Legend

- River
- Lake
- Kiggavik and Sissons Leases
- Regional Study Area

Upland Breeding Bird (Lapland Longspur) Habitat Suitability - Growing 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: 05/06/2014 Scale: 1:500,000
File: 5.4-7_Breeding_Birds_Habitat_Suitability_Growing_2011.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.4-7
UPLAND BREEDING BIRD (LAPLAND LONGSPUR)
HABITAT SUITABILTY - GROWING SEASON

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

5.5 Waterbirds

5.5.1 Status and Traditional Use

Some waterbird species observed in the RSA are considered 'Sensitive' in Nunavut (CESCC 2011, internet site), including the American golden plover, black-bellied plover, Arctic tern, dunlin, king eider, red-necked phalarope, ruddy turnstone, least and semipalmated sandpiper, Thayer's gull, and Wilson's snipe (see Table 5.1-4). Long-tailed duck was identified as 'Sensitive' in Nunavut in Wild Species 2010 (CESCC 2011, internet site), although it was one of the more common species observed in the RSA. The only waterbird species listed federally in *SARA* or by COSEWIC, which would be expected to occur in the RSA during migration but has not been observed to date, is the red knot. Two subspecies of red knot found in Nunavut (*rufa* and *islandica*) are listed on Schedule 1 of the *SARA*, and as Endangered (*rufa* subsp.) and Special Concern (*islandica* subsp.) by COSEWIC (COSEWIC 2014, internet site; *SARA* 2014, internet site), Eskimo curlew is an endangered species that may have migrated through the area historically, but it has not been observed in Canada in decades and is likely Extinct.

CWS identified key migratory bird terrestrial habitats in the Northwest Territories and Nunavut (Latour et al. 2008). One identified site (NU Site 40 – Thelon River) is located northwest of the RSA along the Thelon River from the western half of Aberdeen Lake west to Eyeberry Lake. No key migratory sites are identified within the RSA.

IQ and engagement data relating to waterbirds reflect the importance of various geese, swan and duck species for hunting and egg collection. *Hunters remarked that hunting birds continues to be important, as it contributes variety to their diets* (IQ-RBHT 2009)*. Collection of various types of waterbird eggs from springtime to mid-June was noted in various communities, islands, shores, inland waters* (IQ-ARVJ 2011; IQ-CI03 2009; IQ-CI05 2009; IQ-CI01 2009). *Several types of birds and eggs continue to be harvested, especially in mid-June for goose, duck and gull eggs* (IQ-RBH 2011; IQ-CHW 2009)*. In some coastal communities, the spring arrival of waterfowl continues to be followed by harvesters moving to traditional camps along the coastal lowlands where goose and duck are hunted and eggs are collected* (IQ-ARVJ 2011; Freeman 1976)*.* One Elder said that in his *younger days there were not as many waterfowl around Baker Lake as are found in recent times* (Mannik 1998).

Historical studies reiterate that all communities have used waterbirds for hunting and egg collection (Riewe 1992). Hunting of geese, swans, and ducks was common along the coast in late summer (Freeman 1976). Eider, loon, and crane have also been known to be hunted in some areas (Riewe 1992). Harvest data also reflect the importance of waterbirds. Available harvest data show an increase in goose harvest during some periods, particularly in the late 1970s, although data are variable (see Table 5.1-5). Duck and geese were identified as a harvested species in the AREVA diet survey conducted in 2009 and 2010. One household in the diet survey reported collecting eggs from

gull or tern species. 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). Fifty percent of households were estimated to collect eggs occasionally.

Waterbird data were collected in baseline studies (HOL surveys, aerial surveys, nesting and molting surveys, transect surveys, and incidental observations). Waterbird information was also collected during upland breeding bird plots and transects. All of the waterbirds noted in IQ were frequently observed in baseline studies. Because of the importance placed on geese and duck species, observations for these waterbirds from baseline surveys and IQ and engagement data are summarized in Figure 5.5-1. 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 waterbird surveys and a brief interpretation of results are presented below. Maps for some waterbird species observed during aerial surveys (see Figures 5.1-1A to D) and other ground-based surveys (see Figures 5.1-3 to 5.1-9) are included in Section 5.1. Waterbird observations recorded during upland breeding bird surveys are summarized in Section 5.4. A complete list of waterbird species is provided in Attachment E.

5.5.2 Population Data

5.5.2.1 Height-of-Land Ground Surveys

The most commonly observed waterbird species in both 2008 and 2009 HOL surveys was snow goose, due to large aggregations in June and September (Table 5.5-1). *Snow geese are known to migrate north to south* (EN-WC KIA Apr 2007), and are noted in IQ and engagement data as an important species for hunting and egg collection. In 2008, snow goose comprised 96.7% of all waterbirds observed. In 2009, the proportion of snow goose observations dropped to approximately 58% of all waterbirds observed due to a change in the timing of the HOL survey (i.e., shifted one month earlier). As a result, the southward snow goose migration that occurs in September of each year was not observed in 2009. Similar survey timing in 2010 (i.e., no survey in August or September) may also explain why no snow geese were observed that year. Other common waterbird species observed each year included Canada goose (although not in 2010), sandhill crane (*Grus canadensis*), long-tailed duck, American golden plover, herring gull, and greater white-fronted goose. In 2010, the most commonly observed waterbird was Arctic tern (*Sterna paradisaea*). Waterbird observations from HOL surveys conducted in 2010 were limited most likely due to the earlier timing of the field season that year (April to July) and the decreased number of survey days.

Cumulative monthly counts for waterbird species encountered during the HOL surveys were divided by the number of survey days per month to calculate standardized encounters for each waterbird 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 5.5-2 and illustrated in Figure 5.5-2. In general, the frequency of observations per survey is consistent between years with some exceptions. For example, American golden plover and herring

gull were observed more frequently in 2008. These species have expansive summer breeding ranges, and can be present in large numbers in a given year and nearly absent the following year.

Table 5.5-1 Height-of-Land Ground Survey Results (Monthly) for Waterbirds (2008 to 2010)

Bird Species[(a)]	Number Waterbirds Observed (2008)					Number Waterbirds Observed (2009)					Number Waterbirds Observed (2010)					
	Jun	Jul	Aug	Sep	Total	May	Jun	Jul	Aug	Total	Apr	May	Jun	Jul	Dec	Total
AMGP	23	18	0	0	41	0	16	11	3	30	0	0	6	0	0	6
ARTE	1	1	0	0	2	0	0	0	0	0	0	0	66	0	0	66
CKGO	13	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0
CAGO	40	68	160	72	340	0	7	27	1,031	1,065	0	0	0	0	0	0
COLO	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
GOOS	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
GRSC	8	0	0	0	8	0	0	0	1	1	0	0	4	0	0	4
GWFG	4	0	0	3	7	0	6	1	29	36	0	0	3	0	0	3
HERG	8	20	3	0	31	0	4	7	5	16	0	0	4	0	0	4
JAEG	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0
LOON	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
LTDU	19	18	0	0	37	0	22	23	49	94	0	0	11	1	0	12
LTJA	4	0	0	0	4	0	2	4	0	6	0	0	1	1	0	2
NOPI	0	0	0	0	0	0	4	0	33	37	0	0	0	0	0	0
PAJA	6	1	0	0	7	0	3	2	2	7	0	0	1	0	0	1
PESA	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0

Table 5.5-1 Height-of-Land Ground Survey Results (Monthly) for Waterbirds (2008 to 2010)

Bird Species[(a)]	Number Waterbirds Observed (2008)					Number Waterbirds Observed (2009)					Number Waterbirds Observed (2010)					
	Jun	Jul	Aug	Sep	Total	May	Jun	Jul	Aug	Total	Apr	May	Jun	Jul	Dec	Total
RBME	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
RTLO	0	1	0	0	1	0	1	0	0	1	0	0	2	0	0	2
SACR	17	30	7	5	59	0	9	43	137	189	0	0	14	1	0	15

Table 5.5-1 Height-of-Land Ground Survey Results (Monthly) for Waterbirds (2008 to 2010)

