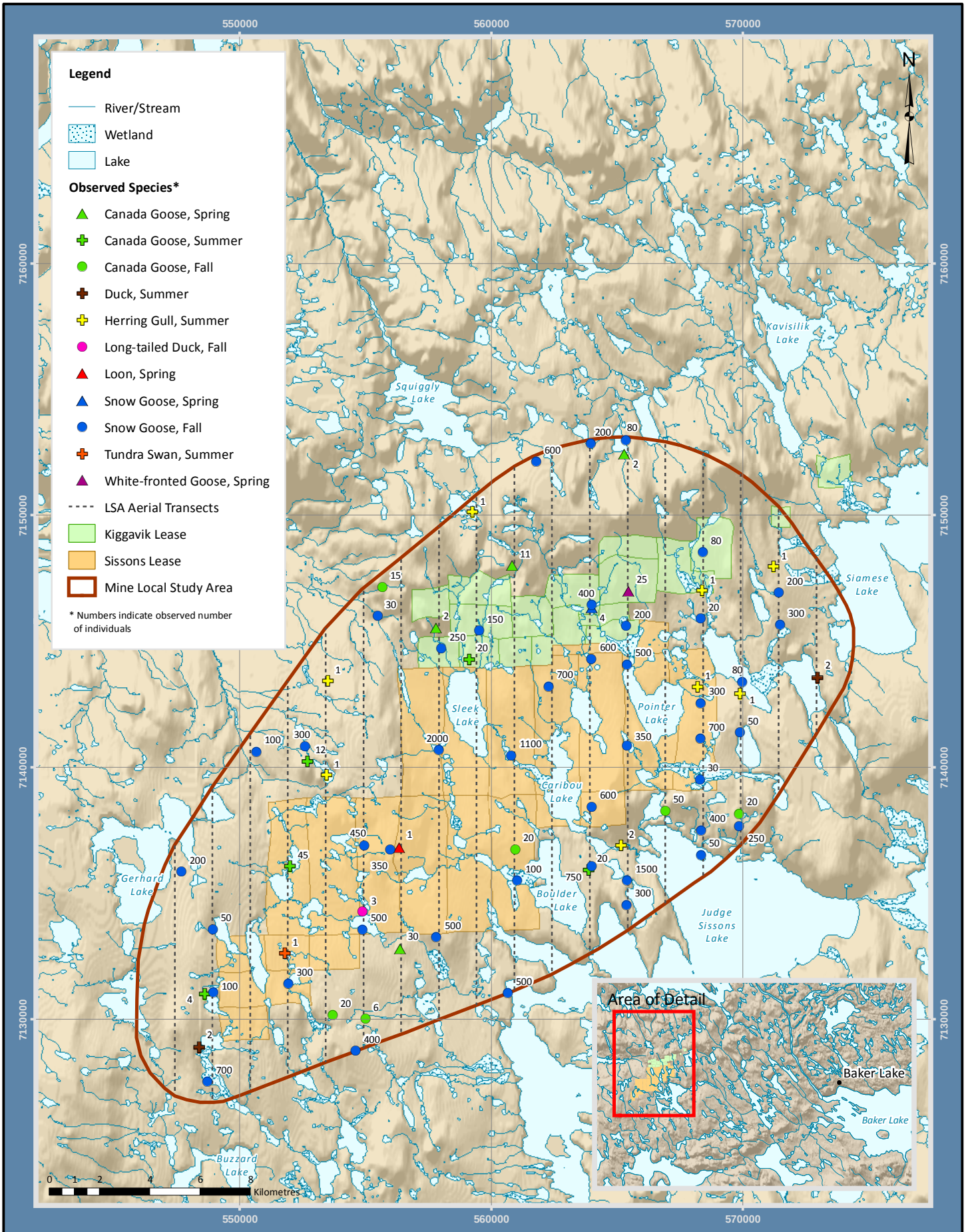

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/06/2014 Scale: 1:200,000
File: 5.1-1C_2008_Aerial_Results_Waterbird_LSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.1-1 C
2008 AERIAL SURVEY RESULTS IN THE LOCAL STUDY AREA - WATERBIRDS

