GAHCHO KUÉ PROJECT

ENVIRONMENTAL IMPACT STATEMENT

ADDENDUM JJ

ADDITIONAL FISH AND AQUATIC RESOURCES BASELINE INFORMATION

December 2010 09-1365-1004

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

LIST OF APPENDICES

JJ1 INTRODUCTION

The purpose of this addendum report was to provide supplemental baseline information on the fisheries and aquatic resources in the area of the De Beers Canada Inc. (De Beers) Gahcho Kué Project (Project). This report supplements the data presented in the Environmental Impact Statement, Annex J Fisheries and Aquatic Resources Baseline. The supplemental information presented in this report was gathered in 2007 and 2010 to fill identified data gaps and to collect additional information to assess potential effects arising from changes in the original mine plan.

Program objectives in 2007 were as follows:

- Conduct shoreline habitat assessments and fish inventories in lakes and streams potentially affected by gravel removal from eskers southwest of the Local Study Area (LSA). Conduct additional fisheries sampling in streams affected by flow routing during Kennady Lake draw-down, mine operations, and refilling operations.
- Confirm fish community composition in Lakes A1, A3, D2, D3, and E1 in the Kennady Lake watershed.
- Confirm the timing of the out-migration of young-of-the-year (YOY) Arctic grayling (*Thymallus arcticus*) from streams potentially affected by flow routing during Kennady Lake draw-down.
- Verify the presence or absence of peamouth (*Mylocheilus caurinus*) in the Kennady Lake and N watersheds.
- Conduct metal concentrations analysis of slimy sculpin (*Cottus cognatus*), a species identified as important for monitoring effects of mine effluent.

Program objectives in 2010 were as follows:

- Conduct additional fish sampling and fish habitat assessments of selected lakes and streams potentially affected by the Project.
- Use hydroacoustics to estimate the large-bodied fish populations in Kennady Lake.

JJ2 STUDY AREAS

The study areas are described in Annex J, Section J2. The LSA is a 739 square kilometres (km^2) area that includes the watersheds of the lakes and streams that may be directly affected by the Project (Figure JJ2-1). The regional study area (RSA) was defined as the entire Lockhart River watershed. Most of the 2007 and 2010 baseline field surveys were conducted within the LSA, although there were a few sites located just outside the LSA boundary. More details on the LSA and RSA are provided in Annex J, Section J2.

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	DE BEERS CANADA
Scale: 1:250,000 (5, 2.5, 0, 5 Kilometres)		
FILE No: B-Fish-002-GIS		DATE: October 25, 2010
JOB NO: 09-1365-1004	REVISION NO: 7	**Figure JJ2-1**
OFFICE: GOLD-CAL	DRAWN: CW	CHECK: GA

I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-002-GIS.mxd

JJ3 METHODS

This section summarizes the methods used during the 2007 and 2010 baseline field programs. Detailed methods of the studies conducted in 2004 and 2005 are included in Annex J, as well as brief descriptions of the methods used in studies prior to 2004.

JJ3.1 AQUATIC HABITAT

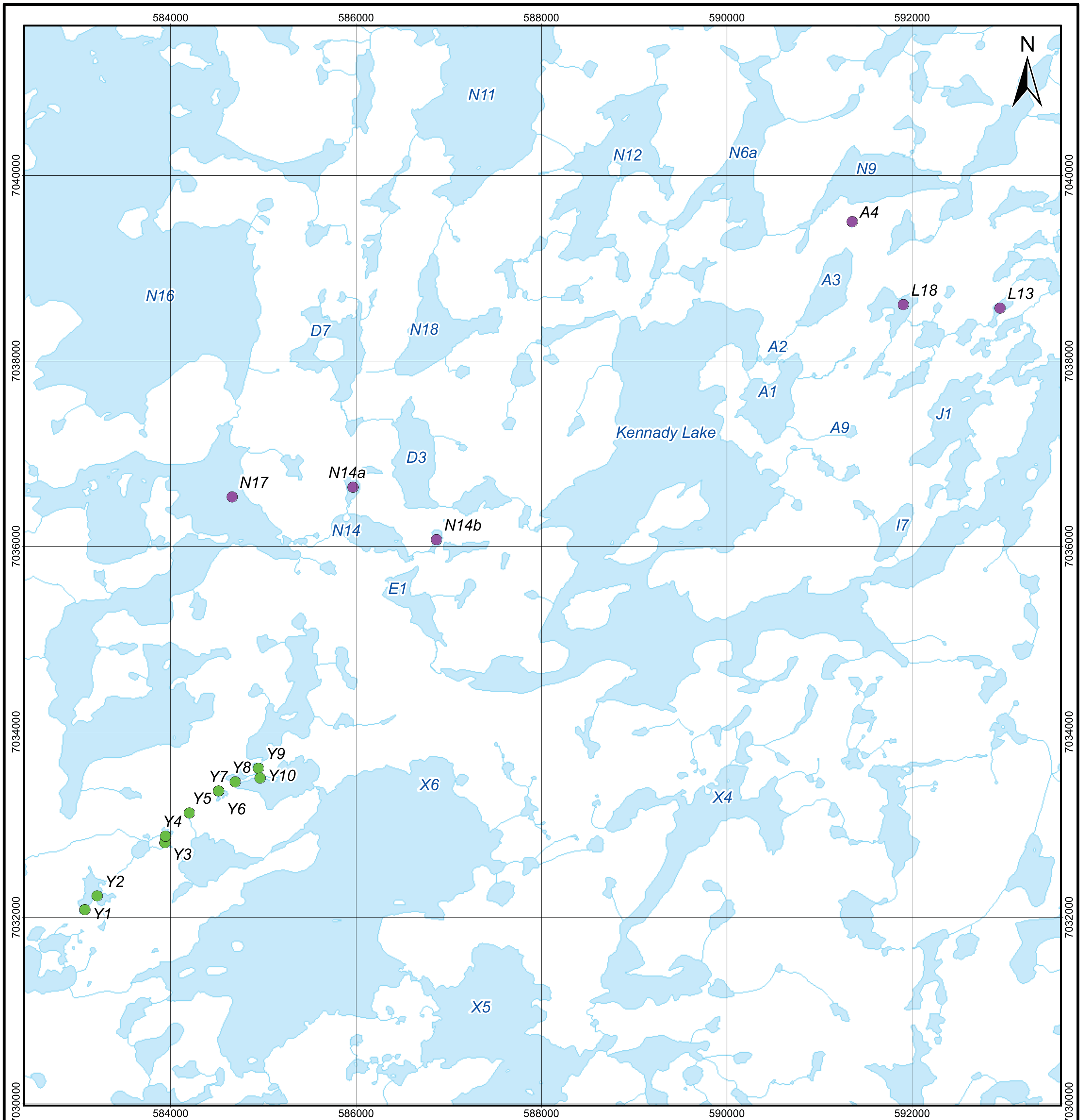
Aquatic habitat was examined in lakes and streams within and outside the LSA. Methods for surveying the aquatic habitat are described in the sections below.

JJ3.1.1 Lakes

Lakes in the LSA were surveyed in previous studies (Annex J). The 2007 and 2010 aquatic habitat lake surveys examined additional lakes not previously surveyed, and additional information was collected on select lakes that had been previously surveyed. The locations of all lakes surveyed for aquatic habitat in 2007 and 2010 are shown in Figure JJ3.1-1. Similar to previous studies, aquatic habitat surveys were conducted to assess the quality and quantity of fish habitat that may be affected by the proposed Project.

JJ3.1.1.1 2007 Studies

A cursory examination of fisheries and aquatic habitat was conducted on July 28, 2007, at 10 small lakes (Lakes Y1 to Y10) just outside of the LSA boundary (Figure JJ3.1-1). This survey was conducted along an esker located approximately 5 kilometres (km) southwest of the proposed Project. All 10 lakes surveyed were immediately adjacent to the esker. The 2007 small lake surveys were brief in nature and focused on shoreline habitat adjacent to the esker. Aquatic habitat along the edge of the esker was photographed and described.



LEGEND

	Watercourse	**Sampling Year**	
	Waterbody	●	2007
A1	Lake Identifier	●	2010

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

I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-131-GIS.mxd

GAHCHO KUÉ PROJECT

Lake Aquatic Habitat Sampling Locations, 2007 and 2010

PROJECTION: UTM Zone 12
DATUM: NAD83

Scale: 1:60,000
1 0.5 0 1
Kilometres

DE BEERS CANADA

FILE No: B-Fish-131-GIS
DATE: August 25, 2010
JOB NO: 09-1365-1004
REVISION NO: 1
OFFICE: GOLD-CAL
DRAWN: RL
CHECK: GA

Figure JJ3.1-1

JJ3.1.1.2 2010 Studies

In 2010, aquatic habitat was assessed within the LSA at five small lakes and the northeast basin of Lake N17. The field program occurred from July 19 to 27, 2010.

Detailed aquatic habitat surveys were conducted and aquatic habitat maps were developed for each lake. The detailed survey encompassed the entire lake, except for N17 where the survey was focussed only on the northeast basin. Methods used in previous studies for the detailed habitat mapping were followed (Annex J), to provide comparable data and produce similar maps. The lakes were accessed by helicopter; aerial photography was conducted at each lake. The detailed habitat mapping was subsequently completed from an inflatable boat, using a depth sounder to determine depth and gradient. Depth and gradient classifications are provided in Table JJ3.1-1. Substrate was determined visually based on the classifications in Table JJ3.1-2. Bathymetric surveys were completed at three of these lakes and can be found in the addendum to the Climate and Hydrology Baseline (Annex H; Addendum HH, Additional Climate and Hydrology Baseline Information).

Table JJ3.1-1 Depth and Gradient Classification for Small Lake Habitat Mapping

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

> = greater than; < = less than

Table JJ3.1-2 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% 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

(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).

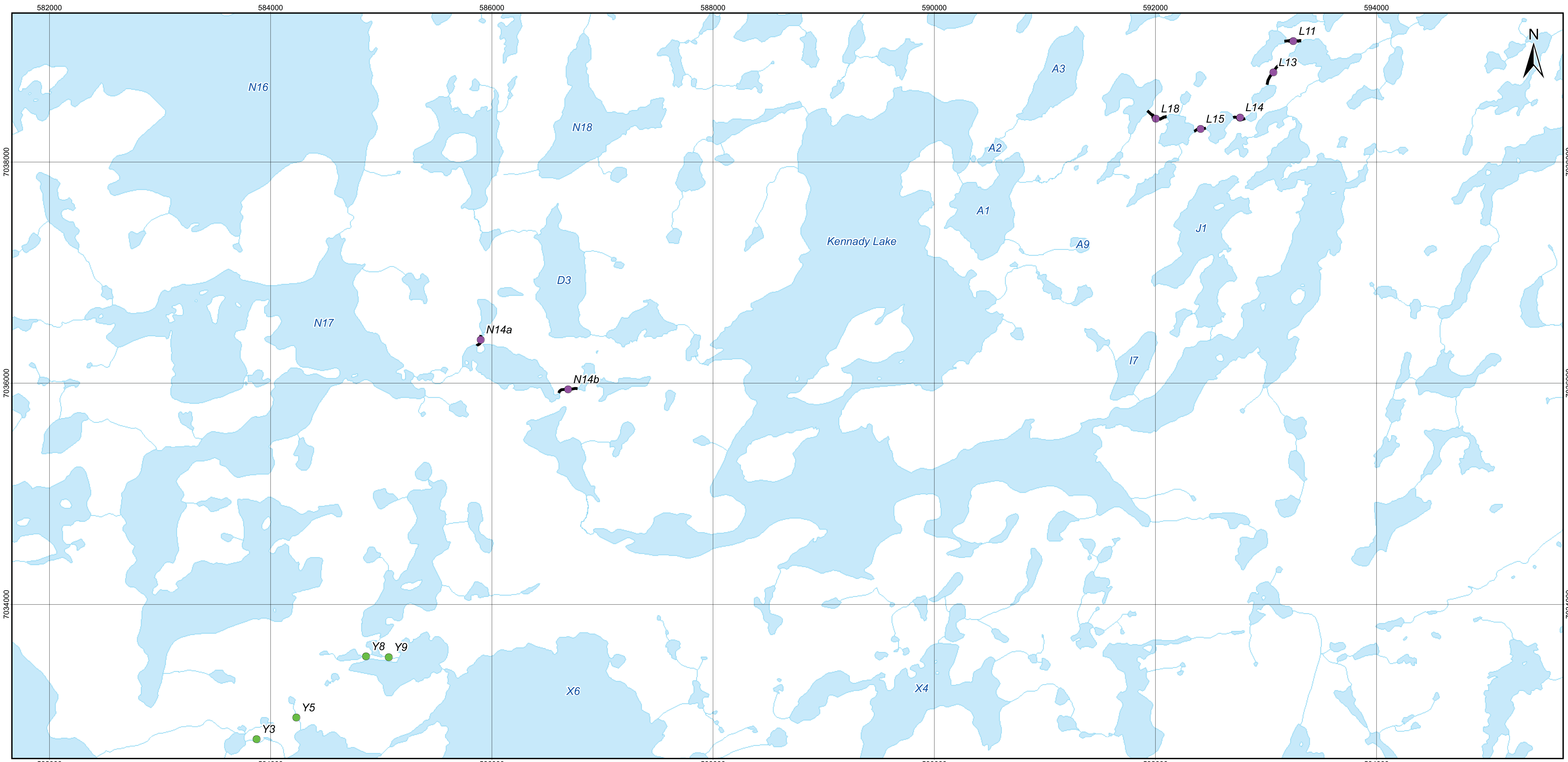
> = greater than; % = percent.

JJ3.1.1.3 Data Analysis

Field notes from 2007 were used to summarize the habitat of the lakes adjacent to the esker. The habitat maps drawn by the field crew in 2010 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 errors through data transfer.

JJ3.1.2 Streams

Streams in the LSA were surveyed in previous studies (Annex J). The 2007 and 2010 aquatic habitat stream surveys examined additional streams not previously surveyed. The location of all stream sites surveyed in 2007 and 2010 are shown in Figure JJ3.1-2. Following the nomenclature used in Annex J, streams are identified by their headwater lake; for example, Stream L11 originates from the outflow of Lake L11. Similar to previous studies, aquatic habitat surveys were conducted to assess the quality and quantity of fish habitat that may be affected by the proposed Project.



LEGEND

Watercourse
Waterbody
A1 Lake Identifier

Sampling Year
2007
2010
Habitat Survey*

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000
*Habitat Surveys Conducted in 2007 and 2010

I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-132-GIS.mxd

GAHCHO KUÉ PROJECT

Stream Aquatic Habitat Sampling Locations, 2007 and 2010

PROJECTION: UTM Zone 12		DATUM: NAD83	DE BEERS CANADA
Scale: 1:35,000 (0.5 0.25 0 0.5 Kilometres)			
FILE No: B-Fish-132-GIS			DATE: August 25, 2010
JOB NO: 09-1365-1004	REVISION NO: 7		Figure JJ3.1-2
OFFICE: GOLD-CAL	DRAWN: RL	CHECK: GA	

JJ3.1.2.1 2007 Studies

A cursory examination of fisheries and aquatic habitat was conducted on July 28, 2007, at four streams just outside of the LSA boundary (Streams Y3, Y5, Y8, and Y9) (Figure JJ3.1-2). This survey was conducted along an esker located approximately 5 km southwest of the proposed Project. All four streams surveyed were immediately adjacent to the esker. The aquatic habitat surveys were brief in nature and focused on habitat adjacent to the esker. Aquatic habitat along the edge of the esker was photographed and described

JJ3.1.2.2 2010 Studies

In 2010, aquatic habitat was assessed in detail at seven streams within the LSA (Figure JJ3.1-2). The field program occurred from July 19 to 27, 2010. Methods used in previous studies (Annex J) were followed, to provide comparable data. Detailed aquatic habitat information was recorded for the entire length of each stream. Habitat was classified into specific habitat units, based on morphology (e.g., run, riffle, pool). Stream characteristics (e.g., maximum depth, wetted and channel width, velocity, and substrate) were recorded within representative habitat units. Where possible, stream discharge was also measured.

Spawning habitat potential specifically for Arctic grayling and northern pike (*Esox lucius*), as well as any potential barriers to migration for these fish species, were recorded. Other physical attributes known to provide potential spawning, rearing, and overwintering habitat were also noted (e.g., cover). Photo documentation of representative habitat was conducted during the ground survey, as well as aerial photography of the stream, the outlet of the stream from its headwater lake, and the inlet of the receiving lake.

JJ3.1.2.3 Data Analysis

Field notes from 2007 were used to describe the habitat of the streams adjacent to the esker. This information is intended to provide a cursory description of the habitat available adjacent to the esker.

The standardized habitat quality rating system developed in Annex J was used to analyse the 2010 data, to ensure consistency with stream data analysis conducted for previous studies. In this system, habitat quality was assessed based on dominant substrate sizes, channel type (single, braided or undefined), habitat type (run, riffle or pool), as well as dominant flow (ephemeral or permanent) and cover conditions. Bank type was classified as poorly defined or well defined. A rating was assigned to each stream, based on whether it provided nil, low, moderate, or high quality spawning habitat potential for Arctic grayling and northern pike. The characteristics of high quality Arctic grayling and northern pike spawning habitat are described in Annex J. As other fish species may utilize these streams for various life stages, an overall fish habitat rating was also assigned to each stream. The overall rating was based on the presence of rearing habitat for Arctic grayling and northern pike, the possibility of spring fish passage, and the possibility of summer rearing habitat for forage fish species. Additional details on overall rating criteria are provided in Annex J.

JJ3.2 LIMNOLOGY

JJ3.2.1 Lakes

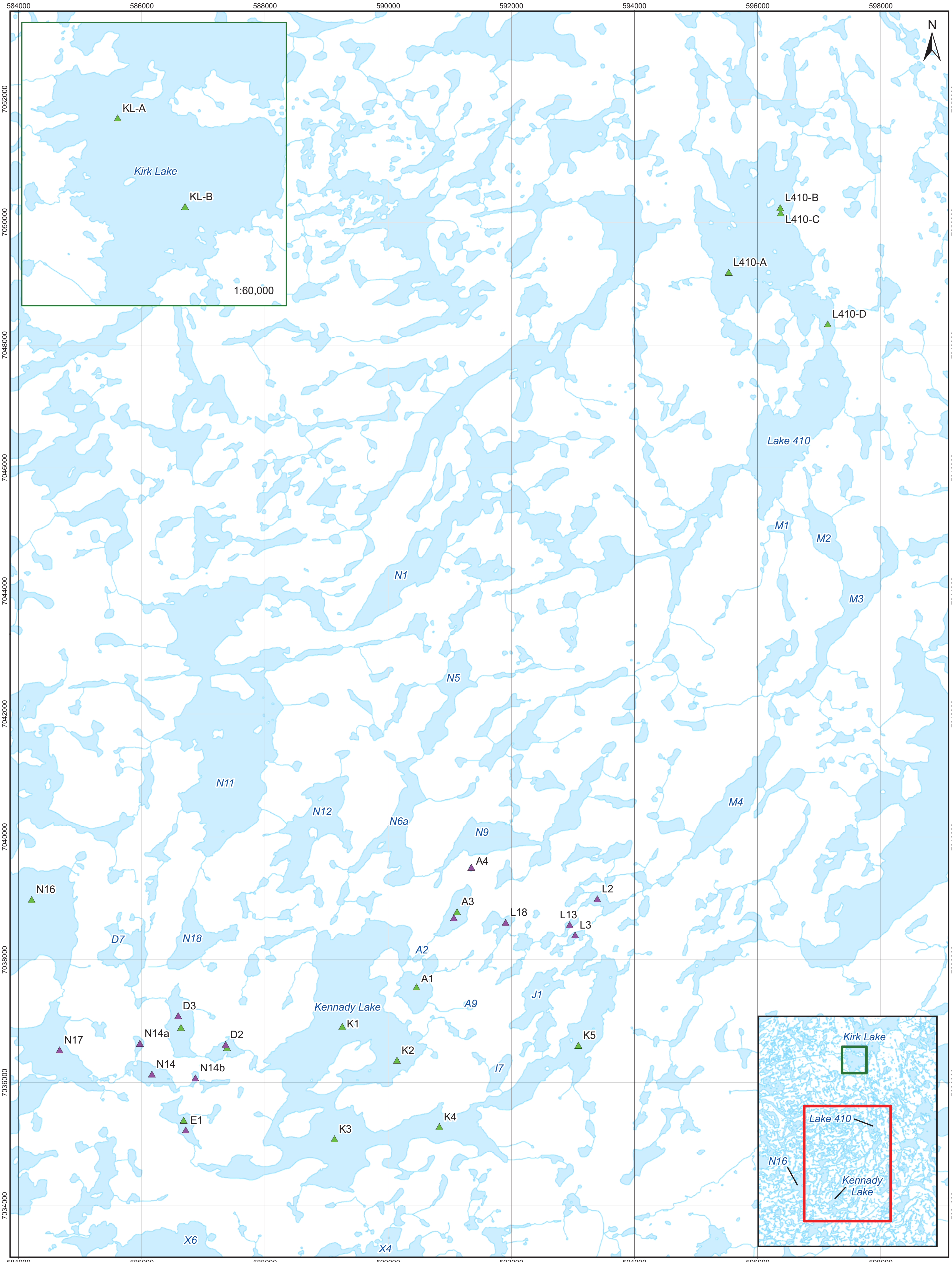
Limnology surveys were conducted on selected lakes in the LSA in 2007 and 2010. The locations of all lakes surveyed for limnological parameters in 2007 and 2010 are shown in Figure JJ3.2-1.

JJ3.2.1.1 2007 Studies

In 2007, limnology surveys were conducted from July through September at Kennady Lake (all five basins), Kirk Lake, Lake 410, and Lake N16, as well as at five small lakes (A1, A3, D2, D3, and E1) within the LSA. Vertical water quality profiles were established at the deep area of each lake or basin, with 1 metre (m) intervals from the surface to the bottom of the water column. Water temperature, specific conductivity, and dissolved oxygen were measured with a YSI multimeter at each interval.

JJ3.2.1.2 2010 Studies

In 2010, limnology surveys were conducted in July at 13 lakes within the LSA. 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 profile was situated at the approximate maximum depth of each lake. The location of maximum depth was determined with a depth sounder by running a few transects across each lake. Water temperature, specific conductivity, dissolved oxygen, and pH were measured at the water surface or each interval with a YSI multimeter. Secchi depth was also measured at each location.



LEGEND

Watercourse
Waterbody
A1 Lake Identifier

Sampling Year
2007
2010

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

I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-133-GIS.mxd

GAHCHO KUÉ PROJECT

Limnology Sampling Locations, 2007 and 2010

PROJECTION: UTM Zone 12		DATUM: NAD83	DE BEERS CANADA
Scale: 1:60,000 (1 0.5 0 1 Kilometres)			
FILE No: B-Fish-133-GIS			DATE: August 25, 2010
JOB NO: 09-1365-1004	REVISION NO: 1		**Figure JJ3.2-1**
OFFICE: GOLD-CAL	DRAWN: RL	CHECK: GA	

JJ3.3 LOWER TROPHIC COMMUNITIES

JJ3.3.1 Phytoplankton

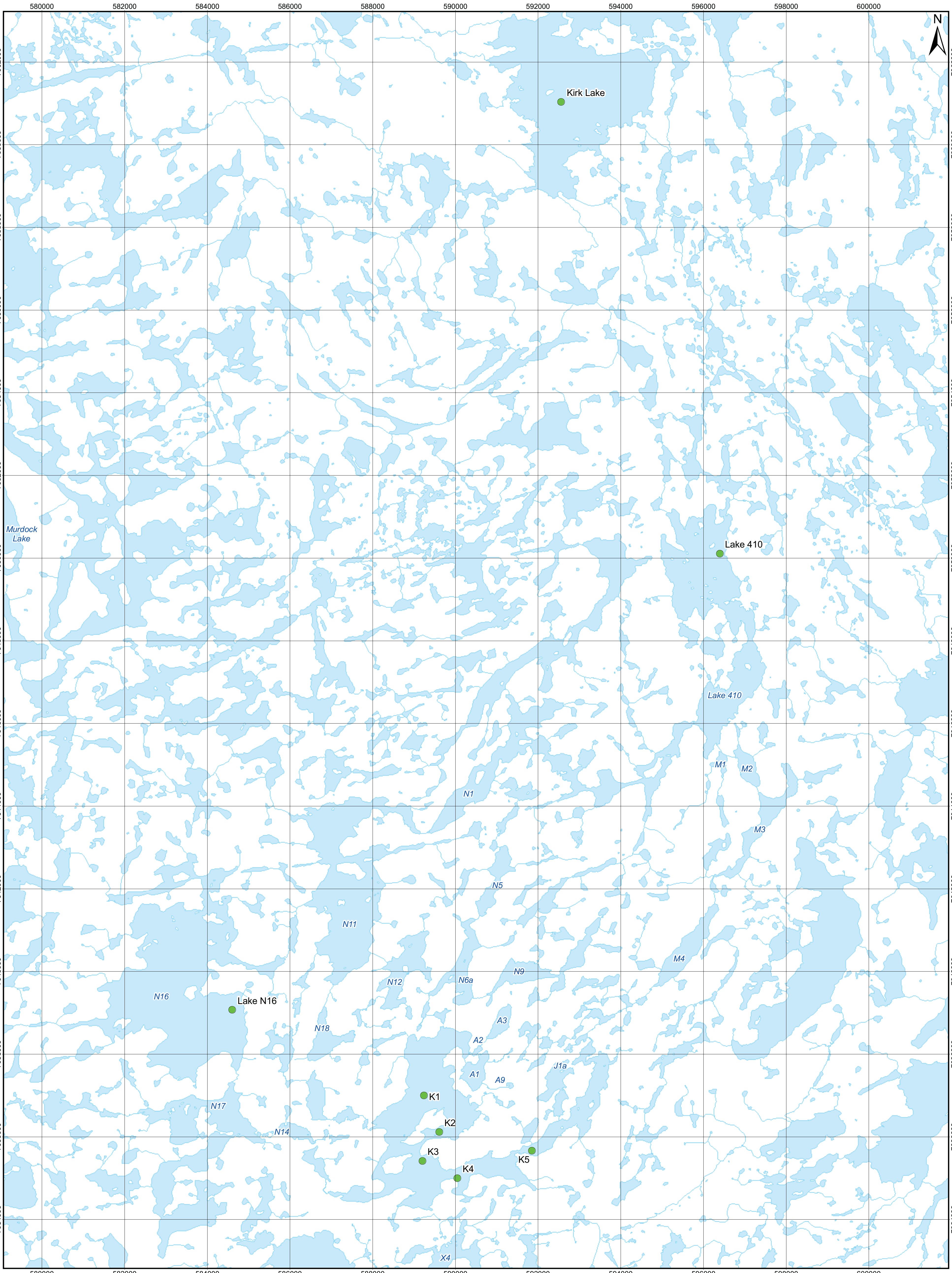
JJ3.3.1.1 2007 Studies

Phytoplankton samples were collected during late summer 2007 in Lake N16, Kennady Lake, Lake 410, and Kirk Lake (Table JJ3.3-1 and Figure JJ3.3-1). One site was sampled in each basin of Kennady Lake. Five samples were collected at each site from a depth of approximately 0.5 m below the water surface, as described in the British Columbia Freshwater Biological Sampling Manual (BC RISC 1997, internet site). Samples were preserved with 5 percent (%) Lugol's solution, stored on ice in a cooler, and shipped immediately for taxonomic identification and analysis. An additional water sample was collected at each site and was submitted to CANTEST Ltd. in Burnaby, British Columbia, for analysis of chlorophyll *a* concentration.

Table JJ3.3-1 Phytoplankton Sampling Locations in Lakes, 2007

Waterbody	Basin	Location (UTM, NAD83)	Date
Lake N16	-	12.584603.7039076	Sept 2, 2007
Kennady Lake	K1	12.589237.7037003	Aug 31, 2007
	K2	12.589610.7036121	Aug 31, 2007
	K3	12.589203.7035423	Aug 31, 2007
	K4	12.590048.7035006	Aug 31, 2007
	K5	12.591848.7035669	Sept 1, 2007
Lake 410	-	12.596394.7050113	Sept 3, 2007
Kirk Lake	-	12.592556.7061037	Sept 3, 2007

UTM = Universal Transverse Mercator; NAD = North American Datum.



LEGEND

- Watercourse
- Waterbody
- *A1* Lake Identifier
- Phytoplankton and Zooplankton Sampling Locations

NOTES

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

GAHCHO KUÉ PROJECT

Phytoplankton and Zooplankton Sampling Locations, 2007

PROJECTION:	DATUM:
UTM Zone 12	NAD83

Scale: 1:90,000

1 0.5 0 1

Kilometres

DE BEERS CANADA

FILE No:	DATE:
B-Fish-138-GIS	October 7, 2010

JOB NO:	REVISION NO:	
09-1365-1004	1	
OFFICE:	DRAWN:	CHECK:
GOLD-CAL	JH	GA

Figure JJ3.3-1

I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-138-GIS.mxd

Phytoplankton samples were analyzed by Bio-Limno Research and Consulting Inc. (Bio-Limno), Halifax, Nova Scotia, for taxonomic composition, abundance and biomass. Aliquots of 7 millilitres (mL) of the preserved phytoplankton samples were allowed to settle overnight in sedimentation chambers following the procedure of Lund et al. (1958). Algal units were counted from randomly selected transects on a Zeiss Axiovert 40 CFL inverted microscope. Counting units were individual cells, filaments, or colonies depending on the organization of the algae. A minimum of 400 units were counted for each sample. The majority of the samples were analyzed at 500 times magnification (x), with initial scanning for large and rare organisms (e.g., *Ceratium* sp.) completed at 250x. Taxonomic identifications were based primarily on Geitler (1932); Skuja (1949); Findlay and Kling (1976); Anton and Duthie (1981); Huber-Pestalozzi (1961, 1972, 1982, 1983); Tikkanen (1986); Prescott (1982); Whitford and Schumacher (1984); Starmach (1985); Krammer and Lange-Bertalot (1986, 1988, 1991a,b); Komárek and Anagnostidis (1998a,b, 2005); and Wehr and Sheath (2003).

Fresh weight biomass was calculated from recorded abundance and specific biovolume estimates based on geometric solids (Rott 1981), assuming a specific gravity of 1 gram per cubic centimetre (g/cm^3). The biovolume (cubic millimetres per cubic metre [mm^3/m^3] wet weight) of each species was estimated from the average dimensions of 10 to 15 individuals. The biovolumes of colonial taxa were based on the number of individuals within each colony. All calculations for cell concentration and biomass were performed with Hamilton’s (1990) computer program.

JJ3.3.1.2 Data Analysis

Phytoplankton data were summarized as total abundance and biomass, species richness, and abundance and biomass of major taxonomic groups. Community composition was summarized as relative abundances of major taxonomic groups based on abundance and biomass. Chlorophyll *a* concentration was compared among waterbodies and used to estimate trophic status.

JJ3.3.2 Zooplankton

JJ3.3.2.1 2007 Studies

Zooplankton samples were collected from the same waterbodies and sites as phytoplankton (Figure JJ3.3-1 and Table JJ3.3-2). Five samples were collected at each site using a 3 m long, 80 micrometres (µm) mesh plankton net of 50 centimetres (cm) mouth diameter, as described in the British Columbia Freshwater Biological Sampling Manual (BC RISC 1997, internet site). Samples were preserved in 5% buffered formalin. Haul depth was recorded for each sample and was used to calculate the volume of water filtered through the net. Filtering efficiency was assumed to be 100%, based on the low productivity in the lakes sampled, which was expected to result in low suspended sediment concentrations.

Table JJ3.3-2 Zooplankton Sampling Locations and Haul Depths in Lakes, Late Summer 2007

Waterbody	Basin	Location (UTM, NAD83)	Date	Depth of Zooplankton Haul (m)
Lake N16	-	12.584603.7039076	Sept 2, 2007	5
Kennady Lake	K1	12.589237.7037003	Aug 31, 2007	13
	K2	12.589610.7036121	Aug 31, 2007	9
	K3	12.589203.7035423	Aug 31, 2007	12
	K4	12.590048.7035006	Aug 31, 2007	5
	K5	12.591848.7035669	Sept 1, 2007	7.5
Lake 410	-	12.596394.7050113	Sept 3, 2007	3.75
Kirk Lake	-	12.592556.7061037	Sept 3, 2007	3.5

UTM = Universal Transverse Mercator; NAD = North American Datum; m = metre.

Zooplankton samples were analyzed by Salki Consultants Inc., Winnipeg, Manitoba, for abundance and biomass of crustaceans and rotifers. Laboratory methods provided by Salki Consultants Inc. are summarized below. Each sample underwent three levels of analysis, as follows:

- 1/40 or 1/80 of each sample was examined under a compound microscope at 63x to 160x, and all specimens of crustaceans and rotifers were identified to the lowest taxonomic level (typically species) and assigned to size categories;
- a second sub-sample, representing 11 percent (%) of the sample volume, was examined under a stereoscope at 12x for the large species (i.e., *Heterocope septentrionales*, *Holopedium gibberum,* and *Daphnia middendorffiana*) and rare species, which were enumerated and assigned to size categories; and
- the entire sample was examined under the stereoscope to improve abundance estimates for the largest species (i.e., adult male and female *Heterocope septentrionales, Holopedium gibberum,* and *Daphnia middendorffiana*).

All Cyclopoida and Calanoida specimens (mature and immature) were identified to the species level, with the exception of nauplii, which were classified as either Calanoida or Cyclopoida. All Cladocera were identified to the species level.

Rotifers were identified to genus. Zooplankton abundance was reported as individuals per litre (ind/L). Taxonomic identifications were based primarily on Brooks (1957), Wilson (1959), and Yeatman (1959).

Biomass estimates for each taxon were obtained using mean adult sizes determined during the analysis of the zooplankton samples and length-weight regression equations developed by Malley et al. (1989). Additional measurements were made on newly encountered species and to validate consistency of adult sizes. Zooplankton biomass was reported as micrograms (wet weight) per litre (µg/L). Wet weights were converted to dry weight by assuming that dry weight equals 7% of wet weight, based on the results of Malley et al. (1989).

JJ3.3.2.2 Data Analysis

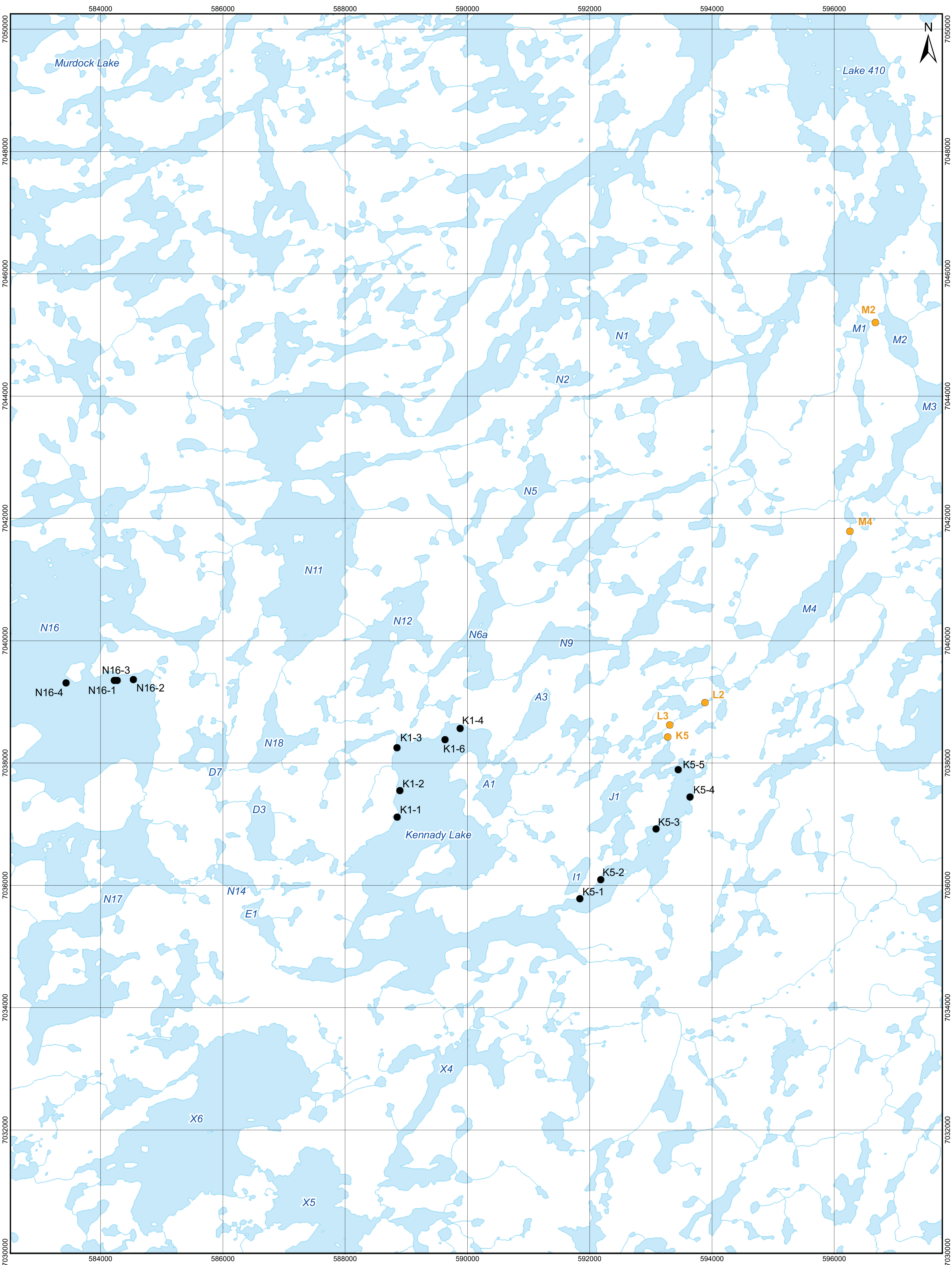
Zooplankton data were summarized as total abundance and biomass, species richness, and abundance and biomass of major taxonomic groups. Community composition was summarized as relative abundances of major taxonomic groups based on abundance and biomass.

JJ3.3.3 Benthic Invertebrates

JJ3.3.3.1 2007 Studies

In 2007, benthic invertebrate sampling was conducted to fill gaps identified in the available baseline data, including limited information on among-site variation in lakes within a habitat type, limited reference lake data, and lack of information on within-site variation in streams.

To fill these data gaps, four sites were sampled in Lake N16 and 10 sites were sampled within Kennady Lake, including five in each of basins K1 and K5 (Figure JJ3.3-2). Five stream sites were sampled for benthic invertebrates within the LSA, downstream of Kennady Lake. Five samples were collected at each site. The 2007 benthic invertebrate survey was conducted by AMEC Earth and Environmental Ltd.



I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-136-GIS.mxd

LEGEND

- Watercourse
- Waterbody
- *A1* Lake Identifier
- Lake Site
- Stream Site

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

GAHCHO KUÉ PROJECT

Benthic Invertebrate Sampling Locations

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS CANADA
Scale: 1:60,000 (1 0.5 0 1 Kilometres)		
FILE No: B-Fish-136-GIS		DATE: September 24, 2010
JOB NO: 09-1365-1004	REVISION NO: 1	**Figure JJ3.3-2**
OFFICE: GOLD-CAL	DRAWN: CC	CHECK: GA

JJ3.3.3.1.1 Field Methods

Benthic invertebrate studies designed to assess environmental quality require the examination of co-varying physical conditions (e.g., substrate characteristics, water velocity, and water depth) and important biological variables (e.g., amount of organic debris), which influence benthic invertebrate distribution and community structure (Cummins and Lauff 1969; Rabeni and Minshall 1977; Alberta Environment 1990; Environment Canada 2002). If sampling sites differ considerably in terms of these attributes, subtle environmental effects (e.g., influences of instream habitat disturbance or pollution) may be difficult or impossible to separate from natural variability. For this reason, sampling sites were selected to minimize physical differences, where possible, and physical characteristics of sampling sites were recorded.

At lake sites, benthic invertebrate samples were collected using a stainless steel Ekman Grab (15 x 15 x 15 cm) with a bottom sampling area of 0.023 square metres (m^2), where bottom sediments were suitable. Each sample was sieved through a sieve bucket with a 500 µm mesh bottom. The material retained in the bucket was placed into individually labelled 1 litre (L) polyethylene jars and preserved with 5% buffered formalin. Samples were shipped to a qualified taxonomist (E. Dratnal, Calgary, Alberta) for taxonomic identification and enumeration of invertebrates.

Water depth, temperature, dissolved oxygen concentration, and specific conductivity were measured at each benthic invertebrate sampling site with a YSI-85 multiparameter meter. An additional sediment sample was collected at each site and sent to ALS Laboratories for determination of sediment particle size, total organic carbon (TOC) content and moisture content.

During the 2007 sampling program, only four sites were sampled in Lake N16 because weather conditions prevented sampling of the fifth planned site on Lake N16. Also, one of the planned sampling sites in Basin K5 of Kennady Lake did not have appropriate bottom substrate for grab sampling so this station was relocated to a different location.

Stream sites generally were located in riffles with gravel/cobble substrates. At these sites, benthic invertebrate samples were collected using a Surber sampler (30 x 30 cm frame) with a bottom sampling area of 0.090 m^2. The Surber sampler was outfitted with 57 cm long collection net made of 500 µm mesh netting. Benthic invertebrates were collected by hand washing of all rocks contained within the Surber's frame while the collection net was oriented downstream to capture dislodged animals. Nets were rinsed with stream water thoroughly after each use. A general description of habitat (i.e., water depth, current velocity, stream dimensions) and substrate particle size (as visual estimate) was recorded at each site. Water temperature was also measured at each sampling location.

Surber samples were placed in individually labelled 1 L polyethylene jars and preserved with 5% buffered formalin. Samples were shipped to a qualified taxonomist (E. Dratnal, Calgary, Alberta) for taxonomic identification and enumeration of invertebrates.

JJ3.3.3.1.2 Laboratory Methods

Laboratory analyses of benthic invertebrate samples were conducted in the same manner for both lake and stream samples, according to methods recommended by Alberta Environment (1990) and Environment Canada (1993). Invertebrates were separated from inorganic and organic material. Each sample was passed through a 200 μm mesh sieve, which separated it into coarse and fine size fractions. Samples containing large amounts of sand were separated into 1 mm and 200 μm fractions; thereafter, the 1 millimetre (mm) fraction was elutriated to separate inorganic and organic matter. Rose Bengal stain was added to the samples prior to sorting, to improve sorting efficiency. To remove all invertebrates from organic debris, each fraction of the sample was examined, portion by portion, on a gridded Petri dish under a dissecting microscope at 10 to 45x magnification. All remaining material was preserved for random checks of removal efficiency.

Benthic invertebrates were identified to the lowest practical taxonomic level, typically genus for most invertebrates within the Class Insecta. Non-insect taxa were usually identified to higher level taxa with the exception of the aquatic worms (Oligochaeta) and snails (Gastropoda), which were identified to family. More difficult groups, such as roundworms (Nematoda) and small early instar animals, were identified to a higher taxonomic level. Sorted invertebrates were stored in vials and preserved in 80% ethanol. Identifications were made using recognized taxonomic keys (Edmunds et al. 1976; Wiggins 1977; McAlpine et al. 1981; Oliver and Roussel 1983; Wiederholm 1983, 1986; Merritt and Cummins 1984; Klemm 1985; Brinkhurst 1986; Pennak 1989; Clifford 1991; Thorp and Covich 1991).

Quality control procedures for laboratory work consisted of verifying invertebrate taxonomic identification and removal efficiency. A reference collection of identified taxa was prepared and all specimens were verified by an independent taxonomist (R.D. Saunders, Calgary, Alberta). As a part of standard quality control measures, residues from 11 samples (12% of the total number of samples) were re-sorted by a person not involved with the initial sorting. A removal efficiency of greater than 95% was considered applicable to the methods incorporated in the laboratory. All re-sorted samples met this criterion.

JJ3.3.3.2 Data Analysis

When analyzing benthic sample data, non-benthic invertebrates, vertebrates, terrestrial taxa, and colonial invertebrates (i.e., Bryozoa [moss animals]) were omitted from data processing. Abundances (number per sample) were converted to densities (number per square metre [no/m²]). These data were then used for the calculation of the following community descriptors and biotic indices:

- total invertebrate density;
- taxon richness;
- Simpson's diversity index (diversity);
- evenness;
- densities of dominant taxa; and
- community composition (relative densities of major invertebrate taxa).

Richness is the total number of taxonomic groups within a station. It provides an indication of the diversity of benthic invertebrates in an area; a higher richness value usually indicates a more healthy and balanced community.

Simpson's index of diversity measures the proportional distribution of organisms in the community, given that not all organisms have the same success in the environment. Certain conditions may favour one organism over another (Simpson 1949). Simpson's index of diversity values range between 0 and 1, where lower values indicate a community dominated by fewer taxonomic groups (less diverse); these are often referred to as stressed communities. Values close to 1 indicate a community consisting of more taxa that are more evenly distributed among the taxonomic groups present. Simpson's index of diversity was calculated using the formula provided by Krebs (1999), as recommended by Environment Canada (2002) for environmental effects monitoring (EEM) programs:

$$D = 1 - \sum_{i=1}^{S} (p_i)^2$$

where:

D = Simpson's index of diversity;
S = the total number of taxa; and
p_i = the proportion of the i^{th} taxon.

Evenness is an index recommended by Environment Canada (2002) for analyzing EEM data. It is a measure of how evenly the total invertebrate density is distributed among the taxa present at the site. Evenness is also expressed as a value between one and zero, with one representing high evenness and zero representing low evenness. Evenness was calculated using the formula provided by Smith and Wilson (1996):

$$E = 1/\sum_{i=1}^{S} (p_i)^2 / S$$

where:

E = Evenness;
p_i = the proportion of the i^{th} taxon; and
S = the total number of taxa.

Benthic invertebrate summary variables are presented in tabular and graphical format. Qualitative comparisons among sampling locations among lake sites and among stream sites were also completed.

Spearman rank correlations were calculated between total benthic invertebrate density, richness and densities of dominant taxa, and selected habitat variables (total organic carbon, sediment particle size, and water depth for lakes; water depth, current velocity, percent cobble substrate, and percent gravel substrate for streams). Statistically significant correlations were examined as scatter-plots to determine whether they represented consistent trends or resulted from one or a few atypical points with high leverage on the value of the correlation coefficient. SYSTAT 11 (SYSTAT 2004) was used to calculate Spearman rank correlations.

JJ3.4 FISHERIES INVESTIGATIONS

JJ3.4.1 Kennady Lake Fish Population Estimates

JJ3.4.1.1 2010 Studies

JJ3.4.1.1.1 Hydroacoustic Survey

Mobile hydroacoustic methods (e.g., Kubecka and Wittingerova 1998; Gangl and Whaley 2004) were used to actively sample pelagic fish populations in Kennady Lake. Hydroacoustic sampling can provide both precise and accurate estimates of population sizes, particularly when used in combination with other sampling techniques such as gill netting (e.g., Yule 2000; Gangl and Whaley 2004).

The Kennady Lake hydroacoustic surveys targeted lake trout (*Salvelinus namaycush)*, a pelagic species (Section 8.3.8.2.2 of the EIS). However, it was anticipated that the surveys would detect other numerically abundant sportfish species that are not truly pelagic, such as round whitefish (*Prosopium cylindraceum*) (Section 8.3.8.2.2 of the EIS). In addition, the hydroacoustic surveys emphasized the detection of larger fish, such as mature lake trout. The study design avoided shallow water where hydroacoustics are generally ineffective, even though these waters can support fish (e.g., juvenile fish). For example, YOY lake trout in Arctic lakes typically move to shallow water, shorelines and to adjacent streams (Golder 2009). This may be a behavioural strategy to avoid predation from large fish in the pelagic zone.

The hydroacoustic surveys were executed over seven days, and included one day of field calibration. In total, Kennady Lake was surveyed three times using hydroacoustic methods. The first hydroacoustic survey was conducted on August 14, 2010, followed by gill netting on August 15, at locations where the hydroacoustic survey was conducted the previous day. This sampling schedule and design was repeated on August 16 to 17 and again on August 18 to 19, 2010. It was later deemed that August 14 surveys failed to effectively sample Kennady Lake due to a combination of wind gusts that were beyond the recommended wind speed threshold of 14 kilometres per hour (km/h), and an adjustment that was required for the side-looking transducer (the angle of the side-looking transducer required an adjustment of approximately 1^{o} downward to reduce interference from the surface). As such, all hydroacoustic data collected on August 14 were excluded from analysis.

It was assumed that individual fish approached even distributions across the lake during the surveys and that surveys were completed before lake trout make their seasonal movements to shallow water spawning areas in September (Section 8.3.8.2.9 of the EIS). Gill netting and hydroacoustic surveys were conducted only during daylight hours due to worker safety considerations. Other researchers have shown that daylight levels do not noticeably alter fish behaviour and distributions in lakes at northern latitudes (Hartman and Margraf 2007).

The sampling unit for the study was defined as the basin (i.e., K1 to K5) with multiple transects and gill net sets within a basin to provide satisfactory spatial coverage of varying habitats and depths. The goal of the hydroacoustic surveys was to have a minimum coverage ratio of 5:1 for Kennady Lake. The coverage ratio was defined as the ratio of total transect length to the square root of the surface area of water (Winfield et al. 2009). Preliminary field assessments identified poor access to Basin K5 across the rocky shelf separating K4 from K5; therefore these transects were removed from the study design (Figure JJ3.4-1).

LEGEND

- Proposed Transect
- August 14th Route (Excluded from Analyses)
- August 16th Route
- August 18th Route

NOTES

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

GAHCHO KUÉ PROJECT

Hydroacoustics Transect Locations

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS CANADA
Scale: 1:50,000 (500 250 0 500 Metres)		
FILE No: B-Fish-137-GIS		DATE: September 27, 2010
JOB NO: 09-1365-1004	REVISION NO: 0	Figure JJ3.4-1
OFFICE: GOLD-CAL	DRAWN: CW	CHECK: GA

I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-137-GIS.mxd

The final study design included a total length of transects of approximately 14 km for basins K1 to K4 combined. This resulted in a coverage ratio of 5.4:1 for the total surface area of K1 to K4, and a ratio of 4.9:1 for the entire surface area of Kennady Lake. The coverage ratios were within the range of ratios typically used in other hydroacoustic programs (values range from 3:1 to 7:1; reviewed in Winfield et al. 2009).

Hydroacoustic data were collected with BioSonics ® DT-X echosounder systems oriented for both horizontal and vertical split-beam sonar (Table JJ3.4-1). Use of horizontal beaming is the recommended approach for estimating fish densities in shallow water and in lakes where fish may be distributed near the surface (e.g., Kubecka and Wittingerov 1998; Knudson and Saegrov 2002; Gangl and Whaley 2004). Horizontal beaming allows for fish detection near the surface (i.e., less than 5 m), where fish are typically missed by a vertically-oriented transducer beam. The advantage of vertical beaming is the application of reliable equations for calculating fish lengths using data on target strength (Love 1971); however, the application of vertical beaming alone is generally not recommended for shallow water conditions, such as those that characterize Kennady Lake.

Table JJ3.4-1 Parameter Inputs for the Transducer and Analysis of Hydroacoustic Data from Kennady Lake (August 14 to 18, 2010)

Specifications	Horizontal Beaming	Vertical Beaming
Equipment		
Boat Speed (m/s)	1.5	1.5
Ping Rate (per sec)	5	5
Transducer Beam Width (°)	7.1	6.8
Transducer Frequency (kHz)	418	199
Pulse Width (ms)	0.4	0.4
Processing		
Analysis Threshold (dB)	-50	-55
Bottom Threshold (dB)	-60	-55
Bottom Width (m)	0.1	0.1
Bottom Blanking Zone (m)	1.25	0.35
Target Recognition (dB)	-50	-55
Target Correlation Factor	0.93	0.90
Target Min. Pulse Width	0.75	0.75
Target Max. Pulse Width	3	3
Target End Point Criteria (dB)	-12	-12
Echo Integration Scaling	Target strength method	Target strength method

Note: Unless otherwise specified, default inputs were used and followed the 'User Guide' for Visual Analyzer™ 4.1.3.6 (Biosonics 2004)

m/s = metres per second; ° - degrees; kHz = kilohertz; ms = milliseconds; dB = decibel; m = metre

In this study, the horizontal (or 'side-looking') echosounder system used a 418 kiloHertz (kHz) transducer operating at a 7.1° angle; whereas, the vertical (or 'down-looking') system used a 199 kHz transducer operating at a 6.8° angle. Data were collected at a pulse-duration of 0.4 ms (milliseconds) to a notebook computer running BioSonics® Visual Acquisition™ Program 5.1. For data acquisition, a threshold of -85 decibels (dB) was used.

JJ3.4.1.1.2 Gill Netting

Standard gill netting methods were conducted in 2010 to capture the variability in the structure of the fish community across habitats and locations surveyed by hydroacoustics. The goal was to deploy multiple, short-duration gill net sets each day (three days in total). A clear advantage of this approach was to minimize fish mortality. Nets were positioned along the hydroacoustic transects perpendicular to shoreline and at depths greater than 2 m (Figure JJ3.4-1). A net typically comprised two panels, where panels were 10 x 1.5 m each and of 64 mm and 89 mm mesh size. In some locations, a one-panel net (10 x 1.5 m) of 38 mm mesh size was set. Nets were checked and re-located every one to three hours. Captured fish were identified to species, measured for fork length and weight, and immediately released to the approximate location of their capture.

JJ3.4.1.2 Data Processing and Analysis

JJ3.4.1.2.1 Hydroacoustic Survey

Data were processed in Biosonics Visual Analyzer™ 4.1.3.6. Processing methods followed the user manual for the software (Biosonics 2004), and were later verified by Biosonics® technical support staff (e.g., Brian Moore, personal communication, Sept. 21, 2010). The approach was designed to be easily replicated in the future, and was consistent with that used in previously published research (Knudsen and Saegrov 2002; Wanzenbock et al. 2003). For processing, a threshold of -50 dB was set for the horizontal (418 kHz) data and a threshold of -55 dB was set for the vertical (199 kHz) data. A higher threshold was used for the horizontal data to better eliminate interference (or noise) that characterizes horizontal acoustic data. The proposed thresholds eliminated all small fish from analyses and simplified data processing by eliminating targets resembling invertebrates or interference. The goal was to include as many sizes of fish as possible, but also provide an estimate that was reliable (i.e., precise and accurate). For vertical beaming, the -55 dB threshold eliminated fish that were less than 4.4 cm in length according to the target strength (TS) equation for 199 kHz data (Love 1971). Love's equation was based on a multitude of fishes and various frequencies ranging from 15 to 1,000 kHz, and has been applied in numerous studies:

Equation JJ3-1

$$L = 10^{((TS+26.18) \div 19.4)}$$

where L refers to fish length (m). For horizontal beaming, the -50 dB threshold eliminated fish that were less than 7.7 cm in length according to the below TS equation developed for 420 kHz data (Kubecka 1994). Kubecka's equation was based on brown trout (*Salmo trutta*):

Equation JJ3-2

$$L = 10^{((TS+102) \div 27.6)}$$

Visual Analyzer™ derived the number of fish per unit area (m^2), as well as target strength distributions in 2 dB groups. Echograms showing target echoes and their voltage returns were captured in 'screen shots' (Appendix JJ.I). All fish targets identified by Visual Analyzer™ were evaluated. Target signal-to-noise ratios and the proximity of targets to the lake bottom profile were considered in assessing whether targets were valid. In some cases, Visual Analyzer™ outputs of fish per unit area were modified and set to zero for pings where targets resembled the lake bottom, interference, rocks, or invertebrates. This approach of visual inspections combined with software algorithms increased the reliability of the results, ensuring that fish densities were not being under- or over-estimated.

The distributions of TS values were presented for horizontal and vertical beaming. Results were presented separately, because the frequencies of the beaming varied and the relationship between target strength and fish size depends on the orientation of the transducer (e.g., Love 1971; Kubecka 1994). TS values can assist with understanding the characteristics of the fish detected during the hydroacoustic surveys (e.g., fish lengths via Love's equation). Target strength distributions can also provide a baseline for future monitoring of Kennady Lake. However, it is critical that interpretations of TS distributions (from Visual Analyzer™) consider that multiple targets can be associated with the same fish. Also, when predicting fish length using TS, Love's equation is valid only in the range of $0.7 \leq L/\lambda \leq 90$, where λ is wavelength. Thus, estimating fish lengths can be unreliable for targets exceeding -30 dB, which would represent a fish longer than approximately 86 cm. Further, target strength formulas may fail to accurately address lake trout in Kennady Lake, as the formulas were developed using different species and under different environmental conditions (Love 1971; Kubecka 1994). Upon comparison of target strength data to the gill net catch, it was anticipated that use of the target strength formulas may, if anything, lead to an overestimation of lake trout abundance in Kennady Lake (also see Hartman and Margraf 2007).

Fish densities were calculated per basin and survey by the summation of mean horizontal densities and mean vertical densities for that basin and survey. The approach of using a basin as the sampling unit, rather than an individual transect, was selected because basins were considered distinct habitat units that could be identified on bathymetric maps. Adjacent basins were expected to be more (statistically) independent than adjacent transects in a basin of Kennady Lake. It is important to note that for calculating density, horizontal fish-per-unit-areas were converted by dividing by the range (or extent) of the sampling cone (m) and by multiplying by the maximum depth (m) that was sampled. This calculation was necessary so that horizontal and vertical fish-per-unit-areas represented similarly oriented dimensions in space (Dawson 2010, pers. comm.). Total fish densities were calculated as the summation of mean horizontal densities and mean vertical densities per basin and survey. Next, the total fish population for Kennady Lake was calculated as the mean basin density (fish/ha [ha]) multiplied by the total surface area (ha) of the lake.

Given the small sample size and the expectation of large variances associated with the calculation of mean fish densities, 90% confidence intervals were used (instead of 95%) and variance estimates were based on clustered errors (i.e., clusters = 4 basins, n = 8 observations). Note that if the level of confidence is increased, we concomitantly increase the width of the confidence interval and trade-off utility with confidence (Zar 1999). Trends in mean fish densities across surveys and basins were also evaluated. Statistics were generated using the software STATA™ 9.2.

JJ3.4.1.2.2 Gill Netting

The baseline gill netting programs in 2004 (Annex J) and 2010 were the most recent programs, and therefore, were considered the most relevant for interpretation of the hydroacoustic data. Specifically, the most recent catch data were used to estimate the percent relative abundance of lake trout in Kennady Lake. In addition, previously recorded fish lengths (from gill netting) were compared to lengths predicted from the TS equations (Equation JJ3-1 and JJ3-2). It was concluded that if the distribution of fish lengths from gill netting differed from that of hydroacoustics, either the target strength equations were inaccurate or the techniques sampled different components of the fish assemblage. Finally, as part of validation of the hydroacoustic data, Pearson correlations of fish densities and gill netting catch-per-unit-effort (CPUE) values were calculated. An alpha level of 0.10 was applied.

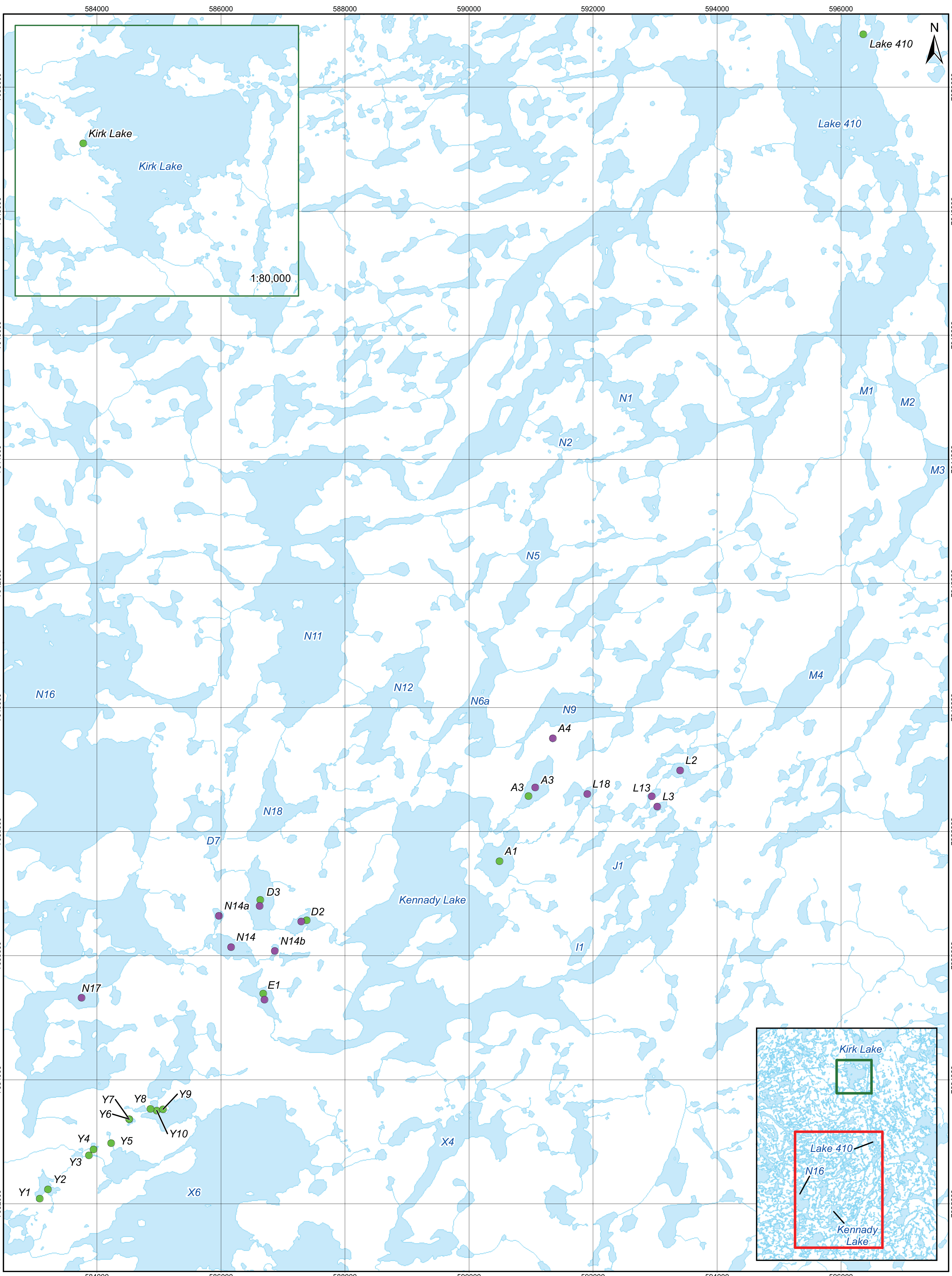
JJ3.4.2 Lake Fish Inventory Surveys

Numerous small lakes and a few larger lakes were sampled for fish in 2007 and 2010. Similar to previous studies (Annex J), the overall objective of the lake sampling program was to determine fish presence as well as species composition and relative abundance, where possible. Specific sampling methods used for each lake sampled are summarized in Table JJ3.4-2. Sampling locations are shown on Figure JJ3.4-2.

Table JJ3.4-2 Fish Sampling Conducted in Lakes, 2007 and 2010

Lake ID	2007			2010	
	Shoreline Electrofishing	Gill Nets	Minnow Traps	Gill Nets	Minnow Traps
Kennady Lake Watershed					
A1	✓	✓	-	-	-
A3	✓	✓	-	✓	✓
D2	✓	✓	✓	✓	✓
D3	✓	✓	✓	✓	✓
E1	✓	✓	✓	✓	✓
Adjacent 'N' Watershed					
N14	-	-	-	✓	✓
N14a	-	-	-	✓	✓
N14b	-	-	-	✓	✓
N17[(a)]	-	-	-	✓	✓
Downstream of Kennady Lake					
Kirk Lake	✓	-	-	-	-
Lake 410	✓	-	-	-	-
L2	-	-	-	✓	✓
L3	-	-	-	✓	✓
L12	-	-	-	✓	✓
L13	-	-	-	✓	✓
L18	-	-	-	✓	✓
Outside of the LSA					
Y1	✓	-	-	-	-
Y2	✓	-	-	-	-
Y4	✓	-	-	-	-
Y5	✓	-	-	-	-
Y6	✓	-	-	-	-
Y7	✓	-	-	-	-
Y8	✓	-	-	-	-
Y9	✓	-	-	-	-
Y10	✓	-	-	-	-

(a) Sampling only conducted in northeast basin of N17.
✓ = Sampled.
\- = Not sampled.



I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-134-GIS.mxd

LEGEND

- Watercourse
- Waterbody
- *A1* Lake Identifier

Sampling Year

- 2007
- 2010

NOTES

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

GAHCHO KUÉ PROJECT

Lake Fish Sampling Locations, 2007 and 2010

PROJECTION: UTM Zone 12		DATUM: NAD83	DE BEERS CANADA
Scale: 1:60,000 (1 0.5 0 1 Kilometres)			
FILE No: B-Fish-134-GIS			DATE: August 25, 2010
JOB NO: 09-1365-1004	REVISION NO: 1		**Figure JJ3.4-2**
OFFICE: GOLD-CAL	DRAWN: RL	CHECK: GA	

JJ3.4.2.1 2007 Studies

In 2007, 14 small lakes were sampled for fish (Figure JJ3.4-2). As part of a cursory survey of waterbodies adjacent to an esker, nine of these lakes were sampled along the shoreline with a backpack electrofisher. The remaining five lakes were sampled as part of the general fisheries investigations program, utilizing a variety of methods, including minnow trapping, gill netting and shoreline electrofishing.

Gill nets were composed of small mesh (38, 51, and 64 mm) SLIN (Spring Littoral Index Netting) panels. Gill nets were typically set for less than one hour and were set to maximize the habitat type sampled.

Shoreline electrofishing was conducted with a Smith-Root Model 12 backpack electrofisher. Shoreline sections sampled were typically 50 to 100 m in length and 3 m in width, and covered multiple shoreline habitat types. Shorelines sampled as part of the esker survey, however, were only conducted on the shoreline adjacent to the esker.

Minnow traps were baited and set overnight. Traps were set in rocky shoreline areas, less than 2 m in depth.

Fish captured were placed in holding buckets and brought to shore for processing. Each fish was identified, enumerated and measured for length and weight. Fish were then released from shore.

JJ3.4.2.2 2010 Studies

In 2010, 13 lakes were sampled for fish (Figure JJ3.4-2); these included 12 small lakes and the northeast basin of N17. Lakes were sampled by gill netting and minnow trapping, where appropriate.

Gill nets were standard FWIN (Fall Walleye Index Netting) nets, composed of eight 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 (h).

Minnow traps were baited and set in the shallow littoral zone at depths less than 1 m. Minnow traps were set overnight, where possible.