Bird Species[(a)]	Number Waterbirds Observed (2008)					Number Waterbirds Observed (2009)					Number Waterbirds Observed (2010)					
	Jun	Jul	Aug	Sep	Total	May	Jun	Jul	Aug	Total	Apr	May	Jun	Jul	Dec	Total
SESA	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
SNGO	465	2	0	16,357	16,824	0	400	0	1,677	2,077	0	0	0	0	0	0
TUSW	0	1	0	0	1	0	3	0	0	3	0	0	0	0	0	0
Unidentified Waterbird	0	0	0	20	20	0	0	7	0	7	0	0	0	0	0	0
Bird Totals	612	160	170	16,457	17,399	1	479	126	2,968	3,574	0	0	114	3	0	117

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 5.5-2 Height-of-Land Ground Survey Results (Daily) for Waterbirds (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/Day	May	Jun	Jul	Aug	Total/Day	Apr	May	Jun	Jul	Dec	Total/Day
# Survey Days	5	8	2	2	17	6	14	6	22	48	2	2	2	1	1	8
AMGP	4.6	2.3	0	0	**2.4**	0	1.1	1.8	0.1	**0.6**	0	0	3	0	0	**0.8**
ARTE	0.2	0.1	0	0	**0.1**	0	0	0	0	**0**	0	0	33	0	0	**8.3**
CKGO	2.6	0	0	0	**0.8**	0	0	0	0	**0**	0	0	0	0	0	**0**
CAGO	8	8.5	80	36	**20**	0	0.5	4.5	47	**22**	0	0	0	0	0	**0**
COLO	0.4	0	0	0	**0.1**	0	0	0	0.1	**0.1**	0	0	0	0	0	**0**
GOOS	0.6	0	0	0	**0.2**	0	0	0	0	**0**	0	0	0	0	0	**0**
GRSC	1.6	0	0	0	**0.5**	0	0	0	0.1	**0.1**	0	0	2	0	0	**0.5**
GWFG	0.8	0	0	1.5	**0.4**	0	0.4	0.2	1.3	**0.8**	0	0	1.5	0	0	**0.4**
HERG	1.6	2.5	1.5	0	**1.8**	0	0.3	1.2	0.2	**0.3**	0	0	2	0	0	**0.5**
JAEG	0	0	0	0	**0**	0.17	0	0.2	0	**0.1**	0	0	0	0	0	**0**
LOON	0	0	0	0	**0**	0	0	0	0.1	**0.1**	0	0	0	0	0	**0**
LTDU	3.8	2.3	0	0	**2.2**	0	1.6	3.8	2.2	**2.0**	0	0	5.5	1	0	**1.5**
LTJA	0.8	0	0	0	**0.2**	0	0.1	0.7	0	**0.1**	0	0	0.5	1	0	**0.3**
NOPI	0	0	0	0	**0**	0	0.3	0	1.5	**0.8**	0	0	0	0	0	**0**
PAJA	1.2	0.1	0	0	**0.4**	0	0.2	0.3	0.1	**0.2**	0	0	0.5	0	0	**0.1**

Table 5.5-2 Height-of-Land Ground Survey Results (Daily) for Waterbirds (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/Day	May	Jun	Jul	Aug	Total/Day	Apr	May	Jun	Jul	Dec	Total/Day
PESA	0	0	0	0	**0**	0	0.1	0	0	**0.1**	0	0	0	0	0	**0**
RBME	0.2	0	0	0	**0.1**	0	0	0	0	**0**	0	0	0	0	0	**0**
RTLO	0	0.1	0	0	**0.1**	0	0.1	0	0	**0.1**	0	0	1	0	0	**0.3**

Table 5.5-2 Height-of-Land Ground Survey Results (Daily) for Waterbirds (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/Day	May	Jun	Jul	Aug	Total/Day	Apr	May	Jun	Jul	Dec	Total/Day
SACR	3.4	3.8	3.5	2.5	**3.5**	0	0.6	7.2	6.2	**3.9**	0	0	7	1	0	**1.9**
SESA	0	0	0	0	**0**	0	0	0	0	**0**	0	0	1	0	0	**0.3**
SHOR	0	0	0	10	**1.2**	0	0	1.2	0	**0.2**	0	0	0	0	0	**0**
SNGO	93	0.3	0	8,179	**990**	0	29	0	76	**43**	0	0	0	0	0	**0**
TUSW	0	0.1	0	0	**0.1**	0	0.2	0	0	**0.1**	0	0	0	0	0	**0**
Bird Totals	**122.8**	**20.2**	**85.0**	**8,229**	**1,024.1**	**0.2**	**34.6**	**21.0**	**134.9**	**74.6**	**0**	**0**	**57**	**3**	**0**	**14.6**

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

5.5.2.2 Aerial Surveys

Aerial surveys conducted in 2007 did not record waterbirds. Waterbird observations from 2008 aerial surveys conducted within the Mine LSA and RSA are summarized in Table 5.5-3 and illustrated in Figures 5.1-1C and D, respectively. Aerial survey data for waterbirds are also included in Figure 5.5-1. Observations of sandhill crane made during aerial surveys in the Mine LSA and RSA are presented in Figures 5.1-1A and B, respectively. The Mine LSA and RSA data were standardized to allow for a direct comparison between areas by dividing the species counts by the Mine LSA and RSA total survey length (296 km and 1,030 km, respectively). As discussed, the overall strategy for the baseline program shifted towards more ground-based surveys after 2008, in part due to input from other stakeholders in regards to the potential cumulative effects of aerial survey programs on wildlife.

During the spring surveys, the most commonly observed waterbird species in the Mine LSA included Canada goose, greater white-fronted goose, and sandhill crane. This pattern was similar to the RSA, which was dominated by Canada goose and sandhill crane. In summer, waterbird presence within the Mine LSA was limited almost exclusively to Canada goose, whereas the most commonly observed species in the RSA included Canada goose, tundra swan, and long-tailed duck. The late summer survey was limited to the RSA survey area, which was occupied by large aggregations of migrating snow geese. In fall, the most commonly observed waterbird species within the LSA included snow goose, Canada goose, and sandhill crane. In contrast, only a handful of tundra swans were observed in the RSA. The variation between Mine LSA and the RSA in the fall surveys is anticipated to be largely the result of survey timing. Specifically, the RSA survey was conducted between 27 to 50 days after the Mine LSA survey. As a result, the majority of the waterbirds had already migrated out of the area by the time the fall RSA survey was conducted.

Generally, waterbird presence was evenly distributed across the Mine LSA. In contrast, a higher proportion of snow goose and tundra swan were observed in the eastern portion of the RSA, which may be indicative of a strategic molting area and/or an established migration route.

5.5.2.3 Waterbird Nesting Surveys

Waterbird nesting surveys were conducted for the Mine LSA in 2008 and 2009, in 2009 along the All-Season Road, and in 2010 along the previously considered South AWAR option. Approximately 29.8 km, 54.8 km, and 42.4 km of shoreline were surveyed within the Mine LSA, along the All-Season Road, and along the South AWAR, respectively. Survey locations are indicated on Figure 4.3-8.

- Waterbird nesting survey results are summarized on maps to illustrate waterbird and active nest distribution within the Mine LSA and RSA (Table 5.5-4; Figure 5.5-3). Detailed Mine LSA waterbird nesting survey results are provided in Figure 5.5-4 (Mapsheet A and B). Nesting

survey results for the road LSAs were also completed for future monitoring purposes (these mapsheets are detailed and are not included in the TWBR).

