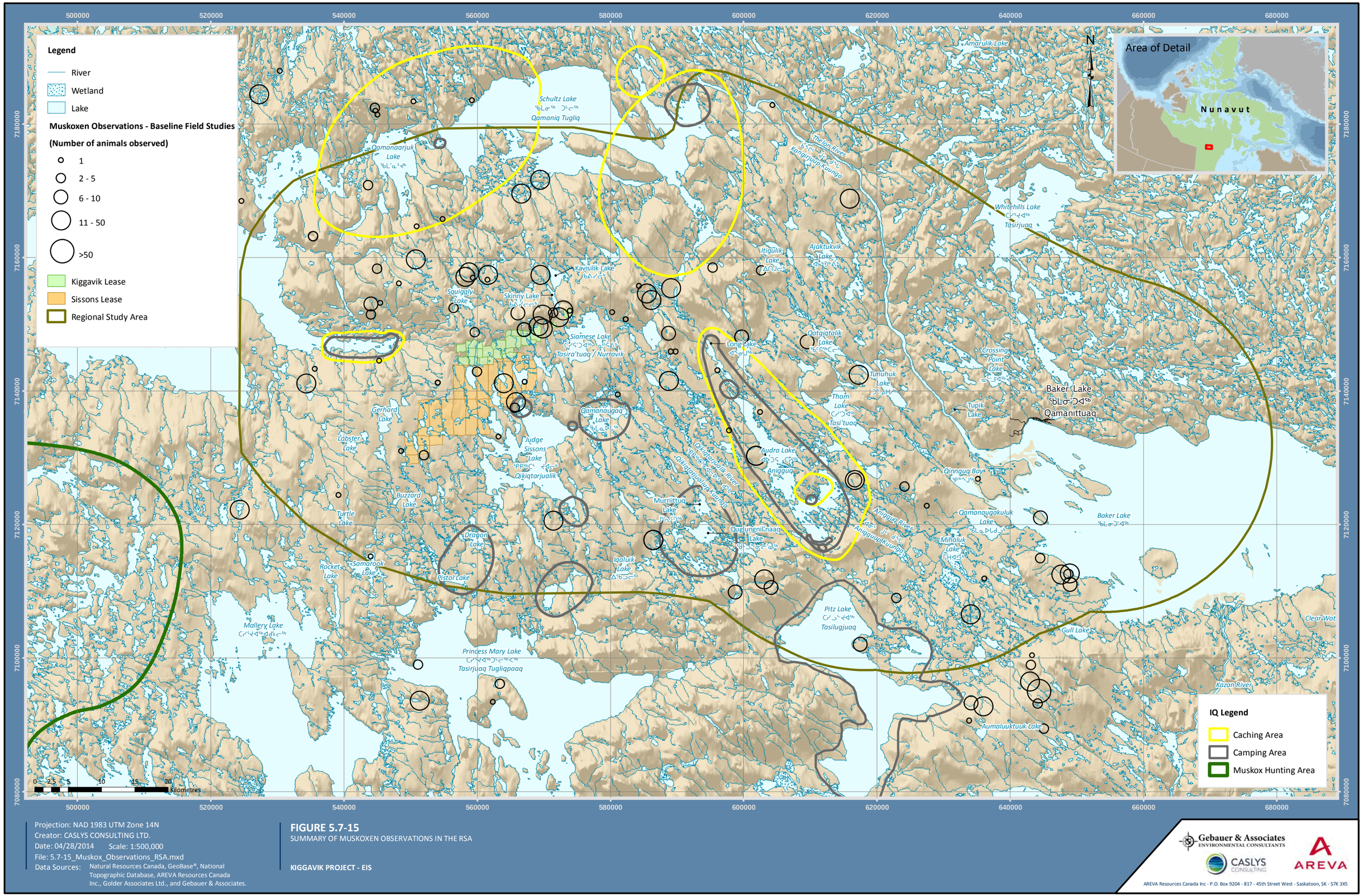

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 04/28/2014 Scale: 1:500,000
File: 5.7-15_Muskox_Observations_RSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Golder Associates Ltd., and Gebauer & Associates.