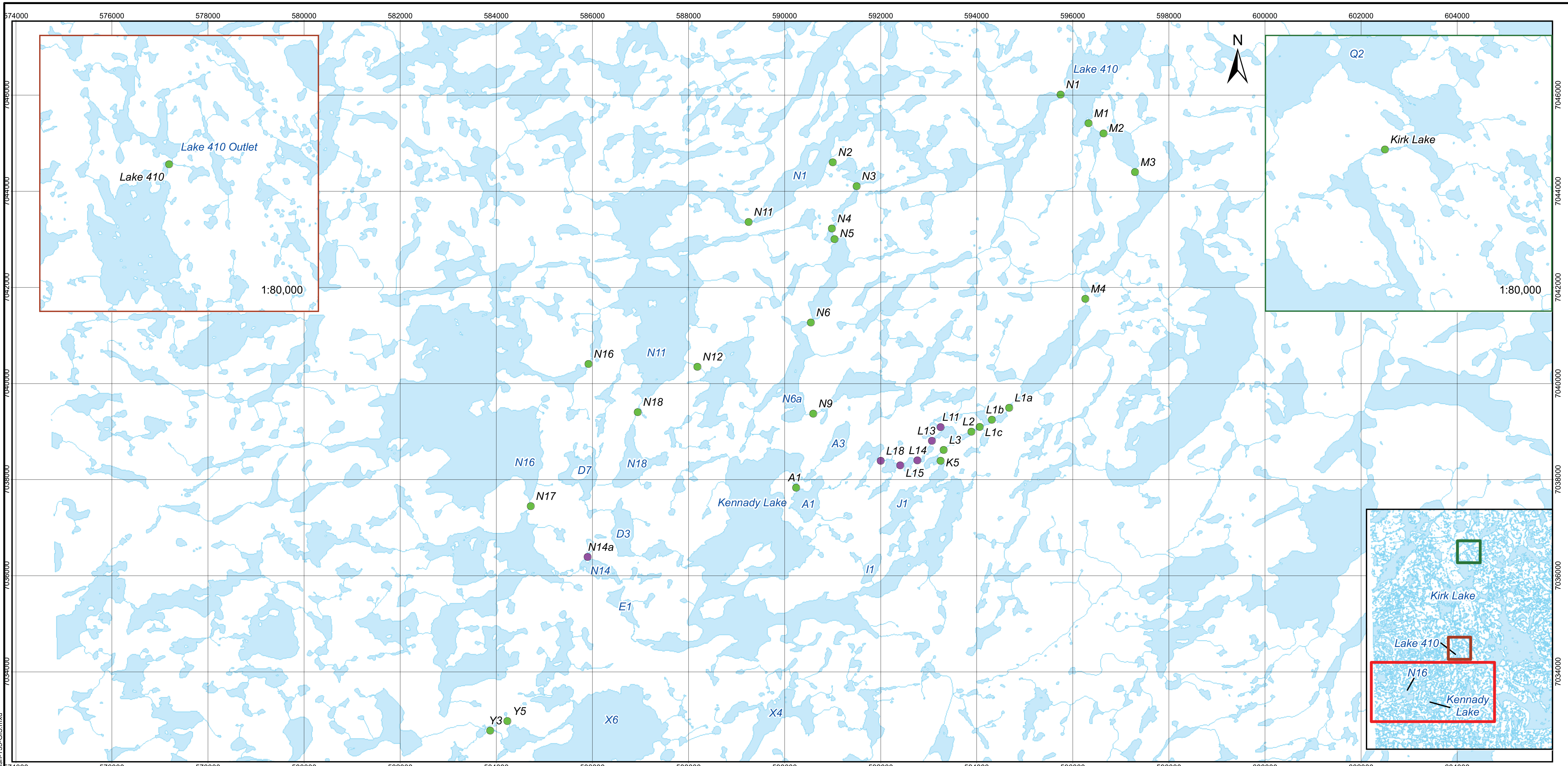
Captured fish were held in large tubs of water and processed at the sampling site. Fish were identified, enumerated, and measured for length and weight, then released into the habitat from which they were captured. Voucher specimens of forage fish species were preserved in formalin for identification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

JJ3.4.2.3 Data Analysis

Data collected during the 2007 and 2010 field programs were entered into respective databases. Quality assurance / quality control procedures were conducted to minimize errors during the data entry process. Lakes sampled for fish were designated as fish bearing, non-fish bearing, or unknown, as described in Annex J. Catch-per-unit-effort was calculated by fish/100 m^2/12 h for gillnetting, fish/100 m for shoreline electrofishing, and fish/trap-days for minnow trapping.

JJ3.4.3 Stream Fish Inventory Surveys

Streams were sampled for fish in 2007 and 2010 (Figure JJ3.4-3). These fish inventory surveys were typically conducted using minnow traps and a backpack electrofisher. Specific sampling methods used for each stream sampled are summarized in Table JJ3.4-3.



LEGEND

- Watercourse
- Waterbody
- *A1* Lake Identifier

Sampling Year
- 2007
- 2010

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000
*Habitat Surveys Conducted in 1996, 1999, 2000, 2001, and/or 2005

K:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-135-GIS.mxd

GAHCHO KUÉ PROJECT

Stream Fish Sampling Locations, 2007 and 2010

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS CANADA
Scale: 1:80,000 (1 0.5 0 1 Kilometres)		
FILE No: B-Fish-135-GIS		DATE: August 25, 2010
JOB NO: 09-1365-1004	REVISION NO: 1	Figure JJ3.4-3
OFFICE: GOLD-CAL	DRAWN: RL	CHECK: GA

Table JJ3.4-3 Fish Inventory Surveys Conducted in Streams, 2007 and 2010

Stream	2007		2010	
	Backpack Electrofishing	Minnow Traps	Backpack Electrofishing	Minnow Traps
Kennady Lake Watershed				
A1	✓	-	-	-
Adjacent 'N' Watershed				
N1	✓	-	-	-
N2	✓	-	-	-
N3	✓	-	-	-
N4	✓	-	-	-
N5	✓	-	-	-
N6	✓	-	-	-
N9	✓	-	-	-
N11	✓	-	-	-
N12	✓	-	-	-
N14a	-	-	✓	✓
N16	✓	-	-	-
N17	✓	✓	-	-
N18	✓	-	-	-
Downstream of Kennady Lake				
K5	✓	-	-	-
L1a	✓	-	-	-
L1b	✓	-	-	-
L1c	✓	-	-	-
L2	✓	-	-	-
L3	✓	-	-	-
L11	-	-	✓	✓
L13	-	-	✓	✓
L14	-	-	✓	✓
L15	-	-	✓	✓
L18	-	-	✓	✓
M1	✓	-	-	-
M2	✓	-	-	-
M3	✓	-	-	-
M4	✓	-	-	-
Lake 410 Outlet	✓	-	-	-
Kirk Lake Outlet	✓	-	-	-
Outside of the LSA				
Y3	✓	-	-	-
Y5	✓	-	-	-

✓ = Sampled; - = Not sampled.

JJ3.4.3.1 2007 Studies

In the summer and fall of 2007, fish inventory surveys were conducted at a total of 27 streams (Table JJ3.4-3, Figure JJ3.4-4).

Backpack electrofishing was conducting using a Smith-Root Model 12 electrofisher. Two of the 27 streams were part of the cursory esker survey (Y3 and Y5). One-pass backpack electrofishing was conducted at the two esker survey streams.

The remaining 25 streams also were sampled with a backpack electrofisher; however, the section of stream sampled was blocked with stop-nets at the upstream and downstream ends. As part of the study of YOY Arctic grayling out-migration, if YOY were captured in a pass, subsequent passes were completed. Fish were released outside of the netted area after each pass.

Minnow trapping was also conducted at Stream N17, at the confluence of Lake N16. Minnow traps were set overnight in shallow water depths.

Fish captured were identified, enumerated, and measured for length and weight. Fish were then released in habitat similar to which they were captured. Voucher specimens of field identified lake chub (*Couesius plumbeus*) were preserved in 10% formalin for laboratory identification verification.

Based on the rationale discussed in Section J4.4.10.1 of Annex J, the presence of peamouth was questioned in the Kennedy Lake watershed. Consequently, in 2007, a sampling program was conducted to specifically determine the presence/absence of peamouth. This sampling program was conducted with assistance from DFO representatives and involved returning to the sites where peamouth was previously identified, as well as targeting habitats preferred by peamouth. Four separate keys, including McPhail and Lindsey (1970), McPhail and McPhail (2007), Nelson and Paetz (1992), and Stewart and Watkinson (2004), were used for cyprinid identification. Voucher specimens were also examined in a laboratory by P. Cott from DFO.

JJ3.4.3.2 2010 Studies

In the summer of 2010, fish inventory surveys were conducted at six streams (Table JJ3.4-2, Figure JJ3.4-4). Methods 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 length of the stream, where applicable.

Minnow traps were baited 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 released in the habitat in which they were captured. Voucher specimens of forage fish species were preserved in 10% formalin for laboratory identification verification.

JJ3.4.3.3 Data Analysis

Data collected during the 2007 and 2010 field programs were entered into respective databases. Quality assurance / quality control procedures were conducted to minimize errors during the data entry process.

Catch-per-unit-effort was calculated per stream area in 2007 (fish/100 m^2) as the sampling sections were closed with stop-nets and channel width was determined. In 2010, CPUE was calculated per stream length (fish/100 m). Where multiple passes were conducted, total number of each species and total CPUE was calculated using only fish captured from the first pass.

In 2007, three-pass depletion method was used to estimate population size of YOY Arctic grayling (less than 70 mm fork length). Calculations were based on the formulas presented in Lockwood and Schneider (2000), as described in Annex J.

JJ3.4.4 Fish Tissue Metal Concentrations

JJ3.4.4.1 Previous Studies

Metal[1] concentrations in muscle and liver tissue samples from lake trout and round whitefish collected from Kennady Lake and Lake N16 were first assessed in 1996 (Canamera 1998). Samples were collected from 20 lake trout and 15 round whitefish from Kennady Lake, and 20 lake trout and 20 round whitefish from Lake N16 (Canamera 1998). Muscle and liver collection methods were outlined in Canamera (1996). Metal concentrations detected in muscle tissue

[1] Note that for the purposes of this document, the term ‘metals’ includes non-metals, such as selenium and metalloids such as arsenic.

samples are outlined in Annex J. Data for liver tissue samples were not included in Annex J and are summarized in this addendum. Metal concentrations were reported in milligram per kilogram (mg/kg) dry weight but were converted to mg/kg wet weight to be consistent with Annex J. The conversions were made using the equation:

$$Concentration\ in\ wet\ weight = Concentration\ in\ dry\ weight\ x\ \frac{100 - percent\ moisture}{100}$$

Summary statistics (i.e., mean, minimum, maximum, standard deviation) for liver concentrations were presented for each study area. Results of the laboratory analyses for all lake trout and round whitefish tissue collected are provided in Appendix JJ.II, Tables JJ.II-1 and JJ.II-2.

Muscle and liver tissue samples were collected for analysis of metals and moisture content from lake trout, round whitefish, northern pike, Arctic grayling, and lake cisco (*Coregonus artedi*) collected from Kennady Lake and Lake N16 in 1999 (EBA and Jacques Whitford 2000). Fish tissue samples were collected opportunistically, and as a result, sample sizes are low. Metal concentrations in muscle samples are discussed in Annex J. Data for liver tissue samples are presented in this addendum. Metal concentrations were reported in mg/kg dry weight and were converted to mg/kg wet weight using the above equation to be consistent with Annex J. Summary statistics (i.e., mean, minimum, maximum, standard deviation) for liver concentrations were presented for each study area.

JJ3.4.4.2 2007 Studies

Slimy sculpin were collected from Kennady Lake, Lake 410, Kirk Lake, and Lake N16 for analysis of whole body metals concentrations. Slimy sculpin were chosen for analysis as they are useful in monitoring the effects of changes in sediment and water quality due to their sedentary nature and reliance on benthic invertebrates as food.

JJ3.4.4.2.1 Field Methods

The original sampling protocol for metal analysis of slimy sculpin called for samples to be taken from Kennady Lake, Lake 410, Kirk Lake, and Lake N16. However, very few fish (one or none in each lake) were captured with backpack electrofishing in the nearshore area. Due to the large amount of effort needed to collect a sufficient sample size of slimy sculpin in these lakes, stream sampling was used instead of lake sampling. Sampling in 2005 indicated a high abundance of slimy sculpin in area streams. Slimy sculpin were collected from

Stream L2 (for Kennady Lake) due to the high abundance in this stream relative to K5 or L3. Outlet streams for Lake 410, Kirk Lake, and Lake N16 were also sampled for slimy sculpin in lieu of the lake shorelines. Slimy sculpin collected from steam L2 and Lake N16 outlet were sampled in the summer of 2007, whereas slimy sculpin taken from Lake 410 and Kirk Lake outlets were collected in the fall of 2007 due to time limitations during the summer field program.

Slimy sculpin were collected using a backpack electrofisher. Sites with abundant cobble or boulder substrate and medium flow were targeted for electrofishing. Information on sampling effort and habitat characteristics is provided in Appendix JJ.II, Table JJ.II-3. Captured fish were enumerated and measured for length and weight (Appendix JJ.II Table JJ.II-4). Slimy sculpin were sacrificed by a blow to the head, placed in a labelled sample bag, and stored in a cooler until return to camp. The slimy sculpin catch from each stream was placed into one bag per site and frozen prior to shipment to the analytical laboratory.

JJ3.4.4.2.2 Laboratory Methods

Two replicate whole body composite samples of slimy sculpin from each study area were analyzed by ALS Laboratory Group (Vancouver, British Columbia) for the following parameters:

- metals (aluminum, antimony, arsenic, barium, beryllium, bismuth, cadmium, calcium, chromium, cobalt, copper, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, uranium, vanadium, zinc); and
- percent moisture.

To create the two composite samples, the analytical laboratory emptied each sample bag of frozen fish into a jar and blended the contents until homogenized. The homogenized sample was then divided into two replicate composite samples.

A list of the parameters, analytical methods, and their associated detection limits used for the slimy sculpin analyses is presented in Table JJ3.4-4. A copy of the analytical report is presented in Appendix JJ.III.

Table JJ3.4-4 Analytical Methods and Associated Detection Limits Used for Analysis of Metals in Whole Body Slimy Sculpin Samples, 2007

Parameter	Method	Detection Limit	
		(mg/kg dw)	(mg/kg ww)
Aluminum (Al)	Puget Sounds Protocols, EPA 6020A-ICPMS	10	2.0
Antimony (Sb)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.050	0.010
Arsenic (As)	Puget Sounds Protocols, EPA 7000-HVAAS	0.10	0.020
Barium (Ba)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.050	0.010
Beryllium (Be)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.30	0.10
Bismuth (Bi)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.30	0.030
Cadmium (Cd)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.030	0.0050
Calcium (Ca)	Puget Sounds Protocols, EPA 6020A-ICPMS	10	2.0
Chromium (Cr)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.50	0.10
Cobalt (Co)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.10	0.020
Copper (Cu)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.050	0.010
Lead (Pb)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.10	0.020
Lithium (Li)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.50	0.10
Magnesium (Mg)	Puget Sounds Protocols, EPA 6020A-ICPMS	3.0	1.0
Manganese (Mn)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.050	0.010
Mercury (Hg)	Puget Sounds Protocols, EPA 245.7-CVAFS	0.005	0.0010
Molybdenum (Mo)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.050	0.010
Nickel (Ni)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.50	0.10
Selenium (Se)	Puget Sounds Protocols, EPA 6020A-ICPMS	1.0	0.20
Silver (Ag)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.030	0.010
Strontium (Sr)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.050	0.010
Thallium (Tl)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.030	0.010
Tin (Sn)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.20	0.050
Uranium (U)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.010	0.0020
Vanadium (V)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.50	0.10
Zinc (Zn)	Puget Sounds Protocols, EPA 6020A-ICPMS	0.50	0.10
% Moisture	Oven dry 105°C-Gravimetric	10	2

mg/kg = milligram per killigram; dw = dry weight; ww = wet weight; ICPMS = inductively coupled plasma – mass spectrometry; HVAAS = hydride vapour atomic absorption spectrophotometry; CVAFS = cold vapour atomic fluorescence spectrophotometry; °C = degrees Celsius

JJ3.4.4.3 Data Analysis

Summary statistics (i.e., mean, minimum, maximum, standard deviation) for slimy sculpin length and weight were calculated for each study area to contrast differences in body size among areas. Length frequency distributions using 10 mm length classes were also prepared for slimy sculpin captured in each area. Because only two replicate whole body composite samples were analyzed for metal concentrations for each area, no statistical comparisons of metal concentrations were made. Instead, qualitative comparisons using mean metal concentrations were made. Relative percent difference[2] in metal concentrations between the duplicates was calculated to assess analytical variability between laboratory duplicate composite samples.

[2] Relative percent difference is the absolute difference between the duplicate values divided by the average of the two duplicates.

JJ4 RESULTS

JJ4.1 AQUATIC HABITAT

JJ4.1.1 Lakes

Descriptions and photos of the aquatic habitat at each lake surveyed in 2007 and 2010 are provided in Appendix JJ.IV. Habitat maps for the detailed aquatic habitat surveys conducted in 2010 are provided in Appendix JJ.V. Table JJ4.1-1 summarizes the areas and the habitat characteristics of each lake surveyed in 2010; however, as the 2007 small lake surveys were cursory, this information was not collected in the 2007 surveys. A summary of the habitat categories by percent area of each lake surveyed in 2010 is provided in Table JJ4.1-2.

The 10 lakes surveyed outside of the LSA in 2007 were small waterbodies, ranging from 0.1 to 5.4 ha in size, with the exception of Lake Y10, which has a surface area of 22.8 ha. Similarly, four of the six lakes surveyed in 2010 (Lakes A4, N14a, N14b, and L13) were very small and shallow, with surface areas ranging from 0.4 to 3.3 ha and maximum depths less than 4 m. Lake L18 was larger, but still considered a small lake, with a surface area of 14.2 ha and a maximum depth of 5.5 m. The northeast basin of Lake N17 was the largest and deepest waterbody surveyed, and it had a surface area of 91.5 ha and a maximum depth of 10.5 m.

As per Annex J, the lakes surveyed generally were shallow depressions in the tundra, characterized by shallow, low gradient shorelines dominated by fines and boulder substrates. Aquatic vegetation, when present, typically was restricted to shorelines and inlet/outlets with streams. At moderate to deep depths (greater than 2 m), lake bottom substrate was generally fines/organics and absent of aquatic vegetation.

Due to typical winter ice depths of 2 m in the region, Lakes A4, N14b, and L13 were not considered suitable for overwintering, as the maximum depths observed were less than 2 m. Lake N14a may contain some pockets of overwintering habitat at its deepest location (3.5 m); however, this likely becomes oxygen depleted in mid to late winter. Based on depth, Lake L18 and the northeast basin of Lake N17 likely provide suitable overwintering habitat for fish, with maximum depths of 5.5 and 10.5 m, respectively.

The fish-bearing status of lakes sampled in 2007 and 2010 is presented in the fisheries investigation section (Section JJ.4-4).

Table JJ4.1-1 Summary of Areas and Habitat Characteristics for Lakes Surveyed, 2007 and 2010

Lake	Lake Area (ha)	Maximum Depth (m)	Dominant Shallow Habitat [(a)]
Kennady Lake Watershed			
A4	0.4	0.4	8LI
Adjacent 'N' Watershed			
N17	91.5 (b)	10.5	10LI
N14a	3.2	3.5	10LI
N14b	2.0	0.7	8LI
Downstream from Kennady Lake			
L13	3.3	1.3	8LI
L18	14.2	5.5	1LI
Outside of the LSA			
Y1	5.4	-	-
Y2	1.5	-	-
Y3	0.1	-	-
Y4	0.7	-	-
Y5	0.3	-	-
Y6	0.1	-	-
Y7	0.3	-	-
Y8	1.3	-	-
Y9	1.2	-	-
Y10	22.8	-	-

(a) Habitat types described in Tables 3.1-1 and 3.1-2.

(b) Area of the basin surveyed, not the entire lake.

ha = hectare; m = metre; - = not sampled

Table JJ4.1-2 Summary of Habitat by Substrate and Depth/Gradient Category for Lakes Surveyed, 2010

Lake	Area (ha)	Substrate Type, Class, Depth (I, II, III) and Gradient Classification (L, H)[a] (% of Total Lake Area)																				
		Bo/Co				Bo	Bd			Bd/Bo	Bd/Co	Veg/Org	Veg/Bo	Fines/Org			Co/Gr		Bo/F		Co/F	
		1				2	3			4	5	6	7	8			9		10		11	
		LI	LII	HI	HII	LI	LI	HI	HII	HI	LI	LI	LI	LI	LII	LIII	LI	LII	LI	LII	LI	LII
Kennady Lake Watershed																						
A4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2	0.0	91.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adjacent 'N' Watershed																						
N14a	3.2	4.1	0.0	4.0	0.0	0.0	0.0	0.1	0.9	0.8	0.0	13.8	0.0	5.5	43.9	0.0	1.2	0.0	25.5	0.0	0.0	0.0
N14b	2.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.6	0.0	0.0	3.1	0.0	16.8	0.0	0.0	0.0
N17	91.5 [b]	0.3	7.4	0.0	13.8	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	47.6	0.0	2.1	16.2	9.2	0.0	2.6
Downstream from Kennady Lake																						
L13	3.3	31.1	0.0	0.0	0.0	1.3	1.5	0.0	0.0	0.0	0.0	0.0	4.3	56.3	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0
L18	14.2	53.9	0.0	0.0	0.0	15.4	0.3	0.6	0.0	0.0	0.9	1.0	0.0	0.0	23.8	0.8	0.0	0.0	0.0	0.0	3.4	0.0

Note: Individual values may not add up to 100% due to rounding.

(a) Habitat types described in Tables 3.1-1 and 3.1-2.

(b) Area of the basin surveyed, not the entire lake.

% = percent; Bo - boulder; Co =cobble; Bd = bedrock; Veg = vegetation; Org = organics; Gr = gravel

JJ4.1.2 Streams

Descriptions and representative photos of the aquatic habitat at each stream surveyed in 2007 and 2010 are provided in Appendix JJ.IV. Detailed habitat data collected in 2010 are provided in Appendix JJ.VI. Table JJ4.1-3 summarizes the fish habitat quality in streams surveyed in 2010. Due to the cursory nature of the 2007 stream surveys, this information was not collected in 2007.

Table JJ4.1-3 Summary of Fish Habitat Quality in Streams Surveyed, 2010

Stream	Date Surveyed	Stream Length (m)	Map Gradient (%)	Flow Duration	Overall Habitat Quality Rating [(a)]	Spawning Habitat Potential [(a)]		Fish Passage [(b)]
						ARGR	NRPK	
Adjacent 'N' Watershed								
N14a	20-Jul-10	57.0	0.0	Ephemeral	L	N	L	No
N14b [(c)]	20-Jul-10	N/A	N/A	Ephemeral	N	N	N	No
Downstream from Kennady Lake								
L11	19-Jul-10	163.5	0.8	Ephemeral	L - M	N	L	No
L13	19-Jul-10	199.9	0.5	Permanent	M	N	L	No
L14	19-Jul-10	151.1	0.6	Permanent	M	N - L	L	No
L15	20-Jul-10	126.6	0.8	Permanent	M	N - L	L	No
L18	19-Jul-10	193.5	1.5	Permanent	L - M	N - L	N - L	No

(a) Habitat Ratings: H = high; M = moderate; L = low; N = nil.
(b) For large-bodied adult fish at the time of the survey.
(c) Stream N14b was dry at the time of the survey, with no defined bed or banks.
m = metre; % = percent; ARGR = Arctic grayling; NRPK = northern pike; N/A = Not applicable.

The streams surveyed in 2010 were typically low gradient, slow flowing streams with ephemeral characteristics. Three of the streams surveyed (Streams N14a, N14b, and L11) were either entirely dry or contained dry sections of channel at the time of the survey, and thus considered ephemeral. The remaining four streams contained flow at the time of the survey and, thus, were classified as permanent in Table JJ4.1-3; however, poorly defined banks indicates they may also dry up under some low flow conditions. None of the streams surveyed provided fish passage for large-bodied adult fish between lakes at the time of the survey. Barriers to fish passage included boulder gardens with interstitial flow or very low water levels, which are seasonal barriers to large fish but would not necessarily deter small-bodied YOY or forage fish species.

The overall habitat quality ratings for streams surveyed in 2010 ranged from nil to moderate, with the majority being moderate. Many were low flow streams containing instream vegetation suitable for rearing northern pike. Although there were barriers to fish passage at the time of the survey, higher water levels during the spring season likely would facilitate migration between lakes. These streams also contained rearing habitat suitable for forage fish species in the summer season.

Spawning habitat potential for Arctic grayling and northern pike was determined based on conditions likely to be present during the spring spawning period. There was little to no Arctic grayling spawning habitat potential, as the streams surveyed lacked riffle habitat with suitable gravel/cobble substrate. Northern pike spawning habitat potential typically was low, due to a lack of suitable emergent vegetation, with the suitability generally increasing near the lake inlet/outlet areas.

JJ4.2 LIMNOLOGY

Limnology results for 2007 and 2010 are summarized in Table JJ4.2-1. Detailed limnology data are provided in Appendix JJ.VII. Additional water quality parameters can also be found in the Water Quality Baseline (Annex I).

JJ4.2.1 Large Lakes

Kennedy Lake, Lake N16, Lake 410, and Kirk Lake, characterized as large lakes, were sampled in 2007. Kennedy Lake was comprised of five sub-basins, identified in Figure J4.1-1 of Annex J. In 2010, the northeast basin of Lake N17 was sampled. Maximum depths, Secchi depths and pH were not recorded for the large lakes in 2007; however, maximum depths and secchi depths were recorded in earlier studies for these lakes (Annex J).

In general, the water columns in the large lakes were well-mixed throughout the open-water season, and thermal stratification was not observed during the sample period. Surface water temperatures were similar amongst the large lakes sampled in 2007, ranging from 8.9 to 10.9 degrees Celsius (°C) (Table JJ4.2-1). In 2010, the water temperatures in Lake N17 ranged from 17.8°C at the surface to 13.9°C (Table JJ4.2-1). The cooler temperature recorded near the bottom of Lake N17 was likely because the probe was within the sediment interface. Surface water warming was observed in Basin K5 of Kennedy Lake but the temperature difference was not sufficient to be considered thermal stratification (i.e., the temperature change was less than or equal to 1°C) (Appendix JJ.VII).

Table JJ4.2-1 Summary of Limnology Parameters in Lakes Surveyed, 2007 and 2010

Lake	Date Surveyed	Max Depth (m)	Water Quality Range (Minimum to Maximum)					
			Secchi Depth (m)	Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	pH (pH units)
Kennady Lake Watershed							
A1	19-Jul-07	-	-	18.4 - 18.5	5.1 - 8.9	8.5 - 22.0[(a)]	-
A3	19-Jul-07	-	-	14.9 - 17.9	0.2 - 8.3	13.5 - 13.7	-
A3	23-Jul-10	4.2	4.2	17.2 - 17.3	9.7 - 10.3	12	6.4 – 7.0
A4	23-Jul-10	0.4	0.4	20.16	9.4	15	5.3
D2	20-Jul-07	-	-	18.6 - 19.0	6.9 - 9.0	15.8 - 16.0	-
D2	24-Jul-10	0.9	0.9	19.9	8.7	13	6.5
D3	21-Jul-07	-	-	19.4 - 19.4	7.3 – 8.0	8.6 - 8.7	-
D3	24-Jul-10	2.5	2.5	19.7 - 19.9	9.2	8	5.8 - 6.6
E1	25-Jul-07	-	-	16.8 - 16.9	8.2 - 8.7	11.9 - 12.1	-
E1	26-Jul-10	3.5	3.5	19.2 - 19.3	8.3 - 8.3	11	6.6 - 6.9
K1 [(b)]	29, 30, 31-Aug-07	-	-	9.1 - 9.7	8.5 - 10.2	12.4 - 13.2	-
K2 [(b)]	31-Aug-07	-	-	9.2 - 9.9	9.4 - 10.0	13.1 - 13.2	-
K3 [(b)]	31-Aug-07	-	-	9.3 - 9.7	9.2 - 9.7	12.8 - 13.2	-
K4 [(b)]	31-Aug-07	-	-	8.9 - 8.9	4.4 - 9.8	13.0 - 13.5	-
K5 [(b)]	1-Sep-07	-	-	8.8 - 10.9	8.3 - 10.8	13.0 - 13.5	-
Adjacent 'N' Watershed							
N14	25-Jul-10	3.5	-	19.7 - 19.8	8.6 - 8.7	8 - 9	6.0 - 6.9
N14a	25-Jul-10	3.2	-	19.2 - 19.3	8.2 - 8.3	8	5.6 - 5.9
N14b	26-Jul-10	0.8	0.8	18.2	8.0	17	7.6
N16	2-Sep-07	-	-	9.1 - 10.0	9.7 - 10.4	11.9 - 12.2	-
N17 [(c)]	27-Jul-10	10.5	6.3	13.9 - 17.8	9.0 - 9.6	8 - 10	5.2 - 7.1
Downstream of Kennady Lake							
Kirk Lake	3-Sep-07	-	-	9.5 - 9.5	11.0 - 11.3	12.4 - 12.5	-
Lake 410	3-Sep-07	-	-	9.3 - 9.4	10.9 - 11.3	10.7 - 10.7	-
L2	21-Jul-10	3.5	3.5	17.8 - 17.8	10.3 - 10.4	-	5.4 - 5.5
L3	21-Jul-10	1.1	1.1	19.5	10.3	-	5.9
L13	22-Jul-10	1.2	1.2	17.8	8.1	15	7.0
L18	22-Jul-10	5.0	5.0	18.0 - 18.1	8.6 - 8.6	9 - 10	6.2 - 7.5

(a) Upper limit of specific conductivity likely to be transcription or equipment error, or probe in contact with sediments.
(b) Sub-basin within Kennady Lake.
(c) Only the northeast sub-basin of Lake N17 was examined.
Max = Maximum; m = metre; °C = degrees Celsius; mg/L = milligrams per litre; µS/cm = microSiemens per centimetre; - = Data not collected

Dissolved oxygen concentrations in the surface waters of the large lakes ranged from 9.0 to 11.0 milligrams per litre (mg/L). Dissolved oxygen concentrations did not decrease with depth in most of the large lakes, which indicates complete vertical mixing within the water column at the time of the survey. Basin K4 of Kennedy Lake did show a sudden decrease in dissolved oxygen from 9.43 mg/L at 6 m to 4.37 mg/L at 6.5 m.

Specific conductivity was similar in Kennady Lake, Lake N16, Lake 410, and Kirk Lake, ranging from 10.7 to 13.5 microSiemens per centimetre (µS/cm). Specific conductivity in the northeast basin of Lake N17 ranged from 8 to 10 µS/cm.

A pH - depth gradient was observed in the northeast basin of Lake N17. Surface water pH was 7.1, gradually decreasing with depth to 5.2 at 9.5 m (Appendix JJ.VII).

JJ4.2.2 Small Lakes

Lake A3 was the deepest of the small lakes surveyed, with a maximum depth of 12.2 m (Table JJ4.2-1). Most of the small lakes were less than 5 m. Lake A4 was the shallowest lake, with a maximum depth observed of 0.4 m.

In general, the small lakes were well mixed during the sample period and did not show thermal stratification within the water column; however, in 2007, a thermocline (a rapid decline in temperature) was documented in Lake A3 between 4 and 5 m depth, with a sudden decrease in temperature of 1.8°C (17.8 to 15.0°C) (Appendix JJ.VII).

Dissolved oxygen concentrations in the surface waters of the small lakes, with maximum depths less than 5 m, ranged from 6.9 to 10.4 mg/L; most were equal to or exceeded 7.0 mg/L (Table JJ4.2-1). In general, dissolved oxygen concentrations were similar throughout the water column in these small, shallow lakes, indicating complete vertical mixing of the water column. Exceptions include Lake A1 and A3. Lake A1 showed a gradual decrease in dissolved oxygen with depth from the surface water to a depth of 5 m (8.90 to 5.08 mg/L). Surface water concentrations of dissolved oxygen in Lake A3 were similar to other lakes in the area, at 7.92 mg/L, but concentrations decreased to below 1 mg/L in the bottom waters (6 to 7 m depths) (Appendix JJ.VII), likely a result of sampling in the soft bottom sediments.

Specific conductivity ranged from 8.0 to 17.0 µS/cm in the small lakes (Table JJ4.2-1). Most of the lakes had specific conductivity readings less than 13 µS/cm; only two lakes had values greater than 15 µS/cm — Lake D3 (2007 survey) and Lake N14b (2010 survey). Although Lake A1 had a recorded value of 22 µS/cm, this is likely to be a transcription or equipment error, or a measurement in the lake sediment.

Secchi depths and pH recorded in 2010 showed that most lakes had Secchi depths equivalent to the maximum depth of the lake (i.e., the small lakes were all clear water lakes in which the bottom sediments could be seen from the surface). Slightly basic to acidic pH values were measured in the small lakes in 2010 (pH values 5.21 to 7.62) (Table JJ4.2-1).

JJ4.3 LOWER TROPHIC COMMUNITIES

JJ4.3.1 Phytoplankton

JJ4.3.1.1 Richness

Six major taxonomic groups (cyanobacteria, Chlorophyta, Chrysophyta, Cryptophyta, Bacillariophyta, and Pyrrophyta) were represented in samples collected from lakes in the LSA (Table JJ4.3-1; Appendices JJ.VIII, Tables JJ.VIII-1 and JJ.VIII.2). In general, species richness of the phytoplankton communities was similar in these lakes. Within Kennady Lake, the lowest phytoplankton richness was documented in basins K4 and K5 (54 species), whereas the highest richness was documented in Basin K3 (66 species). Phytoplankton richness values in Lake N16 (56 species) were within the range of Kennady Lake, whereas Lake 410 (67 species) and Kirk Lake (76 species) had slightly higher richness values.

Table JJ4.3-1 Phytoplankton Species Richness in Lakes, Late Summer 2007

Group	Lake N16	K1	K2	K3	K4	K5	Lake 410	Kirk Lake
Cyanobacteria	9	11	10	13	11	9	8	12
Chlorophyta	21	24	22	19	16	15	22	30
Chrysophyta	15	14	12	17	16	21	20	20
Bacillariophyta	6	6	7	11	8	6	9	9
Cryptophyta	2	2	3	4	2	2	3	2
Pyrrophyta	3	2	1	2	1	2	5	3
Total Species	**56**	**59**	**55**	**66**	**54**	**54**	**67**	**76**

Note: Loose monads and unidentified naked chrysophytes were not included as separate taxa.

JJ4.3.1.2 Abundance and Biomass

Mean total phytoplankton abundance was similar in Lake N16, and basins K1, K2, K4, and K5 of Kennady Lake (Figure JJ4.3-1, Appendix JJ.VIII, Tables JJ.VIII-1 and JJ.VIII-2). Higher abundance was measured in Basin K3, Lake 410, and Kirk Lake. Abundances of major phytoplankton groups were more variable among lakes than total abundance. Cyanobacteria abundance was highest in Basin K3, whereas most other groups had highest abundances in Lake 410 and Kirk Lake.

Mean total phytoplankton biomass was similar among lakes, with the exceptions of lower biomass measured in basins K1 and K2 and higher biomass in Basin K3 (Figure JJ4.3-2, Appendix JJ.VIII, Tables JJ.VIII-1 and JJ.VIII-2). Mean biomass by major phytoplankton group exhibited a greater variability in all lakes compared to abundance. Cyanobacteria, Cryptophyta, and Pyrrophyta had the highest biomass values in Basin K3. There were no consistent patterns in biomass of major phytoplankton groups among the other waterbodies sampled.

Phytoplankton community composition, based on both abundance and biomass, was similar among the basins of Kennady Lake, Lake N16, Lake 410, and Kirk Lake (Figures JJ4.3-3 and JJ4.3-4). Phytoplankton abundance was dominated by Chrysophyta (38.3 to 70.2%) and cyanobacteria (14.4 to 40.9%). Basin K5, Lake 410, and Kirk Lake had slightly lower abundances of cyanobacteria and higher abundances of Chrysophyta than the other basins and waterbodies. Chlorophyta abundance (6.6 to 15.4%) was low and nearly consistent among sampling locations. Bacillariophyta, Cryptophyta, and Pyrrophyta had low relative abundances in all sampled waterbodies.

Cyanobacteria biomass was high (32.1 to 60.9%) at all locations, with the exception of Basin K5 (18.3%). Chrysophyta biomass (16.7 to 38.2%) was high at most sites, and particularly in Basin K5 (66.6%). The biomass of the remaining taxonomic groups generally was low, with the exception of higher biomasses of Chlorophyta in Lake N16 and Pyrrophyta in Basin K3.

Figure JJ4.3-1 Total Phytoplankton Abundance (Mean ± Standard Error) and Abundances of Major Phytoplankton Groups in Lakes, Late Summer 2007

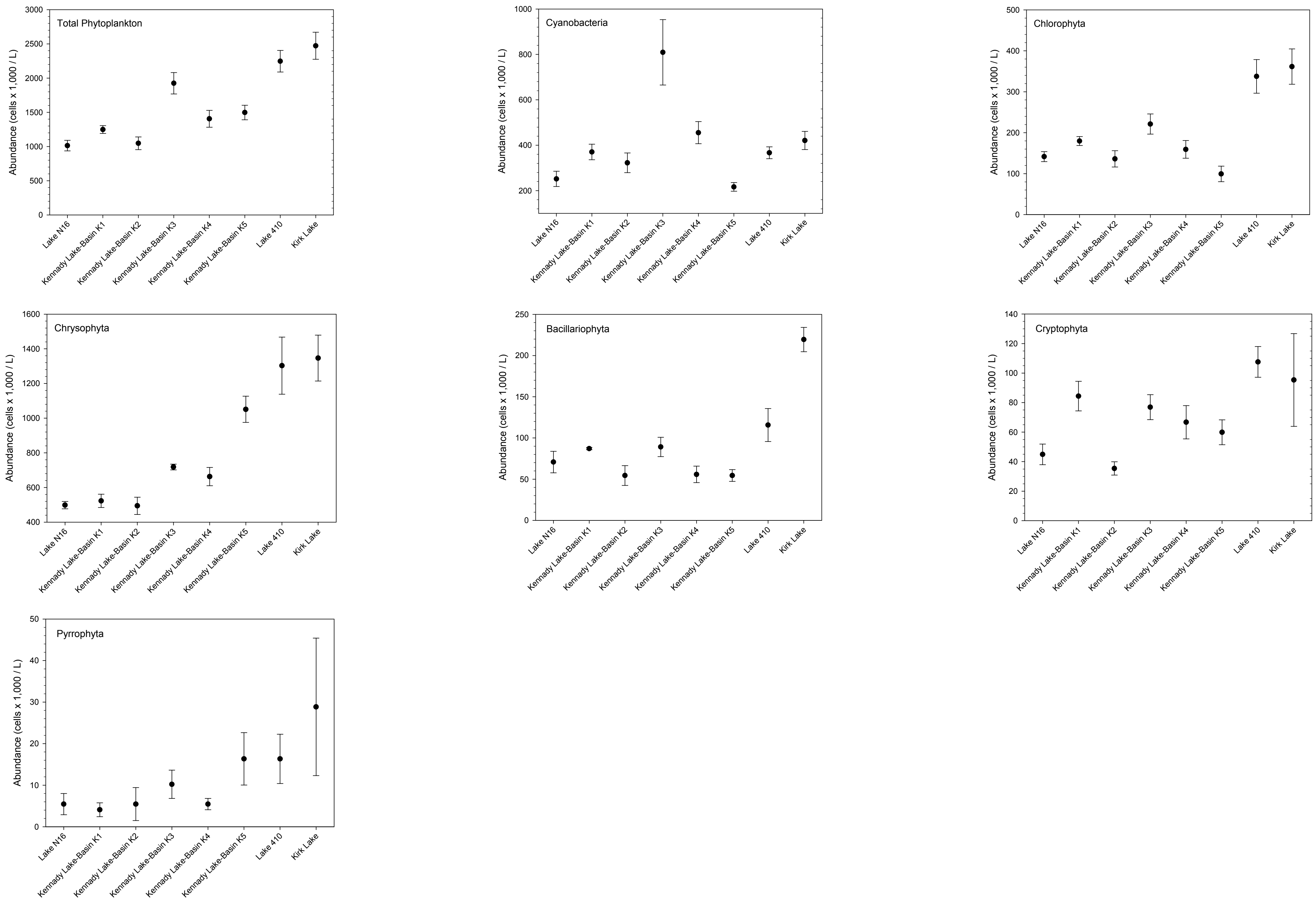


Figure JJ4.3-2 Total Phytoplankton Biomass (Mean ± Standard Error) and Biomass of Major Phytoplankton Groups in Lakes, Late Summer 2007

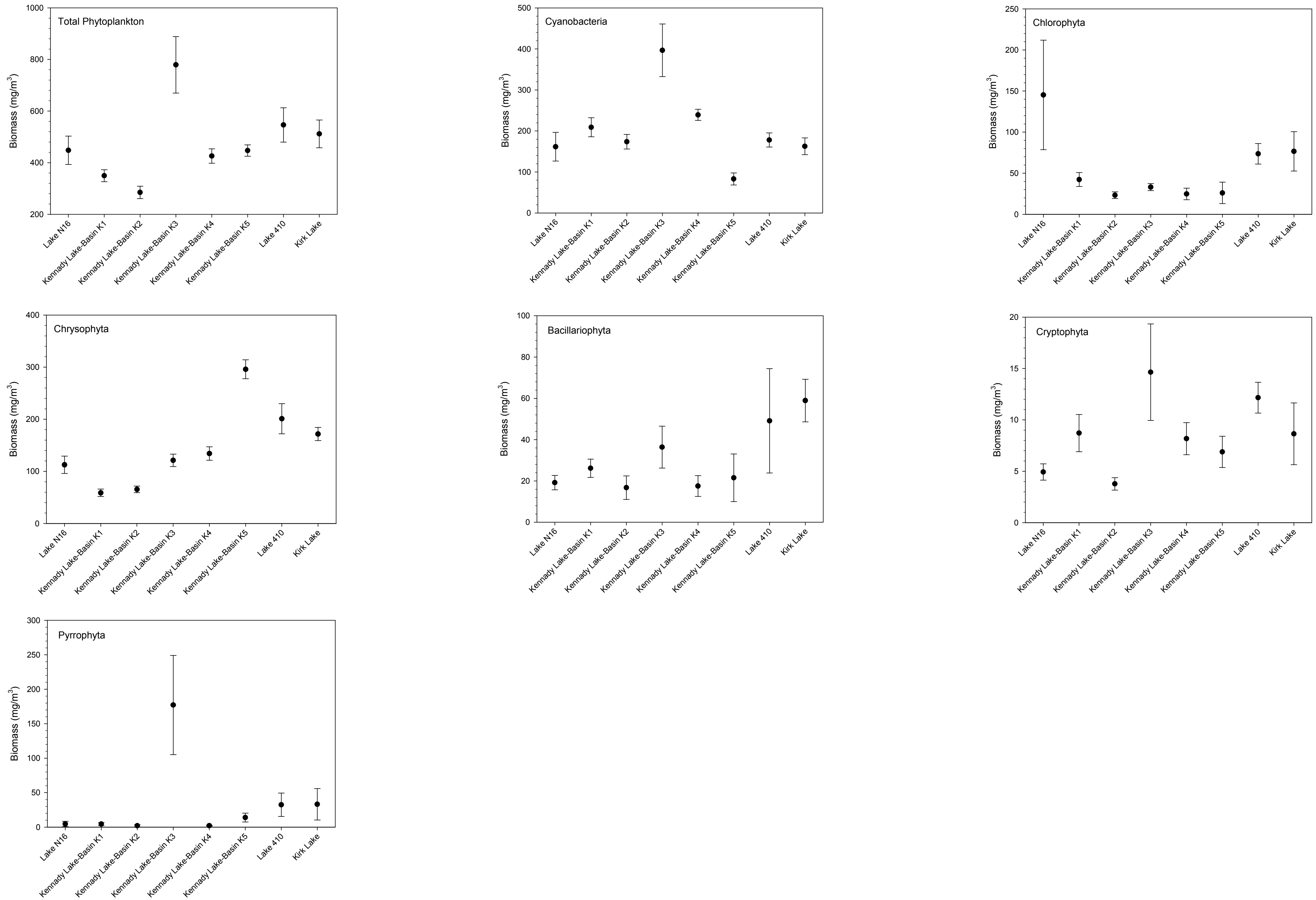


Figure JJ4.3-3 Variation in Relative Abundances of Major Phytoplankton Groups in Lakes, Late Summer 2007

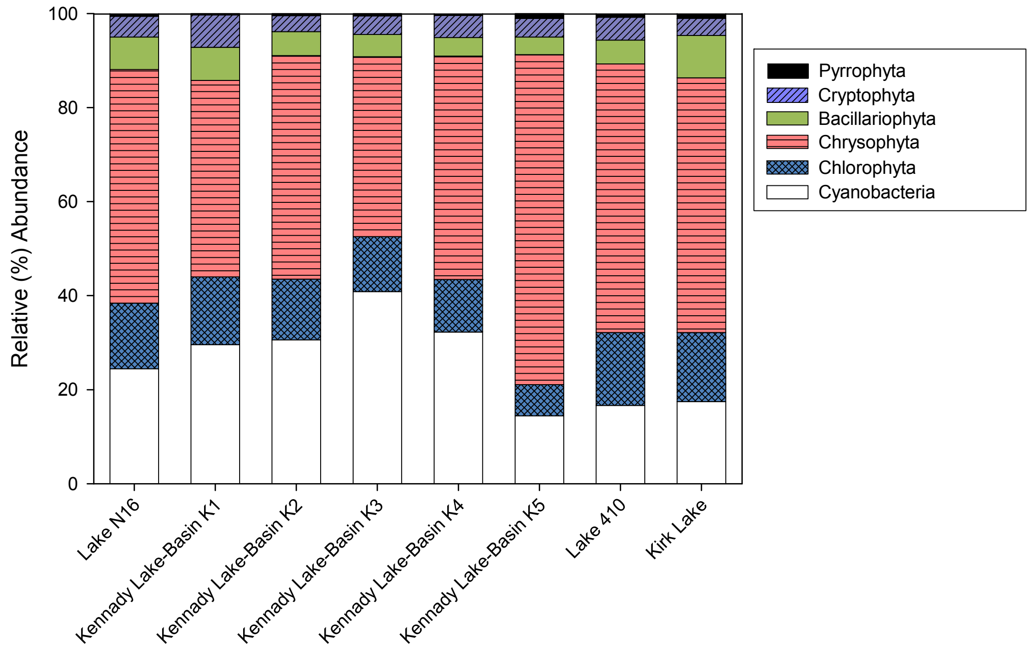
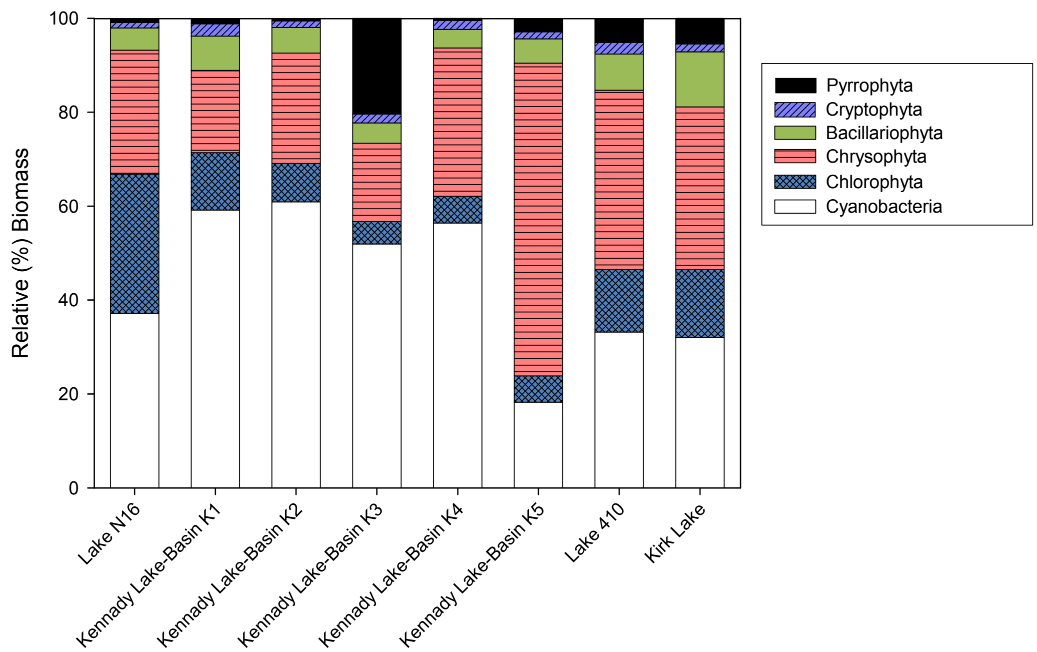


Figure JJ4.3-4 Variation in Relative Biomass of Major Phytoplankton Groups in Lakes, Late Summer 2007



JJ4.3.1.3 Chlorophyll *a*

Mean chlorophyll *a* concentrations were similar among the five basins of Kennady Lake and Lake N16 (Table JJ4.3-2; detailed chlorophyll *a* data are provided in Appendix JJ.VIII, Table JJ.VIII-3). Chlorophyll *a* concentrations were slightly higher in Lake 410, and considerably higher in Kirk Lake. Chlorophyll *a* concentrations measured in 2007 in the LSA were within the range characteristic of oligotrophic lakes (Wetzel 2001).

Table JJ4.3-2 Mean Chlorophyll *a* Concentrations in Lakes, 2007

Waterbody	Basin	Chlorophyll *a* Concentration	
		Mean (µg/L)	Standard Deviation
Lake N16	-	0.92	0.13
Kennady Lake	K1	0.78	0.16
	K2	0.84	0.15
	K3	0.70	0.27
	K4	1.04	0.18
	K5	0.92	0.30
Lake 410	-	1.34	0.05
Kirk Lake	-	2.52	0.18

µg/L = micrograms per litre.

JJ4.3.2 Zooplankton

JJ4.3.2.1 Richness

Four major taxonomic groups (Cladocera, Calanoida, Cyclopoida, and Rotifera) were represented in samples collected from basins K1, K2, K3, K4, and K5 of Kennady Lake, Lake N16, Lake 410, and Kirk Lake in late summer 2007 (Table JJ4.3-3; Appendix JJ.IX, Tables JJ.IX-1 and JJ.IX-2). Lake N16 and Basin K4 of Kennady Lake had the lowest number of taxa (each at 12), and Kirk Lake had the highest number of taxa (17).

Table JJ4.3-3 Total Number of Taxa Identified in Each Major Zooplankton Group in Lakes, Late Summer 2007

Group	Lake N16	K1	K2	K3	K4	K5	Lake 410	Kirk Lake
Cladocera	3	3	3	3	3	4	5	6
Calanoida	3	4	4	4	4	4	4	4
Cyclopoida	1	1	1	1	1	1	2	3
Rotifera	5	6	6	6	4	6	4	4
Total Taxa	**12**	**14**	**14**	**14**	**12**	**15**	**15**	**17**

Note: Cladocera, Calanoida, and Cyclopoida were identified to species; Rotifera were identified to genus.

JJ4.3.2.2 Abundance and Biomass

Total zooplankton abundance ranged from 16.9 ind/L in Basin K3 of Kennady Lake to 29.7 ind/L in Basin K4 of Kennady Lake (Figure JJ4.3-5). A greater degree of variability among waterbodies was observed in zooplankton biomass (Figure JJ4.3-6). Total zooplankton biomass ranged from 107 µg/L in Basin K2 of Kennady Lake to 478 µg/L in Lake N16.

Relative abundances of major zooplankton groups were similar among waterbodies, with Rotifera and cyclopoid copepods having the highest abundances (Figure JJ4.3-7). Lake 410 had fewer cyclopoid copepods and more calanoid copepods compared to the other waterbodies studied. Of all the study lakes, Rotifera accounted for 39.6 to 72.6% of the total abundance, and calanoid copepods accounted for 8.9 to 42.2%. Cladocerans accounted for a small proportion (0.2 to 2.3%) of the zooplankton community based on abundance.

In terms of relative biomass, calanoid copepods, followed by cyclopoid copepods had the largest contributions to the zooplankton communities, with the exception of Lake N16, which was dominated by Cladocera (Figure JJ4.3-8). The small body size of rotifers explains their low relative biomass, despite rotifers being the most abundant group in lakes in the LSA. In contrast, the large size of calanoid copepods (in particular, *Heterocope septentrionalis*) and Cladocera (in particular, *Holopedium gibberum* and *Daphnia middendorffiana*) account for their larger contributions to total biomass, despite low relative abundances. In terms of biomass, zooplankton communities were dominated by the calanoid copepods *Diaptomus pribilofensis* and *Diaptomus minutus*, the cyclopoid copepod *Cyclops scutifer* and the cladoceran *Daphnia middendorffiana*.

Figure JJ4.3-5 Total Zooplankton Abundance (Mean ± Standard Error) and Abundances of Major Zooplankton Groups in Lakes, Late Summer 2007

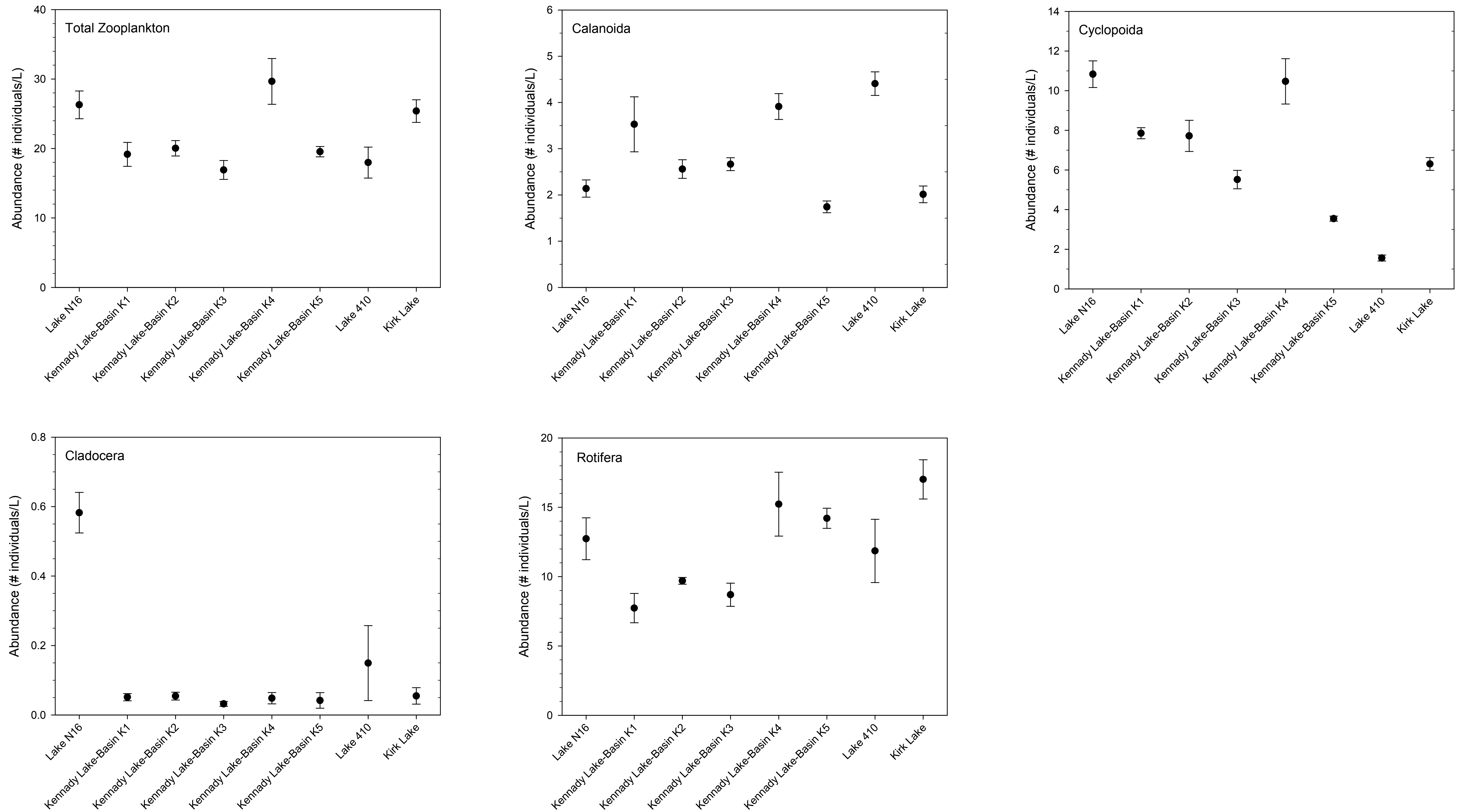


Figure JJ4.3-6 Total Zooplankton Biomass (Mean ± Standard Error) and Biomass of Major Zooplankton Groups in Lakes, Late Summer 2007

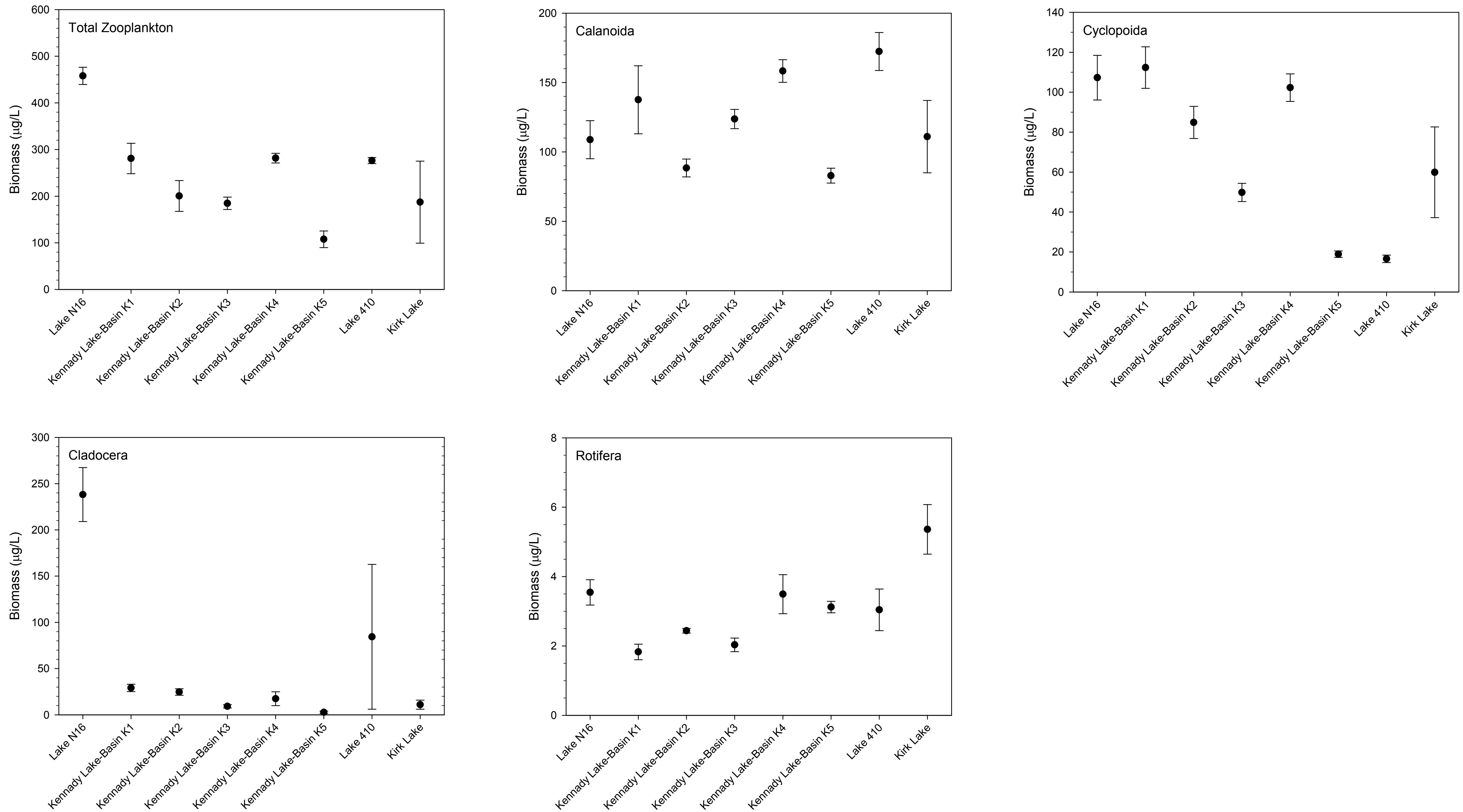


Figure JJ4.3-7 Relative Abundance of Major Zooplankton Groups in Lakes, Late Summer 2007

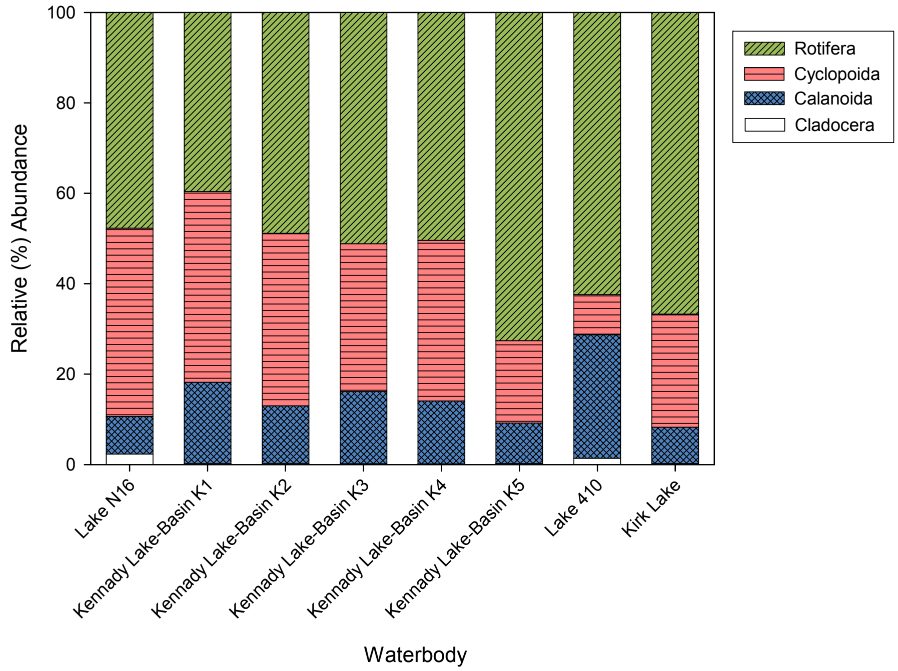
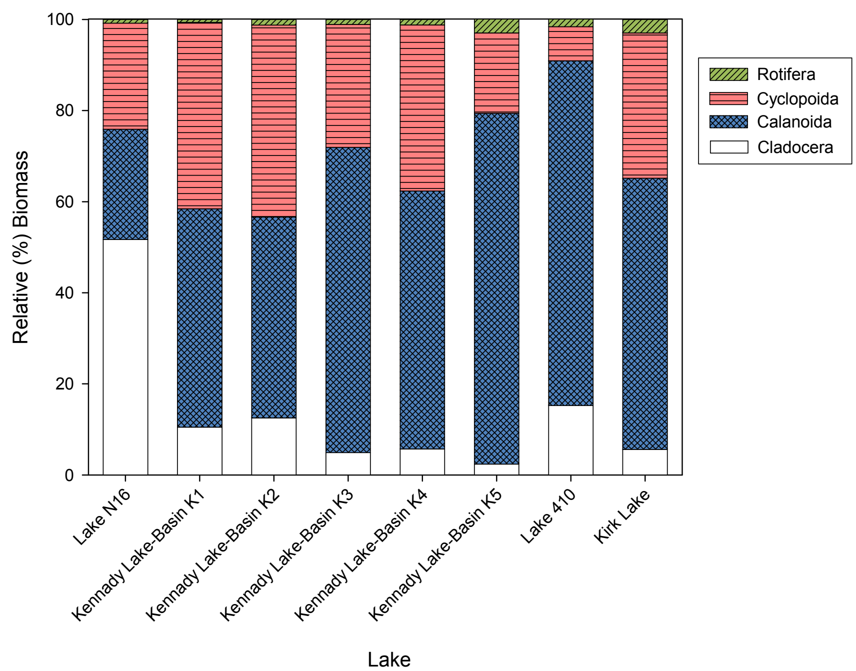


Figure JJ4.3-8 Relative Biomass of Major Zooplankton Groups in Lakes, Late Summer 2007



JJ4.3.3 Benthic Invertebrates

JJ4.3.3.1 Lakes

JJ4.3.3.1.1 Habitat Characteristics

Water depth at benthic invertebrate sites sampled in 2007 ranged from 4 to 5 m in Lake N16 and from 3 to 6 m in Kennady Lake (Appendix JJ.X, Table JJ.X-1). Water temperature and dissolved oxygen were nearly consistent within the water column with depth, indicating that the water column was well mixed in the shallow areas sampled. Water temperature ranged from 9.2°C to 10.9°C at the surface. Surface dissolved oxygen was close to saturation, ranging from 9.0 to 10.4 mg/L among lake sites. Specific conductivity was low, as expected for sub-Arctic lakes, ranging from 11.9 to 13.5 µS/cm at the surface and varied little with depth.

Spearman rank correlation analysis detected significant negative correlations between water depth, and total density, total richness, Chironomidae density, and Oligochaeta density ($P<0.05$, $r_s>0.538$, n=14) (Table JJ4.3-4). Despite the small range in depths, from 3 to 5 m among the nearshore sampling sites, it appears that water depth influenced the benthic invertebrate community. In general, benthic invertebrate density and richness decreased with increasing depth, which is consistent with habitat associations of benthic invertebrates.

Table JJ4.3-4 Spearman Rank Correlations Between Benthic Invertebrate Variables and Habitat Variables

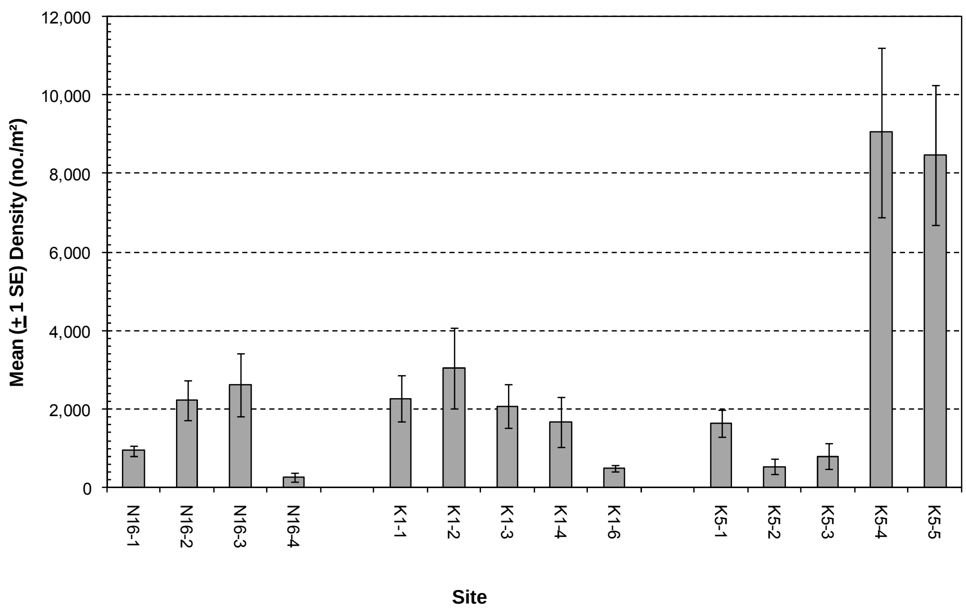
Habitat Variable	Total Density	Total Richness	Chironomidae Density	Oligochaeta Density	Gastropoda Density	Pelecypoda Density
Water depth	**-0.709**	**-0.586**	**-0.720**	**-0.570**	-0.403	-0.483
Total organic carbon	0.160	0.175	0.198	0.091	-0.144	-0.015
Percent fines (silt + clay)	-0.345	-0.235	-0.238	-0.371	-0.394	-0.380

Note: Significant relationships ($P<0.05$, $r_s>0.538$, n=14) are **bolded**.