Table 5.5-3 Waterbird Results for Aerial Surveys in the Mine Local Study Area and Regional Study Area (2008)

Season	Snow Cover	Bird Species[(a)]	Mine LSA			RSA		
			Date	Species Counts	Encounters per Surveyed km	Date	Species Counts	Encounters per Surveyed km
Spring	75–99%	CAGO	25-May-08	45	0.15	23-May-08	115	0.11
		GWFG		25	0.08		0	0
		HERG		0	0		1	0
		LOON		1	0		0	0
		SACR		16	0.05		9	0.01
		SNGO		4	0.01		0	0
		DUCK		0	0		12	0.01
Summer	0%	CAGO	28-Jul-08	101	0.34	22-Jul-08	234	0.23
		HERG		9	0.03		20	0.02
		LTDU		0	0		39	0.04
		SACR		0	0		5	0
		TUSW		1	0		68	0.07
		DUCK		0	0		36	0.03
		GOOS		0	0		50	0.05
Late Summer	0%	CAGO	No Survey	No Survey		09/10 Sep-08	72	0.07
		HERG					3	0
		SACR					36	0.03
		SNGO					11,987	11.64
		TUSW					26	0.03
Fall	0%	CAGO	07-Sep-08	131	0.44	02/03, 30-Oct-08	0	0
		LTDU		3	0.01		0	0
		SACR		58	0.20		0	0
		SNGO		17,320	58.51		0	0
		TUSW		0	0		9	0.01

Results presented are for all transects shown in Figure 4.3-4 and 4.3-5.
(a) List of species names and codes provided in Attachment E

Table 5.5-4 Waterbird Nesting Surveys for the Mine Local Study Area (2008 and 2009) and All-Season Road (2008)

Bird Species	Mine LSA		All-Season Road	South AWAR (no longer considered)
	Number Observed (2008)	Number Observed (2009)	Number Observed (2009)	Number Observed (2010)
Waterbirds				
American golden plover	3	2	3	8 (1 nest, 2 likely nests)
Canada goose	5 (1 nest)	43	26 (7 nests, 2 old nests)	26 (2 nests, 6 eggs, 2 flying)
Cackling goose	0	7 (2 nests)	4 (1 nest)	0
Common loon	0	1	0	1
Common merganser	0	0	0	4
Dunlin	25 (1 nest)	4	8	12
Greater scaup	3 (1 nest)	2	2	0
Greater white-fronted duck	6	0	3	6
Green-winged teal	1	0	0	0
Herring gull	(1 old nest)	3 (1 nest)	55	13
Least sandpiper	0	0	0	3
Long-tailed duck	48 (1 nest)	29	51 (1 nest)	80 (1 nest)
Long-tailed jaeger	1	1	0	4 (1 nest)
Northern pintail	6	3	5	0
Parasitic jaeger	3 (1 nest)	0	0	3 (1 nest, 2 eggs)
Pectoral sandpiper	0	0	2	1
Red-breasted merganser	1 (1 nest)	3	9	0
Red-necked phalarope	20	14	13 (1 nest)	10
Red-throated loon	0	0	0	1 (1 nest, 1 egg)
Sandhill crane	5	1	13 (1 potential nest)	21 (1 nest, 1 egg)
Semipalmated plover	0	0	1	0
Semipalmated sandpiper	33	14 (1 nest)	31 (+4 chicks)	4

Table 5.5-4 Waterbird Nesting Surveys for the Mine Local Study Area (2008 and 2009) and All-Season Road (2008)

Bird Species	Mine LSA		All-Season Road	South AWAR (no longer considered)
	Number Observed (2008)	Number Observed (2009)	Number Observed (2009)	Number Observed (2010)
Snow goose	0	0	0	1
Stilt sandpiper	4	1	6	2 (1 nest, 4 eggs)
Tundra swan	0	2	0	11 (1 nest, 1 egg)
Unidentified duck	0	0	0	1
Unidentified jaeger	0	0	0	(9 flying)
Unidentified shorebird	0	0	0	11
Unidentifed waterbird	0	0	0	(1 nest, 3 eggs)
Upland Birds				
American pipit	0	0	9	0
American tree sparrow	1	1	1	0
Common redpoll	0	0	9 (2 old nests)	1 (1 nest, 3 eggs)
Horned lark	0	2	8	0
Hoary redpoll	0	0	1	0
Lapland longspur	1 (1 nest)	0	63(+7 chicks) (3 nests)	1 (1 nest, 4 chicks)
Rock ptarmigan	0	0	0	2 (1 nest, 9 eggs)
Savannah sparrow	3 (3 nests)	0	23 (1 nest)	0
White-crowned sparrow	0	0	8	0

Mine LSA results presented are for shorelines shown in Figure 5.5-4.
Counts are for adult birds unless otherwise specified.
Bird and nest counts include on and off transect observations.

In 2008, the most common waterbird species observed at the Mine LSA was long-tailed duck (n=48) followed by semipalmated sandpiper (n=33) and dunlin (n=25). In 2009, the most common waterbird species observed at the Mine LSA were Canada goose (n=43), long-tailed duck (n=29), semipalmated sandpiper (n=14), and red-necked phalarope (n=14). Along the All-Season Road LSA, the most common waterbird species observed in 2009 were long-tailed duck (n=51), semipalmated sandpiper (n=33), and Canada goose (n=26). Some annual variability is expected between years due to natural population fluctuations, localized and regional climatic changes, weather conditions, migration timing, survey timing, and survey intensity.

Nest densities in surveyed areas were generally low (also see Figure 5.5-3). In 2008, the nest density was 0.20 nests per km surveyed in the Mine LSA, which decreased to 0.13 nests per km surveyed in 2009. Similarly, the nest density along the All-Season Road was 0.20 nests per km surveyed, which included off-transect nests. The highest density of nests was observed along the previously considered South AWAR option, where a total of 15 nests were observed, at a density of 0.35 nests per km surveyed.

5.5.2.4 Waterbird Molting Surveys

The number of observations for each waterbird species was divided by the total transect length to calculate occurrences for each species per linear kilometre of surveyed transect (Table 5.5-5). Molting surveys were conducted from July 26 to August 6, 2009. In general, active molting appeared to be limited to aggregations of long-tailed duck at lakes L49 and L58 (All-Season Road). Groups of recently molted feathers were also observed along the edges of ponds P2 (Mine LSA) and P106 (All-Season Road) as well as lakes L55 and L66 (All-Season Road). Waterbird molting survey results are summarized on maps to show distribution within the Mine LSA and RSA (Figure 5.5-3). Detailed Mine LSA waterbird molting survey results are provided in Figure 5.5-5 (Mapsheet A and B). Molting survey results for the All-Season Road LSA were also mapped for future monitoring purposes (these mapsheets are extensive and are not included in the TWBR).

Table 5.5-5 Waterbird Molting Surveys for the Mine Local Study Area and All-Season Road (2009)

Bird Species	Mine LSA			All-Season Road		
	Number Birds	Number Nests	Occurrences per km of Surveyed Transect	Number Birds	Number Nests	Occurrences per km of Surveyed Transect
American golden plover	0	0	0	2	0	0.06
Canada goose	0	0	0	2	1 (+1 egg)	0.06
Dunlin	6 (+1 chick)	0	0.21	2	0	0.06
Greater white-fronted goose	1 (+5 chicks)	0	0	1	0	0.03
Herring gull	8	0	0.29	6	0	0.19
Long-tailed duck	12	0	0.43	47 (+6 chicks)	0	1.69
Northern pintail	3	0	0.11	0	0	0
Pectoral sandpiper	0	0	0	3	0	0.19
Red-necked phalarope	5	0	0.18	4	0	0.13

Table 5.5-5 Waterbird Molting Surveys for the Mine Local Study Area and All-Season Road (2009)

Bird Species	Mine LSA			All-Season Road		
	Number Birds	Number Nests	Occurrences per km of Surveyed Transect	Number Birds	Number Nests	Occurrences per km of Surveyed Transect
Sandhill crane	0	0	0	3	0	0.10
Semipalmated sandpiper	6 (+2 chicks)	0	0.29	4	0	0.13
Stilt sandpiper	3	0	0.11	1	0	0.03
Mine LSA results presented are for shorelines shown in Figure 5.5-5. Counts are for adult birds unless otherwise specified.						

On August 13, 2009, a molting survey was conducted at the proposed dock locations in Baker Lake (i.e., proposed AREVA dock locations and the existing AEM dock). No waterbird species were observed over the duration of the surveys (approximately 2.5 hours). Although approximately one dozen weathered feathers, including those of herring gull and Canada goose, were scattered along the beach, the feathers' age and appearance were not indicative of recent molting activities. Transect surveys were also completed in 2010 for proposed dock locations (see Section 5.5.2.6).

5.5.2.5 Sissons Lease Transect Surveys

In 2008, ground-based and PRISM plot surveys in the Sissons Lease area of the Mine LSA suggested that the area may be of particular importance to nesting waterbirds. To further evaluate the potential importance of the Sissons Lease portion of the Mine LSA for waterbirds, ground-based waterbird transects within the Sissons Lease and a comparable area within the RSA (i.e., Sissons Control) were traversed during three separate surveys spanning late June to early August 2009 when the majority of waterbirds are present (Figure 4.3-11). The results from each survey period are summarized in Table 5.5-6.