FIGURE 5.7-15
SUMMARY OF MUSKOXEN OBSERVATIONS IN THE RSA

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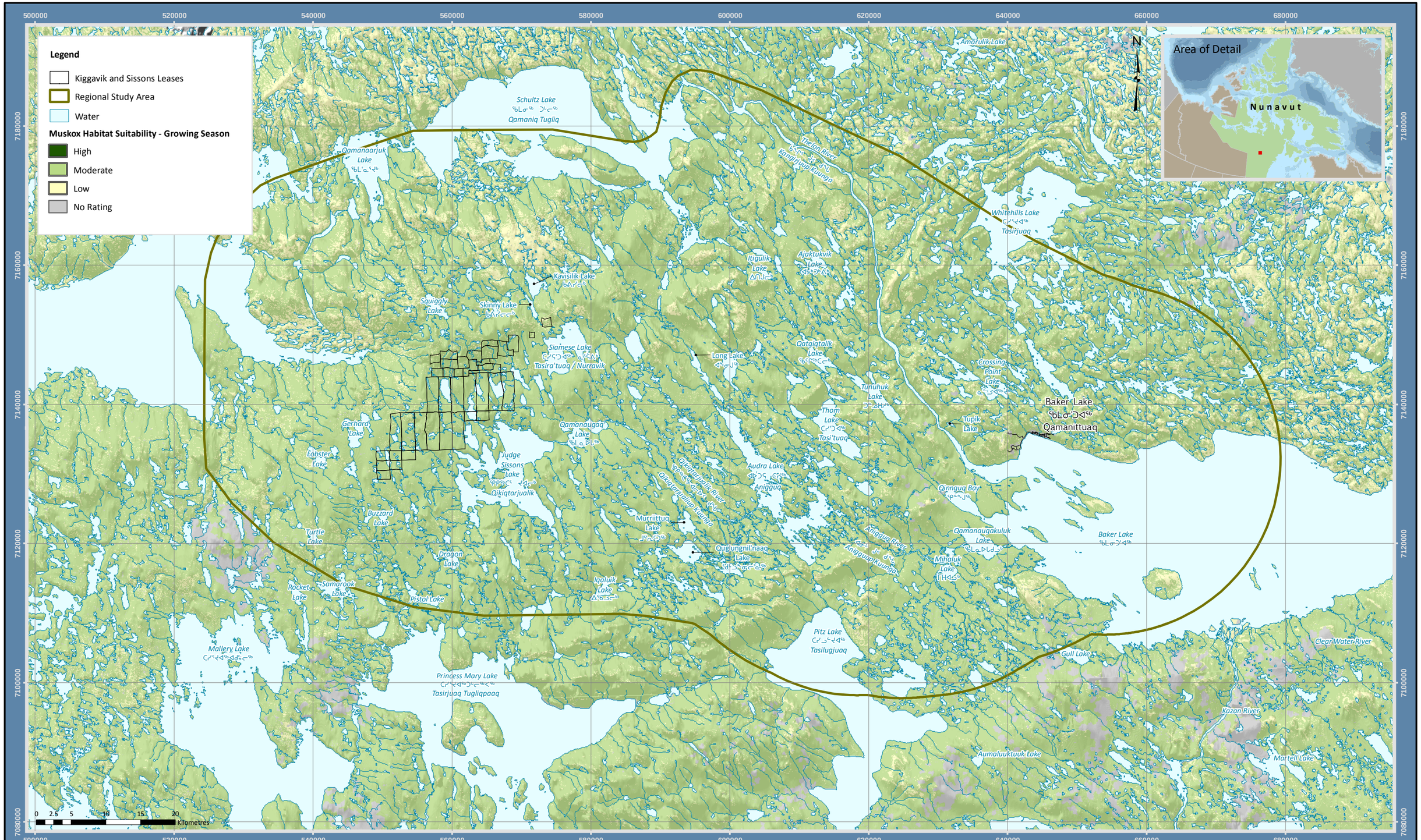

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/07/2014 Scale: 1:500,000
File: 5.7-16_Muskox_Habitat_Suitability_Growing.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.7-16
MUSKOX HABITAT SUITABILTY - GROWING SEASON

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Legend

- Kiggavik and Sissons Leases
- Regional Study Area

Muskox Habitat Suitability - Winter Season

- High
- Moderate
- Low
- No Rating

Area of Detail

Nunavut

N

0 2.5 5 10 15 20 Kilometres

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/07/2014 Scale: 1:500,000
File: 5.7-17_Muskox_Habitat_Suitability_Winter.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.7-17
MUSKOX HABITAT SUITABILTY - WINTER SEASON

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5.8 Predatory Mammals

5.8.1 Grizzly Bear

5.8.1.1 Status and Traditional Use

Grizzly bear is listed as 'Sensitive' in Nunavut (CESCC 2011, internet site), is federally listed as 'Special Concern' by COSEWIC (2014, internet site), but is not listed under the *SARA* (2014, internet site). The presence of grizzly bear in the RSA is confirmed in IQ and engagement data. *Even though it is not a calving ground, it is grizzly bear country, wolverine country* (EN-BL HTO Mar 2009). *One time my grandson caught grizzly near Kiggavik too; just north of Horseshoe Island* (EN-BL CLC Oct 2008).

There is no demographic data for grizzly bears in the Kivalliq region, but the west Kitikmeot population located immediately northwest of the Kivalliq region is thought to be stable or slightly increasing (McLoughlin et al. 2001). According to Baker Lake residents, numbers of grizzly bears, and the number being killed each year, have been increasing steadily over the last few years. *The number of wolves and grizzly bears harvested has increased. Pelts are very valuable* (AEM 2005; IQ-BLHT 2011). Raiding of cached meats by grizzly bears was of increasing concern to hunters. The increase in grizzly bear populations and an apparent eastward range expansion eastward has been documented (Doupe et al. 2007; Rockwell et al. 2008; Struzik 2005).

5.8.1.2 Population Data

Minimal demographic information is available for grizzly bear, largely because of their solitary nature and the fact that they are very widely dispersed on the landscape. Baseline and ongoing monitoring work for the Meadowbank Gold Project only occasionally report grizzly bear occurrences at the Meadowbank Mine Camp (AEM 2009 to 2013, internet site).