JJ4.3.3.1.2 Benthic Invertebrate Community

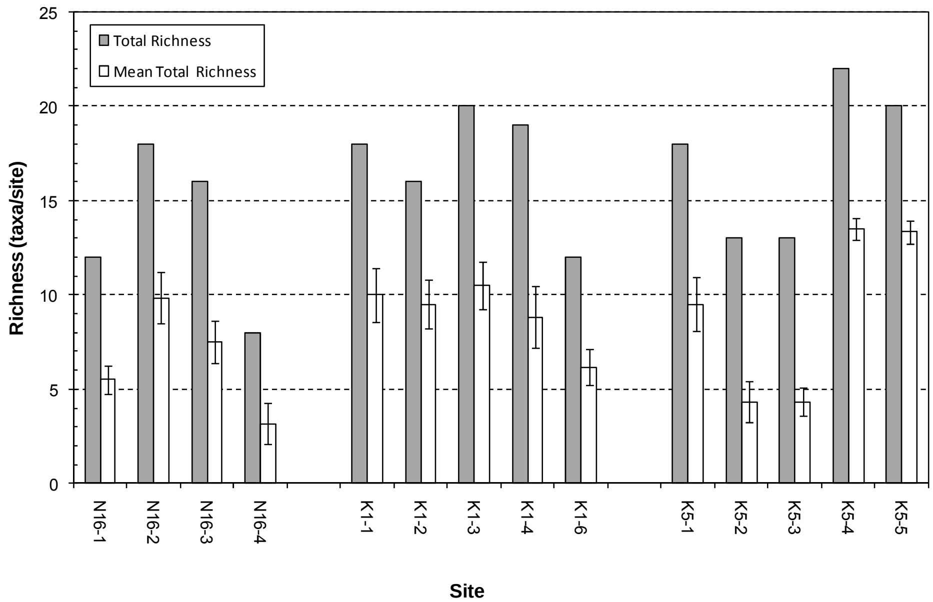
Total benthic invertebrate density was variable within and among lakes (Figure JJ4.3-9, Appendix JJ.X, Table JJ.X-2). Mean (±1 SE) benthic invertebrate density ranged from 274 ± 109 organisms per square metre (org/m²) to 2,622 ± 787 org/m² in Lake N16. In Kennady Lake, density ranged from 489 ± 82 org/m² to 3,037 ± 1,035 org/m² in Basin K1 and from 541 ± 203 org/m² to 9,044 ± 2,159 org/m² in Basin K5. Overall, the Kennady lake sites were similar in density to those of Lake N16 with the exception of sites K5-4 and K5-5, which had much higher densities compared to all other lake sites sampled.

Figure JJ4.3-9 Mean Total Benthic Invertebrate Density at Lake Sampling Locations, Fall 2007



Richness was also generally low, and varied within similar ranges in the two lakes (Figure JJ4.3-10, Appendix JJ.X, Table JJ.X-2). Total richness ranged from 12 to 16 taxa/site in Lake N16. In Kennady Lake, richness ranged from 12 to 20 taxa/site in Basin K1 and from 13 to 22 taxa/site in Basin K5. Mean (±1 SE) richness ranged from 3.2 ± 1.1 to 9.8 ± 1.4 taxa/site in Lake N16. In Kennady Lake, mean richness ranged from 6.2 ± 0.9 taxa/site to 10.5 ± 1.2 taxa/site in Basin K1 and from 4.3 ± 0.8 taxa/site to 13.5 ± 0.6 taxa/site in Basin K5. Site N16-4 had richness values lower than the range observed in Kennady Lake.

Figure JJ4.3-10 Benthic Invertebrate Richness at Lake Sampling Locations, Fall 2007



Simpson's index of diversity values were generally high, ranging from 0.70 to 0.84 in Lake N16 (Figure JJ3.4-11; Appendix JJ.X, Table JJ.X-2), from 0.84 to 0.88 in Basin K1 and from 0.55 to 0.86 in Basin K5. Diversity in Lake N16 was similar to that observed in Kennady Lake. Evenness generally was low to moderate, and varied within similar ranges in the two lakes. Evenness in Lake N16 ranged from 0.21 to 0.60. In Kennady Lake, evenness ranged from 0.32 to 0.56 in Basin K1 and from 0.17 to 0.49 in Basin K5.

The benthic invertebrate community at lake sites was dominated by the midges (Chironomidae) as expected in lakes located in the sub-Arctic (Figure JJ3.4-12; Appendix JJ.X, Table JJ.X-3). Other abundant taxa included roundworms, aquatic worms, and clams (Pelecypoda). A combined total of 36 taxa was collected at lake sites in 2007, 22 of which were midges (Table JJ4.3-5). Composition of the benthic invertebrate community was similar in both lakes.

Figure JJ4.3-11 Simpson's Index of Diversity and Evenness at Lake Sampling Locations, Fall 2007

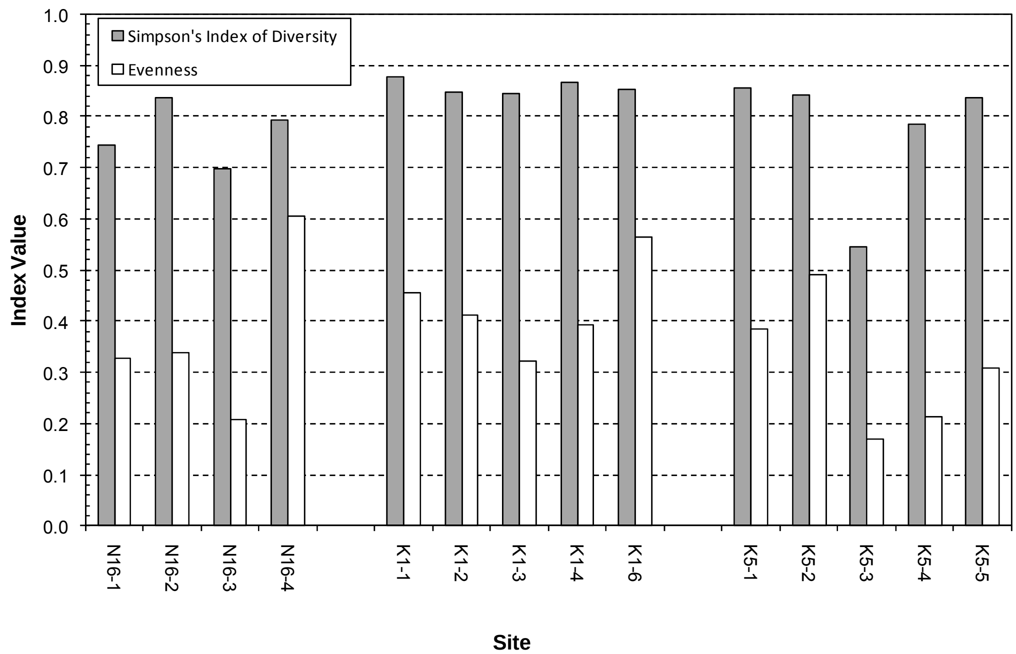


Figure JJ4.3-12 Benthic Invertebrate Community Composition, Fall 2007

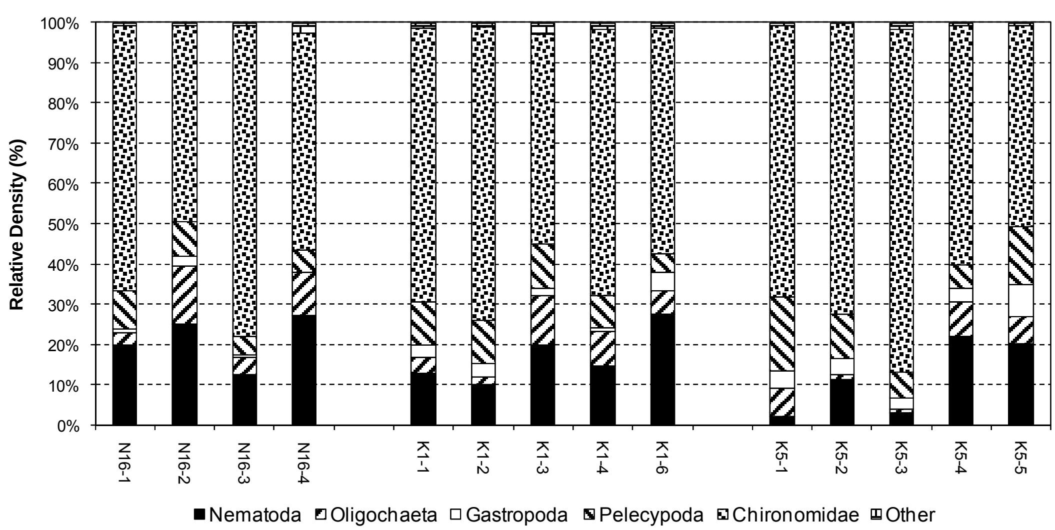


Table JJ4.3-5 List of Benthic Invertebrate Taxa Collected at Lake Sites, Fall 2007

Major taxon	Family	Subfamily/Tribe	Genus/Species
Microturbellaria	-	-	-
Nematoda	-	-	-
Oligochaeta	Enchytraeidae	-	-
	Lumbriculidae	-	-
	Naididae	-	-
	Tubificidae	-	-
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*
Acari	-	-	-
Ostracoda	Cyclocypridae	-	-
Trichoptera	Leptoceridae	-	*Oecetis* sp.
	Phryganeidae	-	*Agrypnia* sp.
Diptera	Ceratopogonidae	-	*Bezzia* gp.
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.
			Conchapelopia sp.
			Procladius sp.
		Diamesinae	*Potthastia longimana*
			Protanypus sp.
		Prodiamesinae	*Monodiamesa* sp.
		Orthocladiinae	*Corynoneura* sp.
			Cricotopus/Orthocladius sp.
			Psectrocladius sp.
			Zalutschia tatrica gp.
		Chironomini	*Chironomus* sp.
			Cladopelma sp.
			Cryptochironomus sp.
			Dicrotendipes sp.
			Microtendipes pedellus gp.
			Parachironomus sp.
			Phaenopsectra sp.
			Polypedilum sp.
			Stictochironomus sp.
		Tanytarsini	*Cladotanytarsus* sp.
			Micropsectra/Tanytarsus sp.
			Paratanytarsus sp.
	Empididae	-	*Chelifera* sp.

- = not identified to this taxonomic level; sp. = unknown species; gp. = genus or species group with similar type of larva.

JJ4.3.3.2 Streams

JJ4.3.3.2.1 Habitat Characteristics

Streams sites were dominated by cobble and gravel substrate (Appendix JJ.X, Table JJ.X-4). Channel width was variable, ranging from 1.1 to 20 m. Water depth at sampling locations was similar, ranging from 0.12 to 0.24 m. Current velocity generally was low, ranging from 0.06 m/s to 0.33 m/s. Water temperature was similar among all sampling locations, ranging from 6°C to 8°C.

Spearman rank correlation analysis detected a single significant correlation between selected benthic invertebrate variables and habitat variables (Table JJ4.3-6). Trichoptera (caddisflies) density was found to be significantly positively correlated with current velocity ($P<0.05$, $r_s=0.398$, n=25), which is expected based on the biology of stream-dwelling species in this group.

Table JJ4.3-6 Spearman Rank Correlations Between Benthic Invertebrate Variables and Habitat Variables for Stream Sites

Habitat Parameter	Total Density	Trichoptera Density	Chironomidae Density	Total Richness	EPT Richness
Water depth	-0.019	-0.183	-0.050	-0.242	-0.243
Current velocity	0.363	**0.448**	-0.012	0.062	-0.185
Cobble substrate	-0.252	-0.077	-0.107	-0.094	0.036
Gravel substrate	0.118	0.059	-0.065	-0.017	-0.144

Note: Significant relationships ($P<0.05$, r_s = 0.398, n=25) are **bolded**.

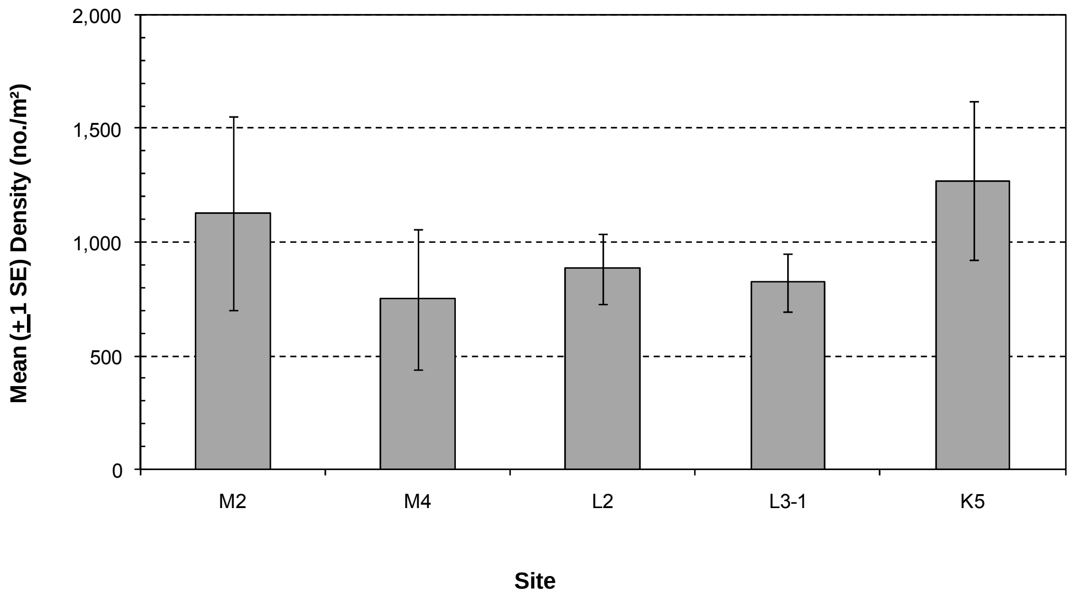
EPT = Ephemeroptera, Plecoptera, and Trichoptera combined.

JJ4.3.3.2.2 Benthic Invertebrate Community

Total benthic invertebrate density was similar among stream sites (Figure JJ4.3-13; Appendix JJ.X, Table JJ.X-5). Mean (±1 SE) total benthic invertebrate density ranged within a narrow range, from 749 ± 311 org/m² to 1,271 ± 348 org/m².

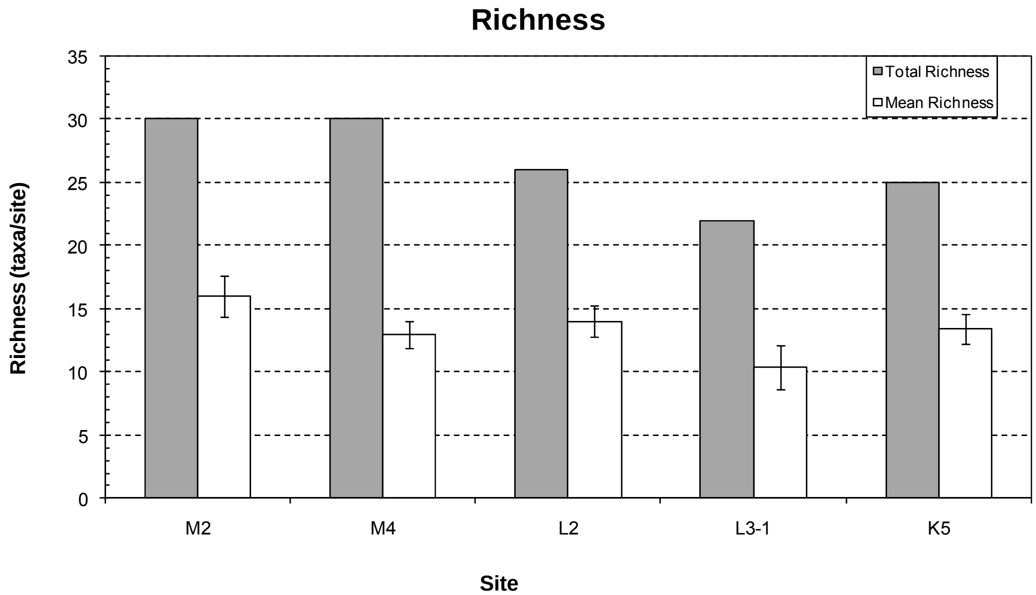
Richness was higher at stream sites than at lake sites, ranging from 22 to 30 taxa/site (Figure JJ4.3-14; Appendix JJ.X, Table JJ.X-5). Mean (±1 SE) richness ranged from 10.4 ± 1.7 taxa/site to 16.0 ± 1.6 taxa/site. Total Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) richness ranged from 4 to 10 taxa/site, and mean (±1 SE) EPT richness ranged from 1.6 ± 0.6 taxa/site to 4.2 ± 0.7 taxa/site. The low EPT richness likely reflects the low current velocity and low nutrient concentrations at the stream sites.

Figure JJ4.3-13 Mean Total Benthic Invertebrate Density at Stream Sampling Locations, Fall 2007

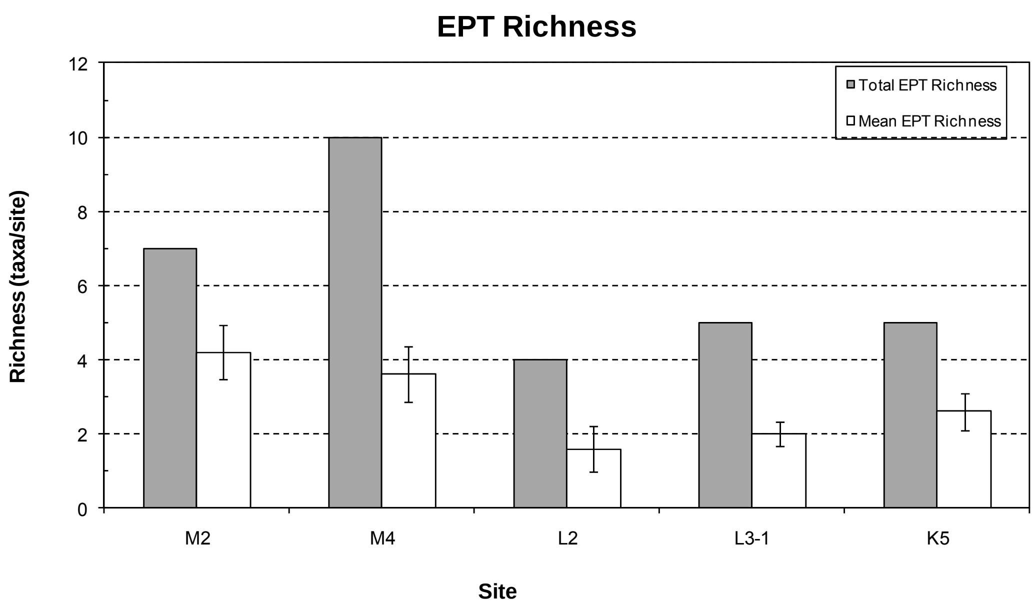


SE = standard error.

Figure JJ4.3-14 Richness and EPT Richness at Stream Sampling Locations, Fall 2007



Note: Error bars represent one standard error.

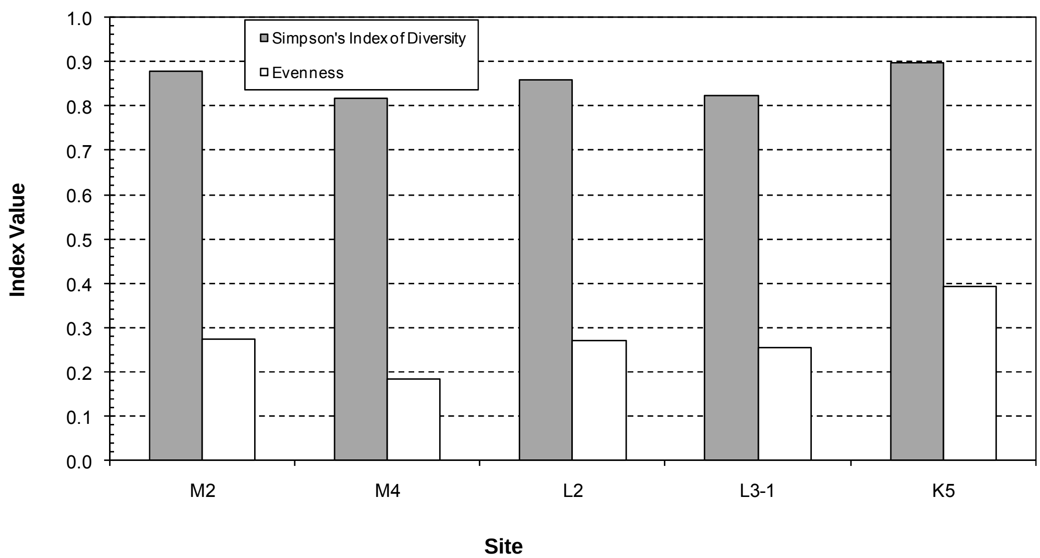


Note: Error bars represent one standard error.

EPT = Ephemeroptera, Plecoptera, and Trichoptera combined.

Simpson’s Index of Diversity was high and similar among stream sites, ranging from 0.82 to 0.90 (Figure JJ4.3-15; Appendix JJ.X, Table JJ.X-5). Evenness was low, ranging from 0.18 to 0.39, indicating that a few taxa are responsible for the majority of total density at the stream sites. The high diversity and low evenness occur because diversity is primarily driven by the number of taxa present and evenness represents how evenly total density is distributed among each taxon present.

Figure JJ4.3-15 Simpson’s Index of Diversity and Evenness at Stream Sampling Locations, Fall 2007



The benthic invertebrate community composition was similar at all stream sites. Stream communities were dominated by midges, with the caddisflies and other taxa making up a considerable proportion of the remainder of the community (Figure JJ4.3-16; Appendix JJ.X, Table JJ.X-6). The other taxa group consisted of the hydras (Hydrozoa), snails, mites, true bugs (Hemiptera), beetles (Coleoptera), and true flies (Diptera) other than the midges. In total, 45 taxa were collected at all stream sites combined, of which 20 taxa were midges (Table JJ4.3-7).

Figure JJ4.3-16 Benthic Invertebrate Community Composition at Stream Sampling Locations, Fall 2007

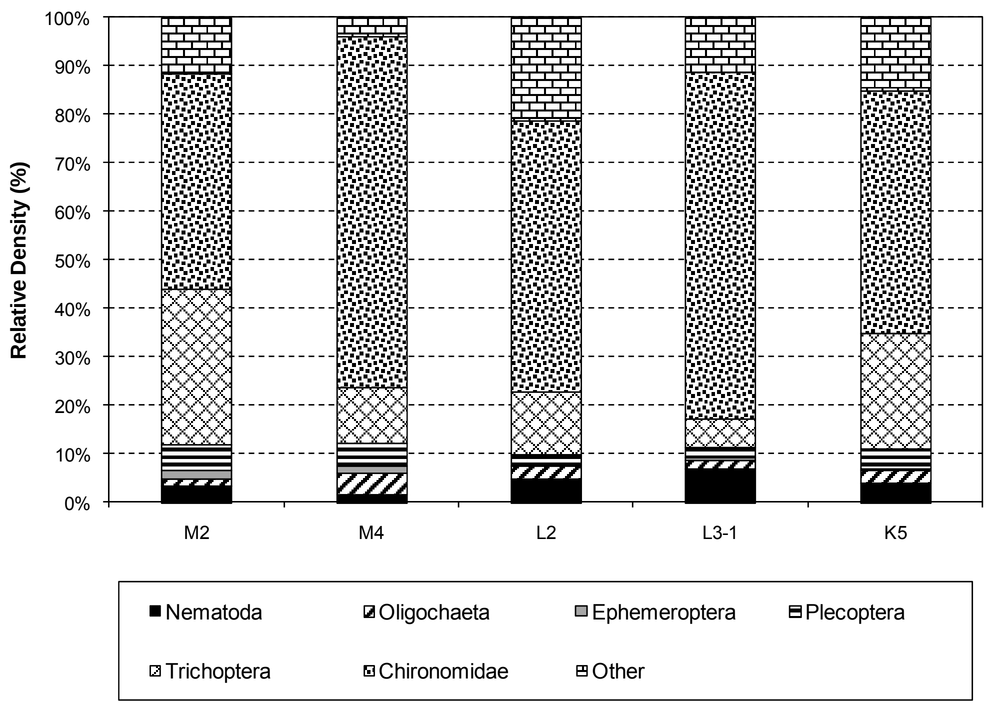


Table JJ4.3-7 List of Benthic Invertebrate Taxa Collected at Stream Sites, Fall 2007

Major Taxon	Family	Subfamily/Tribe	Genus/Species
Hydrozoa	-	-	-
Nematoda	-	-	-
Oligochaeta	Lumbriculidae	-	-
	Naididae	-	-
	Tubificidae	-	-
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*
Acari	-	-	-
Ephemeroptera	Baetidae	-	*Baetis* sp.
	Ephemerellidae	-	*Ephemerella* sp.
	Leptophlebiidae	-	*Paraleptophlebia* sp.
Plecoptera	Nemouridae	-	*Nemoura* sp.
Hemiptera	Corixidae	-	*Callicorixa audei*
Trichoptera	Brachycentridae	-	*Brachycentrus* sp.
	Hydroptilidae	-	*Agraylea* sp.
		-	*Oxyethira* sp.
	Leptoceridae	-	*Mystacides* sp.
	Limnephilidae	-	*Limnophilus* sp.
	Phryganeidae	-	*Agrypnia* sp.
	Polycentropodidae	-	*Polycentropus* sp.
Coleoptera	Dytiscidae	-	*Ilybius* sp.
		-	*Stictotarsus* sp.
	Gyrinidae	-	*Gyrinus* sp.
Diptera	Ceratopogonidae	-	*Bezzia* gp.
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.
			Procladius sp.
		Diamesinae	*Potthastia longimana*
		Orthocladiinae	*Cricotopus/Orthocladius* sp.
			Eukiefferiella sp.
			Heterotrissocladius marcidus gp.
			Psectrocladius sp.
			Pseudosmittia sp.
			Tvetenia sp.
		Chironomini	*Chironomus* sp.
			Cryptochironomus sp.
			Dicrotendipes sp.
			Endochironomus sp.
			Microtendipes pedellus gp.
			Parachironomus sp.
			Polypedilum sp.
		Tanytarsini	*Cladotanytarsus* sp.
			Micropsectra/Tanytarsus sp.
			Paratanytarsus sp.
			Rheotanytarsus sp.
	Empididae	-	*Clinocera* sp.
	Simuliidae	-	*Simulium* sp.
	Tipulidae	-	*Tipula* sp.

- = not identified to this taxonomic level; sp. = unknown species; gp. = genus or species group with similar type of larva.

JJ4.4 FISHERIES INVESTIGATIONS

JJ4.4.1 Kennady Lake Fish Population Estimates

JJ4.4.1.1 2010 Study

JJ4.4.1.1.1 Hydroacoustic Effort and Fish Targets

Sampling effort was reported as total volume of water sampled (in addition to total length of transects). Total volume of water sampled on August 16 and 18 was 574,666 m^3 or 1,313,568 m^3 if summing the water sampled per ping (123,066 pings in total) (Table JJ4.4-1; also see Appendix XI). The latter volume estimate is biased given that adjacent pings have sampling cones that overlap. Based on a conservative sampling volume of 574,666 m^3, approximately 1.35% of the lake was sampled using hydroacoustic methods (the volume of Kennady Lake is approximately 42,617,000 m^3).

The majority of the water volume was sampled by the horizontal beaming method (87%). Given that Kennady Lake is a relatively shallow lake, the range of the sampling cone from horizontal beaming was generally longer than the range (i.e., depth) of the sampling cone from vertical beaming. The range of the sampling cone from horizontal beaming per transect and survey varied from 7.1 m (Transect T8, August 18) to 30.3 m (Transect T9, August 16; Table JJ4.4-1). These ranges corresponded to sampling cone diameters of 0.9 m (for 7.1 m range) and 3.8 m (for 30.3 m range). For horizontal beaming, the diameter of the sampling cone represents the maximum depth that was sampled. In contrast, the range of the sampling cone from vertical beaming represents the depth of water being sampled, which varied from 3.1 m (Transect T8, August 16) to 9.3 m (Transect T9, August 16).

Total length of transects was consistent across surveys, ranging from 13.1 km on August 18 to 13.7 km on August 16; however, total sampling volume varied from 187,238 m^3 (on August 18) to 387,429 m^3 (on August 16). The large difference in volume was an artefact of changes in the effective range of the sampling cone for horizontal beaming, which generally was longer during the August 16 survey (Table JJ4.4-1).

Table JJ4.4-1 Summary of Survey Effort from Horizontal and Vertical Beaming during Hydroacoustic Surveys of Kennady Lake, 2010

Transect	Transect Length (m)	Basin	Horizontal (7.1°, 418 kHz)			Vertical (6.8°, 199 kHz)		
			Possible Targets[(a)]	Range (m)	Volume Sampled[(b)] (m^3)	Possible Targets[(a)]	Range (m)	Volume Sampled[(b)] (m^3)
August 16								
T1	1421	K1		12.0	12745		4.6	1806
T2	878	K1		12.6	8683		4.7	1147
T3	2089	K1	Yes	18.6	45194		6.8	5700
T4	1995	K1		23.2	67143		8.8	9202
T5	809	K1		20.4	21026		7.4	2630
T6	572	K2		18.3	11937		6.9	1620
T7	987	K2	Yes	21.4	28081		8.5	4219
T8	209	K2		7.4	709		3.1	118
T9	1580	K3	Yes	30.3	90417	Yes	9.3	8060
T10	842	K3	Yes	17.9	16819		4.4	975
T11	883	K3		19.1	20122		5.4	1558
T12	484	K4		23.8	17036		7.1	1440
T13	453	K4		12.2	4216		4.2	481
T14	499	K4		11.3	3965		3.6	380
August 18								
T1	1102	K1		11.4	8943		5.2	1753
T2	851	K1	Yes	9.9	5234		4.6	1058
T3	2095	K1	Yes	13.3	23146		6.3	4979
T4	1894	K1		18.4	39889		9.2	9463
T5	856	K1		15.1	12084		7.1	2604
T6	593	K2		11.4	4832		5.9	1219
T7	976	K2		15.2	13998		7.9	3617
T8	189	K2		7.1	593		3.6	143
T9	1571	K3	Yes	16.4	26355	Yes	8.9	7459
T10	819	K3		8.4	3575		4.3	921
T11	849	K3	Yes	9.9	5220		5.0	1247
T12	512	K4	Yes	11.6	4298		6.1	1152
T13	452	K4		7.7	1661	Yes	4.0	432
T14	371	K4		6.9	1086		3.5	279

[(a)] Possible fish targets identified by visual inspection of the echogram, the signal-to-noise ratio of target echoes, the proximity of target echoes to the 'bottom' of the sampling cone (via the echogram), and diagrams of voltage returns of potential fish echoes (via the oscilloscope).

[(b)] Volume sampled was calculated as transect length multiplied by the area of longitudinal-section of a beam [where area = depth (or range; m) x search radius (m) / 2].

kHz = kilohertz; m = metres; m^3 = cubic metres.

Only 28% of the hydroacoustic transects showed target echoes resembling fish, based on a visual assessment of the echograms. In total, a minimum of 75 fish and 15 clusters (or schools) of fish were identified (where a cluster represented either one fish or multiple fish within approximately 200 pings of one another)

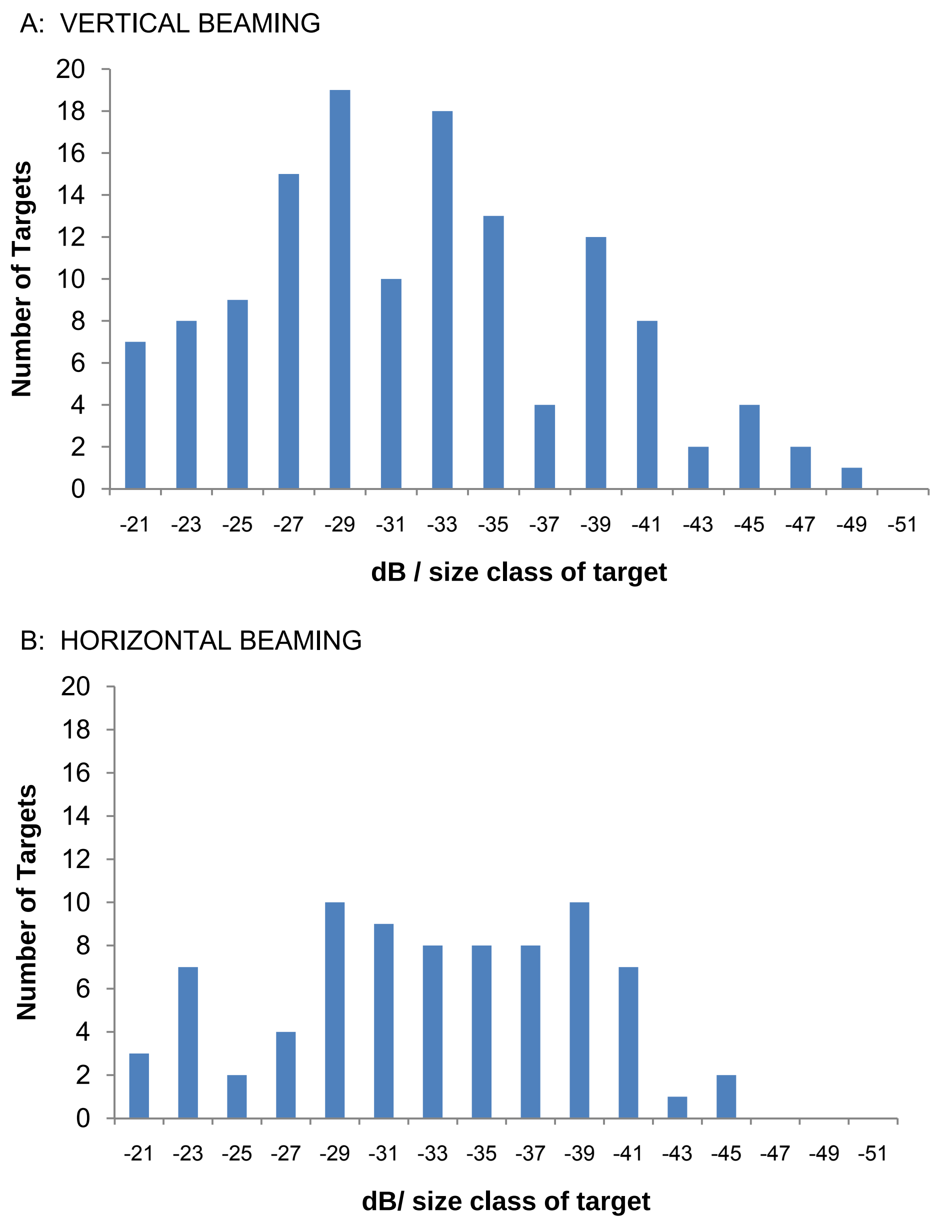
(Table JJ4.4-1; Appendix JJ.I). The distribution of fish was noticeably 'patchy' on the echograms. Approximately 68% of the fish (51 fish) were identified in the vertical echograms, most of which were recorded at the same location along Transect T9. A large school of fish was identified on the vertical echogram for Transect T9 on August 16 and again on August 18 (23 and 27 fish during each survey; Table JJ4.4-1; Appendix JJ.I). This school may be the same group of fish observed on both sampling occasions. The school was located at similar positions on the transect (10 to 17 m depth; Appendix JJ.I).

Visual Analyzer™ identified 211 fish targets in total. The number of targets was highly variable among transects and basins. Most fish targets were recorded along Transect T9 in Basin K3 (153 targets or 73% of all targets). Of the 211 targets, 132 (63%) were from vertical beaming and 79 (37%) were from horizontal beaming.

The distribution of TS was very similar between the horizontal and vertical datasets (Figure JJ4.4-1). The mean TS for vertical beaming was -32.0 dB, or 68 cm in length (-32.9 to -31.1 dB; 90% CI), whereas the mean TS for horizontal beaming was -32.9 dB, or 32 cm in length (-34.1 to -31.8 dB; 90% CI). The smallest target for vertical beaming was -49 dB, and the smallest target for horizontal beaming was -45 dB (Figure JJ4.4-1). Based on Love's equation for vertical TS, the smallest fish may be 8 cm, but most (87%) targets were likely fish greater than 23 cm, a TS of -41 dB. Based on Kubecka's equation for horizontal TS, the smallest fish target may be 12 cm, and most (87%) fish were likely larger than 16 cm in length, a TS of -41 dB.

Based on the estimated minimum size of detected fish, the density estimate may be representative of fish greater than two years in age, and of those at, or approaching maturity (Scott and Crossman 1998; also see Annex J, Table J4.4-10). The fact that the TS data are dominated by fish considerably larger than the minimum detection size is consistent with the prediction that hydroacoustics missed small fish that were generally close to shore or in adjacent streams (Golder 2009).

Figure JJ4.4-1 Target strength Distribution for Vertical Beaming (A) and Horizontal Beaming (B) of Kennady Lake, 2010



Based on Visual Analyzer™ algorithms, the mean basin fish density of Kennady Lake was 0.002331 fish/m^2, or 23.31 fish/ha (0 to 51.16 fish/ha; 90% confidence interval [CI]). Average densities from vertical beaming were 19.08 fish/ha, whereas average densities from horizontal beaming were 4.24 fish/ha. Applying these densities to the entire wetted surface area of Kennady Lake (i.e., 814 ha), the total fish population was estimated at 18,977 fish (0 to 42,081 fish; 90% CI). The variance in numbers of fish was likely a result of systematic error [e.g., equipment sensitivity, transducer (boat) motion], as well as sampling error. High sampling error reflected lower than expected sampling coverage (e.g., August 14 survey was excluded, K5 could not be accessed), combined with low numbers of fish detected and an uneven fish distribution, vertically and horizontally. A key strength of the sampling design, however, was the replication of surveys and the variability that was captured from one survey to the next (Figure JJ4.4-2). This variability was low; August 16 and 18 population estimates differed by only 1,960 fish (i.e., only 10% of the mean).

The hydroacoustic surveys showed that most of the Kennady Lake fish population resided in Basin K3 (Figure JJ4.4-2). Further, densities were variable among basins (Figure JJ4.4-2). For example, the fish density calculated for Basin K3 was almost 45-times greater than that calculated for Basin K2. The lowest density was observed in K2 (0.64 fish/ha), and the highest density was observed in K3 (56.97 fish/ha). It was difficult to conclude whether the spatial trends in density were real, or an artefact of low numbers of detected fish and the unanticipated uneven distribution of fish during the time of sampling. However, spatial trends in hydroacoustic fish densities were similar to those observed for summer 2004 CPUEs (Figure JJ4.4-2 and Figure JJ4.4-3; Pearson $r = 0.67$, $P < 0.01$, $n = 8$). The correlation between hydroacoustic densities and fish CPUEs lends support to the notion that the hydroacoustic surveys reliably quantified the fish population (Yule 2000; Gangl and Whaley 2004).

One possible explanation for the observation of high densities of fish in Basin K3 may be that this basin is unique and characterized by summer thermoclines (steep, vertical temperature gradients) which can affect fish distributions in the summer (Section 8.3.6.2 of the EIS; Sellers et al. 1998; Scott and Crossman 1998). Basin K3 can approach depths of 20 m (see transects 9, 10, 11; Appendix JJ.XI) and may be sheltered from the wind due to the adjacent topography; whereas other basins of Kennady Lake may not show these characteristics. Previously completed (2004) baseline studies in the summer have shown that water temperatures in K3 are consistent (at 14^{o}C) until about 9 m depths, at which point they decline and approach colder temperatures (7^{o}C) at depths of 14 m (Section 8.3.6.2 of the EIS). Approximately 76% of the fish targets were recorded in Basin K3 and fish were typically observed at depths greater than 10 m (Appendix JJ.I). This corroborated previous studies that documented lake trout concentrations in thermocline zones of stratified lakes at northern latitudes (Sellers et al. 1998; Scott and Crossman 1998).

Figure JJ4.4-2 Estimated Mean Abundance of Fish per Basin (K1 to K4) and Survey (Aug. 16 & 18, 2010) for Kennady Lake

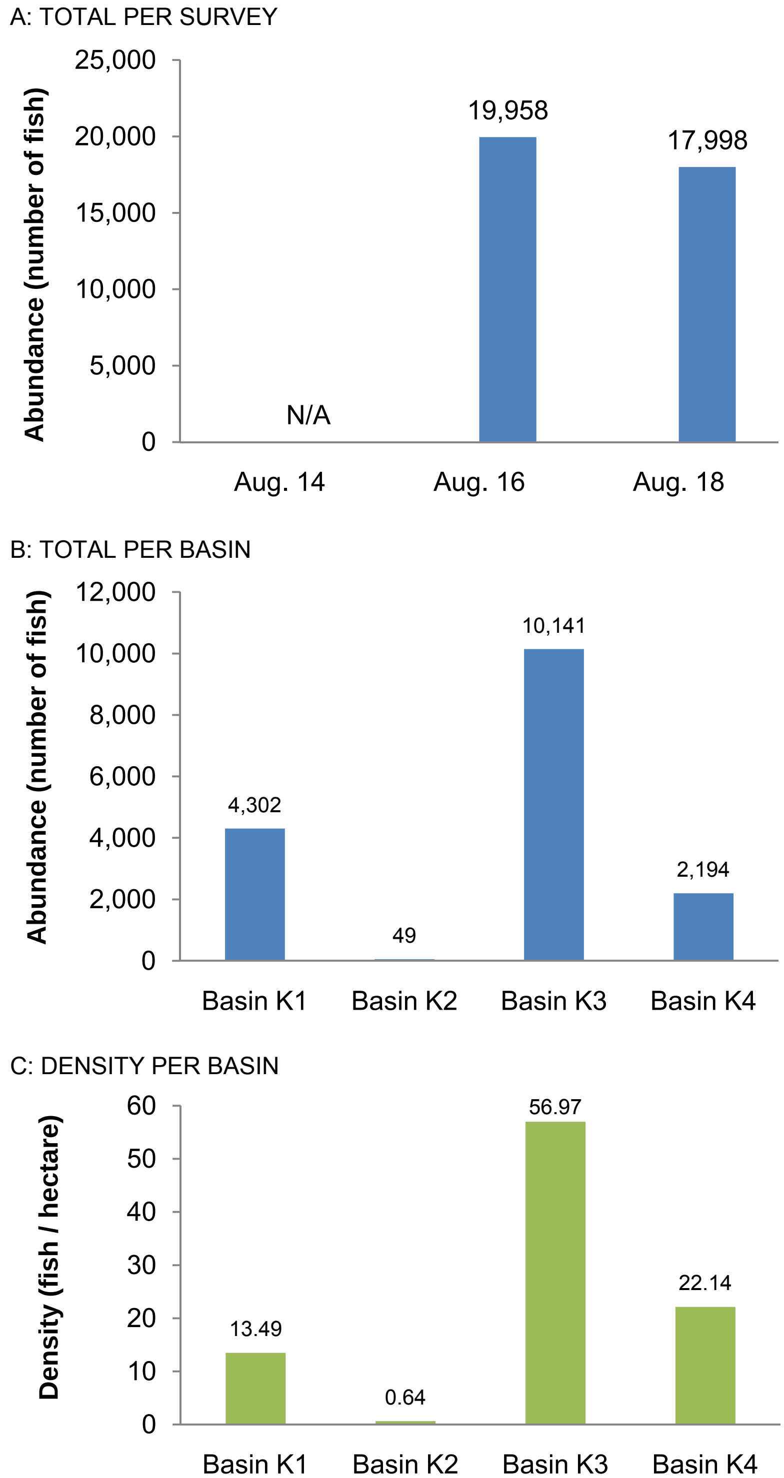
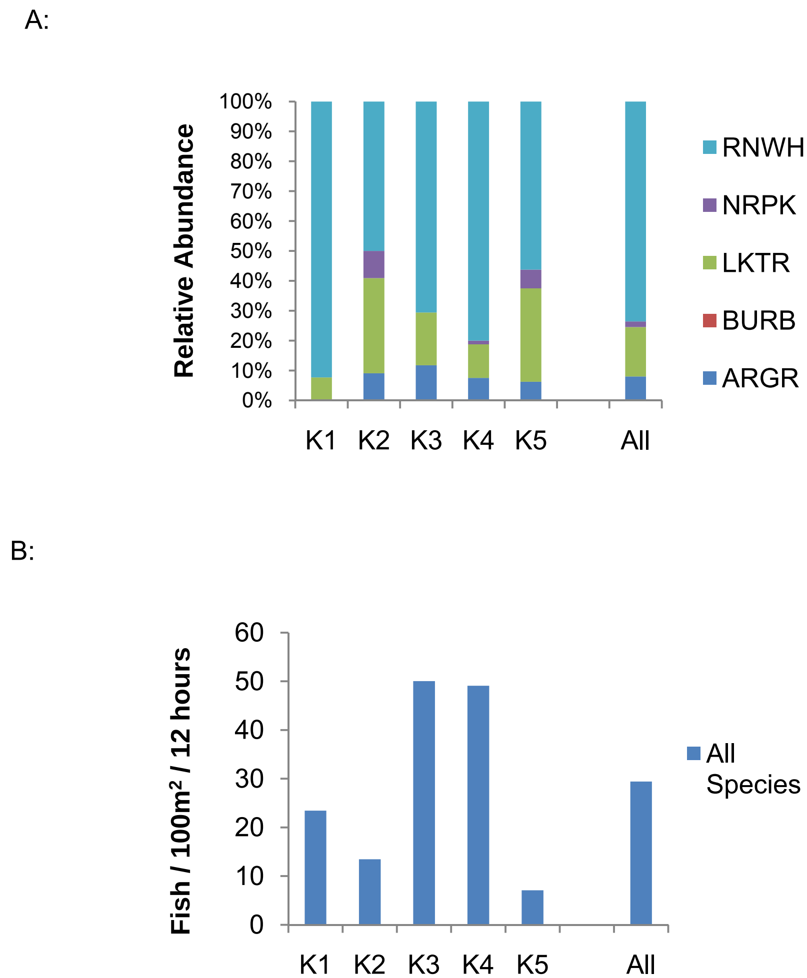


Figure JJ4.4-3 Estimated Relative Abundance of Fish Species and Fish Catch-Per-Unit-Effort (fish / 100 m^2 / 12-net hours) from Gill Nets (38 and 64 mm) in Summer 2004 at Kennady Lake.



JJ4.4.1.1.2 Gill Net Fish Composition

Gill netting effort in 2010 was 72 short-duration sets of 30 m^2 net (which included one 64 mm panel and one 89 mm panel), plus 10 short-duration sets of 15 m^2 net (one 38 mm panel). Soaking time ranged from 0.9 to 3.2 h. Total standardized effort was 3,652 m^2 net h. Multiple sets were deployed in each study basin: K1 = 26, K2 =14, K3 = 20 and K4 = 12.

Only eight of the 72 sets captured fish, and only 13 fish were captured in total (Appendix JJ.XII). Twelve fish were captured in the 64-mm panels (one northern pike, five lake trout and six round whitefish); whereas one fish (lake chub) was captured in the 38-mm panel. Six fish were captured in K4, five fish in K3, and two fish in K1. No fish were captured in K2. Overall, 85% of the catch was lake trout and round whitefish. Although few fish were captured, the results were consistent with previously completed baseline studies in Kennady Lake and other lakes in the Northwest Territories (e.g., Johnson 1976; Section 8.3.8 of the EIS; Annex J). The lake trout CPUE was 1.41 fish/100 m^2/12 net h, and the round whitefish CPUE was 1.69 fish/100 m^2/12 net h. The total (all species combined) CPUE was 3.66 fish/100 m^2/12 net h.

The CPUE values were low during the summer 2010 study, compared to those observed during summer 1996 and summer 2004 (Section 8.3.8 of the EIS; Annex J) For example, average CPUE for lake trout in summer 1996 was 3.64 fish/100 m^2/12-net hours (per basin), and in summer 2004 was 6.11 fish/100 m^2/12 net h (per basin). Average CPUE for round whitefish in summer 1996 was 16.8 fish/100 m^2/12 net h (per basin), and in summer 2004 was 22.6 fish/100 m^2/12 net h (per basin). Data of mesh sizes of 38 mm and 64 mm were pooled for calculation of CPUEs for 1996 and 2004. Differences in CPUEs between programs may exist, in part, because previous work may have set nets in locations identified as ‘good’ habitat (e.g., between islands, off a shelf), whereas gill netting in 2010 was constrained to random locations along the transects. Although, the overall low size of the fish catch in the 2010 summer program precluded an effective validation of the hydroacoustic data by itself, gill netting from previous programs captured sufficient numbers of fish to estimate the relative abundance of lake trout in Kennady Lake.

To supplement the fish catch data in 2010, data from recent baseline studies (Annex J) were used to describe CPUE among basins and to approximate the relative abundance of fish species in Kennady Lake (Figure JJ4.4-3). Fish catch data were from gill nets of 38 mm and 64 mm mesh sizes. In summer 2004, the lowest CPUE was recorded in Basin K2 (13.5 fish/100 m^2/12 net h), and the highest CPUE was recorded in Basin K3 (50.0 fish/100 m^2/12 net h). The percent relative abundance of species captured during summer 2004 indicated that round whitefish was the dominant species in Kennady Lake (Figure JJ4.4.1). The mean relative abundance of round whitefish was 69.8% (53.4 to 86.3%; 90% CI; n = 5 basins); whereas the mean relative abundance of lake trout was 19.9% (9.27 to 30.6%; 90% CI; n = 5 basins). Together, round whitefish and lake trout comprised approximately 90% of the gill net catch in summer 2004. The ratio of lake trout captures to round whitefish was 0.22, lake trout to northern pike was 8.75, and lake trout to Arctic grayling was 2.06.

JJ4.4.1.1.3 Lake Trout Population Size

Assuming that the species relative abundances derived from the gill net catch of summer 2004 (Annex J) characterized the species composition of fish detected from hydroacoustics in 2010, lake trout densities would be 4.64 fish/ha and the lake trout fish population would be 3,776 fish (19.9% of total fish abundance). This approach is typical for monitoring studies of fish abundance (e.g., Yule 2000; Gangl and Whaley 2004; Staines 2008). This value was 1.64 times greater than previously estimated minimum population size of 2,300 fish (Annex J, Section J4.4.3.2).

However, it is generally difficult to assess whether the species composition of a gill net catch is similar in composition to the fish detected from hydroacoustics (e.g., Yule 2000; Gangl and Whaley 2004; Hartman and Mgraf 2007). The method of hydroacoustics does not directly identify the species of individual targets. Based on target strengths and known sizes of fish species in Kennady Lake, the percent relative abundance of lake trout in Kennady Lake may be higher than the 19.9% determined from gill netting. For example, approximately 65% of all vertical targets were large targets (i.e., targets larger than -35 dB or 385 mm in length; Table JJ4.4.1). Lake trout and northern pike are the only species that exceed 385 mm in Kennady Lake (see Annex J, Section J4.4.3.2, Table J4.4-13). Thus, based on the estimated sizes of the fish identified during the hydroacoustic surveys, a population estimate of 3,776 lake trout may be an underestimation. To address this, a fish size dependent population estimate was calculated as described below.

Given the target strength data and distribution of fish in Kennady Lake, lake trout densities were calculated as the sum of densities from horizontal and vertical beaming using the below equations:

Equation JJ4-1

$$LKTR\ Horizontal\ Density = \%LKTR \times horizontal\ density$$

Equation JJ4-2

$$\begin{aligned} LKTR\ Vertical\ Density \\ &= (\%targets < 385\ mm\ \times\ \%LKTR \times vertical\ density) \\ &+ \left(\%targets \geq 385\ mm\ \times \%LKTR^1 \times vertical\ density\right) \end{aligned}$$

where %LKTR was the percentage of lake trout estimated from the 2004 fish catch data (19.9%), and %LKTR was the percentage (90%) of lake trout targets of all targets greater than 385 mm (the maximum length of round whitefish observed for Kennady Lake). Approximately 10% of the large targets were determined to be of northern pike. While it was assumed that the fish composition of hydroacoustic data from horizontal beaming was similar to the composition determined from 2004 gill netting (Equation JJ4-1), the vertical data were adjusted to better reflect the observed composition of large-sized targets from hydroacoustics. The combined results from the above equations generated a mean density of 13.42 lake trout per hectare (±8.5 SE), and a lake trout population of 10,925 fish (±6,920 SE). The upper 90% confidence limit for density was 33.42 lake trout/ha and the upper 90% confidence limit for population size was 27,207 lake trout. This was felt to be a more conservative (i.e., high) estimation of lake trout abundance in the lake.

The mean density of lake trout in Kennady Lake appears to be similar to densities reported in similar systems by other researchers (Staines 2008; Winfield et al. 2009). For example, hydroacoustic assessments of lake trout in the Ugashik Lakes, Alaska (2002 to 2006) calculated mean annual densities to be 10.1 lake trout/ha (Staines 2008). A population assessment of Arctic char (*Salvelinus alpinus*) in oligotrophic lakes in the United Kingdom reported 37 fish/ha (Winfield et al. 2009).

JJ4.4.2 Lake Fish Inventory Surveys

JJ4.4.2.1 2007 Study

A summary of the fish captured by gear type for the 2007 surveys is provided in Table JJ4.4-2. Catch results and CPUE data are provided in Appendix JJ.XIII.

Fish were captured in nine of the 15 lakes sampled. Fish species captured included five sport fish (Arctic grayling, burbot [*Lota lota*], lake trout, northern pike, and round whitefish), one non-sport fish (longnose sucker [*Catostomus catostomus*]), and two forage fish species (ninespine stickleback [*Pungitius pungitius*] and slimy sculpin). Shoreline electrofishing of Lake 410 and Kirk Lake was conducted as part of the metal testing component; one slimy sculpin and one northern pike were captured.

Gill netting appeared to be a more effective sampling method than shoreline electrofishing. Minnow trapping was the least effective method; minnow traps were set in three of the lakes sampled, and no fish were captured.

JJ4.4.2.2 2010 Study

A summary of the fish captured by gear type is provided in Table JJ4.4-3. Catch results and CPUE data are provided in Appendix JJ.XIII.

Fish were captured in nine of the 13 lakes sampled. Fish species captured included four sport fish (Arctic grayling, burbot, lake trout and northern pike), one non-sport fish (longnose sucker), and three forage fish species (lake chub, ninespine stickleback, and slimy sculpin). Sport fish were captured in all three watersheds sampled within the LSA in 2010 (i.e., Kennady Lake watershed, the adjacent N watershed, and lakes sampled downstream of Kennady Lake in the L watershed). Similar to what was noted in previous baseline studies (Annex J), the abundance of fish also was low in most lakes sampled in 2010.

Table JJ4.4-2 Number of Fish Captured by Gear Type in Lakes Surveyed, 2007

Lake	Gill Nets				Shoreline Electrofishing						Minnow Traps	Total
	ARGR	LKTR	NRPK	RNWH	BURB	NRPK	LNSC	NNST	SLSC	UNKN	No Fish Caught	
Kennady Lake Watershed												
A1	2	0	0	12	0	0	0	0	0	0	-	14
A3	1	4	1	0	0	0	0	0	0	1 (a)	-	7
D2	0	0	1	0	0	0	0	0	0	0	0	1
D3	0	0	0	0	0	0	0	0	0	0	0	0
E1	0	0	3	0	0	0	0	0	2	0	0	5
Downstream from Kennady Lake												
Kirk Lake	-	-	-	-	0	1	0	0	0	0	-	1
Lake 410	-	-	-	-	0	0	0	0	1	0	-	1
Outside of LSA												
Y1	-	-	-	-	0	0	0	9	0	0	-	9
Y2	-	-	-	-	0	0	0	0	0	0	-	0
Y4	-	-	-	-	0	0	0	0	0	0	-	0
Y6	-	-	-	-	0	0	0	0	0	0	-	0
Y7	-	-	-	-	0	0	0	0	0	0	-	0
Y8	-	-	-	-	0	0	0	0	0	0	-	0
Y9	-	-	-	-	1	0	2	0	0	13 (b)	-	16
Y10	-	-	-	-	5	0	0	0	2	0	-	7

(a) = unknown fry; (b) = unknown sucker species

ARGR = Arctic grayling; LKTR = lake trout; NRPK = northern pike; RNWH = round whitefish; BURB = burbot; LNSC = longnose sucker; NNST = ninespine stickleback; SLSC = slimy sculpin; UNKN = unknown species; - = not sampled

Table JJ4.4-3 Number of Fish Captured by Gear Type in Lakes Surveyed, 2010

Lake	Gill Nets				Minnow Traps					Total
	ARGR	LKTR	NRPK	LNSC	BURB	NRPK	LKCH	NNST	SLSC	
Kennady Lake Watershed										
A3	0	1	0	0	0	0	0	0	0	1
A4	0	0	0	0	0	0	0	0	0	0
D2	0	0	0	0	0	1	0	0	0	1
D3	0	0	1	0	0	1	0	0	0	2
E1	0	0	0	0	0	0	0	0	0	0
Adjacent N Watershed										
N14	4	1	0	3	0	0	2	1	1	12
N14a	0	0	0	5	0	0	67	0	2	74
N14b	0	0	0	0	0	0	0	0	0	0
N17	0	2	0	0	1	0	4	0	2	9
Downstream from Kennady Lake										
L2	0	0	2	0	0	1	0	0	0	3
L3	0	0	0	0	0	1	0	0	0	1
L13	0	0	0	0	0	0	0	0	0	0
L18	3	1	0	0	1	0	0	0	0	5
Total	7	5	3	8	2	4	73	1	5	108

ARGR = Arctic grayling; LKTR = lake trout; NRPK = northern pike; LNSC = longnose sucker; BURB = burbot; LKCH = lake chub; NNST = ninespine stickleback; SLSC = slimy sculpin

JJ4.4.2.3 Fish-Bearing Status

Based on the results of the 2007 and 2010 programs, the fish-bearing status of small lakes is provided in Table JJ4.4-4. The majority of these small lakes were designated as fish-bearing, meaning fish were captured or there was a connection to another fish-bearing lake or stream. As outlined in Annex J, lakes were designated as non-fish bearing if no fish were 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). According to the above criteria, Lakes A4 and N14b were considered non-fish bearing, as no fish were captured during sampling, depths were very shallow (0.4 and 0.8 m, respectively), and there was no defined channel connecting to other lakes. Even at high flow events, there would only likely be limited overland flow between lakes.

Due to the cursory nature of the 2007 survey of the lakes near the esker, the fish-bearing status of some of these lakes has not been assessed.

Table JJ4.4-4 Fish-Bearing Status of Small Lakes Surveyed, 2007 and 2010

Sub-watershed	Fish Species Known to Use Sub-watershed[(a)]	Lake	Max Depth (m) [(b)]	Fish Species Captured in Lake (2007 and 2010)	Lake Designation	Rationale
A	ARGR, NRPK, LKTR, BURB, NNST, SLSC, RNWH, LKCH	A1	-	ARGR, RNWH	fish-bearing	fish caught in lake
		A3	4.2	ARGR, LKTR, NRPK, UNKN	fish-bearing	fish caught in lake
		A4	0.4	no fish caught	non-fish-bearing	no fish caught in lake; no connection to other lakes; small, shallow lake likely isolated year-round
D	ARGR, BURB, LKTR, NRPK, NNST, SLSC	D2	0.9	NRPK	fish-bearing	fish caught in lake
		D3	2.5	NRPK	fish-bearing	fish caught in lake
E	ARGR, BURB, NRPK, NNST, SLSC	E1	3.5	NRPK, SLSC	fish-bearing	fish caught in lake
L	ARGR, BURB, LKTR, NRPK, LKCH, SLSC, NNST, RNWH	L2	3.5	NRPK	fish-bearing	fish caught in lake
		L3	1.1	NRPK	fish-bearing	fish caught in lake
		L13	1.2	no fish caught	fish-bearing	connection to downstream fish-bearing lake for small bodied fish at the time of the survey
		L18	5.0	ARGR, BURB, LKTR	fish-bearing	fish caught in lake
N	ARGR, BURB, LKTR, CISC, RNWH, LNSC, LKCH, NNST, SLSC, WHSC	N14	3.5	ARGR, LKTR, LNSC, LKCH, NNST, SLSC	fish-bearing	fish caught in lake
		N14a	3.2	LNSC, LKCH, SLSC	fish-bearing	fish caught in lake
		N14b	0.8	no fish caught	non-fish-bearing	no fish caught in 2010; shallow lake likely isolated year-round; no connection to N14
		N17 [(c)]	10.5	BURB, LKTR, LKCH, SLSC	fish-bearing	fish caught in lake
Y	ARGR, BURB, LNSC, NNST, SCKR, SLSC	Y1	-	NNST	fish-bearing	fish caught in lake
		Y2	-	no fish caught	unknown	no fish caught; more information required
		Y4	-	no fish caught	unknown	no fish caught; more information required
		Y6	-	no fish caught	unknown	no fish caught; more information required
		Y7	-	no fish caught	unknown	no fish caught; more information required
		Y8	-	no fish caught	unknown	no fish caught; more information required
		Y9	-	BURB, LNSC, SCKR	fish-bearing	fish caught in lake
		Y10	-	BURB, SLSC	fish-bearing	fish caught in lake

(a) Fish species known to use sub-watershed is based on information provided in Annex J Fisheries and Aquatic Resources Baseline.

(b) Maximum depth observed in 2007 or 2010.

(c) Only the northeast basin of Lake N17 was examined.

- = Data not collected, ARGR = Arctic grayling, BURB = burbot, CISC = cisco; LKTR = lake trout, NRPK = northern pike, RNWH = round whitefish, LNSC = longnose sucker, SCKR = unknown sucker species; LKCH = lake chub, NNST = ninespine stickleback, SLSC = slimy sculpin; WHSC = white sucker.

JJ4.4.3 Stream Fish Inventory Surveys

JJ4.4.3.1 2007 Study

JJ4.4.3.1.1 Stream Sampling

A summary of total catch is provided in Tables JJ4.4-5 and JJ4.4-6 for the summer and fall sampling seasons, respectively. Detailed catch results and catch-per-unit-effort data are provided in Appendix JJ.XIII.

In the summer of 2007, 598 fish were captured in the 25 streams sampled (Table JJ4.4-5). The majority of these fish were slimy sculpin, which were common to almost every stream sampled. Arctic grayling were captured in 11 streams in the summer sampling period: one stream outside the LSA, three streams downstream of Kennady Lake, and seven streams in the N watershed. Other commonly caught fish included burbot and lake chub. Northern pike were captured in only four streams: L3, M2, M3, and M4. Juvenile lake trout were captured in both N17 and N18, just upstream from the confluence with the downstream lake. Very few ninespine stickleback and longnose sucker were captured.

In the summer of 2007, Arctic grayling were commonly caught in streams in the N watershed and were only caught in the L watershed streams downstream of Kennady Lake. Similar to summer sampling in 2005, no Arctic grayling were captured in the M watershed streams. Also similar to 2005 summer sampling, no northern pike were captured in the N watershed. Burbot and slimy sculpin were common to both the streams downstream of Kennady Lake and the N watershed. Only four lake chub were captured in the streams downstream of Kennady Lake, yet they were captured in every stream sampled in the N watershed. Ninespine stickleback and longnose sucker were only captured in the N watershed.

In the fall of 2007, 259 fish were captured in the 12 streams surveyed (Table JJ4.4-6). Again, the majority of the fish were slimy sculpin. Other commonly caught fish included Arctic grayling and burbot. Arctic grayling were captured in seven streams: four streams in the downstream outlet drainage and three streams in the N watershed. Lake chub and ninespine stickleback were also captured in the fall sampling period. Northern pike, lake trout, and longnose sucker were not captured or observed in the fall sampling period.

Table JJ4.4-5 Total Catch for Backpack Electrofishing Surveys Conducted in Streams Surveyed, Summer 2007

Stream	Number of Fish Captured by Species								Total
	ARGR	BURB	LKTR	NRPK	LNSC	LKCH	NNST	SLSC	
Kennady Lake Watershed									
A1	0	1	0	0	0	0	0	4	5
Downstream of Kennady Lake									
K5	0	0	0	0	0	0	0	1	1
L1a	9	1	0	0	0	4	0	10	24
L1b	1	0	0	0	0	0	0	4	5
L1c	0	0	0	0	0	0	0	1	1
L2	22	1	0	0	0	0	0	69	92
L3	0	0	0	1	0	0	0	0	1
M1	0	2	0	0	0	0	0	12	14
M2	0	0	0	1	0	0	0	7	8
M3	0	1	0	1	0	0	0	6	8
M4	0	0	0	1	0	0	0	3	4
Adjacent N Watershed									
N1	0	3	0	0	0	1	0	21	25
N2	7	5	0	0	0	2	0	1	15
N3	41	5	0	0	0	11	0	33	90
N4	68	7	0	0	0	6	0	18	99
N5	0	1	0	0	0	2	3	6	12
N6	7	3	0	0	0	4	0	1	15
N9	0	2	0	0	0	3	0	1	6
N11	0	7	0	0	0	12	1	8	28
N12	8	1	0	0	0	30	1	1	41
N16	1	6	0	0	2	1	0	38	48
N17	0	6	1	0	1	21	0	1	30
N18	16	2	1	0	0	1	0	1	21
Outside of LSA									
Y3	2	2	0	0	0	0	0	1	5
Y5	0	0	0	0	0	0	0	0	0
Total	**182**	**56**	**2**	**4**	**3**	**98**	**5**	**248**	**598**

Notes:

ARGR = Arctic grayling; LKTR = lake trout; NRPK = northern pike; BURB = burbot; SLSC = slimy sculpin; LKCH = lake chub; NNST = ninespine stickleback; LNSC = longnose sucker.