KIGGAVIK PROJECT - EIS

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CASLYS CONSULTING
AREVA

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Legend

- River
- Wetland
- Lake

Observed Species *

- Canada Goose, Spring
- Canada Goose, Summer
- Duck, Summer
- Goose, Summer
- Herring Gull, Spring
- Herring Gull, Summer
- Long-tailed Duck, Summer
- Snow Goose, Spring
- Snow Goose, Summer
- Tundra Swan, Summer
- Tundra Swan, Fall
- RSA Aerial Transects
- Kiggavik Lease
- Sissons Lease
- Regional Study Area

* Numbers indicate observed number of individuals

Area of Detail

Nunavut

N

2 Tundra Swan
250 Snow Goose

2 Herring Gull
8 Snow Goose

1 Tundra Swan
1 Herring Gull

6 Tundra Swan
12 Canada Goose

6 Canada Goose
400 Snow Goose

2 Tundra Swan
1500 Snow Goose

1 Tundra Swan
20 Canada Goose

IQ Legend

- Goose Nesting Location
- White Swan Nesting Area
- Goose Hunting Area

0 2.5 5 10 15 20 Kilometres

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 04/28/2014 Scale: 1:500,000
File: 5.1-1D_2008_Aerial_Results_Waterbird_RSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Golder Associates Ltd., and Gebauer & Associates.

FIGURE 5.1-1 D
2008 AERIAL SURVEY RESULTS IN THE REGIONAL STUDY AREA - WATERBIRDS

KIGGAVIK PROJECT - EIS

Gebauer & Associates ENVIRONMENTAL CONSULTANTS
CASLYS CONSULTING
AREVA

AREVA Resources Canada Inc - P.O. Box 9204 - 817 - 45th Street West - Saskatoon, SK - S7K 3X5

Legend

- River
- Wetland
- Lake

Observed Species *

- Falcon sp, Fall
- Raptor, Fall
- Rough-legged Hawk, Fall
- Snowy Owl, Fall
- RSA Aerial Transects
- Kiggavik Lease
- Sissons Lease
- Regional Study Area

* Numbers indicate observed number of individuals

Area of Detail

Nunanvut

N

Schultz Lake
Qamaniq Tugliq

Amarulik Lake

Qamanaarjuk Lake

Thelon River
Kangirjuup Kuunga

Whitehills Lake
Tasirjuaq

Itigulik Lake

Ajaktukvik Lake

Kavisilik Lake

Squiggly Lake

Skinny Lake

Siamese Lake
Tasira'tuaq / Nurtavik

Long Lake

Qatqiqtalik Lake

Crossing Point Lake

Tunuhuk Lake

Thom Lake
Tasi'tuaq

Baker Lake
Qamanittuaq

Tupik Lake

Gerhard Lake

Lobster Lake

Qamanaugaq Lake

Judge Sissons Lake

Qikiqtarjualik

Audra Lake
Aniggug

Qikiqtarjualik River
Qikiqtarjualik Kuunga

Qinnguq Bay

Buzzard Lake

Turtle Lake

Murriittuq Lake

Qamanaugakuluk Lake

Baker Lake

Dragon Lake

Quglungnil;naaq Lake

Aniggug River
Aniggugpi Kuunga

Mihaluk Lake

Samarook Lake

Rocket Lake

Pistol Lake

Iqaluit Lake

Pitz Lake
Tasilugjuaq

Clear Water River

Gull Lake

Mallery Lake

Princess Mary Lake
Tasirjuaq Tugliqpaaq

Kazan River

Aumaluuktuuk Lake

Martell Lake

0 2.5 5 10 15 20 Kilometres

500000 520000 540000 560000 580000 600000 620000 640000 660000 680000

7180000 7160000 7140000 7120000 7100000 7080000

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/06/2014 Scale: 1:500,000
File: 5.1-1E_2008_Aerial_Results_Raptors_RSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.1-1 E
2008 AERIAL SURVEY RESULTS FOR THE REGIONAL STUDY AREA - RAPTORS