Population data on large predators for the Kiggavik Project were collected from HOL and other ground-based surveys, aerial surveys, and camp wildlife logs. Information on grizzly bear occurrence from historical and baseline field programs is provided in Table 5.8-1. All predatory mammal sightings, including IQ and engagement data, are summarized in Figure 5.8-1. Grizzly bears were seen incidentally in the RSA during ground surveys and grizzly bear sign was recorded south of the Sissons Lease (see Figure 5.1-4), along the Winter Road (Figure 5.1-7), nearby at the north end of Long Lake (a den, identified from IQ data; Figure 5.8-1), and near the proposed Thelon River crossing (see Figure 5.1-8). Grizzly bear observations were recorded at other locations in the Mine LSA during HOL surveys (see Table 5.1-1). One grizzly bear was reportedly seen near Thom Lake, possibly as part of camp incidental observations (EN-BL CLC Oct 2008). No focused bear or den surveys have been conducted to date.

Evidence of grizzly bear presence has been consistently reported every year where data are available, although never frequently observed. While larger numbers of grizzly bears were documented in the late 1970s and early 1980s than during recent surveys, this may not reflect differences in abundance since survey methods differed between years.

Table 5.8-1 Summary of Current and Available Historical Data on Grizzly Bear Sightings in the Kiggavik Regional Study Area

Year	Method	Number of Sightings	Total Number Animals	% Cubs		Number of Dens	Number of Tracks	Number of Digs or Chews
				% of Animal Sightings	% of Total Animals			
2010	Winter Road	1	0	0	0	0	0	1
	South AWAR Nest Survey	1	0	0	0	0	0	(scat, kill)
2009	Thelon River Transects	1	0	0	0	0	0	(scat)
	Incidentals	3	4	0	0	0	0	2
	Camp Log/Monitors	1	1	0	0	0	0	0
2008	Incidentals	1	2	0	0	0	0	0
	All-Season Road Raptor Nest	1	0	0	0	0	1	0
	RSA Aerial	1	1	0	0	0	0	0
2007	Incidental	8	3	0	0	1* (inactive)	1	3
1992[(a)]	Unknown	1	2	100%	50%	0	0	0
1991[(b)]	Incidental	Unknown	Unknown	0	0	0	0	0
1980[(c)]	Incidental	5	7	20%	28%	0	0	0
1979[(d)]	Ground Survey	7	10	14%	20%	0	0	0

* Located 8.5 km south of camp (from AREVA 2008)

(a) Geomatics 1991

(b) 'Operation Raleigh Arctic Expedition' (BEAK 1992)

(c) URG 1981

(d) Speller et al. 1979

ND = No data

5.8.1.3 Distribution and Habitat Use

Grizzly bears are distributed across most of mainland Nunavut except for the northeast (including Boothia and Melville Peninsulas), and on some of the larger islands (McLoughlin et al. 2001). Population density decreases from west to east (McLoughlin et al. 2001). Grizzly bears are at their lowest population densities in the Arctic tundra, and their range sizes are hundreds of kilometres in area (McLellan 1994).

Based on available information, grizzly bears are assumed to range across the entire RSA. During IQ studies, interviewees noted that grizzly bears have been observed in the area of Qikiqqtarjualik (Sissons) Lake, near Schultz Lake, and north of Baker Lake. Bears have been observed in Baker Lake: *If a grizzly bear is very hungry they can come close right into town* (EN-BL NPC June 2007). No particular area, other than possible den sites, appears to be of critical importance. One inactive grizzly bear den was documented approximately 8.5 km south of the main camp, at the north end of Judge Sissons Lake (Figure 5.8-1) (AREVA 2008).

Eskers and tall riparian shrub habitats were preferred throughout the year by grizzly bears in the central Canadian Arctic (McLoughlin et al. 2002a). Home ranges contained more esker, tussock/hummock successional tundra, lichen veneer, birch seep, and tall shrub riparian relative to the availability of other habitats (McLoughlin et al. 2002a). Habitat preference varied among the active seasons, and there was some variation in habitat preference among males and females with cubs. In general, females with cubs avoided the habitats preferred most strongly by males (McLoughlin et al. 2002a). Although eskers are often cited as being the predominate habitat used for denning (Mueller 1995), research in the central Canadian Arctic suggests that, while they are used, they are not the most common denning habitat for grizzly bears (McLoughlin et al. 2002b). Dens were also found in heath tundra, tall shrub riparian, birch seep, and heath tundra-boulder habitats (McLoughlin et al. 2002b). Eskers have not been found in the Kiggavik LSA and are very uncommon in the RSA (see Figure 5.8-1), but other potential denning habitats are common in the area (e.g., Heath Tundra). Excavated or ground dens are rarely reused by grizzly bears, but they may use natural caves and hollow tree dens more than once. Bears have been observed to den as close as one to two kilometres from human activity (Linnell et al. 2000).

Research by Gau et al. (2002) in the central Canadian Arctic indicated that caribou are a very important food for barren-ground grizzly bears, particularly during spring and fall migration when caribou were plentiful in the study area. Denning typically occurs from October to May (McLoughlin 1999). In early summer, when caribou were uncommon in the area, grizzly bears foraged on horsetail, cotton grass, and sedges. The preferred habitat in this season was tall shrub riparian (McLoughlin et al. 2002a). Reynolds et al. (1987) and Young and McCabe (1997), also observed high use of caribou, particularly calves, in some seasons by grizzly bear in Alaska. Berries are fed on to some extent in the spring, and then again later in the year (Gau et al. 2002). In the late summer in the central Arctic, crowberry, bog blueberry, cranberry, and bearberry were more commonly eaten

than at any other time of the year (Gau et al. 2002). Berry-producing habitats, represented by the Heath Tundra community are common in the RSA. As well, Arctic ground squirrels frequently occurred as a food item in all active seasons in the central Canadian Arctic (Gau et al. 2002).