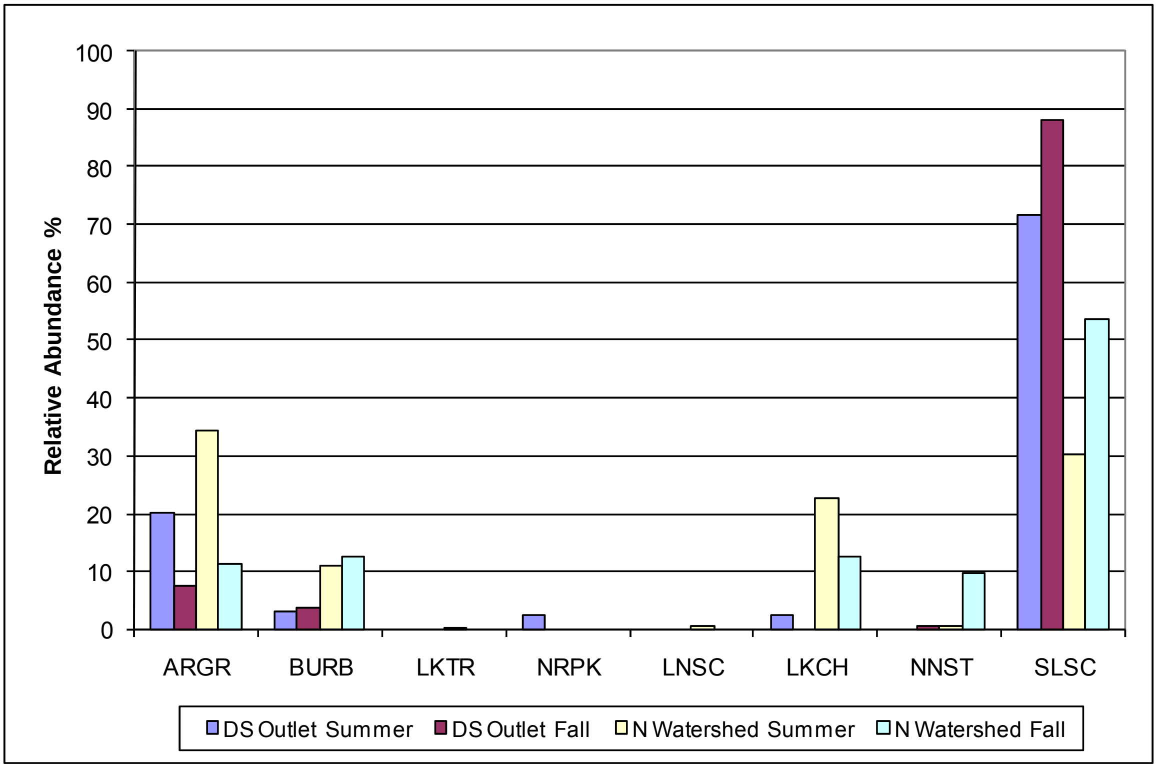
Table JJ4.4-6 Total Catch for Backpack Electrofishing Surveys Conducted in Streams Surveyed, Fall 2007

Stream	Total Number of Fish Captured by Species (All Passes)								Total
	ARGR	BURB	LKTR	NRPK	LNSC	LKCH	NNST	SLSC	
Downstream of Kennady Lake									
K5	1	0	0	0	0	0	0	3	4
L1a	3	1	0	0	0	0	0	29	33
L2	5	3	0	0	0	0	1	86	95
L3	1	1	0	0	0	0	0	0	2
410	0	2	0	0	0	1	0	21	24
Kirk	0	0	0	0	0	0	0	30	30
Adjacent N Watershed									
N2	5	4	0	0	0	4	3	5	21
N3	1	0	0	0	0	1	0	12	14
N4	0	2	0	0	0	0	1	7	10
N6	0	0	0	0	0	4	3	1	8
N11	0	1	0	0	0	0	0	12	13
N18	2	2	0	0	0	0	0	1	5
Total	**18**	**16**	**0**	**0**	**0**	**10**	**8**	**207**	**259**

ARGR = Arctic grayling; LKTR = lake trout; NRPK = northern pike; BURB =burbot; SLSC = slimy sculpin; LKCH = lake chub; NNST = ninespine stickleback; LNSC = longnose sucker.

Relative abundance for the fall and summer sampling in the outlet drainage of the Kennady Lake watershed and N watershed is presented in Figure JJ4.4-4. In the Kennady Lake downstream outlet streams, slimy sculpin was the most abundant fish species in both the summer and fall, followed by Arctic grayling. In the N Watershed, Arctic grayling was the most abundant fish species in the summer, followed by slimy sculpin; in the fall, slimy sculpin was the most abundant. In both watersheds, Arctic grayling abundance decreased in the fall compared to the summer.

Figure JJ4.4-4 Relative Abundance of Fish Species Captured in the Downstream Outlet and N Watershed Streams, Summer and Fall 2007



ARGR = Arctic Grayling; LKTR = lake trout; NRPK = northern pike; BURB = burbot; SLSC = slimy sculpin; LKCH = lake chub; NNST = ninespine stickleback; LNSC = longnose sucker.

A summary of CPUE results for streams sampled within the LSA in the summer and fall seasons in 2007 is presented in Table JJ4.4-7. In general, there were higher densities of fish captured in the summer season. Stream L2 had the highest density of fish (24.7 fish/100 m^2) in the downstream outlet streams, whereas Stream N12 had the highest density in the N watershed (49.0 fish/100 m^2). Arctic grayling densities were the highest in Stream L2 (6.0 fish/100 m^2) in the downstream outlet streams and Stream N4 in the N watershed (15.5 fish/100 m^2) in summer.

In fall 2007, the highest densities of fish were in Stream L2 in the downstream outlet streams (15.3 fish/100 m^2) and Stream N6 in the N watershed (11.4 fish/100 m^2). Overall, the density of Arctic grayling decreased in the fall compared to the summer, with the highest density observed in Stream L2 in the downstream outlet streams (1.3 fish/100 m^2) and Stream N2 in the N watershed (2.2 fish/100 m^2).

Table JJ4.4-7 Catch-per-Unit-Effort for Backpack Electrofishing Surveys Conducted in Streams Surveyed in the Local Study Area, Summer and Fall 2007

Stream	Season	Area Sampled (m^2)	CPUE (fish/100 m^2) by Species [(a)]								Total CPUE (fish/100 m^2)
			ARGR	BURB	LKTR	NRPK	LNSC	LKCH	NNST	SLSC	
Kennady Lake Watershed											
A1	Summer	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0
Downstream of Kennady Lake											
K5	Summer	280	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4
	Fall	280	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.5
L1a	Summer	120	2.5	0.0	0.0	0.0	0.0	2.5	0.0	1.7	6.7
	Fall	120	0.8	0.0	0.0	0.0	0.0	0.0	0.0	8.3	9.1
L1b	Summer	150	0.7	0.0	0.0	0.0	0.0	0.0	0.0	2.7	3.4
L1c	Summer	120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8
L2	Summer	150	6.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	24.7
	Fall 1 [(b)]	150	1.3	1.3	0.0	0.0	0.0	0.0	0.0	12.7	15.3
	Fall 2 [(b)]	150	1.3	0.0	0.0	0.0	0.0	0.0	0.7	6.7	8.7
L3	Summer	150	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7
	Fall	135	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	1.4
M1	Summer	70	0.0	2.9	0.0	0.0	0.0	0.0	0.0	17.1	20.0
M2	Summer	140	0.0	0.0	0.0	0.7	0.0	0.0	0.0	5.0	5.7
M3	Summer	120	0.0	0.8	0.0	0.8	0.0	0.0	0.0	5.0	6.6
M4	Summer	720	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.5
410	Fall	2500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8
Kirk	Fall	500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0
Adjacent N Watershed											
N1	Summer	180	0.0	0.6	0.0	0.0	0.0	0.6	0.0	10.0	11.2
N2	Summer	180	2.2	0.6	0.0	0.0	0.0	0.6	0.0	0.0	3.4
	Fall	180	2.2	1.1	0.0	0.0	0.0	1.7	0.6	0.0	5.6
N3	Summer	390	4.1	0.8	0.0	0.0	0.0	1.8	0.0	4.6	11.3
	Fall	390	0.3	0.0	0.0	0.0	0.0	0.3	0.0	3.6	4.2
N4	Summer	200	15.5	1.5	0.0	0.0	0.0	1.5	0.0	5.0	23.5
	Fall	200	0.0	1.0	0.0	0.0	0.0	0.0	0.5	3.5	5.0
N5	Summer	720	0.0	0.1	0.0	0.0	0.0	0.3	0.4	0.8	1.6
N6	Summer	480	1.5	0.6	0.0	0.0	0.0	0.8	0.0	0.2	3.1
	Fall	70	0.0	0.0	0.0	0.0	0.0	5.7	4.3	1.4	11.4

Table JJ4.4-7 Catch-per-Unit-Effort for Backpack Electrofishing Surveys Conducted in Streams Surveyed in the Local Study Area, Summer and Fall 2007 (continued)

Stream	Season	Area Sampled (m^2)	CPUE (fish/100 m^2) by Species [(a)]								Total CPUE (fish/100 m^2)
			ARGR	BURB	LKTR	NRPK	LNSC	LKCH	NNST	SLSC	
N9	Summer	160	0.0	1.3	0.0	0.0	0.0	1.9	0.0	0.6	3.8
N11	Summer	800	0.0	0.9	0.0	0.0	0.0	1.5	0.1	1.0	3.5
	Fall	800	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.5	1.6
N12	Summer	100	8.0	1.0	0.0	0.0	0.0	39.0	1.0	1.0	49.0
N16	Summer	150	0.7	4.0	0.0	0.0	1.3	0.7	0.0	25.3	32.0
N17	Summer 1 [(b)]	384	0.0	0.8	0.0	0.0	0.0	5.2	0.0	0.0	6.0
	Summer 2 [(b)]	480	0.0	0.6	0.2	0.0	0.2	0.2	0.0	0.2	1.4
N18	Summer	150	11.3	0.0	0.7	0.0	0.0	0.7	0.0	0.7	13.4
	Fall	140	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.7	3.5

(a) Data from first pass only.

(b) Multiple passes.

m^2 = square metres; CPUE = catch-per-unit-effort; ARGR = Arctic grayling; LKTR = lake trout; NRPK = northern pike; BURB = burbot; SLSC = slimy sculpin; LKCH = lake chub; NNST = ninespine stickleback; LNSC = longnose sucker.

JJ4.4.3.1.2 Arctic Grayling

A summary of total catch, CPUE, and three-pass depletion population estimates for YOY Arctic grayling for streams surveyed in 2007 are presented in Table JJ4.4-8.

Sufficient numbers of YOY Arctic grayling required to calculate three-pass depletion estimates were captured in three of the 14 streams sampled. Within these three streams (L2, N3, and N4), the highest density of YOY Arctic grayling was in Stream N4, with 37 fish/100 m^2. Stream N3 had a YOY Arctic grayling density of 14.4 fish/100 m^2. The lowest density of YOY Arctic grayling was in Stream L2, with 8 fish/100 m^2. These streams were previously assessed for aquatic habitat; Streams N3 and N4 were rated as providing moderate quality Arctic grayling spawning habitat, whereas Stream L2 was rated as high quality Arctic grayling spawning habitat (Annex J).

A summary of life history information for Arctic grayling captured in streams within the LSA in the summer and fall of 2007 is provided in Tables JJ4.4-9 and JJ4.4-10, respectively.

In the summer, the majority of Arctic grayling captured were YOY, ranging in length from 20 to 55 mm and in weight from 0.1 to 2.3 grams (g) (Table JJ4.4-9). The mean length and weight of YOY Arctic grayling downstream from Kennady Lake was 49 mm and 1.3 g, respectively; the mean length and weight of YOY Arctic grayling within the N Watershed was 37 mm and 0.6 g, respectively. The difference in sizes indicated that YOY Arctic grayling were larger in the N watershed than in the streams downstream of Kennady Lake.

Juvenile Arctic grayling were captured in several streams throughout both the N watershed and downstream of Kennady Lake. Juveniles ranged in length from 118 to 194 mm and in weight from 18.5 to 102.4 g. Stream L2 was the only stream sampled in 2007 where all life stages (YOY, juvenile, and adult) of Arctic grayling were captured. Additionally, no adult Arctic grayling were captured in streams outside of Stream L2.

In the fall, most of the Arctic grayling captured were juveniles, ranging in length from 70 to 186 mm and in weight from 3 to 69 g (Table JJ4.4-10). Young-of-the-year Arctic grayling were not captured downstream of Kennady Lake; however, four were recorded in streams within the N watershed. No adult Arctic grayling were captured in the fall.

Table JJ4.4-8 Total Catch, Catch-per-Unit-Effort, and Three-Pass Depletion Estimates for Backpack Electrofishing Surveys Conducted in the Local Study Area, 2007

Stream	Season	Total ARGR in Three Passes			YOY ARGR Depletion Estimate				Fish Species Captured in First Pass						Total Fish [b]	Total CPUE (fish/100 m^2) [b]
		YOY [a]	Juv [a]	Adult [a]	Pop Estimate (#)	95% CI -	95% CI +	Pop Density (fish/100 m^2)	ARGR	BURB	NRPK	LKCH	NNST	SLSC		
Downstream of Kennady Lake																
K5	Summer	0	0	0	-	-	-	-	0	0	0	0	0	1	1	0.4
	Fall	0	1	0	-	-	-	-	1	0	0	0	0	3	4	1.4
L1a	Summer	8	1	0	-	-	-	-	3	0	0	3	0	2	8	6.7
	Fall	0	3	0	-	-	-	-	0	0	0	0	0	10	10	8.3
L1b	Summer	0	1	0	-	-	-	-	1	0	0	0	0	4	5	3.3
L2	Summer	11	9	2	12	9	15	8.0	9	0	0	0	0	28	37	24.7
	Fall 1	0	2	0	-	-	-	-	2	2	0	0	0	19	23	15.3
	Fall 2	0	3	0	-	-	-	-	2	0	0	0	1	10	13	8.7
L3	Summer	0	0	0	-	-	-	-	0	0	1	0	0	0	1	0.7
	Fall	0	1	0	-	-	-	-	1	1	0	0	0	0	2	1.5
M1	Summer	0	0	0	-	-	-	-	0	2	0	0	0	12	14	20.0
M2	Summer	0	0	0	-	-	-	-	0	0	1	0	0	7	8	5.7
M3	Summer	0	0	0	-	-	-	-	0	1	1	0	0	6	8	6.7
M4	Summer	0	0	0	-	-	-	-	0	0	1	0	0	3	4	0.6
Adjacent N Watershed																
N2	Summer	7	0	0	-	-	-	-	4	1	0	1	0	0	6	3.3
	Fall	2	3	0	-	-	-	-	4	2	0	3	1	0	10	5.6
N3	Summer	38	3	0	56	29	83	14.4	16	3	0	7	0	18	44	11.3
	Fall	1	0	0	-	-	-	-	1	0	0	1	0	14	16	4.1
N4	Summer	67	1	0	74	65	83	37.0	31	3	0	3	0	10	47	23.5
	Fall	0	0	0	-	-	-	-	0	2	0	0	1	7	10	5.0
N5	Summer	0	0	0	-	-	-	-	0	1	0	2	3	6	12	1.7
N6	Summer	7	0	0	-	-	-	-	7	3	0	4	0	1	15	3.1
	Fall	0	0	0	-	-	-	-	0	0	0	4	3	1	8	15.2

(a) YOY, juvenile, and adult ARGR were fish <70 mm, 70 mm to 240 mm, and >240, respectively.

(b) Total fish and total CPUE was calculated from the first pass only.

= number; % = percent; m^3 = cubic metres; - = Not applicable, YOY = young-of-the-year, CI = Confidence Interval, CPUE = catch-per-unit-effort, Juv = juvenile, Pop = population, ARGR = Arctic grayling, BURB = burbot, NRPK = northern pike, LKCH = lake chub, NNST = ninespine stickleback, SLSC = slimy sculpin

Table JJ4.4-9 Length and Weight Characteristics for Arctic Grayling Captured in the Local Study Area, Summer 2007

Stream	YOY [a]					Juvenile [a]					Adult [a]				
	n	Length (mm)		Weight (g)		n	Length (mm)		Weight (g)		n	Length (mm)		Weight (g)	
		Range	Mean	Range	Mean		Range	Mean	Range	Mean		Range	Mean	Range	Mean
Downstream of Kennady Lake															
L2	11	20 - 53	47	0.3 - 2.3	1.3	9	124 - 194	159	19.4 - 102.4	51.6	2	245 - 310	278	153.1 - 361	257.1
L1b	0	-	-	-	-	1	142	-	29.2	-	0	-	-	-	-
L1a	8	47 - 55	51	0.7 - 2.1	1.4	1	132	-	26.4	-	0	-	-	-	-
Sub-total	19	20 - 55	49	0.3 - 2.3	1.3	11	124 - 194	155	19.4 - 102.4	47.2	2	245 - 310	278	153.1 - 361	257.1
Adjacent 'N' Watershed															
N2	7	32 - 42	38	0.3 - 0.6	0.4	0	-	-	-	-	0	-	-	-	-
N3	38	33 - 50	42	0.3 - 1.6	0.8	3	118 - 157	134	18.5 - 47.7	30.2	0	-	-	-	-
N4	67	32 - 43	37	0.1 - 1.3	0.6	1	125	-	22.3	-	0	-	-	-	-
N6	7	31 - 36	33	0.2 - 0.5	0.3	0	-	-	-	-	0	-	-	-	-
N12	8	29 - 39	34	0.3 - 0.5	0.4	0	-	-	-	-	0	-	-	-	-
N16	0	-	-	-	-	1	180	-	80.1	-	0	-	-	-	-
N18	16	25 - 34	31	0.3 - 0.4	0.3	0	-	-	-	-	0	-	-	-	-
Sub-total	143	25 - 50	37	0.1 - 1.3	0.6	5	118 - 180	142	18.5 - 80.1	38.6	0	-	-	-	-

[a] YOY <70 mm; Juvenile 70 to 240 mm; Adult >240 mm.

g = grams; mm = millimetres; - = Not applicable; YOY = young-of-the-year.

Table JJ4.4-10 Length and Weight Characteristics for Arctic Grayling Captured in the Local Study Area, Fall 2007

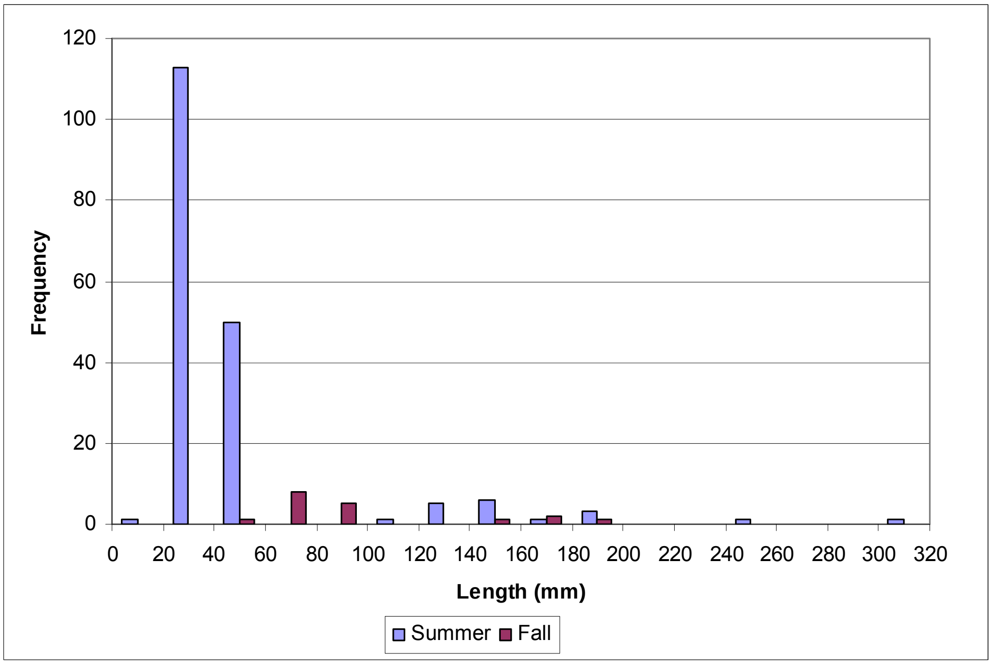
Stream	YOY [(a)]					Juvenile [(a)]				
	n	Length (mm)		Weight (g)		n	Length (mm)		Weight (g)	
		Range	Mean	Range	Mean		Range	Mean	Range	Mean
Downstream of Kennady Lake										
K5	0	-	-	-	-	1	81	-	4.9	-
L1a	0	-	-	-	-	3	70 - 176	106	3.2 – 50.5	19.5
L2	0	-	-	-	-	5	80 – 94	88	5.5 – 6	5.8
L3	0	-	-	-	-	1	175	-	65.6	-
Sub-total	0	-	-	-	-	10	70 - 176	102	3.2 – 65.6	15.8
Adjacent 'N' Watershed										
N2	2	66 - 69	68	1.9 – 3.2	2.6	3	70 - 146	98	3 – 34.8	14.2
N3	1	-	61	-	2.1	0	-	-	-	-
N18	1	-	43	-	0.5	1	-	186	-	69
Sub-total	4	43 - 69	60	0.5 – 3.2	1.9	4	70 - 186	120	3 - 69	27.9

[(a)] YOY < 70 mm; Juvenile 70 to 240 mm

- = Not applicable; YOY = young-of-the-year.

The length-frequency of all Arctic grayling captured in the LSA is shown in Figure JJ4.4-5. In the summer, YOY (<70 mm) Arctic grayling were the most frequently captured life stage in the streams. Juvenile (70 to 240 mm) and adult (>240 mm) Arctic grayling were also captured; however, the YOY size class dominated. In the fall, the frequency of YOY Arctic grayling decreased. These YOY fish either moved into the lakes to overwinter or grew over the summer to be in the juvenile size class (70 to 240 mm).

Figure JJ4.4-5 Length-Frequency of Arctic Grayling Caught in the Local Study Area, Summer and Fall 2007



JJ4.4.3.1.3 Peamouth Verification

In total, 25 streams were sampled in 2007, including the two locations where peamouth had been previously reported (Streams A1 and N17). Two passes were completed in Stream A1; no peamouth were captured or observed. N17 was sampled twice in the summer; a total of 24 lake chub were captured at this site, but no peamouth were captured or observed. In the remaining streams sampled, no peamouth were captured or observed. The total stream electrofishing effort for 2007 was 33,030 seconds.

The only cyprinid species captured during the 2007 surveys was lake chub (Photo JJ4.3-1). This species was common to the streams in the LSA, especially the N watershed. Eight individuals retained from Streams N17 and L1a were identified using four separate keys including McPhail and Lindsey (1970), McPhail and McPhail (2007), Nelson and Paetz (1992), and Stewart and Watkinson (2004).

Additionally, 73 lake chub were captured during the 2010 lake surveys; no peamouth were captured or observed.

Photo JJ4.3-1 Representative Photograph of Lake Chub Captured in the Local Study Area

JJ4.4.3.2 2010 Study

A summary of total catch for 2010 stream sampling is provided in Table JJ4.4-11. Detailed catch results and catch-per-unit-effort data are provided in Appendix JJ.XIII.

Table JJ4.4-11 Total Catch for Backpack Electrofishing and Minnow Trapping Surveys Conducted in Streams Surveyed, Summer 2010

Stream	Backpack Electrofishing			Minnow Trapping		
	Number of Fish Captured by Species		Total Fish	Number of Fish Captured by Species		Total Fish
	RNWH	SLSC		RNWH	SLSC	
L11	0	0	0	0	0	0
L13	0	0	0	0	0	0
L14	2	0	2	0	0	0
L15	1	0	1	1	0	1
L18	6	3	9	0	2	2
N14a	-	-	-	0	3	3

RNWH = round whitefish; SLSC = slimy sculpin; - = not sampled.

Fish were captured in four of the six streams sampled. Two fish species were captured: one sport-fish species (round whitefish) and one forage fish species (slimy sculpin). The highest density of fish occurred in Stream L18, with a backpack electrofishing CPUE of 3.7 fish/100 m^2. The lowest density of fish was in Stream L15, with a backpack electrofishing CPUE of 0.8 fish/100 m^2.

Fish were not captured in Streams L11 and L13. At the time of the survey, Stream L11 was composed of isolated sections of run habitat and dry channel, with limited connection to Lake L11 and Lake L2. Although Stream L13 did not have dry sections of channel, a large boulder garden was present and may have deterred fish from utilizing this stream.

JJ4.4.4 Fish Tissue Metal Concentrations

JJ4.4.4.1 Previous Studies

Antimony, beryllium, and tin were not detected in any of the lake trout liver samples collected in 1996 from either Kennady Lake or Lake N16 (Table JJ4.4-12; Canamera 1998). Boron, chromium, and lead were detected more frequently and at higher concentrations in liver samples from Lake N16 fish than in those from Kennady Lake, whereas the reverse was observed for vanadium (Table JJ4.4-12). Most of the other parameters were detected in at least 50% of the liver samples.

Mean concentrations of aluminum, copper, molybdenum, and silver were higher in lake trout liver samples collected in 1996 from Kennady Lake than those from Lake N16 (Table JJ4.4-12; Canamera 1998). In comparison, mean concentrations of arsenic, barium, boron, chromium, mercury, nickel, and zinc were higher in liver samples from Lake N16 than those collected in Kennady Lake.

Table JJ4.4-12 Metal Concentrations in Lake Trout Liver Tissue Samples from Kennady Lake and Lake N16, 1996

Parameter	Kennady Lake (n = 20; mean body length = 544 mm)					Lake N16 (n = 20; mean body length = 569 mm)				
	Detection Frequency	Mean	SD	Minimum	Maximum	Detection Frequency	Mean	SD	Minimum	Maximum
Aluminum (Al)	100%	3.1	3.8	0.3	13.7	80%	0.7	0.6	<0.2	2.4
Antimony (Sb)	0%	<0.2	na	<0.2	<0.2	0%	<0.2	na	<0.2	<0.2
Arsenic (As)	90%	0.04	0.06	0.01	0.27	100%	0.12	0.10	0.01	0.44
Barium (Ba)	100%	0.01	0.01	0.002	0.04	60%	0.02	0.05	<0.002	0.24
Beryllium (Be)	0%	<0.01	na	<0.01	<0.01	0%	<0.01	na	<0.01	<0.01
Boron (B)	0%	<0.1	na	<0.1	<0.1	90%	0.3	0.2	<0.1	0.9
Cadmium (Cd)	100%	0.17	0.11	0.05	0.37	100%	0.13	0.07	0.05	0.29
Calcium (Ca)	100%	144	64	89	299	100%	159	120	78	565
Chromium (Cr)	25%	<0.11	na	<0.11	0.22	95%	0.35	0.20	<0.11	0.91
Cobalt (Co)	100%	0.14	0.06	0.06	0.30	100%	0.17	0.09	0.05	0.36
Copper (Cu)	100%	31.59	6.94	22.57	47.62	100%	11.88	8.27	1.66	27.47
Iron (Fe)	100%	826	662	151	2176	100%	609	356	137	1464
Lead (Pb)	0%	<0.01	na	<0.01	<0.01	35%	<0.01	na	<0.01	0.06
Magnesium (Mg)	100%	179	23	140	228	100%	139	29	90	219
Manganese (Mn)	100%	1.48	0.37	1.03	2.23	100%	1.16	0.42	0.33	2.08
Mercury (Hg)	100%	0.348	0.286	0.065	0.986	100%	0.639	0.309	0.183	1.240
Molybdenum (Mo)	100%	0.2	0.1	0.1	0.4	100%	0.1	0.04	0.04	0.3
Nickel (Ni)	55%	0.04	0.02	0.02	0.09	100%	0.14	0.31	0.02	1.44
Phosphate (PO_4)	100%	3416	563	2484	4563	100%	3066	472	2372	3982
Potassium (K)	100%	3704	565	2344	4361	100%	2492	417	1864	3511
Silver (Ag)	100%	0.09	0.06	0.01	0.22	90%	0.05	0.04	<0.002	0.12
Sodium (Na)	100%	1433	284	989	2112	100%	1623	292	1125	2089
Strontium (Sr)	100%	0.20	0.07	0.08	0.41	100%	0.25	0.24	0.08	1.01
Tin (Sn)	0%	<0.02	na	<0.02	<0.02	0%	<0.02	na	<0.02	<0.02
Vanadium (V)	20%	<0.11	na	<0.11	0.21	0%	<0.1	na	<0.1	<0.1
Zinc (Zn)	100%	14.19	7.20	3.41	29.15	100%	37.86	24.70	18.42	101.92
% Moisture	na	77.6	3.3	70.7	82.4	na	76.7	2.3	72.9	80.3

Source: Canamera 1998.

Note: Concentrations are in units of mg/kg wet weight.
Non-detect values were replaced with the detection limit for calculations of mean and SD. When more than 50% of the values were non-detect, the mean was considered to be the same as the detection limit.
Original data were reported in dry weight; concentrations were converted to wet weight for this Addendum.

n = number of fish; mm = millimetres; SD = standard deviation; mg/kg = milligram per kilogram

As with lake trout, antimony, beryllium, and tin were not detected in any of the round whitefish liver samples collected in 1996 from either Kennady Lake or Lake N16 (Table JJ4.4-13; Canamera 1998). Vanadium was not detected in any of liver samples from Kennady Lake and was detected in 5% of the samples from Lake N16. Boron, chromium, and silver were detected more frequently and at higher concentrations in liver samples from Lake N16 fish than in those from Kennady Lake, whereas the reverse was observed for aluminum and lead (Table JJ4.4-13). Most of the other parameters were detected in at least 50% or more of the liver samples.

Mean concentrations of aluminum and copper were higher in round whitefish liver samples collected in 1996 from Kennady Lake than those from Lake N16 (Table JJ4.4-13; Canamera 1998). Mean concentrations of arsenic, barium, chromium, nickel, silver, strontium, and zinc were higher in round whitefish liver samples taken from Lake N16 than those collected in Kennady Lake.

In 1999, liver tissue samples were collected from four species in Kennady Lake (lake trout, northern pike, arctic grayling, and round whitefish) and three species in Lake N16 (lake trout, round whitefish, cisco) (Table JJ4.4-14; EBA and Jacques Whitford 2000). Between one and four fish of each species were sampled from each study area. Only lake trout and round whitefish were common between the two study areas. Mean mercury concentration was higher in lake trout liver samples from Kennady Lake than that from Lake N16. In contrast, mean cadmium concentration was lower in lake trout liver samples from Kennady Lake than that from Lake N16. All other parameters had similar mean concentrations between the two study areas. Liver tissue from only one round whitefish individual from each study area was analysed for metal concentrations. The single fish collected from Lake N16 had higher arsenic, cadmium, chromium, copper, lead, and selenium concentrations in its liver tissues compared to concentrations measured in the single fish from Kennady Lake.

Table JJ4.4-13 Metal Concentrations in Round Whitefish Liver Tissue Samples from Kennady Lake and Lake N16, 1996

Parameter	Kennady Lake (n = 15; mean body length = 337 mm)					Lake N16 (n = 20; mean body length = 326 mm)				
	Detection Frequency	Mean	SD	Minimum	Maximum	Detection Frequency	Mean	SD	Minimum	Maximum
Aluminum (Al)	93%	0.9	1.0	<0.2	4.3	30%	<0.2	na	<0.2	0.5
Antimony (Sb)	0%	<0.2	na	<0.2	<0.2	0%	<0.2	na	<0.2	<0.2
Arsenic (As)	67%	0.03	0.02	<0.01	0.06	90%	0.36	0.36	0.01	1.01
Barium (Ba)	100%	0.02	0.01	0.00	0.06	80%	0.04	0.06	0.002	0.23
Beryllium (Be)	0%	<0.01	na	<0.01	<0.01	0%	<0.01	na	<0.01	<0.01
Boron (B)	0%	<0.1	na	<0.1	<0.1	95%	0.4	0.3	<0.1	1.4
Cadmium (Cd)	93%	0.06	0.03	<0.01	0.11	100%	0.05	0.02	0.02	0.08
Calcium (Ca)	100%	109	30	69	182	100%	163	154	78	799
Chromium (Cr)	47%	<0.11	na	<0.11	0.38	70%	0.23	0.13	<0.11	0.47
Cobalt (Co)	100%	0.13	0.10	0.03	0.36	100%	0.21	0.14	0.07	0.67
Copper (Cu)	100%	20.70	2.24	16.92	24.04	100%	3.00	1.00	1.77	4.97
Iron (Fe)	100%	127	79	54	288	100%	191	67	49	301
Lead (Pb)	27%	<0.01	na	<0.01	0.08	5%	<0.01	na	<0.01	0.01
Magnesium (Mg)	100%	228	52	169	316	100%	173	28	115	200
Manganese (Mn)	100%	2.23	0.53	1.61	3.30	100%	2.26	0.61	1.34	3.69
Mercury (Hg)	100%	0.10	0.03	0.05	0.16	90%	0.14	0.07	<0.001	0.31
Molybdenum (Mo)	100%	0.2	0.03	0.1	0.2	100%	0.2	0.0	0.1	0.2
Nickel (Ni)	67%	0.03	0.01	<0.02	0.05	95%	0.08	0.06	<0.02	0.25
Phosphate (PO_4)	100%	3873	693	3016	5344	100%	3446	598	2182	4724
Potassium (K)	100%	4492	1033	2880	6570	100%	2956	264	2635	3457
Silver (Ag)	20%	<0.002	na	<0.002	0.026	65%	0.01	0.01	<0.002	0.05
Sodium (Na)	100%	1037	296	544	1571	100%	979	238	424	1450
Strontium (Sr)	100%	0.20	0.07	0.09	0.36	100%	0.40	0.55	0.03	2.62
Tin (Sn)	0%	<0.02	na	<0.02	<0.02	0%	<0.02	na	<0.02	<0.02
Vanadium (V)	0%	<0.12	na	<0.12	<0.12	5%	<0.1	na	<0.1	0.1
Zinc (Zn)	100%	2.20	0.54	1.40	3.55	100%	21.67	3.43	11.82	26.78
% Moisture	na	76.4	1.7	70.8	78.6	na	75	2	71	80

Source: Canamera 1998.

Note: Concentrations are in units of mg/kg wet weight.
Non-detect values were replaced with the detection limit for calculations of mean and SD. When more than 50% of the values were non-detect, the mean was considered to be the same as the detection limit.
Original data were reported in dry weight; concentrations were converted to wet weight for this Addendum.

n = number of fish; mm = millimetres; SD = standard deviation; mg/kg = milligram per kilogram

Table JJ4.4-14 Metal Concentrations in Liver Tissue Samples from Fish Collected from Kennady Lake and Lake N16, 1999

Lake	Fish Species	Sample	Parameter (*Detection Limit*)									
			Arsenic (*0.05*)	Cadmium (*0.001*)	Chromium (*0.05*)	Copper (*0.01*)	Lead (*0.005*)	Mercury (*0.005*)	Nickel (*0.01*)	Selenium (*0.1*)	Silver (*0.001*)	Zinc (*0.1*)
Kennady Lake	Lake trout	Fish 1	<0.05	0.0420	0.09	4.16	<0.005	0.0770	0.05	2.1	0.0460	26.1
		Fish 2	0.060	0.0830	0.16	13.6	<0.005	0.2940	0.04	2.0	0.1130	27.5
		Fish 3	0.100	0.0620	0.22	16.8	0.0070	0.1410	0.06	2.4	0.0720	33.4
		Mean	0.070	0.0623	0.16	11.5	<0.005	0.1707	0.05	2.2	0.0770	29.0
	Northern pike	Fish 1	<0.05	0.0240	0.09	2.74	<0.005	0.0860	0.02	1.7	0.0250	26.3
		Fish 2	0.080	0.0140	0.19	7.09	0.0240	0.0160	0.04	1.8	0.0740	71.2
		Mean	0.065	0.0190	0.14	4.9	0.0145	0.0510	0.03	1.8	0.0495	48.8
	Arctic grayling	Fish 1	0.110	0.1780	0.37	5.56	0.0120	0.0180	0.03	1.5	0.1160	24.0
		Fish 2	0.090	0.1020	0.17	2.79	0.0060	0.0170	0.03	1.2	0.0060	22.9
		Mean	0.100	0.1400	0.27	4.2	0.0090	0.0175	0.03	1.4	0.0610	23.5
	Whitefish	Fish 1	0.060	0.0290	0.06	1.59	0.0100	0.0190	0.04	1.1	0.0040	22.5
Lake N16	Lake trout	Fish 1	0.130	0.1490	0.16	21.2	0.0110	0.0250	0.06	1.4	0.0840	31.8
		Fish 2	0.120	0.1500	0.22	15.4	<0.005	0.0760	0.06	2.3	0.1080	32.4
		Fish 3	0.080	0.0890	0.13	10.3	0.0070	0.0290	0.04	2.0	0.0320	35.7
		Fish 4	0.080	0.1200	0.20	11.7	0.0060	0.1320	0.06	2.4	0.0430	32.5
		Mean	0.103	0.1270	0.18	14.7	0.0073	0.0655	0.06	2.0	0.0668	33.1
	Whitefish	Fish 1	0.140	0.0710	0.18	2.84	0.0770	0.0180	0.04	2.0	0.0040	30.7
	Cisco	Fish 1	0.120	0.0530	0.18	5.09	<0.005	0.0200	0.05	1.7	0.0750	572

Source: EBA and Jacques Whitford 2000.

Note: Concentrations are in units of mg/kg wet weight.

Non-detect values were replaced with the detection limit for calculations of mean and SD. When more than 50% of the values were non-detect, the mean was considered to be the same as the detection limit.

Original data were reported in dry weight; concentrations were converted to wet weight for this Addendum.

< = less than; mg/kg = milligram per kilogram

JJ4.4.4.1.1 Comparison Among Studies

The range of metal concentrations in lake trout liver tissues was similar between the 1996 and 1999 studies, although maximum concentrations were higher in 1996. Mean cadmium and copper concentrations in lake trout livers from Kennady Lake were higher in 1996 than in 1999. Mean mercury and nickel concentrations in lake trout livers were higher in Lake N16 in 1996 than in 1999.

With only one round whitefish collected from each study area in 1999, limited comparisons could be made between the 1996 and 1999 studies. However, the liver of the individual fish collected in 1999 from Kennady Lake had much lower copper and much higher zinc concentrations than those observed in 1996 fish.

JJ4.4.4.2 2007 Study

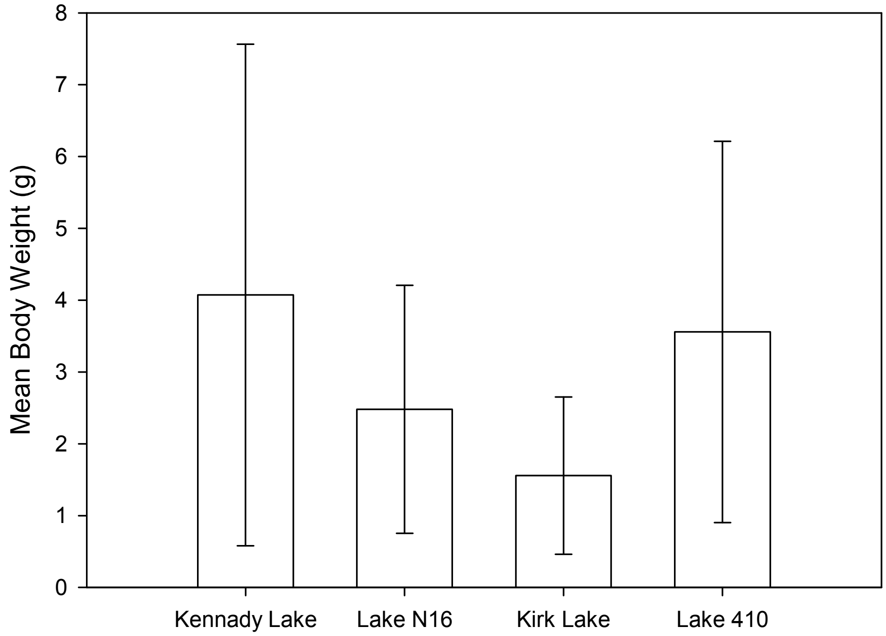
Length and weight data for slimy sculpin catch used in metal tissue analysis are summarized in Table JJ4.4-15. Mean body weights of slimy sculpin ranged from 1.6 to 4.1 g among the study areas (Figure JJ4.4-6). Length frequency distributions were similar among study areas (Figure JJ4.4-7). The catch from each study area included individuals from seven of the eight length classes, with the exception of Lake N16 catch, which included individuals from only five of the eight length classes.

Table JJ4.4-15 Length and Weight of Slimy Sculpin Collected for Tissue Chemistry, 2007

Study Site	n	Length (mm)			Weight (g)		
		Range	Mean	SD	Range	Mean	SD
Kennady Lake (Stream L2)	22	45 - 105	66	17	1.2 - 13.4	4.1	3.5
Lake N16 (Outflow)	31	45 - 87	60	13	0.9 - 7.3	2.5	1.7
Kirk Lake (Outflow)	21	49 - 105	67	16	1.5 - 11.1	3.6	2.7
Lake 410 (Outflow)	30	36 - 100	53	15	0.5 - 4.5	1.6	1.1

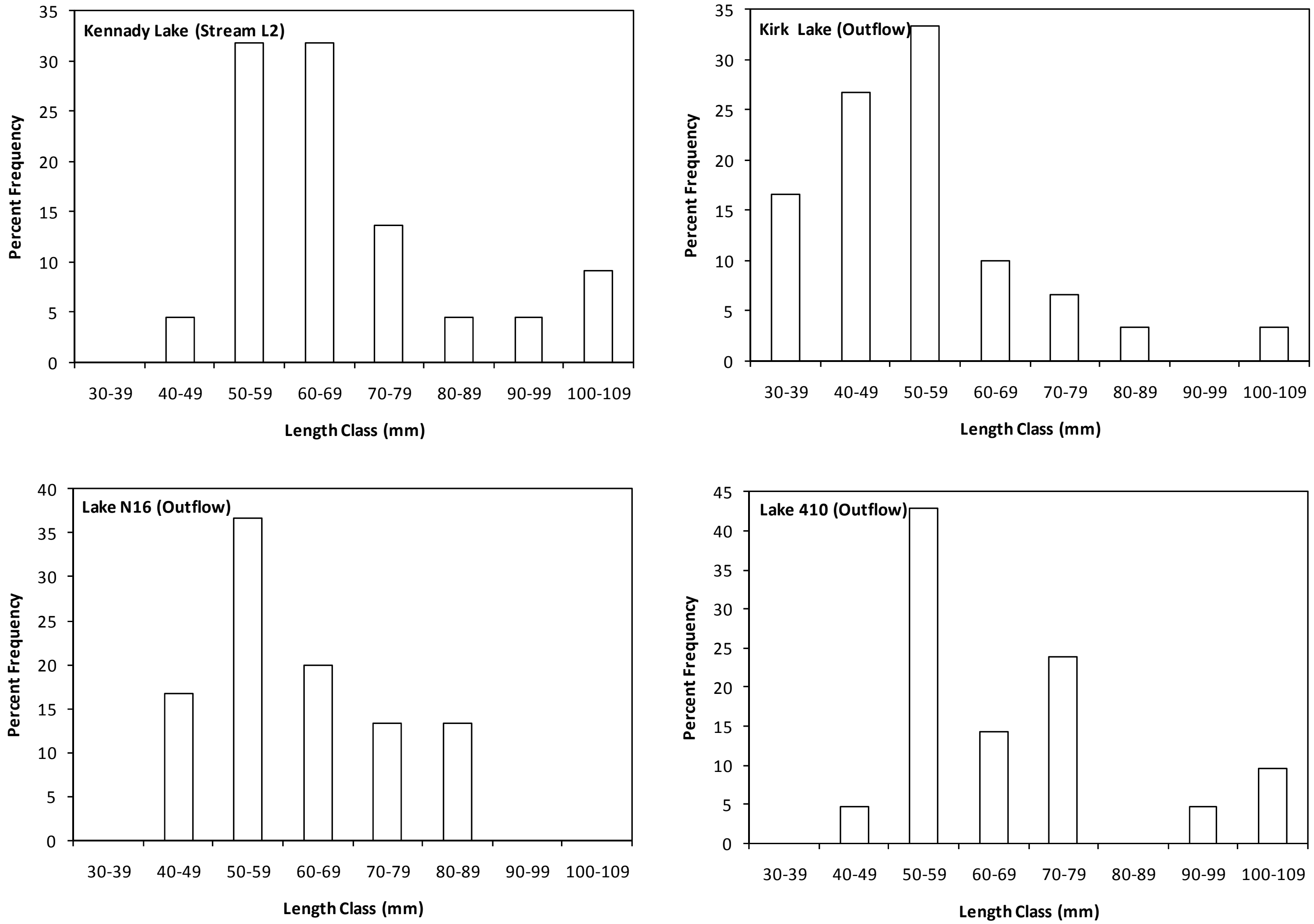
n = number of fish; mm = millimetres; g = grams; SD = standard deviation

Figure JJ4.4-6 Mean Body Weight of Slimy Sculpin Collected for Tissue Chemistry, 2007



Note: Error bars represent standard deviation

Figure JJ4.4-7 Length Frequency Distributions for Slimy Sculpin Collected for Tissue Chemistry, 2007



mm = millimetres

Metal concentrations varied less than 25 % between laboratory duplicates in all but one case, indicating an acceptable level of analytical variability (Table JJ4.4-16). The single exception was tin in Kennady Lake slimy sculpin, which was detected in one composite but was below detection in the other. Antimony, arsenic, beryllium, bismuth, lead, lithium, nickel, silver, thallium, tin, and vanadium were not detected in most samples. Mean concentrations of most other parameters were similar among the study areas, with the exception of aluminum, barium, cadmium, cobalt, manganese, and uranium (Figure JJ4.4-8). Mean concentrations of these parameters varied by more than two times among study areas. Mean concentrations of aluminum, cobalt, and uranium were highest in slimy sculpin from Lake 410, and generally were similar among the other study areas. Mean concentrations of barium, cadmium, and manganese were highest in slimy sculpin from Kirk Lake, and lowest in those from Kennady Lake.

Table JJ4.4-16 Summary of Composite Whole Body Metal Concentrations in Slimy Sculpin, 2007

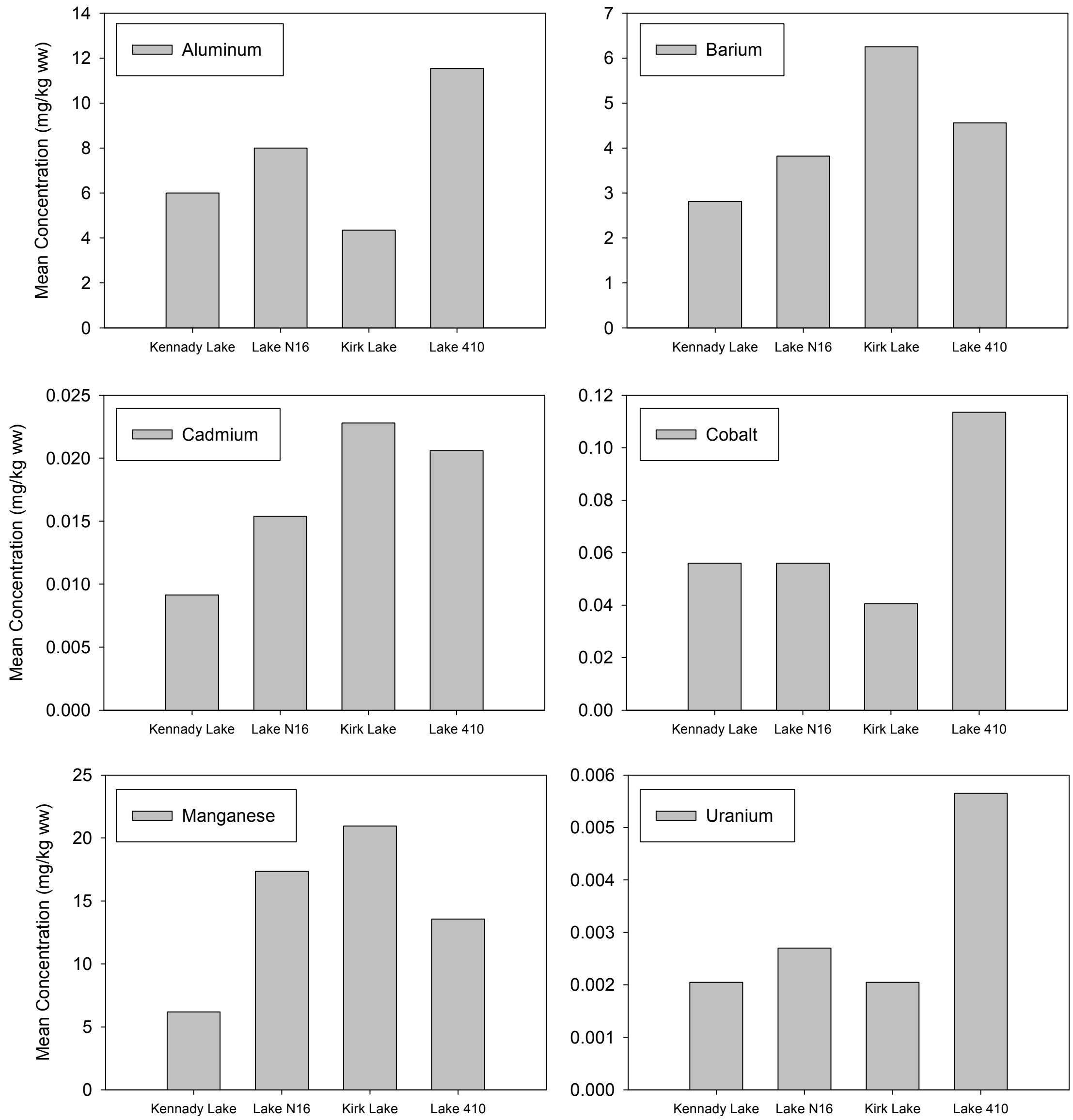
Parameter	Kennady Lake (Stream L2)				Lake N16 (Outflow)				Kirk Lake (Outflow)				Lake 410 (Outflow)			
	Composite 1	Composite 2	Mean	RPD	Composite 1	Composite 2	Mean	RPD	Composite 1	Composite 2	Mean	RPD	Composite 1	Composite 2	Mean	RPD
Aluminum (Al)	6.2	6.0	6.0	3%	7.0	9.0	8.0	25%	4.2	4.5	4.4	7%	13.6	9.5	11.6	35%
Antimony (Sb)	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na
Arsenic (As)	<0.020	<0.020	<0.020	na	0.022	<0.020	0.021	10%	<0.020	<0.020	<0.020	na	<0.020	0.022	0.021	10%
Barium (Ba)	2.58	3.05	2.82	17%	4.26	3.38	3.82	23%	6.13	6.37	6.25	4%	4.13	4.99	4.56	19%
Beryllium (Be)	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na
Bismuth (Bi)	<0.030	<0.030	<0.030	na	<0.030	<0.030	<0.030	na	<0.030	<0.030	<0.030	na	<0.030	<0.030	<0.030	na
Cadmium (Cd)	0.0093	0.0090	0.0092	3%	0.0146	0.0162	0.0154	10%	0.0217	0.0239	0.0228	10%	0.0216	0.0196	0.0206	10%
Calcium (Ca)	5450	6990	6220	25%	11600	7330	9465	45%	11900	12800	12350	7%	7230	8460	7845	16%
Chromium (Cr)	0.14	0.17	0.16	19%	0.17	0.16	0.17	6%	<0.10	0.17	0.14	52%	0.19	0.16	0.18	17%
Cobalt (Co)	0.055	0.057	0.056	4%	0.054	0.058	0.056	7%	0.042	0.039	0.041	7%	0.120	0.107	0.114	11%
Copper (Cu)	0.852	0.914	0.883	7%	0.790	0.789	0.790	0%	0.783	0.786	0.785	0%	0.951	0.808	0.880	16%
Lead (Pb)	0.025	<0.020	0.023	22%	<0.020	<0.020	<0.020	na	<0.020	<0.020	<0.020	na	<0.020	<0.020	<0.020	na
Lithium (Li)	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na
Magnesium (Mg)	265	306	286	14%	352	327	340	7%	346	346	346	0%	295	285	290	3%
Manganese (Mn)	5.70	6.67	6.19	16%	19.5	15.2	17.4	25%	21.2	20.7	21.0	2%	13.3	13.8	13.6	4%
Mercury (Hg)	0.0334	0.0332	0.0333	1%	0.0213	0.0208	0.0211	2%	0.0357	0.0319	0.0338	11%	0.0395	0.0316	0.0356	22%
Molybdenum (Mo)	0.028	0.029	0.029	4%	0.030	0.029	0.030	3%	0.023	0.025	0.024	8%	0.034	0.032	0.033	6%
Nickel (Ni)	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10	0.12	0.11	18%	<0.10	<0.10	<0.10	na
Selenium (Se)	0.29	0.31	0.30	7%	0.57	0.55	0.56	4%	0.33	0.33	0.33	0%	0.38	0.33	0.36	14%
Silver (Ag)	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na
Strontium (Sr)	20.6	26.1	23.4	24%	33.0	24.4	28.7	30%	33.8	37.4	35.6	10%	28.1	33.8	31.0	18%
Thallium (Tl)	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na	<0.010	<0.010	<0.010	na
Tin (Sn)	0.153	<0.050	0.102	101%	<0.050	<0.050	<0.050	na	<0.050	<0.050	<0.050	na	<0.050	<0.050	<0.050	na
Uranium (U)	<0.0020	0.0021	0.0021	5%	0.0028	0.0026	0.0027	7%	<0.0020	0.0021	0.0021	5%	0.0060	0.0053	0.0057	12%
Vanadium (V)	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na
Zinc (Zn)	23.8	26.1	25.0	9%	33.4	30.2	31.8	10%	39.6	34.2	36.9	15%	31.1	30.9	31.0	1%
% Moisture	77.9	76.9	77.4	1%	76.2	77.6	76.9	2%	77.2	75.5	76.4	2%	76.6	75.8	76.2	1%

Concentrations are in units of mg/kg wet weight. Non-detect values were replaced with the detection limit for calculations of mean and RPD.

(a) Relative percent difference (RPD) is the absolute difference between the duplicate values divided by the average of the two duplicates.

RPD = relative percent difference; < = less than; % = percent; mg/kg ww = milligram per kilogram wet weight.

Figure JJ4.4-8 Mean Concentrations of Select Parameters in Composite Whole Body Samples of Slimy Sculpin, 2007



mg/kg ww = milligrams per kilogram wet weight

JJ5 SUMMARY AND CONCLUSIONS

JJ5.1 AQUATIC HABITAT

JJ5.1.1 Lakes

Lakes assessed in 2007 and 2010 were all small (0.1 – 5.4 ha), with the exception of L18 (14.2 ha), Y10 (22.8 ha), and N17. Only the northeast basin of N17 was surveyed, which was 91.5 ha in size.

In 2007, 10 lakes were surveyed from the shoreline. These lakes were adjacent to an esker; consequently, shoreline substrates were often composed of gravel and cobble, suitable for spawning fish species such as longnose sucker. Cover for rearing fish throughout these lakes was minimal and consisted of substrate, instream vegetation, overhanging vegetation and undercut banks. As these lakes were assessed from the shoreline, depths were not recorded and overwintering habitat potential was unknown.

In 2010, six lakes were assessed for aquatic habitat. 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, provided in substrate, instream vegetation, overhanging vegetation, and occasionally depth. Lakes N14a and N17 may provide potential overwintering habitat, with maximum observed depths of 5.5 m and 10.5 m, respectively. The remaining lakes were mostly shallow, with little or no overwintering habitat potential.

JJ5.1.2 Streams

In 2007, four streams adjacent to an esker were surveyed. Two of the four streams provided little to no habitat for fish, as there was little to no flow and no defined stream channel. The remaining two streams did provide suitable fish habitat; Stream Y3 provided quality rearing habitat for Arctic grayling, whereas Stream Y9 provided rearing habitat for fish from Lakes Y9 and Y10.

In 2010, seven streams were assessed for aquatic habitat. These streams were often characterized by low gradient, slow flowing, and poorly defined systems. Three of the streams were deemed ephemeral based on dry sections and poorly defined channel. The remaining four may become ephemeral later in the open-water season. None of the streams provided fish passage for large-bodied fish at the time of the survey; however, many could facilitate small-bodied fish passage. The majority contained low to moderate overall fish habitat potential. There was very little to no Arctic grayling spawning habitat potential; however, some northern pike spawning habitat potential was identified.

JJ5.2 LIMNOLOGY

Limnology data were collected for 18 lakes in 2007 and 2010. Kennady Lake, Lake N16, Lake N17, Lake 410, and Kirk Lake were the largest of the lakes surveyed. These larger lakes generally were well mixed throughout the open-water season. No thermal stratification was observed and no decreasing dissolved oxygen trends were observed in these larger lakes. Most of the remaining 13 lakes had maximum depths less than or equal to 5 m. Similar to data from the larger lakes, these small lakes generally did not exhibit any temperature or dissolved oxygen stratification with depth. Additionally, these small lakes were typically very clear, with the Secchi disc visible to the bottom substrates.

JJ5.3 LOWER TROPHIC COMMUNITIES

JJ5.3.1 Phytoplankton

Lakes in the LSA have chlorophyll *a* concentrations, as well as phytoplankton communities, typical of an oligotrophic sub-Arctic lake. Algal abundance and biomass were low and the two dominant algal taxonomic groups, which include Chrysophyta (golden-brown algae) and cyanobacteria, are typical of northern shield lakes at this latitude. Phytoplankton communities were similar in Kennady Lake, Lake N16, and the two downstream lakes (Lake 410 and Kirk Lake). In general, phytoplankton communities in all four lakes were diverse in terms of the numbers of species present. This is common in oligotrophic lakes, where slower growth rates permit a greater number of species with a high degree of niche overlap to coexist, compared to more productive waters (Wetzel 2001).

JJ5.3.2 Zooplankton

The composition of the zooplankton communities of Kennady Lake, Lake N16, Lake 410, and Kirk Lake was similar. Communities were dominated by calanoid copepods based on biomass, except for Lake N16, where cladocerans were dominant. Rotifera accounted for a substantial portion of total zooplankton abundance, but contributed little in terms of biomass. The zooplankton communities documented in the LSA are similar to those in other sub-Arctic lakes, such as Lac de Gras (Golder 2010) and Snap Lake (De Beers 2010).

JJ5.3.3 Benthic Invertebrates

The benthic invertebrate communities of lakes were characterized by low to moderate density during the 2007 sampling program, consistent with the generally low productivity typical of sub-Arctic lakes on the Canadian Shield. Taxonomic richness was moderate and overall diversity was high. Evenness was low indicating that a few taxa accounted for most of the organisms present in lakes. At lake sites, the midges were the dominant taxa, with the round worms and fingernail clams also representing a considerable proportion of the benthic invertebrate community at some stations. Overall, the benthic invertebrate communities in Lake N16 and basins K1 and K5 of Kennady Lake were similar in fall 2007.

The benthic invertebrate communities at stream sites sampled in 2007 were characterized by low density. As in the lakes sampled, taxonomic richness was moderate and overall diversity was high. Evenness was low indicating that a few taxa accounted for most of the organisms present in streams. At stream sites, the midges were the dominant organisms present, which was similar to lake sites. The caddisflies also accounted for a considerable proportion of the benthic invertebrate communities in streams.

The benthic invertebrate community in lake and stream in the Gahcho Kué local study area is consistent with that expected in the sub-Arctic region where low productivity is common due to low nutrient levels, low temperatures, and long ice covered periods. Both lake and stream communities were dominated by the midges.

JJ5.4 FISHERIES INVESTIGATIONS

JJ5.4.1 Kennady Lake Fish Population Estimates

Two hydroacoustic surveys of pelagic fish were successfully completed in Kennady Lake during late summer (Aug 16 to 18, 2010). BioSonics ® DT-X echosounder systems oriented for both horizontal and vertical split-beam sonar were used. Each survey was conducted along transects representing various habitats and sub-basins of Kennady Lake (approximately 13.4 km per survey). The software Visual AnalyzerTM, combined with visual inspections of echograms identified 211 fish targets in total. Target strength data indicated that most targets were of fish greater than 18 cm in length (approximately 90% of all targets). The fish density of Kennady Lake was determined to be 23.3 fish/ha (0 to 51.2 fish/ha; 90% CI). If considering the entire wetted surface area of Kennady Lake (i.e., 814.1 ha), the total fish population was estimated at 18,977 fish. This estimate does not include fish (e.g., YOY, small fish) that prefer shallow water where hydroacoustic surveys are generally ineffective.

Temporal variability was low suggesting that the program can be reliably repeated; August 16 and 18 population estimates differed by only 1,960 fish (i.e., only 10% of the mean). The distribution of fish was noticeably ‘patchy’ in Kennady Lake. The hydroacoustic surveys showed that most of the Kennady Lake population resided in basin K3 (53%) where there was deep water (approximately 20 m in depth), and possibly, vertical thermoclines. Recent gill net catch data (2004 and 2010) showed similar spatial trends. However, the composition of gill netting data may differ from that collected from hydroacoustics, particularly from vertical beaming. Based on gill netting, the percent relative abundance of lake trout was 20% and the relative abundance of round whitefish was 70%. In contrast, targets from hydroacoustic vertical beaming were dominated by fish larger than round whitefish (i.e., almost 60% of vertical targets were assumed to be of large lake trout). Given these results, a mean density of 13.42 lake trout/ha was calculated (or a lake trout population of 10,925 fish).

The density estimate should be biologically conservative, and possibly an overestimation given the methods in which the density was calculated, In addition, the density of lake trout in Kennady Lake appears to be similar to, but slightly higher than that reported for a hydroacoustic assessment of lake trout in the Ugashik Lakes, Alaska (10.1 lake trout/ha; Staines 2008).

JJ5.4.2 Lakes

In 2007, fish were captured in nine of 15 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 two forage fish species (ninespine stickleback and slimy sculpin).

In 2010, fish were captured in nine of 13 lakes sampled. Fish species captured included four sport fish (Arctic grayling, burbot, lake trout, and northern pike), 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 2007 and 2010 were designated as fish-bearing.

JJ5.4.3 Streams

In 2007, 25 streams were sampled in the summer and 12 streams were sampled in the fall. In the summer 598 were captured, and in fall, 258 fish were captured. Fish captured in both seasons included four sport fish (Arctic grayling, burbot, lake trout, and northern pike), one non-sport fish (longnose sucker), and three forage fish species (lake chub, ninespine stickleback, and slimy sculpin). In both seasons, the majority of fish captured were slimy sculpin. In general, there were higher densities of fish in the summer than the fall.

In 2010, five streams were sampled in the summer. A total of 12 fish was captured in three of the five streams. Fish captured included one sport fish species (round whitefish) and one forage fish species (slimy sculpin).

Three-pass depletion population estimates for YOY Arctic grayling were calculated in three of the 14 streams sampled in 2007. The densities of YOY Arctic grayling in these three streams ranged from 8 to 37 fish/100 m^2. Stream L2 had the highest densities of YOY Arctic grayling and was also the only stream sampled with all three life stages present (YOY, juvenile, and adult). Adult Arctic grayling were not captured outside of Stream L2.

No peamouth were captured in 2007 or 2010. As the study area is well outside the known range for peamouth and subsequent studies have not captured any individuals, it is assumed peamouth previously identified in the LSA were lake chub, misidentified as peamouth.

JJ5.4.4 Fish Tissue Metal Concentrations

Metal concentrations were analyzed in lake trout and round whitefish liver samples collected from Kennady Lake and Lake N16 in 1996 (Canamera 1998) and in lake trout, round whitefish, northern pike, Arctic grayling, and lake cisco collected from Kennady Lake and Lake N16 (EBA and Jacques Whitford 2000).

In 1996, mean concentrations of some parameters (i.e., aluminum, copper, molybdenum, and silver) were higher in lake trout liver samples collected from Kennady Lake than those from Lake N16, whereas the opposite was true for other parameters (i.e., arsenic, barium, boron, chromium, mercury, nickel, and zinc). In 1999, mean mercury concentration was higher in lake trout liver samples from Kennady Lake than that from Lake N16 whereas mean cadmium concentration was lower in samples from Kennady Lake than that from Lake N16. Overall, the range of metal concentrations in lake trout liver tissues was similar between the 1996 and 1999 studies, although maximum concentrations were higher in 1996. Mean cadmium and copper concentrations in lake trout livers from Kennady Lake were higher in 1996 than in 1999. Mean mercury and nickel concentrations in lake trout livers were higher in Lake N16 in 1996 than in 1999.

In 1996, mean concentrations of aluminum and copper were higher in round whitefish liver samples collected from Kennady Lake than those from Lake N16, whereas mean arsenic, barium, chromium, nickel, silver, strontium, and zinc concentration were higher in liver samples taken from Lake N16 than those collected in Kennady Lake. In 1999, the single round whitefish collected from Lake N16 had higher arsenic, cadmium, chromium, copper, lead, and selenium concentrations in its liver tissues compared to concentrations measured in the single fish from Kennady Lake. With only one round whitefish collected from each study area in 1999, limited comparisons could be made between the 1996 and 1999 studies. However, the liver of the individual fish collected in 1999 from Kennady Lake had much lower copper and much higher zinc concentrations than those observed in 1996 fish.

Slimy sculpin were collected from the outlet streams of Kennady Lake, Lake 410, Kirk Lake, and Lake N16 for analysis of whole body metals concentrations. Mean concentrations of aluminum, cobalt, and uranium were highest in slimy sculpin from Lake 410, and generally were similar among the other study areas. Mean concentrations of barium, cadmium, and manganese were highest in slimy sculpin from Kirk Lake, and lowest in those from Kennady Lake.

JJ6 REFERENCES

JJ6.1 LITERATURE CITED

Alberta Environment. 1990. *Selected Methods for the Monitoring of Benthic Invertebrates in Alberta Rivers*. Assessment. Division, Environmental Quality Monitoring Branch. 41 pp.

Anton, A. and H.C. Duthie. 1981. *Use of cluster analysis in the systematics of the algal genus Cryptomonas*. Can J Bot 59:992-1002.

Biosonics. 2004. User guide, Visual Analyzer™ 4. Biosonics, Inc., 4027 Leary Way NW, Seattle, WA 98107, USA.

Brinkhurst, R.O. 1986. *Guide to the Freshwater Aquatic Microdrile Oligochaetes of North America*. Canadian Special Publication of Fisheries and Aquatic Sciences 84. 259 pp.

Brooks, J.L. 1957. *The Systematics of North American Daphnia*. Mem Connect Acad Arts Sci 13:1-180.

Canamera Geological Ltd. 1998. *1996 Environmental Baseline Studies: 5034 Diamond Project*. Prepared by the Environmental Resources Division of Canamera Geological. Submitted to Monopros Ltd., Yellowknife, NT.

Clifford, H.F. 1991. *Aquatic Invertebrates of Alberta*. University of Alberta Press. Edmonton, Alberta. 538 pp.

Cummins, K.W., and G.H. Lauff. 1969. The Influence of Substrate Particle size on the Microdistribution of Stream Macrobenthos. Hydrobiologia 34: 145-181.

De Beers (De Beers Canada Inc.). 2010. *2009 Annual Report, Aquatic Effects Monitoring Program, Type A Water License MV2001L2-0002*. Prepared by Golder Associates, Calgary, Alberta, March 2010.

