Table 5-14: Waterfowl Population Index and Species Richness among Survey Strata, June 2008 and 2009

Species	Mine Stratum		North Stratum		South Stratum		East Stratum	Discovery Stratum
	2008	2009	2008	2009	2008	2009	2008	2009
Red-throated Loon	0	21	0	0	0	0	0	0
Pacific Loon	42	42	42	0	21	0	0	0
Common Loon	0	21	0	0	0	0	0	0
Red-breasted Merganser	53	107	0	0	0	0	0	0
Tundra Swan	231	567	0	0	0	0	21	609
Canada Goose	588	1239	441	1134	1218	1008	42	987
Snow Goose	0	147	0	1995	0	2709	0	1239
Northern Pintail	256	1025	0	128	128	128	0	641
Scaup species	81	324	0	0	0	162	0	324
Long-tailed Duck	628	471	432	314	1100	1100	0	1924
Sandhill Crane	147	189	84	84	483	504	0	189
Herring Gull	168	105	63	168	273	567	21	882
Common Eider	0	0	0	0	0	0	0	105
Greater White-fronted Goose	0	0	0	0	0	0	0	0
Unidentified duck species	42	0	0	0	0	0	0	42
TOTAL	**2237**	**4258**	**1062**	**3823**	**3223**	**6178**	**84**	**6942**
Species Richness	**9**	**12**	**5**	**6**	**6**	**7**	**3**	**9**
Density/km^2	**16.6**	**31.5**	**7.9**	**28.3**	**23.9**	**45.8**	**0.6**	**51.4**

Table 5-15: Waterfowl Population Index and Species Richness among Survey Strata, July 2008 and 2009

Species	Mine Stratum		North Stratum		South Stratum		East Stratum	Discovery Stratum
	2008	2009	2008	2009	2008	2009	2008	2009
Red-throated Loon	0	0	21	21	63	0	0	0
Pacific Loon	0	147	84	42	0	0	0	189
Common Loon	42	0	42	0	0	0	0	0
Red-breasted Merganser	0	0	160	107	0	0	0	0
Tundra Swan	483	882	0	42	0	0	0	504
Canada Goose	546	945	2583	2016	2100	882	1995	210
Snow Goose	0	21	21	0	0	42	315	0
Northern Pintail	0	0	0	0	0	0	0	0
Scaup species	0	0	0	0	0	0	0	0
Long-tailed Duck	79	353	0	157	236	314	0	393
Sandhill Crane	63	441	105	168	336	567	21	189

Table 5-15: Waterfowl Population Index and Species Richness among Survey Strata, July 2008 and 2009 (continued)

Species	Mine Stratum		North Stratum		South Stratum		East Stratum	Discovery Stratum
	2008	2009	2008	2009	2008	2009	2008	2009
Herring Gull	63	126	105	84	252	294	0	315
Common Eider	0	0	0	0	0	0	0	0
Greater White-fronted Goose	0	105	0	0	0	0	0	0
Unidentified duck species	42	105	42	0	84	42	0	210
TOTAL	**1318**	**3125**	**3163**	**2637**	**3071**	**2141**	**2331**	**2010**
Species Richness	**6**	**8**	**9**	**8**	**6**	**5**	**3**	**6**
Density/km^2	**9.2**	**23.2**	**24.1**	**19.6**	**22.7**	**15.9**	**17.3**	**14.9**

Canada Geese, Snow Geese, Tundra Swans, and Long-tailed Ducks accounted for a large proportion of waterfowl in each stratum. Common Eiders were only recorded during the July 2009 survey in the Discovery stratum and Greater White-fronted Geese were only recorded in the Mine stratum the same year. Greater Scaup (*Aythya marila*) and Lesser Scaup (*Aythya affinis*) were not differentiated due to the similarities in appearance.

In both years, only Tundra Swans and Canada Geese were observed with broods during waterfowl aerial surveys. More broods were recorded in 2008 (14 broods) than in 2009 (7 broods) (Table 5-16). This could be due to the late break-up that occurred in 2009. During June 2009 surveys, most small ponds and wetlands were frozen whereas at the same time in 2008, break-up was further advanced and there was more open water. This could affect the brood production in July because when spring is late, waterfowl may not attempt to nest (Marshall 1952; Ryder 1970). Overall, Canada Geese had the most broods and the highest number of young.