Wolf is used as an indicator species for assessing denning habitat suitability of predatory mammals, and is discussed in more detail in Section 5.8.5.

5.8.2 Wolverine

5.8.2.1 Status and Traditional Use

Wolverine is listed as 'Secure' in Nunavut (CESCC 2011, internet site) and has been listed as a species of 'Special Concern' by COSEWIC (2014, internet site). Wolverine is not listed under the *SARA* (2014, internet site). The presence of wolverine in the RSA was confirmed during IQ studies, although those studies noted that populations were low. *Even though it is not a calving ground, it is grizzly bear country, wolverine country* (EN-BL HTO Mar 2009). Some Elders commented that wolverine is one of the few targeted species that is not often found close to Baker Lake (although coastal hunters indicated they travel west towards Baker Lake to find wolverines). None of the Baker Lake hunters recalled ever seeing a wolverine den in the RSA.

Wolverines are solitary animals that occur at densities that are low relative to other carnivores (Banci 1994). Population estimates for the NWT (including Nunavut) more than 20 years ago suggested there is a stable (or increasing) population of more than 3,000 animals (Dauphiné 1989). During Coral Harbour engagement activities, it was noted that in some areas *there are more wolves and even wolverines crossing from the mainland recently* (EN-CH OH Nov 2010)

Wolverine is an important furbearing species for residents of Baker Lake, and the maintenance of a healthy population is important for local trappers. *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* (IQ-RBJ 2011). Harvest estimates from 1996 to 2001 indicate that an average of 12 wolverines (ranging from 2 to 22 animals per year) was trapped annually in the Baker Lake area (see Tables 5.1-6 and 5.1-8C). Recent data (2007 to 2013) have recorded only 2 to 15 wolverines harvested per year, although these HHS study counts for wolverine were low and may be under reported. The AREVA diet survey estimated a much larger annual catch of 185 animals for 2009 and 2010. *People continue to hunt wolf and wolverine deliberately, not for food, but to sell the pelts* (IQ-RBYA 2009).

5.8.2.2 Population Data

Very little demographic information is available for wolverine largely because of their solitary nature and dispersion across the landscape. Baseline and ongoing monitoring surveys for the Meadowbank Gold Project have typically reported the presence of at least two wolverines at their mine camp per season, and some problem animals were euthanized (AEM 2009 to 2014, internet site).

Population data on large predators for the Kiggavik Project were collected from HOL and other ground-based surveys, aerial surveys, and camp wildlife logs. Information on wolverine occurrence from historical and baseline field programs is provided in Table 5.8-2. All predatory mammal sightings are summarized in Figure 5.8-1. Wolverines were seen during RSA aerial surveys in both 2008 and 2009, but not during LSA surveys (see Figure 5.1-1H and 5.1-2). Wolverines were observed along the All-Season Road and the previously considered South AWAR option (including three records during the winter season along the All-Season Road) (see Figures 5.1-4 to 5.1-6 for details). Some sign of wolverine presence was also seen on the Winter Road (see Figure 5.1-7). Seasonal wolverine observations from HOL and winter surveys are provided in Tables 5.1-1 and 5.1-3.

Table 5.8-2 Summary of Current and Available Historical Data on Wolverine Sightings in the Kiggavik Regional Study Area

Year	Method	Number of Sightings	Total Number Animals	Number of Tracks	Number of Digs
2010	Winter Road	1	0	0	1
	All-Season Road Winter	3	0	3	0
	Camp Log/Monitor	1	1	0	0
2009	South AWAR Ground	1	1	0	0
	RSA Aerial	2	6	0	0
	All-Season Road Nest Survey	1	0	1	0
	Incidentals	2	2	5	1
2008	RSA Aerial	1	1	0	0
	South AWAR Ground	1	1	0	0
	HOL (Mine LSA)	9	9	0	0
2007[(a)]	Incidentals	1	1	ND	ND
Pre-2007	Any survey	ND	ND	ND	ND

[(a)] AREVA 2008

ND = No data

According to available historical data, no wolverines were actually recorded during field surveys of the Project area before this baseline program began in 2007. Although not observed in high numbers, wolverines and/or evidence of their presence have been recorded consistently since this time. The higher numbers recorded for HOL surveys in 2009 may be due to the same individual being recorded on more than one HOL survey plot on the same day.

5.8.2.3 Distribution and Habitat Use

Based on baseline data from 2007 to 2010, wolverines appear to range across all surveyed areas of the RSA. No particular area, other than possible den sites, appears to be of critical importance. During focus group discussions with Baker Lake hunters, none of the hunters present recalled ever seeing a wolverine den in the RSA. The only documented active wolverine den in the Baker Lake area was reported and photographed in 2008 within the Meadowbank RSA.