EBA Engineering Consultants Ltd. (EBA) and Jacques Whitford Environment Ltd. 2000. *Gahcho Kué (Kennedy Lake) Environmental Studies 1999*. Submitted to Monopros Ltd., Yellowknife, NT.

Edmunds, J.F., Jr., S.L. Jensen, and L. Berner. 1976. *The Mayflies of North and Central America*. University of Minnesota Press. Minneapolis, Minnesota, USA. 330 pp.

Environment Canada. 1993. *Guidelines for Monitoring Benthos in Freshwater Environments*. Prepared by EVS Consultants, North Vancouver, BC, Canada. 81 pp.

Environment Canada. 2002. *Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring*. National Environmental Effects Monitoring Office, Gatineau , Quebec.

Findlay, D.L. and H.J. Kling. 1976. *A species list and pictorial reference to the phytoplankton of Central and Northern Canada*. Fisheries and Environment Canada, Fisheries and Marine Service, Manuscript Report No. 1503. 619 pp.

Gangl, R. S., and R. A. Whaley. 2004. *Comparison of fish density estimates from repeated hydroacoustic surveys on two Wyoming waters*. North American Journal of Fisheries Management 24:1279-1287.

Geitler, L. 1932. Cyanophyceae. In: L. Rabenhorst (ed), *Kryptogamenflora von Deutschland, Österreich und der Schweiz, Vol. 14*. Akademische Verlagsgesellschaft, Leipzig. 1196 p.

Golder (Golder Associates Ltd.). 2009. *Meliadine Gold Project – Aquatics Baseline Synthesis Report. Prepared for Comaplex Minerals Corporation, Calgary, AB*. Golder Report No. 09-1373-0010-4000.

Golder. 2010. *Plankton Report in Support of the 2009 AEMP Annual Report for the Diavik Diamond Mine, NWT*. Prepared for Diavik Diamond Mines Inc. Yellowknife, Northwest Territories.

Hamilton, P. 1990. *The revised edition of a computerized counter for plankton, periphyton and sediment diatom analysis*. Hydrobiologia 194:23-30.

Hartman, K. J., and F. J. Margraf. 2007. *Assessing fish populations in remote subarctic lakes using hydroacoustics*. Lake and Reservoir Management 23:211-218.

Huber-Pestalozzi, G. 1961. *Das phytoplankton des Süβwassers. Systematik und Biologie. 5 Teil, Chlorophyceae (Grünalgen), Ordnung: Volvocales Die Binnengewäser (Band XVI)*. - E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u Obermiller), Stuttgart. 728 pp.

Huber-Pestalozzi, G. 1972. Das phytoplankton des Süβwassers. Systematik und Biologie. 6 Teil, Chlorophyceae (Grünalgen), Ordnung: Tetrasporales von B. Fott. Die Binnengewäser (Band XVI). - E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u Obermiller), Stuttgart. 47 pp.

Huber-Pestalozzi, G. 1982. *Das phytoplankton des Süβwassers. Systematik und Biologie. 8 Teil, 1 Halfte. Conjugatophyceae Zygnematales und Desmidiales von Kurt Förster, Pfronten/Allgäu Die Binnengewäser (Band XVI)*. - E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u Obermiller), Stuttgart. 543 pp.

Huber-Pestalozzi, G. 1983. *Das phytoplankton des Süβwassers. Systematik und Biologie. 7 Teil, 1 Halfte. Chlorophyceae (Grünalgen), Ordnung: Chlorococcales von J. Komárek und B. Fott. Die Binnengewäser (Band XVI).* - E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u Obermiller), Stuttgart. 1044 pp.

Johnson, L. 1976. *Ecology of Arctic Populations of Lake trout, Salvelinus namaycush, Lake Whitefish, Coregonus clupeaformis, Arctic Char, S. alpinus, and Associated Species in Unexploited Lakes of the Canadian Northwest Territories*. Journal of the Fisheries Research Board of Canada 33: 2459-2488.

Klemm, D.J. (editor). 1985. *A Guide to the Freshwater Annelida (Polychaeta, Naidid and Tubificid Oligochaeta, and Hirudinea) of North America*. Kendall/Hunt Publishing Company. Dubuque, Iowa, USA. 198 pp.

Knudsen, F. R., and H. Saegrov. 2002. *Benefits from horizontal beaming during acoustic survey: application to three Norwegian lakes*. Fisheries Research 56:205-211.

Komárek, J. and K. Anagnostidis. 1998a. *Cyanoprokaryota. Part 1: Chroococcales*. In: Ettl H. et al. (eds), Süswasserflora von Mitteleuropa. B Spektrum Akademischer Verlag. Volume 19/1. Gustav Fischer. 584 pp.

Komárek, J. and K. Anagnostidis. 1998b. *Cyanoprokaryota. Part 2: Oscillatoriales*. In: B. Büdel et al. (eds), Süswasserflora von Mitteleuropa. Elsevier Spektrum Akademischer Verlag. Volume Band 19/2. 757 pp.

Komárek, J. and K. Anagnostidis. 2005. *Cyanoprokaryota 2. Teil: Oscillatoriales*. Pp. 1- 759. In: B. Bridel; G.L. Gastner and M.S. Krienitz (eds). Süßwasserflora von Mitteleuropa 19/2. London, Elsevier.

Krammer, K. and H. Lange-Bertalot. 1986. *Bacillariophyceae. 1. Teil: Naviculaceae*. In: Ettl H. et al. (eds), Süswasserflora von Mitteleuropa. Begründet von A. Pascher. Band 2/1. Stuttgart-Jena. 876 pp.

Krammer, K. and H. Lange-Bertalot. 1988. *Bacillariophyceae. 2 Teil: Bacillariaceae, Epithemiaceae, Surirellaceae*. In: Ettl H. et al. (eds), Süswasserflora von Mitteleuropa. Begründet von A. Pascher Band 2/2. Stuttgart-Jena. 596 pp.

Krammer, K. and H. Lange-Bertalot. 1991a. *Bacillariophyceae. 3 Teil: Centrales, Fragilariaceae, Eunotiaceae. Unter Mitarbet von H. Häkansson and M. Nörpel*. In: Ettl H. et al. (eds), Süswasserflora von Mitteleuropa. Begründet von A. Pascher Band 2/3. Stuttgart-Jena. 576 pp.

Krammer, K. and H. Lange-Bertalot. 1991b. *Bacillariophyceae. 4 Teil: Achnanthaceae Kritische Ergänzungen zu Navicula (Lineolatae) und Gomphonema*. In: Ettl, H. Et al. (eds), Süswasserflora von Mitteleuropa. Band 2/4. Stuttgart-Jena. 437 pp.

Krebs, C.J. 1999. *Ecological Methodology*. Second edition. Addison Wesley Longman. New York, New York, USA. 576 pp.

Kubecka, J. 1994. *Simple model on the relationship between fish acoustical target strength and aspect for the high-frequency sonar in shallow water*. Journal of Applied Ichthyology 10: 75-81.

Kubecka, J., and M. Wittingerova. 1998. *Horizontal beaming as a crucial component of acoustic fish stock assessment in freshwater reservoirs*. Fisheries Research 35:99-106.

Lockwood, R.N. and J.C. Schneider. 2000. *Stream fish population estimates by mark-and-recapture and depletion methods*. Chapter 7 *in* Schneider, J.C. (ed.). 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbour.

Love, R. H. 1971. *Measurements of fish target strength: a review*. Fishery Bulletin 69: 703-713.

Lund, J.W.G., C. Kippling and E.D. le Cren. 1958. *The inverted microscope method of estimating algal numbers and the statistical basis for the estimation by counting.* Hydrobiologia 11:144-170.

Malley D.F., S.G. Lawrence, M.A. MacIver and W.J. Findlay. 1989. *Range of variation in estimates of dry weight for planktonic Crustacea and Rotifera from temperate North American lakes*. Can Tech Rep Fish Aquat Sci 1666: 49 pp.

McAlpine, J.F., B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Fockeroth, and D.M. Wood (editors). 1981. *Manual of Nearctic Diptera. Volume 1.* Research Branch, Agriculture Canada. Ottawa, Ontario. Monograph 27. 674 pp.

McPhail, J.D. , and C.C. Lindsey. 1970. *Freshwater Fishes of Northwestern Canada and Alaska*. Fisheries Research Board of Canada. Ottawa. 381 pp.

McPhail, J.D., and D.L. McPhail. 2007. *Freshwater Fishes of British Columbia*. The University of Alberta Press, Edmonton. 620 pp.

Merritt, R.W., and K.W. Cummins (editors). 1984. *An Introduction to the Aquatic Insects of North America*. Second edition. Kendall/Hunt Publishing Company. Dubuque, Iowa, USA. 722 pp.

Nelson, J. S., and M. J. Paetz. 1992. *The Fishes of Alberta*. The University of Alberta Press, Edmonton. 437 pp.

Oliver, D.R., and M.E. Roussel. 1983. *The Insects and Arachnids of Canada, Part 11*. The Genera of Larval Midges of Canada. Diptera: Chironomidae. Biosystematic Research Institute, Research Branch, Agriculture Canada. Ottawa, Ontario. Publication 1746. 263 pp.

Pennak, R.W. 1989. *Freshwater Invertebrates of the United States*. Third edition. John Wiley and Sons. New York, New York, USA. 628 pp.

Prescott, G.W. 1982. *Algae of the Western Great Lakes*. Otto Koeltz Science Publishers. 977 pp.

Rabeni, C.F., and G.W. Minshall. 1977. *Factors Affecting Microdistribution of Stream Benthic Insects*. Oikos 29: 33-43.

Rott, E. 1981. *Some results from phytoplankton counting inter-calibrations*. Schweiz Z Hydrol 24:15-24.

Scott, W.B. and E.J. Crossman. 1973. *Freshwater Fishes of Canada*. Fisheries Research Board of Canada, Ottawa. Bulletin 184.

Sellers, T. J., B. R. Parker, D. W. Schindler, and W. M. Tonn. 1998. *Pelagic distribution of lake trout (Salvelinus namaycush) in small Canadian Shield lakes with respect to temperature, dissolved oxygen, and light*. Canadian Journal of Fisheries and Aquatic Sciences 55:170-179.

Simpson, E.H. 1949. *Measurements of Diversity*. Nature 163: 688.

Skuja, H. 1949. *Zur Siisswasseralgenflora Burmas*. Nova Ada Regia Societatis Scientiarum Upsaliensis 14: 1-188.

Smith, B., and J.B. Wilson. 1996. *A Consumer's Guide to Evenness Indices*. Oikos 76: 70-82.

Staines, G. J. 2008. Hydroacoustic assessment of resident species in the Ugashik Lakes, Alaska. Thesis for Master of Science. Department of Wildlife and Fisheries, Morgantown, West Virginia, USA.

Starmach, K. 1985. *Chrysophyceae und Haptophyceae*. In: Ettl H. et al. (eds), Süswasserflora von Mitteleuropa. Begründet von A. Pascher Band 1. VEB Gustav Fischer Verlag, Jena. 515 pp.

Stewart, K. W. and D.A. Watkinson. 2004. *The Freshwater Fishes of Manitoba*. University of Manitoba Press. Winnipeg. 276 pp.

SYSTAT. 2004. SYSTAT Software, Inc., Version 11. San Jose, CA.

Thorp, J.H., and A.P. Covich (editors). 1991. *Ecology and Classification of North American Freshwater Invertebrates*. Academic Press, Inc. San Diego, California, USA. 911 pp.

Tikkanen, T. 1986. *Kasviplantonopas. Suomen Luonnosuojelun Tuki Oy*. 278 pp.

Wanzenbock, J., T. Mehner, M. Schulz, H. Gassner, and I. J. Winfield. 2003. *Quality assurance of hydroacoustic surveys: the repeatability of fish-abundance and biomass estimates in lakes within and between hydroacoustic systems*. ICES Journal of Marine Science 60: 486-492.

Wehr, J.D. and R.G. Sheath. 2003. *Freshwater Algae of North America*. Academic Press. 918 pp.

Wetzel, R. G. 2001. *Limnology: Lake and River Ecosystems*. 3rd Edition. Academic Press. New York, NY. 1006 pp.

Whitford, L.A. and G.J. Schumacher. 1984. *A Manual of Freshwater Algae*. Sparks Press, NC. 337 pp.

Wiederholm, T. 1983. *Chironomidae of the Holarctic Region – Keys and Diagnoses. Part 1*. *Larvae. Entomologica Scandinavica*, Supplement No. 19. 457 pp.

Wiederholm, T. 1986. *Chironomidae of the Holarctic region – Keys and Diagnoses. Part 2. Pupae*. Entomologica Scandinavica, Supplement No. 28. 482 pp.

Wiggins, G.B. 1977. *Larvae of the North American Caddisfly Genera (Trichoptera*). University of Toronto Press. Toronto, Ontario, Canada. 401 pp.

Wilson, M.S. 1959. *Calanoida*. In: W. T. Edmondson (ed). Fresh-water Biology. 2nd ed. John Wiley and Sons, New York, NY, pp 738- 794.

Winfield, I. J., J. M. Fletcher, J. B. James, and C. W. Bean. 2009. *Assessment of fish populations in still waters using hydroacoustics and survey gill netting: Experiences with Arctic char (Salvelinus alpinus) in the UK*. Fisheries Research 96:30-38.

Yeatman, H.C. 1959. *Cyclopoida*. In: W. T. Edmondson (ed), Fresh-water Biology. 2nd ed. John Wiley and Sons, New York, NY, pp. 795- 815.

Yule, D. L. 2000. *Comparison of horizontal acoustics and purse seine estimates of salmonid densities and sizes in eleven Wyoming waters*. North American Journal of Fisheries Management 20:759-775.

Zar, J. H. 1999. *Biostatistical Analysis*, Fourth Edition. Prentice-Hall, Inc. Upper Saddle River, New Jersey, USA.

JJ6.2 INTERNET REFERENCES

BC RISC (British Columbia Resources Information Standards Committee). 1997. *Guidelines for Interpreting Water Quality Data*. Prepared by Ministry of Environment, Lands and Parks, LandData BC, and Geographic Data BC for the Land Use Task Force. Version 1.0. URL: http://www.ilmb.gov.bc.ca/risc/pubs/aquatic/interp/index.htm. Last accessed October 12, 2010.

JJ6.3 PERSONAL COMMUNICATIONS

Dawson, Jim. 2010. Senior Scientist. Biosonics. Email and telephone conversation. September 10, 2010.

Moore, Brian. 2010. Hydroacoustic Scientist. Biosonics. Email and telephone conversation. September 21, 2010.

JJ7 ACRONYMS AND GLOSSARY

JJ7.1 ACRONYMS

AMEC	AMEC Earth and Environmental Ltd.
ARGR	Arctic grayling
BURB	burbot
CPUE	catch-per-unit-effort
De Beers	De Beers Canada Inc.
DO	dissolved oxygen
EEM	environmental effects monitoring
EPT	Ephemeroptera, Plecoptera, and Trichoptera combined
GIS	geographic information system
LKCH	lake chub
LKTR	lake trout
LNSC	longnose sucker
LSA	local study area
n	number
NNST	ninespine stickleback
NRPK	northern pike
P	probability
Project	Gahcho Kué Project
QA/QC	quality assurance / quality control
r_s	critical value of the Spearman rank correlation coefficient
RNWH	round whitefish
RPD	relative percent difference
RSA	regional study area
SE	standard error
SLIN	spring littoral index netting
SLSC	slimy sculpin
TOC	total organic carbon
TS	target strength
UNKN	unknown fish species
YOY	young-of-the-year

JJ7.2 UNITS OF MEASURE

%	percent
/ha	per hectare
<	less than
>	greater than

°C	degrees Celsius
µg/L	micrograms per litre
µm	micrometre
µS/cm	microSiemens per centimetre
cm	centimetre
dB	decibels
g	gram
g/cm^3	grams per cubic centimetre
h	hour
ha	hectare
ind/L	individuals per litre
kHz	kiloHertz
km	kilometre
km/h	kilometres per hour
km^2	square kilometre
L	litre
m	metre
m/s	metres per second
m^2	square metre
m^3	cubic metre
mg/kg	milligram per kilogram
mg/L	milligram per litre
mL	millilitre
mm	millimetre
mm^3	cubic millimetres
ms	millisecond
no/m^2	number per square metre
org/m^2	number of organisms per square metre
taxa/site	number of organisms belonging to a specific group (usually genus) at a sampling site

JJ7.3 GLOSSARY

Bathymetric Surveys Measurement of water depths in a lake.

Benthic Invertebrates Animals without backbones that live on river and lake bottoms. Benthic refers to the bottom, and these animals are also called zoobenthos.

Calanoida An order of copepods; small planktonic animals that are a component of zooplankton.

Chlorophyll *a* The primary photosynthetic pigment contained in the phytoplankton (primary producers).

Chlorophyta Green algae; a component of phytoplankton.

Chrysophyta	Golden-brown algae; a component of phytoplankton.
Cladocera	A group of small planktonic animals (crustaceans) also known as water fleas; a component of zooplankton.
Colonial	Individuals of the same species clustered together to form a group.
Copepoda	An order of planktonic crustacean; a component of zooplankton.
Cryptophyta	Flagellated algae also known as cryptomonads; a component of phytoplankton.
Cyanobacteria	Blue-green algae; a component of phytoplankton.
Cyclopoida	An order of copepods; small planktonic animals that are a component of zooplankton.
Diatom	A group of algae that are encased within a frustule made of silica; a component of phytoplankton.
Dissolved Oxygen	Oxygen dissolved within the water column.
Diversity	A numerical index that incorporates evenness and richness; the diversity index measures the proportional distribution of organisms in the community.
Echo	The sound energy transmitted by the echosounder and reflected by a target of density differing from the medium in which the sound is traveling.
Echogram	A display of a time series of received echo pulses, where the Y axis is range or depth, while the X axis represents a time series (minutes).
Effluent	Outflowing of water or other liquids from a man-made structure.
Elutriated	Separation of materials of fine and coarse material by washing, decanting, and settling.
Enumeration	The act of counting individuals.
Ephemeral	Lasting for a short time or part of a complete cycle. In reference to water, typically describes a stream that flows for only part of the open-water period.
Evenness	A measure of how evenly the total invertebrate abundance is distributed among the different types of organisms present at the site.
Gradient	The slope of a stream channel or lake shoreline.
Headwater	The source of water at the top of a watershed, typically a lake or marsh.
Hydroacoustics	The application of controlled sound energy in water to remotely obtain information about the physical characteristics of the water body, its bathymetry, or biotic populations.
Interstitial	Pertaining to the area or space between rocks in a stream or lake.
Inundate	To cover with water, especially floodwaters during spring freshet.
Limnology	The study of inland freshwater lakes, which includes the physical, chemical, and biological aspects of lakes.
Limnology Profiles	Refers to measurements of water temperature, conductivity, pH, and dissolved oxygen in the water column of a lake.

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.
Noise	Unwanted signals that interfere with the signals to be quantified. Sources include volume reverberation noise from unwanted particles, bubbles, invertebrates, as well as the sound field grazing a boundary, and false targets (e.g., rocks, woody debris).
Oligotrophic	A lake lacking in nutrients and having low organic productivity.
Periphyton	Algae and small crustaceans that live attached to rocks and other substrates projecting from the bottom of a stream or lake.
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.
Pyrrophyta	Dinoflagellates; a component of phytoplankton.
Range	Distance from the transducer face to the target. Often used synonymously with depth in vertical sounding. Typically expressed in meters, but often expressed in terms of the time interval between transmission and reception of the echo (in ms).
Richness	The number of different types of animals present in a sample or at a location.
Rotifera	A large class of the pseudocoelomate phylum Aschelminthes; a component of zooplankton.
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.
Signal-to-Noise Ratio	The amount by which a signal exceeds noise, or is below noise (unit dB).
Specific Conductivity	A measure of the resistance of a solution to electrical flow; an indirect measure of the salinity of the water.
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).
Target	An object to be detected, located or measured.
Target Strength (TS)	A measure of the reflecting power of a target expressed in decibels. The ratio of the acoustic intensity (I_R) reflected from a fish and measured 1 m away, to the incident acoustic intensity (I_i).
Taxon	A group of organisms at the same level of the standard biological classification system; the plural of taxon is taxa.
Terrestrial	Living or growing on land.

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).
Transducer	A transducer converts electrical energy into acoustic energy in transmission mode and converts acoustic energy to electrical energy during receiving.
Watershed	The upstream land area drained by a river network.
YSI multiparameter meter	A meter that measures temperature, specific conductivity, pH, 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 JJ.I

HYDROACOUSTIC SURVEYS – ECHOGRAMS, 2010

‘Screen shots’ of echograms (in Visual Analyzer 4.1.3.6) of fish echoes (or targets) from acoustic surveys of Kennady Lake (August 14 to 16, 2010); screen shots are first presented for vertical beaming (JJ.I-1 to JJ.I-6) then horizontal beaming (JJ.I.7 to JJ.I-18), and are in alphabetical order of transect name

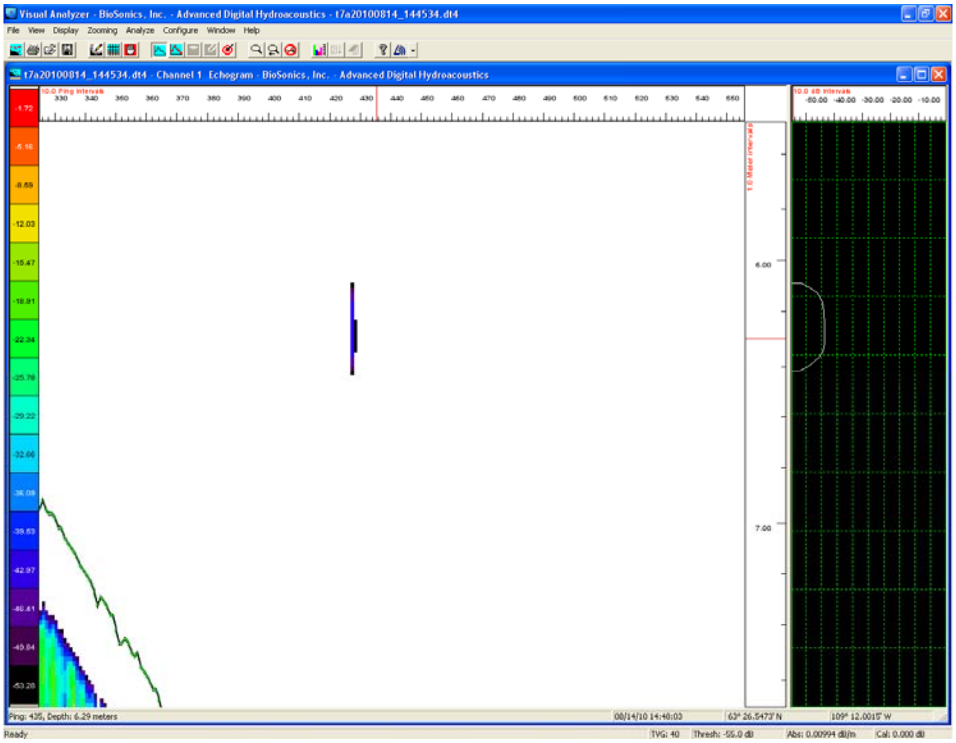


Figure JJ.I-1 Fish targets (6.3 m depth) from vertical beaming at Transect T7, August 14, 2010.

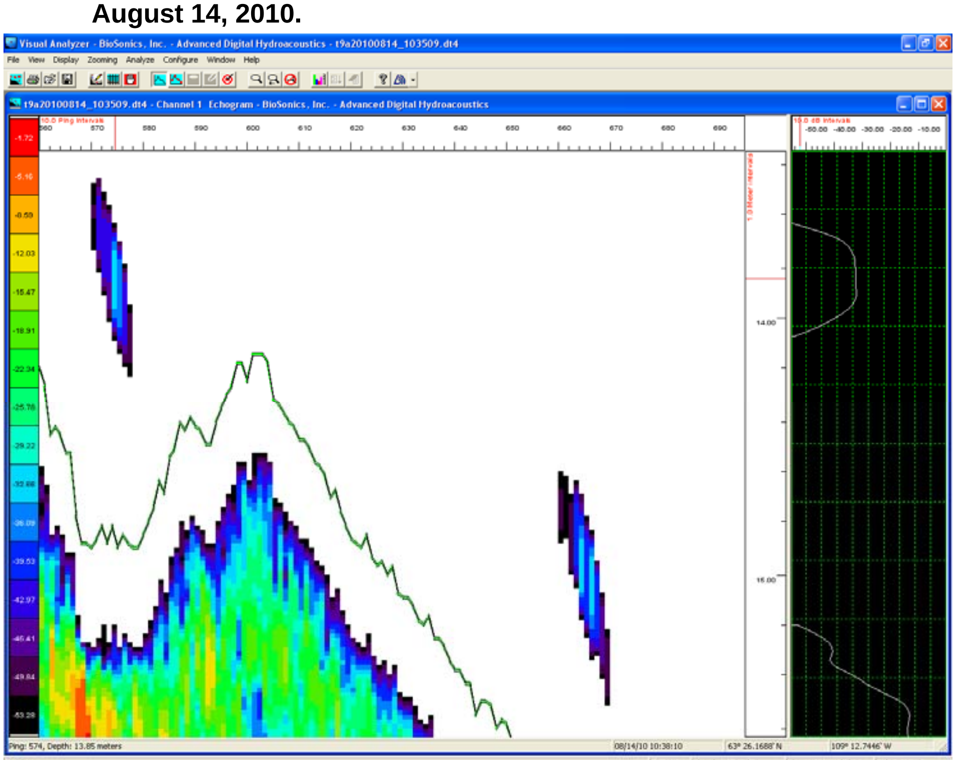


Figure JJ.I-2 Fish targets (14-15 m depths) from vertical beaming along Transect T9, August 14, 2010; voltage return diagram is for fish at 13.8 m, ping 574.

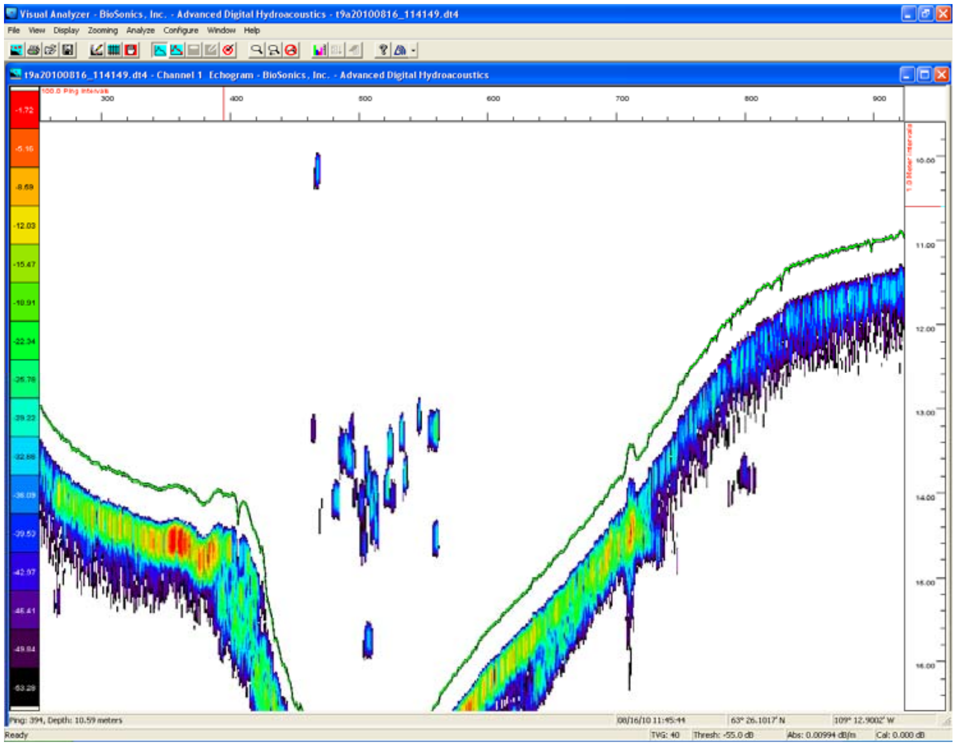


Figure JJ.I-3 Multiple fish targets (10-18 m depths) from vertical beaming at Transect T9, August 16, 2010.

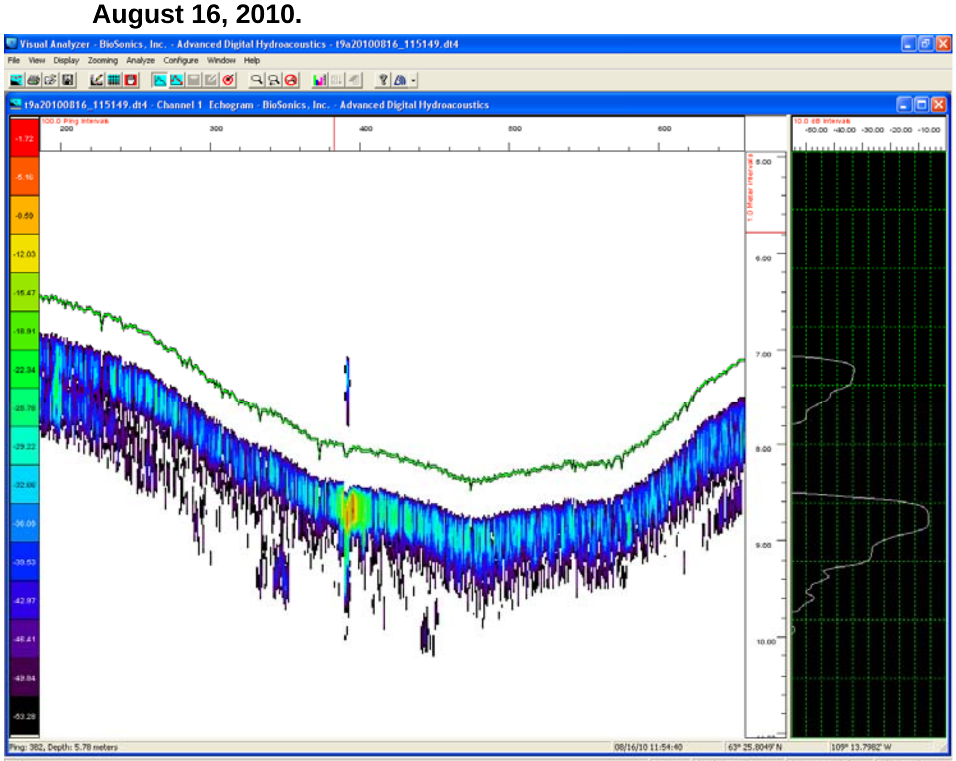


Figure JJ.I-4 Fish targets (7.5 m depth) from vertical beaming at Transect T9, August 16, 2010.

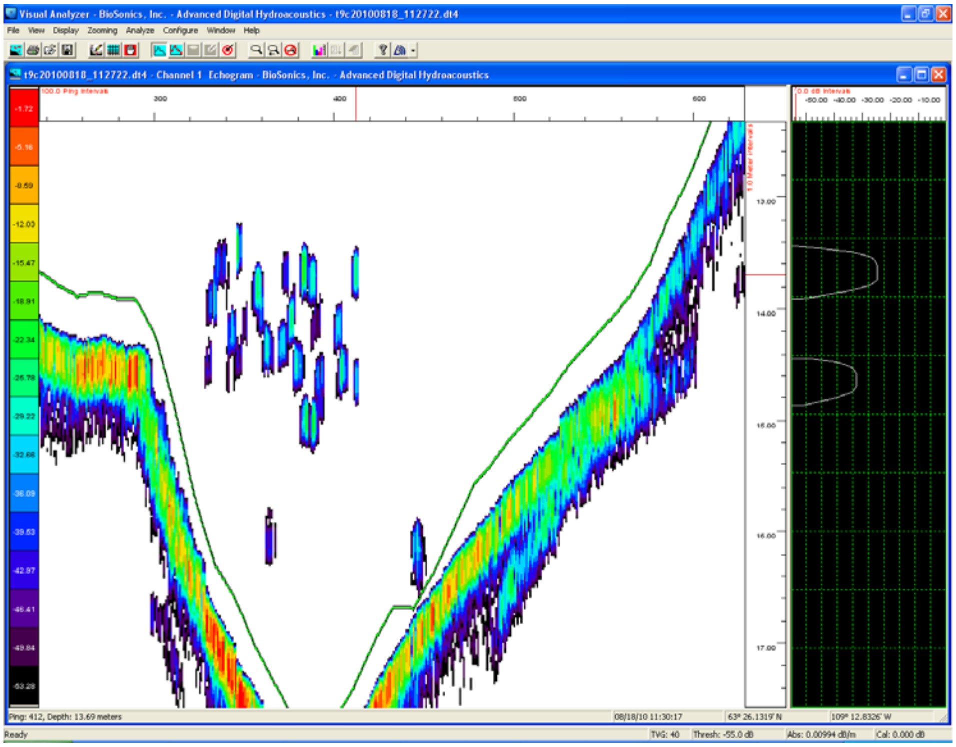


Figure JJ.I-5 **Multiple fish targets from vertical beaming of deep locations (13 to 17 m) on Transect T9, August 18, 2010'; voltage return diagram was for fish at 13.7 m, ping 412.**

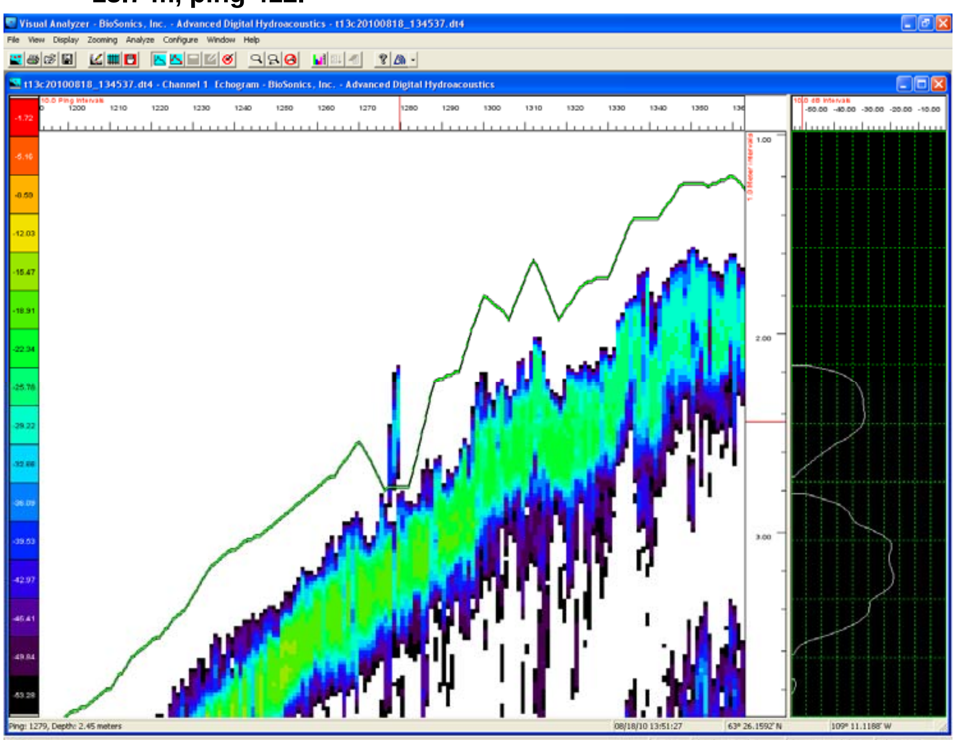


Figure JJ.I-6 **Fish targets from vertical beaming, located near the bottom (2.5 m depth)**

on Transect T13, August 18, 2010.

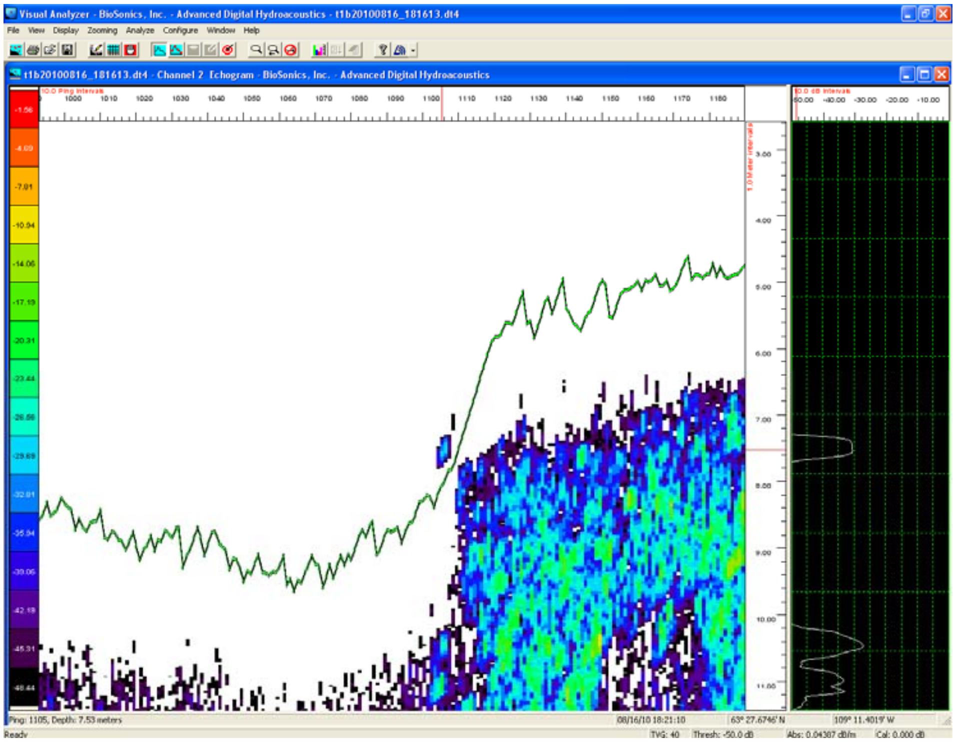


Figure JJ.I-7 Fish targets from horizontal beaming (ping 1106, 7.5 m range) at Transect T1, August 16, 2010.

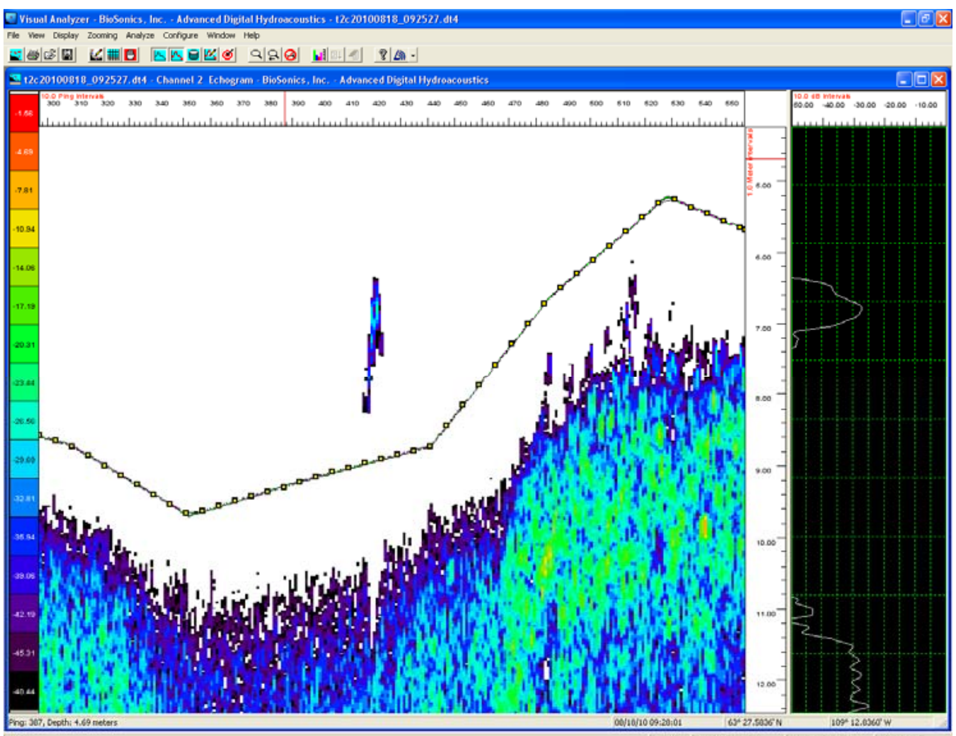


Figure JJ.I-8 Fish targets from horizontal beaming (ping 421, 6.9 m range) at

Transect T2, August 18, 2010.

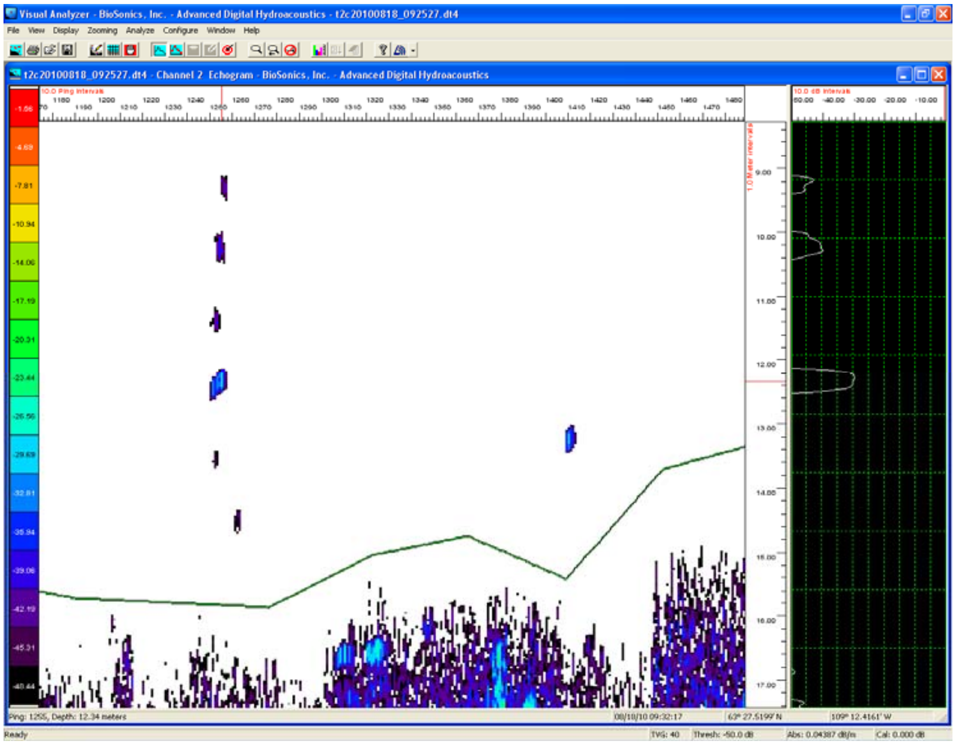


Figure JJ.I-9 Fish targets from horizontal beaming at Transect T2, August 18, 2010 (voltage return on oscilloscope was for target at ping 1255, 12.3 m range).

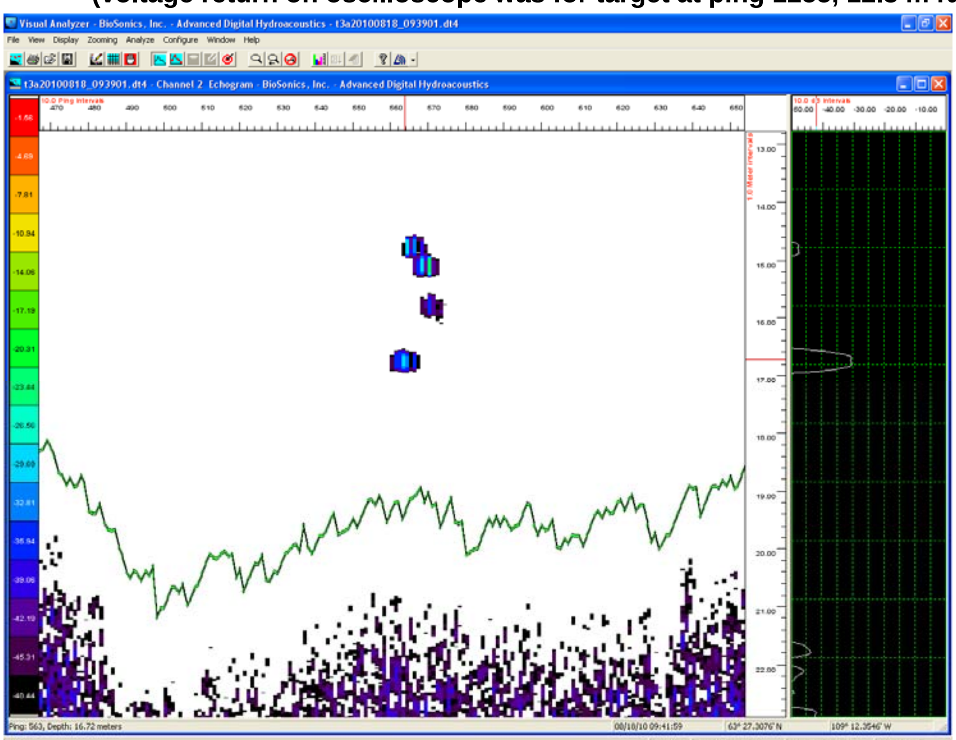


Figure JJ.I-10 Fish targets from horizontal beaming at Transect T3, August 18, 2010

(voltage return on oscilloscope was for target at ping 563, 16.7 m range).

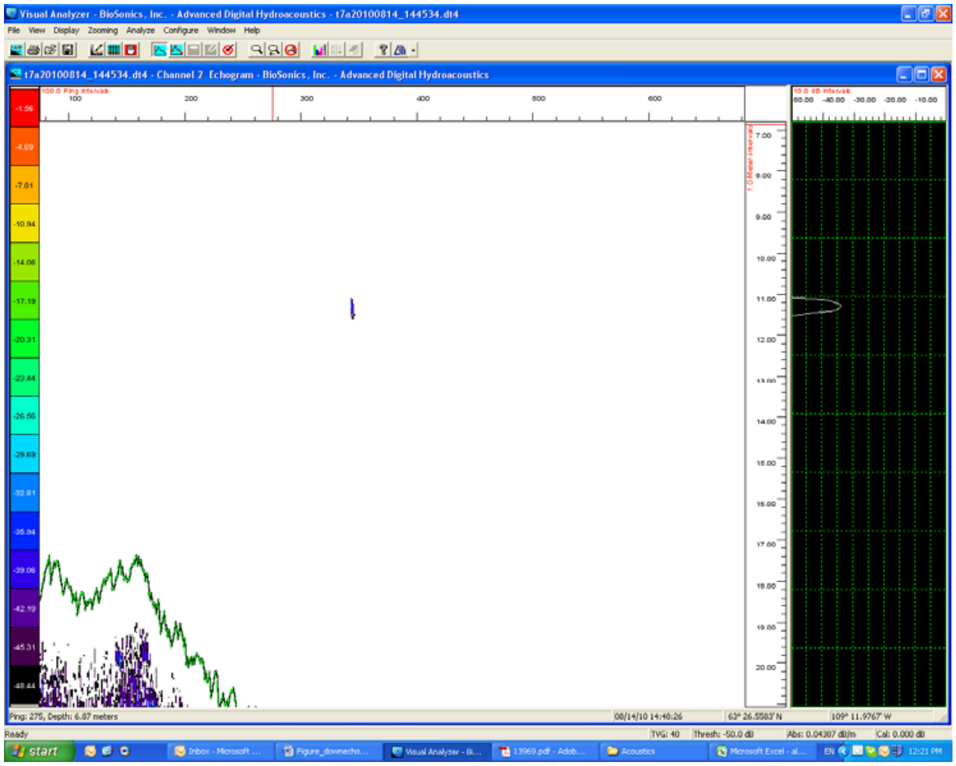


Figure JJ.I-11 Fish targets from horizontal beaming at Transect T7, August 14, 2010.

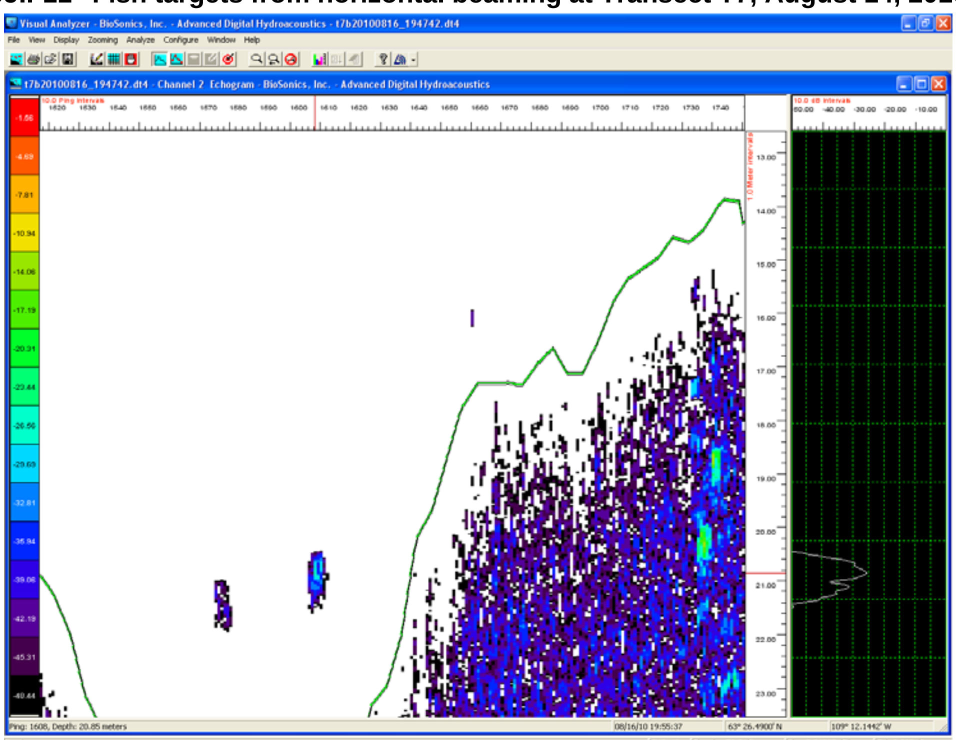


Figure JJ.I-12 Fish targets from horizontal beaming at Transect T7, August 16, 2010 (voltage return on oscilloscope was for ping 1608, 20.9 m range).

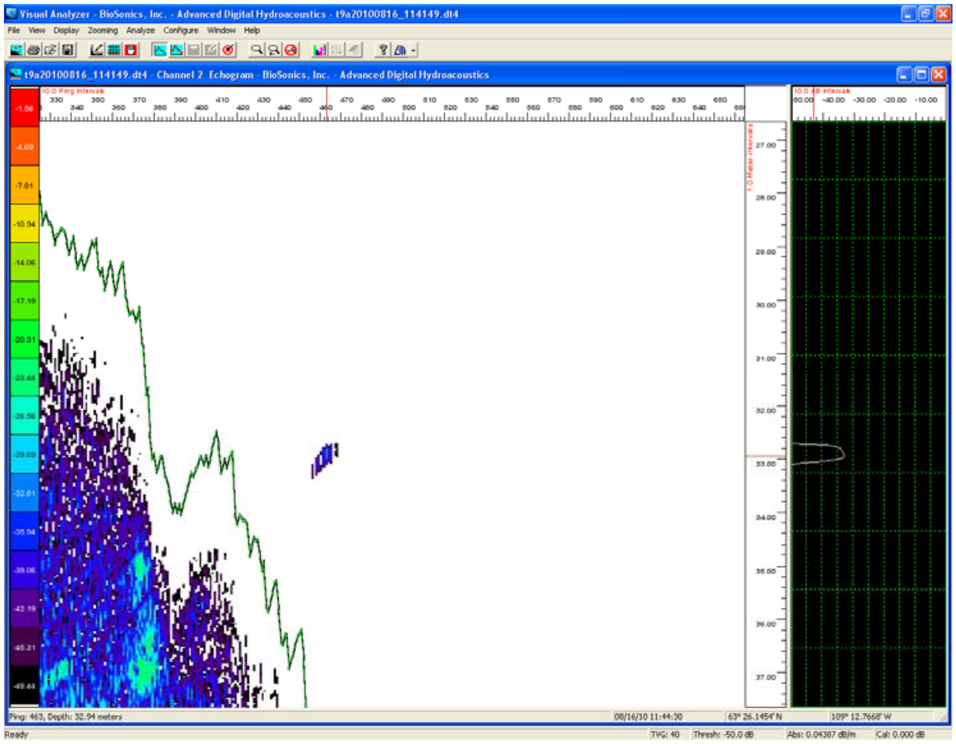


Figure JJ.I-13 Fish targets from horizontal beaming at Transect T9, August 16, 2010.

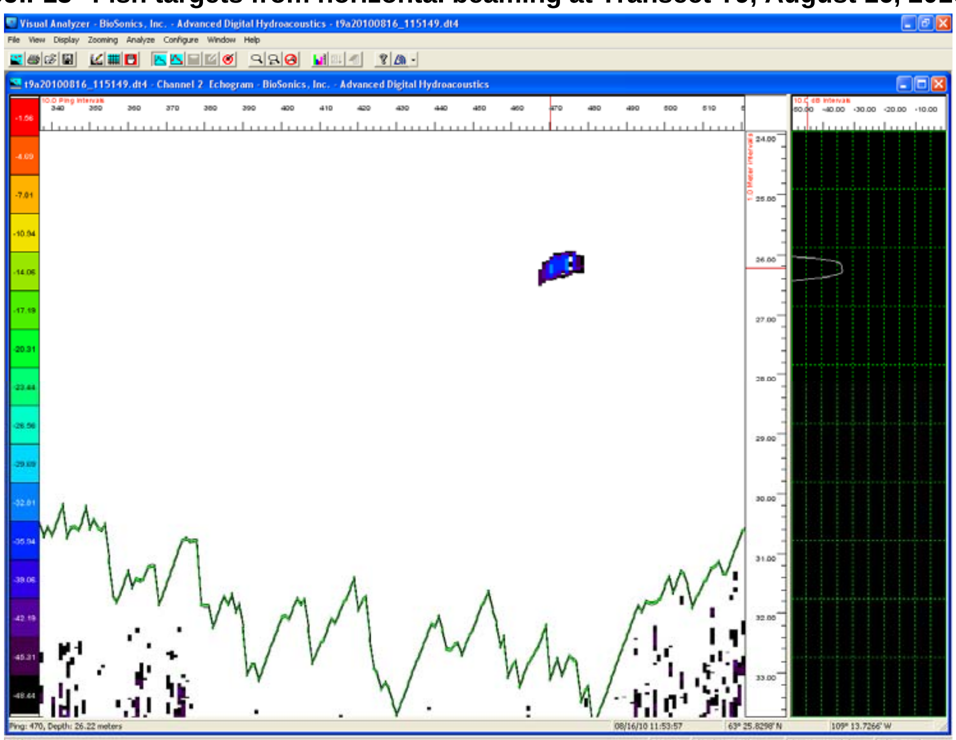


Figure JJ.I-14 Fish targets from horizontal beaming at Transect T9, August 16, 2010.

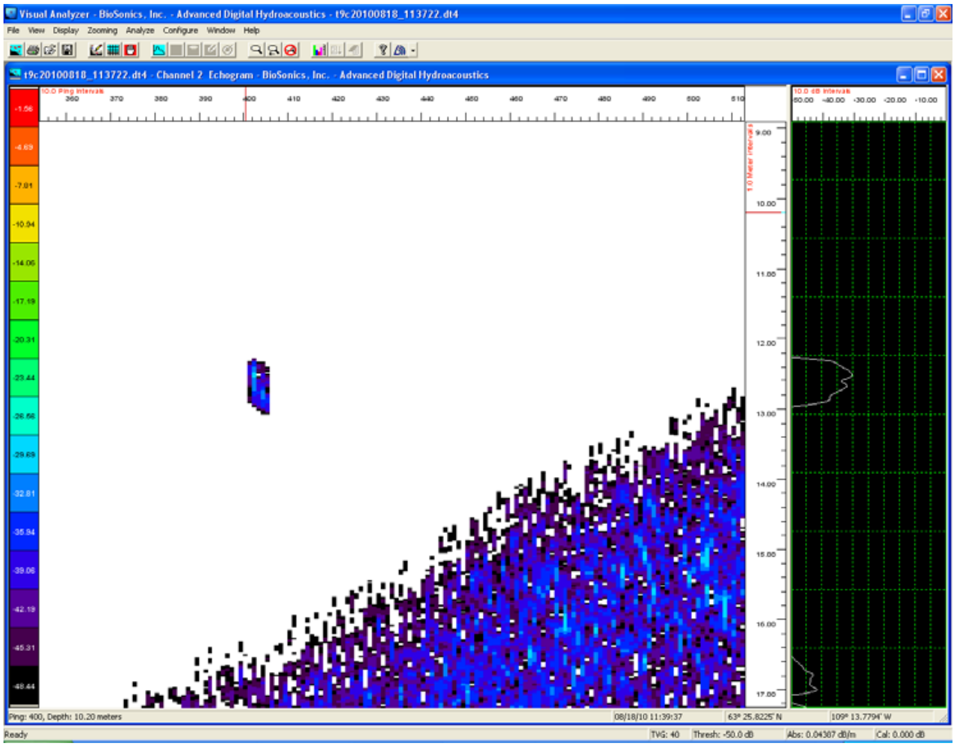


Figure JJ.I-15 Fish targets from horizontal beaming at Transect T9, August 18, 2010.

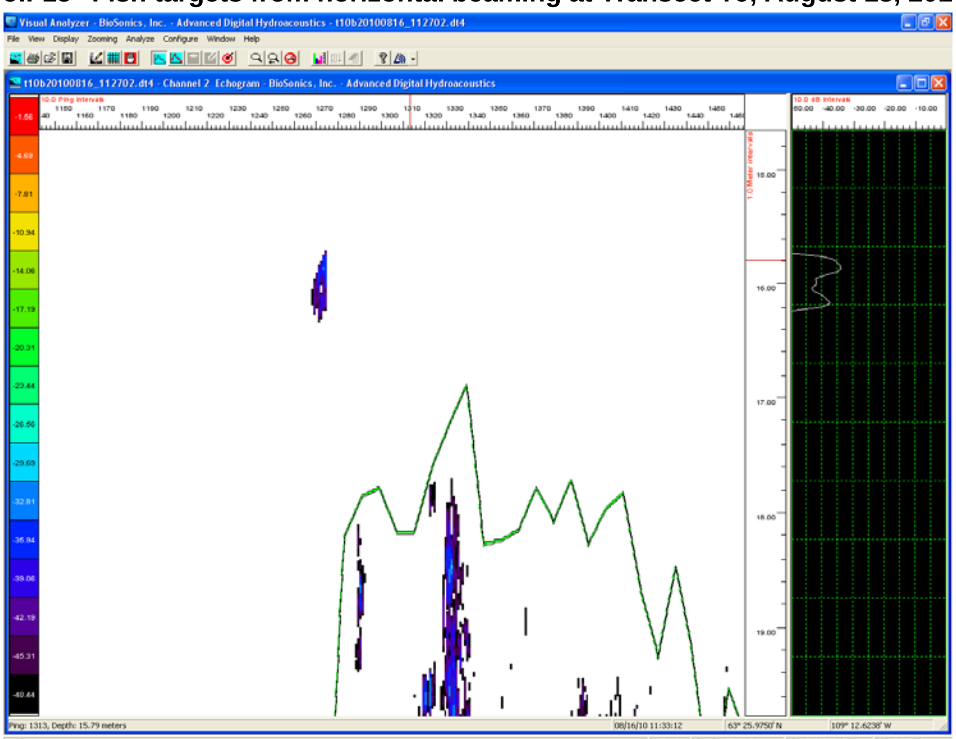


Figure JJ.I-16 Fish targets from horizontal beaming at Transect T10, August 16, 2010.

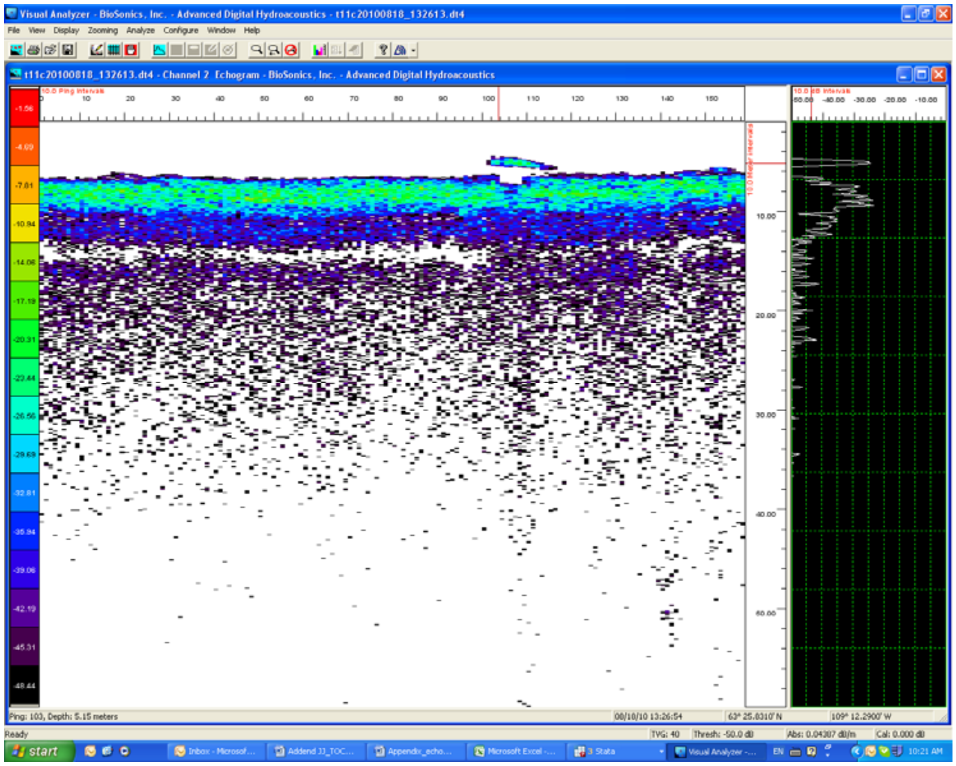


Figure JJ.I-17 Horizontal beaming showing a stack of fish echoes (i.e., school of fish) at Transect T11, August 18, 2010.

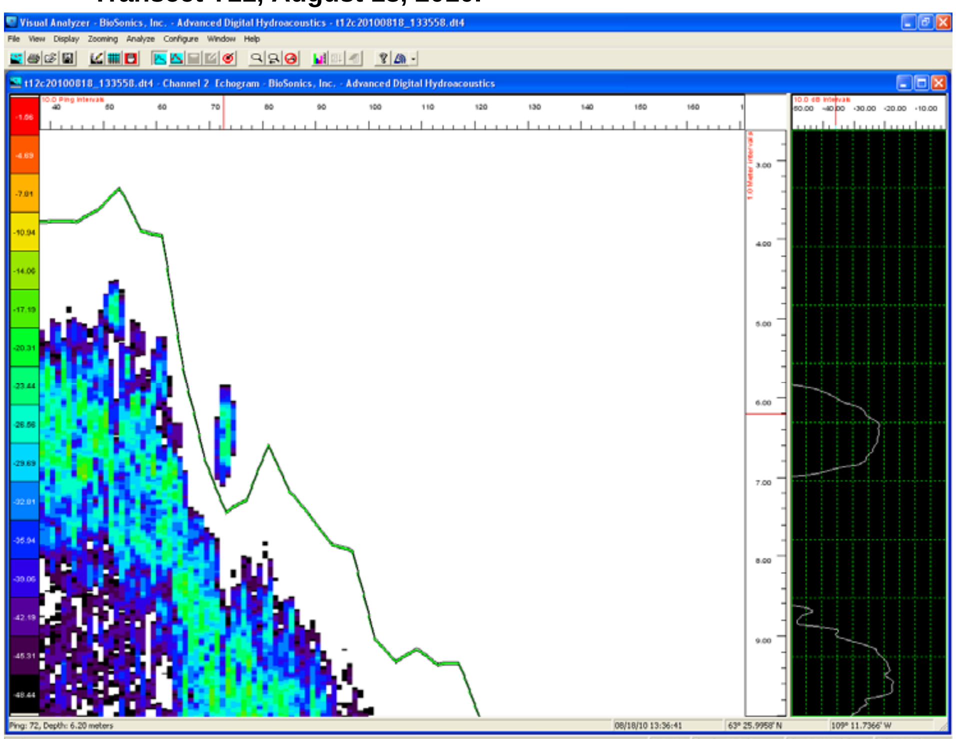


Figure JJ.I-18 Horizontal beaming showing a stack of fish echoes (i.e., small school of fish) on Transect T12, August 18, 2010.

