March 2012

GAHCHO KUÉ PROJECT

2011 Fish and Aquatic Resources Supplemental Monitoring Report

Submitted to:
De Beers Canada Inc.

DRAFT REPORT

Report Number: 11-1365-0001 / DCN 054

Distribution:

1 copy to De Beers Canada Inc.

1 copy to Golder Associates Ltd.

Golder Associates

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1.0 INTRODUCTION

De Beers Canada Inc. (De Beers) is proposing to develop the Gahcho Kué Project (Project), a diamond mine in the Northwest Territories (NWT). The Project is located in the North Slave region of the NWT at Kennedy Lake, approximately 140 kilometres (km) northeast of Łutselk'e and 280 km northeast of Yellowknife.

Baseline studies have been conducted to support the Environmental Impact Assessment (EIS) for the Project and the Environmental Impact Review (EIR) Process. These data were reported in the December 2010 EIS (De Beers 2010). Baseline data reported in the 2010 EIS are sufficient to support the environmental assessment within the EIS. However, De Beers is committed to ongoing data collection in advance of regulatory approval of and the permitting process for the Project. As such, supplemental baseline data have been collected in 2011, and will continue to be collected and reported annually, until such time that these activities are no longer required prior to Project construction or evolve into future monitoring programs associated with an approved Project.

The purpose of collecting and reporting the supplemental baseline data for the Project is to support a consistent and transparent baseline program. In general, the goals of the supplemental data collection are to:

- reduce uncertainty and increase the level of confidence in impact predictions;
- broaden the baseline areas of investigation; and
- contribute to long-term future monitoring and adaptive management of the Project.

The focus of the 2011 supplemental data collection reported herein is fish and aquatic resources. More specifically, this report provides information from 2011 field studies on the fisheries and aquatic resources in the Project area. This report supplements the data presented in the 2010 EIS (De Beers 2010, Annex J [Fisheries and Aquatic Resources Baseline] and Addendum JJ [Additional Fish and Aquatic Resources Baseline Information]).

Specific program objectives in 2011 were the following:

- conduct fish and fish habitat baseline sampling at Lake N11;
- conduct fish and fish habitat baseline sampling at a proposed reference lake (an unnamed lake subsequently referred to as East Lake);
- verify the presence or absence of Northern Pike in the N watershed; and
- conduct additional fish sampling and fish habitat assessments of selected lakes affected by the Project.

A lower trophic level sampling program was conducted at Lake N11 and East Lake, and a fish tissue sampling program was conducted at Lake N11. The lower trophic and fish tissue analysis are reported separately from this report (Golder 2011a,b).

2.0 STUDY AREAS

The local study area (LSA) for fish and aquatic resources (Figure 2-1) is 739 square kilometres (km^2) and includes the following:

- Kennady Lake and the smaller lakes and streams of its watershed;
- streams and lakes downstream of Kennady Lake to the outlet of Kirk Lake; and
- streams and lakes in the watershed adjacent to Kennady Lake (N watershed), which flow into Lake 410.

The regional study area (RSA) is in the Lockhart River watershed. These study areas are described in greater detail within Annex J, Section J2 of the 2010 EIS (De Beers 2010).

Most of the 2011 baseline field surveys for fish and aquatic resources were conducted within the LSA. East Lake was the only lake sampled that was outside of the LSA, although it is within the RSA. East Lake flows north into Fletcher Lake within the Lockhart River drainage.

LEGEND

- Gahcho Kué Project
- Winter Access Road
- Watercourse
- Waterbody
- *K1* Lake Identifier
- Watershed Boundary
- Local Study Area
- Flow Direction

NOTES
Base data source: National Topographic Base Data (NTDB) 1:250,000

GAHCHO KUÉ PROJECT

Local Study Area

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:250,000 (5 2.5 0 5 Kilometres)	
FILE No: B2011-Fish-020-GIS	DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1
OFFICE: GOLD-CAL	DRAWN: DC / CHECK: JF

DE BEERS CANADA

Figure 2-1

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3.0 METHODS

Methods for the 2011 field programs for fish and aquatic resources are described in this section. Methods used in previous studies are summarized in Annex J and Addendum JJ of the 2010 EIS (De Beers 2010).

3.1 Aquatic Habitat

In 2011, aquatic habitat was assessed at four lakes within the LSA, as well as East Lake. The 2011 lake surveys collected habitat information at lakes not previously surveyed, or additional information on select lakes previously surveyed. The locations of the five lakes surveyed for aquatic habitat in 2011 are shown in Figure 3-1. Similar to previous studies, aquatic habitat surveys were conducted to assess the quality and quantity of fish habitat in these lakes.

The field program was conducted from July 6 to 19 and August 6 to 22, 2011. Detailed aquatic habitat maps were developed for each lake surveyed. Methods used were consistent with those used in previous studies, as described in Annex J, in order to provide comparable data and produce consistent maps.

The field biologists accessed each site by helicopter and took aerial photos of each lake. The detailed habitat mapping was completed from an inflatable boat, using a depth sounder to determine the depth and gradient. Depth and gradient classifications used are provided in Table 3-1. Substrate was determined visually based on the classifications provided in Table 3-2. Bathymetric surveys have been completed at four of these lakes and can be found in Addendum HH (Climate and Hydrology Baseline) of the 2010 EIS (De Beers 2010). Although field crews collected depth information during the fish and fish habitat surveys, no detailed bathymetric survey data are currently available for East Lake.

3.1.1 Data Analysis

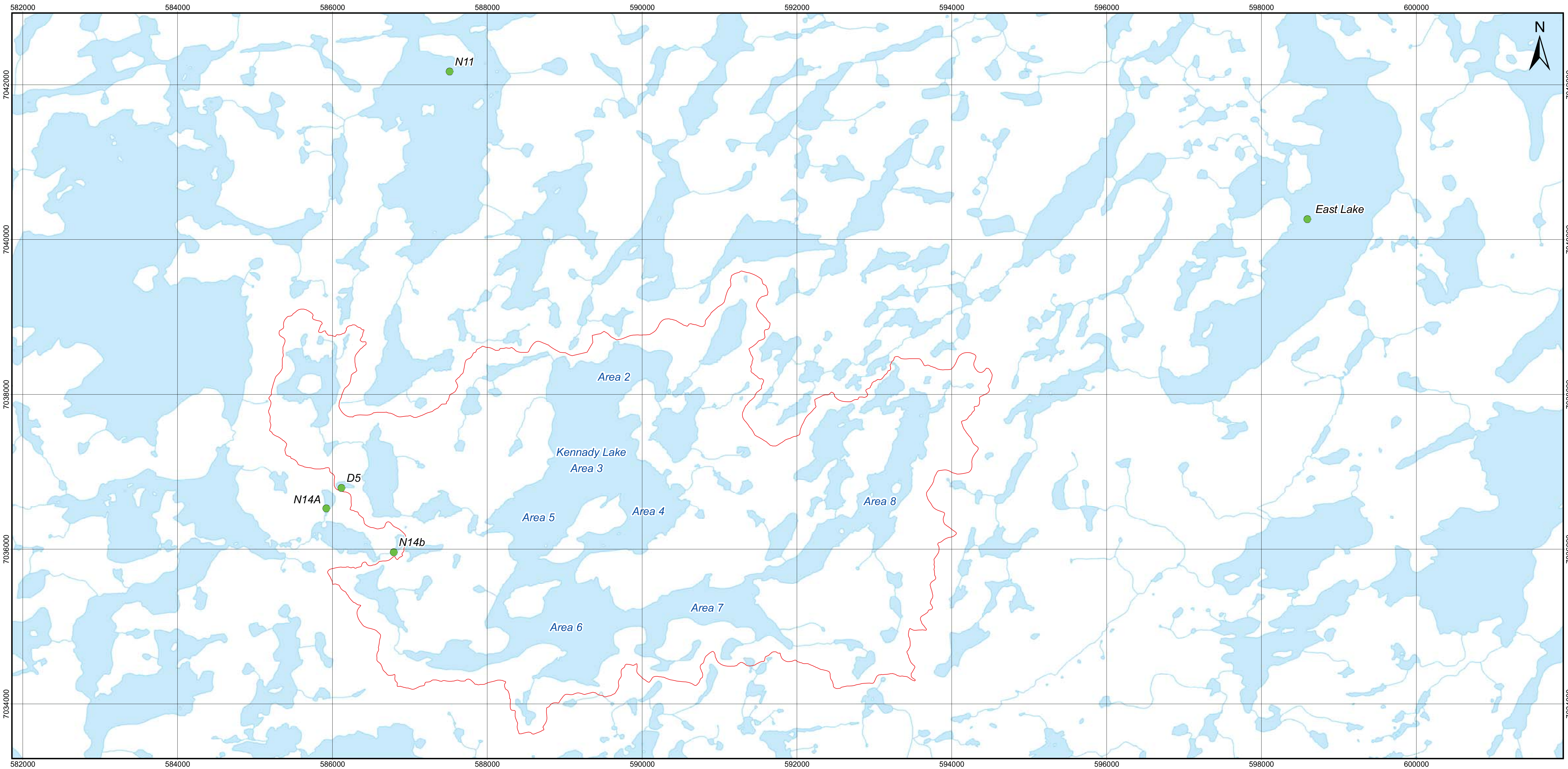
The habitat maps created by the field crew in 2011 were digitized into a geographic information system (GIS) for production. Quality assurance / quality control (QA/QC) procedures were applied to the resulting figures to minimize possible errors through data transfer.

3.2 Limnology

In 2011, limnology surveys were conducted in July and August at 16 lakes (Figure 3-2). Vertical water quality profiles with 1 m intervals were established at lakes with a maximum depth greater than 2 m; surface water quality was measured at lakes with a maximum depth 2 m or less. Each sample station was situated at the approximate maximum depth of each lake. Maximum depth was determined with a depth sounder and running several transects across each lake. Water temperature (degrees Celsius [°C]), specific conductivity (microSiemens per centimetre [µS/cm], dissolved oxygen (DO; milligrams per litre [mg/L]), and pH were measured at the water surface or at each interval with a Yellow Springs Instrument (YSI) multimeter. Secchi depth (metres [m]) also was measured at each location.

3.2.1 Data Analysis

Data collected during the 2011 limnology surveys were entered into an Excel spreadsheet. Quality Assurance / Quality Control procedures were conducted to minimize errors during the data entry process.



LEGEND

Watercourse

Waterbody

Area 2 Lake Area Identifier

2011 Lake Habitat Sampling Location

Kennady Lake Watershed Boundary

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

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GAHCHO KUÉ PROJECT

Lake Habitat Sampling Locations 2011

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS CANADA
Scale: 1:50,000 — 0 500 1,000 2,000 Meters		
FILE No: B2011-Fish-016-GIS		DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1	
OFFICE: GOLD-CAL	DRAWN: DC	CHECK: JF	**Figure 3-1**

Table 3-1 Depth and Gradient Classification for Small Lake Habitat Mapping

Gradient Class		Depth Class	
H	high gradient (>10°)	I	0 to 2 m
L	low gradient (≤10°)	II	>2 to 4 m
-	unknown	III	>4 m

Note: > = less than; < = greater than; m = metre.

Table 3-2 Substrate Classification for Small Lake Habitat Mapping

Class	Substrate Type[(a)]	Description
1	Boulder/cobble	substrates generally clean due to wave action and ice scour; on average 60 percent (%) boulders, 40% cobbles; interstitial spaces generally clean
2	Boulder	substrates 80% or greater boulder; remainder cobble, gravel, or fine sediments
3	Bedrock	substrate 100% bedrock
4	Bedrock/boulder	bedrock overlain with some boulders
5	Bedrock/cobble	bedrock overlain with cobble
6	Vegetation/organics	submergent, emergent, or inundated vegetation on organic substrates
7	Vegetation/boulder	emergent or inundated vegetation; substrates of boulder or boulder and cobble
8	Fines/organics	substrates predominantly fines, organics, or sand
9	Cobble/gravel	substrates a mixture of cobble, gravel, and fines; on average, 15% boulders, 35% cobble, 35% gravel, 15% fines
10	Boulder/fines	highly embedded boulders overlain with layer of fine sediments; substrates greater than 40% boulder
11	Cobble/fines	highly embedded cobble substrates overlain with layer of fine sediments; substrates greater than 40% cobble
12	Boulder/gravel	substrates a mixture of boulder, gravel, and fines, on average 50% boulders, 10% cobble, 30% gravel, 10% fines