Key habitats for wolverines in the central Canadian Arctic included boulder fields, riparian tall shrub, and fractured bedrock sites (AXYS and Penner 1998). These habitats are relatively common in the RSA. Food availability is the fundamental factor influencing movement patterns and home range selection by wolverines, although the habitat use patterns of adult males are also influenced by breeding activities (Banci 1994). Wolverine have been linked to zones of persistent snow cover and boulders because of their reliance on cached food as they litter during late winter (Inman et al. 2012). Den use is from February to May. During the winter, wolverine distribution is determined by the distribution of ungulates and the availability of ungulate carrion (Banci 1987); therefore, wolverine productivity is closely tied to the status of caribou and wolf populations in a region (Dauphiné 1989; Mulders 1999, internet site).

In Arctic Alaska, Arctic ground squirrels were the most frequent item in the summer diet of wolverines while remnants of caribou carcasses and cached ground squirrels were of critical importance in winter (Magoun 1987; Dalerum et al. 2009). Other foods taken by wolverines included geese and eggs from Arctic goose colonies (Samelius et al. 2002). Wolverines are considered opportunistic feeders.

Wolf is used as an indicator species for assessing denning habitat suitability of predatory mammals, and is discussed in more detail in Section 5.8.5.

5.8.3 Wolf

5.8.3.1 Status and Traditional Use

The Arctic wolf is listed as ‘Secure’ in Nunavut (CESCC 2011, internet site), and has not been identified as a species at risk or of concern by COSEWIC or *SARA* (2014, internet site). Wolf

populations are likely stable or increasing within their range in Nunavut (Hayes and Gunson 1995). IQ and engagement data concur, and some blame caribou population decline on increased wolf populations. *The caribou are far from here now and there are too many wolves around* (EN-BL OH Nov 2013). Some communities have noted *there are more wolves and even wolverines crossing from the mainland recently* [from Coral Harbour] (EN-CH OH Nov 2010).

Baker Lake residents have indicated that the wolf harvest in the Meadowbank area has increased in recent years.: *The number of wolves and grizzly bears harvested has increased. Pelts are very valuable* (AEM 2005b; IQ-BLHT 2011); however, regional population numbers and trends remain poorly understood. Wolf is an important furbearing species for residents of Baker Lake. Harvest estimates from 1996 to 2001 indicate that an average of 91 wolves was harvested annually in the Baker Lake area (see Table 5.1-5). The AREVA diet survey estimated a much larger annual catch of 211 animals for 2009 and 2010. Recent hunter harvest studies (2007 to 2013) have not recorded wolf harvest. It was noted in Repulse Bay that *people continue to hunt wolf deliberately, not for food, but to sell the pelts* (IQ-RBYA 2009).

The presence of wolf in the RSA is confirmed from IQ and engagement data. Some areas noted for wolves included Anigguq Lake, Qallihaaq (near Thom Lake) and in the area of Qikiqqtarjualik (Sissons) Lake. *Your mine is near a wolf denning area* (EN-BL OH Nov 2013). A large wolf winter hunting area is identified around Aberdeen and Schultz lakes (Figure 5.1-12; IQ-BLE 2011). Hunting around Siamese and Skinny lakes was also noted *(*EN-BL OH Nov 2013).

5.8.3.2 Population Data

Very little demographic information is available for wolf, although they are more common and generally seen singly or in small packs ranging from three to seven animals. Baseline and ongoing monitoring surveys for the Meadowbank Gold Project has reported occasional encounters with single and generally sick individuals, particularly at the Meadowbank Mine, where a few problem animals have been destroyed in the last few years (AEM 2009 to 2014, internet site).

Population data on large predators for the Kiggavik Project were collected from HOL and other ground-based surveys, aerial surveys, and camp wildlife logs. Information on wolf occurrence from historical and baseline field programs is provided in Table 5.8-3. All predatory mammal sightings are summarized in Figure 5.8-1. Wolves were seen during all RSA aerial surveys from 2007 to 2009, but not during LSA surveys (see Figure 5.1-1H and 5.1-2). Incidental ground observations of wolves throughout the RSA were recorded in 2007, including in the Mine LSA (Figure 5.1-3). Wolves and wolf sign have been recorded along the All-Season Road and Winter Road, and the removed South AWAR option (see Figures 5.1-4 to 5.1-6). Seasonal wolf observations from HOL and winter surveys are provided in Tables 5.1-1 and 5.1-3.

Wolves were the most frequently observed large predator within the Kiggavik Mine LSA and RSA. At least one pack appears to use the RSA for denning (see observation of seven individuals [2 adult, 5 young] east of Skinny Lake in Figure 5.8-1, identified during 2008 aerial surveys (Figure 5.1-1H). *Around Judge Sissons Lake I saw five wolves catch and kill caribou and eat it* (EN-BL CLC Nov 2008).

Table 5.8-3 Summary of Current and Available Historical Data on Wolf Sightings in the Kiggavik Regional Study Area

Year	Method	Number of Sightings	Total Number Animals	% Cubs		Number of Dens	Number of Tracks/ Scats/ Fur
				% of Animal Sightings	% of Total Animals		
2010	Winter Road	1	0	0	0	0	1
	South AWAR Nest Survey	2	1	0	0	0	1
	HOL (Mine LSA)	3	4	0	0	0	2
	Camp Log/Monitor	11	12	0	0	0	0
2009	All-Season Road Quarry	1	0	0	0	0	1
	Sissons Transects (RSA)	1	1	0	0	0	0
	Sissons Transects (LSA)	1	0	0	0	0	1
	Incidentals	3	3	0	0	0	0
	RSA Aerial	2	6	0	0	1	0
	South AWAR Ground	1	1	0	0	0	1
	HOL	3	3	0	0	0	1
	Camp Log/Monitor	9	8	0	0	0	1
2008	RSA and LSA Aerial	4	14	50%	45%	0	0
	South AWAR Aerial	2	2	0	0	1 (old)	1
	All-Season Road Raptor Nest	1	1	0	0	0	0
2007	RSA Aerial	2	2	0	0	2 (1 active)	0
	Incidental	4	1	0	0	1	0
1991[(a)]	Unknown	Unknown	Unknown	0	0	0	0