Table 5-16: Waterfowl Productivity (Number of Broods and Young Observed) within Survey Strata, July 2008 and 2009

Species	Mine Stratum		North Stratum		South Stratum		East Stratum	Discovery Stratum
	2008	2009	2008	2009	2008	2009	2008	2009
Tundra Swan	4 (12)	2 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
Canada Goose	3 (11)	2 (7)	4 (15)	1 (3)	3 (15)	0 (0)	0 (0)	1 (1)
Total	**7 (23)**	**4 (10)**	**4 (15)**	**1 (3)**	**3 (15)**	**0 (0)**	**0 (0)**	**2 (2)**
Mean	**5.5 (16.5)**		**2.5 (9.0)**		**1.5 (0)**		**0 (0)**	**2 (2)**

Note: number in parentheses indicates total number of young observed.

5.8 Loons and Swans

Pacific, Red-throated, and Common loons have all been documented in the study area, with Pacific Loons being the only species commonly recorded as breeding. Pacific Loons nest on small, quiet, fish-bearing lakes and ponds with sloping shorelines (Ruggles 1994). Tundra Swans occur in the study area, are regularly documented as breeding, and are easily observed due to their large size and white colour. Tundra Swan breeding territories are comprised of a lake, used for refuge and foraging, and adjacent terrestrial habitats and ponds near the lake's perimeter used for foraging and nesting (Earnst and Rothe 2004). The lake provides important refuge for cygnets during brood-rearing (Limpert and Earnst 1994).

Nesting Pacific Loons and Tundra Swans were not randomly distributed within the mine study area. In all survey years, breeding pairs were concentrated in the northwest and southeast ends of the areas (Appendix B7; Figures 5-17 to 5-20). Nest locations in the same immediate areas were used in consecutive years based on repeated observations of nests and lake use by adults with fledglings (Figures 5-17 to 5-20).

Loons

Pacific, Red-throated, and Common loons are summer residents in the study area. In all years, Pacific Loons were the most-frequently observed loon species, whereas Red-throated and Common loons were uncommon. In 2000, Red-throated Loons were not recorded in the mine or control study areas. In 1998, based on the intensive ground survey in June and follow-up ground checks on selected lakes in June and July, there were one, 2, and 11 breeding pairs of Common, Red-throated, and Pacific Loons, respectively, within the mine study area. Occupancy and productivity varied, with the number of adult nesting pairs ranging from 7 to 16 in the mine area and from 7 to 14 in the control area. Nesting was likely delayed in 2000 and 2009 due to cold temperatures and a late break-up. Observations were similar in 1998 to 2000 but the number of breeding pairs in both survey areas was lower in 2009 (Table 5-17). This is likely not a mine effect but rather due to reduced survey effort in 2009 because no ground searches or follow up surveys occurred. Productivity can vary between years due to predation. Kertell (1996) found that the principal cause of reproductive failure in Pacific Loons appeared to be predation by arctic fox during incubation.