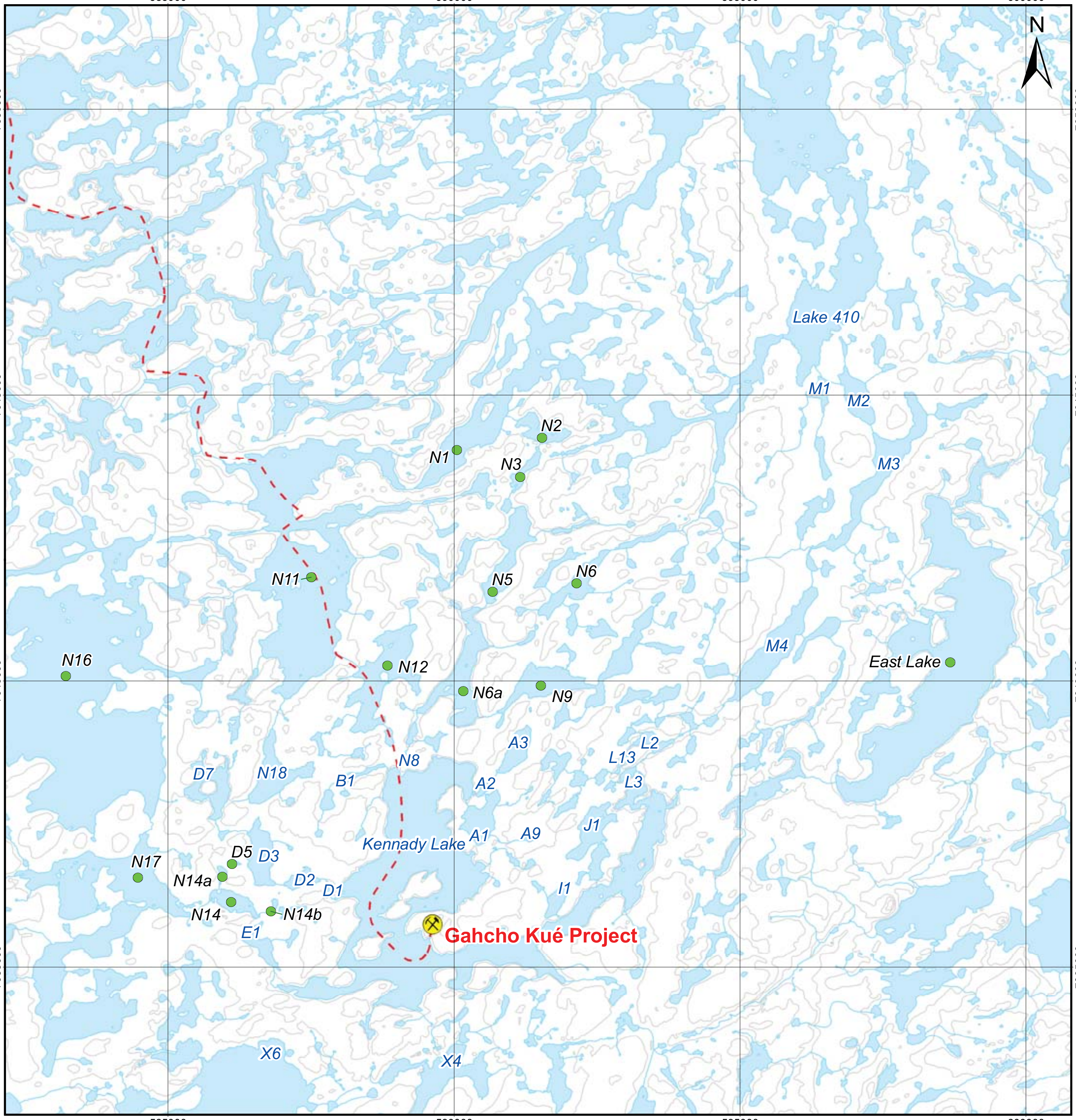
Note: (a) Particle sizes: fines (sands, silts, clays, fine organic matter; <2 millimetres [mm]); gravels (2 to 64 mm); cobbles (>64 to 256 mm); boulders (>256 mm).

3.3 Fisheries Investigations

3.3.1 Lakes

In 2011, 16 lakes were sampled for fish (Figure 3-3). Similar to previous studies (2010 EIS [De Beers 2010] Annex J and Addendum JJ), the overall objectives of the lake fisheries sampling program was to determine fish presence and species composition, as well as relative abundance, to the extent possible. Sampling locations are shown on Figure 3-3. Specific sampling methods used for each lake are summarized in Table 3-3.

A major part of the fish sampling program in 2011 was increased sampling effort in the N Watershed to target Northern Pike, which had not been collected previously in the N Watershed. Lakes in the N Watershed with high potential Northern Pike habitat were identified for sampling. Sampling locations within the N watershed are shown on Figure 3-3.



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LEGEND

- Gahcho Kué Project
- Winter Access Road
- Watercourse
- Waterbody
- Contour (10 m interval)
- Lake Limnology Sampling Site
- *N17* Lake Identifier

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Lake Limnology Sampling Locations 2011

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:100,000 (1,000 500 0 1,000 Metres)	
FILE No: B2011-Fish-017-GIS	DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1
OFFICE: GOLD-CAL	DRAWN: DC / CHECK: JF

DE BEERS CANADA

Figure 3-2

Table 3-3 Fish Surveys Conducted in Lakes, 2011

Lake ID	Gill Nets	Shoreline Electrofishing	Minnow Traps	Angling
D5	-	✓	✓	-
N1	✓	-	✓	✓
N2	✓	-	✓	-
N3	✓	-	✓	✓
N5	✓	-	✓	-
N6	✓	-	✓	-
N6a	✓	-	✓	-
N9	✓	-	✓	-
N11	✓	-	✓	✓
N12	✓	✓	✓	-
N14a	✓	✓	✓	-
N14b	-	✓	✓	-
N14	✓	-	✓	-
N16	✓	-	✓	✓
N17	✓	-	✓	-
East Lake	✓	✓	✓	✓

Note: ✓= Sampled; - = Not sampled.

Lakes were sampled by gill netting, minnow trapping, shoreline backpack electrofishing, and angling, where appropriate. Additional fishing effort and sampling occurred at Lake N11 for the collection of fish tissue.

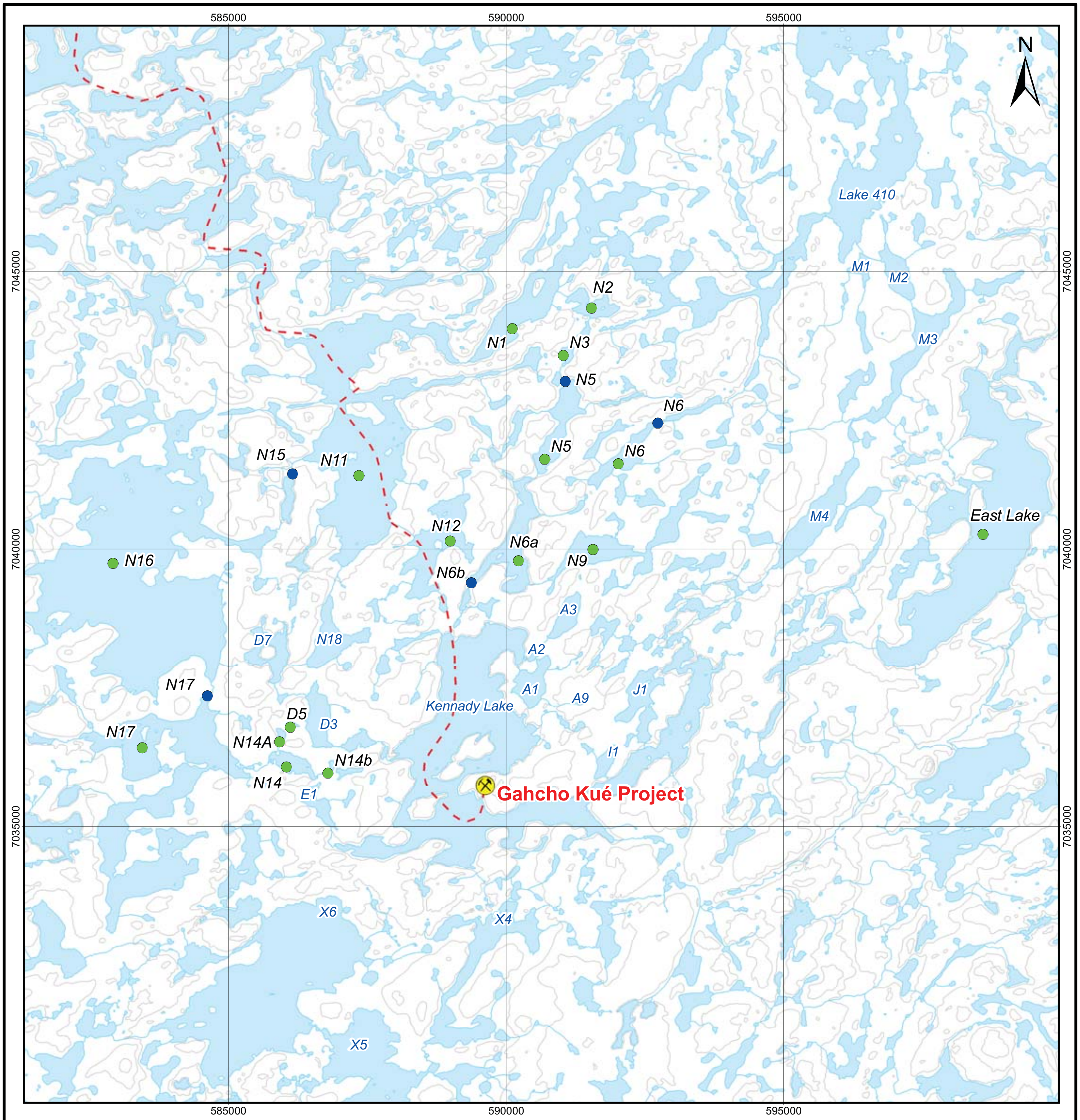
Gill nets were standard Fall Walleye Index Netting (FWIN) (Morgan 2000) nets, composed of eight 1.7 m x 25 m panels of varying mesh sizes (25, 38, 51, 63, 76, 102, 127, and 152 mm). Gill nets were set for approximately two to six hours during daylight hours.

Gee minnow traps were baited and set in the shallow littoral zone at depths less than 1 m. Three to five minnow traps were set overnight, where possible. At a minimum, minnow traps were set for three hours.

Shoreline backpack electrofishing was conducted with a Smith-Root Model 12B electrofisher along the shallow littoral zone in areas considered to provide suitable fish habitat.

Angling was also used in lakes that could not be gill netted due to shallow depths that would not allow for the gill net to fish effectively. These lakes typically had depths less than 1.7 m. Angling also occurred in areas that were identified as potential Northern Pike habitat (i.e., embayment areas with submergent and emergent aquatic vegetation). A variety of lures and baits were used while angling.

Captured fish were held in large tubs of water and processed at the sampling site. Fish were identified, enumerated and measured for length and weight, then released into the habitat they were captured from. Voucher specimens of forage fish species were preserved in formalin for identification verification.



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LEGEND

- Gahcho Kué Project
- Winter Access Road
- Watercourse
- Waterbody
- Lake Fish Sampling Location
- Stream Fish Sampling Location
- Contour (10 m interval)
- *N16* Lake Identifier

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Lake and Stream Fish Sampling Locations 2011

PROJECTION:	DATUM:	
UTM Zone 12	NAD83	DE BEERS CANADA
Scale: 1:100,000 1,000 500 0 1,000 Metres		
FILE No: B2011-Fish-014-GIS		DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1	
OFFICE: GOLD-CAL	DRAWN: DC	CHECK: JF

Figure 3-3

3.3.1.1 Data Analysis

Data collected during the 2011 field programs were entered into databases. Quality Assurance / Quality Control procedures were conducted to minimize errors during the data entry process.

Electrofishing catch-per-unit-effort (CPUE) was calculated as number of fish caught per net hour (fish/net h). CPUE for minnow trapping was calculated as the number of fish per trap hour (fish/trap h).

Lakes sampled for fish were designated as fish-bearing, non-fish-bearing or unknown, as described in Annex J. Fish-bearing lakes are those in which fish have been captured, or where fish are known to occur elsewhere in the watershed and connection to these fish-bearing waters are established at some point during the year. Non-fish-bearing lakes are those in which fish were not captured, the lake was not connected to a fish-bearing lake and the lake was too shallow for fish to overwinter (i.e., less than 3 m). As discussed in Annex J, typical ice depths in the region are 2 m; therefore, lakes with depths less than 3 m would likely freeze to the bottom or have only small residual pockets of water and it is assumed that fish could not overwinter in these conditions. Unknown fish-bearing status was assigned to lakes where sampling was inadequate to determine fish presence, even if the depth was less than 3 m.

3.3.2 Streams

In the summer of 2011, fish inventory surveys were conducted at five streams within the N Watershed. Streams in the N Watershed with high potential Northern Pike habitat were identified for sampling. Stream sampling locations are shown on Figure 3-3. Specific sampling methods used are summarized in Table 3-4. Methods used included backpack electrofishing and minnow trapping, where possible.

Electrofishing was conducted with a Smith-Root Model 12B electrofisher. A single pass of electrofishing was conducted for a minimum effort of 300 seconds or the total length of the stream, where applicable.

Minnow traps were baited with dry cat food and set overnight. A minimum of five minnow traps were set in clusters within the stream.

Fish captured were identified, enumerated, and measured for length and weight. Fish were then typically released in the habitat from which they were captured. Voucher specimens of forage fish species were preserved in 10% formalin for laboratory identification verification.

Table 3-4 Fish Inventory Surveys Conducted in Streams, 2011

Stream ID	Backpack Electrofishing	Minnow Traps
N5	✓	-
N6a	✓	✓
N6b	✓	✓
N15	✓	-
N17	✓	✓

Note: ✓= Sampled; - = Not sampled.

3.3.2.1 Data Analysis

Data collected during the 2011 field program was entered into databases. Quality Assurance / Quality Control procedures were conducted to minimize errors during the data entry process.

Electrofishing CPUE was calculated as number of fish caught per 100 seconds of active electrofishing (fish/100 s). Catch-per-unit-effort for minnow trapping was calculated as fish/trap h.

4.0 RESULTS

4.1 Aquatic Habitat

Descriptions and photos of the aquatic habitat at each lake surveyed in 2011 are provided in Appendix I. Habitat maps for the detailed aquatic habitat surveys conducted in 2011 are provided in Appendix II. The habitat characteristics of each lake surveyed in 2011 are summarized in Table 4-1. A summary of the habitat categories by percent area of each lake surveyed in 2011 is provided in Table 4-2.

Three of the five lakes surveyed in 2011 (Lakes D5, N14a, and N14b) were very small and shallow, with surface areas ranging from 1.4 to 3.3 hectares (ha) and maximum depths less than 4 m. East Lake and Lake N11 were larger, with a surface areas of 578 ha and 538 ha, respectively.

Lakes D5, N11, N14a, N14b, and East Lake shorelines were typically shallow, low gradient, and dominated by fines and boulder substrates. Aquatic vegetation was restricted to shorelines and inlet/outlets of the lakes. Cover for fish was minimal, and primarily provided by substrate, instream vegetation, overhanging vegetation, and occasionally depth.