The Sissons Control had consistently higher total waterbird counts across surveys. The variation between areas cannot be attributed to distance surveyed, as the total linear transect distance in the Sissons Lease portion of the Mine LSA (33.8 km) was similar to the Sissons Control area (33.2 km). Similarly, survey timing was not anticipated to play a large role as survey timing largely overlapped. Although the Sissons Control area was originally selected based on its habitat similarities to the Sissons Lease area, unavoidable variation between habitat types may have been a contributing factor. ELC units for the Sissons Lease area and Sissons Control area are summarized in Table 5.5-7. Between the Sissons study areas, the Control area had higher proportions of Wet Graminoid, Graminoid/Shrub Tundra, and Shrub Tundra habitats and a lower proportion of Water and Graminoid

Tundra habitats. Compared to the entire RSA, the Sissons Control area had higher proportions of Wet Graminoid, Graminoid Tundra, and Graminoid/Shrub Tundra. Compared to the entire Mine LSA, the Sissons Lease area has an over-representation of Graminoid Tundra. Note that the Sissons Lease area was surveyed specifically because of its differences to the overall RSA and Mine LSA.

In 2009, king eider was observed and recorded in areas west of Baker Lake for the first time. Specifically, a king eider female was observed incubating three eggs in the Sissons Lease portion of the Mine LSA in early July (off-transect of SWT-01), and a male along with five chicks was subsequently observed in early August in the Sissons Control area (between CWT-07 and CWT-09) (Figure 5.5-6). King eider was not observed during any other year of current baseline studies. King eider is typically restricted to coastline areas and is thought to seldom breed in the areas observed. Some recent studies suggest a potential population decline (Suydam 2001). King eider has a status rank of 'Sensitive' (CESCC 2011, internet site) although it is not listed under the *SARA* or by COSEWIC. Observations of king eider from baseline studies in the RSA are included on the regional distribution map for this species in Figure 5.5-6. Stilt sandpiper was also observed in greater numbers than expected. Observations from baseline studies in the RSA are presented on the regional distribution map for this species in Figure 5.5- 7.

Table 5.5-6 Waterbird Transect Surveys for the Mine Local Study Area (Sissons Lease) and Control Area (Regional Study Area) (2009)

Survey ID	Total Count – Survey 1 (June 29–July 5, 2009)		Total Count – Survey 2 (July 19–22, 2009)		Total Count – Survey 3 (August 1–4, 2009)	
Species[(a)]	Control (RSA)	Sissons Lease (LSA)	Control (RSA)	Sissons Lease (LSA)	Control (RSA)	Sissons Lease (LSA)
Waterbirds						
AMGP	11	2	26	0	6 (1 chick)	2
CAGO	39	30 (1 nest)	0	1	31	28
CKGO	5 (1 nest, 4 eggs)	0	0	0	0	0
DUCK	0	0	0	0	50	0
DUNL	4	10	1	9 (2 chicks)	0	7 (2 chicks)
GRSC	4	0	0	0	0	0
GWFG	3	4	0	0	0	1 (4 chicks)
HERG	3 (1 nest)	1 adult (1 nest)	0	4	2	7
KIEI	0	1 (1 nest, 3 eggs)	0	0	1 (5 chicks)	0
LTDU	31	15	117	2	21 (4 chicks)	10
LTJA	7	1	3	0	1	0
NOPI	11	12 (1 nest, 6 eggs)	0	1 (5 chicks)	0	3

Table 5.5-6 Waterbird Transect Surveys for the Mine Local Study Area (Sissons Lease) and Control Area (Regional Study Area) (2009)

Survey ID	Total Count – Survey 1 (June 29–July 5, 2009)		Total Count – Survey 2 (July 19–22, 2009)		Total Count – Survey 3 (August 1–4, 2009)	
Species[(a)]	**Control (RSA)**	**Sissons Lease (LSA)**	**Control (RSA)**	**Sissons Lease (LSA)**	**Control (RSA)**	**Sissons Lease (LSA)**
PAJA	2	2	1	0	1	2
PALO	1	1	0	0	0	0
PESA	1	0	0	0	1	0
RBME	1	0	0	0	0	0
RNPH	4	8	0	2 (3 chicks)	2	4
RTLO	1	0	0	0	0	0
SACR	7	2	2	2	3	1
SESA	27 (2 nests, 4 eggs each)	10	13	17	5	12 (1 chick)
STSA	7	15	15 (1 chick)	7	0	2
TUSW	0	0	5	0	0	0
Total	**169**	**110**	**130**	**47**	**124**	**63**
Upland Birds						
AMPI	0	0	ND	ND	ND	ND
ATSP	0	0	ND	ND	ND	ND
CORE	9	16	ND	ND	ND	ND
HOLA	5	4	ND	ND	ND	ND
HORE	1	3	ND	ND	ND	ND
LALO	92	24	ND	ND	ND	ND
REDP	11	13	ND	ND	ND	ND
SAVS	25	35	ND	ND	ND	ND

Results presented are for transect surveys conducted at locations shown in Figure 4.3-11.

Counts are for total number of adult birds unless otherwise specified.

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

ND = No data (upland breeding birds not recorded)

Table 5.5-7 Comparison of Ecological Land Classification Units in the Sissons Lease (Mine LSA) and Sissons Control (Regional Study Area)

ELC Units	% ELC Units in Entire Mine LSA	Sissons Lease (in Mine LSA)		% ELC Units in Entire RSA	Sissons Control (in RSA)	
		Area Surveyed by Transects (ha)	% ELC Units in Sissons Lease		Area Surveyed by Transects (ha)	% ELC Units in Sissons Control
Water	13.5%	352.3	21%	25.6%	276.8	18%
Sand and Gravel	0.2%	0.7	0%	1%	0.5	0%
Rock Association	0.1%	0.4	0%	1%	2.8	0%
Wet Graminoid	6.9%	169.3	10%	7.2%	224.8	15%
Graminoid Tundra	13.2%	371.8	22%	12.5%	275.3	18%
Graminoid/Shrub Tundra	10.3%	102.2	6%	8.1%	292.7	19%
Shrub Tundra	6%	23.1	1%	4.2%	65.4	4%
Shrub/Heath Tundra	8.3%	90.8	5%	6%	92.2	6%
Heath Tundra	36%	534.8	32%	24.6%	267.5	17%
Heath Upland	2.8%	8.4	1%	3.2%	20.4	1%
Lichen Tundra	1.3%	8.8	1%	1.6%	11.3	1%
Heath Upland/Rock Complex	1.5%	8.0	0%	4.7%	8.6	1%
Totals	100%	1,670.6	100%	100%	1,538.3	100%

Shaded lines are those ELC units most often used by waterbirds.
ha = hectare

5.5.2.6 Thelon River and Baker Lake Transect Surveys

Summary results of species observed at each location are provided in Table 5.5-8, and included in Figures 5.1-8 and 5.1-9. Data from 2009 nesting and molting surveys conducted along the All-Season Road at the proposed Thelon River crossing are included in Figure 5.1-8. In general, bird species encountered during the surveys would typically be expected in the area. Confirmed nesting birds included a pair of greater white-fronted geese with five chicks along the Thelon River, and nesting semipalmated sandpiper (two chicks) and common redpoll (two chicks) along the Baker Lake shoreline.

Table 5.5-8 Waterbird Transect Surveys for the Proposed Thelon River Crossing (2009) and Baker Lake Dock Areas (2010)

Survey ID	Proposed Thelon River Crossing (2009)			AREVA Proposed Baker Lake Dock (2010)				AEM Baker Lake Dock (2010)			
Bird Species[(a)]	Jul 15	Aug 11	Aug 28	Jun 18	Jul 9	Jul 20	Aug 24	Jun 18	Jul 9	Jul 20	Aug 24
Waterbirds											
AMGP	0	0	0	0	1	0	0	1	0	0	0
CAGO	0	0	0	0	0	3	5	0	0	0	0
COLO	0	0	0	0	1	2	0	0	0	0	0
COME	0	0	0	0	0	0	0	0	2	0	0
GLGU	0	0	0	2	0	0	0	0	0	0	0
GWFG	2 (5 chick)	0	0	0	0	0	0	0	0	0	0
HERG	7	0	0	38	1	1	1	2	2	2	1
LTDU	0	0	0	0	1	0	0	0	24	0	0
LTJA	0	0	0	4	0	0	0	0	0	0	0
NOPI	0	0	0	2	0	0	0	0	0	0	0
PAJA	0	0	0	0	0	2	0	2	0	0	0
RBME	1	0	0	0	0	0	0	0	0	0	0
SEPL	0	0	0	2	0	0	0	1	0	0	0
SESA	0	0	0	2	0	0	0	2	0	1 (2 chick)	0