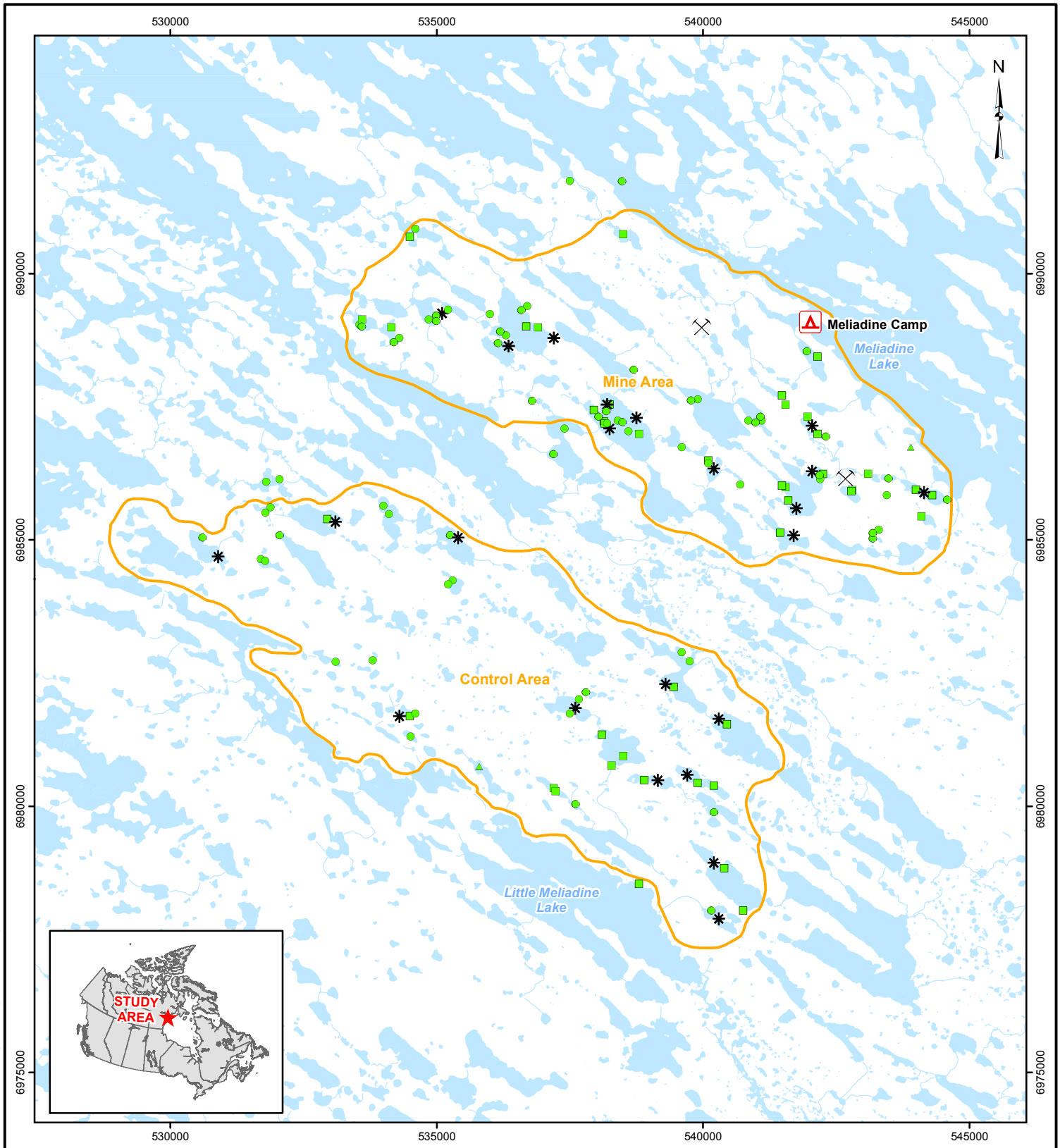
Table 5-17: Pacific Loon Occupancy and Productivity, 1998 to 2000, and 2009

Year	Mine Study Area		Control Study Area	
	# Adult Nesting Pairs	# Broods (Mean # of Fledglings per brood)	# Adult Nesting Pairs	# Broods (Mean # of Fledglings per brood)
1998	11	Unknown	-	-
1999	16	4 (1.3)	14	3 (1.5)
2000	14	8 (1.5)	14	4 (1.0)
2009	7	3 (>1.3)	7	3 (>0.7)
Mean[a]	12.0	5 (1.4)	11.7	3.3 (>0.9)

Note: "#" indicates number;" -" indicates area not surveyed;" >" indicates nests were still being incubated during July survey, accurate brood count not possible

[a] mean based on total number of fledglings

Density for breeding pairs of Pacific Loons was higher for all years in the mine area than the control area (Table 5-18). This may be due to habitat suitability, as there is more variability in the size of lakes in the mine area. Predation upon eggs and young is often high, and loons avoid predation by breeding at low densities, nesting on islands, and using nesting ponds to escape from predators. Adults may also actively defend eggs and chicks against small predators (Petersen 1979; Davis 1972). Again, reduced density observed in 2009 compared to previous years is likely not a mine effect but directly related to reduced survey effort.