Due to depths less than 2 m (Table 4-1), Lake D5 and Lake N14b likely freeze to the bottom and, thus, do not provide overwintering habitat. Lake N14a may contain some pockets of overwintering habitat for small-bodied fish species at the deepest depth (3.1 m); however, these pockets likely also become oxygen depleted in mid- to late winter. Lake N11 and East Lake likely provide suitable overwintering habitat for fish, with maximum depths of 6.6 and 9.5 m, respectively.

The fish-bearing status of lakes sampled in 2011 is presented in the fisheries investigation section (Section 4-4).

Table 4-1 Summary of Habitat Characteristics for Lakes Surveyed, 2011

Lake	Lake Area (ha)	Maximum Depth[(a)] (m)	Dominant Shallow Habitat [(b)]
D5	1.4	0.5	10LI
N11	538	6.6	1LI
N14a	3.1	3.1	10LI
N14b	1.8	0.7	1LI
East Lake	578	9.5	1LI

Note: ha = hectare; m = metre.

The bathymetric mapping results suggest a maximum depth of 10.0 m (Addendum HH).

(a) Measured maximum water depth at time of survey

(b) Habitat types (substrate, gradient, depth classes) described in Tables 3-1 and 3-2

Table 4-2 Summary of Habitat by Substrate and Depth/Gradient Category for Lakes Surveyed, 2011

Lake	Area (ha)	Substrate Type, Gradient Classification (L, H) and Depth (I, II, III)[a] (% of Total Lake Area)																													
		Bo/Co 1				Bo 2					Bd 3					Bd/Bo 4		Bd/ Co 5	Veg/ Org 6	Veg/ Bo 7	Fines/Org 8				Co/Gr 9		Bo/F 10			Co/F 11	
		LI	LII	HI	HII	LI	LII	LIII	HI	HII	LI	LII	HI	HII	HIII	LII	HI	LI	LI	LI	LI	LII	LIII	HIII	LI	LII	LI	LII	HII	LI	LII
D5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	17.6	38.9	0.0	0.0	0.0	0.0	0.0	42.4	0.0	0.0	0.0	0.0
N11	538	14.5	15.3	1.2	0.0	0.4	0.5	0.0	0.0	0.0	0.6	0.1	0.0	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	5.4	54.5	0.0	0.0	0.0	3.6	4.2	0.0	0.0	0.0
N14a	3.3	0.0	0.0	0.0	0.0	35.3	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	16.0	20.6	26.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N14b	1.8	24.6	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	59.5	0.0	0.0	0.0	2.0	0.0	9.8	0.0	0.0	0.0	0.0
East Lake	578	15.3	0.2	0.0	0.1	8.1	8.2	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	61.6	0.9	0.0	0.0	0.0	2.9	0.1	0.0	0.0

Note: (a) Habitat classifications (Substrate, Gradient, Depth) described in Tables 3-1 and 3-2.

Bo = boulder, Co = cobble, Bd = bedrock, Gr = gravel, F = fines/organics, Veg = vegetation, Org = organics.

4.2 Limnology

Limnology data for the lakes surveyed in 2011 are summarized in Table 4-3. Detailed limnology data can be found in Appendix III. Lake N5 was the deepest lake surveyed, with maximum depths of 12.5 m. Lake N1 was the second deepest lake, with a maximum depth of 10.2 m. Most of the small lakes were less than 6 m in depth. Lake D5 was the shallowest lake, with a maximum depth of 0.5 m.

Table 4-3 Summary of Limnology Parameters in Lakes Surveyed, 2011

Lake	Date Surveyed	Maximum Depth [m]	Parameter Range (Minimum to Maximum)				
			Secchi Depth [m]	Temperature [°C]	Dissolved Oxygen [mg/L]	Specific Conductivity [µS/cm]	pH
D5	08-Aug-11	0.5	>0.5	20.3	8.6	26	6.4
N1	10-Jul-11	10.2	6.8	12.5-17.8	5.5-9.5	15	6.6-7.2
N2	14-Jul-11	2.9	>2.9	18.6	8.2-8.3	15-16	7.0-7.3
N3	18-Jul-11	3.2	>3.2	16.5	8.6-8.8	16	7.3
N5	13-Jul-11	12.5	5.5	11.3-18.4	8.2-9.5	10-13	7.8
N6	13-Jul-11	4.5	>4.5	17.0-18.9	8.3-8.5	14	7.5-8.0
N6a	14-Jul-11	4.3	>4.3	18.9	8.0-8.1	9	6.5
N9	08-Jul-11	8.4	-	13.4-14.6	9.0-9.2	12-15	6.0-7.5
N11	09-Jul-11	6.6	5.7	14.8-16.5	7.0-7.3	11-12	5.3-5.6
N12	08-Jul-11	8.1	-	14.8-16.7	8.9-9.2	8-9	7.8
N14a	08-Aug-11	3.1	2.5	15.1-18.9	8.1-9.1	9	6.1-7.0
N14b	09-Aug-11	0.7	0. 2	17.0	9.6	23	7.0
N14	06-Jul-11	3.5	-	15.6	9.2-9.6	10	7.0-7.4
N16	16-Jul-11	5.2	>5.2	14.6	9.2-9.4	15-16	6.4-7.0
N17	07-Jul-11	3.5	-	14.6-16.1	9.2-9.5	14-20	6.7-7.4
East Lake	06-Jul-11	9.5	4.5	11.0-14.2	10.4-10.9	9-10	8.6-8.7

Note: - = Data not collected; m = metre; °C = degrees Celsius; mg/L = milligrams per litre; µS/cm = microSiemens per centimetre.
The bathymetric mapping results suggest a maximum depth of 10.0 m (Addendum HH).
Detailed limnology data can be found in Appendix III.

Dissolved oxygen concentrations in the surface waters of the small, shallow lakes (i.e., with a depth less than 6 m) ranged from 8.0 to 9.6 mg/L (Table 4-3). In general, changes in dissolved oxygen with depth were not observed in these small, shallow lakes, indicating complete vertical mixing of the water column. Most of the larger, deeper lakes were also well mixed; however, there was some depletion of dissolved oxygen with depth in Lake N1 (Table 4-3, Appendix III).

Specific conductivity in all the lakes was low (Table 4-3), and ranged from 9 to 26 µS/cm. Most of the lakes had specific conductivity readings less than 17 µS/cm; only three lakes had values greater than 17 µS/cm (Lakes D5, N14b, and N17). Two of those lakes had depths less than 0.7 m, and the increased readings may be a result of stirring up the substrate on the bottom by wave action and/or evapotranspiration.

Secchi depths in most lakes were equivalent to the maximum depth of the lake; for the most part, the small lakes were clear water lakes in which the bottom sediments could be seen from the surface, with the exception of Lakes N14a and N14b where the Secchi depth was less than the bottom. In deeper lakes (i.e., depths greater than 6.5 m), water was also typically clear with Secchi depths greater than 4.5 m (Table 4-3). Basic to acidic pH values were measured in the lakes in 2011 (pH values 5.3 to 8.7) (Table 4-3).

In general, the lakes were well mixed during the sample period and did not show thermal stratification within the water column (Table 4-3, Appendix III). Lake N1, however, showed a decrease of temperature with depth, indicating the presence of a slight thermocline (Appendix III).

4.3 Fisheries Investigations

4.3.1 Lakes

A summary of the fish captured in the 16 lakes sampled in 2011 by gear type is provided in Table 4-4. Catch results and gill netting, backpack electrofishing, and minnow trapping CPUE data are provided in Appendix IV.

Fish were captured in 14 of the 16 lakes sampled. Fish species captured included six sport fish (Arctic Grayling, Burbot, Lake Trout, Longnose Sucker, Northern Pike, and Round Whitefish), and three forage fish species (Lake Chub, Ninespine Stickleback, and Slimy Sculpin). Of the lakes sampled for Northern Pike in the N Watershed, Northern Pike were only captured in two of the lakes (Lake N1 and Lake N11). However, this is the first time that Northern Pike have been documented in the N Watershed. The sampling confirmed Northern Pike are present in the N Watershed but are likely low in abundance, due to limited spawning and rearing habitats, and poor connectivity between waterbodies.

Gill netting was a more effective sampling method than shoreline electrofishing. Fish were captured in 13 of the 14 lakes where gill nets were deployed. Lake N1 is the only lake where fish were not captured in gill nets.

Minnow trapping was the most effective method for catching forage fish species. Minnow traps were set in all 16 lakes, and fish were caught in nine of the lakes where the minnow traps were set.

Angling was used at five of the 16 lakes sampled. Fish were captured by angling at four of these lakes. All of the Lake Trout that were used for the fish tissue analysis in Lake N11 were captured by angling. Nine of the 11 sampled Northern pike were captured by angling in lakes N1 and N11.

Based on the results of the 2011 program, the fish-bearing status of the lakes surveyed is provided in Table 4-5. The majority of these lakes were designated as fish-bearing, meaning fish were captured or there was a connection to another fish-bearing lake or stream. Lakes were designated as non-fish-bearing if fish were not captured, the maximum depths were too shallow for overwintering fish (i.e., less than 3 m), and there was no connection to fish-bearing lakes or streams during high flows (i.e., spring); these criteria match those used in Annex J of the 2010 EIS (De Beers 2010).

Table 4-4 Number of Fish Captured by Sample Method in Lakes Surveyed, 2011

Lake	Gill Nets						Shoreline Electrofishing					Minnow Traps						Angling		Total
	ARGR	LKTR	LKCH	LNSC	NRPK	RNWH	BURB	LKCH	LNSC	NNST	SLSC	BURB	LKCH	LNSC	NNST	NRPK	SLSC	LKTR	NRPK	
D5	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	-	-	**0**
N1	0	0	0	0	0	0	-	-	-	-	-	0	0	0	0	0	0	0	4	**4**
N2	1	2	0	1	0	22	-	-	-	-	-	0	5	1	0	0	0	-	-	**32**
N3	1	2	0	6	0	9	-	-	-	-	-	0	4	0	1	0	0	1	0	**24**
N5	0	2	0	0	0	1	-	-	-	-	-	1	16	12	3	0	0	-	-	**35**
N6a	0	1	0	0	0	0	-	-	-	-	-	0	6	0	0	0	0	-	-	**7**
N6	22	5	2	3	0	0	-	-	-	-	-	0	26	0	0	0	0	-	-	**58**
N9	0	1	0	0	0	1	-	-	-	-	-	0	0	0	0	0	0	-	-	**2**
N11	0	4	0	0	0	0	-	-	-	-	-	7	143	20	2	2	2	38	5	**223**
N12	0	7	0	0	0	0	1	26	1	1	5	1	19	4	0	0	2	-	-	**67**
N14a	2	0	0	2	0	0	0	6	0	10	1	0	21	0	0	0	0	-	-	**42**
N14b	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	-	-	**0**
N14	1	0	0	0	0	0	-	-	-	-	-	0	3	1	0	0	0	-	-	**5**
N16	0	9	0	4	0	0	-	-	-	-	-	2	0	4	0	0	0	2	0	**21**
N17	0	21	0	0	0	1	-	-	-	-	-	0	0	0	0	0	0	-	-	**22**
East Lake	0	4	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	0	0	**8**

Note: ARGR = Arctic Grayling; BURB = Burbot; LKCH = Lake Chub; LKTR = Lake Trout; LNSC = Longnose Sucker; NNST = Ninespine Stickleback; NRPK = Northern Pike; RNWH = Round Whitefish; SLSC = Slimy Sculpin; - = not sampled.

Table 4-5 Fish-Bearing Status of Small Lakes Surveyed, 2011

Sub-watershed	Fish Species Known to Use Sub-watershed	Lake	Maximum Depth (m) [a]	Fish Species Captured in Lake (2011)	Lake Designation	Rationale
D	ARGR, BURB, LKTR, NRPK	D5	0.5	no fish caught	non-fish-bearing	no fish caught in 2011; very shallow lake; lake not connected to other streams/lakes
N	ARGR, BURB, LKCH, LKTR, LNSC, NNST, RNWH, SLSC	N1	10.2	NNST	fish-bearing	fish caught in lake
		N2	2.9	ARGR, LKCH LKTR, LNSC, RNWH	fish-bearing	fish caught in lake
		N3	3.2	ARGR, LKCH, LKTR, LNSC, NNST, RNWH	fish-bearing	fish caught in lake
		N5	12.5	BURB, LKCH LKTR, LNSC, NNST, RNWH	fish-bearing	fish caught in lake
		N6	4.5	ARGR, LKCH, LKTR, LNSC	fish-bearing	fish caught in lake
		N6a	4.3	LKCH, LKTR	fish-bearing	fish caught in lake
		N9	8.4	LKTR, RNWH	fish-bearing	fish caught in lake
		N11	6.6	BURB, LKCH, LKTR, LNSC, NNST, NRPK, SLSC	fish-bearing	fish caught in lake
		N12	8.1	BURB, LKCH, LKTR, LNSC, NNST, SLSC	fish-bearing	fish caught in lake
		N14a	3.1	ARGR, LKCH, LNSC, NNST, SLSC	fish-bearing	fish caught in lake
		N14b	0.7	no fish caught	non-fish-bearing	no fish caught in 2011; very shallow lake; no inlet/outlet
		N14	3.5	ARGR, LKCH, LNSC	fish-bearing	fish caught in lake
		N16	5.2	BURB, LKTR, LNSC, NNST	fish-bearing	fish caught in lake
		N17	3.5	LKTR, RNWH	fish-bearing	fish caught in lake
Fletcher Lake	Unknown	East Lake	9.5	BURB, LKTR, NRPK, SLSC	fish-bearing	fish caught in lake

Note: ARGR = Arctic Grayling, BURB = Burbot, LKCH = Lake Chub, LKTR = Lake Trout, LNSC = Longnose Sucker; NNST = Ninespine Stickleback; NRPK = Northern Pike; RNWH = Round Whitefish; SLSC = Slimy Sculpin.