Table 5.5-8 Waterbird Transect Surveys for the Proposed Thelon River Crossing (2009) and Baker Lake Dock Areas (2010)

Survey ID	Proposed Thelon River Crossing (2009)			AREVA Proposed Baker Lake Dock (2010)				AEM Baker Lake Dock (2010)			
Bird Species[(a)]	Jul 15	Aug 11	Aug 28	Jun 18	Jul 9	Jul 20	Aug 24	Jun 18	Jul 9	Jul 20	Aug 24
Total	10 (5 chick)	0	0	50	4	8	6	8	28	3 (2 chick)	1

Table 5.5-8 Waterbird Transect Surveys for the Proposed Thelon River Crossing (2009) and Baker Lake Dock Areas (2010)

Survey ID	Proposed Thelon River Crossing (2009)			AREVA Proposed Baker Lake Dock (2010)				AEM Baker Lake Dock (2010)			
Bird Species[(a)]	**Jul 15**	**Aug 11**	**Aug 28**	**Jun 18**	**Jul 9**	**Jul 20**	**Aug 24**	**Jun 18**	**Jul 9**	**Jul 20**	**Aug 24**
Upland Birds											
AMPI	3	0	0	5	3	3	21	1	2	1	0
CORE	0	0	0	0	14	2	2	0	10	4 (nest, 2 chick)	4
HOLA	0	0	0	0	3	0	2	0	0	0	0
LALO	16	0	0	28	18	7	30	15	4	2	23
REDP	4	0	0	7	0	0	0	2	0	0	0
ROPT	0	0	0	0	5	0	0	0	0	0	0
SAVS	3	0	0	2	5	0	12	0	1	3	1
SNBU	0	0	0	0	2	0	0	0	0	2	0
WCSP	5	0	0	9	4	2	2	5	0	0	8
WIPT	0	0	0	1	0	0	0	0	0	0	0

Results presented are for all surveys conducted at locations shown in Figure 4.3-9 and Figure 4.3-10.

Counts are for adult birds unless otherwise specified.

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

5.5.3 Habitat Suitability

5.5.3.1 Habitat Suitability for All Waterbirds

For the purpose of rating ELC units for waterbird habitat suitability, long-tailed duck was used as a representative (or indicator) species for this VEC group. Long-tailed ducks are an appropriate indicator species as they are the most common waterbird species in the area during the growing season. Geese are more numerous in the area at times, but they use the area mostly during migration to and from breeding grounds. Long-tailed ducks select nesting sites that are relatively close to waterbodies. Frequently, nests are located on islands or on tundra within 100 m of shorelines. Long-tailed ducks forage almost exclusively on or at the edge of waterbodies where they consume primarily aquatic insects, crustaceans, fish roe, and vegetation (Robertson and Savard 2002).

Suitability of habitats within the RSA for waterbirds was determined by rating 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 5.5-9. 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 (note that this analysis is limited since waterbirds were not targeted during the PRISM surveys). This 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 waterbird (long-tailed duck) habitat within the RSA and all LSAs during the growing season is presented in Table 5.5-10. Also rated as High suitability habitat were all areas within 25 m of waterbodies. These areas are considered to be of high value to nesting waterbirds. The percentages of High-rated habitats are greatest along the Winter Road LSA compared to the Mine LSA, All-Season Road LSA, and RSA. The percentage of Low rated habitat is greatest in the Mine LSA and along the All-Season Road LSA (over 50%). Distribution of High, Moderate, and Low suitability habitats for the growing season is illustrated in Figure 5.5-8. Generally, the rated habitat types for waterbirds are well distributed throughout the RSA.

Other important habitat for waterbirds from IQ and engagement data is included in Figure 5.5-1. Swan and geese nesting and hunting areas were identified along Annigguq River, Mihaluk Lake, and the south shore of Baker Lake (Figure 5.1-12). *Huqliq is a fishing place and birds lay eggs there (*EN-BL CLC Feb 2008). IQ studies have noted goose nesting grounds along the side of Qikiqtaujaq River, and that Canada geese and snow geese have been hunted in the area around the RSA. Hunters have remarked that Canada goose nesting areas have moved further north and are found around all the small lakes in the area. Historical studies note the importance of the Baker Lake shoreline, between the Thelon and Kazan rivers, for waterbirds, and identified the mouth of the Kazan River as a goose nesting ground (IDS 1978; McLaren and Holdsworth 1978; Riewe 1992).

Between Baker Lake and Beverly Lake (to the northwest of Baker Lake), many areas were used for goose hunting, duck hunting, and egg collection during the spring (Freeman 1976). Residents noted that from Baker Lake *you would not need to travel far to get geese, would not travel to Kiggavik (*EN-BL OH Nov 2013*). A bridge over the Thelon River might prevent people from taking their boats up river to pick goose eggs* (IQ-BL06 2008).

5.5.3.2 Habitat Suitability for Shorebirds

Shorebirds are a category of waterbird that are highly dependent on the upland/water interface, and have more specific habitat requirements than waterfowl species. They are used as another indicator species for waterbirds because of their specific habitat requirements. All potential shorebird species occurring in the RSA, based on baseline studies summarized throughout Section 5.5, and their general habitat associations are summarized in Table 5.5-11. To simplify habitat analyses, shorebirds were split into two groups: Wetland-associated Shorebirds (WAS) and Upland-associated Shorebirds (UAS). With the exception of the three plover species (UAS) known to occur in upland habitats within the Kiggavik area, other breeding shorebirds (WAS) prefer wetland habitats. Suitability of habitats within the RSA for shorebirds was determined by rating each of the ELC habitat units as High, Moderate, or Low for the growing season (Table 4.5-3B). A summary of the ELC units, ratings and justification is provided in Table 5.5-12.

Shorebirds associated with wetland habitats (WAS) locate their nests and forage in these habitats. The ELC units Wet Graminoid and Graminoid Tundra are rated as High suitability habitat for nesting and foraging, as are all habitats within 25 m of Water (e.g., ponds and lakes), irrespective of the ELC unit. Total area of High, Moderate and Low suitability WAS habitat within the RSA, Mine LSA and current road LSAs during the growing season is presented in Table 5.5-13A. The Mine LSA and surrounding RSA have a similar breakdown, with approximately 30% of High and Moderate suitability habitat found in each. The percentage of High rated habitats is similar for both road LSAs. Distribution of High, Moderate and Low suitability habitats for the growing season is illustrated in Figure 5.5-9. More High-rated habitat is found south and east of the Kiggavik area.

Shorebirds associated with upland habitats (UAS) locate their nests and forage in these habitats. The ELC units Sand, Gravel and Lichen Tundra are rated as High suitability habitat for both nesting and foraging. Total area of High, Moderate, and Low suitability UAS habitat within the RSA, Mine LSA ,and current road LSAs during the growing season is presented in Table 5.5-13B. Very little (<3%) of habitat is rated High quality for UAS in any LSA or throughout the RSA. Moderate suitability habitats, which consist of several ELC units (Wet Graminoid, Graminoid Tundra, Graminoid/Shrub Tundra, Heath Tundra and Heath Upland) used primarily for foraging, are more predominant, covering 69% of the Mine LSA and 56% of the RSA. More Moderate rated habitat for UAS is found on the All-Season Road LSA (67%) than the Winter Road LSA (50%). Distribution of High, Moderate, and Low suitability habitats for the growing season is illustrated in Figure 5.5-10. Generally, the rated habitat types for UAS are well distributed throughout the RSA.