LEGEND

- Camp
- Pacific Loon Observation
  - Pacific Loon - Group
  - Pacific Loon - Pair
  - Pacific Loon - Single
  - Pacific Loon - Nest
- Proposed Mine Site
- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

2.5 0 2.5
SCALE 1:100,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

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PROJECT
COMAPLEX MINERALS CORP
COMAPLEX MINERALS CORPORATION
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
PACIFIC LOON OCCUPANCY JUNE/JULY

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-17

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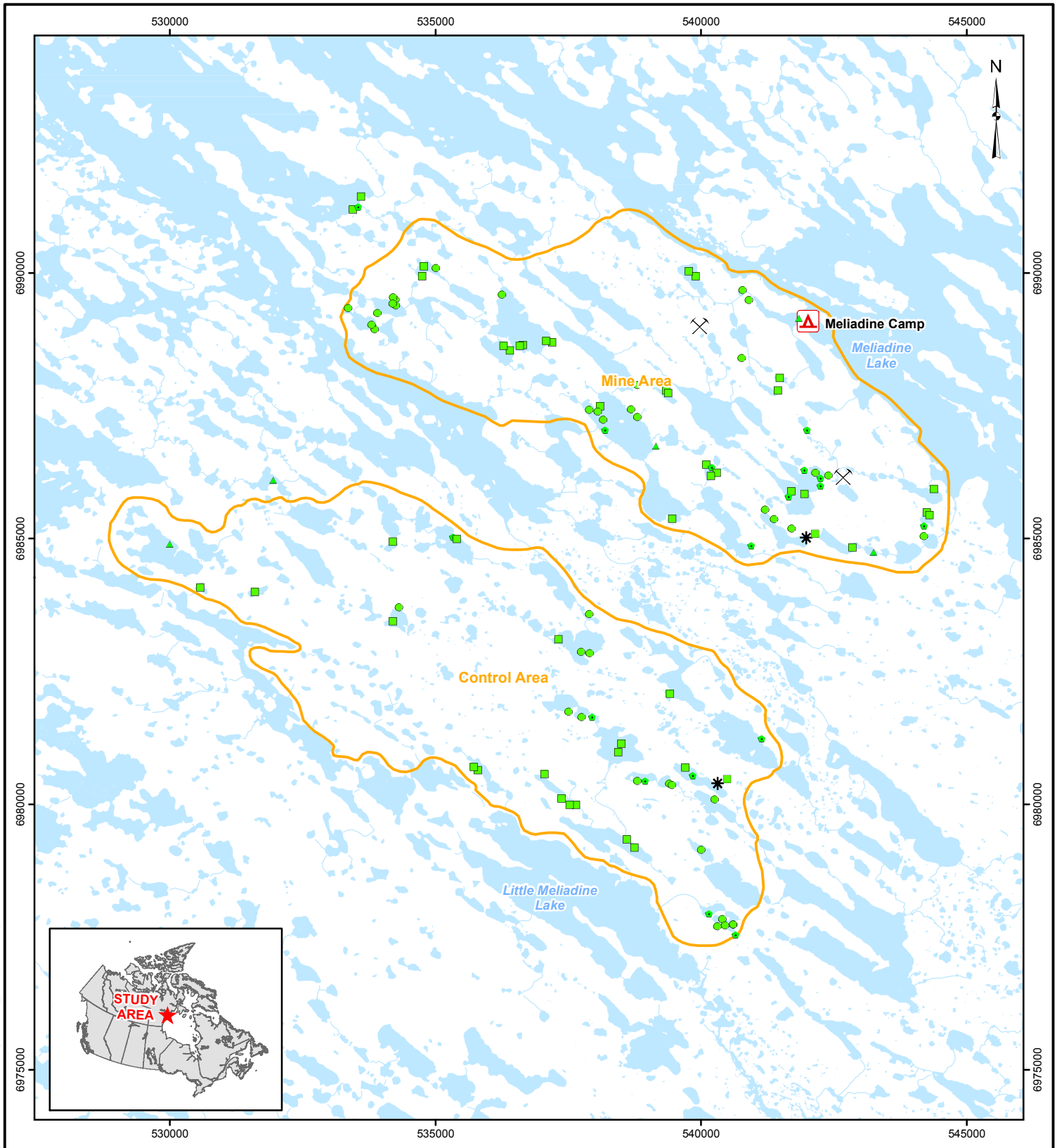