([a]) Max depth measured in 2011.

4.3.2 Streams

A summary of total catch and electrofishing CPUE is provided in Table 4-6. Detailed catch results and CPUE data are provided in Appendix IV.

Table 4-6 Catch and Catch-per-Unit-Effort for Backpack Electrofishing Surveys and Catch for Minnow Trapping Surveys

Stream	Backpack Electrofishing					Minnow Trapping					
	Number of Fish Captured by Species				Total CPUE (fish/100 s)	Number of Fish Captured by Species					Total Fish
	BURB	LKCH	LNSC	SLSC		BURB	LNSC	LKCH	NNST	SLSC	
N5	1	14	1	2	5.7	-	-	-	-	-	-
N6a	0	5	0	3	2.8	0	0	50	0	-	50
N6b	0	0	0	0	0	2	1	9	0	-	12
N15	0	22	0	10	5.7	-	-	-	-	-	-
N17	0	16	0	7	4.4	1	0	26	5	1	33

Note: - = no fish caught; CPUE = catch-per-unit-effort; fish/100 s - fish caught per 100 seconds of active electrofishing; BURB = Burbot, LKCH = Lake Chub, LNSC = Longnose Sucker, NNST = Ninespine Stickleback, SLSC = Slimy Sculpin.

Fish were captured in all of the five streams sampled. Five fish species were captured, including two sport-fish species (Burbot, and Longnose Sucker), and three forage fish species (Lake Chub, Ninespine Stickleback, and Slimy Sculpin). The highest density of fish occurred in Streams N5 and N15, with a backpack electrofishing CPUE of 5.7 fish/100 s. The targeted Northern Pike sampling in streams in the N watershed did not capture any Northern Pike. The lowest density of fish was in Stream N6a, with a backpack electrofishing CPUE of 3.4 fish/100 s. Fish were not captured by backpack electrofishing or minnow trapping in Stream N6b.

5.0 SUMMARY AND CONCLUSIONS

5.1 Aquatic Habitat

In 2011, five lakes were assessed for aquatic habitat. The lakes ranged in size from the smallest, Lake D5 at 1.8 ha, to the largest, East Lake at 578 ha. The shorelines of these lakes were typically shallow, low gradient, and dominated by fines and boulder substrates. Aquatic vegetation was restricted to shorelines and inlet/outlets of the lakes. Cover for fish was minimal; however, limited cover was provided by substrate, instream vegetation, overhanging vegetation, and occasionally depth. Of the five lakes for which habitat assessments were conducted in 2011, East Lake, Lake N11, and Lake N14a may provide potential overwintering habitat, with maximum observed depths of 9.5 m, 6.5 m, and 3.1 m, respectively. The remaining lakes, D5 and N14b, were shallow (0.5 m and 0.7 m, respectively) and likely freeze to the bottom with no overwintering habitat potential.

5.2 Limnology

Limnology data were collected for 16 lakes in 2011. East Lake, and Lakes N1, N5, N9, N11, N12, N16, and N17 were larger and deeper than the other lakes surveyed. These larger lakes generally were well mixed at the time of sampling. With the exception of Lake N1, no thermal stratification was observed and no decreasing dissolved oxygen trends were observed in these larger lakes. The remaining eight lakes were smaller, with most of the lakes having maximum depths less than 5 m. Similar to data from the larger lakes, these small lakes generally did not exhibit any temperature or dissolved oxygen trends with depth. Additionally, these smaller lakes were typically very clear with the Secchi depth equivalent to the water depth, with Lakes N14a and N14b being an exception.

5.3 Fisheries Investigations

5.3.1 Lakes

In 2011, fish were captured in 14 of 16 lakes sampled. Fish species captured included five sport fish (Arctic Grayling, Burbot, Lake Trout, Northern Pike, and Round Whitefish), one non-sport fish (Longnose Sucker), and three forage fish species (Lake Chub, Ninespine Stickleback, and Slimy Sculpin).

Based on the capture results, the majority of lakes sampled in 2011 were designated as fish-bearing. Two of the lakes, Lake D5 and Lake N14b, had no fish captured; both of these lakes are shallow and have limited or no connectivity to adjacent lakes, and therefore were considered non-fish-bearing.

Eleven Northern Pike were captured in total, four in Lake N1 and seven in Lake N11. This is the first time that Northern Pike have been captured in the N Watershed, indicating that Northern Pike are present in the N Watershed, but likely at low abundance due to limited spawning and rearing habitat, and poor connectivity between waterbodies.

5.3.2 Streams

In 2011, five streams were sampled. In total, 12 fish were captured in three of the five streams. Fish captured included one sport fish species (Burbot) and three forage fish species (Lake Chub, Ninespine Stickleback, and Slimy Sculpin).

6.0 CLOSURE

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7.0 REFERENCES

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8.0 ABBREVIATIONS

ARGR	Arctic grayling
BC	British Columbia
BURB	burbot
CPUE	catch-per-unit-effort
De Beers	De Beers Canada Inc.
EIS	Environmental Impact Statement
GIS	geographic information system
LKCH	lake chub
LKTR	lake trout
LNSC	longnose sucker
LSA	local study area
NNST	ninespine stickleback
NRPK	northern pike
pH	a measure of the acidity or alkalinity of water
Project	Gahcho Kué Project
QA/QC	quality assurance / quality control
RNWH	round whitefish
RSA	regional study area
SLSC	slimy sculpin
YSI	Yellow Springs Instruments

8.1 Units of Measure

%	percent
<	less than
>	greater than
°C	degrees Celsius
µS/cm	microSiemens per centimetre
h	hour
ha	hectare
km^2	square kilometre
m	metre
mg/L	milligram per litre
mm	millimetre
s	seconds

9.0 GLOSSARY

Bathymetry	Measurement of water depths in a lake.
Bathymetric survey	A survey carried out to map the topography and features of the bed of an ocean, lake, river or other body of water.
Conductivity	A measure of the capacity of water to conduct an electrical current. It is the reciprocal of resistance. This measurement provides an estimate of the total concentration of dissolved ions in the water.
Dissolved Oxygen	Oxygen dissolved within the water column.
Electrofishing	A live fish capture technique in which negative (anode) and positive (cathode) electrodes are placed in the water and an electrical current is passed between the electrodes. Fish are attracted to the anode and become stunned by the current, allowing fish to be collected, measured and then released.
Formalin	An aqueous solution of formaldehyde that is 37 percent by weight.
Gill netting	A fishing net set vertically in the water so that fish swimming into it are entangled by the gills in its mesh.
Gradient	The slope of a stream channel or lake shoreline.
Hydrology	The study of flowing water and effects of flowing water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
Limnology	The study of inland waters, including the biological, chemical, physical, geological, and other attributes of inland waters, such as, lakes and ponds, rivers, springs, streams and wetlands.
Littoral	The shallow, shoreline area of a lake.
Lower trophic	Organisms in an ecosystem that form the bottom of the food chain (benthic invertebrates, zooplankton, and phytoplankton) upon which fish depend as food.
pH	A measure of the acidity or alkalinity of water.
Phytoplankton	Small, usually microscopic, plants that live in the water column of lakes and make their food through primary production.
Plankton	Small, often microscopic, plants (phytoplankton) and animals (zooplankton) that live in the open water column of lakes. They are an important food source for many larger animals.
Secchi Depth	A measure of water clarity, measured by lowering a 20 cm diameter disk (Secchi disk) with alternating black and white coloured quadrants. The shallowest depth at which the disk is no longer visible is the Secchi depth.
Substrate	The bottom of a waterbody, usually consisting of sediments of various particle sizes (e.g., sand, silt, clay, gravel, cobble, boulder) and organic material (e.g., living or dead plant material).
Thermal stratification	Horizontal layers of differing densities produced in a lake by temperature changes at different depths.
Thermocline	The depth in a lake where temperatures most sharply decline causing a separation of higher density water below the thermocline (hypolimnion) and lower density water above the thermocline (epilimnion).

Watershed	The upstream land area drained by a river network.
Yellow Springs Instrument (YSI)	A meter that measures temperature, conductivity and dissolved oxygen in water.
Zooplankton	Small, sometimes microscopic, animals that live in the water column of lakes and mainly eat primary producers (phytoplankton).

APPENDIX I

2011 SITE PHOTOS

LAKE D5

Lake D5 is a 1.4 ha lake, located north of Lake D3, within the D Watershed (Appendix II, Figure II-1). At the time of the survey (August 8, 2011), the maximum measured depth was 0.5 m. Bathymetric contours, however, suggest a maximum depth of 0.75 m (Addendum HH of the 2010 EIS [De Beers 2010[1]]). This lake was very shallow, with depths typically less than 0.5 m and a low gradient slope (Photo I-1). The shoreline habitat was characterized by vegetation/boulder substrate, with some vegetation/organics along the north east shoreline (Photo I-2). The area in the centre of the lake consisted primarily of fine/organic substrate. At the time of the survey, no connectivity was observed between this lake and Lake D3, as the connecting watercourse was not defined.

Photo I-1 Aerial view facing north of Lake D5 (August 8, 2011).

[1] De Beers (De Beers Canada Inc.). 2010. Environmental Impact Statement for the Gahcho Kué Project. Volumes 1, 2, 3a, 3b, 4, 5, 6a, 6b, 7 and Annexes A through N. Submitted to Mackenzie Valley Environmental Impact Review Board. December 2010.

Photo I-2 View of the shoreline habitat along the north side of Lake D5 (August 8, 2011).

LAKE N11

Lake N11 is a 538 ha lake located east of Lake N16 within the N Watershed, which drains northeast to Lake N1 (Appendix II, Figures 11-2a and 11-2b) (Photo I-3). At the time of the survey (July 10, 2011), the maximum observed depth was 6.6 m; however, the bathymetric mapping results (July 2010) suggest a maximum depth of 10.0 m (Addendum HH of the 2010 EIS [De Beers 2010]). The east shoreline was primarily boulder/cobble, boulder/fines, and boulder substrate with some sections of bedrock. The west shoreline was primarily boulder/cobble, boulder/fines with small sections of bedrock substrate. The south shoreline and outlet was characterized by boulder/fines substrates (Photo I-4). The deeper, middle section was characterized by fine/organic substrates and depths greater than 4 m. The shorelines were typically low gradient. At the time of the survey, good connectivity to other lakes was observed. Streams N12, N15, and N18 as well as other unnamed streams flowed into Lake N11. The outlet stream N11 also had good connectivity downstream to Lake N1.

Photo I-3 Aerial view facing south of Lake N11 (July 10, 2011).

Photo I-4 **Aerial view of the boulder/cobble shoreline habitat and outlet area located on the southern shore of Lake N11 (July 10, 2011).**

LAKE N14A

Lake N14a is a 3.3 ha lake located north of Lake N14, within the N Watershed. The outlet of N14a flows south into Lake N14 (Appendix II, Figure II-3) (Photo I-5). At the time of the survey (August 8, 2011), the maximum observed depth was 3.1 m; which is consistent with the bathymetric mapping (July 2010) (Addendum HH of the 2010 EIS [De Beers 2010]). The east shoreline was primarily vegetation/boulder substrate, with a small section of boulder/cobble substrate and boulder/fine substrates farther away from the shore. The west shoreline was composed of several substrate categories, including boulder/fine, fine/organic, boulder/cobble, cobble/gravel, and bedrock. The south shoreline and outlet was characterized by bedrock and boulder substrates (Photo I-6). The deeper, middle section was characterized by fine/organic substrates and moderately deep depths (>2 to 4 m class). The shorelines were typically low gradient and shallow (less than 2 m), with the exception of the bedrock sections, where gradient dropped off steeply and depth was moderate. At the time of the survey, there was no connectivity to Lake N14, with dry sections of channel in the connecting watercourse (Stream N14a).

Photo I-5 Aerial view facing west of Lake N14a (August 8, 2011).

Photo I-6 **View of outlet stream N14a looking north towards Lake N14a (August 8, 2011).**

LAKE N14B

Lake N14b is a 1.8 ha lake, located east of Lake N14, within the N Watershed. The oulet of N14b flows west into Lake N14 (Appendix II, Figure II-4). At the time of the survey (August 8, 2011), the maximum observed depth was 0.7 m. Bathymetric contours, however, suggest a maximum depth of 0.8 m. This lake was very shallow, with depths typically less than 0.5 m and a low gradient slope (Photo I-7). The shoreline habitat was characterized by boulder substrate with cobble or fines, and a few sections of cobble/gravel substrate (Photo I-8). The area in the centre of the lake consisted primarily of fine/organic substrate. At the time of the survey, there was no connectivity between this lake and Lake N14, as the connecting watercourse (Stream N14b) was dry.

Photo I-7 Aerial view facing north at Lake N14b (August 8, 2011). Lake is in centre of photo.

Photo I-8 View facing south of the east shoreline of Lake N14b (August 8, 2011).

EAST LAKE

East Lake is a large unnamed lake (578 ha), located east of the M Watershed. East Lake flows north into Fletcher Lake (Appendix II, Figure II-5) (Photo I-9). At the time of the survey (July 6, 2011), the maximum observed depth was 9.5 m. The shoreline of this basin was mainly composed of boulder, boulder/cobble, and boulder/fines substrate (Photo I-10) with some sections of bedrock. The habitat along the shoreline was moderately deep (>2 to 4 m class) with a low gradient slope. A pelagic area was present in the middle of the basin, with depths greater than 4 m, low gradient slope, and fine/organic substrate (Photo I-11). At the time of the survey, there was good connectivity between this basin and Fletcher Lake.