APPENDIX JJ.II

FISH TISSUE – SUPPORTING DATA, 1996 AND 2007

Table JJ.II-1: Metal Concentrations in Muscle and Liver Tissue from Lake Trout and Round Whitefish Collected from Kennady Lake, 1996

Tissue Number	Sample Number	Species	Fork Length (mm)	Tissure Type	Moisture Content (%)	Metal Concentrations in mg/kg on dry weight basis (detection limits in italics)																									
						Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	PO_4	K	Ag	Na	Sr	Sn	V	Zn
						1.0	*1.0*	*0.05*	*0.01*	*0.05*	*0.5*	*0.05*		*0.5*	*0.05*	*0.05*	*1*	*0.05*	*0.05*	*0.05*	*0.005*	*0.1*	*0.1*	*0.5*	*0.5*	*0.01*	*0.5*	*0.01*	*0.1*	*0.5*	*0.05*
502 K12M	674	LKTR	534	Muscle	75.3	1.0	<	<	0.03	<	<	<	311	<	<	1.83	15	<	1060.00	0.31	0.885	<	<	11000.0	19000.0	<	908.0	0.18	<	<	10.40
502 K13M	675	LKTR	549	Muscle	75.4	<	<	0.07	<	<	<	<	362	0.8	<	2.16	11	<	1060.00	0.42	1.530	<	<	9660.0	17400.0	<	1100.0	0.15	<	<	8.62
502 K14M	676	LKTR	707	Muscle	72.5	<	<	<	<	<	<	<	272	<	<	1.53	8	<	934.00	0.32	2.110	<	0.3	9000.0	16200.0	<	829.0	0.10	<	<	9.71
502 K16M	678	LKTR	380	Muscle	76.3	8.0	<	<	0.04	<	<	<	936	<	<	1.14	13	<	1210.00	0.60	0.660	<	<	11200.0	19100.0	<	914.0	1.21	<	<	19.70
502 K17M	679	LKTR	445	Muscle	76.5	<	<	<	0.04	<	<	<	1280	<	<	1.78	12	<	1170.00	0.58	0.715	<	<	11500.0	19600.0	<	1050.0	1.69	<	<	13.10
502 K24M	719	LKTR	578	Muscle	73.9	<	<	<	<	<	<	<	336	<	<	2.23	11	<	1070.00	0.31	2.180	<	<	9240.0	19000.0	<	1060.0	0.10	<	<	8.52
502 K22M	720	LKTR	458	Muscle	77.5	<	<	<	0.08	<	<	<	1450	<	<	1.14	8	<	1070.00	0.49	0.265	<	0.1	10400.0	18600.0	<	839.0	2.08	<	<	16.00
502 K23M	721	LKTR	517	Muscle	73.6	<	<	<	0.12	<	<	0.05	1370	<	<	1.48	9	2.72	944.00	0.44	0.715	<	0.4	9120.0	17500.0	<	854.0	2.25	<	<	9.89
502 K18M	733	LKTR	575	Muscle	80.2	<	<	0.10	<	<	<	0.45	1180	<	<	2.54	23	<	1120.00	0.49	2.270	<	<	10900.0	19900.0	<	1300.0	1.04	<	<	16.00
502 K19M	734	LKTR	481	Muscle	73.8	<	<	<	<	<	<	<	360	<	<	2.03	12	<	1010.00	0.37	0.590	<	<	9240.0	15600.0	<	958.0	0.17	<	<	14.20
502 K20M	735	LKTR	608	Muscle	75.4	<	<	<	<	<	<	0.61	213	<	<	1.53	11	<	999.00	0.31	1.950	<	<	8820.0	14200.0	<	721.0	0.04	<	<	10.60
502 K21M	736	LKTR	520	Muscle	75.8	1.0	<	<	<	<	<	<	238	<	<	1.02	12	<	1010.00	0.32	0.420	<	<	9120.0	18300.0	<	805.0	0.14	<	<	7.99
502 K33M	739	LKTR	611	Muscle	76.1	<	<	<	<	<	<	0.06	285	<	<	1.67	11	<	901.00	0.23	3.300	<	<	8340.0	15600.0	<	932.0	0.09	<	<	6.37
502 K34M	740	LKTR	578	Muscle	77.8	<	<	<	0.07	<	<	<	1450	<	<	0.87	21	<	975.00	0.48	1.920	<	<	9780.0	18600.0	<	1140.0	2.02	<	<	10.10
502 K31M	742	LKTR	560	Muscle	76.6	<	<	<	0.04	<	<	<	1020	<	<	0.83	19	<	1140.00	0.59	1.580	<	<	11000.0	18800.0	<	884.0	1.16	<	<	9.97
502 K32M	743	LKTR	659	Muscle	75.1	<	<	<	0.04	<	<	<	1020	<	<	2.58	6	<	989.00	0.37	2.510	<	<	9660.0	17200.0	<	925.0	1.37	<	<	6.84
502 K36M	775	LKTR	494	Muscle	76.4	<	<	<	0.38	<	<	<	278	<	<	0.76	16	<	1060.00	0.34	0.780	<	<	9360.0	17800.0	<	968.0	0.11	<	<	9.48
502 K37M	776	LKTR	595	Muscle	81.9	<	<	<	<	<	<	0.06	445	<	<	2.01	10	0.07	1090.00	0.35	2.430	<	<	9660.0	19800.0	<	1460.0	0.14	<	<	10.30
502 K38M	777	LKTR	489	Muscle	78.3	<	<	<	<	<	<	<	872	<	<	0.92	8	<	1170.00	0.74	1.200	<	<	10000.0	19100.0	<	865.0	0.70	<	<	12.80
502 K39M	778	LKTR	549	Muscle	77.3	<	<	<	0.04	<	<	<	2440	<	<	1.47	10	<	947.00	0.68	1.720	<	0.6	9240.0	15800.0	<	1210.0	3.04	<	<	7.66
502 K25M	717	RNWH	355	Muscle	76.8	<	<	<	0.29	<	<	<	1580	<	<	1.14	7	<	1150.00	0.56	0.320	<	<	10900.0	19500.0	0.94	1000.0	4.07	<	<	9.94
502 K26M	718	RNWH	346	Muscle	75.1	<	<	<	0.05	<	<	<	602	<	<	0.98	8	<	1060.00	0.37	0.310	<	<	10100.0	18600.0	0.01	722.0	1.04	<	<	11.30
502 K27M	729	RNWH	330	Muscle	77.1	<	<	<	0.12	<	<	0.06	659	<	<	1.46	9	0.06	1090.00	0.48	0.300	<	<	10300.0	20400.0	<	593.0	1.26	<	<	8.59
502 K28M	730	RNWH	359	Muscle	76.5	<	<	<	0.19	<	<	0.11	1250	<	<	1.95	10	<	1100.00	0.70	0.370	<	<	9960.0	17200.0	<	1160.0	2.79	<	<	8.46
502 K29M	731	RNWH	342	Muscle	76.3	<	<	<	0.25	0.07	<	<	1590	<	0.06	2.80	18	<	1220.00	0.80	0.270	<	<	10800.0	19300.0	<	751.0	3.12	<	<	10.00
502 K30M	732	RNWH	326	Muscle	70.8	1.0	<	<	0.48	<	<	<	2100	<	<	2.34	12	<	995.00	1.07	0.060	<	<	8940.0	15100.0	<	984.0	5.75	<	<	18.00
502 K35M	741	RNWH	355	Muscle	76.2	<	<	<	0.12	<	<	<	1220	<	0.11	1.18	18	<	1060.00	0.52	0.705	<	0.2	10300.0	18800.0	<	996.0	2.26	<	<	8.55
502 K40M	779	RNWH	332	Muscle	78.6	<	<	<	0.02	<	<	<	357	<	<	2.48	6	<	1280.00	0.34	0.655	<	<	11300.0	18700.0	<	991.0	0.33	<	<	9.52
502 K41M	780	RNWH	330	Muscle	76.4	<	<	<	<	<	<	<	212	<	<	1.72	8	<	1070.00	0.26	0.535	<	<	8820.0	15600.0	<	929.0	0.03	<	<	12.40
502 K42M	781	RNWH	314	Muscle	77.6	<	<	<	<	<	<	<	351	<	<	1.92	4	<	1170.00	0.46	0.195	<	<	10400.0	19300.0	<	734.0	0.19	<	<	8.63
502 K43M	782	RNWH	340	Muscle	76.8	<	<	<	0.03	<	<	<	789	<	<	0.50	8	<	1150.00	0.46	0.480	0.3	<	9660.0	16100.0	<	1070.0	1.31	<	<	10.60
502 K44M	783	RNWH	327	Muscle	76.2	<	<	<	<	<	<	<	286	<	<	0.67	13	<	1200.00	0.35	0.385	<	<	10300.0	16800.0	<	888.0	0.08	<	<	8.78
502 K45M	784	RNWH	325	Muscle	76.8	1.0	<	<	<	<	<	<	199	<	<	1.94	7	0.38	1220.00	0.29	0.385	<	<	9960.0	16200.0	<	1120.0	<	<	<	9.07
502 K46M	785	RNWH	345	Muscle	77.8	<	<	<	0.17	<	<	<	1130	<	<	0.67	10	<	1250.00	0.54	0.280	<	<	11100.0	19500.0	<	756.0	2.36	<	<	8.79
502 K47M	786	RNWH	336	Muscle	76.9	<	<	<	0.35	<	<	0.13	2200	<	<	0.55	9	<	1180.00	0.71	0.565	<	<	11400.0	18400.0	<	658.0	6.31	<	<	8.87
502 K12L	674	LKTR	534	Liver	70.7	1.0	<	<	0.02	<	<	0.17	438	<	0.22	89.20	514	<	553.00	4.90	0.635	0.4	<	10700.0	14600.0	0.15	5360.0	0.62	<	<	30.50
502 K13L	675	LKTR	549	Liver	76.3	58.0	<	0.08	0.03	<	<	0.94	1170	0.5	1.28	170.00	5600	<	807.00	6.31	0.795	0.9	<	15000.0	16900.0	0.62	4430.0	1.15	<	0.9	123.00
502 K14L	676	LKTR	707	Liver	77.0	2.0	<	0.16	0.02	<	<	0.37	385	<	0.48	124.00	2030	<	732.00	6.11	2.470	0.6	0.2	14000.0	15800.0	0.40	6620.0	0.62	<	<	57.60

Table JJ.II-1: Metal Concentrations in Muscle and Liver Tissue from Lake Trout and Round Whitefish Collected from Kennady Lake, 1996 (continued)

Tissue Number	Sample Number	Species	Fork Length (mm)	Tissue Type	Moisture Content (%)	Metal Concentrations in mg/kg on dry weight basis (detection limits in italics)																									
						Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	PO_4	K	Ag	Na	Sr	Sn	V	Zn
						1.0	*1.0*	*0.05*	*0.01*	*0.05*	*0.5*	*0.05*		*0.5*	*0.05*	*0.05*	*1*	*0.05*	*0.05*	*0.05*	*0.005*	*0.1*	*0.1*	*0.5*	*0.5*	*0.01*	*0.5*	*0.01*	*0.1*	*0.5*	*0.05*
502 K16L	678	LKTR	380	Liver	74.7	3.0	<	0.31	0.02	<	<	0.35	417	<	0.57	152.00	1520	<	859.00	8.74	0.255	0.8	0.1	17400.0	16200.0	0.70	5090.0	0.60	<	<	98.90
502 K17L	679	LKTR	445	Liver	75.2	3.0	<	0.37	0.01	<	<	0.33	491	<	0.54	192.00	1140	<	920.00	8.33	0.345	0.7	<	18400.0	16300.0	0.48	4780.0	0.67	<	<	85.70
502 K24L	719	LKTR	578	Liver	81.6	4.0	<	0.11	0.02	<	<	0.47	603	<	0.53	164.00	1020	<	759.00	6.12	2.450	0.6	0.3	13500.0	16200.0	0.66	10600.0	0.90	<	<	116.00
502 K22L	720	LKTR	458	Liver	79.5	2.0	<	0.20	0.03	<	<	0.43	549	<	0.51	168.00	2270	<	887.00	7.07	0.320	0.7	<	16500.0	18900.0	1.05	7570.0	1.15	<	<	120.00
502 K23L	721	LKTR	517	Liver	79.8	3.0	<	0.11	0.04	<	<	0.47	526	<	0.49	123.00	2120	<	793.00	7.62	0.530	0.7	0.3	14700.0	15400.0	0.16	7730.0	1.07	<	<	33.90
502 K18L	733	LKTR	575	Liver	77.7	18.0	<	0.25	0.03	<	<	1.62	500	0.5	0.57	111.00	9760	<	815.00	8.03	1.080	0.8	<	15100.0	19400.0	0.30	4570.0	0.35	<	0.7	68.50
502 K19L	734	LKTR	481	Liver	80.1	3.0	<	0.07	0.05	<	<	0.46	623	<	0.44	127.00	1930	<	774.00	5.20	0.450	0.6	<	13900.0	17100.0	0.29	7520.0	0.89	<	<	45.60
502 K20L	735	LKTR	608	Liver	76.7	11.0	<	0.06	0.02	<	<	0.70	758	<	1.06	148.00	3810	<	820.00	5.22	1.700	0.6	0.2	14800.0	18200.0	0.31	6200.0	0.80	<	<	69.90
502 K21L	736	LKTR	520	Liver	72.4	5.0	<	0.08	0.07	<	<	0.46	384	<	0.38	132.00	2530	<	770.00	8.09	0.470	0.8	<	15300.0	15800.0	0.43	4640.0	0.76	<	<	48.70
502 K33L	739	LKTR	611	Liver	82.4	8.0	<	#N/A	0.03	<	<	0.96	1700	<	1.12	153.00	2930	<	854.00	5.86	5.600	0.4	0.2	16200.0	19900.0	0.26	12000.0	2.33	<	<	53.00
502 K34L	740	LKTR	578	Liver	80.5	26.0	<	0.14	0.05	<	<	1.71	454	<	1.27	139.00	9660	<	866.00	6.39	2.800	1.0	<	16600.0	18800.0	0.48	7660.0	0.59	<	0.8	98.10
502 K31L	742	LKTR	560	Liver	78.5	18.0	<	1.24	0.17	<	<	1.53	494	0.7	0.51	137.00	5200	<	862.00	6.21	1.490	1.8	0.4	16300.0	10900.0	0.68	4600.0	1.05	<	<	49.20
502 K32L	743	LKTR	659	Liver	79.4	9.0	<	0.15	0.02	<	<	0.37	1080	<	0.53	141.00	1000	<	962.00	5.01	4.590	0.4	0.3	16900.0	21000.0	0.10	8340.0	1.50	<	<	23.50
502 K36L	775	LKTR	494	Liver	71.8	7.0	<	0.14	0.10	<	<	0.33	349	<	0.57	148.00	3050	<	616.00	5.59	0.655	0.5	<	15300.0	10100.0	0.35	4820.0	0.64	<	<	49.60
502 K37L	776	LKTR	595	Liver	79.1	40.0	<	0.18	0.02	<	<	1.78	825	0.8	0.69	183.00	8580	<	791.00	5.25	3.290	0.6	0.2	14100.0	16800.0	0.09	6820.0	0.76	<	<	37.70
502 K38L	777	LKTR	489	Liver	78.0	10.0	<	0.10	0.06	<	<	0.38	432	<	0.55	115.00	1360	<	802.00	7.87	0.730	0.7	0.1	14600.0	15600.0	0.23	6340.0	0.58	<	<	46.50
502 K39L	778	LKTR	549	Liver	80.2	56.0	<	0.19	0.04	<	<	1.61	1170	1.1	0.80	114.00	10100	<	899.00	7.68	2.800	0.8	0.2	16400.0	20700.0	0.05	6310.0	1.01	<	0.7	17.20
502 K25L	717	RNWH	355	Liver	77.6	1.0	<	0.11	0.05	<	<	0.22	595	<	0.76	84.90	299	<	1170.00	10.20	0.485	0.5	0.2	18900.0	23300.0	<	5380.0	0.79	<	<	7.93
502 K26L	718	RNWH	346	Liver	77.8	1.0	<	0.12	0.02	<	<	0.29	321	<	0.28	94.20	411	<	894.00	8.71	0.515	0.8	0.1	14800.0	17400.0	0.02	4880.0	0.74	<	<	10.10
502 K27L	729	RNWH	330	Liver	74.2	2.0	<	0.06	0.08	<	<	0.38	456	<	0.40	102.00	329	<	1380.00	14.40	0.360	0.7	<	21400.0	17700.0	<	3670.0	1.11	<	<	9.39
502 K28L	730	RNWH	359	Liver	80.0	5.0	<	<	0.05	<	<	0.45	503	<	0.18	98.40	440	<	833.00	6.86	0.555	0.8	0.2	15100.0	17000.0	<	6290.0	0.84	<	<	8.06
502 K29L	731	RNWH	342	Liver	76.9	4.0	<	<	0.09	<	<	0.24	380	<	1.54	84.00	986	<	714.00	7.11	0.400	0.7	<	13800.0	13700.0	<	4190.0	0.84	<	<	11.80
502 K30L	732	RNWH	326	Liver	77.2	2.0	<	0.06	0.11	<	<	0.11	623	<	0.35	74.80	502	<	1060.00	10.10	0.350	0.6	0.1	18300.0	22500.0	<	4420.0	1.22	<	<	6.84
502 K35L	741	RNWH	355	Liver	77.5	2.0	<	0.26	0.06	<	<	0.30	409	<	1.41	101.00	1190	<	877.00	9.65	0.665	0.8	<	17100.0	20600.0	0.11	6600.0	0.83	<	<	14.90
502 K40L	779	RNWH	332	Liver	79.6	4.0	<	<	0.06	<	<	0.19	419	<	0.20	82.90	276	<	1090.00	13.20	0.730	0.6	<	18200.0	24100.0	<	3770.0	0.75	<	<	8.39
502 K41L	780	RNWH	330	Liver	79.3	3.0	<	0.17	0.06	<	<	<	478	0.6	0.69	82.00	260	<	1260.00	10.70	0.325	0.5	0.1	19400.0	25900.0	0.02	3440.0	0.63	<	<	9.61
502 K42L	781	RNWH	314	Liver	79.3	<	<	<	0.06	<	<	0.17	638	0.8	0.12	82.10	291	0.07	1140.00	11.00	0.205	0.6	0.2	18100.0	22200.0	<	4730.0	1.33	<	<	6.93
502 K43L	782	RNWH	340	Liver	82.2	6.0	<	0.07	0.14	<	<	0.37	481	0.8	0.50	91.90	1240	<	785.00	6.98	0.540	0.9	0.2	13000.0	18200.0	<	5260.0	0.97	<	<	8.69
502 K44L	783	RNWH	327	Liver	80.1	18.0	<	0.12	0.27	<	<	0.39	544	1.6	0.60	92.20	418	0.32	716.00	7.24	0.430	0.6	0.1	13800.0	12100.0	<	4150.0	1.13	<	<	11.50
502 K45L	784	RNWH	325	Liver	77.6	3.0	<	<	0.06	<	<	0.40	299	0.7	0.58	81.60	536	<	760.00	7.10	0.315	0.8	0.2	13700.0	18400.0	<	3610.0	0.40	<	<	9.88
502 K46L	785	RNWH	345	Liver	73.7	2.0	<	0.18	0.04	<	<	0.07	375	0.6	0.47	76.20	244	0.05	1030.00	10.90	0.325	0.5	<	17100.0	17300.0	<	2450.0	0.62	<	<	6.31
502 K47L	786	RNWH	336	Liver	71.6	1.0	<	0.21	0.06	<	<	0.16	371	0.9	0.39	88.50	596	0.13	768.00	8.11	0.400	0.9	0.1	13400.0	14800.0	<	2850.0	0.60	<	<	9.54

Source: Canamera 1998

mm = millimetres; % = percent; mg/kg = milligram per kilogram; < = below detection limit; LKTR = lake trout; RNWH = round whitefish.

Table JJ.II-2: Metal Concentrations in Muscle and Liver Tissue from Lake Trout and Round Whitefish Collected from the Control Lake, 1996

Tissue Number	Sample Number	Species	Fork Length (mm)	Tissue Type	Moisture Content (%)	Metal Concentrations in mg/kg on dry weight basis (detection limits in italics)																									
						Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	PO_4	K	Ag	Na	Sr	Sn	V	Zn
						1.0	*1.0*	*0.05*	*0.01*	*0.05*	*0.5*	*0.05*		*0.5*	*0.05*	*0.05*	*1*	*0.05*	*0.05*	*0.05*	*0.005*	*0.1*	*0.1*	*0.5*	*0.5*	*0.01*	*0.5*	*0.01*	*0.1*	*0.5*	*0.05*
502-C04M	520	LKTR	677	Muscle	74.4	52.0	<	0.36	1.39	0.31	0.7	<	736	0.9	0.07	4.74	29	0.11	4020.00	1.24	5.340	<	0.3	16500.0	18300.0	0.01	1700.0	5.00	<	<	40.80
502-C03M	521	LKTR	533	Muscle	75.0	<	<	<	0.04	<	<	<	317	<	<	1.86	14	<	1090.00	0.40	1.320	<	0.1	6970.0	18100.0	<	1550.0	0.34	<	<	11.20
502-C02M	525	LKTR	558	Muscle	76.2	1.0	<	0.21	0.03	<	<	<	652	0.8	<	1.98	24	<	1840.00	0.76	2.320	<	0.2	12600.0	17500.0	0.01	1200.0	0.52	<	<	15.40
502-C01M	526	LKTR	591	Muscle	74.5	<	<	0.41	0.03	<	0.8	<	1100	<	<	2.17	14	<	1200.00	0.50	2.340	<	0.1	8480.0	16900.0	0.02	1370.0	1.60	<	<	12.60
502-C05M	527	LKTR	575	Muscle	73.8	<	<	0.64	0.03	<	1.2	<	428	0.9	<	2.68	14	<	1270.00	0.46	1.090	<	0.2	9450.0	15900.0	0.12	1020.0	0.46	<	<	11.70
502-C18M	528	LKTR	603	Muscle	77.5	1.0	<	1.35	0.05	<	1.3	<	536	1.7	<	2.55	18	<	1010.00	0.41	3.010	<	0.2	8200.0	17500.0	0.06	1330.0	0.39	<	<	17.10
502-C09M	575	LKTR	528	Muscle	73.3	<	<	0.59	0.03	<	0.9	<	358	1.0	<	2.44	19	<	1370.00	0.46	1.590	<	0.1	9170.0	17800.0	0.17	1180.0	0.36	<	<	12.10
502-C08M	576	LKTR	434	Muscle	72.9	48.0	<	0.42	0.08	<	0.8	<	605	2.9	0.06	4.06	21	<	3530.00	1.32	0.752	0.6	<	10800.0	19900.0	0.39	1230.0	5.80	<	<	34.90
502-C06M	579	LKTR	515	Muscle	79.9	<	<	0.22	0.02	<	0.7	<	421	<	<	1.52	24	<	1360.00	0.60	1.970	<	0.1	10100.0	23800.0	0.02	1490.0	0.37	<	<	13.50
502-C07M	580	LKTR	527	Muscle	77.9	<	<	1.09	0.04	<	1.2	<	381	1.1	<	3.11	24	<	1490.00	0.51	1.470	<	0.1	9950.0	22200.0	0.40	1110.0	0.21	<	<	10.40
502 C21M	926	LKTR	577	Muscle	78.1	<	<	0.26	<	<	<	<	330	<	0.13	1.71	25	<	1480.00	0.40	1.170	<	<	10800.0	17800.0	<	1020.0	0.16	<	<	13.30
502 C22M	927	LKTR	499	Muscle	76.5	<	<	0.16	0.01	<	<	<	383	<	<	2.18	17	0.23	1450.00	0.34	1.070	<	<	11200.0	20900.0	0.03	1200.0	0.31	<	<	12.50
502 C23M	928	LKTR	646	Muscle	79.2	<	<	0.24	<	<	<	<	350	<	<	1.57	12	<	1370.00	0.38	2.290	<	<	10900.0	20900.0	<	1330.0	0.24	<	<	11.80
502 C24M	929	LKTR	660	Muscle	79.5	<	<	0.24	<	<	<	<	407	<	<	1.55	13	<	1460.00	0.35	2.470	<	<	10800.0	21500.0	0.03	1410.0	0.21	<	<	11.80
502 C25M	930	LKTR	490	Muscle	75.9	<	<	0.16	<	<	<	<	348	<	<	1.34	11	<	1350.00	0.33	0.944	<	<	9960.0	17600.0	0.01	978.0	0.20	<	<	11.20
502 C36M	977	LKTR	662	Muscle	76.0	<	<	0.15	<	<	<	<	318	<	<	1.86	20	<	1210.00	0.36	2.220	<	<	9820.0	16200.0	<	1310.0	0.20	<	<	11.00
502 C37M	978	LKTR	500	Muscle	79.0	<	<	0.34	0.09	<	<	<	1640	<	<	2.18	21	<	1630.00	0.60	1.770	<	0.1	12800.0	20000.0	0.02	1890.0	2.78	<	<	14.30
502 C38M	979	LKTR	569	Muscle	78.6	<	<	0.25	<	<	<	<	415	<	0.06	1.27	18	<	1540.00	0.55	1.410	<	<	10600.0	17900.0	<	1580.0	0.21	<	<	12.50
502 C39M	980	LKTR	518	Muscle	80.3	<	<	0.18	0.20	<	<	<	3440	<	<	1.47	27	<	1600.00	0.90	1.660	<	0.1	12400.0	17800.0	<	1350.0	5.39	<	<	13.20
502 C40M	981	LKTR	708	Muscle	75.6	<	<	<	0.01	<	<	<	276	<	<	1.42	14	<	1330.00	0.27	3.280	<	<	9500.0	14900.0	0.01	1160.0	0.23	<	<	11.30
502-C17M	572	RNWH	345	Muscle	77.4	1.0	<	0.70	0.18	<	<	<	1030	1.0	<	3.41	20	<	1290.00	0.47	0.384	<	0.2	9210.0	21800.0	<	1230.0	2.31	<	<	15.20
502-C10M	573	RNWH	325	Muscle	77.2	<	<	1.61	1.36	<	1.6	<	4530	1.5	<	2.18	23	<	1490.00	1.56	0.384	<	0.3	12300.0	20800.0	0.26	896.0	13.00	<	<	13.10
502-C16M	574	RNWH	347	Muscle	76.4	<	<	0.98	0.13	<	<	<	610	0.7	0.07	1.79	19	<	1280.00	0.40	0.418	<	0.1	8800.0	20600.0	<	1370.0	1.23	<	<	19.30
502-C19M	582	RNWH	360	Muscle	77.3	1.0	<	1.14	0.02	<	1.2	<	578	1.7	<	2.46	17	<	1480.00	0.49	0.468	<	0.1	11000.0	21800.0	0.03	1010.0	0.76	<	<	14.00
502-C20M	585	RNWH	330	Muscle	76.4	<	<	1.95	0.29	<	1.0	<	1120	1.6	<	2.18	21	<	1320.00	0.59	0.317	<	0.2	9260.0	19500.0	0.29	1270.0	2.44	<	<	18.80
502-C11M	606	RNWH	330	Muscle	77.8	<	<	2.21	0.52	<	1.2	<	2510	0.9	<	2.29	23	<	1580.00	0.88	0.401	<	0.2	11000.0	20800.0	0.20	1520.0	6.56	<	<	25.50
502-C12M	607	RNWH	325	Muscle	74.7	1.0	0.1	1.12	0.14	<	1.3	0.11	360	0.6	0.16	2.44	13	<	1230.00	0.32	1.470	<	0.5	7850.0	21200.0	0.15	1250.0	0.63	<	<	12.00
502-C13M	608	RNWH	309	Muscle	76.0	1.0	<	0.38	0.20	<	<	<	888	<	<	2.71	17	<	1440.00	0.65	0.367	<	0.2	9610.0	21400.0	<	1550.0	2.20	<	<	14.30
502-C14M	609	RNWH	308	Muscle	76.8	<	<	1.38	0.42	<	0.6	<	1550	0.9	<	2.70	21	<	1460.00	0.63	0.484	<	0.3	10500.0	22200.0	0.07	1440.0	4.27	<	<	15.90
502-C15M	640	RNWH	336	Muscle	76.9	<	<	0.58	0.12	<	1.1	<	406	<	0.12	3.27	19	<	1420.00	0.40	0.217	<	0.2	9250.0	21600.0	<	1180.0	0.68	<	<	13.80
502 C26M	967	RNWH	317	Muscle	79.0	<	<	0.15	0.33	<	<	<	1330	<	0.11	1.37	19	<	1710.00	0.75	0.412	<	<	12700.0	21700.0	<	811.0	3.26	<	<	13.00
502 C27M	968	RNWH	325	Muscle	78.1	<	<	0.19	0.41	<	<	<	1450	<	0.10	1.28	12	<	1670.00	0.63	0.461	<	<	11500.0	19700.0	0.01	844.0	3.89	<	<	12.00
502 C28M	969	RNWH	312	Muscle	78.4	<	<	0.12	0.04	<	<	<	364	<	<	1.41	18	<	1540.00	0.37	0.454	<	<	11500.0	19900.0	0.01	1550.0	0.50	<	<	12.10
502 C29M	970	RNWH	350	Muscle	78.1	<	<	0.19	0.03	<	<	<	354	<	0.08	1.25	17	<	1540.00	0.44	0.447	<	<	11200.0	19400.0	<	1110.0	0.38	<	<	15.80
502 C30M	971	RNWH	320	Muscle	78.5	<	<	0.18	0.02	<	<	<	312	<	0.08	1.35	21	<	1610.00	0.37	0.376	<	<	11500.0	20800.0	<	1110.0	0.34	<	<	11.70
502 C31M	972	RNWH	323	Muscle	78.8	<	<	0.19	0.16	<	<	<	820	<	0.07	1.20	19	<	1720.00	0.49	0.461	<	<	11900.0	20300.0	<	1040.0	1.98	<	<	12.50
502 C32M	973	RNWH	345	Muscle	77.4	3.0	<	0.26	0.37	<	<	<	1720	<	0.14	1.13	14	<	1650.00	0.66	0.533	<	<	12400.0	20600.0	0.02	1940.0	4.19	<	<	12.00
502 C33M	974	RNWH	321	Muscle	80.0	<	<	0.19	0.02	<	<	<	357	<	0.11	1.31	12	<	1620.00	0.37	0.461	<	<	11300.0	19200.0	<	1400.0	0.37	<	<	12.40
502 C34M	975	RNWH	297	Muscle	78.2	<	<	0.20	0.02	<	<	<	515	<	<	1.47	17	<	1650.00	0.41	0.469	<	<	12700.0	19300.0	<	1300.0	0.50	<	<	11.60
502 C35M	976	RNWH	295	Muscle	77.7	<	<	0.18	0.16	<	<	<	879	<	0.08	1.08	13	<	1520.00	0.50	0.362	<	<	11400.0	20500.0	<	1350.0	1.88	<	<	11.70

Table JJ.II-2: Metal Concentrations in Muscle and Liver Tissue from Lake Trout and Round Whitefish Collected from the Control Lake, 1996 (continued)

Tissue Number	Sample Number	Species	Fork Length (mm)	Tissue Type	Moisture Content (%)	Metal Concentrations in mg/kg on dry weight basis (detection limits in italics)																									
						Al	Sb	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	PO_4	K	Ag	Na	Sr	Sn	V	Zn
						1.0	*1.0*	*0.05*	*0.01*	*0.05*	*0.5*	*0.05*		*0.5*	*0.05*	*0.05*	*1*	*0.05*	*0.05*	*0.05*	*0.005*	*0.1*	*0.1*	*0.5*	*0.5*	*0.01*	*0.5*	*0.01*	*0.1*	*0.5*	*0.05*
502-C04L	520	LKTR	677	Liver	78.6	3.0	<	0.72	0.03	<	2.0	0.55	447	1.1	0.58	77.80	2880	<	565.00	4.85	3.950	0.5	0.2	10800.0	9270.0	0.46	8160.0	0.96	<	<	120.00
502-C03L	521	LKTR	533	Liver	77.2	2.0	<	0.61	0.12	<	2.4	0.48	1680	1.0	0.87	59.00	2440	<	662.00	6.31	1.750	0.6	0.2	13400.0	9380.0	0.41	5880.0	3.29	<	<	125.00
502-C02L	525	LKTR	558	Liver	74.1	10.0	<	0.44	0.07	<	3.7	1.07	341	1.0	1.00	75.50	6150	<	624.00	7.64	2.470	1.1	0.4	13900.0	8580.0	0.33	5870.0	0.64	<	<	149.00
502-C01L	526	LKTR	591	Liver	71.7	<	<	0.26	0.01	<	1.0	0.32	304	<	0.36	61.70	1160	<	455.00	3.89	2.800	0.5	0.3	9830.0	7620.0	0.15	5290.0	0.67	<	<	101.00
502-C05L	527	LKTR	575	Liver	76.0	<	<	0.45	0.04	<	1.6	0.22	565	0.9	0.27	21.00	955	<	835.00	7.93	1.400	0.5	0.5	15200.0	13400.0	0.03	6070.0	1.39	<	<	93.40
502-C18L	528	LKTR	603	Liver	76.7	2.0	<	1.31	0.10	<	<	0.51	2510	0.5	0.51	52.70	2720	<	587.00	5.39	4.280	0.5	0.4	10700.0	9370.0	0.38	5720.0	4.50	<	<	126.00
502-C09L	575	LKTR	528	Liver	77.2	2.0	<	0.87	0.07	<	1.8	0.46	455	3.4	0.53	59.10	2390	<	612.00	5.13	2.000	0.6	0.4	11100.0	9440.0	0.30	5590.0	1.12	<	<	130.00
502-C08L	576	LKTR	434	Liver	72.1	<	<	0.38	0.05	<	<	0.17	400	2.3	0.20	26.70	772	<	522.00	4.55	0.675	0.5	0.3	10400.0	8650.0	0.13	4150.0	1.16	<	<	86.40
502-C06L	579	LKTR	515	Liver	82.3	10.0	<	0.67	0.05	<	0.7	1.21	670	2.4	0.60	69.80	6970	<	662.00	2.72	2.050	0.6	0.7	11800.0	12500.0	0.27	9770.0	1.13	<	<	143.00
502-C07L	580	LKTR	527	Liver	81.0	4.0	<	1.98	0.04	<	1.6	0.64	494	3.3	0.45	30.40	4710	<	789.00	7.66	2.230	0.5	0.1	14400.0	11500.0	0.08	7240.0	0.71	<	<	108.00
502 C21L	926	LKTR	577	Liver	75.3	3.0	<	0.21	<	<	1.4	0.69	444	1.0	1.40	120.00	2930	0.06	569.00	5.14	1.280	0.6	0.2	14500.0	12300.0	0.27	5480.0	0.40	<	<	118.00
502 C22L	927	LKTR	499	Liver	75.4	1.0	<	0.18	<	<	1.1	0.42	470	1.0	1.30	107.00	1760	0.08	596.00	5.52	1.590	0.5	0.2	14100.0	11100.0	0.43	7280.0	0.55	<	<	390.00
502 C23L	928	LKTR	646	Liver	72.5	4.0	<	0.07	<	<	1.1	0.45	505	0.9	0.88	14.20	660	<	681.00	4.93	5.960	0.3	0.4	17400.0	14200.0	0.04	8540.0	0.94	<	<	490.00
502 C24L	929	LKTR	660	Liver	73.0	3.0	<	0.13	<	<	1.3	0.67	946	0.9	0.70	17.10	3450	0.06	668.00	4.83	4.800	0.4	0.3	16100.0	13500.0	0.04	10100.0	0.96	<	<	152.00
502 C25L	930	LKTR	490	Liver	76.3	2.0	<	0.51	0.01	<	1.2	0.62	463	1.7	0.60	114.00	1730	0.09	502.00	4.66	1.360	0.5	0.2	14700.0	10500.0	0.39	7080.0	0.43	<	<	139.00
502 C36L	977	LKTR	662	Liver	77.1	<	<	0.39	<	<	1.2	0.26	792	1.4	0.36	17.80	1480	0.15	617.00	4.02	4.220	0.3	0.2	15100.0	13300.0	0.08	7220.0	0.63	<	<	369.00
502 C37L	978	LKTR	500	Liver	76.5	2.0	<	0.21	<	<	1.4	0.32	489	1.6	1.70	14.80	3050	<	673.00	4.93	2.860	0.4	0.2	16200.0	11900.0	<	9010.0	0.66	<	<	147.00
502 C38L	979	LKTR	569	Liver	76.3	3.0	<	0.22	<	<	1.1	1.17	580	1.6	1.28	29.00	2970	<	421.00	1.56	3.180	0.6	0.1	12000.0	8710.0	0.10	7870.0	0.46	<	<	123.00
502 C39L	980	LKTR	518	Liver	70.8	2.0	<	0.21	<	<	1.0	1.46	769	1.7	0.56	8.45	3370	0.09	519.00	3.04	2.480	0.2	0.2	13000.0	13000.0	<	10200.0	0.41	<	<	93.50
502 C40L	981	LKTR	708	Liver	76.6	2.0	<	0.26	0.97	<	1.2	0.27	493	1.4	0.94	30.60	1290	0.25	389.00	3.51	4.500	0.5	5.9	10500.0	7900.0	0.14	5350.0	0.41	<	<	91.40
502-C17L	572	RNWH	345	Liver	74.7	<	<	3.06	0.23	<	1.6	0.24	484	0.5	0.66	10.60	763	<	734.00	14.60	0.525	0.9	0.4	12100.0	11400.0	0.01	4390.0	1.68	<	<	86.90
502-C10L	573	RNWH	325	Liver	71.1	1.0	<	2.20	0.14	<	3.3	0.15	431	1.6	0.29	12.70	990	<	642.00	8.39	0.475	0.6	0.2	11700.0	9740.0	0.05	3890.0	1.20	<	<	82.80
502-C16L	574	RNWH	347	Liver	73.3	1.0	<	2.63	0.13	<	2.7	0.24	356	0.5	0.82	16.90	1080	<	726.00	8.11	0.675	0.8	0.1	12200.0	12100.0	0.12	3750.0	0.97	<	<	87.90
502-C19L	582	RNWH	360	Liver	75.5	<	<	4.11	0.17	<	1.8	0.29	587	0.7	0.50	17.80	752	<	805.00	10.20	0.600	0.8	0.5	12900.0	12200.0	0.07	4430.0	1.66	<	<	96.10
502-C20L	585	RNWH	330	Liver	74.6	<	<	2.94	0.92	<	0.5	0.24	766	<	0.36	13.60	831	<	786.00	7.88	0.550	0.8	0.3	11900.0	12900.0	0.08	3830.0	2.55	<	<	98.30
502-C11L	606	RNWH	330	Liver	74.3	<	<	1.75	0.72	<	<	0.18	3110	<	0.44	12.40	853	<	737.00	10.50	0.650	0.7	0.7	10800.0	11500.0	0.04	3650.0	10.20	<	<	103.00
502-C12L	607	RNWH	325	Liver	77.1	<	<	0.89	0.13	<	1.7	0.24	552	<	1.43	18.00	556	<	851.00	11.70	0.575	0.7	<	14700.0	11900.0	<	4620.0	1.24	<	<	98.10
502-C13L	608	RNWH	309	Liver	78.4	<	<	4.19	0.37	<	6.7	0.09	830	<	0.31	13.10	631	<	801.00	9.84	0.525	0.6	0.5	10100.0	12200.0	0.02	4290.0	2.80	<	<	124.00
502-C14L	609	RNWH	308	Liver	73.4	<	<	3.27	0.17	<	2.4	0.17	605	<	0.52	18.70	846	<	744.00	9.31	0.350	0.5	0.3	11700.0	10800.0	0.20	4150.0	1.82	<	<	81.00
502-C15L	640	RNWH	336	Liver	78.3	2.0	<	0.75	0.26	<	1.5	0.19	776	<	1.50	18.80	935	<	847.00	10.10	0.425	0.7	0.3	13100.0	13200.0	0.02	5380.0	2.00	<	<	95.90
502 C26L	967	RNWH	317	Liver	76.5	2.0	<	0.24	0.15	<	1.3	0.33	596	1.2	0.56	11.90	680	<	579.00	9.32	0.596	0.8	0.2	15800.0	11400.0	0.02	2610.0	1.05	<	<	86.50
502 C27L	968	RNWH	325	Liver	80.2	<	<	0.31	<	<	1.3	0.10	552	1.0	0.76	11.80	246	<	658.00	6.99	0.312	0.5	0.1	16500.0	13400.0	0.04	2140.0	0.17	<	<	59.70
502 C28L	969	RNWH	312	Liver	73.8	<	<	0.35	0.02	<	1.6	0.08	402	1.8	0.56	8.26	739	<	557.00	8.81	1.190	0.6	0.2	15000.0	11200.0	<	4250.0	0.71	<	<	87.50
502 C29L	970	RNWH	350	Liver	75.4	1.0	<	0.34	0.04	<	1.0	0.22	360	1.1	2.74	11.90	1110	<	504.00	6.10	<	0.8	1.0	14600.0	11200.0	0.02	4680.0	0.69	<	<	102.00
502 C30L	971	RNWH	320	Liver	75.8	<	<	0.31	<	<	0.9	0.18	539	0.8	1.78	9.12	981	<	616.00	6.13	0.612	0.6	0.2	15000.0	13500.0	<	5990.0	0.83	<	<	91.40
502 C31L	972	RNWH	323	Liver	77.5	<	<	0.06	0.02	<	0.9	0.08	348	0.8	0.46	8.06	529	0.06	825.00	9.96	0.622	0.6	0.2	18400.0	12400.0	<	2740.0	0.42	<	<	85.20
502 C32L	973	RNWH	345	Liver	73.6	<	<	<	0.02	<	1.3	0.31	325	0.9	0.76	6.88	657	<	737.00	12.40	<	0.7	0.2	16800.0	13000.0	<	2920.0	0.40	<	<	75.60
502 C33L	974	RNWH	321	Liver	73.9	<	<	<	<	<	1.0	0.18	437	0.9	0.82	6.80	390	<	736.00	10.60	0.684	0.4	0.2	18100.0	12300.0	<	2920.0	0.41	<	<	75.30
502 C34L	975	RNWH	297	Liver	76.8	<	<	0.41	<	<	1.3	0.11	782	1.7	0.68	10.30	632	<	772.00	7.53	0.942	0.4	0.1	17300.0	14900.0	0.03	4510.0	0.58	<	<	77.80
502 C35L	976	RNWH	295	Liver	75.1	1.0	<	0.74	0.02	<	1.3	0.13	411	1.9	1.02	7.73	1210	<	462.00	5.39	0.732	0.5	0.3	13300.0	10800.0	<	4560.0	0.69	<	0.5	73.70

Source: Canamera 1998

mm = millimetres; % = percent; mg/kg = milligram per kilogram; < = below detection limit; LKTR = lake trout; RNWH = round whitefish.

Table JJ.II-3. Sampling Locations, Effort, and Habitat Characteristics for Slimy Sculpin Survey, 2007

Site	Date	Site UTM	Substrate	Stream Length (m)	Stream Width (m)	Water Temp	Spec Cond	Start Time	End Time	Backpack Electrofishing Duration (s)	Number of Fish Captured	CPUE (number of fish / 100 s)
Kennady Lake (Stream L2)	26-Jul-2007	12.0593878.7038997	Boulder/Cobble	30	5	14.3	10	10:00	10:16	404	22	5.45
Control Lake (Outflow)	28-Jul-2007	12.0585995.7040488	Boulder	50	10	15	10	8:00	8:24	597	31	5.19
Kirk Lake (Outflow)	27-Aug-2007	12.0599015.7076783	Boulder	50	10	9	10	10:35	11:08	958	30	3.13
Lake 410 (Outflow)	26-Aug-2007	12.0596673.7051419	Boulder	50	50	8	10	14:30	15:45	2325	21	0.90

m = metres; temp = temperature; spec cond = specific conductivity; s = seconds; CPUE = catch-per-unit-effort.

Table JJ.II-4: Summary of Length and Weight Data for Slimy Sculpin Used in Metal Burden Analysis, 2007

Kennady Lake (Stream L2)		Control Lake (Outflow)		Kirk Lake (Outflow)		Lake 410 (Outflow)	
Length (mm)	Weight (g)	Length (mm)	Weight (g)	Length (mm)	Weight (g)	Length (mm)	Weight (g)
104	10.7	86	7.3	100	4.1	75	4.6
97	11.4	78	4.4	83	2.5	54	1.5
105	13.4	80	4.0	67	2.6	100	8.9
87	8.1	71	4.2	75	4.0	105	11.1
67	3.0	87	7.0	52	1.4	92	7.2
70	3.7	67	3.1	75	4.5	58	1.7
72	4.5	82	4.9	55	1.8	70	3.9
67	3.6	72	3.7	63	2.9	71	3.7
62	3.2	65	2.6	57	1.7	56	1.8
70	3.4	64	2.8	44	0.8	78	5.5
64	2.3	72	3.1	39	0.5	73	4.1
45	2.0	60	1.9	55	1.6	68	3.6
64	2.8	60	2.3	54	1.5	56	1.8
50	2.9	59	1.9	50	1.2	55	1.9
50	1.5	50	1.2	52	1.5	60	2.2
61	2.5	51	1.2	52	1.4	55	1.6
50	1.6	59	3.5	40	0.7	57	1.6
62	1.9	55	1.4	55	1.4	55	1.6
56	1.9	49	1.2	46	0.9	66	2.9
52	1.2	48	1.0	42	0.6	49	1.6
50	2.5	50	1.1	41	0.7	58	1.9
54	1.5	45	1.2	43	0.7	-	-
-	-	49	1.2	50	1.2	-	-
-	-	50	0.9	46	1.0	-	-
-	-	50	1.2	40	0.7	-	-
-	-	51	0.9	69	0.6	-	-
-	-	50	1.2	38	1.6	-	-
-	-	50	1.2	36	1.6	-	-
-	-	67	2.9	39	0.5	-	-
-	-	47	1.1	37	0.5	-	-
-	-	48	1.3	-	-	-	-

mm = millimetres; g = grams.

APPENDIX JJ.III

FISH TISSUE – LABORATORY ANALYTICAL REPORT, 2007

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

ANALYTICAL REPORT

AMEC EARTH & ENVIRONMENTAL LTD.

ATTN: KOURTNEY BRADLEY

2227 DOUGLAS ROAD

BURNABY BC V5C 5A9

Reported On: 15-FEB-08 05:12 PM

Lab Work Order #: **L595391** **Date Received:** **18-JAN-08**

Project P.O. #:
Job Reference: VE51664.6500.652004
Legal Site Desc:
CofC Numbers:

Other Information:

Comments:

Joyce Chow
General Manager, Vancouver

For any questions about this report please contact your Account Manager:

Jerry Holzbecher

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L595391-5	L595391-6	L595391-7	L595391-8	L595391-9
	Sample ID	L595391-5	L595391-6	L595391-7	L595391-8	L595391-9
	Description					
	Sampled Date	26-AUG-07	26-AUG-07	27-AUG-07	27-AUG-07	29-JUL-07
	Sampled Time					
	Client ID	LAKE 410 SCULPIN - COMP 1	LAKE 410 SCULPIN - COMP 2	KIRK LAKE SCULPIN - COMP 1	KIRK LAKE SCULPIN - COMP 2	CONTROL OUTLET SCULPIN - COMP 1
TISSUE						
Physical Tests	% Moisture (%)	76.6	75.8	77.2	75.5	76.2
Total Metals	Aluminum (Al)-Total (mg/kg)	58	39	19	18	29
	Aluminum (Al)-Total (mg/kg wwt)	13.6	9.5	4.2	4.5	7.0
	Antimony (Sb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Antimony (Sb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Arsenic (As)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Total (mg/kg wwt)	<0.020	0.022	<0.020	<0.020	0.022
	Barium (Ba)-Total (mg/kg)	17.7	20.6	26.8	26.0	17.9
	Barium (Ba)-Total (mg/kg wwt)	4.13	4.99	6.13	6.37	4.26
	Beryllium (Be)-Total (mg/kg)	<0.30	<0.30	<0.30	<0.30	<0.30
	Beryllium (Be)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Bismuth (Bi)-Total (mg/kg)	<0.30	<0.30	<0.30	<0.30	<0.30
	Bismuth (Bi)-Total (mg/kg wwt)	<0.030	<0.030	<0.030	<0.030	<0.030
	Cadmium (Cd)-Total (mg/kg)	0.092	0.081	0.095	0.098	0.062
	Cadmium (Cd)-Total (mg/kg wwt)	0.0216	0.0196	0.0217	0.0239	0.0146
	Calcium (Ca)-Total (mg/kg)	30900	35000	52000	52400	48700
	Calcium (Ca)-Total (mg/kg wwt)	7230	8460	11900	12800	11600
	Chromium (Cr)-Total (mg/kg)	0.82	0.64	<0.50	0.69	0.70
	Chromium (Cr)-Total (mg/kg wwt)	0.19	0.16	<0.10	0.17	0.17
	Cobalt (Co)-Total (mg/kg)	0.51	0.44	0.18	0.16	0.23
	Cobalt (Co)-Total (mg/kg wwt)	0.120	0.107	0.042	0.039	0.054
	Copper (Cu)-Total (mg/kg)	4.07	3.34	3.43	3.21	3.32
	Copper (Cu)-Total (mg/kg wwt)	0.951	0.808	0.783	0.786	0.790
	Lead (Pb)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Lead (Pb)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1260	1180	1510	1410	1480
	Magnesium (Mg)-Total (mg/kg wwt)	295	285	346	346	352
	Manganese (Mn)-Total (mg/kg)	56.6	57.2	92.8	84.6	81.9
	Manganese (Mn)-Total (mg/kg wwt)	13.3	13.8	21.2	20.7	19.5
	Mercury (Hg)-Total (mg/kg)	0.169	0.131	0.156	0.130	0.0895
	Mercury (Hg)-Total (mg/kg wwt)	0.0395	0.0316	0.0357	0.0319	0.0213
	Molybdenum (Mo)-Total (mg/kg)	0.143	0.131	0.102	0.104	0.126
	Molybdenum (Mo)-Total (mg/kg wwt)	0.034	0.032	0.023	0.025	0.030
	Nickel (Ni)-Total (mg/kg)	<0.50	<0.50	<0.50	0.51	<0.50
	Nickel (Ni)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	0.12	<0.10
	Selenium (Se)-Total (mg/kg)	1.6	1.3	1.4	1.3	2.4
	Selenium (Se)-Total (mg/kg wwt)	0.38	0.33	0.33	0.33	0.57

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L595391-10	L595391-11	L595391-12		
	Description					
	Sampled Date	29-JUL-07	26-JUL-07	26-JUL-07		
	Sampled Time					
	Client ID	CONTROL OUTLET SCULPIN - COMP 2	STREAM L2 - COMP 1	STREAM L2 - COMP 2		
TISSUE						
Physical Tests	% Moisture (%)	77.6	77.9	76.9		
Total Metals	Aluminum (Al)-Total (mg/kg)	40	28	26		
	Aluminum (Al)-Total (mg/kg wwt)	9.0	6.2	6.0		
	Antimony (Sb)-Total (mg/kg)	<0.050	<0.050	<0.050		
	Antimony (Sb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010		
	Arsenic (As)-Total (mg/kg)	<0.10	<0.10	<0.10		
	Arsenic (As)-Total (mg/kg wwt)	<0.020	<0.020	<0.020		
	Barium (Ba)-Total (mg/kg)	15.1	11.7	13.2		
	Barium (Ba)-Total (mg/kg wwt)	3.38	2.58	3.05		
	Beryllium (Be)-Total (mg/kg)	<0.30	<0.30	<0.30		
	Beryllium (Be)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Bismuth (Bi)-Total (mg/kg)	<0.30	<0.30	<0.30		
	Bismuth (Bi)-Total (mg/kg wwt)	<0.030	<0.030	<0.030		
	Cadmium (Cd)-Total (mg/kg)	0.072	0.042	0.039		
	Cadmium (Cd)-Total (mg/kg wwt)	0.0162	0.0093	0.0090		
	Calcium (Ca)-Total (mg/kg)	32700	24700	30300		
	Calcium (Ca)-Total (mg/kg wwt)	7330	5450	6990		
	Chromium (Cr)-Total (mg/kg)	0.72	0.63	0.73		
	Chromium (Cr)-Total (mg/kg wwt)	0.16	0.14	0.17		
	Cobalt (Co)-Total (mg/kg)	0.26	0.25	0.25		
	Cobalt (Co)-Total (mg/kg wwt)	0.058	0.055	0.057		
	Copper (Cu)-Total (mg/kg)	3.51	3.86	3.96		
	Copper (Cu)-Total (mg/kg wwt)	0.789	0.852	0.914		
	Lead (Pb)-Total (mg/kg)	<0.10	0.11	<0.10		
	Lead (Pb)-Total (mg/kg wwt)	<0.020	0.025	<0.020		
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)	1460	1200	1330		
	Magnesium (Mg)-Total (mg/kg wwt)	327	265	306		
	Manganese (Mn)-Total (mg/kg)	67.5	25.8	28.9		
	Manganese (Mn)-Total (mg/kg wwt)	15.2	5.70	6.67		
	Mercury (Hg)-Total (mg/kg)	0.0929	0.151	0.144		
	Mercury (Hg)-Total (mg/kg wwt)	0.0208	0.0334	0.0332		
	Molybdenum (Mo)-Total (mg/kg)	0.130	0.126	0.127		
	Molybdenum (Mo)-Total (mg/kg wwt)	0.029	0.028	0.029		
	Nickel (Ni)-Total (mg/kg)	<0.50	<0.50	<0.50		
	Nickel (Ni)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Selenium (Se)-Total (mg/kg)	2.5	1.3	1.3		
	Selenium (Se)-Total (mg/kg wwt)	0.55	0.29	0.31		

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L595391-5	L595391-6	L595391-7	L595391-8	L595391-9
	Sample ID	L595391-5	L595391-6	L595391-7	L595391-8	L595391-9
	Description					
	Sampled Date	26-AUG-07	26-AUG-07	27-AUG-07	27-AUG-07	29-JUL-07
	Sampled Time					
	Client ID	LAKE 410 SCULPIN - COMP 1	LAKE 410 SCULPIN - COMP 2	KIRK LAKE SCULPIN - COMP 1	KIRK LAKE SCULPIN - COMP 2	CONTROL OUTLET SCULPIN - COMP 1
TISSUE						
Total Metals	Silver (Ag)-Total (mg/kg)	<0.030	<0.030	<0.030	<0.030	<0.030
	Silver (Ag)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Strontium (Sr)-Total (mg/kg)	120	140	148	153	139
	Strontium (Sr)-Total (mg/kg wwt)	28.1	33.8	33.8	37.4	33.0
	Thallium (Tl)-Total (mg/kg)	0.032	<0.030	<0.030	<0.030	<0.030
	Thallium (Tl)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Tin (Sn)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Tin (Sn)-Total (mg/kg wwt)	<0.050	<0.050	<0.050	<0.050	<0.050
	Uranium (U)-Total (mg/kg)	0.026	0.022	<0.010	<0.010	0.012
	Uranium (U)-Total (mg/kg wwt)	0.0060	0.0053	<0.0020	0.0021	0.0028
	Vanadium (V)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Vanadium (V)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Zinc (Zn)-Total (mg/kg)	133	128	173	140	140
	Zinc (Zn)-Total (mg/kg wwt)	31.1	30.9	39.6	34.2	33.4

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L595391-10	L595391-11	L595391-12		
	Sample ID	L595391-10	L595391-11	L595391-12		
	Description					
	Sampled Date	29-JUL-07	26-JUL-07	26-JUL-07		
	Sampled Time					
	Client ID	CONTROL OUTLET SCULPIN - COMP 2	STREAM L2 - COMP 1	STREAM L2 - COMP 2		
TISSUE						
Total Metals	Silver (Ag)-Total (mg/kg)	<0.030	<0.030	<0.030		
	Silver (Ag)-Total (mg/kg wwt)	<0.010	<0.010	<0.010		
	Strontium (Sr)-Total (mg/kg)	109	93.4	113		
	Strontium (Sr)-Total (mg/kg wwt)	24.4	20.6	26.1		
	Thallium (Tl)-Total (mg/kg)	<0.030	<0.030	<0.030		
	Thallium (Tl)-Total (mg/kg wwt)	<0.010	<0.010	<0.010		
	Tin (Sn)-Total (mg/kg)	<0.20	0.69	<0.20		
	Tin (Sn)-Total (mg/kg wwt)	<0.050	0.153	<0.050		
	Uranium (U)-Total (mg/kg)	0.011	<0.010	<0.010		
	Uranium (U)-Total (mg/kg wwt)	0.0026	<0.0020	0.0021		
	Vanadium (V)-Total (mg/kg)	<0.50	<0.50	<0.50		
	Vanadium (V)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Zinc (Zn)-Total (mg/kg)	135	108	113		
	Zinc (Zn)-Total (mg/kg wwt)	30.2	23.8	26.1		

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
AG-DRY-MS-VA	Tissue	Silver in Tissue by ICPMS	PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

AG-WET-MS-VA	Tissue	Silver in Tissue by ICPMS	PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

AS-DRY-HVAAS-VA	Tissue	Arsenic in Tissue by HVAAS	PUGET SOUND PROTOCOLS

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series).

AS-WET-HVAAS-VA	Tissue	Arsenic in Tissue by HVAAS	PUGET SOUND PROTOCOLS

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series).

HG-DRY-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS	PUGET SOUND PROTOCOLS

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS	PUGET SOUND PROTOCOLS

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DRY-MS-VA	Tissue	Metals in Tissue by ICPMS	PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-WET-MS-VA	Tissue	Metals in Tissue by ICPMS	PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate or block digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

COC #

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

Page 1 of 1

REPORT TO:
COMPANY: AMEC Earth + Environmental
CONTACT: Kourtney Bradley
ADDRESS: 2227 Douglas Road
Burnaby BC V5C 5A9
PHONE: 604 294-3811 FAX: 604 294-4664

REPORT FORMAT / DISTRIBUTION
HARDCOPY: STANDARD X OTHER ____
ELECTRONIC: PDF X EXCEL X CUSTOM ____
EMAIL 1: Kourtney.bradley@amec.com
EMAIL 2:

SERVICE REQUESTED
REGULAR SERVICE (DEFAULT)
X RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

INVOICE TO: SAME AS REPORT ? (YES) / NO
COMPANY: AMEC Earth + Environmental
CONTACT: Kourtney Bradley
ADDRESS: 2227 Douglas Rd.
Burnaby, BC V5C 5A9
PHONE: 604 294-3811 FAX: 604 294-4664
Lab Work Order # (lab use only): L593391

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → →

CLIENT / PROJECT INFORMATION:
JOB #: VE51664.6500.652004
PO /AFE:
Legal Site Description:
QUOTE #: ALSEQ08-21
ALS CONTACT: Jennifer Darrah
SAMPLER (Initials): KB

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	General Metals Scan (ICP/MS)	Mercury (Cold Vapour AAS)	Arsenic (Hydride generation AAS)	Moisture								HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	Lake 410 Sculpin	Aug 26/07		Fish.														
	Kirk Lake Sculpin	Aug 27/07		Fish														
	Control Outlet Sculpin	July 29/07		Fish														
	Stream L2 (2 bags)	July 26/07		Fish														

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS
2 Composite samples from each site (4 sites x 2 samples). Randomly divide samples.

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified below.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
		HD 08/01/18	2:34

SAMPLE CONDITION (lab use only)
TEMPERATURE: 0°C
SAMPLES RECEIVED IN GOOD CONDITION ? (YES) / NO (If no provide details): Frozen

GENF14.01

APPENDIX JJ.IV

AQUATIC HABITAT – HABITAT DESCRIPTIONS AND PHOTOS, 2007 AND 2010

APPENDIX JJ.IV.1

HABITAT DESCRIPTIONS AND PHOTOS FOR LAKES SURVEYED IN 2007

Lake Y1

Two sites were surveyed at Lake Y1 on July 28, 2007. The first site was located at the southern end of the lake, adjacent to the esker (Photo JJ.IV.1-1,). Substrate along the shoreline was uniform, consisting of gravel and sand. In deeper areas, the substrate was composed of fines. Cover was provided by emergent aquatic vegetation and overhanging vegetation along the shoreline. Boulders were located across the lake in isolated patches, but none near the esker at this sample site.

The second site was located at the narrowing of the esker between Lake Y1 and Lake Y2 (Photo JJ.IV.1-2). Substrate was more varied, with cobble and boulder dominant; however, the substrate was compacted. Cover was provided by boulders and overhanging vegetation, including small shrubs.

Lake Y2

Lake Y2 was separated from Lake Y1 by a small narrowing of the esker. At the time of the survey (July 28, 2007), there was no connection between the two lakes, but areas of scour were observed. It is likely that at times of high flow, such as during spring freshet, a connection between the two lakes is present.

Substrate in Lake Y2 consisted of compacted gravel and cobble (Photo JJ.IV.1-3). Cover in the shallow area of the lake consisted of large cobble and overhanging vegetation along the shoreline. Emergent aquatic vegetation was also present along the edge of the esker.

Photo JJ.IV.1-1 View of Lake Y1 shoreline looking northeast along the esker (July 28, 2007).

Photo JJ.IV.1-2 View of Lake Y1 shoreline at the narrows, looking northeast (July 28, 2007).

Photo JJ.IV.1-3 View of Lake Y2 shoreline, looking northeast (July 28, 2007).

Lake Y3

At the time of the survey (July 28, 2007), Lake Y3 was observed to be a small shallow pond adjacent to the esker (Photo JJ.IV.1-4). The substrate was mostly fines, with a few boulders visible. The shoreline was vegetated with grasses. There was no cover provided by deep areas, only by overhanging vegetation.

Photo JJ.IV.1-4 View of Lake Y3 from the esker looking south (July 28, 2007).

Lake Y4

Lake Y4 is located on the north side of the esker and was surveyed on July 28, 2007 (Photo JJ.IV.1-5). The substrate was composed of compact sand and gravel, with boulder-cobble substrate located along the east end of the lake. The shoreline adjacent to the esker was vegetated with grasses and emergent aquatic vegetation. The banks of the shoreline were undercut by 0.4 m.

Photo JJ.IV.1-5 View of Lake Y4 shoreline, looking east (July 28, 2007).

Lake Y5

Lake Y5 was surveyed on July 28, 2007. Lake Y5 is a small pond that drains south through Stream Y5 to a larger lake. The substrate of Lake Y5 was composed mostly of organics and fines. At the time of the survey, Lake Y5 was heavily vegetated along the margins with emergent aquatic vegetation (Photo JJ.IV.1-6).

Photo JJ.IV.1-6 View of Lake Y5 (July 28, 2007).

Lake Y6

Lake Y6 was surveyed on July 28, 2007. Lake Y6 is a small shallow lake located south of the esker (Photo JJ.IV.1-7). The substrate was composed of fines and organics. The banks were vegetated tundra and there was some aquatic vegetation in the lake.

Photo JJ.IV.1-7 View of Lake Y6 shoreline (July 28, 2007).

Lake Y7

Lake Y7 is adjacent to Lake Y6; however, there was no connection between the lakes at the time of survey (July 28, 2007). Lake Y7 was similar to Lake Y6 in that it was a small shallow lake, with fines/organic substrate and vegetated tundra banks (Photo JJ.IV.1-8). There was an area near the esker where the substrate was primarily small gravel.

Photo JJ.IV.1-8 View of Lake Y7 shoreline (July 28, 2007).

Lake Y8

Lake Y8, located on the north side of the esker, was surveyed on July 28, 2007. The shoreline consisted of exposed cobble substrate with a shallow slope (Photo JJ.IV.1-9). The substrate of the lake was composed of cobble and gravel. A small patch of aquatic vegetation was located at the eastern edge of the lake.

Photo JJ.IV.1-9 View of Lake Y8 shoreline (July 28, 2007).

Lake Y9

Lake Y9, which is located on the north side of the esker, was surveyed on July 28, 2007 (Photo JJ.IV.1-10). Lake Y9 was connected to a large lake to the north by an open channel interspersed with boulders. In the nearshore area, the habitat was mainly shallow, vegetated, sandy areas. There was abundant aquatic vegetation, providing cover in shallow areas. Boulders were visible in deeper water.

Photo JJ.IV.1-10 View of Lake Y9 (July 28, 2007).

Lake Y10

Lake Y10, located on the south side of the esker, was connected to Lake X6 at the time of the survey (July 28, 2007) through an open channel. Substrate along the lake shoreline consisted of gravel and sand (Photo JJ.IV.1-11). There were a few patches of emergent aquatic vegetation along the shoreline. Some small boulders and cobble were available in isolated patches.

Photo JJ.IV.1-11 View of Lake Y10 shoreline (July 28, 2007).

APPENDIX JJ.IV.2

HABITAT DESCRIPTIONS AND PHOTOS FOR LAKES SURVEYED 2010

Lake A4

Lake A4 is a headwater lake at the northern extent of the Kennady Lake watershed (Photo JJ.IV.2-1). This 0.4 ha lake was the smallest lake surveyed in 2010. Lake A4 was very shallow, with a maximum observed depth of 0.4 m. Substrate consisted mainly of fines and organics with occasional boulders (Photo JJ.IV.2-2). Emergent vegetation and organics dominated the substrate along the north shore (Photo JJ.IV.2-3). At the time of the survey (July 23, 2010), there was no connectivity to other waterbodies and no defined channel at the outlet or the inlet areas.

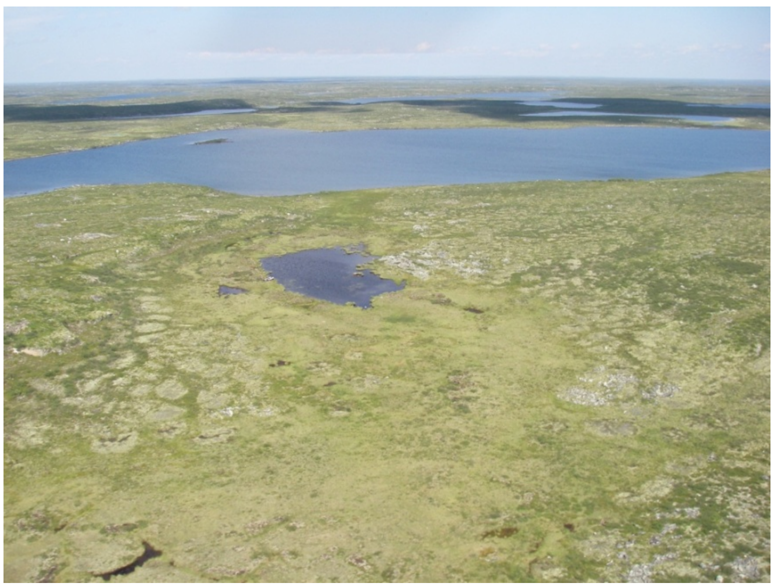


Photo JJ.IV.2-1 Aerial view of Lake A4, looking north, with Lake N9 in the background (July 23, 2010).

Photo JJ.IV.2-2 View looking north from the south shore of Lake A4 (July 23, 2010).

Photo JJ.IV.2-3 Small patch of submerged vegetation in Lake A4 (July 23, 2010).

Lake L13

Lake L13 is a small 3.3 ha lake within the L watershed, downstream from the Kennady Lake watershed. At the time of the survey (July 22, 2010), the maximum observed depth was 1.3 m. Bathymetric contours, however, suggest a maximum depth of 1.42 m

(Annex H). Substrate primarily consisted of fines and organics, with areas of boulders and vegetation along the shoreline and throughout the south end of the lake (Photo JJ.IV.2-4). At the time of the survey, there was connectivity to the inflow and outflow streams of Lake L13 (Photo JJ.IV.2-5).

Photo JJ.IV.2-4 Looking north along the east shoreline of Lake L13 (July 22, 2010).

Photo JJ.IV.2-5 View of the outlet of Lake L13 into Stream L13 (July 22, 2010).

Lake L18

Lake L18 is located west and upstream of L13, within the L watershed. Lake L18 has a surface area of 14.2 ha. At the time of the survey (July 22, 2010), the maximum observed depth was 5.5 m. The shoreline was considered low gradient and consisted mainly of boulder/cobble substrate with sections of cobbles and fines, as well as bedrock (Photos JJ.IV.2-6 and JJ.IV.2-7). A moderate depth (2 to 4 m) pelagic zone was present within the middle and west basins of the lake. This deeper area contained fine/organic substrate, with low gradient slopes and a deep hole in the southwest corner. At the time of the survey, there was poor connectivity to the downstream lake via the outlet watercourse (Stream L18); fish passage for large-bodied fish was unlikely, but forage fish possibly could migrate between waterbodies.

Photo JJ.IV.2-6 Southwest aerial view of Lake L18 (July 22, 2010).

Photo JJ.IV.2-7 View of the shoreline habitat in the southwest corner of Lake L18 (July 22, 2010).

Lake N14a

Lake N14a is a 3.2 ha lake located north of Lake N14, within the N watershed (Photo JJ.IV.2-11). At the time of the survey (July 25, 2010), the maximum observed depth was 3.5 m; however, the bathymetric mapping results suggests a maximum depth of 3.30 m (Annex H). The east shoreline was primarily vegetation/organic substrate, with a small section of boulder/cobble substrate and boulder/fine substrates farther away from the shore. The west shoreline contained a variety of substrates 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 JJ.IV.2-12). The deeper, middle section was characterized by fine/organic substrates and moderate depths (2 to 4 m). The near-shore areas typically were low gradient and shallow (<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 JJ.IV.2-8 Aerial view of Lake N14a, facing south (July 25, 2010).

Photo JJ.IV.2-9 View from the south shore at the outlet, looking north at Lake N14a (July 25, 2010).