LEGEND

- Camp
- Pacific Loon Observation
  - Pacific Loon - Group
  - Pacific Loon - Brood
  - Pacific Loon - Pair
  - Pacific Loon - Single
  - Pacific Loon - Nest
- Proposed Mine Site
- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

2.5 0 2.5
SCALE 1:100,000 KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

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PROJECT
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DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-18

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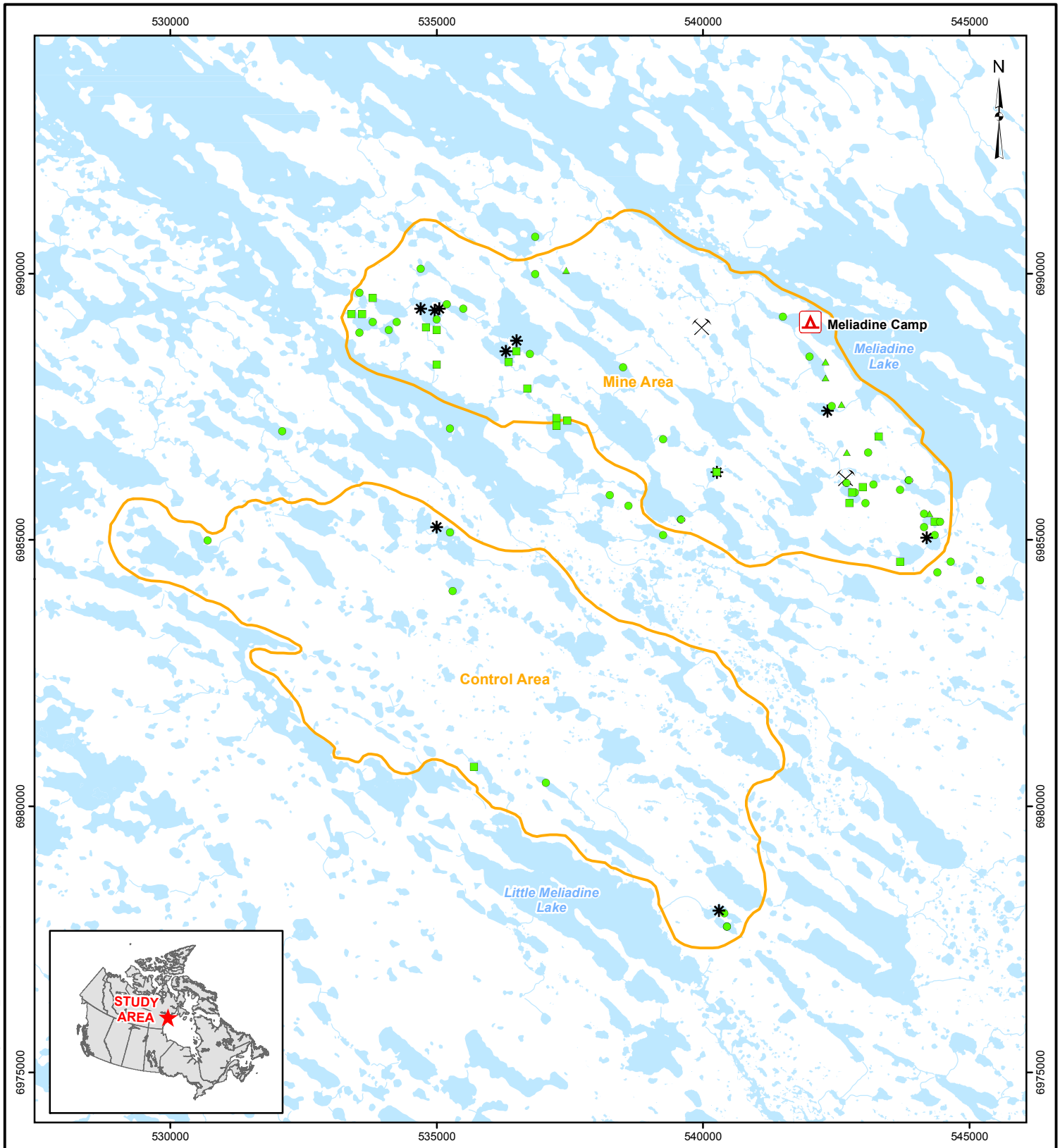