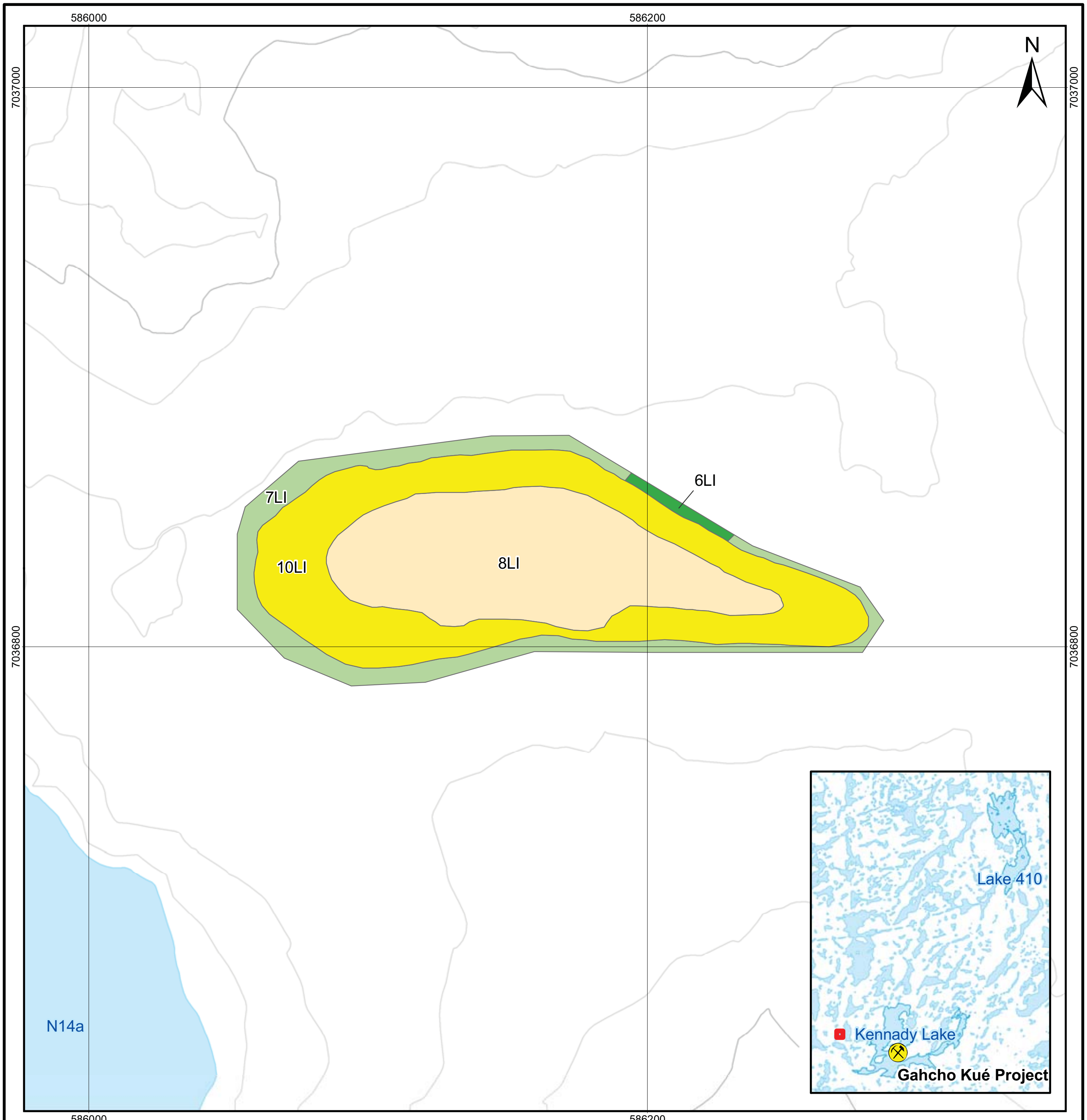
Photo I-9 Aerial view facing north of East Lake (July 6, 2011).

Photo I-10 A view of the west shoreline and boulder substrate at East Lake (July 6, 2011).

Photo I-11 Aerial view facing south towards East Lake (July 6, 2011).

APPENDIX II

2011 LAKE HABITAT MAPS



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LEGEND

Gahcho Kué Project
Index Contour (5 m interval)
Intermediate Contour (1 m interval)
Watercourse
Waterbody

Aquatic Habitat Label

8LI
Depth Category
Gradient Category
Substrate Category

Substrate Category

6	Vegetation/Organics
7	Vegetation/Boulder
8	Fines/Organics
10	Boulder/Fines

Gradient Category

H	High
L	Low
-	Unknown

Depth Category

I	0 - 2 m
II	> 2 - 4 m
III	> 4 m

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake D5

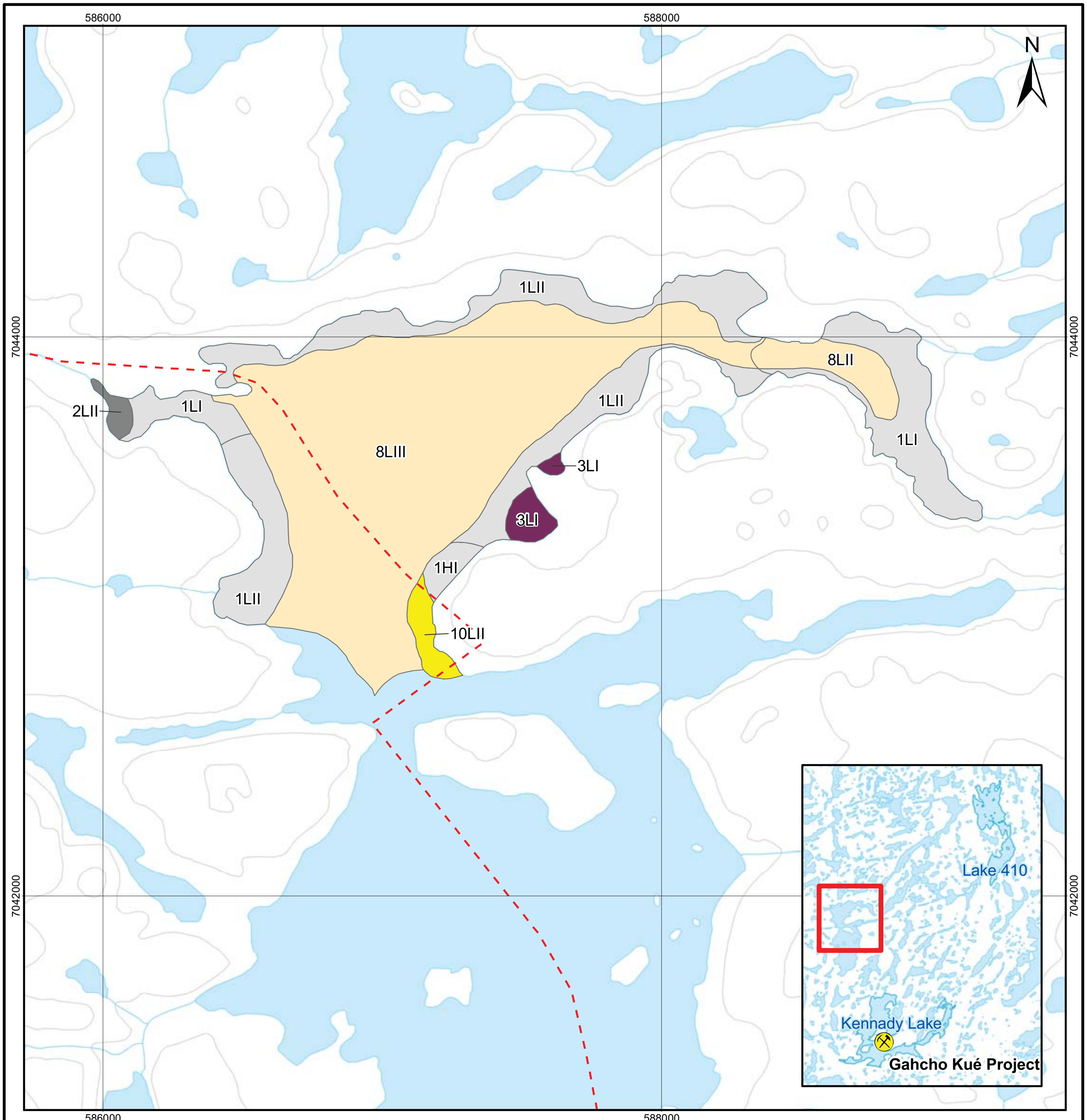
PROJECTION: UTM Zone 12
DATUM: NAD83

Scale: 1:2,000
20 10 0 20
Metres

DE BEERS CANADA

FILE No: B2011-Fish-009-GIS
DATE: January 27, 2012
JOB NO: 11-1365-0001
REVISION NO: 1
OFFICE: GOLD-CAL
DRAWN: DC
CHECK: JF

Figure II-1



LEGEND

- Gahcho Kué Project
- Contour (10 m interval)
- Watercourse
- Winter Access Road
- Waterbody

Substrate Category

- 1 Boulder/Cobble
- 2 Boulder
- 3 Bedrock
- 8 Fines/Organics
- 10 Boulder/Fines

Depth Category

- I 0 - 2 m
- II > 2 - 4 m
- III > 4 m

Aquatic Habitat Label

8LI
- Depth Category
- Gradient Category
- Substrate Category

Gradient Category

- H High
- L Low
- \- Unknown

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake N11 (North Basin)

PROJECTION: UTM Zone 12	DATUM: NAD83

Scale: 1:20,000
200 100 0 200
Metres

DE BEERS CANADA

FILE No: B2011-Fish-013-GIS		DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1	
OFFICE: GOLD-CAL	DRAWN: DC	CHECK: JF

Figure II-2a

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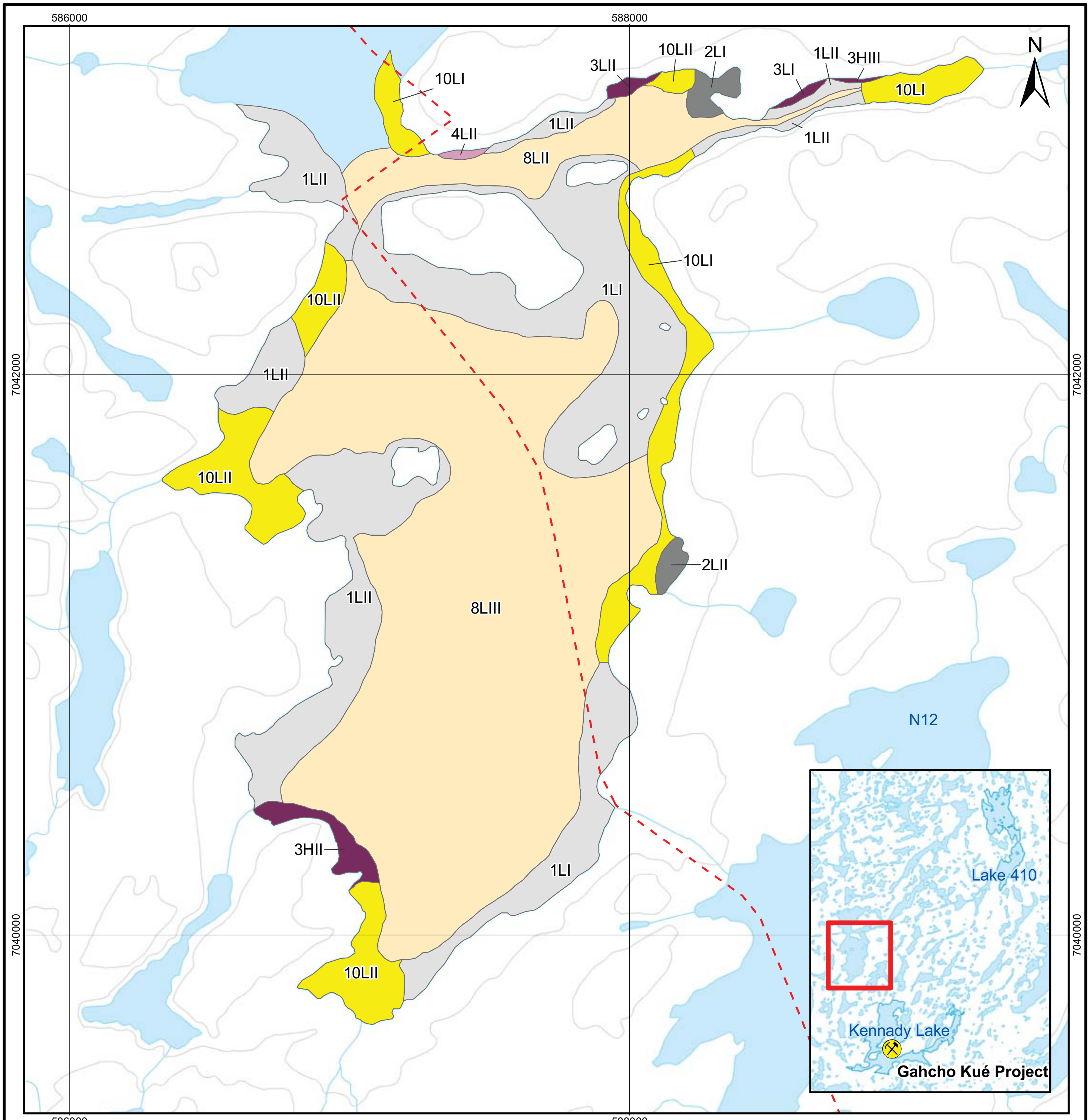

LEGEND

Gahcho Kué Project
Contour (10 m interval)
Watercourse
Winter Access Road
Waterbody

Aquatic Habitat Label

8LI
Depth Category
Gradient Category
Substrate Category

Substrate Category

1 Boulder/Cobble
2 Boulder
3 Bedrock
4 Bedrock/Boulder
8 Fines/Organics
10 Boulder/Fines

Gradient Category

H High
L Low
\- Unknown

Depth Category

I 0 - 2 m
II > 2 - 4 m
III > 4 m

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake N11 (South Basin)

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:20,000 (200 100 0 200 Metres)	DE BEERS CANADA
FILE No: B2011-Fish-012-GIS	DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1
OFFICE: GOLD-CAL	DRAWN: DC
CHECK: JF	**Figure II-2b**