Table 5.5-9 Summary of Relative Value of Ecological Land Classification Units to Waterbirds 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	H	Rated high because waterbirds are almost exclusively found foraging in water bodies, and nests are generally in the vicinity of water bodies.
Sand	0.0	ND	ND	M	This ELC unit is rare in the landscape but is a preferred nesting substrate for plovers.
Gravel	2.0	ND	ND	M	This ELC unit is rare in the landscape but is a preferred nesting substrate for plovers.
Rock Association	2.8	1.4%	0.5	L	Rated low because the habitat is rarely associated with water.
Wet Graminoid	7.1	11.9%	1.68	H	Rated high because it is likely associated with nearby water, and waterbirds commonly nest on wet graminoid tundra. This ELC unit is of particularly high value to shorebirds such as the semipalmated sandpiper.
Graminoid Tundra	9.9	3.5%	0.35	H	Rated high because it is likely associated with nearby water, and waterbirds will nest on graminoid tundra. This ELC unit is of particularly high value to shorebirds such as the semipalmated sandpiper.
Graminoid/ Shrub Tundra	9.5	18.2%	1.92	M	Rated moderate because it may occur near moist habitat and could be associated with nearby water.
Shrub Tundra	5.9	6.3%	1.21	L	Rated low because most waterbirds do not forage or nest in this habitat.
Shrub/Heath Tundra	7.1	ND	ND	L	Rated low because most waterbirds do not forage or nest in this habitat.
Heath Tundra	31.6	36.4%	1.15	L	Rated low because most waterbirds do not forage or nest in this habitat.
Heath Upland	9.4	3.5%	0.37	L	Rated low because most waterbirds do not forage or nest in this habitat.
Heath Upland/ Rock Complex	11.5	18.9%	1.64	L	Rated low because waterbirds do not forage or nest in this habitat.

Table 5.5-9 Summary of Relative Value of Ecological Land Classification Units to Waterbirds During the Growing Season

Lichen Tundra	2.5	ND	ND	L	Rated low because most waterbirds do not forage or nest in this habitat.

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 long-tailed duck

H = High; M = Moderate; L = Low

ND = Not detected

Table 5.5-10 Comparative Percentages of Waterbird 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[b]	16,155	35.9%	21,080	40.5%	36,244	64.6%	468,510	47.7%
Moderate	4,437	9.9%	2,987	5.7%	4,881	8.7%	81,528	8.3%
Low	24,417	54.2%	27,810	53.4%	14,766	26.3%	430,516	43.8%
No Rating	0	0.0%	155	0.3%	200	0.4%	2,340	0.2%
Totals	**45,009**	**100.0%**	**52,031**	**100.0%**	**56,090**	**100.0%**	**982,895**	**100.0%**

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

(a) Indicator species is long-tailed duck

(b) High suitability habitat includes a 25 m buffer around all waterbodies.

ha = hectare

Table 5.5-11 Habitat Preferences of Shorebird Species Known or Expected to Occur in the RSA

Shorebird Species	Potential Abundance[(a)]	Breeding Status	Shorebird Type	Habitat Preferences	ELC Unit Used
American golden plover	Uncommon	Known to Breed	UAS	Breeds on sparse, low vegetation on higher, well-drained, rocky slopes (Johnson and Connors 2010)	Sand, Gravel, Lichen Tundra
Baird's sandpiper	Rare	Migrant	UAS	In migration occurs on river bars, lake and pond margins, and other wetland habitats (Moskoff and Montgomerie 2002)	Wet Graminoid
Black-bellied plover	Rare	May Breed	UAS	Breeds on open, relatively dry heath tundra, and gravel and sand areas between wetter areas (Paulson 1995)	Sand, Gravel, Lichen Tundra
Dunlin	Rare	Known to Breed	WAS	Breeds on generally moist-wet tundra, often in areas with ponds (Warnock and Gill 1996).	Wet Graminoid, Graminoid Tundra
Least sandpiper	Rare	Migrant	UAS	In migration occurs on muddy margins of lakes, ponds, marshes and other wetlands (Nebel and Cooper 2008).	Wet Graminoid, Graminoid Tundra
Pectoral sandpiper	Rare	Known to Breed	WAS	Breeds on flat and marshy tundra interspersed with hummocks and vegetated by sedges and grasses (Farmer et al. 2103)	Wet Graminoid
Red-necked phalarope	Uncommon	Known to Breed	WAS	Breeds in pond and marsh areas with emergent vegetation and sedge-dominated areas (Rubega et al. 2000)	Wet Graminoid
Ruddy turnstone	Rare	Migrant	UAS	In migration occurs in shoreline, beaches and adjacent habitats (Nettleship 2000)	Water, Sand, Gravel
Semipalmated plover	Rare	Known to Breed	UAS	Breeds on well-drained, gravel, shale or sandy areas particularly in shoreline areas (Nol and Blanken 1999)	Sand, Gravel, Lichen Tundra
Semipalmated sandpiper	Common	Known to Breed	WAS	Breeds in variably drained wet tundra with low vegetation near small ponds and other wetlands (Hicklin and Gratto-Trevor 2010)	Wet Graminoid, Graminoid Tundra, Graminoid/Shrub Tundra

Table 5.5-11 Habitat Preferences of Shorebird Species Known or Expected to Occur in the RSA

Stilt sandpiper	Uncommon	Known to Breed	WAS	Breeds in wet to moist sedge-dominated tundra often in association with low ridges (Klima and Jehl 2012)	Wet Graminoid, Graminoid Tundra
White-rumped sandpiper	Rare	Migrant	UAS	In migration occurs on pond margins, marshy areas and other wetland habitats (Parmalee 1992)	Wet Graminoid
Wilson's Snipe	Rare	May Breed	WAS	Breeds in open marshy areas at edges of ponds and lakes (Mueller 1999)	Wetlands

(a) Potential abundance is a relative designation that reflects the probability of observing a species in a given season. For example, common species are likely to be encountered daily, whereas rare species may only be reported once per week.

UAS = Upland-associated Shorebirds; WAS = Wetland-associated Shorebirds

Table 5.5-12 Summary of Relative Value of Ecological Land Classification Units to Wetland-associated and Upland-associated Shorebirds during the Growing Season

ELC Unit	Growing Season Ranking		Reasoning
	Wetland-associated Shorebirds (WAS)	Upland-associated Shorebirds (UAS)	
Water	L	Nil	Rated Low for WAS because red-necked phalaropes forage in open water areas. All shoreline areas within 25 m of Water rated as High for WAS. UAS do not use Water.
Sand	L	H	Rated Low for WAS because of limited use. Rated High for UAS because used for nesting and foraging during the breeding season.
Gravel	L	H	Rated Low for WAS because of limited use. Rated High for UAS because used for nesting and foraging during the breeding season.
Rock Association	L	L	Limited use by WAS and UAS.
Wet Graminoid	H	M	Most WAS use this unit for foraging and breeding. Some use by UAS for foraging.
Graminoid Tundra	H	M	Most WAS use this unit for foraging and breeding. Some use by UAS for foraging.
Graminoid/ Shrub Tundra	M	M	Some WAS (e.g., semipalmated sandpiper – most common shorebird species in study area) use this unit for foraging and breeding. Also use by UAS for foraging.
Shrub Tundra	L	L	Rated Low because most shorebirds do not forage or nest in this habitat.
Shrub/Heath Tundra	L	L	Rated Low because most shorebirds do not forage or nest in this habitat.
Heath Tundra	L	M	Limited use by WAS but suitable foraging habitats for UAS.
Heath Upland	L	M	Limited use by WAS but suitable foraging habitats for UAS.
Heath Upland/ Rock Complex	L	L	Rated Low because most shorebirds do not forage or nest in this habitat.
Lichen Tundra	L	H	Rated Low for WAS because of limited use. Rated High for UAS because used for nesting and foraging during the breeding season.
Growing season is approximately June 1 to September 30 (four months). H = High; M = Moderate; L = Low			

Table 5.5-13A Comparative Percentages of Wetland-associated Shorebird 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[b]	%
High[c]	10,076	22.4%	13,431	25.8%	15,418	27.5%	217,295	22.1%
Moderate	4,356	9.7%	2,864	5.5%	4,752	8.5%	74,911	7.6%
Low	30,577	67.9%	35,581	68.4%	35,720	63.7%	688,183	70.0%
No Rating	0	0.0%	155	0.3%	198	0.4%	2,339	0.2%
Totals	45,009	100.0%	52,032	100.0%	56,088	100.0%	982,728	100.0%

Table 5.5-14B Comparative Percentages of Upland-associated Shorebird 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[b]	%
High	667	1.5%	1,034	2.0%	1,435	2.6%	24,648	2.5%
Moderate	31,139	69.2%	34,774	66.8%	27,886	49.7%	546,852	55.6%
Low	7,123	15.8%	8,393	16.1%	5,725	10.2%	157,545	16.0%
No Rating	6,080	13.5%	7,831	15.0%	21,042	37.5%	253,694	25.8%
Totals	45,009	100.0%	52,032	100.0%	56,088	100.0%	982,738	100.0%

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

[a] Only final road options are included in this analysis.

[b] The total area for shorebird habitat in the RSA is slightly less than for other species due to a modified ELC raster data source used to model habitat.