Lake N14b

Lake N14b is a 2.0 ha lake, located east of Lake N14, within the N watershed. At the time of the survey (July 26, 2010), the maximum observed depth was 0.7 m. Bathymetric contours, however, suggest a maximum depth of 0.80 m (Annex H). This lake was very shallow, with depths typically less than 0.5 m and a low gradient slope (Photo JJ.IV.2-13). The shoreline habitat was characterized by boulder substrate, with cobble or fines and a few sections of cobble/gravel substrate (Photo JJ.IV.2-14). The area in the centre of the lake and in the southwest end primarily had fine/organic substrate. At the time of the survey, there was no connectivity between this lake and N14, as the connecting watercourse (Stream N14b) was dry.

Photo JJ.IV.2-10 Aerial view looking north at Lake N14b (July 26, 2010).

Photo JJ.IV.2-11 View of the east shoreline, facing south, in Lake N14b (July 26, 2010).

Northeast Basin of Lake N17

Lake N17 is a large lake (91.5 ha), located south of Lake N16, at the south end of the N watershed. The northeast basin of Lake N17 was surveyed on July 27, 2010 (Photo JJ.IV.2-8). This basin of Lake N17 has a surface area of 91.5 ha. At the time of the survey, this basin had a maximum observed spot depth of 10.5 m. Bathymetric contours, however, suggest a maximum depth of 12.9 m (Annex H). The shoreline of this basin was composed mainly of boulder substrate, with fines, gravel, or cobble, as well as a few sections of cobble with gravel or fines and bedrock (Photos JJ.IV.2-9 and JJ.IV.2-10). The habitat along the shoreline was of moderate depth (up to 4 m) 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. At the time of the survey, there was good connectivity between this basin and Lake N16.

Photo JJ.IV.2-12 Aerial view looking southeast at the basin surveyed in Lake N17 (July 27, 2010).

Photo JJ.IV.2-13 A view of the east shoreline of the surveyed basin in Lake N17 (July 27, 2010).

Photo JJ.IV.2-14 A view of a sandy section of shoreline in the northeast basin of Lake N17 (July 27, 2010).

.

APPENDIX JJ.IV.3

HABITAT DESCRIPTIONS AND PHOTOS FOR STREAMS SURVEYED 2007

Stream Y3

Stream Y3 is located between the two sections of the esker, approximately 80 m away from the esker (Photo JJ.IV.3-1). Stream Y3 was selected for sampling because of its close proximity to the esker and was crossed to reach the southeast section.

Average channel width of Stream Y3 was 2.1 m and average depth was 0.32 m. Habitat consisted of glide-type habitat, with small amounts of riffle. Channel substrate was composed of fines. The banks were also composed entirely of fines and were vertical in shape. Riparian vegetation consisted of dwarf birch and grasses. A high amount of cover was available in the stream channel due to the overhanging vegetation and deep pools. The stream also had good flow and was connected to the downstream lake at the time of survey.

Photo JJ.IV.3-1 Upstream view of Stream Y3 (July 28, 2007).

Stream Y5

Stream Y5 connects Lake Y5 to a larger lake through a small undefined channel over grasses (Photo JJ.IV.3-2). At the time of the survey (July 28, 2007), the wetted width varied between 0.5 to 1 m, and depth varied from 0.01 to 0.05 m. Downstream from the esker, the channel lost all definition, and water dissipated into a wet grassy area, with no visible channel or flow.

Photo JJ.IV.3-2 Downstream view of Stream Y5 (July 28, 2007).

Stream Y8

Stream Y8 is situated between Lakes Y8 and Y9. The area between the two lakes was surveyed (July 28, 2007) but no stream was observed. There was a small depression, but no evidence of scour or alluvial substrate present (Photo JJ.IV.3-3). If there is a connection between the two lakes, it is highly ephemeral and may only be present at extremely high water conditions.

Photo JJ.IV.3-3 Upstream view of Stream Y8 (July 28, 2007).

Stream Y9

Stream Y9 connects Lakes Y9 and Y10 (Photo JJ.IV.3-4). The channel width ranged from approximately 2 to 3 m, and the substrate primarily consisted of boulders. Aquatic grasses were growing in the channel, and the stream riparian area consisted of willow species.

Photo JJ.IV.3-4 Downstream view of Stream Y9 (July 28, 2007).

APPENDIX JJ.IV.4

HABITAT DESCRIPTIONS AND PHOTOS FOR STREAMS SURVEYED 2010

Stream L11

Stream L11 occurs within the L watershed and connects Lake L11 to Lake L2. This stream was surveyed on July 19, 2010 (Photo JJ.IV.4-1). At the time of the survey, fish passage was not possible due to dry sections of channel.

Stream L11 is 163.5 m in length, with a mean stream gradient of 0.8%. At the time of the survey, Stream L11 had wetted widths ranging from 1.04 to 3.66 m and channel widths ranging from 1.30 to 4.94 m. The maximum depth observed was 0.25 m. The habitat was composed of 13.5% run habitat and 86.5% dry channel (Photos JJ.IV.4-2). The channel substrate was entirely organics. There were minimal amounts of cover provided by emergent and submergent vegetation as well as overhanging grasses and shrubs.

The vegetation present indicated there may be northern pike spawning potential in the spring during higher flows near the inlet and outlets of the connecting lakes. Based on the lack of suitable substrate, no Arctic grayling spawning potential existed within Stream L11.

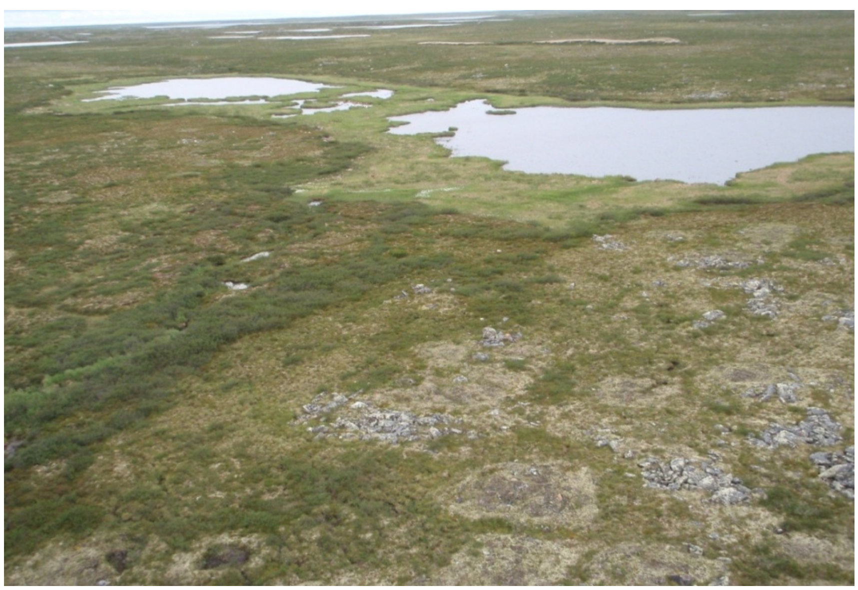


Photo JJ.IV.4-1 Aerial view, looking west, of Stream L11 (July 19, 2010).

Photo JJ.IV.4-2 Isolated sections of water in Stream L11 (July 19, 2010).

Stream L13

Stream L13 occurs within the L watershed and connects Lake L13 downstream to Lake L2. This stream was surveyed on July 19, 2010 (Photo JJ.IV.4-3). At the time of the survey, fish passage was not possible for large-bodied fish due to a large amount of boulders within the stream; however, small fish may be able to pass through this area (Photo JJ.IV.4-4).

Stream L13 is about 200 m in length, with a mean stream gradient of 0.5%. At the time of the survey, Stream L13 had wetted ranging from 1.17 to 15.0 m and channel widths ranging from 1.36 to 15.3 m. The maximum depth observed was 0.40 m. Discharge was 0.004 m^3/s. Substrate was dominated by boulders and organics; however, small amounts of gravel and cobble also were present. The habitat was composed mainly of one run habitat unit with a boulder garden. A moderate amount of instream cover was provided by substrate (i.e., boulders) and submergent vegetation. A small amount of overhead cover was provided by overhanging grasses and shrubs.

Based on the presence of emergent vegetation at the inlet of Lake L2, there may be northern pike spawning habitat potential during higher spring flows. Due to a lack of suitable spawning substrate, there was no Arctic grayling spawning habitat potential in Stream L13.

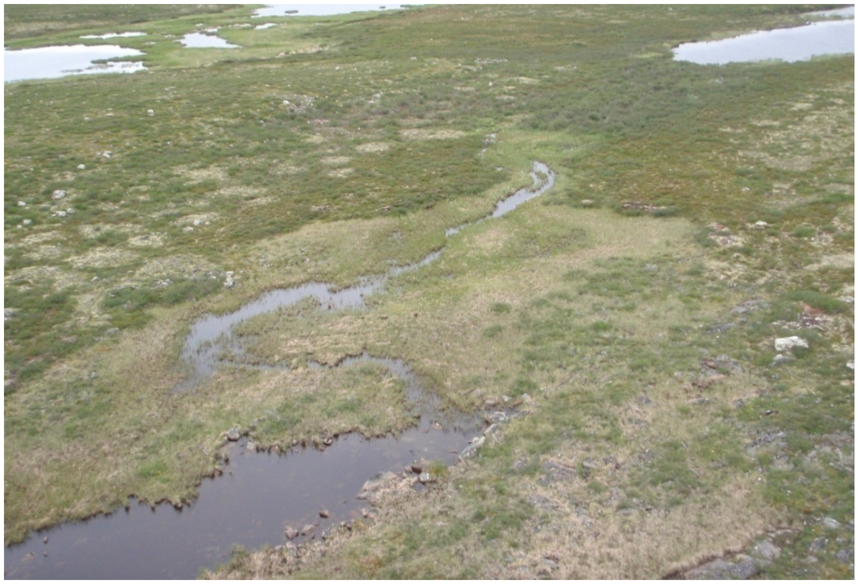


Photo JJ.IV.4-3 Aerial view of Stream L13 (July 19, 2010).

Photo JJ.IV.4-4 View of boulder garden in Stream L13 (July 19, 2010).

Photo JJ.IV.4-5 View of typical run habitat in Stream L13 (July 19, 2010).

Stream L14

Stream L14 occurs within the L watershed and is a total of 151.1 m in length. Stream L14 connects Lake 14 to Lake L13. This stream was surveyed on July 19, 2010 (Photo JJ.IV.4-6).

Stream L14 has a mean stream gradient of 0.6%. At the time of the survey, Stream L13 had wetted widths ranging from 1.00 to 1.52 m and channel widths ranging from 2.00 to 2.84 m. The maximum depth observed was 0.80 m. Discharge was 0.003 m^3/s. Substrate was dominated by organics and boulders, with small amounts of clay/silt, sand, gravel, and cobble. The habitat was composed entirely of run habitat with a small boulder garden section (Photos JJ.IV.4-7 and JJ.IV.4-8). Cover for fish was provided by substrate, emergent vegetation, undercut banks, and overhanging shrubs.

There generally was a lack of suitable spawning habitat for both northern pike and Arctic grayling. The boulder garden also restricts access for these large-bodied sportfish species. For these reasons, spawning habitat potential for both species was considered low.

Photo JJ.IV.4-6 Aerial view of Stream L14 (July 19, 2010).

Photo JJ.IV.4-7 View of run habitat in Stream L14 (July 19, 2010).

Photo JJ.IV.4-8 Boulder garden in Stream L14 (July 19, 2010).

Stream L15

Stream L15 connects Lake L15 to Lake L14 within the L watershed. This stream was surveyed on July 19, 2010 (Photo JJ.IV.4-9).

Stream L15 is 126.6 m in length and has a mean stream gradient of 0.8%. At the time of the survey, Stream L15 had wetted widths ranging from 0.60 to 5.37 m and channel widths ranging from 1.40 to 6.24 m. The maximum depth observed was 1.50 m; however, mean maximum depth was 0.68 m. Discharge was 0.001 m^3/s. Substrate was dominated by organics and boulders, with small amounts of gravel and cobble. The habitat was characterized by run habitat units, with small pools throughout and one small boulder garden (Photos JJ.IV.4-10 to JJ.IV.4-12). Cover for fish was provided by substrate, emergent and submergent vegetation, depth, undercut banks, and overhanging shrubs.

Based on the small size of Stream L15, lack of suitable substrate, and restricted access (boulder garden), spawning habitat potential was considered low for both northern pike and Arctic grayling.

Photo JJ.IV.4-9 Aerial view of Stream L15 at its headwater lake, Lake L15 (July 19, 2010).

Photo JJ.IV.4-10 View of typical run habitat in Stream L15 (July 19, 2010).

Photo JJ.IV.4-11 View of boulder garden in Stream L15 (July 19, 2010).

Photo JJ.IV.4-12 View of shallow pool habitat in Stream L15 (July 19, 2010).

Stream L18

Stream L18 drains Lake L18 into Lake L15 within the L watershed. This stream was surveyed on July 20, 2010 (Photo JJ.IV.4-13).

Stream L18 is 193.5 m in length and has a mean stream gradient of 1.5%. At the time of the survey, Stream L18 had wetted widths ranging from 0.30 to 40 m and channel widths ranging from 0.35 to 50 m. Sections of Stream L18 contained poorly defined banks. The maximum depth observed was 0.40 m; however, mean maximum depth was 0.22 m. Discharge was 0.001 m^3/s. Substrate was dominated by organics and boulder, with occasional pockets of gravel and cobble. The habitat was composed entirely of run habitat (Photo JJ.IV.4-14). Cover for fish was provided by submergent and emergent vegetation, undercut banks, and overhanging grasses and shrubs.

At the time of the survey, shallow water and sections of narrow channel likely would inhibit large-bodied fish migration. Based on the shallow depths and lack of suitable coarse substrate (for Arctic grayling), Stream L18 had nil to low rating for both northern pike and Arctic grayling spawning habitat potential.

Photo JJ.IV.4-13 Aerial view of Stream L18 at its headwater lake, Lake L18 (July 20, 2010).

Photo JJ.IV.4-14 View of typical run habitat in Stream L18 (July 20, 2010).

Stream N14a

Stream N14a drains Lake N14a into Lake N14 within the N watershed. This stream was surveyed on July 20, 2010 (Photo JJ.IV.4-13).

Stream N14a is 57.0 m in length and has a mean stream gradient less than 0.01%. At the time of the survey, Stream N14a had wetted widths ranging from 6.9 to 10.0 m. The channel was poorly defined and contained a dry section. The maximum depth observed was 0.3 m. There was no measurable flow at the time of the survey. Substrate was dominated by organics, with boulders and occasional sections of cobble substrate. Where water was present, the habitat was composed of run type habitat. A minimal amount of cover for fish was provided through submergent and emergent vegetation and overhanging grasses.

Based on the lack of defined channel as well as suitable substrate/vegetation, Stream N14a was rated as having no Arctic grayling spawning habitat potential and very low northern pike spawning habitat potential.

Photo JJ.IV.4-16 View of the braided channel of Stream N14a (July 20, 2010).

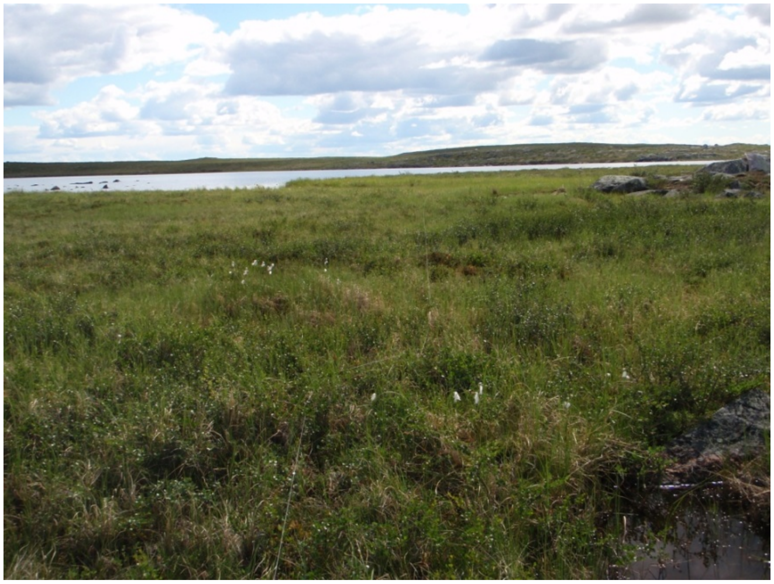


Photo JJ.IV.4-17 View of dry area with no defined channel or active flow (July 20, 2010).

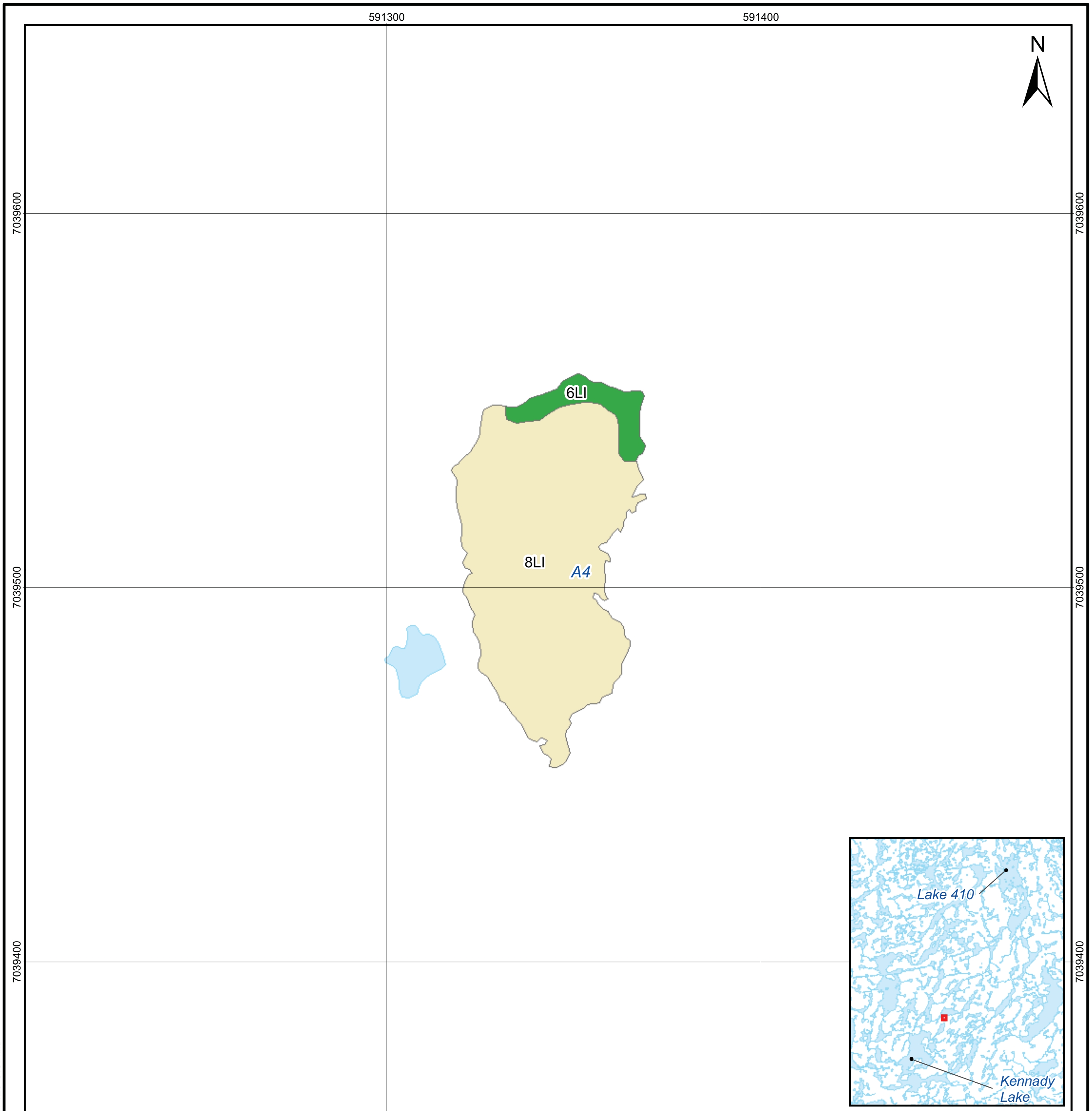
Stream N14b

Stream N14b drains Lake N14b towards Lake N14 within the N watershed. This stream was surveyed on July 20, 2010 (Photo JJ.IV.4-15). At the time of the survey, Stream N14b was dry, with no defined bed or banks. This was not considered a permanent system; flow is likely ephemeral between the two lakes and limited to periods of high rainfall or snow melt.

Photo JJ.IV.4-15 Aerial view of Stream N14b (July 20, 2010).

APPENDIX JJ.V

AQUATIC HABITAT – LAKE HABITAT MAPS, 2010



i:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-125-GIS.mxd

GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake A4

LEGEND

Watercourse
Waterbody
A4 Lake Identifier

Aquatic Habitat Label

8LI
Depth Category
Gradient Category
Substrate Category

Substrate Category

1 Boulder/Cobble
2 Boulder
3 Bedrock
4 Bedrock/Boulder
5 Bedrock/Cobble
6 Vegetation/Organics
7 Vegetation/Boulder
8 Fines/Organics
9 Cobble/Gravel
10 Boulder/Fines
11 Cobble/Fines
12 Boulder/Gravel

Gradient Category

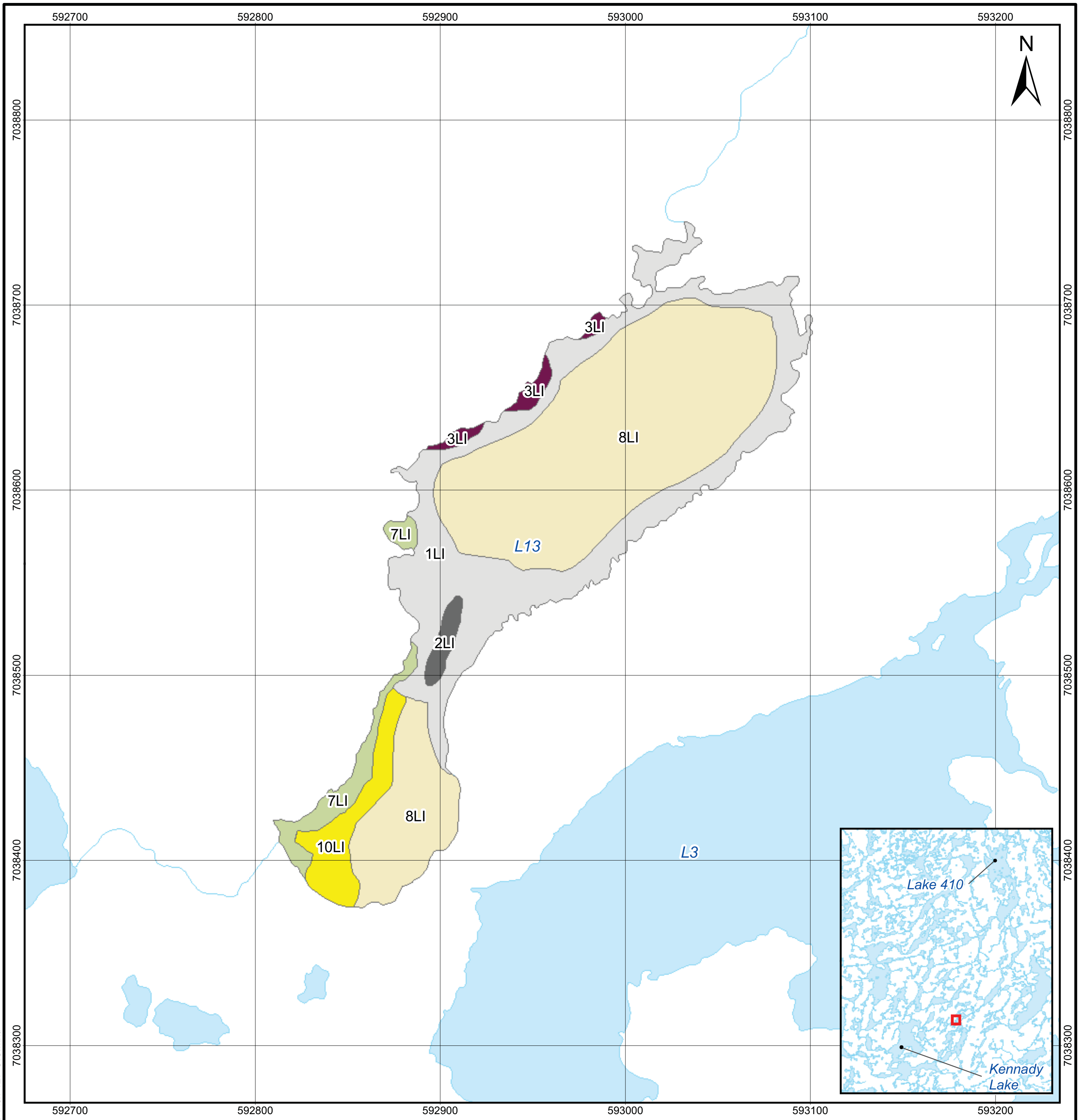
H High
L Low
\- Unknown

Depth Category

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

NOTES
Base Data Source: Eagle Mapping Ltd.

PROJECTION: UTM Zone 12	DATUM: NAD83	DE BEERS CANADA
Scale: 1:1,500 20 10 0 20 Metres		
FILE No: B-Fish-125-GIS		DATE: August 6, 2010
JOB NO: 09-1365-1004	REVISION NO: 1	Figure JJ.V-1
OFFICE: GOLD-CAL	DRAWN: AB	CHECK: GA



i:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-127-GIS.mxd

LEGEND

Watercourse
Waterbody
L13 Lake Identifier

Aquatic Habitat Label

8LI
- Depth Category
- Gradient Category
- Substrate Category

Substrate Category

1 Boulder/Cobble
2 Boulder
3 Bedrock
4 Bedrock/Boulder
5 Bedrock/Cobble
6 Vegetation/Organics
7 Vegetation/Boulder
8 Fines/Organics
9 Cobble/Gravel
10 Boulder/Fines
11 Cobble/Fines
12 Boulder/Gravel

Gradient Category

H High
L Low
\- Unknown

Depth Category

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

NOTES
Base Data Source: Eagle Mapping Ltd.

GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake L13

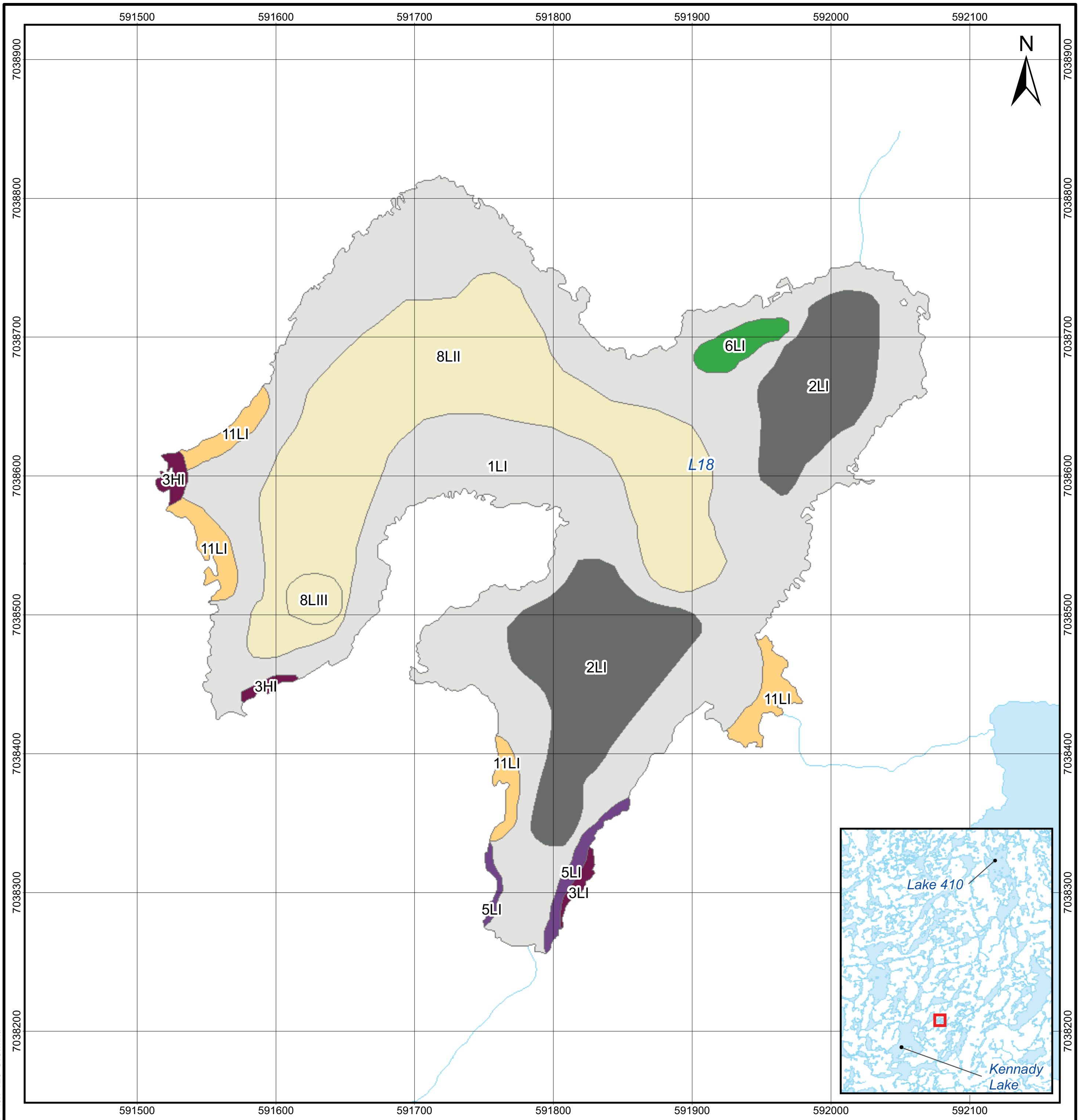
PROJECTION: UTM Zone 12	DATUM: NAD83

Scale: 1:3,000
50 25 0 50
Metres

DE BEERS CANADA

FILE No: B-Fish-127-GIS		DATE: August 6, 2010
JOB NO: 09-1365-1004	REVISION NO: 1	
OFFICE: GOLD-CAL	DRAWN: AB	CHECK: GA

Figure JJ.V-2



GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake L18

LEGEND

- Watercourse
- Waterbody
- *L18* Lake Identifier

Aquatic Habitat Label

8LI
- Depth Category
- Gradient Category
- Substrate Category

Substrate Category

1 Boulder/Cobble
2 Boulder
3 Bedrock
4 Bedrock/Boulder
5 Bedrock/Cobble
6 Vegetation/Organics
7 Vegetation/Boulder
8 Fines/Organics
9 Cobble/Gravel
10 Boulder/Fines
11 Cobble/Fines
12 Boulder/Gravel

Gradient Category

H High
L Low
- Unknown

Depth Category

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

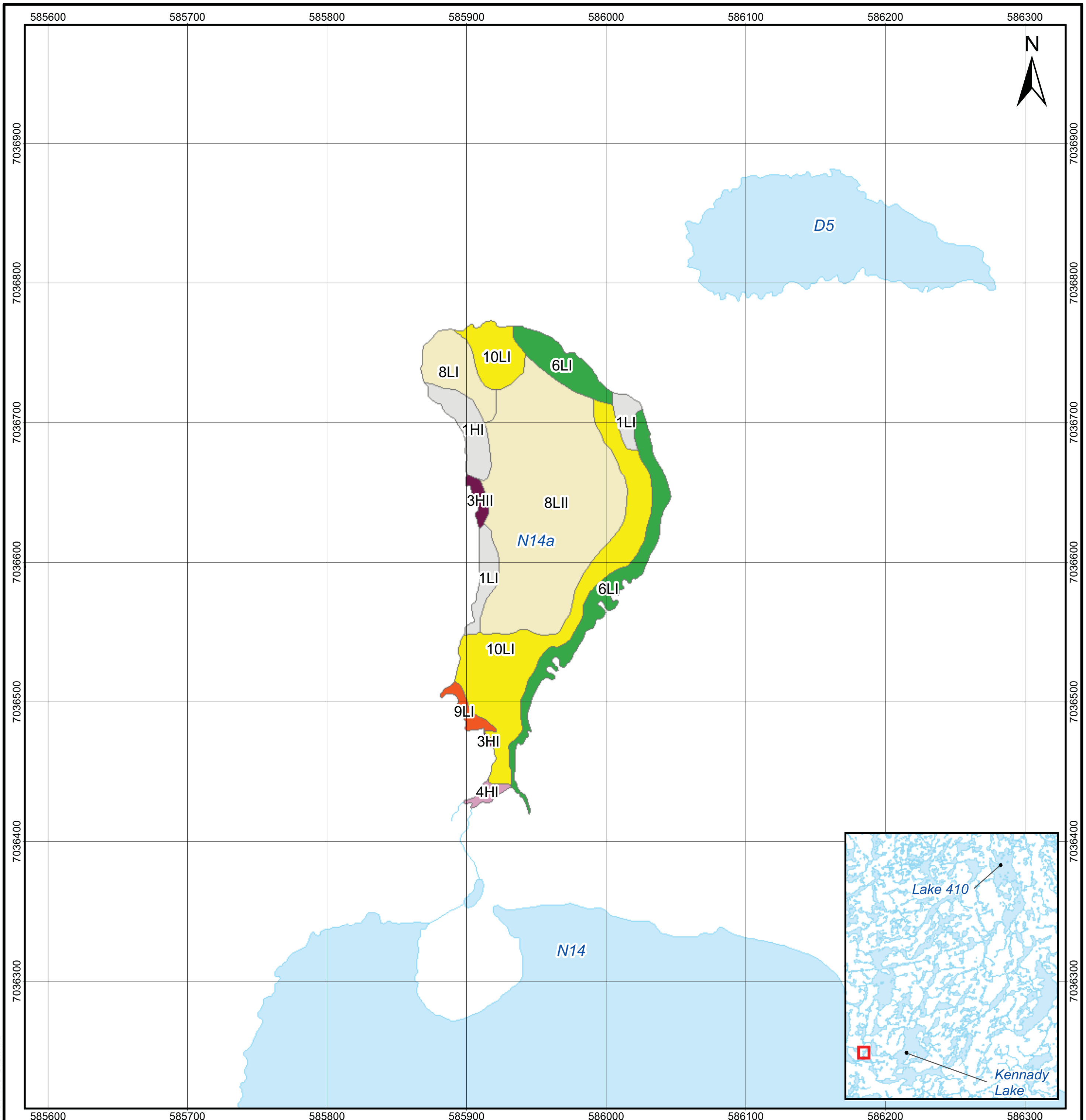
NOTES
Base Data Source: Eagle Mapping Ltd.

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:4,000 (50 25 0 50 Metres)	
FILE No: B-Fish-129-GIS	DATE: August 6, 2010
JOB NO: 09-1365-1004	REVISION NO: 1
OFFICE: GOLD-CAL	DRAWN: AB / CHECK: GA

DE BEERS CANADA

Figure JJ.V-3

i:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-129-GIS.mxd



i:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-128-GIS.mxd

LEGEND

Watercourse
Waterbody
N14a Lake Identifier

Aquatic Habitat Label

8LI
Depth Category
Gradient Category
Substrate Category

Substrate Category

1 Boulder/Cobble
2 Boulder
3 Bedrock
4 Bedrock/Boulder
5 Bedrock/Cobble
6 Vegetation/Organics
7 Vegetation/Boulder
8 Fines/Organics
9 Cobble/Gravel
10 Boulder/Fines
11 Cobble/Fines
12 Boulder/Gravel

Gradient Category

H High
L Low
\- Unknown

Depth Category

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

NOTES
Base Data Source: Eagle Mapping Ltd.

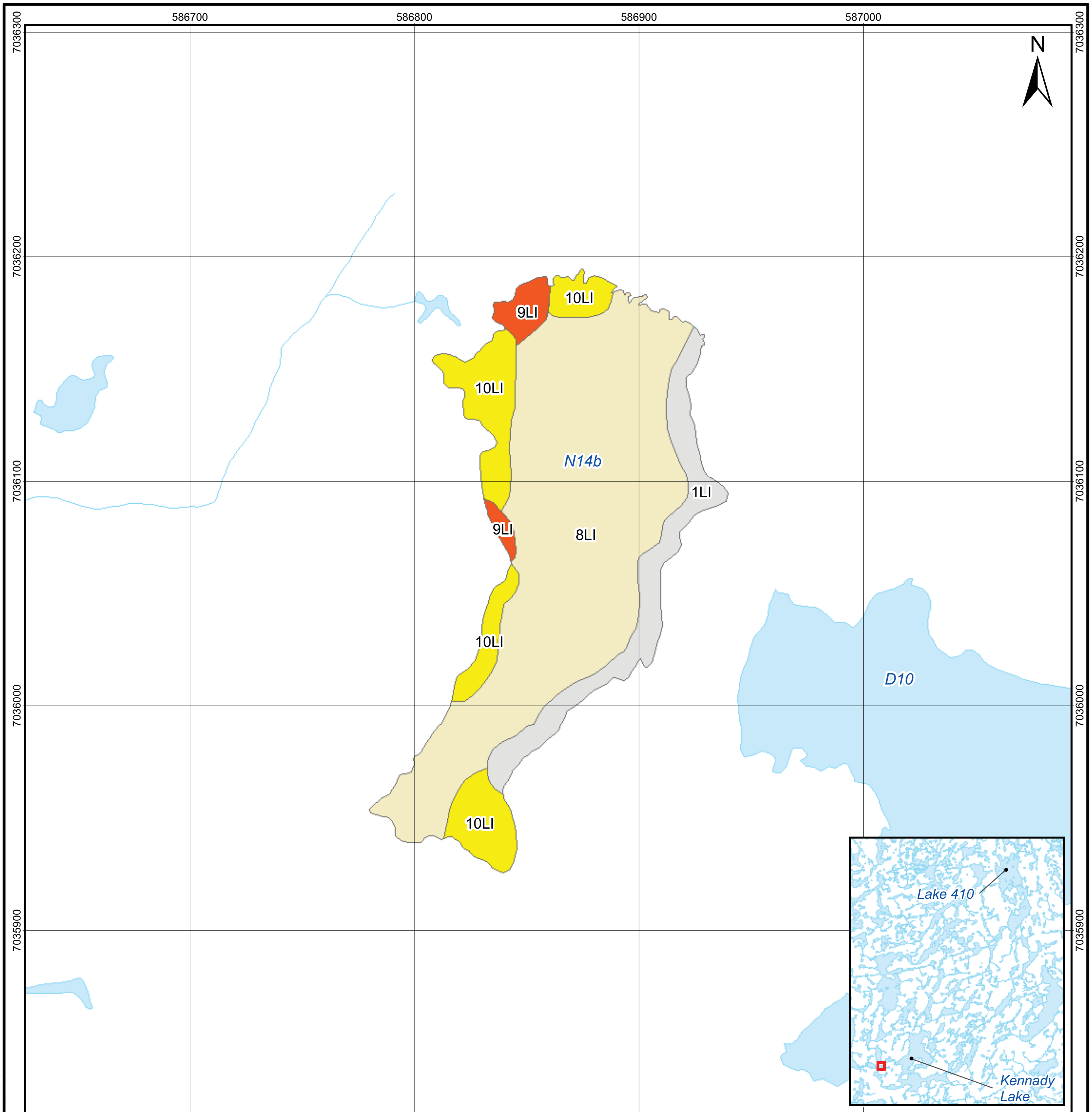
GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake N14a

PROJECTION: UTM Zone 12	DATUM: NAD83	
Scale: 1:4,000 (50 25 0 50 Metres)		
FILE No: B-Fish-128-GIS		DATE: August 6, 2010
JOB NO: 09-1365-1004	REVISION NO: 1	
OFFICE: GOLD-CAL	DRAWN: AB	CHECK: GA

DE BEERS CANADA

Figure JJ.V-4



i:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-126-GIS.mxd

LEGEND

- Watercourse
- Waterbody
- *N14b* Lake Identifier

Aquatic Habitat Label

8LI
- Depth Category
- Gradient Category
- Substrate Category

Substrate Category

1	Boulder/Cobble
2	Boulder
3	Bedrock
4	Bedrock/Boulder
5	Bedrock/Cobble
6	Vegetation/Organics
7	Vegetation/Boulder
8	Fines/Organics
9	Cobble/Gravel
10	Boulder/Fines
11	Cobble/Fines
12	Boulder/Gravel

Gradient Category

H	High
L	Low
-	Unknown

Depth Category

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

NOTES
Base Data Source: Eagle Mapping Ltd.

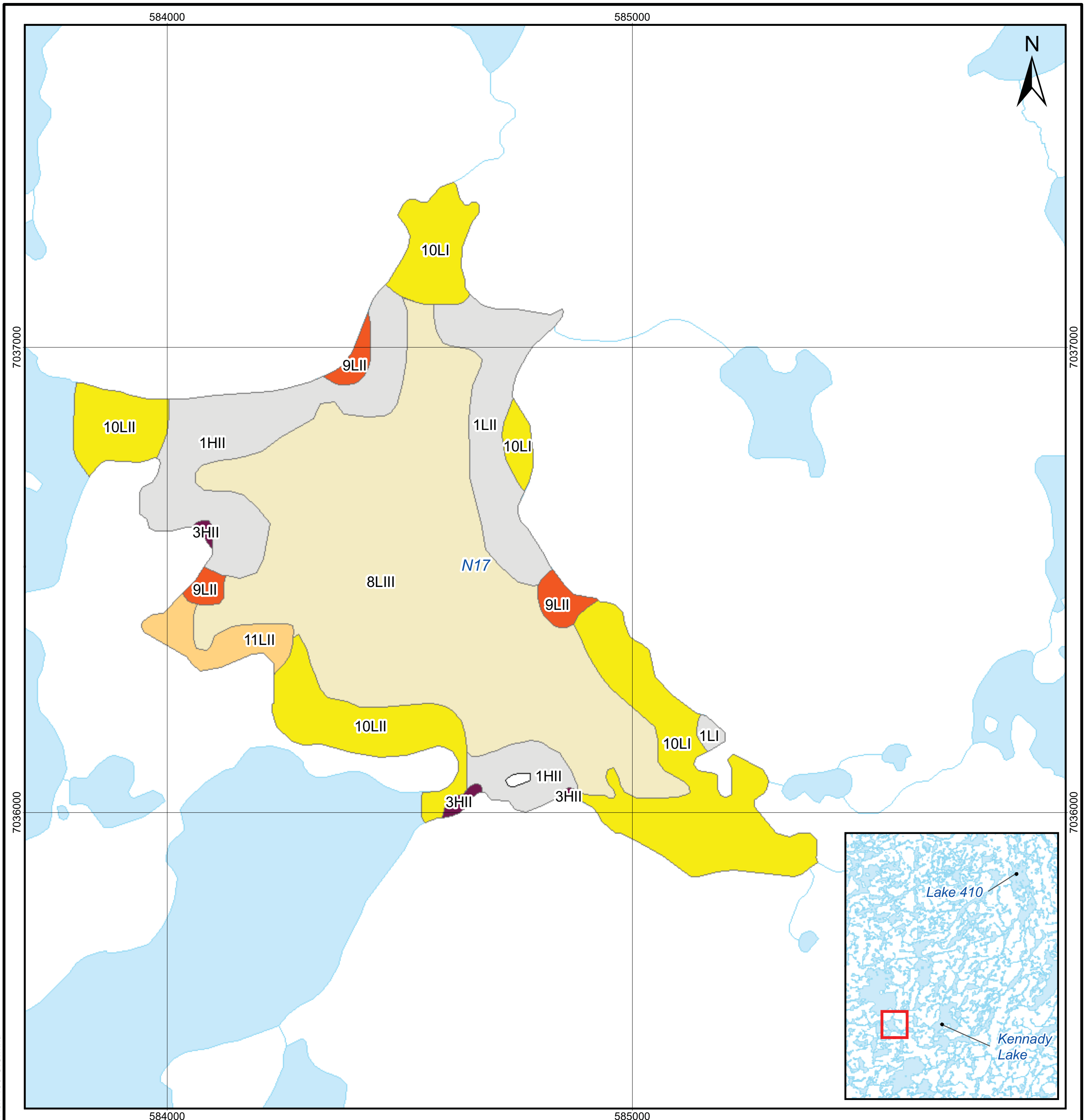
GAHCHO KUÉ PROJECT

Aquatic Habitat in Lake N14b

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:2,500 (50 25 0 50 Metres)	
FILE No: B-Fish-126-GIS	DATE: August 6, 2010
JOB NO: 09-1365-1004	REVISION NO: 1
OFFICE: GOLD-CAL	DRAWN: AB
CHECK: GA	

DE BEERS CANADA

Figure JJ.V-5



I:\CLIENTS\DE_BEERS\09-1365-1004\maps\10_fisheries-aquatics\Baseline\B-Fish-130-GIS.mxd

LEGEND

- Watercourse
- Waterbody
- *N17* Lake Identifier

Aquatic Habitat Label

8LI
- Depth Category
- Gradient Category
- Substrate Category

Substrate Category

- 1 Boulder/Cobble
- 2 Boulder
- 3 Bedrock
- 4 Bedrock/Boulder
- 5 Bedrock/Cobble
- 6 Vegetation/Organics
- 7 Vegetation/Boulder
- 8 Fines/Organics
- 9 Cobble/Gravel
- 10 Boulder/Fines
- 11 Cobble/Fines
- 12 Boulder/Gravel

Gradient Category

- H High
- L Low
- \- Unknown

Depth Category

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

NOTES
Survey was completed for the basin displayed.
Base Data Source: Eagle Mapping Ltd.

GAHCHO KUÉ PROJECT

Aquatic Habitat in the Northeast Basin of Lake N17

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:12,000 (200 100 0 200 Metres)	
FILE No: B-Fish-130-GIS	DATE: August 6, 2010
JOB NO: 09-1365-1004	REVISION NO: 1
OFFICE: GOLD-CAL	DRAWN: AB / CHECK: GA

DE BEERS CANADA

Figure JJ.V-6

APPENDIX JJ.VI

AQUATIC HABITAT – STREAM HABITAT DATA, 2010

Table JJ.VI-1 Stream Habitat Data, 2010

Stream	UTM Coordinates (NAD 83, Zone 12)		Date Surveyed	Length Surveyed (m) [a]	Stream Length (m) [b]	Map Gradient (%)	Flow Duration	Mean Maximum Depth (m)	Mean Channel Width (m)	Channel Type [c]	Bank Type [d]	Habitat Unit (%) [e]								Bed Material Type [g]		Overall Habitat Quality Rating [h]	Spawning Habitat Quality		Fish Passage [i]
	Easting	Northing										R	G	RF	BO	CA	PL	Dry	OU/WL	Dominant	Sub-Dominant		ARGR	NRPK	
N14a	585882	7036353	20-Jul-10	119.2	57.0	0.0	Ephemeral	0.3	9.25	C2 &C3	D2	74.9	-	-	-	-	-	25.1	-	Or	Bo	L	N	L	No
N14b	586869	7036077	20-Jul-10	-	-	-	Ephemeral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	N	N	No
L11	593243	7039087	19-Jul-10	226.6	163.5	0.8	Ephemeral	0.25	2.51	C1	D2	13.5	-	-	-	-	-	86.5	-	Or	-	L - M	N	L	No
L13	593072	7038821	19-Jul-10	320.3	199.9	0.5	Permanent	0.33	8.33	C1	D1	100	-	-	- [f]	-	-	-	-	Or/Bo	Co	M	N	L	No
L14	592715	7038419	19-Jul-10	152.3	151.1	0.6	Permanent	0.67	2.42	C1	D1	100	-	-	- [f]	-	-	-	-	Or	Bo	M	N - L	L	No
L15	592399	7038305	19-Jul-10	125.5	126.6	0.8	Permanent	0.68	3.76	C1	D1	80.6	-	-	- [f]	-	19.4	-	-	Or	Bo	M	N - L	L	No
L18	591956	7038457	20-Jul-10	245	193.5	1.5	Permanent	0.22	17.9	C1 & C3	D1	100	-	-	- [f]	-	-	-	-	Or	Bo	L - M	N - L	N - L	No

(a) Length surveyed in the field.

(b) Length determined by GIS.

(c) Where C1 = single active channel; C2 = multiple or braided channel; and C3 = dispersed flow, no defined channel.

(d) Where D1 = well defined stream bank; and D2 = poorly defined stream bank.

(e) Where R = run; G = glide; RF = riffle; BO = boulder garden; CA = cascade; PL = pool; Dry = dry channel; and OU/WL = lake outlet or wetland

(f) Boulder gardens present, within the dominant habitat unit.

(g) Where Or = organics; Bo = boulder; Co = cobble.

(h) Where N = nil; L = low; M = moderate; and H = high.

(i) At the time of the survey.

- = Data not recorded.

UTM = Universal Transverse Mercator; NAD = North American Datum; m = metres; % = percent.

Table JJ.VI-2 Stream Water Quality Data, 2010

Stream	UTM Coordinates (NAD 83, Zone 12)		Date	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH (pH units)
	Easting	Northing							
N14a	585882	7036353	20-Jul-10	0.20	0.10	19.00	16	5.5	5.7
L11	593243	7039087	19-Jul-10	0.25	0.10	13.01	15	2.7	6.0
L13	593072	7038821	19-Jul-10	0.20	0.10	15.27	15	6.5	5.8
L14	592715	7038419	19-Jul-10	0.60	0.30	16.25	14	6.5	7.0
L15	592399	7038308	19-Jul-10	0.60	0.30	16.53	13	5.5	5.9
L18	591971	7038427	20-Jul-10	0.15	0.10	15.74	12	8.9	7.0

UTM = Universal Traverse Mercator; NAD = North American Datum; m = metres; °C = degress celsius; µS/cm = microSiemens per centimetre; mg/L = milligrams per litre.

APPENDIX JJ.VII

LIMNOLOGY – LAKE WATER QUALITY PROFILE DATA, 2007 AND 2010

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010

Lake	UTM Coordinates (NAD 83, Zone 12)		Date	Max Depth at Sampling Location (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (μS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH (pH units)
	Easting	Northing										
A1	590324	7037732	19-Jul-07	-	-	-	0.0	18.4	8.5	8.9	90.5	-
							1.0	18.5	8.5	8.5	90.6	-
							2.0	18.5	8.5	8.5	90.6	-
							3.0	18.5	8.5	8.5	90.7	-
							4.0	18.5	8.6	8.5	90.3	-
							5.0	18.4	22.0 (a)(b)	5.1	62.1	-
A3	590987	7038622	19-Jul-07	-	-	-	0.0	17.9	13.5	7.9	83.5	-
							1.0	17.9	13.6	7.4	77.3	-
							2.0	17.9	13.5	7.9	82.8	-
							3.0	17.8	13.6	7.0	72.8	-
							4.0	17.8	13.6	7.2	74.5	-
							5.0	15.0	13.5	8.3	81.6	-
							6.0	14.9	13.7	0.7 (b)	7.5 (b)	-
							7.0	14.9	13.7	0.2 (b)	2.6 (b)	-
D2	587226	7036520	20-Jul-07	-	-	-	0.0	19.0	15.8	9.0	92.5	-
							1.0	18.6	16.0	6.9	73.5	-
D3	586626	7037243	21-Jul-07	-	-	-	0.0	19.4	8.6	8.0	86.5	-
							1.0	19.4	8.6	7.9	86.0	-
							2.0	19.4	8.7	8.0	86.4	-
							2.5	19.4	8.7	7.3	79.5	-
E1	586389	7035531	25-Jul-07	-	-	-	0.0	16.8	11.9	8.7	89.6	-
							1.0	16.8	12.1	8.4	86.4	-
							2.0	16.9	12.0	8.2	85.1	-
							2.5	16.9	12.1	8.2	84.5	-
K1-1	588851	7037118	29-Aug-07	-	-	-	0.0	9.7	12.8	10.1	89.4	-
							1.0	9.7	13.0	9.8	86.3	-
							2.0	9.6	12.4	9.7	84.7	-
							3.0	9.6	13.1	9.4	82.8	-
							4.0	9.6	13.1	9.5	83.5	-

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010 (continued)

Lake	Easting	Northing	Date	Profile Max Depth (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH
K1-2	588896	7037553	30-Aug-07	-	-	-	0.0	9.5	12.5	10.2	89.2	-
							1.0	9.4	12.9	9.0	78.7	-
							2.0	9.4	13.0	9.0	78.3	-
							3.0	9.4	13.0	9.0	78.0	-
							4.0	9.4	13.0	9.0	78.8	-
							4.5	9.4	12.9	9.5	82.8	-
K1-3	588849	7038253	30-Aug-07	-	-	-	0.0	9.3	13.0	9.3	80.7	-
							1.0	9.3	13.0	8.8	76.6	-
							2.0	9.3	13.0	9.0	78.4	-
							3.0	9.3	13.2	9.5	82.9	-
							4.0	9.3	13.1	9.5	81.9	-
							5.0	9.3	13.0	9.5	82.8	-
							5.5	9.2	13.0	9.3	80.9	-
K1-4	589881	7038566	30-Aug-07	-	-	-	0.0	9.2	13.1	9.3	79.4	-
							1.0	9.2	12.7	9.3	81.0	-
							2.0	9.2	13.1	9.3	81.2	-
							3.0	9.1	13.0	9.0	78.4	-
							3.5	9.1	13.1	9.8	84.6	-
K1-6	589634	7038386	30-Aug-07	-	-	-	0.0	9.7	13.0	9.2	81.1	-
							1.0	9.5	13.0	8.5	74.0	-
							2.0	9.3	13.0	9.6	84.3	-
							3.0	9.2	13.0	9.5	83.0	-
							4.0	9.2	13.0	9.4	81.8	-
							5.0	9.2	13.0	9.8	85.2	-

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010 (continued)

Lake	Easting	Northing	Date	Profile Max Depth (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH
K1-C	589237	7037003	31-Aug-07	-	-	-	0.0	9.5	13.0	9.7	84.8	-
							1.0	9.4	13.1	9.7	84.5	-
							2.0	9.4	13.1	9.6	84.3	-
							3.0	9.4	13.0	9.6	84.0	-
							4.0	9.4	13.1	9.6	84.2	-
							5.0	9.4	13.0	9.7	84.7	-
							6.0	9.4	13.0	9.6	83.9	-
							7.0	9.4	13.0	9.7	84.7	-
							8.0	9.4	13.1	9.6	83.6	-
							9.0	9.4	13.1	9.7	84.6	-
							10.0	9.4	13.0	9.6	83.3	-
							11.0	9.4	13.1	9.4	81.3	-
							12.0	9.4	13.0	9.5	83.0	-
							13.0	9.4	13.0	9.5	82.9	-
							14.0	9.4	13.1	9.6	82.8	-
							15.0	9.4	13.0	9.3	80.5	-
K2B	589610	7036121	31-Aug-07	-	-	-	0.0	9.3	13.1	10.0	87.5	-
							1.0	9.9	13.2	9.7	84.6	-
							2.0	9.3	13.1	9.7	84.2	-
							3.0	9.3	13.1	9.6	84.0	-
							4.0	9.3	13.1	9.8	85.5	-
							5.0	9.3	13.1	9.6	84.3	-
							6.0	9.3	13.1	9.6	83.8	-
							7.0	9.3	13.1	9.4	82.1	-
							8.0	9.3	13.1	9.7	84.6	-
							9.0	9.3	13.1	9.7	85.0	-
							10.0	9.2	13.1	9.5	82.3	-
							11.0	9.3	13.1	9.4	81.8	-

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010 (continued)

Lake	Easting	Northing	Date	Profile Max Depth (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH
K3A	589203	7035423	31-Aug-07	-	-	-	0.0	9.7	13.1	9.6	84.6	-
							1.0	9.6	13.0	9.7	85.0	-
							2.0	9.5	13.0	9.4	82.0	-
							3.0	9.5	13.0	9.6	84.1	-
							4.0	9.5	13.0	9.6	84.0	-
							5.0	9.5	13.0	9.6	83.5	-
							6.0	9.5	12.8	9.2	80.3	-
							7.0	9.5	13.1	9.5	82.5	-
							8.0	9.5	13.2	9.4	82.4	-
							9.0	9.5	13.0	9.3	80.9	-
							10.0	9.5	13.0	9.4	83.0	-
							11.0	9.4	13.1	9.6	83.9	-
							12.0	9.4	13.2	9.2	80.5	-
							13.0	9.4	13.0	9.5	82.8	-
							14.0	9.4	12.9	9.4	82.4	-
							15.0	9.4	13.0	9.2	80.2	-
							16.0	9.3	13.1	9.3	80.4	-
K4	590048	7035006	31-Aug-07	-	-	-	0.0	8.9	13.0	9.8	84.8	-
							1.0	8.9	13.1	9.4	81.1	-
							2.0	8.9	13.0	9.4	81.1	-
							3.0	8.9	13.1	9.6	82.9	-
							4.0	8.9	13.0	9.5	82.5	-
							5.0	8.9	13.1	9.7	83.6	-
							6.0	8.9	13.1	9.4	81.4	-
							6.5	8.9	13.5	4.4	40.0	-
K5-1	591838	7035784	01-Sep-07	-	-	-	0.0	10.4	13.3	9.1	82.0	-
							1.0	9.6	13.4	9.4	82.2	-
							2.0	9.3	13.4	9.3	80.8	-
							3.0	9.2	13.4	9.3	80.0	-
							4.0	9.2	13.4	9.5	83.3	-
							5.0	9.2	13.4	9.9	86.2	-
							6.0	9.2	13.4	10.0	86.9	-

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010 (continued)

Lake	Easting	Northing	Date	Profile Max Depth (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH
K5-1	591840	7035669	01-Sep-07	-	-	-	0.0	9.1	13.0	10.3	88.9	-
							1.0	9.1	13.1	9.8	85.2	-
							2.0	9.0	13.1	9.8	85.0	-
							3.0	9.1	13.1	9.7	83.8	-
							4.0	9.1	13.2	9.9	85.4	-
							5.0	9.0	13.2	9.9	86.5	-
							6.0	9.0	13.2	10.1	87.5	-
							7.0	9.0	13.3	9.1	78.5	-
							8.0	9.0	13.3	9.3	81.2	-
							9.0	9.0	13.3	9.5	83.1	-
							10.0	9.0	13.3	9.4	80.6	-
							11.0	9.0	13.3	9.6	82.6	-
K5-2	592183	7036095	01-Sep-07	-	-	-	0.0	10.7	13.5	9.8	88.6	-
							1.0	9.5	13.5	9.3	81.3	-
							2.0	9.3	13.4	9.2	79.8	-
							3.0	9.3	13.3	10.0	87.5	-
							4.0	9.2	13.4	9.4	81.3	-
							5.0	9.2	13.4	10.0	87.0	-
							6.0	9.1	13.4	9.3	80.2	-
K5-3	593086	7036926	01-Sep-07	-	-	-	0.0	10.5	13.5	9.0	86.3	-
							1.0	9.1	13.4	9.8	85.4	-
							2.0	8.9	13.3	9.0	79.2	-
							3.0	8.9	13.3	9.1	79.7	-
							4.0	8.8	13.3	8.6	73.7	-
K5-4	593641	7037445	01-Sep-07	-	-	-	0.0	10.9	13.4	9.7	87.2	-
							1.0	10.1	13.4	10.3	92.4	-
							2.0	9.2	13.3	10.3	90.4	-
							3.0	9.0	13.3	10.8	93.8	-
K5-5	593448	7037892	01-Sep-07	-	-	-	0.0	10.8	13.4	9.6	86.8	-
							1.0	9.5	13.3	9.7	85.4	-
							2.0	9.4	13.3	9.5	82.0	-
							3.0	9.4	13.3	8.3	73.0	-

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010 (continued)

Lake	Easting	Northing	Date	Profile Max Depth (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH
Con-1	584225	7039353	02-Sep-07	-	-	-	0.0	9.8	12.2	9.7	85.0	-
							1.0	9.9	12.0	10.0	87.9	-
							2.0	9.8	12.0	10.1	89.1	-
							3.0	9.8	12.0	10.1	89.2	-
							4.0	9.8	12.0	10.1	89.1	-
							5.0	9.8	12.0	10.1	89.1	-
Con-2	584539	7039365	02-Sep-07	-	-	-	0.0	9.9	12.0	10.4	92.2	-
							1.0	9.8	12.1	10.3	90.6	-
							2.0	9.9	12.0	10.1	89.5	-
							3.0	9.9	12.1	10.2	90.2	-
							4.0	9.9	12.0	10.3	91.3	-
Con-3	584275	7039352	02-Sep-07	-	-	-	0.0	10.0	12.0	10.2	90.2	-
							1.0	10.0	11.9	10.2	90.5	-
							2.0	10.0	12.0	10.2	90.2	-
							3.0	10.0	12.0	10.3	91.2	-
							4.0	10.0	12.0	10.2	90.9	-
Con-4	583437	7039311	02-Sep-07	-	-	-	0.0	9.9	11.9	10.2	90.5	-
							1.0	9.1	12.0	10.1	87.1	-
							2.0	9.9	12.1	10.2	90.3	-
							3.0	9.9	12.1	10.3	90.8	-
							4.0	9.9	12.0	10.3	90.6	-
							5.0	9.9	11.9	10.3	90.7	-
							6.0	9.9	12.0	10.3	90.6	-
Control	584603	7039076	02-Sep-07	-	-	-	0.0	9.6	12.0	10.4	91.2	-
							1.0	9.6	12.0	10.3	90.1	-
							2.0	9.6	12.0	10.3	90.6	-
							3.0	9.6	12.0	10.4	90.9	-
							4.0	9.6	12.0	10.3	90.5	-
							5.0	9.6	12.0	10.3	90.3	-
							6.0	9.6	12.0	9.9	87.1	-

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010 (continued)

Lake	Easting	Northing	Date	Profile Max Depth (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH
Lake 410	596394	7050113	03-Sep-07	-	-	-	0.0	9.3	10.7	10.9	94.3	-
							1.0	9.3	10.7	11.1	96.2	-
							2.0	9.3	10.7	11.2	97.6	-
							3.0	9.4	10.7	11.2	97.9	-
							4.0	9.4	10.7	11.3	98.4	-
							4.5	9.4	10.7	11.0	96.1	-
Kirk Lake	592556	7061037	03-Sep-07	-	-	-	0.0	9.5	12.5	11.0	95.7	-
							1.0	9.5	12.4	11.2	97.9	-
							2.0	9.5	12.4	11.2	98.0	-
							3.0	9.5	12.5	11.3	98.9	-
							4.0	9.5	12.4	11.3	98.4	-
L2	593341	7038957	21-Jul-10	3.5	3.5	3.5	0.5	17.8	-	10.4	-	5.4
							1.0	17.81	-	10.4	-	5.5
							2.0	17.78	-	10.3	-	5.5
							3.0	17.75	-	10.3	-	5.3
L3	593093	7038436	21-Jul-10	1.1	1.1	1.1	0.5	19.51	-	10.3	-	5.9
L13	593902	7038649	22-Jul-10	1.2	1.2	1.2	0.5	17.76	15	8.1	-	7.0
L18	591646	7038656	22-Jul-10	5	5	5	0.5	18.07	10	8.6	-	7.5
							1.0	18.04	10	8.6	-	6.9
							2.0	18.05	9	8.6	-	6.6
							3.0	18.03	9	8.6	-	6.3
							4.0	18.03	9	5.6	-	6.2
A3	591211	7038972	23-Jul-10	4.2	4.2	4.2	0.5	17.32	12	10.3	-	7.0
							1.0	17.25	12	10.1	-	6.6
							2.0	17.24	12	10.1	-	6.4
							3.0	17.23	12	9.7	-	6.5
							4.0	17.22	12	9.9	-	6.4
A4	591337	7039487	23-Jul-10	0.4	0.4	0.4	0.2	20.16	15	9.4	-	5.3
D2	587380	7036597	24-Jul-10	0.9	0.9	0.9	0.5	19.88	13	8.7	-	6.5
D3	586605	7037135	24-Jul-10	2.5	2.5	2.5	0.5	19.86	8	9.2	-	6.6
							1.0	19.72	8	9.2	-	6.1
							2.0	19.71	8	9.2	-	5.8

Table JJ.VII-1 Lake Water Quality Profile Data, 2007 and 2010 (continued)

Lake	Easting	Northing	Date	Profile Max Depth (m)	Secchi Depth (m)	Water Depth (m)	Sample Depth (m)	Temperature (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH
E1	586415	7035574	26-Jul-10	3.5	3.5	3.5	0.5	19.25	11	8.3	-	6.9
							1	19.24	11	8.3	-	6.77
							2	19.23	11	8.3	-	6.63
							3	19.23	11	8.3	-	6.6
N14	586096	7036097	25-Jul-10	3.5	-	3.5	0.5	19.76	9	8.6	-	6.87
							1	19.74	8	8.6	-	6.53
							2	19.71	8	8.7	-	6.12
							3	19.73	8	8.7	-	6.01
N14a	585947	7036581	25-Jul-10	3.2	-	3.2	0.5	19.31	8	8.2	-	5.9
							1	19.29	8	8.3	-	5.65
							2	19.25	8	8.3	-	5.64
							2.5	19.24	8	8.2	-	5.66
N14b	586868	7036047	26-Jul-10	0.8	0.8	0.8	0.5	18.19	17	8.0	-	7.62
N17 [(c)]	584704	7036274	27-Jul-10	9.8	6.3	9.8	0.3	17.83	8	9.4	-	7.08
							1	17.83	10	9.6	-	6.6
							2	17.81	-	9.2	-	6.72
							3	17.8	-	9.4	-	6.35
							4	17.76	-	9.0	-	6.27
							5	17.74	-	9.3	-	6.24
							6	17.7	-	9.3	-	6.13
							7	17.68	-	9.5	-	6.08
							8	17.63	-	9.4	-	5.88
							9	17.01	-	9.4	-	5.78
							9.5	13.87	-	9.0	-	5.21

(a) Likely an equipment or transcription error.

(b) Measurement likely in the soft sediments.

(c) Only the northeast basin of Lake N17 was surveyed.

- = Data not recorded.

UTM = Universal Transverse Mercator; NAD = North American Datum; m = metres; % = percent; °C = degrees celsius; µS/cm = microSiemens per centimetre; mg/L = milligram per litre.