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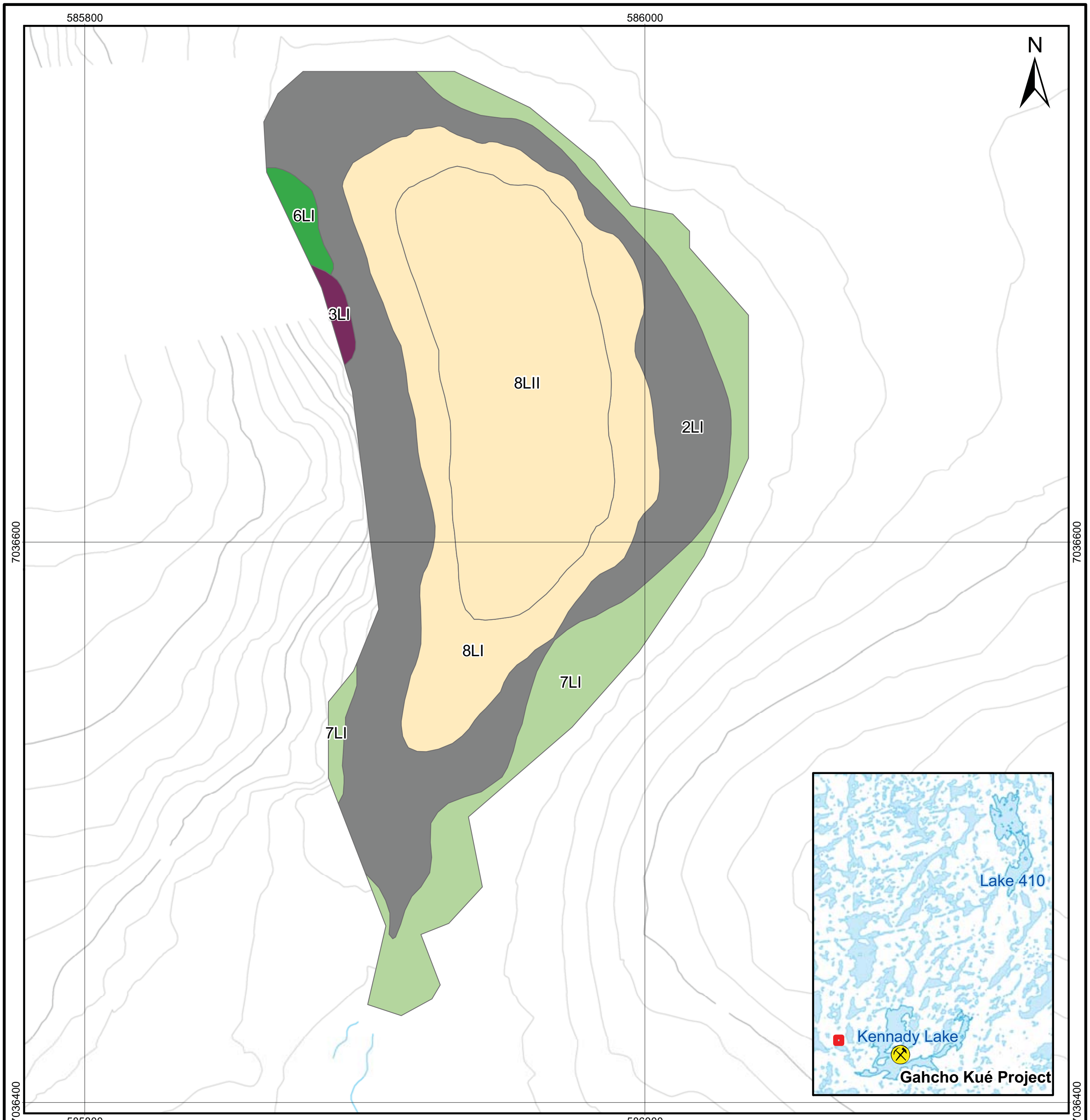

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LEGEND

- Gahcho Kué Project
- Index Contour (5 m interval)
- Intermediate Contour (1 m interval)
- Watercourse
- Waterbody

Aquatic Habitat Label

8LI
- Depth Category
- Gradient Category
- Substrate Category

Substrate Category

- 2 Boulder
- 3 Bedrock
- 6 Vegetation/Organics
- 7 Vegetation/Boulder
- 8 Fines/Organics

Gradient Category

- H High
- L Low
- \- Unknown

Depth Category

- I 0 - 2 m
- II > 2 - 4 m
- III > 4 m

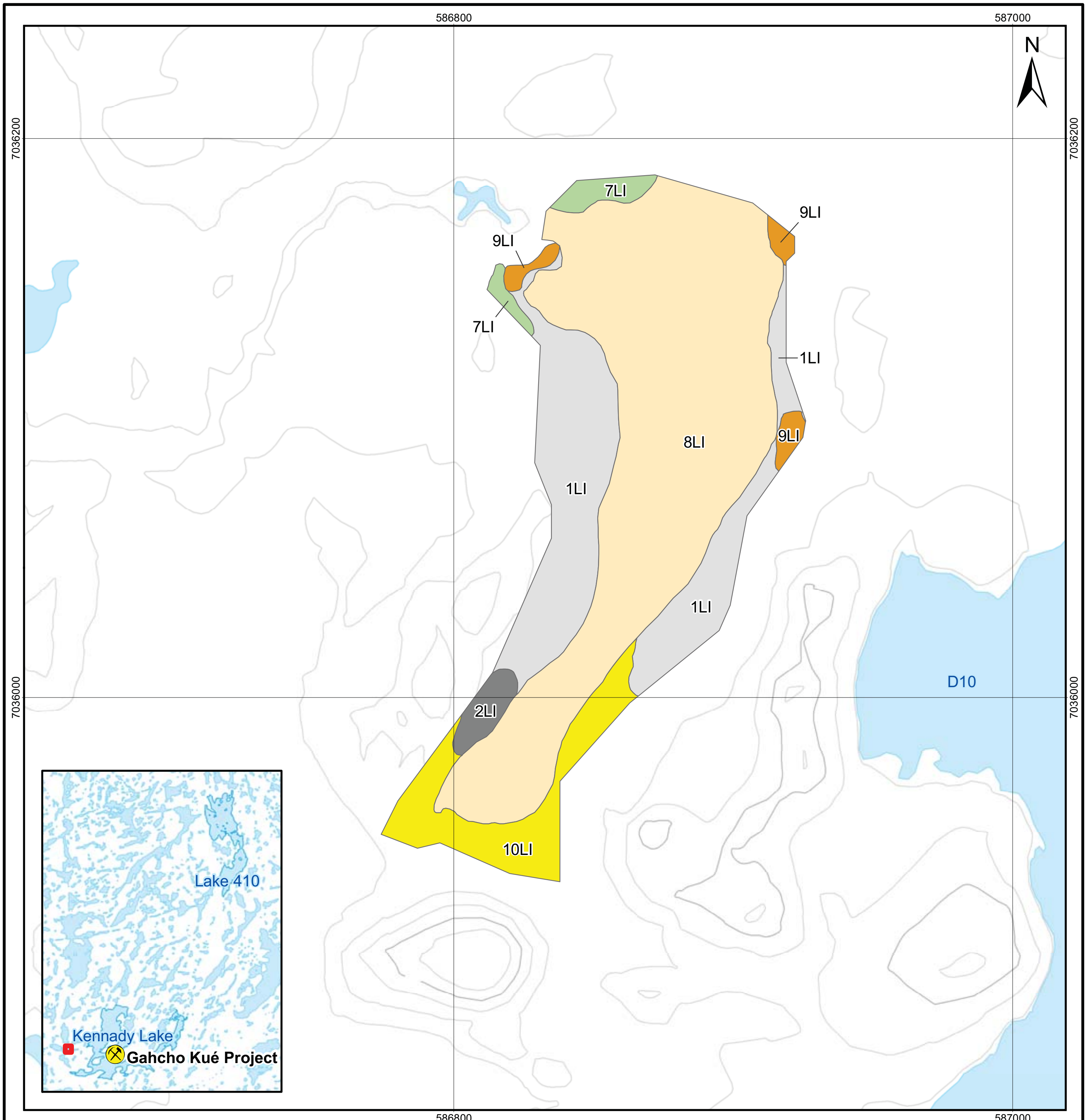
NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake N14a

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:2,000 (20 10 0 20 Metres)	DE BEERS CANADA
FILE No: B2011-FISH-008-GIS	DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1
OFFICE: GOLD-CAL	DRAWN: DC; CHECK: JF

Figure II-3



LEGEND

Gahcho Kué Project
Index Contour (5 m interval)
Intermediate Contour (1 m interval)
Watercourse
Waterbody

Aquatic Habitat Label

8LI
Depth Category
Gradient Category
Substrate Category

Substrate Category

1 Boulder/Cobble
2 Boulder
7 Vegetation/Boulder
8 Fines/Organics
9 Cobble/Gravel
10 Boulder/Fines

Gradient Category

H High
L Low
- Unknown

Depth Category

I 0 - 2 m
II > 2 - 4 m
III > 4 m

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake N14b

PROJECTION: UTM Zone 12
DATUM: NAD83

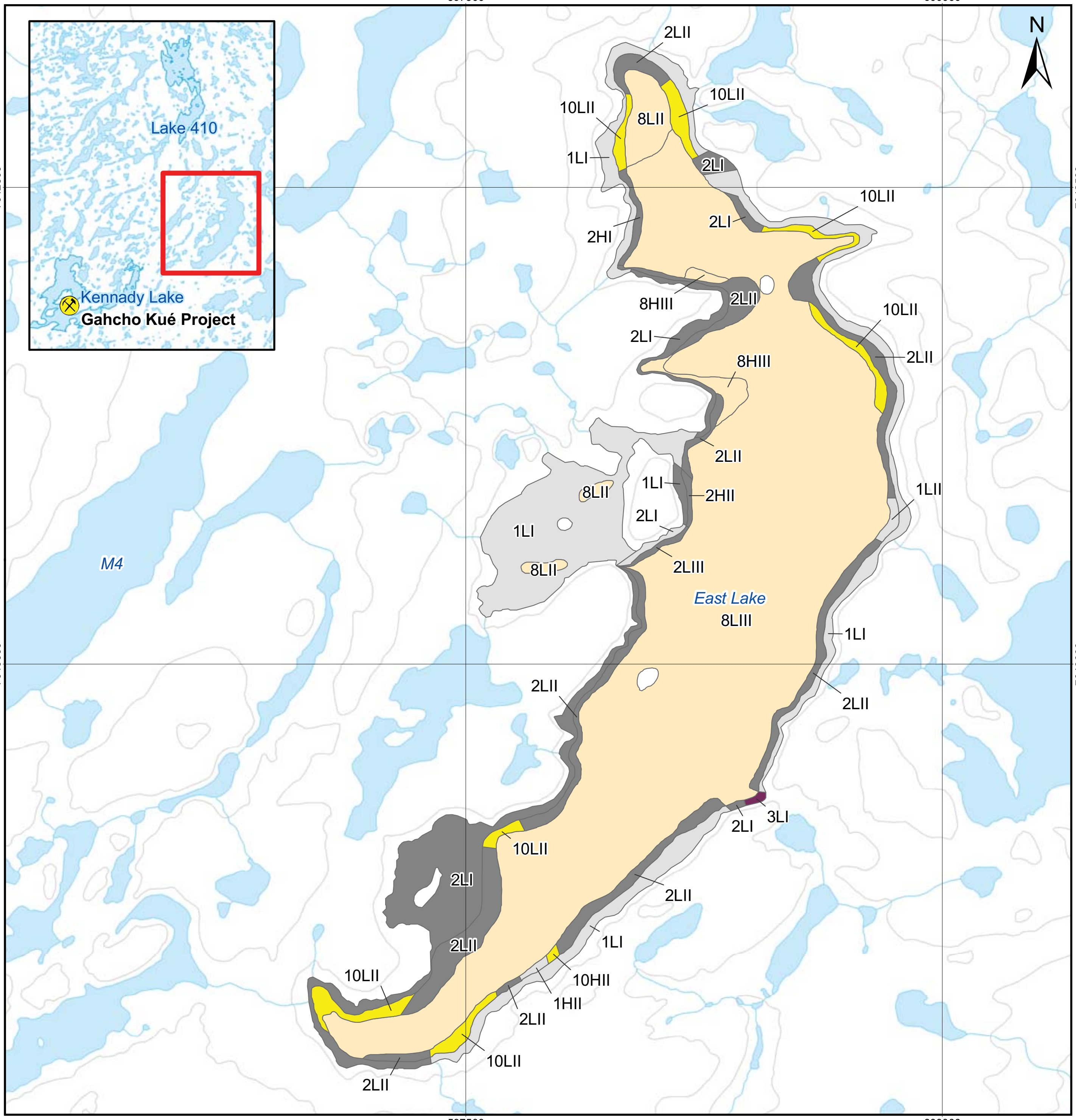
Scale: 1:2,000
20 10 0 20
Metres

DE BEERS CANADA

FILE No: B2011-Fish-010-GIS
DATE: January 27, 2012
JOB NO: 11-1365-0001
REVISION NO: 1
OFFICE: GOLD-CAL
DRAWN: DC
CHECK: JF

Figure II-4

I:\CLIENTS\DE_BEERS\11-1365-0001\Mapping\MXD\Fish\B2011-Fish-010-GIS.mxd



LEGEND

Gahcho Kué Project
Contour (10 m interval)
Watercourse
Waterbody

Aquatic Habitat Label

8LI
Depth Category
Gradient Category
Substrate Category

Substrate Category

1 Boulder/Cobble
2 Boulder
3 Bedrock
8 Fines/Organics
10 Boulder/Fines

Gradient Category

H High
L Low
\- Unknown

Depth Category

I 0 - 2 m
II > 2 - 4 m
III > 4 m

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000

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GAHCHO KUÉ PROJECT

Aquatic Habitat in East Lake

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS CANADA
Scale: 1:30,000 (500 250 0 500 Metres)		
FILE No: B2011-Fish-011-GIS		DATE: January 27, 2012
JOB NO: 11-1365-0001	REVISION NO: 1	
OFFICE: GOLD-CAL	DRAWN: DC	CHECK: JF