[b] High suitability habitat includes a 25 m buffer around all waterbodies.

ha = hectare

Legend

- River
- Wetland
- Lake

Waterbird (Goose and Swan)

Observations*

- Cackling Goose
- Canada Goose
- Snow Goose
- Tundra Swan
- White-fronted Goose
- Kiggavik Lease
- Sissons Lease
- Regional Study Area

* Numbers indicate observed number of individuals

Area of Detail

Nunavut

N

Lease Inset

IQ Information

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

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/28/2014 Scale: 1:500,000
File: 5.5-1_Waterbird_IQ_Observations_in_RSA.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Golder Associates Ltd., and Gebauer & Associates.

FIGURE 5.5-1
SUMMARY OF GOOSE AND SWAN OBSERVATIONS WITHIN THE RSA

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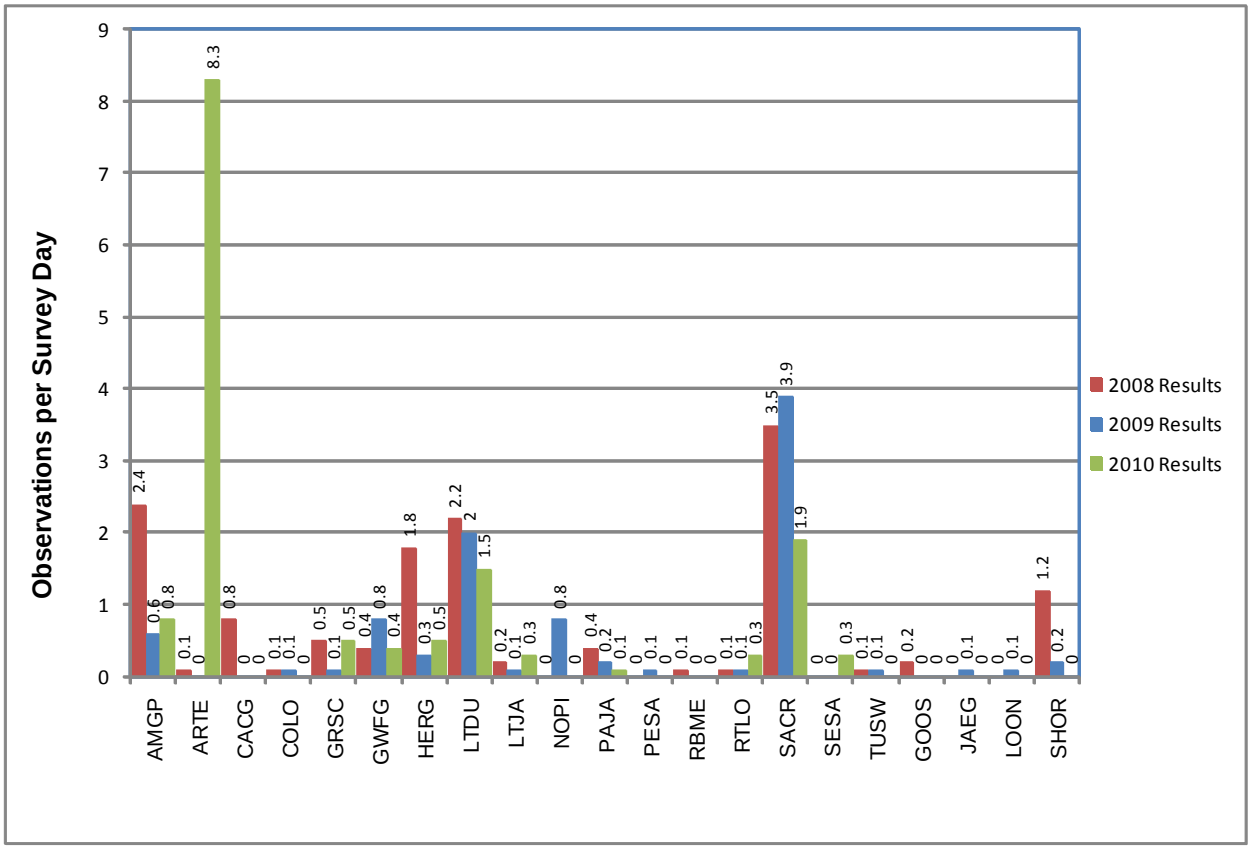
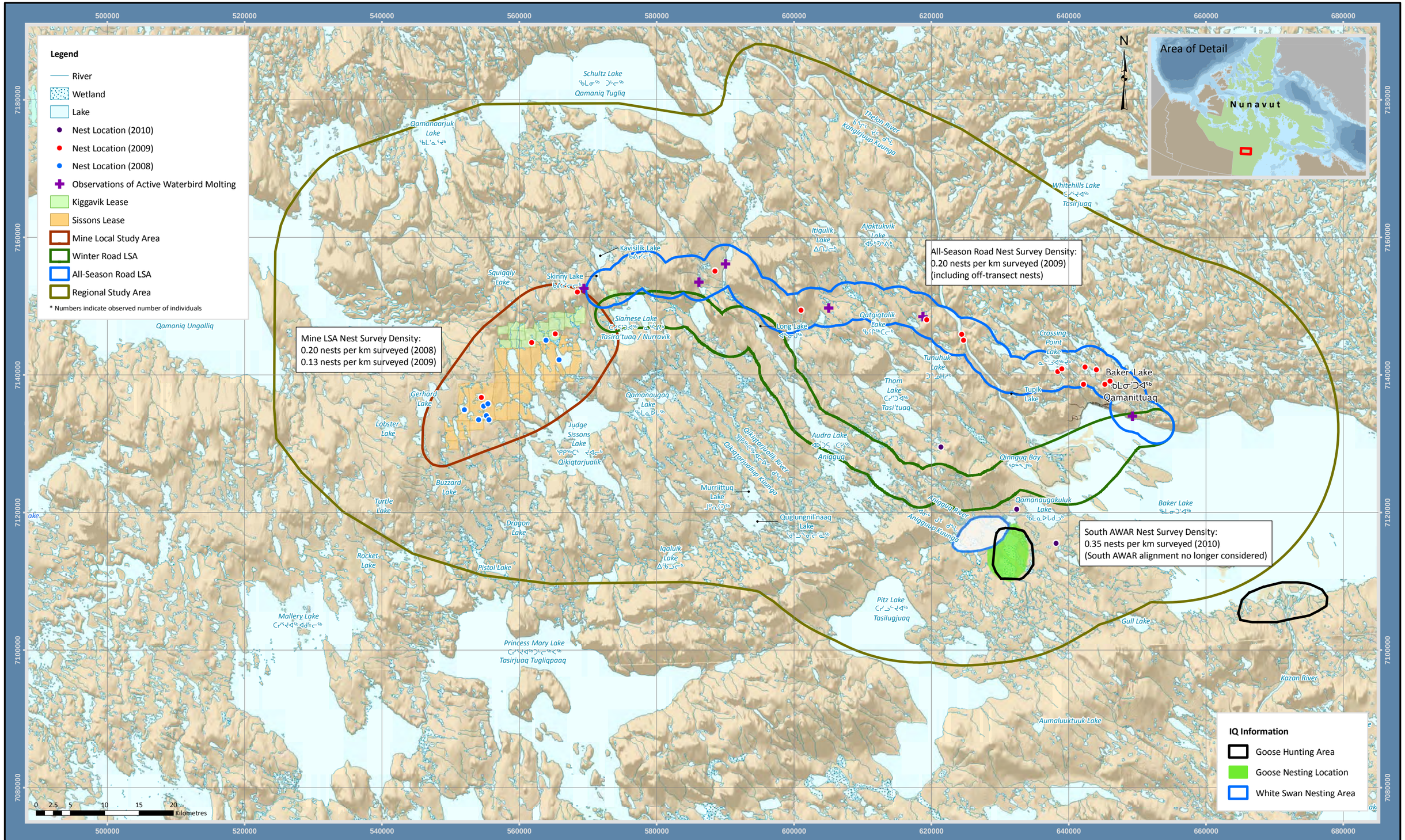


Snow goose and Canada goose observations are not included in this figure given the large variation in scale relative to other waterbird species in 2008/09.

List of species names and codes provided in Attachment E

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

Figure 5.5-2 Height-of-Land Ground Survey Results per Survey Day for Waterbirds (2008 to 2010)



Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/28/2014 Scale: 1:500,000
File: 5.5-3_Waterbird_Nesting_Molting_Summary.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., Golder Associates Ltd., and Gebauer & Associates.