Table 5.8-3 Summary of Current and Available Historical Data on Wolf Sightings in the Kiggavik Regional Study Area

Year	Method	Number of Sightings	Total Number Animals	% Cubs		Number of Dens	Number of Tracks/ Scats/ Fur
				% of Animal Sightings	% of Total Animals		
1980[(b)]	Incidental	3	Unknown	0	0	0	0
1979[(c)]	Ground Survey	6	14	50%	64%	0	0

(a) Geomatics 1991

(b) URG 1981

(c) Speller et al. 1979

5.8.3.3 Distribution and Habitat Use

Based on available information, wolves appear to be widespread and range across the entire RSA. No particular area, other than possible den sites, appears to be of critical importance to these species. Mueller (1995) found that wolves in the central Canadian Arctic denned almost exclusively on sandy eskers; however, Heard et al. (1996) found that the dens of 'tundra' wolves (resident all year round above the tree line) might sometimes be simple scrapes on the tundra. Eskers have not been found in the Kiggavik LSA and are very uncommon in the RSA (see Figure 5.8-1). All identified and surveyed dens are included in Figure 5.8-1, and none were found on eskers (although a specific den survey has not been conducted). An old wolf den was located within the Sissons Lease area, and other old wolf dens have been recorded along the All-Season Road and the previously considered South AWAR option (Figure 5.8-1). A wolf den identified from IQ is found north of Pitz Lake. Three wolf den sites were documented in 2007, although the location of these dens has not been recorded. Habitat suitability for wolf denning is discussed in more detail in Section 5.8.5.

Caribou are essential to the existence of wolves in the Arctic (Kuyt 1972). Wolves move with the caribou herds and can travel thousands of kilometres. They tend to remain near caribou winter ranges in the winter season. The exception is during the denning season, when movement is more restricted (April to October). Wolves have been known to return to within 25 km of previous denning area, and dens are sometimes reused (Walton et al. 2001). In the Thelon River area, caribou was the main prey species in the spring, summer and winter (Kuyt 1972). Other prey items (i.e., muskox, ermine, wolverine, wolf, fox, Arctic hare, Arctic ground squirrel, lemmings, voles, geese, ptarmigan, fish, and insects) were taken only rarely during that period (Kuyt 1972). On Ellesmere Island, muskoxen and Arctic hares were key prey items (Tener 1954; Mech 1987, 2007).

5.8.4 Arctic Fox

5.8.4.1 Status and Traditional Use

Arctic fox is considered secure in Nunavut (CESCC 2011, internet site) and is not listed federally by COSEWIC or *SARA* (2014, internet site). Arctic fox is considered an important species for local trappers, although it is not generally considered a food source. One Elder explained that *fox were eaten when caribou were scarce* (IQ-BL01 2008). Harvest/trapping results are summarized for two periods, 1969 to 1977 (IDS 1978) and 1996 to 2001 (NWMB 2005) (Table 5.1-5). Numbers of trapped Arctic fox are noticeably lower in recent years than in the 1970s. Causes for this decline could include changes in Arctic fox populations, lower pelt prices, or changes in trapping activities in the Baker Lake area.

Studies conducted in the late 1970s, based on hunting data, information from Elder interviews, and data from the Inuit Land Use and Occupancy Project (ILUOP) indicate fox hunting in the area of the Kiggavik Project to be low (trapping effort <32%) and near Baker Lake along proposed road

alignments to be medium (trapping effort 32% to <66%) (IDS 1978). Previous IQ studies have noted that Arctic fox were trapped along the southeast end of Baker Lake in late winter and along the east side of Princess Mary Lake (Riewe 1992; Mannik 1998). Baker Lake residents have indicated there were many foxes past Beverly Lake (EN-BL CLC Apr 2007).

5.8.4.2 Population Data

Arctic foxes were the most frequently observed predatory or small mammal species recorded during field surveys within the RSA. Several dens have been reported during the baseline program and individuals (including cubs) were regularly seen in the vicinity of the exploration camp. In 2010, up to four fox cubs were observed playing near the main camp in August. Table 5.8-4 summarizes current and historical information on Arctic fox observations. Baseline and ongoing monitoring surveys for the Meadowbank Gold Project have typically reported the presence of many foxes at their mine camp per season, and some problem animals have had to be euthanized (AEM 2009 to 2014, internet site).