Figure II-5

APPENDIX III

2011 LIMNOLOGY PROFILE DATA

Table III-1 Water Quality Profile Data for 2011 Limnology Sampling

Lake ID	UTM NAD/Zone	Easting	Northing	Date	Max Depth (m)	Secchi Depth (m)	Profile	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	pH
D5	83 12V	586119	7036804	8-Aug-11	0.5	>0.5	0.3	20.3	8.6	26	6.4
N1	83 12V	590051	7044039	10-Jul-11	10.2	6.8	0.3	17.8	8.9	15	7.2
							1.0	17.3	8.8	15	7.1
							2.0	17.2	8.8	15	6.9
							3.0	16.9	8.8	15	6.9
							4.0	14.6	9.2	15	6.9
							5.0	13.8	9.5	15	7.1
							6.0	13.5	9.4	15	6.9
							7.0	13.3	9.4	15	6.9
							8.0	13.1	9.2	15	6.9
							9.0	13.0	9.2	15	6.7
							10.0	12.5	5.5	15	6.6
N2	83 12V	591538	7044256	14-Jul-11	2.9	>2.9	0.3	18.6	8.3	15	7.3
							1.0	18.6	8.2	16	7.1
							2.0	18.6	8.2	15	7.1
							2.5	18.6	8.2	15	7.0
N3	83 12V	591051	7043568	18-Jul-11	3.2	>3.2	0.3	16.5	8.8	16	7.3
							1.0	16.5	8.8	16	-
							2.0	16.5	8.7	16	-
							3.0	16.5	8.6	16	-
N5	83 12V	590675	7041562	13-Jul-11	12.5	5.5	0.3	18.4	8.4	13	7.8
							1.0	18.4	8.4	11	-
							2.0	18.3	8.2	11	-
							3.0	17.4	8.2	11	-
							4.0	14.9	9.2	11	-
							5.0	13.9	9.3	10	-
							6.0	13.3	9.1	10	-
							7.0	13.1	9.0	10	-
							8.0	12.9	9.5	10	-

Table III-1 Summary of Deepest Water Quality Profile for 2011 Limnology (continued)

Lake ID	UTM NAD/Zone	Easting	Northing	Date	Max Depth (m)	Secchi Depth (m)	Profile	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	pH
N5 (cont'd)	83 12V	590675	7041562	13-Jul-11	12.5	5.5	9.0	12.6	9.3	10	-
							10.0	12.1	8.9	10	-
							11.0	11.4	8.4	10	-
							12.0	11.3	8.2	10	-
N6	83 12V	592144	7041710	13-Jul-11	4.5	>4.5	0.3	18.9	8.5	14	7.5
							1.0	18.7	8.3	14	7.6
							2.0	18.6	8.4	14	7.8
							3.0	17.6	8.5	14	8.0
							4.0	17.0	8.4	14	8.0
N6a	83 12V	590162	7039826	14-Jul-11	4.3	>4.3	0.3	18.9	8.0	9	6.5
							1.0	18.9	8.0	9	-
							2.0	18.9	8.0	9	-
							3.0	18.9	8.0	9	-
							4.0	18.9	8.1	9	-
N9	83 12V	591518	7039923	8-Jul-11	8.4	-	0.3	14.6	9.2	15	7.5
							1.0	14.6	9.1	14	7.0
							2.0	14.5	9.1	14	6.9
							3.0	14.5	9.1	13	6.9
							4.0	14.5	9.1	13	6.5
							5.0	14.3	9.1	14	6.5
							6.0	14.0	9.1	13	6.3
							7.0	13.5	9.1	13	6.0
							8.0	13.4	9.0	12	6.0
N11	83 12V	587507	7041817	-	6.6	5.7	0.3	16.5	7.1	11	5.6
							1.0	16.5	7.1	12	5.6
							2.0	16.5	7.0	12	5.5
							3.0	16.5	7.1	12	5.4
							4.0	16.4	7.1	11	5.3
							5.0	15.0	7.3	11	5.4
							6.0	14.8	7.2	11	5.4

Table III-1 Summary of Deepest Water Quality Profile for 2011 Limnology (continued)

Lake ID	UTM NAD/Zone	Easting	Northing	Date	Max Depth (m)	Secchi Depth (m)	Profile	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	pH
N12	83 12V	588835	7040272	8-Jul-11	8.1	-	0.3	16.7	9.2	9	7.8
							1.0	16.6	9.2	8	-
							2.0	16.6	9.1	8	-
							3.0	16.3	9.1	9	-
							4.0	16.2	9.1	8	-
							5.0	15.0	9.2	8	-
							6.0	14.8	9.1	8	-
							7.0	14.8	8.9	8	-
N14a	83 12V	585948	7036579	8-Aug-11	3.1	2.5	0.3	18.9	9.1	9	7.0
							1.0	18.7	9.1	9	6.7
							2.0	15.9	9.1	9	6.4
							2.8	15.1	8.1	9	6.1
N14b	83 12V	586800	7035972	9-Aug-11	0.7	0.2	0.3	17.0	9.6	23	7.0
N14	83 12V	586111	7036029	6-Jul-11	3.5	-	0.3	15.6	9.6	10	7.4
							1.0	15.6	9.4	10	7.3
							2.0	15.6	9.3	10	7.0
							3.0	15.6	9.2	10	7.0
N16	83 12V	584154	7041523	16-Jul-11	5.2	>5.2	0.3	14.6	9.4	16	7.0
							1.0	14.6	9.3	16	6.4
							2.0	14.6	9.3	16	7.0
							3.0	14.6	9.3	15	6.6
							4.0	14.6	9.2	15	6.5
							5.0	14.6	9.3	15	6.5
N17	83 12V	584532	7037038	7-Jul-11	3.5	-	0.3	16.1	9.3	20	7.4
							1.0	15.6	9.2	19	7.4
							2.0	14.8	9.5	14	7.0
							3.0	14.6	9.4	18	6.7

Table III-1 Summary of Deepest Water Quality Profile for 2011 Limnology (continued)

Lake ID	UTM NAD/Zone	Easting	Northing	Date	Max Depth (m)	Secchi Depth (m)	Profile	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	pH
East Lake	83 12V	598594	7039692	6-Jul-11	9.5	4.5	0.3	14.2	10.4	10	8.6
							1.0	12.1	10.7	10	8.7
							2.0	11.9	10.5	10	8.7
							3.0	11.5	10.9	10	8.7
							4.0	11.5	10.8	10	8.7
							5.0	11.4	10.9	10	8.7
							6.0	11.3	10.9	9	8.7
							7.0	11.2	10.9	10	8.7
							8.0	11.1	10.9	10	8.7
							9.0	11.0	10.9	10	8.7

Notes: - = Data not collected

APPENDIX IV

2011 FISH CAPTURE AND EFFORT DATA

Table IV-1 Summary of Effort, Catch, and Catch-Per-Unit-Effort for Minnow Trapping, 2011

Site I.D.	Number of Traps	Set Date	Set Time (hh:mm)	End Date	End Time (hh:mm)	Total Sample Time	Total Effort (Trap-Hours)	Total Effort (Trap-Days)	Easting	Northing	Fish Caught	Number of Fish Captured by Species						Total Fish Caught	Total CPUE (fish/ trap day)
												BURB	LKCH	LNSC	NNST	NRPK	SLSC		
D5 Lake	2	8-Aug-11	9:40	8-Aug-11	16:30	7:10	14.20	0.59	586119	7036794	No	0	0	0	0	0	0	0	0.00
N1 Lake	3	10-Jul-11	9:02	11-Jul-11	8:28	22:26	66.78	2.78	594720	7045385	No	0	0	0	0	0	0	0	0.00
	5	10-Jul-11	9:05	11-Jul-11	8:25	22:02	110.10	4.59	594762	7045367	No	0	0	0	0	0	0	0	0.00
	2	10-Jul-11	9:04	11-Jul-11	8:26	22:22	44.44	1.85	594747	7045379	No	0	0	0	0	0	0	0	0.00
N2 Lake	5	14-Jul-11	11:30	15-Jul-11	8:40	15:01	75.05	3.13	592011	7044379	Yes	0	5	1	0	0	0	6	1.92
N3 Lake	5	18-Jul-11	10:00	18-Jul-11	14:39	4:39	21.95	0.91	591221	7043627	Yes	0	1	0	1	0	0	2	2.19
	5	18-Jul-11	10:02	18-Jul-11	14:40	4:38	21.90	0.91	591238	7043660	No	0	0	0	0	0	0	0	0.00
	5	14-Jul-11	10:58	15-Jul-11	8:40	20:42	102.10	4.25	591480	7044112	Yes	0	3	0	0	0	0	3	0.71
N5 Lake	5	13-Jul-11	10:25	14-Jul-11	8:42	22:17	110.85	4.62	591242	7043047	Yes	1	1	0	3	0	0	5	1.08
	5	13-Jul-11	10:30	14-Jul-11	8:51	21:21	106.05	4.42	591263	7042984	Yes	0	15	12	0	0	0	27	6.11
N6 Lake	3	13-Jul-11	10:55	14-Jul-11	8:34	22:39	67.17	2.80	591654	7041144	Yes	0	25	0	0	0	0	26	9.30
	4	13-Jul-11	10:32	14-Jul-11	8:44	22:12	88.48	3.69	592686	7042211	No	0	0	0	0	0	0	0	0.00
N6 Stream	3	13-Jul-11	10:26	14-Jul-11	8:50	22:50	67.50	2.81	592737	7042268	Yes	0	50	0	0	0	0	50	17.78
N6a Lake	5	14-Jul-11	12:20	14-Jul-11	16:30	4:10	20.50	0.85	590201	7039535	Yes	0	6	0	0	0	0	6	7.02
N6B Stream	5	14-Jul-11	17:50	15-Jul-11	8:20	15:30	76.50	3.19	589377	7039392	Yes	2	9	1	0	0	0	12	3.76
N9 Lake	3	8-Jul-11	9:36	8-Jul-11	12:18	2:42	4.00	0.17	590892	7039481	No	0	0	0	0	0	0	0	0.00
	2	8-Jul-11	9:36	8-Jul-11	12:20	2:44	4.80	0.20	590892	7039481	No	0	0	0	0	0	0	0	0.00
	2	8-Jul-11	9:12	8-Jul-11	12:12	3:00	6.00	0.25	590994	7039577	No	0	0	0	0	0	0	0	0.00
	3	8-Jul-11	9:10	8-Jul-11	12:10	3:00	9.00	0.38	591047	7039629	No	0	0	0	0	0	0	0	0.00
N11 Lake	10	11-Jul-11	9:15	12-Jul-11	8:10	22:55	225.50	9.40	-	-	Yes	2	111	13	0	1	0	127	13.52
	5	10-Jul-11	8:50	11-Jul-11	9:00	24:10	120.50	5.02	587347	7042398	No	0	0	0	0	0	0	0	0.00
	5	10-Jul-11	8:40	11-Jul-11	8:49	24:09	120.45	5.02	587417	7042360	Yes	1	0	0	2	0	0	3	0.60
	10	12-Jul-11	8:20	13-Jul-11	7:55	23:35	233.50	9.73	589143	7043419	Yes	4	32	7	0	1	2	46	4.73
N12 Lake	5	8-Jul-11	14:00	9-Jul-11	8:20	18:20	91.00	3.79	588289	7040065	Yes	1	18	3	0	0	0	22	5.80
	5	8-Jul-11	14:07	9-Jul-11	8:40	18:33	91.65	3.82	588246	7040102	Yes	0	1	1	0	0	2	4	1.05
N14 Lake	5	6-Jul-11	16:28	7-Jul-11	8:25	15:57	77.85	3.24	585965	7036049	Yes	0	3	1	0	0	0	4	1.23
	5	6-Jul-11	16:48	7-Jul-11	8:51	16:03	80.15	3.34	586082	7035979	No	0	0	0	0	0	0	0	0.00
N14a Lake	2	8-Aug-11	16:55	9-Aug-11	11:30	18:35	37.00	1.54	586032	7036665	Yes	0	6	0	0	0	0	6	3.90
	2	8-Aug-11	16:55	9-Aug-11	11:20	18:25	36.50	1.52	586028	7036683	yes	0	15	0	0	0	0	15	9.86
N14 b Lake	3	8-Aug-11	14:51	9-Aug-11	10:20	20:05	60.15	2.51	586793	7035963	No	0	0	0	0	0	0	0	0.00
	5	8-Aug-11	14:15	9-Aug-11	10:20	20:05	60.15	2.51	586795	703596	No	0	0	0	0	0	0	0	0.00
N16 Lake	9	16-Jul-11	11:05	16-Jul-11	16:40	5:35	48.15	2.01	583745	7037206	Yes	1	0	0	0	0	0	1	0.50
	5	15-Jul-11	11:00	16-Jul-11	9:45	22:45	112.25	4.68	584377	7042509	Yes	1	0	4	0	0	0	5	1.10
	4	15-Jul-11	11:21	16-Jul-11	9:35	22:14	88.56	3.69	584015	7041924	No	0	0	0	0	0	0	0	0.00
N17 Lake	2	8-Aug-11	9:40	8-Aug-11	16:30	7:00	14.00	0.58	58440	7037085	No	0	0	0	0	0	0	0	0.00
	5	7-Jul-11	13:05	7-Jul-11	18:25	5:20	26.00	1.08	584427	7037087	No	0	0	0	0	0	0	0	0.00
	5	7-Jul-11	13:30	7-Jul-11	17:10	3:40	30.20	1.26	584623	7036076	No	0	0	0	0	0	0	0	0.00
N17 Stream	5	15-Jul-11	11:20	16-Jul-11	9:45	22:25	111.25	4.64	584622	7037357	Yes	0	24	0	2	0	0	26	5.61
	5	15-Jul-11	13:40	16-Jul-11	9:20	19:40	97.00	4.04	584511	7037241	Yes	1	2	0	3	0	1	7	1.73
East Lake	5	6-Jul-11	12:10	7-Jul-11	15:09	26:59	132.95	5.54	598330	7040110	Yes	1	0	0	0	0	1	2	0.36
	5	6-Jul-11	12:20	7-Jul-11	15:00	26:40	132.00	5.50	598365	7040182	Yes	0	0	0	0	0	1	1	0.18
	5	7-Jul-11	18:23	8-Jul-11	8:35	14:35	71.75	2.99	598330	7040110	No	0	0	0	0	0	0	0	0.00
	5	7-Jul-11	15:20	8-Jul-11	8:50	17:30	86.50	3.60	598365	7040182	No	0	0	0	0	0	0	0	0.00