KIGGAVIK PROJECT - EIS

Gebauer & Associates ENVIRONMENTAL CONSULTANTS
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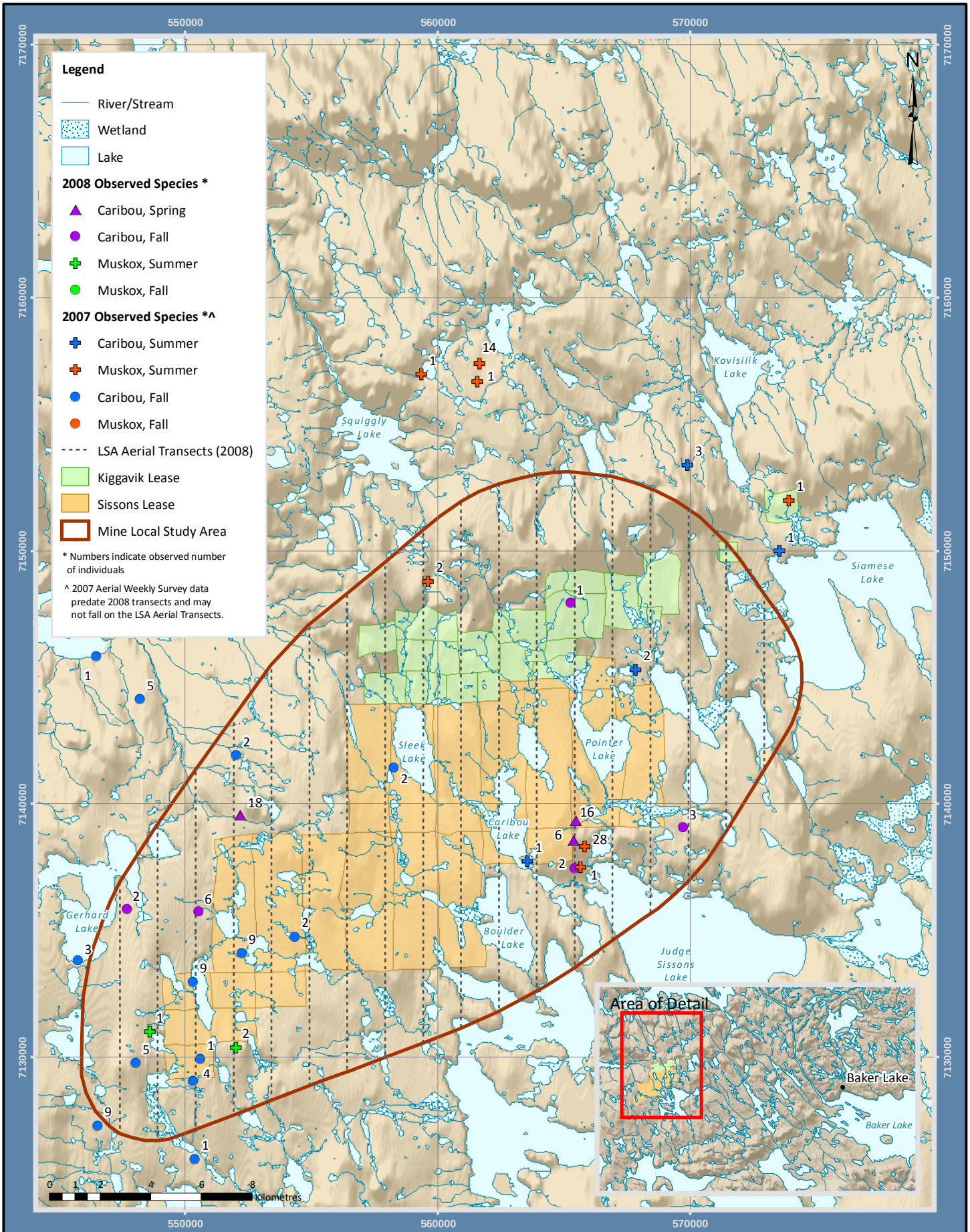

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/06/2014 Scale: 1:200,000
File: 5.1-1F_2008_Aerial_Results_Caribou_Muskox_LSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.1-1 F
2007 AND 2008 AERIAL SURVEY RESULTS FOR THE LOCAL STUDY AREA - CARIBOU AND MUSKOX

KIGGAVIK PROJECT - EIS

Gebauer & Associates ENVIRONMENTAL CONSULTANTS
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