Table 5.8-4 Summary of Current and Historical Data on Arctic Fox Sightings in the Kiggavik Regional Study Area

Year	Method	Number of Sightings	Total Number Animals	% Cubs		Number of Dens	Number of Carcass
				% of Animal Sightings	% of Total Animals		
2010	All-Season Winter	4	5	0	0	1 (snow den)	0
	Winter Road	4	3 (2 cub)	100%	66%	2	0
	South AWAR Nest Survey	1	0	0	0	0	(scat)
	Baker Lake Docks	2	0	0	0	0	2
	HOL (Mine LSA)	2	2	0	0	0	0
	Camp Log/Monitor	11	16	28%	43%	0	0
2009	Incidentals	3	3	0	0	4	1
	HOL (Mine LSA)	25	29	0	0	0	0
	Camp Log/Monitor	8	8	0	0	0	1
	All-Season Quarry	8	1	0	0	0	(scat)
2008	RSA Aerial	3	3	0	0	0	0
	LSA Aerial	1	1	0	0	0	0
	South AWAR Aerial	1	0	0	0	2	0

Table 5.8-4 Summary of Current and Historical Data on Arctic Fox Sightings in the Kiggavik Regional Study Area

Year	Method	Number of Sightings	Total Number Animals	% Cubs		Number of Dens	Number of Carcass
				% of Animal Sightings	% of Total Animals		
	HOL (Mine LSA)	4	4	0	0	0	0
2007	Incidental	3	3	0	0	0	0
1991[a]	Unknown	Unknown	Unknown	0	0	0	0
1980[b]	Incidental	Numerous	At least 9	100%	At most 78%	3	0
1979[c]	Ground Survey	6	At least 8	13%	At least 25%	0	0

[a] Geomatics 1991

[b] URG 1981, sightings made from dens only which accounts for high percentage of cubs

[c] Speller et al. 1979, sightings made from dens only which accounts for high percentage of cubs

ND = No data

5.8.4.3 Distribution, Habitat Use and Suitability

Arctic fox are present throughout the RSA, and no area of critical importance was identified. According to recent IQ interviews, Qikiqqtarjualik Lake (Sissons Lake) was noted as an area with plenty of foxes, as was Anigguq Lake. Another interviewee indicated that foxes were trapped around a lake called Halummaqsautitalik Lake. A number of fox sightings were recorded near the mine camp itself. Arctic foxes are present in the RSA throughout the year, and can have large home ranges, except during the denning period. Arctic fox and sign were recorded along the All-Season Road in summer and winter (Figure 5.8-1, also Figures 5.1-4 and 5.1-5). Dens have been located along the the Winter Road and the previously considered South AWAR option (Figure 5.8-1, also Figures 5.1-6 and 5.1-7); one of these dens had 27 entrances. A fox den is also noted from IQ, north of Pitz Lake. Historical data show a mean density of dens in three good denning regions in and around the RSA to be at least one den per 36 km^2 (IDS 1978).

Arctic foxes depend on dens for rearing their young (Smits et al. 1989). Den sites in central Kivalliq typically occurred on sandy, well-vegetated gentle slopes (Macpherson 1969). Areas where eskers or moraines overlooked broad valleys or river flats appeared to have the most den sites while dens were sparse in areas where bedrock and boulders were common (Macpherson 1969). Research in the central Canadian Arctic found that Arctic foxes denned almost exclusively on sandy eskers (Mueller 1995). Eskers have not been found in the Kiggavik Mine LSA and are very uncommon in the RSA (see Figure 5.8-1); however, Arctic foxes are adaptive and opportunistic in den site selection

(Smits et al. 1988), and denning habitat may not be as limited as the lack of esker-type habitat suggests. For example, foxes may den among boulders rather than excavating a site (Macpherson 1969).

Lemmings have been found to be the key prey species taken by Arctic fox (Chesmore 1968; Angerbjorn et al. 1999; Elmhagen et al. 2000; Roth 2003), caribou carrion, birds (e.g., geese, rock ptarmigan, shorebirds) and bird eggs have also been documented as being important in some seasons (Chesmore 1968; Eide et al. 2005).

5.8.5 Habitat Suitability for Denning (Predatory Mammals)

Common amongst all predatory mammals found around the RSA is the use of particular habitats for denning purposes. While some predators may den in more varied types of habitat (e.g., grizzly bear use of Heath Tundra habitats, see Section 5.8.1.3), all of these predators would be expected to make some use of the habitat units most suitable for denning, namely sand and gravel deposits. Wolves in particular require unconsolidated materials, such as often found on beach deposits and eskers, to excavate den sites. Because of the general lack of suitable denning areas, the same wolf den sites may be used from year to year.

The suitability of denning habitats for predators, in particular wolf, within the RSA was determined by rating each of the ELC habitat units as High, Moderate or Low (see Tables 4.5-2 and 4.5-3A). The ELC units Sand and Gravel are rated as High suitability habitat for wolf denning. Rock Associations are rated as Moderate suitability, while most other ELC units provide limited denning habitat. A summary of the ELC units, ratings and justification is provided Table 5.8-5. Non-ELC data, including surficial geology maps of beach deposits (rated as High), were also incorporated into the analysis.

Total area of High, Moderate, and Low suitability wolf denning habitat within the RSA and all LSAs is presented in Table 5.8-6. Denning habitat units are very specific and relatively limited. In all LSAs and throughout the RSA, Low suitability habitat and ELC units with no relative habitat value represent more than 90% of total area. The Mine LSA has the least amount of High suitability habitat for wolf denning. The Winter Road LSA has the most High suitability habitat at 4.2%, likely due to the more extensive beach deposits in close proximity to Baker Lake. The All-Season Road LSA has the most High and Moderate suitability habitat of the two road options.