Note: - = Data not collected

Table IV-2 Summary of Effort, Catch, and Catch-Per-Unit-Effort for Gill Nets Set in Lakes, 2011

Lake I.D.	Date	Mesh Size (mm)	Set Time	Pull Time	Effort (hh:mm)	Total Effort (net hours)	Shallow End UTM				Shallow End Depth (m)	Deep End UTM				Deep End Depth (m)	Fish captured (Y/N)	Number of Fish Captured by Species					Total Fish Caught	CPUE (fish/net hour)
							UTM NAD	Zone	Easting	Northing		UTM NAD	Zone	Easting	Northing			ARGR	LKCH	LKTR	LNSC	RNWH		
East Lake	6-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	13:35	17:35	4:00	32	83	12	597151	7038036	7	83	12	597072	7038087	8.5	Y	0	0	1	0	0	1	0.03
	7-Jul-11		9:55	16:10	7:15	58	83	12	598594	7040266	8.2	83	12	598517	7040241	9	Y	0	0	3	0	1	4	0.07
	7-Jul-11		9:30	18:48	9:18	73.4	83	12	597672	7040527	7	83	12	598629	7040451	8.2	N	0	0	0	0	0	0	0.00
N1	10-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	14:50	16:16	1:26	10.08	83	12	590117	7043972	1.8	83	12	590046	7043995	8.7	N	0	0	0	0	0	0	0.00
	10-Jul-11		15:00	16:30	1:30	10.4	83	12	589376	7043416	1.8	83	12	589426	7043441	4.1	N	0	0	0	0	0	0	0.00
	10-Jul-11		10:00	10:30	1:30	10.4	83	12	594945	7045327	1.8	83	12	594993	7045273	2.7	N	0	0	0	0	0	0	0.00
	10-Jul-11		10:15	10:20	0:05	0.4	83	12	-	-	1.8	83	12	-	-	2.5	N	0	0	0	0	0	0	0.00
N2	14-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	14:55	16:25	1:30	10.4	83	12	591276	7044677	1.8	83	12	591308	7044617	2.9	Y	0	0	0	0	1	1	0.10
	14-Jul-11		14:25	16:02	1:37	10.96	83	12	591347	7044442	2.2	83	12	591407	7044442	3	Y	0	0	0	1	3	4	0.37
	14-Jul-11		12:42	14:38	1:56	12.48	83	12	591960	7044324	1.9	83	12	591891	7044349	3.2	Y	1	0	0	0	2	3	0.24
	14-Jul-11		12:20	13:55	1:35	10.8	83	12	591684	7044363	2.1	83	12	591625	7044399	3.5	Y	0	0	2	0	6	8	0.74
	14-Jul-11		10:43	12:15	2:15	17.2	83	12	591737	7044448	1.8	83	12	591732	7044506	3.2	Y	0	0	0	0	4	4	0.23
	14-Jul-11		11:08	12:35	1:27	10.16	83	12	591488	7044218	1.7	83	12	591508	7044276	3.2	Y	0	0	0	0	6	6	0.59
N3	18-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	10:26	13:42	3:16	25.28	83	12	591034	7043491	-	83	12	591049	7043536	-	Y	1	0	1	3	8	13	0.51
	18-Jul-11		10:30	13:40	3:10	24.8	83	12	591316	7043865	-	83	12	591360	7043825	-	Y	0	0	1	3	1	5	0.20
N5	13-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	11:32	16:39	5:07	40.32	83	12	590701	7041621	-	83	12	590675	7041562	-	Y	0	0	2	0	1	3	0.07
	13-Jul-11		11:03	17:00	5:57	44.56	83	12	591088	7042874	-	83	12	591124	7042932	-	N	0	0	0	0	0	0	0.00
N6a	14-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	13:04	16:30	3:26	26.08	83	12	590229	7039790	3.5	83	12	590165	7039823	4.5	Y	0	0	1	0	0	1	0.04
	14-Jul-11		13:25	16:45	3:20	25.6	83	12	590320	7040609	3.5	83	12	590316	7040536	4	N	0	0	0	0	0	0	0.00
N6	13-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	11:02	16:25	5:23	41.84	83	12	592026	7041537	1.8	83	12	592076	7041589	3.3	Y	22	2	5	3	0	32	0.76
N9	8-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	9:45	11:58	2:13	17.04	83	12	590947	7039632	1.9	83	12	591010	7039643	2.7	Y	0	0	1	0	1	2	0.12
	8-Jul-11		9:49	12:10	2:21	17.68	83	12	591251	7039869	2.1	83	12	591113	7039739	4.3	N	0	0	0	0	0	0	0.00
	15-Jul-11		15:40	17:05	1:25	10	83	12	584158	7041161	1.9	83	12	584152	7041096	3.4	N	0	0	0	0	0	0	0.00
N11	11-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	9:39	16:37	6:58	52.64	83	12	586921	7042131	4.5	83	12	586965	7042169	5	Y	0	0	2	0	0	2	0.04
	11-Jul-11		9:52	16:45	6:45	51.6	83	12	586877	7042151	6.5	83	12	586920	7042065	6.6	N	0	0	0	0	0	0	0.00
	12-Jul-11		9:29	14:31	5:02	40.16	83	12	586926	7042152	-	83	12	586904	7042102	-	Y	0	0	2	0	0	2	0.05
	12-Jul-11		9:13	15:03	6:00	48	83	12	586830	7042123	5.8	83	12	586781	7042067	6	N	0	0	0	0	0	0	0.00
N12	8-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	14:45	17:30	1:45	11.6	83	12	588058	7040265	5	83	12	588777	7040258	7.5	Y	0	0	7	0	0	7	0.60
	8-Jul-11		14:25	17:28	3:03	24.24	83	12	588542	7039998	3.5	83	12	588542	7039998	4	N	0	0	0	0	0	0	0.00
N14	6-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	16:16	18:08	1:52	12.16	83	12	586046	7036075	-	83	12	586061	7036136		N	0	0	0	0	0	0	0. 00
	6-Jul-11		15:23	17:55	2:32	18.56	83	12	586317	7036114	2.2	83	12	583301	7036062	2.3	Y	1	0	0	0	0	1	0.05
N14a	8-Aug-11	25, 38, 51, 63, 76, 102, 127, 152	13:29	16:30	3:01	24.08	83	12	585922	7036528	1.7	83	12	585939	7036580	2.7	Y	0	0	0	1	0	1	0.04
	8-Aug-11		13:23	16:17	3:54	28.32	83	12	585930	7036613	1.8	83	12	585979	7036600	2.7	Y	2	0	0	1	0	3	0.11

Table IV-2 Summary of Effort, Catch, and Catch-Per-Unit-Effort for Gill Nets Set in Lakes, 2011 (continued)

Lake I.D.	Date	Mesh Size (mm)	Set Time	Pull Time	Effort (hh:mm)	Total Effort (net hours)	Shallow End UTM				Shallow End Depth (m)	Deep End UTM				Deep End Depth (m)	Fish captured (Y/N)	Number of Fish Captured by Species					Total Fish Caught	CPUE (fish/net hour)
							UTM NAD	Zone	Easting	Northing		UTM NAD	Zone	Easting	Northing			ARGR	LKCH	LKTR	LNSC	RNWH		
N16	15-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	14:00	15:30	1:30	10.4	83	12	584584	7041075	1.8	83	12	584815	7041073	2.5	Y	0	0	2	0	0	2	0.19
	15-Jul-11		14:35	16:20	1:45	11.6	83	12	584418	7040837	1.7	83	12	584333	7040836	2.8	N	0	0	0	0	0	0	0.00
	15-Jul-11		11:07	12:40	1:53	12.48	83	12	584386	7042435	1.7	83	12	584330	7042407	2.3	N	0	0	0	0	0	0	0.00
	15-Jul-11		10:40	12:10	1:30	10.4	83	12	583988	7041858	1.8	83	12	583923	7041848	2.5	N	0	0	0	0	0	0	0.00
	15-Jul-11		12:45	14:15	1:30	10.4	83	12	583989	7041448	1.9	83	12	583965	7041500	3.7	N	0	0	0	0	0	0	0.00
	15-Jul-11		12:15	13:45	1:30	10.4	83	12	584357	7041532	1.8	83	12	584408	7041571	2.7	Y	0	0	1	0	0	1	0.10
	16-Jul-11		11:20	12:50	1:30	10.4	83	12	583560	7037479	1.8	83	12	583590	7037535	3.2	Y	0	0	1	0	0	1	0.10
	16-Jul-11		11:40	13:10	1:30	10.4	83	12	583662	7037651	1.8	83	12	5834631	7037693	5.3	Y	0	0	2	4	0	6	0.58
	16-Jul-11		12:05	14:05	2:00	16	83	12	583382	7037487	1.8	83	12	583438	7037472	2.4	Y	0	0	1	0	0	1	0.06
	16-Jul-11		13:20	14:55	1:35	10.8	83	12	584359	7038131	1.6	83	12	584345	7038187	4	Y	0	0	1	0	0	1	0.09
	16-Jul-11		14:15	15:45	1:30	10.4	83	12	584639	7037888	1.8	83	12	584697	7037875	2.3	Y	0	0	1	0	0	1	0.10
N17	16-Jul-11	25, 38, 51, 63, 76, 102, 127, 152	11:10	13:00	1:50	12	83	12	582684	7036473	5	83	12	582751	7036497	6.5	Y	0	0	11	0	0	11	0.92
	16-Jul-11		10:45	14:07	3:52	28.16	83	12	582958	7036630	4	83	12	582910	7036587	4.8	N	0	0	0	0	0	0	0.00
	7-Jul-11		13:21	18:10	4.49	35.92	83	12	584761	7036115	2.1	83	12	584744	7036174	2.5	Y	0	0	6	0	0	6	0.17
	7-Jul-11		11:00	17:25	6:25	50	83	12	584496	7037123	2	83	12	584598	7037188	2.3	Y	0	0	4	0	1	5	0.10

Note: - = Data not collected

Table IV-3 Summary of Effort, Catch, and Catch-Per-Unit-Effort for Angling, 2011

Lake ID.	Date	Number of Anglers	Start Time	Stop Time	Effort[(a)] (hours)	Total Effort (hours)	Fish captured (Y/N)	LKTR	NRPK	Total Fish Caught	CPUE (fish/ hour)
N1	10-Jul-11	2	15:20	15:50	0.5	1.0	Y	0	4	4	4.00
N3	18-Jul-11	2	10:30	13:00	2.5	5.0	Y	1	0	1	0.20
N11	9-Jul-11	2	14:00	17:00	3.0	6.0	Y	6	0	6	1.00
	10-Jul-11	2	9:30	14:00	4.5	9.0	Y	15	0	15	1.67
	10-Jul-11	2	9:15	9:30	0.3	0.5	Y	0	5	5	10.00
	11-Jul-11	2	14:30	17:05	2.6	5.1	Y	10	0	10	1.96
	12-Jul-11	2	12:40	14:40	2.0	4.0	Y	7	0	7	1.75
N16	16-Jul-11	2	11:50	12:35	0.4	0.7	Y	2	0	2	2.85
East Lake	8-Jul-11	1	-	-	1.0	1.0	N	0	0	0	0.00

Note: (a) = Actual time spent angling, not based on the start and stop times.
- = Data not collected

Table IV-4 Summary of Effort, Catch, and Catch-Per-Unit-Effort for Backpack Electrofishing, 2011

Site I.D.	Date	Start Time (hh:mm)	End Time (hh:mm)	Effort[(a)] (s)	Length Surveyed (m)	Fish Caught	Number of Fish Captured by Species					Total Fish Caught	CPUE (fish/100 s)
							BURB	LKCH	LNSC	NNST	SLSC		
D5 Lake	8-Aug-11	9:41	11:03	-	550	N	0	0	0	0	0	0	-
N12 Lake	9-Jul-11	9:30	10:02	454	100	Y	1	26	1	1	5	34	7.49
N14a Lake	8-Aug-11	13:03	13:46	1351	350	Y	0	6	0	10	1	17	1.23
N14b Lake	8-Aug-11	16:25	15:07	584	185	N	0	0	0	0	0	0	0.00
East Lake	8-Jul-11	9:40	10:08	522	150	N	0	0	0	0	0	0	0.00
N5 Stream	14-Jul-11	10:27	11:05	316	-	Y	1	14	1	0	2	18	5.70
N6 Stream	14-Jul-11	9:30	9:45	281	-	Y	0	5	0	0	3	8	2.85
N6b Stream	15-Jul-11	8:30	8:56	250	100	N	0	0	0	0	0	0	0.00
N15 Stream	15-Jul-11	16:00	16:20	559	150	Y	0	22	0	0	10	32	5.72
N17 Stream	15-Jul-11	11:25	12:03	522	200	Y	0	16	0	0	7	23	4.41

Note: (a) = Actual time recorded from electroshocker, not based on the start and stop times.
- = Data not collected

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