FIGURE 5.5-3
SUMMARY OF WATERBIRD NESTING AND MOLTING SURVEY RESULTS

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555000 560000 565000 570000

7150000 7145000 7140000

Legend

- Nest Location (2009)
- Nest Location (2008)
- Survey Extent
- Proposed Mine Features (at time of survey)
- Current Proposed Mine Features
- Kiggavik Lease
- Sissons Lease

Survey Routes: 2009

- (Note: Alternating Colour
- to help with transect identification)
- Survey Routes: 2008

* Indicate transects that have been surveyed in both 2008 and 2009

Note: Observations for 2009 are in red and 2008 are in blue.

AMGP - American Golden-Plover
ATSP - American Tree Sparrow
CAGO - Canada Goose
CKGO - Cackling Goose
COLO - Common Loon
DUNL - Dunlin
GRSC - Greater Scaup
GWFG - Greater White-fronted Goose
GWTE - Green-winged Teal
HERG - Herring Gull
LALO - Lapland Longspur
LTDU - Long-tailed Duck
LTJA - Long-tailed Jaeger
NOHA - Northern Harrier
NOPI - Northern Pintail
PAJA - Parasitic Jaeger
RBME - Red-breasted Merganser
RNPH - Red-necked Phalarope
SACR - Sandhill Crane
SAVS - Savannah Sparrow
SEOW - Short-eared Owl
SESA - Semipalmated Sandpiper
STSA - Stilt Sandpiper
TUSW - Tundra Swan

N

L1*
LTDU (2)
LTJA (1)
LTDU (3)
SACR (1)

Siamese Lake

SESA (1)
LTJA (1)
P7*
P4
P5*
P12
P104
P85
P6*
P100
P13
L83
LTDU (3)
Drum Lake
Lin Lake
P8* SACR (2)
W101 CKGO (1) and nest (4 eggs)
P18*
Old waterbird nest
P14*
P10*
W102
P2*
P82
P19*
DUNL (1)
SESA (1)
SACR (pr)
L15*
P81
P86
LTDU (1)
CKGO (1) and nest
P17*
L80
L29*
GRSC (2)
RBME (3)
CAGO (1)
COLO (2)
SESA (4)
CKGO (4)
SACR (1)
LTDU (3)
AMGP (2)
LTDU (2f) and nest (7 eggs)
SAVS (1) and nest (5 eggs)
RBME (1f) and nest (7 eggs)
SAVS (1) and nest (5 eggs)
NOPI (2)
LTDU (5f, 1m)
GRSC (pr)
Jaeger Lake
Scotch Lake
L20*
LTDU (3m, 2f)
RNPH (pr)
DUNL (1)
P32
Fox Lake
Sleek Lake
L21*
SESA (2)
LTDU (4)
CAGO (2)
SESA (4)
DUNL (2)
LTDU (1)
CAGO (40)
L87
L88
HERG (1)
P22*
SESA (2)
LTDU (2)
RNPH (2)
SESA (2)
LTDU (pr)
RNPH (1f)
Pointer Lake
RNPH (pr)
SESA (1)
Sik Sik Lake
P23*
P24*
P25*
SESA (4)
LTDU (2)
RNPH (4)
SESA (1)
P26*
L30*
P27*
SESA (1)
RNPH (2)
W31*
NOHA (1) P89
P35 GWFG (pr)

0 0.5 1 2 3 4 Kilometres

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/30/2014 Scale: 1:50,000
File: 5.5-4_Waterbird_Nest_Survey_Minesite.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.5-4
WATERBIRD NESTING SURVEY RESULTS FOR MINE LOCAL STUDY AREA (2008-2009)
MAPSHEET A

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Legend

- Nest Location (2009)
- Nest Location (2008)
- Survey Extent
- Proposed Mine Features (at time of survey)
- Current Proposed Mine Features
- Kiggavik Lease
- Sissons Lease

Survey Routes: 2009

- (Note: Alternating Colour
- to help with transect identification)
- Survey Routes: 2008

* Indicate transects that have been surveyed in both 2008 and 2009

Note: Observations for 2009 are in red and 2008 are in blue.

AMGP - American Golden-Plover
ATSP - American Tree Sparrow
CAGO - Canada Goose
CKGO - Cackling Goose
COLO - Common Loon
DUNL - Dunlin
GRSC - Greater Scaup
GWFG - Greater White-fronted Goose
GWTE - Green-winged Teal
HERG - Herring Gull
LALO - Lapland Longspur
LTDU - Long-tailed Duck
LTJA - Long-tailed Jaeger
NOHA - Northern Harrier
NOPI - Northern Pintail
PAJA - Parasitic Jaeger
RBME - Red-breasted Merganser
RNPH - Red-necked Phalarope
SACR - Sandhill Crane
SAVS - Savannah Sparrow
SEOW - Short-eared Owl
SESA - Semipalmated Sandpiper
STSA - Stilt Sandpiper
TUSW - Tundra Swan

550000 555000 560000 565000

7140000 7135000

N

Sleek Lake
Fox Lake
Sik Sik Lake
Rock Lake
Caribou Lake
Willow Lake
Boulder Lake
Mushroom Lake
Knee Lake
Lunch Lake
Andrew Lake
Shack Lake
Cigar Lake

L20* LTDU (3m,2f) RNPH (pr) DUNL (1)
P32
L21* SESA (2) LTDU (4) CAGO (2) SESA (4) DUNL (2) LTDU (1)
P22* SESA (2) LTDU (2) RNPH (2) SESA (2) LTDU (pr) RNPH (1f)
RNPH (pr) SESA (1)
P23*
P24*
P26*
P27* SESA (1) RNPH (2)
P28* RNPH (2) SAVS (1) DUNL (1) SESA (1) ATSP (1)
CAGO (40)
L87
L88 HERG (1)
NOHA (1) P89
P35 GWFG (pr)
L36 LTDU (2pr+7f) SEOW (1) RNPH (5) SESA (1)
L37* TUSW (1)
L38* NOPI (3) RNPH (1) NOPI (2pr) CAGO (2)
P39* CAGO (2) LTDU (1)
LTDU (1) L76
L69* SESA (1) and nest (4 eggs) STSA (1) HERG (1) STSA (1) PAJA (1) SESA (1) old HERG nest
P77
L70
L75 LTDU (4)
P74
SESA (1) HERG nest
L90
P79
P40
L41 GWTE (1m) LTDU (2) LALO (1f) and nest (4 eggs)
L72 LTDU (8) SESA (1)
P73
L91
P78
L92
L99 LTDU (3)
P42 LTDU (1) CAGO (probable nest on island)
P43
L94 SESA (9) DUNL (5)
P71*
P71b
P58* LTDU (2) STSA (1)
L50 RNPH (2) SESA (1)
L98
STSA (1)
P59*
L57*
P97 DUNL (1)
P51 DUNL (1)
L64 AMGP (1) DUNL (6) LTDU (3) RNPH (4) SESA (5) NOPI (2) STSA (1)
P68
L56* LTDU (2)
L48 RNPH (2)
P54* DUNL (1)
L96
P44
P45
L52 SAVS (1) and nest (4 eggs) RNPH (1f)
SESA (1)
P67 DUNL (1) PAJA (1)
P65
L95 STSA (1) DUNL (1)
L53* DUNL (2) RNPH (3) LTDU (3) SESA (1)
P62
P66 DUNL (1)
L46 GRSC (1f) and nest (4 eggs)
L63 GWFG (4) RNPH (1) LTDU (1)
P61 DUNL (1) SESA (1)
L60 PAJA (1f) and nest (2 eggs) DUNL (1) and nest (2 eggs) AMGP (2)

0 0.5 1 2 3 4 Kilometres

Projection: NAD 1983 UTM Zone 14N
Creator: CASLYS CONSULTING LTD.
Date: 05/30/2014 Scale: 1:50,000
File: 5.5-4_Waterbird_Nest_Survey_Minesite.mxd
Data Sources: Natural Resources Canada, GeoBase®, National Topographic Database, AREVA Resources Canada Inc., and Gebauer & Associates.

FIGURE 5.5-4
WATERBIRD NESTING SURVEY RESULTS FOR MINE LOCAL STUDY AREA (2008-2009)
MAPSHEET B

KIGGAVIK PROJECT - EIS

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