LEGEND

- Camp
- Proposed Mine Site

Tundra Swan Observation

- Tundra Swan - Group
- Tundra Swan - Pair
- Tundra Swan - Single
- Tundra Swan - Nest

- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

SCALE 1:100,000

2.5 0 2.5

KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

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TITLE

TUNDRA SWAN OCCUPANCY JUNE/JULY

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-19

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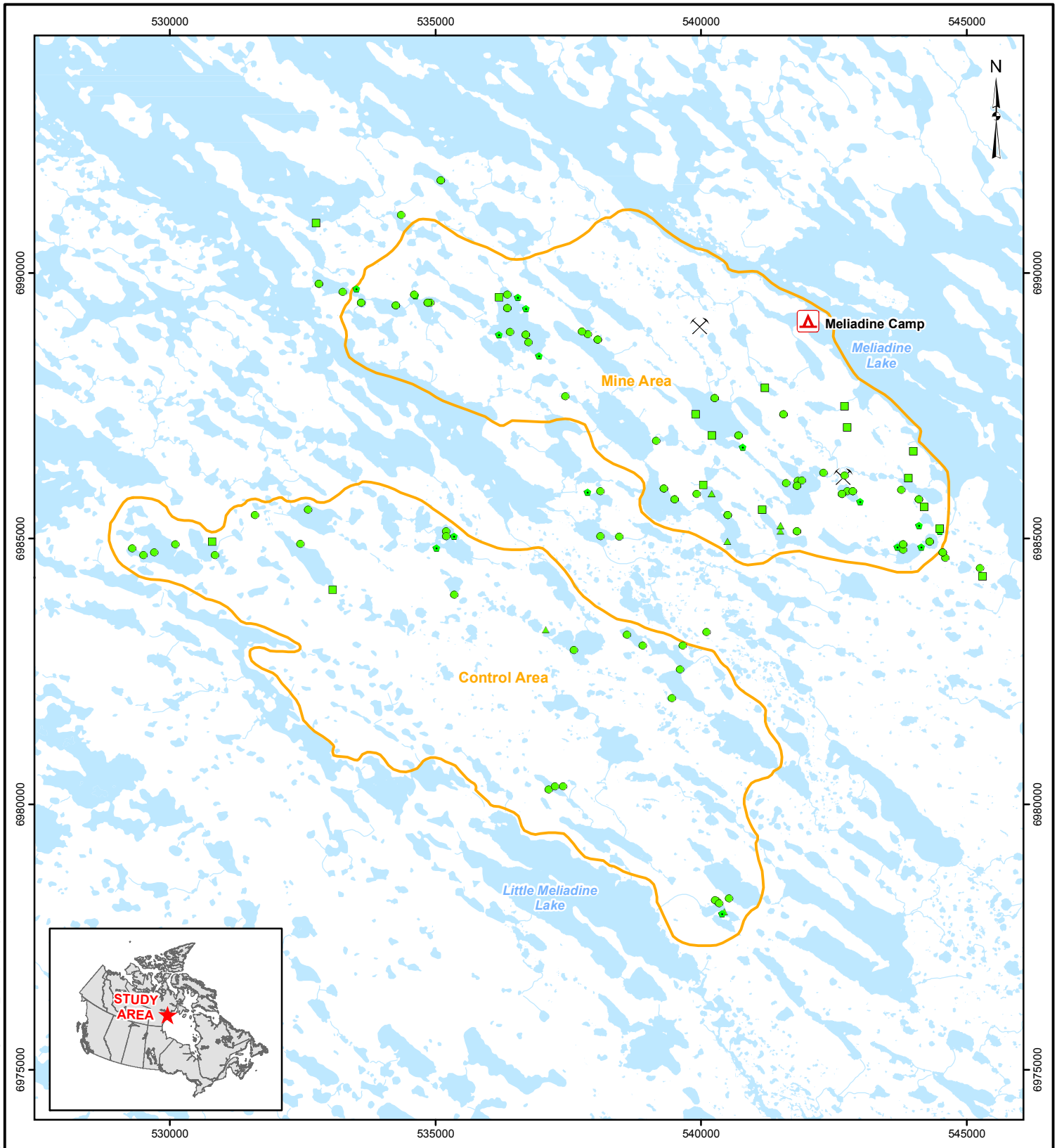