Distribution of High, Moderate, and Low suitability denning habitats is provided in Figure 5.8-2. Generally, High and Moderate suitability denning habitats are more prevalent in the northwest around Aberdeen and Schultz lakes, and to the southeast near Baker Lake.

Table 5.8-5 Summary of Relative Value of Ecological Land Classification Units for Wolf Denning

ELC Unit	Ranking	Reasoning
Water	Nil	Not suitable
Sand	H	Unconsolidated materials in upland areas suitable for denning
Gravel	H	Unconsolidated materials in upland areas suitable for denning
Rock Association	M	Potential den sites amongst larger rock complexes
Wet Graminoid	Nil	Ground water levels not suitable for denning
Graminoid Tundra	Nil	Ground water levels not suitable for denning
Graminoid/ Shrub Tundra	Nil	Ground water levels not suitable for denning
Shrub Tundra	L	Limited availability of suitable den sites
Shrub/Heath Tundra	L	Limited availability of suitable den sites
Heath Tundra	L	Limited availability of suitable den sites
Heath Upland	L	Limited availability of suitable den sites
Heath Upland/ Rock Complex	M	Potential unconsolidated materials in upland areas suitable for denning
Lichen Tundra	L	Potential den sites amongst larger rock complexes
H = High; M = Moderate; L = Low		

Table 5.8-6 Comparative Percentages of Denning Habitat Suitability in Local and Regional Study Areas

Habitat Suitability	Mine LSA		All-Season Road LSA		Winter Road LSA		RSA	
	ha	%	ha	%	ha	%	ha	%
High	223	0.5%	517	1.0%	2,358	4.2%	18,548	1.9%
Moderate	709	1.6%	3,587	6.9%	1,204	2.1%	56,129	5.7%
Low	24,343	54.1%	24,836	47.7%	13,580	24.2%	385,226	39.2%
No Rating	19,734	43.8%	23,092	44.4%	38,945	69.4%	522,825	53.2%
Totals	45,009	100.0%	52,032	100.0%	56,088	100.0%	982,729	100.0%
Only final road options are included in this analysis. ha = hectare								

Legend

- River
- Wetland
- Lake
- Kiggavik Lease
- Sissons Lease

Predatory Mammal Observations*

- Arctic Fox
- Wolf
- Wolverine
- Grizzly Bear

* Numbers indicate observed number of individuals (where recorded)

- Eskers (1:50,000 NTDB)
- Regional Study Area

IQ Legend

- Wolf Den
- Fox Den
- Fox Den
- Wolf and Fox Den
- Grizzly Den
- Wolf/Caribou Hunting Area

Area of Detail

Nunavut

N

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: 5.8-1_Predatory_Mammal_Observations_in_RSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Golder Associates Ltd., and Gebauer & Associates.

FIGURE 5.8-1
SUMMARY OF PREDATORY MAMMAL OBSERVATIONS WITHIN THE RSA

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Legend

- Kiggavik and Sissons Leases
- Regional Study Area
- Water

Wolf Denning Habitat Suitability

- High
- Moderate
- Low
- No Rating

Area of Detail

Nunavut

N

Schultz Lake
ᖃᓄᐃᓕᖅ ᑐᓴᖅ
Qamaniq Tugliq

Amarulik Lake

Qamanaarjuk Lake
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Thelon River
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Kangirtuup Kuunga

Whitehills Lake
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Tasirjuaq

Itigulik Lake
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Ajaktukvik Lake
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Kavisilik Lake
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Squiggly Lake

Skinny Lake
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Aberdeen Lake
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Qamaniq Ungalliq

Siamese Lake
ᑕᓯᕋᓐᓂᐊᖅ
Tasira'tuaq / Nurtavik

Long Lake
ᓕᐊᖅᓴᖅ

Qatqiqtalik Lake
ᖁᐊᖅᑎᓕᒃ

Crossings Point Lake

Tunuhuk Lake
ᑐᓄᐅᕆᒃ

Thom Lake
ᑐᓴᕐᑕᖅ

Tasi'tuaq

Baker Lake
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Qamanittuaq

Tupik Lake

Gerhard Lake

Qamanaugaq Lake
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Lobster Lake

Judge Sissons Lake
ᐃᓕᓴᕐᓂᐊᖅ

Qikiqtarjualik

Audra Lake
ᐊᐅᑕᓐ

Aniggug

Qinnguq Bay
ᖁᓕᓂᖅ

Buzzard Lake

Turtle Lake

Murriittuq Lake
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Qamanaugakuluk Lake
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Baker Lake
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Dragon Lake

Quglungnilnaaq Lake
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Mihaluk Lake
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Samarook Lake
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Rocket Lake

Pistol Lake

Iqaluit Lake
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Qulaituijarvik

Pitz Lake
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Tasilugjuaq

Clear Water River

Gull Lake

Mallery Lake
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Princess Mary Lake
ᑭᓚᔪᐊᖅᑐᓪᓗᒃᑭᖅᑐᖅ
Tasirjuaq Tugliqpaaq

Kazan River

Aumaluuktuuk Lake

Martell Lake

0 2.5 5 10 15 20
Kilometres

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/09/2014 Scale: 1:500,000
File: 5.8-2_Wolf_Denning_Habitat_Suitability.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Gov't of Nunavut, and Gebauer & Associates.

FIGURE 5.8-2
WOLF DENNING HABITAT SUITABILITY

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