LEGEND

- Camp
- Proposed Mine Site
- Tundra Swan Observation
  - Tundra Swan - Group
  - Tundra Swan - Brood
  - Tundra Swan - Pair
  - Tundra Swan - Single
- Watercourse
- Loon and Swan Survey Area (1998-2000, 2009)
- Waterbody

SCALE 1:100,000

2.5 0 2.5

KILOMETRES

REFERENCE

Base data obtained from NTDB. Wildlife data obtained from field survey.
Projection: UTM Zone 15 Datum: NAD 83

DRAFT

PROJECT

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MELIADINE GOLD PROJECT
NUNAVUT

TITLE

TUNDRA SWAN PRODUCTIVITY JULY/AUGUST

Golder Associates
Edmonton, Alberta

PROJECT NO. 09-1373-0010			PHASE No. 1000	
DESIGN	PS	23 Oct. 2009	SCALE AS SHOWN	REV. 0
GIS	JW	6 Nov. 2009		
CHECK	PS	13 Nov. 2009		
REVIEW	MJ	13 Nov. 2009		

FIGURE 5-20

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Table 5-18: Pacific Loon Breeding Density, 1998 to 2000 and 2009

Year	Breeding Density (Breeding Pairs per km^2)	
	Mine	Control
1998	0.28	-
1999	0.41	0.27
2000	0.36	0.27
2009	0.18	0.14
Mean density	0.29	0.23

Note: "-" indicates area not surveyed

During all survey years, lakes occupied by Pacific Loons ranged in area from 0.80 to 95.1 ha (Table 5-19). Petersen (1979) found ponds with nests to be on average 1.8 ha in size, with less than 1% of occupied ponds being greater than 9.6 ha and only 24% of occupied ponds being less than 0.3 ha. Ruggles (1994) found that Pacific Loons used lakes as small as 4 ha.

Table 5-19: Comparison of Size Range in Hectares of Occupied Lakes by Pacific Loons in Mine Area and Control Area, 1998 to 2000 and 2009

1998	1999		2000		2009	
Mine Area	Mine Area	Control Area	Mine Area	Control Area	Mine Area	Control Area
0.80 to 12.5	1.0 to 87.1	1.0 to 44.9	1.0 to 85	1.0 to 65	21.1 to 49.9	16.2 to 95.1

Tundra Swans

Tundra Swans are regular summer breeders in the study area. Tundra Swan occupancy and productivity was variable during the 4 years surveys were conducted between 1998 and 2009. The number of adult nesting pairs ranged from 5 to 8 in the mine area and from one to 5 in the control area (Table 5-20). In all survey years, the number of broods ranged from zero to 7, and the mine area was consistently more successful with more broods and fledglings than the control area.

Table 5-20: Tundra Swan Occupancy and Productivity, 1998 to 2000 and 2009

Year	Mine Study Area		Control Study Area	
	# Adult Nesting Pairs	# Broods (Mean # of Fledglings)	# Adult Nesting Pairs	# Broods (Mean # of Fledglings)
1998	8	3 (unknown)	-	-
1999	5 to 7	6 (1.7)	1	0 (0)
2000	7	3 (3)	5	2 (3)
2009	7	7 (2)	1	1(3)
Mean	6.8 to 7.3	4.8 (2.1)[a]	2.3	1.0 (2.3)[a]

Note: "#" indicates number; "-" indicates area not surveyed
[a] mean based on total number of fledglings