APPENDIX JJ.VIII

PHYTOPLANKTON – SUPPORTING DATA, 2007

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
SPECIES	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L
BACILLARIOPHYTA																				
Achnanthes minutissima Kuetzing				20,420													6,806			
Asterionella formosa Hansall	7,249																			
Aulacoseira spp.																				
Cyclotella/Stephanodiscus sp (4-10 µm)	181,230	123,236	122,522	153,152	61,260	47,646	27,227	40,839	81,680	34,033	40,840	47,646	54,454	68,067	61,260	20,420	88,488	40,840	20,419	20,420
Cyclotella/Stephanodiscus sp (14-18 µm)				10,210				6,806												
Cyclotella bodanica Grunow														6,806		6,806	6,806			
Cymbella sp.																				
Eunotia sp.								6,806												
Navicula sp.	7,249	7,249																		
Nitzschia acicularis (Kuetzing) W. Smith																6,806				
Nitzschia sp.		7,249	71,471		51,050		13,613	13,613	6,806										6,806	
Synedra/Nitzschia sp.																				
Rhizosolenia eriensis H.L. Smith													13,613	6,806	6,806					
Rhizosolenia longiseta Ehrenberg	7,249	14,498		10,210	51,050	6,806	20,420		20,420	6,806	40,840	6,806	13,613	6,806	13,613	6,806			6,806	20,420
Synedra sp.	57,993	36,246	10,210	20,420	40,840			13,612	6,806			27,226	6,806		6,806				6,806	6,806
Synedra ulna (Nitzsch) Ehr.																				
Tabellaria flocculosa (Roth) Kuetzing	14,498				10,210							6,806								
Total Bacillariophyta	275,469	188,478	204,203	214,412	214,410	54,452	61,260	81,676	115,712	40,839	81,680	88,484	88,486	88,485	88,485	40,838	102,100	40,840	40,837	47,646
CHLOROPHYTA																				
Ankistrodesmus bernardii Komarek	7,249					6,806														
Ankistrodesmus falcatus (Corda) Ralfs	7,249				10,210															
Ankistrodesmus falcatus var. *mirabilis* West			20,420																	
Ankistrodesmus fusiformis Corda	7,249																			
Ankistrodesmus gracilis (Reinsch) Kors.				30,630																
Ankistrodesmus spiralis (Turner) Lemmermann	7,249	14,498																		
Arthrodesmus cuspidatus (Brebisson) Teiling		7,249																		
Arthrodesmus incus (Brebisson) Hassall				10,210											6,806		6,806			
Arthrodesmus incus var. *ralfsii* (W. West) Teiling																				
Chamydomonas frigida Skuja												6,806								
Chlamydomonas globosa Snow				10,210																
Closterium acerosum (Schrank) Ehrenberg							6,806			6,806										

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
SPECIES	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L
Coenocystis sp.															6,806	6,806				
Cosmaruim bioculatum Brebisson							6,806		6,806	6,806	6,806	6,806		13,613			6,806	6,806		
Cosmarium phaseolus Brebisson	7,249	14,498																		6,806
Cosmarium regnesii Reinsch						6,806					6,806							6,806		
Cosmarium sp.														6,806						
Crucegenia crucifera (Wolle) Collins																	6,806			
Crucegenia quadrata Morren	7,249		10,210											20,420					6,806	
Crucegenia rectangularis (A. Braun) Gay								6,806				6,806								
Crucegenia sp.																	6,806			
Crucegenia tetrapedia (Kirchner) W. & G.S. West																				
Elakatothrix genevensis (Reverdin) Hindak									6,806				6,806			6,806				
Euastrum ansatum Ehrenberg			10,210																	
Euastrum insulare (Wittrock) Roy																				
Eudorina elegans Ehrenberg																				
Gloeocystis sp.	21,747	21,747		10,210		6,806			6,806		6,806	6,806		13,613	6,806		13,613	6,806	6,806	
Gloeotilia sp.		14,498	10,210		20,420	13,613	13,613	6,806	6,806			6,806	13,613	13,613	6,806	27,227	13,613	13,613	27,227	6,806
Kirchneriella contorta (Schmidle) Bohlin																				
Korshikoviella sp.											6,806			6,806	13,613					6,806
Monoraphidium braunii Naegeli	50,744	43,495	30,630	122,522	30,630	27,227	47,647	40,840	61,261	54,454	74,874	61,261	54,454	68,067	47,647	34,033	34,033	34,033	20,420	68,067
Monoraphidium contortum (Thuret) Komarkova-Legenerova	50,744	14,498	10,210	40,840	30,630															
Monoraphidium convolutum (Corda)																				13,613
Monoraphidiu dybowskii (Wolosz) Hindak et. Kom.-Legn.	7,249																	6,806		
Monoraphidium griffithii (Berkeley) Komarkova-Legenerova	36,246	36,246	51,050	40,840	71,471	20,420						6,806	6,806	6,806	20,420		20,420			34,033
Monoraphidium irregulare (G.M. Smith) Komarkova-Legenerova		14,498	10,210										6,806							
Monoraphidium minutum (Nag.) Komarkova-Legenerova	14,498												6,806							
Monoraphidium setiforme Komarkova-Legenerova	21,747	86,991	51,050	81,681	51,050			6,806								6,806				
Monoraphidium sp.																				
Mougeotia sp.	7,249																			
Oocystis borgei Snow	21,747	21,747	10,210							6,806				6,806	13,613					
Oocystis gigas Archer															6,806					
Oocystis parva W. & G.S. West	14,498	7,249	51,050	30,630	30,630	13,613		20,420	27,227	34,033	13,613	54,454	74,874	20,420	40,840	13,613	34,033	27,227		40,840
Oocystis pusilla Hansgirg			20,420	51,050		6,806	13,613	13,613	34,033	40,840	13,613								34,033	

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	**Kirk Lake**					**Lake N16**					**Kennady Lake - Basin K1**					**Kennady Lake - Basin K2**				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year:	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**
Day:	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**2**	**2**	**2**	**2**	**2**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**
SPECIES	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**
Oocystis solitaria Wittrock				51,050	10,210	6,806		20,420						6,806	13,613	6,806	6,806			6,806
Oocystis submarina Lagerheim						6,806														
Quadrigula chodatii (Tanner-Fullman) G.M. Smith							13,613													
Scenesdesmus ecornis var. *bicellularis* (Ehrenberg) Chodat	7,249	7,249																		
Scenedesmus dimorphus (Turp.) Kuetzing								6,806												
Spondylosium planum (Wolle) W. & G.S. West	7,249	21,747	20,420	20,420	10,210	6,806		6,806		6,806	13,613	6,806						6,806		
Tetraedron minimum (A. Braun) Hansgirg	36,246	7,249													6,806					
Tetraedron mimimum var. *tetralobulatum* Reins				30,630	30,630			13,612	13,613	13,613		6,806	13,613	13,613	13,613	6,806	6,806	6,806		20,420
Ulothrix sp.						6,806														
Total Chlorophyta	340,709	333,460	306,300	530,923	296,091	129,321	102,098	142,935	163,358	170,164	142,937	170,163	183,778	197,389	204,195	108,903	156,548	115,709	95,292	204,197
CHRYSOPHYTA																				
Bitrichia chodatii (Reverdin) Chodat	7,249	14,498			10,210		6,806		20,420	13,613			6,806	20,420	6,806	6,806		6,806		6,806
Chrysolykos planctonicus Mack	7,249			10,210	10,210									6,806						
Chrysolykos skujae (Nauwerck) Bourrelly		7,249																		
Chromulina sp.		21,747	40,840	40,840	40,840	6,806	6,806	20,420		13,613	6,806	6,806		6,806			6,806	20,420		6,806
Desmarella moniliformis Kent																				
Dicronema cf. *vlklanum* Prauser	21,747	7,249	10,210	20,420	112,311	27,227	40,840	27,227	13,613	20,420	27,227	61,261	61,261	176,976	122,522	34,033	68,067		6,806	13,613
Dinobryon acuminatum Ruttner										6,806										
Dinobryon bavaricum var. *medium* (Lemmermann) Krieger	21,747	21,747	10,210	30,630	20,420	47,647	13,613	6,806	20,420	6,806	6,806	6,806	6,806		13,613	20,420	6,806			6,806
Dinobryon bavaricum Imhof									13,613	20,420	6,806	6,806	6,806	13,613	6,806	13,613		20,420	40,840	13,613
Dinobryon borgei Lemmermann	7,249	28,996		40,840	10,210	13,613	6,806				13,613					6,806		6,806		
Dinobryon dilatatum Hillard	14,498	14,498	20,420	10,210	40,840			6,806						6,806						
Dinobryon sp. (loose monad)	21,747			51,050	71,471	6,806	6,806	47,647		13,613			6,806					6,806		
Dinobryon sociale var. *americana* (Brunthaler) Bachmann	14,498				10,210			6,806	6,806											
Dinobryon sociale Ehrenberg		14,498		40,840	10,210		6,806			6,806										
Dinobryon bavaricum var. *Vanhoffenii* (Bachm.) Krieg.																				
Epipyxis sp.		7,249	10,210	10,210	10,210				6,806	13,613					6,806		6,806	13,613		13,613
Unid. naked Chrysophyte sp. (*Ochromonas*/*Chromulina*)-large	877,156	616,183	704,502	775,973	724,922	183,783	149,749	183,783	292,691	245,044	245,044	224,623	163,362	224,623	197,396	136,135	217,817	319,918	204,203	251,851
Unid. naked Chrysophyte sp. (*Ochromonas*/*Chromulina*)-small	275,470	173,981	306,305	479,878	418,617	129,328	156,556	136,135	142,942	129,328	149,749	251,851	122,522	156,556	81,681	68,067	136,135	211,010	163,362	176,976
Haptophyte *(Erkenia/Chrysochromulina)*		21,747			51,050		6,806			6,806		13,613	20,420	6,806	27,227	6,806		13,613	6,806	
Kephyrion boreale Skuja																				
Kephyrion sp.																				

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year:	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**
Day:	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**2**	**2**	**2**	**2**	**2**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**
SPECIES	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**
Mallomonas sp.													6,806			6,806				
Monosiga varians Skuja																				
Ochromonas sp.	14,498	7,249	40,840	51,050	51,050	6,806	6,806						6,806				13,613	6,806	6,806	
Pedinella sp.				10,210																
Pseudokephyrion alaskanum Hilliard					10,210															
Pseudokephyrion attenuatum Hilliard	7,249		10,210	20,420																
Pseudokephyrion ellipsoideum (Pascher) Schmid	7,249																			
Pseudokephyrion minutissimum Conrad				10,210																
Stichogloea globosa Starmach						6,806	13,613	20,420	40,840	6,806	13,613	6,806	6,806	6,806			20,420	6,806		20,420
Stichogloea doederleinii (Schmidle) Wille			10,210	20,420		27,227	27,227	47,647	6,806	13,613		20,420	13,613		27,227	68,067		34,033	13,613	6,806
Synura sp.	28,996	7,249		20,420	30,630															
Uroglena sp.																				
Total Chrysophyta	1,326,604	964,143	1,163,957	1,643,831	1,633,621	456,049	449,240	503,697	564,957	517,307	469,664	598,992	428,820	626,218	490,084	367,559	476,470	667,057	442,436	517,310
CRYPTOPHYTA																				
Cryptomonas erosa Ehrenberg																				
Cryptomonas marsonii Skuja																				
Cyrptomonas phaseolus Skuja																				
Katablepharis ovalis Skuja	21,747	28,996	61,261	142,942	163,362	6,806		6,806	13,613		47,647	34,033	34,033	40,840	88,488	6,806	6,806			20,420
Rhodomonas lens Pascher & Ruttner																		6,806		
Rhodomonas minuta Skuja	7,249		20,420	30,630		27,227	47,647	20,420	54,454	47,647	40,840	20,420	40,840	47,647	27,227	13,613	27,227	27,227	40,840	27,227
Total Cryptophyta	28,996	28,996	81,681	173,572	163,362	34,033	47,647	27,226	68,067	47,647	88,487	54,453	74,873	88,487	115,715	20,419	34,033	34,033	40,840	47,647
CYANOBACTERIA																				
Anabaena affinis Lemmermann		7,249																		
Anabaena circinalis Rabenhorst				10,210																
Anabaena solitaria f. planctonica (Brunnthaler) Komarek																				
Anabaena solitaria Klebahn			10,210																	
Anabaena sp.													6,806							
Aphanocapsa delicatissima West & West	420,455	376,960	265,464	224,623	296,095	122,522	95,294	176,976	204,203	190,589	115,715	170,169	251,851	251,851	170,169	122,522	231,430	142,942	68,067	217,817
Aphanocapsa elachista W. & G.S. West	14,498	14,498			10,210		6,806	20,420	20,420	6,806		27,227	20,420			20,420	13,613	13,613	20,420	6,806
Aphanothece sp.	7,249		30,630	30,630	20,420	54,454	13,613	40,840	61,261	20,420	54,454	74,874	68,067	68,067	68,067	61,261	115,715	27,227	27,227	88,488
Aphanothece clathrata W & G.S. West							6,806									6,806				6,806

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year:	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**
Day:	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**2**	**2**	**2**	**2**	**2**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**
SPECIES	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**
Chroococcus limneticus Lemmermann											6,806		6,806	6,806	6,806					
Cyanodictyon sp. 1 (rod-shaped)																6,806				
Cyanodictyon sp. 2 (spherical)					20,420													6,806		
Cylindrospermum minimum G.S. West				10,210	10,210				6,806											
Limnothrix sp.	79,741	28,996	30,630	51,050	91,891	6,806	6,806	13,613	54,454	20,420	88,488	95,294	81,681	68,067	47,647	20,420	102,101	68,067	115,715	34,033
Merismopedia tenusissima Lemmermann		7,249				13,613					20,420	6,806	13,613	13,613			6,806			20,420
Nostoc sp.																				
Oscillatoria chalybea Mertens														6,806						
Phormidium sp.																				
Planktolyngya limnetica Lemmermann	14,498				10,210	6,806							6,806							
Rhabdoderma lineare Schmidle & Lauterborn					10,210	6,806	20,420	34,033		27,227	6,806	6,806	6,806					13,613		
Snowella lacustris (Chodat) Komarek et Hindak														6,806		13,613			13,613	
Total Cyanobacteria	536,441	434,952	336,934	326,723	469,666	211,007	149,745	285,882	347,144	265,462	292,689	381,176	462,856	422,016	292,689	251,848	469,665	272,268	245,042	374,370
PYRROHPYTA																				
Phacus sp.							6,806													
Glenodinium sp.	7,249				10,210							6,806		6,806						
Gymnodinium ordinatum Skuja	7,249	7,249		71,471			6,806		6,806		6,806						20,420	6,806		
Gymnodinium sp.				20,420	20,420			6,806												
Peridinium inconspicum Lemmermann																				
Peridinium pusillum (Penard) Lemmermann																				
Peridinium sp.																				
Total Pyrrophyta	14,498	7,249		91,891	30,630		13,612	6,806	6,806		6,806	6,806		6,806			20,420	6,806		
TOTAL	2,522,718	1,957,279	2,093,075	2,981,352	2,807,780	884,862	823,602	1,048,222	1,266,044	1,041,419	1,082,263	1,300,074	1,238,813	1,429,401	1,191,168	789,567	1,259,236	1,136,713	864,447	1,191,170

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year:	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**
Day:	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**1**	**1**	**1**	**1**	**1**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
SPECIES	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**
BACILLARIOPHYTA																				
Achnanthes minutissima Kuetzing				6,806										6,806	6,806				6,806	
Asterionella formosa Hansall																				
Aulacoseira spp.					13,613															
Cyclotella/Stephanodiscus sp (4-10 µm)	27,227	54,453	71,471	27,226	40,840	27,227	13,613	27,226	54,453	20,419	47,646	47,646	34,033	20,419	54,454	6,806	20,419	74,874	54,453	61,259
Cyclotella/Stephanodiscus sp (14-18 µm)								6,806												
Cyclotella bodanica Grunow		6,806				6,806		6,806			6,806									
Cymbella sp.				6,806																
Eunotia sp.																				
Navicula sp.		6,806															6,806			6,806
Nitzschia acicularis (Kuetzing) W. Smith																				
Nitzschia sp.								13,613								6,806	20,420		6,806	6,806
Synedra/Nitzschia sp.					6,806				6,806	6,806			13,613					6,806		
Rhizosolenia eriensis H.L. Smith					6,806		6,806													
Rhizosolenia longiseta Ehrenberg	13,613	27,227	30,630	34,033	27,227	6,806	6,806	34,033	6,806	20,420	6,806	6,806	6,806		6,806	20,420	40,840	40,840	20,420	47,647
Synedra sp.	6,806	6,806											6,806			6,806	13,613	27,227	27,226	6,806
Synedra ulna (Nitzsch) Ehr.																				6,806
Tabellaria flocculosa (Roth) Kuetzing		6,806	10,210	6,806			6,806										6,806		27,227	
Total Bacillariophyta	47,646	108,904	112,311	81,677	95,292	40,839	34,031	88,484	68,065	47,645	61,258	54,452	61,258	27,225	68,066	40,838	108,904	149,747	142,938	136,130
CHLOROPHYTA																				
Ankistrodesmus bernardii Komarek	6,806															27,227	6,806		20,420	
Ankistrodesmus falcatus (Corda) Ralfs																6,806		6,806		
Ankistrodesmus falcatus var. *mirabilis* West																20,420				
Ankistrodesmus fusiformis Corda								6,806												
Ankistrodesmus gracilis (Reinsch) Kors.																				
Ankistrodesmus spiralis (Turner) Lemmermann																	6,806	6,806		
Arthrodesmus cuspidatus (Brebisson) Teiling																				
Arthrodesmus incus (Brebisson) Hassall																				
Arthrodesmus incus var. *ralfsii* (W. West) Teiling																	6,806		6,806	
Chamydomonas frigida Skuja																				
Chlamydomonas globosa Snow																				
Closterium acerosum (Schrank) Ehrenberg																				
Coenocystis sp.	6,806								6,806											

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
SPECIES	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L
Cosmaruim bioculatum Brebisson																				
Cosmarium phaseolus Brebisson								6,806			6,806							6,806		
Cosmarium regnesii Reinsch							6,806	6,806				6,806		6,806	6,806				6,806	
Cosmarium sp.																				
Crucegenia crucifera (Wolle) Collins																				
Crucegenia quadrata Morren	20,420	13,613													20,420					
Crucegenia rectangularis (A. Braun) Gay																				
Crucegenia sp.																				
Crucegenia tetrapedia (Kirchner) W. & G.S. West																			6,806	6,806
Elakatothrix genevensis (Reverdin) Hindak															6,806					
Euastrum ansatum Ehrenberg																				
Euastrum insulare (Wittrock) Roy	6,806																			
Eudorina elegans Ehrenberg					6,806															
Gloeocystis sp.		20,420				6,806	6,806	6,806	13,613					6,806	6,806		13,613	6,806		
Gloeotilia sp.	20,420	20,420	10,210	20,420	6,806	20,420	6,806	6,806	13,613	6,806		6,806		6,806	6,806	61,261	74,874	61,261	47,647	13,613
Kirchneriella contorta (Schmidle) Bohlin																	6,806			
Korshikoviella sp.		27,227		6,806	6,806	20,420		6,806	6,806	6,806	6,806	6,806	6,806	13,613				6,806		
Monoraphidium braunii Naegeli	88,488	61,261	71,471	61,261	40,840	54,454	6,806	40,840	54,454	13,613	34,033	27,227	20,420	47,647	6,806	115,715	40,840	88,488	74,874	47,647
Monoraphidium contortum (Thuret) Komarkova-Legenerova																	6,806			6,806
Monoraphidium convolutum (Corda)	6,806									6,806				6,806						
Monoraphidiu dybowskii (Wolosz) Hindak et. Kom.-Legn.																				
Monoraphidium griffithii (Berkeley) Komarkova-Legenerova	6,806	13,613			13,613	6,806		6,806	13,613						6,806	102,101	95,294	122,522	47,647	54,454
Monoraphidium irregulare (G.M. Smith) Komarkova-Legenerova				6,806																
Monoraphidium minutum (Nag.) Komarkova-Legenerova																				
Monoraphidium setiforme Komarkova-Legenerova																				
Monoraphidium sp.		6,806																		
Mougeotia sp.										6,806					6,806				6,806	
Oocystis borgei Snow			10,210							13,613										
Oocystis gigas Archer																				
Oocystis parva W. & G.S. West	40,840	61,261	102,101	81,681	40,840	68,067	61,261	95,294	34,033	54,454	27,227	20,420	34,033	61,261	34,033	74,874	27,227	74,874	6,806	20,420
Oocystis pusilla Hansgirg						6,806								6,806	6,806		20,420			
Oocystis solitaria Wittrock	6,806	6,806	10,210	13,613				6,806	6,806						6,806	6,806	40,840	6,806	6,806	54,454

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
SPECIES	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L
Oocystis submarina Lagerheim																				
Quadrigula chodatii (Tanner-Fullman) G.M. Smith				13,613	6,806											13,613				
Scenesdesmus ecornis var. *bicellularis* (Ehrenberg) Chodat																				6,806
Scenedesmus dimorphus (Turp.) Kuetzing																				
Spondylosium planum (Wolle) W. & G.S. West	13,613		20,420	6,806													13,613	13,613	20,420	6,806
Tetraedron minimum (A. Braun) Hansgirg																	6,806			
Tetraedron mimimum var. *tetralobulatum* Reins	40,840	27,227	10,210	6,806	6,806	20,420	13,613	20,420	6,806	13,613			6,806	6,806	6,806			6,806	13,613	
Ulothrix sp.																				
Total Chlorophyta	265,457	258,654	234,832	217,812	129,323	204,199	102,098	211,002	156,550	122,517	74,872	68,065	68,065	163,357	122,513	428,823	367,557	408,400	265,457	217,812
CHRYSOPHYTA																				
Bitrichia chodatii (Reverdin) Chodat	6,806		10,210									6,806	20,420				40,840	6,806	6,806	13,613
Chrysolykos planctonicus Mack				6,806	6,806															
Chrysolykos skujae (Nauwerck) Bourrelly			10,210																	
Chromulina sp.	13,613	13,613	30,630	13,613	6,806	6,806			6,806	6,806	6,806	6,806	6,806	6,806	6,806	13,613		47,647	13,613	40,840
Desmarella moniliformis Kent															6,806					
Dicronema cf. *vlklanum* Prauser	47,647	13,613	40,840		6,806	27,227			40,840		6,806	6,806	6,806	6,806		13,613			6,806	6,806
Dinobryon acuminatum Ruttner																				13,613
Dinobryon bavaricum var. *medium* (Lemmermann) Krieger			10,210	6,806	27,227	6,806	6,806		6,806		6,806	6,806	13,613	20,420		54,454	102,100	102,101	88,488	40,840
Dinobryon bavaricum Imhof		34,033		6,806		20,420	27,227	34,033		6,806	13,613	6,806		6,806	27,227				6,806	
Dinobryon borgei Lemmermann											6,806				6,806	34,033	74,874	40,840	13,613	54,454
Dinobryon dilatatum Hillard	13,613		10,210	6,806					6,806	6,806		6,806	6,806	6,806	20,420		6,806	6,806	6,806	6,806
Dinobryon sp. (loose monad)			10,210				13,613	27,227	20,420		13,613	13,613	6,806	20,420	13,613	20,420	13,613	20,420	13,613	6,806
Dinobryon sociale var. *americana* (Brunthaler) Bachmann		6,806											20,420		40,840	13,613	40,840	40,840	27,227	68,067
Dinobryon sociale Ehrenberg								13,613		6,806	13,613	6,806		27,227						
Dinobryon bavaricum var. *Vanhoffenii* (Bachm.) Krieg.																				6,806
Epipyxis sp.		6,806	10,210	13,613	13,613	6,806		6,806				6,806				13,613	20,420	27,227	6,806	20,420
Unid. naked Chrysophyte sp. (*Ochromonas*/*Chromulina*)-large	401,600	353,952	326,725	347,145	333,532	340,339	238,237	387,986	306,305	367,566	251,851	449,247	578,576	544,542	469,668	496,895	544,542	844,041	490,088	775,973
Unid. naked Chrysophyte sp. (*Ochromonas*/*Chromulina*)-small	238,237	190,589	245,044	217,817	211,010	258,657	149,749	163,362	170,169	258,657	217,817	292,691	292,691	306,305	306,305	176,976	197,396	347,145	340,339	544,542
Haptophyte *(Erkenia/Chrysochromulina)*		6,806	10,210	13,613			13,613		6,806	27,227	13,613	13,613	20,420		6,806			6,806	6,806	34,033
Kephyrion boreale Skuja		6,806		6,806	6,806						34,033	6,806	13,612	6,806	27,226	6,806	13,613		6,806	6,806
Kephyrion sp.													6,806							6,806
Mallomonas sp.									13,613	6,806		6,806		27,227						6,806

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
SPECIES	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L	cells/L
Monosiga varians Skuja					6,806	6,806			6,806	6,806		6,806		13,613	13,613					20,420
Ochromonas sp.		6,806		6,806						6,806				13,613				40,840		34,033
Pedinella sp.				6,806																
Pseudokephyrion alaskanum Hilliard												6,806								
Pseudokephyrion attenuatum Hilliard																6,806		6,806	6,806	13,613
Pseudokephyrion ellipsoideum (Pascher) Schmid						6,806					6,806	13,613		6,806	6,806					
Pseudokephyrion minutissimum Conrad																				
Stichogloea globosa Starmach	6,806	20,420		20,420	6,806	20,420		40,840	20,420	13,613	47,647	88,488	47,647	54,454	68,067		6,806	13,613	13,613	
Stichogloea doederleinii (Schmidle) Wille	34,033	54,454	10,210	54,454	34,033	54,454	20,420	13,613	20,420	47,647	108,908	176,976	88,488	54,454	102,101	61,261	40,840	81,681	54,454	34,033
Synura sp.								6,806												
Uroglena sp.							6,806													
Total Chrysophyta	762,355	714,704	724,919	728,317	660,251	755,547	476,471	694,286	626,217	762,352	748,738	1,129,913	1,129,917	1,123,111	1,123,110	912,103	1,102,690	1,633,619	1,109,496	1,756,136
CRYPTOPHYTA																				
Cryptomonas erosa Ehrenberg		6,806		6,806																
Cryptomonas marsonii Skuja																				6,806
Cyrptomonas phaseolus Skuja				6,806																
Katablepharis ovalis Skuja	20,420	68,067	20,420	47,647	34,033	13,613	20,420	61,261	54,454	74,874	27,227	47,647	54,454	27,227	61,261	95,294	81,681	102,101	68,067	68,067
Rhodomonas lens Pascher & Ruttner																				
Rhodomonas minuta Skuja	54,454	20,420	30,630	34,033	34,033	34,033	13,613	34,033	20,420	6,806	6,806	20,420	13,613	20,420	20,420	34,033	27,227	27,227	6,806	20,420
Total Cryptophyta	74,874	95,293	51,050	95,292	68,066	47,646	34,033	95,294	74,874	81,680	34,033	68,067	68,067	47,647	81,681	129,327	108,908	129,328	74,873	95,293
CYANOBACTERIA																				
Anabaena affinis Lemmermann																				
Anabaena circinalis Rabenhorst																				
Anabaena solitaria f. planctonica (Brunnthaler) Komarek				6,806																
Anabaena solitaria Klebahn																				
Anabaena sp.									6,806							6,806				
Aphanocapsa delicatissima West & West	292,691	959,756	234,834	469,668	408,407	285,884	163,362	316,515	255,254	272,271	88,488	149,749	95,294	170,169	122,522	163,362	275,674	136,135	136,135	122,522
Aphanocapsa elachista W. & G.S. West	34,033	34,033	61,261	10,210	3,403	13,613	6,806	13,613	27,227	6,806	6,806	6,806	13,613	6,806	27,227		13,613	40,840		13,613
Aphanothece sp.	95,294	183,783	163,362	408,407	347,145	204,203	81,681	153,152	102,101	88,488	34,033	27,227	68,067	20,420	27,227	40,840	61,261	20,420	129,328	61,261
Aphanothece clathrata W & G.S. West				6,806					6,806						6,806					
Chroococcus limneticus Lemmermann		6,806				6,806	6,806	6,806					6,806							
Cyanodictyon sp. 1 (rod-shaped)	6,806																			

Table JJ.VIII-1 Phytoplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year:	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**
Day:	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**1**	**1**	**1**	**1**	**1**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
SPECIES	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**	**cells/L**
Cyanodictyon sp. 2 (spherical)		6,806																		
Cylindrospermum minimum G.S. West									6,806											
Limnothrix sp.	40,840	47,647	40,840	27,227	34,033	47,647	40,840	47,647	27,227	40,840		6,806		6,806		61,261	61,261	115,715	102,101	88,488
Merismopedia tenusissima Lemmermann	34,033	20,420		20,420	20,420	6,806		6,806	6,806		20,420	54,454	54,454	34,033		27,227	27,227	6,806	6,806	27,227
Nostoc sp.				6,806																
Oscillatoria chalybea Mertens																				
Phormidium sp.																			6,806	
Planktolyngya limnetica Lemmermann							6,806	6,806					6,806					6,806	27,227	34,033
Rhabdoderma lineare Schmidle & Lauterborn	6,806															6,806				
Snowella lacustris (Chodat) Komarek et Hindak		6,806						6,806						6,806	13,613		6,806			
Total Cyanobacteria	510,503	1,266,057	500,297	956,350	813,408	564,959	306,301	558,151	439,033	408,405	149,747	245,042	245,040	245,040	197,395	306,302	445,842	326,722	408,403	347,144
PYRROHPYTA																				
Phacus sp.																				
Glenodinium sp.																	6,806	6,806		
Gymnodinium ordinatum Skuja		13,613		6,806	6,806		6,806	6,806	6,806	6,806	6,806	6,806	6,806	13,613	40,840	6,806	13,613			
Gymnodinium sp.		6,806	10,210		6,806														13,613	6,806
Peridinium inconspicum Lemmermann																	6,806			
Peridinium pusillum (Penard) Lemmermann																			20,420	
Peridinium sp.												6,806								
Total Pyrrophyta		20,419	10,210	6,806	13,612		6,806	6,806	6,806	6,806	6,806	13,612	6,806	13,613	40,840	6,806	27,225	6,806	34,033	6,806
TOTAL	1,660,835	2,464,031	1,633,619	2,086,254	1,779,952	1,613,190	959,740	1,654,023	1,371,545	1,429,405	1,075,454	1,579,151	1,579,153	1,619,993	1,633,605	1,824,199	2,161,126	2,654,622	2,035,200	2,559,321

cells/L = cells per litre; µm = micrometer; n/a = not available.

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year:	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**
Day:	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**2**	**2**	**2**	**2**	**2**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**
SPECIES	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**
BACILLARIOPHYTA																				
Achnanthes minutissima Kuetzing	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
Asterionella formosa Hansall	11.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aulacoseira spp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclotella/Stephanodiscus sp (4-10 μm)	71.17	46.16	48.11	50.71	17.77	16.62	10.69	13.94	21.60	13.37	11.85	16.62	21.38	22.54	21.56	8.02	26.37	11.85	3.02	8.02
Cyclotella/Stephanodiscus sp (14-18 μm)	0.00	0.00	0.00	4.01	0.00	0.00	0.00	7.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclotella bodanica Grunow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.59	0.00	10.95	10.95	0.00	0.00	0.00
Cymbella sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eunotia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula sp.	4.64	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitzschia acicularis (Kuetzing) W. Smith	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00
Nitzschia sp.	0.00	1.74	2.89	0.00	6.09	0.00	0.80	1.20	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00
Synedra/Nitzschia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rhizosolenia eriensis H.L. Smith	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	0.68	1.03	0.00	0.00	0.00	0.00	0.00
Rhizosolenia longiseta Ehrenberg	0.07	0.18	0.00	0.10	0.64	0.09	0.19	0.00	0.19	0.09	0.51	0.06	0.17	0.06	0.17	0.06	0.00	0.00	0.04	0.26
Synedra sp.	4.14	3.77	1.38	2.36	6.98	0.00	0.00	1.73	0.92	0.00	0.00	4.33	1.23	0.00	1.23	0.00	0.00	0.00	1.10	1.19
Synedra ulna (Nitzsch) Ehr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tabellaria flocculosa (Roth) Kuetzing	6.26	0.00	0.00	0.00	3.57	0.00	0.00	0.00	0.00	0.00	0.00	10.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Bacillariophyta	97.30	52.25	52.39	57.65	35.06	16.70	11.68	30.74	23.32	13.45	12.36	31.67	23.83	38.88	23.98	19.95	37.41	11.85	5.07	9.47
CHLOROPHYTA																				
Ankistrodesmus bernardii Komarek	2.39	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ankistrodesmus falcatus (Corda) Ralfs	0.53	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ankistrodesmus falcatus var. *mirabilis* West	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ankistrodesmus fusiformis Corda	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ankistrodesmus gracilis (Reinsch) Kors.	0.00	0.00	0.00	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ankistrodesmus spiralis (Turner) Lemmermann	1.21	2.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arthrodesmus cuspidatus (Brebisson) Teiling	0.00	2.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arthrodesmus incus (Brebisson) Hassall	0.00	0.00	0.00	10.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.57	0.00	11.18	0.00	0.00	0.00
Arthrodesmus incus var. *ralfsii* (W. West) Teiling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chamydomonas frigida Skuja	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chlamydomonas globosa Snow	0.00	0.00	0.00	14.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Closterium acerosum (Schrank) Ehrenberg	0.00	0.00	0.00	0.00	0.00	0.00	228.10	0.00	0.00	307.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coenocystis sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	3.21	0.00	0.00	0.00	0.00
Cosmaruim bioculatum Brebisson	0.00	0.00	0.00	0.00	0.00	0.00	11.18	0.00	11.18	11.18	11.18	11.18	0.00	8.55	0.00	0.00	4.28	7.19	0.00	0.00
Cosmarium phaseolus Brebisson	30.37	44.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.81
Cosmarium regnesii Reinsch	0.00	0.00	0.00	0.00	0.00	2.28	0.00	0.00	0.00	0.00	2.28	0.00	0.00	0.00	0.00	0.00	0.00	3.56	0.00	0.00
Cosmarium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.51	0.00	0.00	0.00	0.00	0.00	0.00
Crucegenia crucifera (Wolle) Collins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00
Crucegenia quadrata Morren	0.41	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.38	0.00
Crucegenia rectangularis (A. Braun) Gay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.42	0.00	0.00	0.00	19.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crucegenia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.05	0.00	0.00	0.00
Crucegenia tetrapedia (Kirchner) W. & G.S. West	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elakatothrix genevensis (Reverdin) Hindak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.14	0.00	0.00	0.17	0.00	0.00	0.00	0.00
Euastrum ansatum Ehrenberg	0.00	0.00	4.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Euastrum insulare (Wittrock) Roy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eudorina elegans Ehrenberg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gloeocystis sp.	7.59	0.97	0.00	1.34	0.00	1.82	0.00	0.00	0.77	0.00	1.82	0.89	0.00	2.67	4.56	0.00	1.37	4.56	7.30	0.00
Gloeotilia sp.	0.00	3.07	2.31	0.00	6.93	4.23	10.26	1.92	2.57	0.00	0.00	3.42	3.08	3.08	1.88	5.77	3.46	2.31	7.53	1.15
Kirchneriella contorta (Schmidle) Bohlin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Korshikoviella sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.14	0.29	0.00	0.00	0.00	0.00	0.16
Monoraphidium braunii Naegeli	0.90	0.77	0.38	1.41	0.35	0.34	0.60	0.51	0.77	0.68	3.18	0.77	1.28	0.86	0.60	0.50	0.50	0.50	0.26	1.00
Monoraphidium contortum (Thuret) Komarkova-Legenerova	1.01	0.29	0.20	0.81	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidium convolutum (Corda)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28
Monoraphidiu dybowskii (Wolosz) Hindak et. Kom.-Legn.	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.43	0.00	0.00
Monoraphidium griffithii (Berkeley) Komarkova-Legenerova	2.47	2.28	3.21	2.57	4.49	1.28	0.00	0.00	0.00	0.00	0.00	0.34	0.46	0.43	2.98	0.00	1.28	0.00	0.00	2.64
Monoraphidium irregulare (G.M. Smith) Komarkova-Legenerova	0.00	2.39	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidium minutum (Nag.) Komarkova-Legenerova	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidium setiforme Komarkova-Legenerova	1.37	1.91	3.21	1.71	1.07	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00
Monoraphidium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mougeotia sp.	75.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oocystis borgei Snow	7.44	7.52	1.34	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00	0.00	6.93	13.86	0.00	0.00	0.00	0.00	0.00
Oocystis gigas Archer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.13	0.00	0.00	0.00	0.00	0.00

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Oocystis parva W. & G.S. West	1.82	4.10	7.70	2.60	2.17	1.88	0.00	1.57	1.80	6.84	1.71	11.98	8.34	0.77	5.93	0.77	2.57	1.03	0.00	2.02
Oocystis pusilla Hansgirg	0.00	0.00	1.37	1.92	0.00	30.79	0.96	0.38	1.80	9.69	2.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.73	0.00
Oocystis solitaria Wittrock	0.00	0.00	0.00	20.53	0.38	2.05	0.00	5.39	0.00	0.00	0.00	0.00	0.00	2.74	1.14	0.89	1.54	0.00	0.00	1.75
Oocystis submarina Lagerheim	0.00	0.00	0.00	0.00	0.00	17.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quadrigula chodatii (Tanner-Fullman) G.M. Smith	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scenesdesmus ecornis var. *bicellularis* (Ehrenberg) Chodat	0.12	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scenedesmus dimorphus (Turp.) Kuetzing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spondylosium planum (Wolle) W. & G.S. West	3.89	5.83	5.47	10.69	5.35	7.19	0.00	1.82	0.00	12.32	8.55	3.56	0.00	0.00	0.00	0.00	0.00	3.56	0.00	0.00
Tetraedron minimum (A. Braun) Hansgirg	18.98	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.16	0.00	0.00	0.00	0.00	0.00
Tetraedron mimimum var. *tetralobulatum* Reins	0.00	0.00	0.00	16.04	0.69	0.00	0.00	0.46	0.46	0.46	0.00	0.10	0.46	0.19	0.46	0.23	0.10	0.10	0.00	0.29
Ulothrix sp.	0.00	0.00	0.00	0.00	0.00	2.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Chlorophyta	158.01	82.46	33.01	86.17	23.38	72.38	253.10	29.34	19.72	351.84	31.10	51.48	14.50	56.12	58.41	11.71	28.96	24.23	17.20	34.09
CHRYSOPHYTA																				
Bitrichia chodatii (Reverdin) Chodat	0.36	0.34	0.00	0.00	0.24	0.00	0.19	0.00	1.03	0.38	0.00	0.00	0.16	0.58	0.34	0.34	0.00	0.34	0.00	0.19
Chrysolykos planctonicus Mack	0.06	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Chrysolykos skujae (Nauwerck) Bourrelly	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromulina sp.	0.00	4.10	5.35	5.88	5.88	0.98	1.28	3.85	0.00	2.14	0.98	0.51	0.00	0.80	0.00	0.00	0.80	2.94	0.00	1.28
Desmarella moniliformis Kent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dicronema cf. *vlklanum* Prauser	0.18	0.17	0.24	0.17	0.94	0.64	0.96	0.64	0.11	0.38	0.23	0.51	0.51	1.48	1.28	0.29	0.71	0.00	0.16	0.32
Dinobryon acuminatum Ruttner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dinobryon bavaricum var. *medium* (Lemmermann) Krieger	5.47	4.86	0.86	8.66	1.68	5.13	2.28	1.96	2.85	0.68	0.63	1.25	2.85	0.00	4.39	6.27	2.74	0.00	0.00	1.37
Dinobryon bavaricum Imhof	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85	5.39	1.07	1.71	5.88	0.77	1.71	1.37	0.00	2.05	3.34	1.25
Dinobryon borgei Lemmermann	0.55	1.09	0.00	1.54	0.38	0.51	0.22	0.00	0.00	0.00	4.89	0.00	0.00	0.00	0.00	0.07	0.00	0.22	0.00	0.00
Dinobryon dilatatum Hillard	0.61	0.48	0.67	0.68	1.15	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00
Dinobryon sp. (loose monad)	1.02	0.00	0.00	5.13	11.23	0.19	0.26	1.80	0.00	1.25	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.32	0.00	0.00
Dinobryon sociale var. *americana* (Brunthaler) Bachmann	3.64	0.00	0.00	0.00	2.57	0.00	0.00	1.28	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dinobryon sociale Ehrenberg	0.00	1.37	0.00	2.69	9.41	0.00	0.57	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dinobryon bavaricum var. *Vanhoffenii* (Bachm.) Krieg.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Epipyxis sp.	0.00	0.17	0.24	0.29	0.11	0.00	0.00	0.00	0.19	0.32	0.00	0.00	0.00	0.00	0.22	0.00	0.22	0.45	0.00	0.45
Unid. naked Chrysophyte sp. (*Ochromonas*/*Chromulina*)-large	132.27	116.15	132.80	121.89	150.31	26.46	31.05	26.46	55.17	35.28	35.28	29.40	30.79	23.52	37.21	16.04	28.51	46.07	38.49	64.62
Unid. naked Chrysophyte sp. (*Ochromonas*/*Chromulina*)-small	6.49	4.10	7.22	11.31	9.86	3.05	3.69	3.21	3.37	3.05	3.53	5.93	2.89	3.69	1.92	1.60	3.21	4.97	3.85	4.17

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Haptophyte *(Erkenia/Chrysochromulina)*	0.00	0.14	0.00	0.00	0.43	0.00	0.06	0.00	0.00	0.06	0.00	0.11	0.17	0.06	0.23	0.06	0.00	0.11	0.04	0.00
Kephyrion boreale Skuja	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kephyrion sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mallomonas sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00	1.54	0.00	0.00	0.00	0.00
Monosiga varians Skuja	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ochromonas sp.	2.73	1.37	5.35	6.68	6.68	1.28	0.46	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	3.49	1.15	1.15	0.00
Pedinella sp.	0.00	0.00	0.00	5.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudokephyrion alaskanum Hilliard	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudokephyrion attenuatum Hilliard	2.92	0.00	1.37	2.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudokephyrion ellipsoideum (Pascher) Schmid	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudokephyrion minutissimum Conrad	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stichogloea globosa Starmach	0.00	0.00	0.00	0.00	0.00	5.47	7.30	57.02	85.54	7.13	24.95	7.30	3.56	3.56	0.00	0.00	17.82	7.13	0.00	10.95
Stichogloea doederleinii (Schmidle) Wille	0.00	0.00	3.42	7.70	0.00	29.69	43.62	53.89	2.57	35.93	0.00	5.24	22.81	0.00	13.97	33.18	0.00	6.42	3.49	1.75
Synura sp.	8.93	2.92	0.00	6.29	9.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uroglena sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Chrysophyta	165.38	137.31	157.50	187.63	210.48	73.42	91.94	150.37	154.25	92.88	71.55	51.98	74.33	34.78	61.28	60.76	57.51	72.18	50.53	86.35
CRYPTOPHYTA																				
Cryptomonas erosa Ehrenberg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cryptomonas marsonii Skuja	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyrptomonas phaseolus Skuja	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Katablepharis ovalis Skuja	1.82	2.43	5.13	11.98	15.05	0.57	0.00	0.57	2.14	0.00	4.39	3.14	2.85	3.76	12.74	0.57	0.57	0.00	0.00	1.88
Rhodomonas lens Pascher & Ruttner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00
Rhodomonas minuta Skuja	0.67	0.00	1.71	4.41	0.00	4.28	4.79	2.05	5.47	4.79	4.11	1.71	3.76	4.39	2.74	1.25	2.51	2.51	4.11	2.74
Total Cryptophyta	2.49	2.43	6.84	16.39	15.05	4.85	4.79	2.62	7.61	4.79	8.50	4.85	6.61	8.15	15.48	1.82	3.08	5.25	4.11	4.62
CYANOBACTERIA																				
Anabaena affinis Lemmermann	0.00	15.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena circinalis Rabenhorst	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena solitaria f. planctonica (Brunnthaler) Komarek	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena solitaria Klebahn	0.00	0.00	2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aphanocapsa delicatissima West & West	118.43	120.85	53.46	98.37	95.80	64.72	57.02	113.76	118.33	86.96	45.62	68.43	71.28	94.38	66.15	46.76	104.35	44.94	16.25	61.87

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Aphanocapsa elachista W. & G.S. West	6.15	3.28	0.00	0.00	4.33	0.00	7.70	3.46	61.59	3.85	0.00	48.11	23.09	0.00	0.00	14.63	8.66	25.02	24.06	3.85
Aphanothece sp.	2.73	0.00	14.43	19.25	25.02	36.57	25.66	29.51	66.72	6.42	44.91	53.89	60.30	69.28	48.11	65.44	59.02	9.62	10.26	53.37
Aphanothece clathrata W & G.S. West	0.00	0.00	0.00	0.00	0.00	0.00	19.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.25	0.00	0.00	0.00	12.83
Chroococcus limneticus Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	0.00	14.60	3.65	7.30	0.00	0.00	0.00	0.00	0.00
Cyanodictyon sp. 1 (rod-shaped)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.83	0.00	0.00	0.00	0.00
Cyanodictyon sp. 2 (spherical)	0.00	0.00	0.00	0.00	2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71	0.00	0.00
Cylindrospermum minimum G.S. West	0.00	0.00	0.00	2.89	2.60	0.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Limnothrix sp.	45.55	25.62	24.06	28.87	80.83	3.74	7.48	4.81	51.64	20.85	53.25	70.03	65.22	56.88	28.98	16.04	65.97	52.39	92.70	21.06
Merismopedia tenusissima Lemmermann	0.00	0.12	0.00	0.00	0.00	1.14	0.00	0.00	0.00	0.00	2.11	0.06	2.05	0.29	0.00	0.00	0.11	0.00	0.00	2.05
Nostoc sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oscillatoria chalybea Mertens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.90	0.00	0.00	0.00	0.00	0.00	0.00
Phormidium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Planktolyngya limnetica Lemmermann	4.55	0.00	0.00	0.00	9.62	5.35	0.00	0.00	0.00	0.00	0.00	0.00	2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rhabdoderma lineare Schmidle & Lauterborn	0.00	0.00	0.00	0.00	0.64	0.34	5.13	1.71	0.00	3.37	0.96	0.38	0.34	0.00	0.00	0.00	0.00	1.92	0.00	0.00
Snowella lacustris (Chodat) Komarek et Hindak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.77	0.00	9.62	0.00	0.00	12.51	0.00
Total Cyanobacteria	177.41	165.42	94.69	154.87	221.07	111.86	122.25	153.26	299.24	121.44	154.14	240.91	247.94	252.15	150.54	184.56	238.12	135.60	155.78	155.04
PYRROHPYTA																				
Phacus sp.	0.00	0.00	0.00	0.00	0.00	0.00	18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Glenodinium sp.	17.49	0.00	0.00	0.00	18.86	0.00	0.00	0.00	0.00	0.00	0.00	11.18	0.00	8.21	0.00	0.00	0.00	0.00	0.00	0.00
Gymnodinium ordinatum Skuja	1.37	0.95	0.00	18.34	0.00	0.00	1.54	0.00	1.54	0.00	2.74	0.00	0.00	0.00	0.00	0.00	8.21	1.54	0.00	0.00
Gymnodinium sp.	0.00	0.00	0.00	103.93	4.62	0.00	0.00	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peridinium inconspicum Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peridinium pusillum (Penard) Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peridinium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Pyrrophyta	18.86	0.95	0.00	122.26	23.48	0.00	19.79	1.28	1.54	0.00	2.74	11.18	0.00	8.21	0.00	0.00	8.21	1.54	0.00	0.00
TOTAL	619.44	440.81	344.44	624.97	528.52	279.20	503.54	367.62	505.67	584.41	280.40	392.07	367.21	398.29	309.69	278.81	373.29	250.65	232.69	289.57

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
BACILLARIOPHYTA																				
Achnanthes minutissima Kuetzing	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.28	0.00	0.00	0.00	0.10	0.00
Asterionella formosa Hansall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aulacoseira spp.	0.00	0.00	0.00	0.00	14.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclotella/Stephanodiscus sp (4-10 µm)	10.69	17.19	9.21	6.78	11.85	2.31	2.74	4.41	10.91	5.92	8.23	16.21	5.86	3.83	11.38	2.67	3.83	10.54	10.91	8.87
Cyclotella/Stephanodiscus sp (14-18 µm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclotella bodanica Grunow	0.00	36.95	0.00	0.00	0.00	21.38	0.00	21.38	0.00	0.00	58.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cymbella sp.	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eunotia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula sp.	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.00	0.00	2.08
Nitzschia acicularis (Kuetzing) W. Smith	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitzschia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.41	0.00	0.14	0.49
Synedra/Nitzschia sp.	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.61	0.61	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.61	0.00	0.00
Rhizosolenia eriensis H.L. Smith	0.00	0.00	0.00	0.00	1.03	0.00	2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rhizosolenia longiseta Ehrenberg	0.21	0.34	0.48	0.43	0.43	0.09	0.06	0.43	0.24	0.26	0.11	0.09	0.24	0.00	0.24	0.26	1.44	0.51	0.26	0.60
Synedra sp.	0.80	2.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23	0.00	0.00	1.10	1.96	3.98	6.04	1.74
Synedra ulna (Nitzsch) Ehr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.03
Tabellaria flocculosa (Roth) Kuetzing	0.00	10.21	41.17	14.70	0.00	0.00	6.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.78	0.00	126.81	0.00
Total Bacillariophyta	11.70	67.92	50.85	22.53	28.79	23.78	11.07	34.23	11.76	6.79	67.02	16.29	8.24	4.13	11.89	4.64	56.19	15.65	144.25	24.82
CHLOROPHYTA																				
Ankistrodesmus bernardii Komarek	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.98	0.97	0.00	4.28	0.00
Ankistrodesmus falcatus (Corda) Ralfs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.80	0.00	0.00
Ankistrodesmus falcatus var. *mirabilis* West	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	0.00	0.00	0.00
Ankistrodesmus fusiformis Corda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ankistrodesmus gracilis (Reinsch) Kors.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ankistrodesmus spiralis (Turner) Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.94	1.86	0.00	0.00
Arthrodesmus cuspidatus (Brebisson) Teiling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arthrodesmus incus (Brebisson) Hassall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arthrodesmus incus var. *ralfsii* (W. West) Teiling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.60	0.00	7.13	0.00
Chamydomonas frigida Skuja	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chlamydomonas globosa Snow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Closterium acerosum (Schrank) Ehrenberg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Coenocystis sp.	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cosmaruim bioculatum Brebisson	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cosmarium phaseolus Brebisson	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.09	0.00	0.00	23.09	0.00	0.00	0.00	0.00	0.00	0.00	2.28	0.00	0.00
Cosmarium regnesii Reinsch	0.00	0.00	0.00	0.00	0.00	0.00	2.28	2.28	0.00	0.00	0.00	2.28	0.00	2.28	2.28	0.00	0.00	0.00	3.56	0.00
Cosmarium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crucegenia crucifera (Wolle) Collins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crucegenia quadrata Morren	1.35	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	0.00	0.00	0.00	0.00	0.00
Crucegenia rectangularis (A. Braun) Gay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crucegenia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crucegenia tetrapedia (Kirchner) W. & G.S. West	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.56	3.56
Elakatothrix genevensis (Reverdin) Hindak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00
Euastrum ansatum Ehrenberg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Euastrum insulare (Wittrock) Roy	15.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eudorina elegans Ehrenberg	0.00	0.00	0.00	0.00	14.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gloeocystis sp.	0.00	15.40	0.00	0.00	0.00	2.74	0.91	0.45	3.85	0.00	0.00	0.00	0.00	7.30	1.54	0.00	5.79	9.24	0.00	0.00
Gloeotilia sp.	4.33	3.46	3.08	4.19	2.74	8.21	3.59	2.57	3.42	3.42	0.00	3.59	0.00	1.06	2.57	26.17	25.40	17.32	23.95	5.47
Kirchneriella contorta (Schmidle) Bohlin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00
Korshikoviella sp.	0.00	1.41	0.00	0.16	0.35	1.11	0.00	0.17	0.13	0.14	0.14	0.14	0.14	0.71	0.00	0.00	0.00	0.11	0.00	0.00
Monoraphidium braunii Naegeli	1.30	0.90	1.05	0.90	1.35	0.80	0.09	0.60	0.80	0.20	0.96	0.40	0.67	0.70	0.22	1.70	0.56	1.20	2.47	1.68
Monoraphidium contortum (Thuret) Komarkova-Legenerova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.29
Monoraphidium convolutum (Corda)	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidiu dybowskii (Wolosz) Hindak et. Kom.-Legn.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidium griffithii (Berkeley) Komarkova-Legenerova	0.96	1.60	0.00	0.00	0.71	0.43	0.00	0.43	0.71	0.00	0.00	0.00	0.00	0.00	0.44	6.52	6.09	7.83	3.04	3.54
Monoraphidium irregulare (G.M. Smith) Komarkova-Legenerova	0.00	0.00	0.00	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidium minutum (Nag.) Komarkova-Legenerova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidium setiforme Komarkova-Legenerova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoraphidium sp.	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mougeotia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.32	0.00	0.00	0.00	0.00	62.87	0.00	0.00	0.00	19.25	0.00
Oocystis borgei Snow	0.00	0.00	16.42	0.00	0.00	0.00	0.00	0.00	0.00	8.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oocystis gigas Archer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oocystis parva W. & G.S. West	1.80	3.59	8.85	4.11	2.05	2.57	2.57	5.90	2.25	3.59	1.80	1.03	2.47	3.85	1.28	5.65	2.05	2.69	0.38	0.67

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Oocystis pusilla Hansgirg	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	1.35	0.00	0.67	0.00	0.00	0.00
Oocystis solitaria Wittrock	1.54	1.75	4.11	3.08	0.00	0.00	0.00	3.65	1.28	0.00	0.00	0.00	0.00	0.00	1.54	2.10	12.57	1.75	0.89	21.90
Oocystis submarina Lagerheim	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quadrigula chodatii (Tanner-Fullman) G.M. Smith	0.00	0.00	0.00	2.57	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	0.00	0.00	0.00	0.00
Scenesdesmus ecornis var. *bicellularis* (Ehrenberg) Chodat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
Scenedesmus dimorphus (Turp.) Kuetzing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spondylosium planum (Wolle) W. & G.S. West	12.83	0.00	7.79	8.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.55	29.20	43.79	3.56
Tetraedron minimum (A. Braun) Hansgirg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.16	0.00	0.00	0.00
Tetraedron mimimum var. *tetralobulatum* Reins	0.58	0.91	0.14	0.23	0.23	0.68	0.46	0.29	0.10	0.19	0.00	0.00	0.10	0.10	0.23	0.00	0.00	0.10	0.19	0.00
Ulothrix sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Chlorophyta	44.31	31.36	41.45	24.99	23.31	17.43	9.89	41.35	13.18	41.99	26.00	7.44	3.38	17.27	75.99	54.45	86.13	74.38	112.51	40.79
CHRYSOPHYTA																				
Bitrichia chodatii (Reverdin) Chodat	0.34	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	1.03	0.00	0.00	0.00	2.05	0.34	0.19	0.68
Chrysolykos planctonicus Mack	0.00	0.00	0.00	0.16	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysolykos skujae (Nauwerck) Bourrelly	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromulina sp.	2.57	2.14	4.41	2.57	1.28	1.15	0.00	0.00	1.28	0.80	1.75	1.41	1.15	1.28	1.75	1.60	0.00	12.22	3.49	7.70
Desmarella moniliformis Kent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00
Dicronema cf. *vlklanum* Prauser	1.12	0.32	0.96	0.00	0.06	0.64	0.00	0.00	0.34	0.00	0.16	0.16	0.06	0.16	0.00	0.32	0.00	0.00	0.16	0.06
Dinobryon acuminatum Ruttner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51
Dinobryon bavaricum var. *medium* (Lemmermann) Krieger	0.00	0.00	1.51	1.48	6.84	0.68	1.48	0.00	1.48	0.00	0.83	0.90	8.15	2.92	0.00	12.12	16.62	18.41	14.82	5.19
Dinobryon bavaricum Imhof	0.00	15.05	0.00	2.05	0.00	4.79	4.11	10.95	0.00	6.29	2.50	1.48	0.00	2.97	5.59	0.00	0.00	0.00	0.45	0.00
Dinobryon borgei Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.26	1.60	6.27	1.54	0.51	1.80
Dinobryon dilatatum Hillard	0.45	0.00	0.34	0.22	0.00	0.00	0.00	0.00	0.26	0.68	0.00	0.32	0.38	0.45	1.06	0.00	0.22	0.26	0.26	0.22
Dinobryon sp. (loose monad)	0.00	0.00	1.03	0.00	0.00	0.00	1.37	2.51	1.25	0.00	0.71	0.77	0.68	2.05	0.90	2.22	1.48	2.05	0.83	0.74
Dinobryon sociale var. *americana* (Brunthaler) Bachmann	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.79	0.00	6.54	4.45	9.59	6.29	3.08	11.12
Dinobryon sociale Ehrenberg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.14	0.00	0.26	1.76	0.38	0.00	4.79	0.00	0.00	0.00	0.00	0.00	0.00
Dinobryon bavaricum var. *Vanhoffenii* (Bachm.) Krieg.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.37
Epipyxis sp.	0.00	0.22	0.29	0.45	0.45	0.22	0.00	0.22	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.11	0.58	0.90	0.19	0.48
Unid. naked Chrysophyte sp. (*Ochromonas/Chromulina*)-large	75.70	60.05	61.59	89.06	75.44	64.15	49.40	89.59	63.51	43.30	64.62	76.21	148.44	92.38	79.68	140.23	92.38	216.55	125.74	91.42
Unid. naked Chrysophyte sp. (*Ochromonas/Chromulina*)-small	5.61	4.49	5.77	1.82	4.97	6.09	3.53	3.85	4.01	6.09	5.13	6.90	6.90	7.22	7.22	4.17	4.65	8.18	8.02	12.83
Haptophyte *(Erkenia/Chrysochromulina)*	0.00	0.06	0.09	0.11	0.00	0.00	0.11	0.00	0.06	0.23	0.11	0.11	0.17	0.00	0.06	0.00	0.00	0.06	0.06	0.29

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year:	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**
Day:	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**1**	**1**	**1**	**1**	**1**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
SPECIES	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**	**mg/m^3**
Kephyrion boreale Skuja	0.00	0.23	0.00	0.23	0.45	0.00	0.00	0.00	0.00	0.00	1.71	0.16	0.32	0.16	0.64	0.19	0.68	0.00	0.13	0.19
Kephyrion sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Mallomonas sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.21	3.65	0.00	6.42	0.00	21.90	0.00	0.00	0.00	0.00	0.00	7.13
Monosiga varians Skuja	0.00	0.00	0.00	0.00	0.16	0.16	0.00	0.00	0.16	0.16	0.00	0.16	0.00	0.32	0.32	0.00	0.00	0.00	0.00	0.48
Ochromonas sp.	0.00	1.41	0.00	1.41	0.00	0.00	0.00	0.00	0.00	1.28	0.00	0.00	0.00	2.57	0.00	0.00	0.00	10.48	0.00	7.06
Pedinella sp.	0.00	0.00	0.00	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudokephyrion alaskanum Hilliard	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudokephyrion attenuatum Hilliard	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.00	0.71	0.22	0.38
Pseudokephyrion ellipsoideum (Pascher) Schmid	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.16	0.38	0.00	0.19	0.16	0.00	0.00	0.00	0.00	0.00
Pseudokephyrion minutissimum Conrad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stichogloea globosa Starmach	14.26	35.64	0.00	14.26	14.26	28.58	0.00	57.02	28.51	7.13	74.84	149.69	81.97	124.74	80.54	0.00	3.65	7.13	10.69	0.00
Stichogloea doederleinii (Schmidle) Wille	15.72	27.94	1.92	20.96	22.70	17.46	27.94	8.73	12.22	30.79	96.05	101.29	47.15	55.88	75.09	11.55	31.93	29.65	15.72	6.24
Synura sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uroglena sp.	0.00	0.00	0.00	0.00	0.00	0.00	61.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Chrysophyta	115.77	148.12	78.65	136.62	126.67	124.29	149.53	175.30	121.30	100.67	250.66	347.41	301.26	319.98	259.92	179.61	170.11	314.77	184.57	156.02
CRYPTOPHYTA																				
Cryptomonas erosa Ehrenberg	0.00	13.97	0.00	15.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cryptomonas marsonii Skuja	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.11
Cyrptomonas phaseolus Skuja	0.00	0.00	0.00	3.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Katablepharis ovalis Skuja	1.88	9.80	1.88	4.19	2.85	1.96	3.21	5.65	4.56	11.76	2.51	3.99	7.84	2.28	8.82	8.78	7.53	10.26	5.70	6.27
Rhodomonas lens Pascher & Ruttner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rhodomonas minuta Skuja	8.55	1.88	3.08	3.42	3.14	3.14	1.37	5.35	3.21	0.68	0.68	2.05	2.14	2.05	2.05	5.35	4.63	4.28	0.68	3.21
Total Cryptophyta	10.44	25.65	4.96	26.17	5.99	5.10	4.58	10.99	7.77	12.45	3.19	6.04	9.98	4.33	10.87	14.13	12.16	14.54	6.39	13.59
CYANOBACTERIA																				
Anabaena affinis Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena circinalis Rabenhorst	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena solitaria f. planctonica (Brunnthaler) Komarek	0.00	0.00	0.00	9.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena solitaria Klebahn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anabaena sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.56	0.00	0.00	0.00	0.00	0.00	0.00	2.89	0.00	0.00	0.00	0.00
Aphanocapsa delicatissima West & West	118.90	346.42	59.45	150.12	81.73	82.12	67.15	92.55	84.72	119.75	17.68	47.33	16.94	47.33	23.38	41.91	79.98	33.93	49.61	39.63
Aphanocapsa elachista W. & G.S. West	41.19	25.60	116.92	10.20	9.62	2.69	1.15	26.94	51.96	19.25	3.85	0.38	38.49	3.85	55.04	0.00	2.69	32.72	0.00	30.79

Table JJ-VIII-2 Phytoplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year:	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
SPECIES	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
Aphanothece sp.	73.13	153.97	123.17	280.99	148.19	114.51	62.55	74.10	70.25	59.02	17.96	15.40	19.63	8.98	16.68	14.76	53.89	14.11	62.23	31.43
Aphanothece clathrata W & G.S. West	0.00	0.00	0.00	19.25	0.00	0.00	0.00	0.00	19.25	0.00	0.00	0.00	0.00	0.00	19.25	0.00	0.00	0.00	0.00	0.00
Chroococcus limneticus Lemmermann	0.00	14.26	0.00	0.00	0.00	14.60	14.60	14.60	0.00	0.00	0.00	0.00	14.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanodictyon sp. 1 (rod-shaped)	6.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyanodictyon sp. 2 (spherical)	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cylindrospermum minimum G.S. West	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Limnothrix sp.	41.16	40.84	35.28	18.18	23.84	32.61	37.42	44.91	24.06	32.72	0.00	4.81	0.00	1.07	0.00	52.07	39.03	92.38	78.05	66.18
Merismopedia tenusissima Lemmermann	1.37	0.51	0.00	0.91	4.11	0.11	0.00	0.11	0.46	0.00	0.68	2.05	2.17	0.80	0.00	0.68	0.68	0.23	0.23	0.51
Nostoc sp.	0.00	0.00	0.00	26.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oscillatoria chalybea Mertens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phormidium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.11	0.00
Planktolyngya limnetica Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	8.55	6.42	0.00	0.00	0.00	0.00	2.14	0.00	0.00	0.00	0.00	8.55	8.87	24.06
Rhabdoderma lineare Schmidle & Lauterborn	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.00
Snowella lacustris (Chodat) Komarek et Hindak	0.00	0.77	0.00	0.00	0.00	0.00	0.00	7.70	0.00	0.00	0.00	0.00	0.00	19.25	15.40	0.00	9.62	0.00	0.00	0.00
Total Cyanobacteria	283.13	582.94	334.82	515.61	267.49	246.64	191.42	267.32	260.21	230.73	40.17	69.98	93.96	81.27	129.74	113.34	185.89	181.92	216.10	192.61
PYRROHPYTA																				
Phacus sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Glenodinium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.57	2.28	0.00	0.00
Gymnodinium ordinatum Skuja	0.00	5.47	0.00	2.10	2.74	0.00	1.54	2.74	3.19	2.74	2.74	2.74	2.74	5.47	25.66	1.80	5.47	0.00	0.00	0.00
Gymnodinium sp.	0.00	285.12	304.85	0.00	285.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.49	23.09
Peridinium inconspicum Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.09	0.00	0.00	0.00
Peridinium pusillum (Penard) Lemmermann	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.07	0.00
Peridinium sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Pyrrophyta	0.00	290.60	304.85	2.10	287.86	0.00	1.54	2.74	3.19	2.74	2.74	32.76	2.74	5.47	25.66	1.80	41.14	2.28	93.56	23.09
TOTAL	465.34	1146.60	815.59	728.01	740.11	417.24	368.02	531.93	417.41	395.37	389.78	479.93	419.57	432.47	514.08	367.97	551.62	603.55	757.37	450.92

mg/m^3 = milligrams per cubic metre; µm = micrometer; n/a = not available.

Table JJ-VIII-3 Chlorophyll *a* Concentrations (µg/L) in Lakes in the Local Study Area, 2007

Lake	Basin	Chlorophyll *a* Concentration (µg/L)					Mean (µg/L)	Standard Deviation
		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5		
Lake N16	-	0.9	0.7	1.0	1.0	1.0	0.92	0.13
Kennady Lake	K1	1.0	0.7	0.9	0.7	0.6	0.78	0.16
	K2	1.0	0.8	0.6	0.9	0.9	0.84	0.15
	K3	0.5	0.5	1.0	0.5	1.0	0.7	0.27
	K4	1.2	0.9	1.2	0.8	1.1	1.04	0.18
	K5	1.2	1.2	1.0	0.6	0.6	0.92	0.3
Lake 410	-	1.4	1.4	1.3	1.3	1.3	1.34	0.05
Kirk Lake	-	2.6	2.6	2.2	2.6	2.6	2.52	0.18

µg/L = micrograms per litre; - = not applicable.

APPENDIX JJ.IX

ZOOPLANKTON – SUPPORTING DATA, 2007

Table JJ.IX-1 Zooplankton Abundance in Lakes in the Local Study Area, 2007

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
Depth:	3.5	3.5	3.5	3.5	3.5	5	5	5	5	5	13	13	13	13	13	9M	9	9	9	9
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	40	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	1	1	1	1	1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	1	1	2.2	1	2.2
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	S&D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INSTAR IDENTIFICATION & SIZE CLASS	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L
CALANOIDA																				
Heterocope septentrionalis **Juday & Muttkowski**																				
H. septentrionalis adult female	0.0029	0.0044	0.0073	0.0058	0.0044	0.0157	0.0448	0.0224	0.0135	0.0202	0.0147	0.0069	0.0043	0.0103	0.0121	0.0034	0.0062	0.0037	0.0085	0.0100
H. septentrionalis adult male		0.0015	0.0058	0.0029	0.0029	0.0067	0.0022	0.0135	0.0022	0.0224	0.0043	0.0017	0.0060	0.0026	0.0086	0.0051	0.0006	0.0037	0.0011	0.0050
H. septentrionalis 4.0 mm F & M																				
H. septentrionalis 3.0 mm																				
H. septentrionalis 2.0 mm										0.0093										
H. septentrionalis 1.0 mm						0.0815									0.0036					
Total *H. septentrionales*	0.0029	0.0058	0.0131	0.0087	0.0073	0.1039	0.0471	0.0359	0.0157	0.0519	0.0190	0.0086	0.0103	0.0129	0.0243	0.0085	0.0068	0.0075	0.0096	0.0149
Epischura lacustris **S.A. Forbes**																				
E. lacustris adult female	0.0662	0.1165	0.2329	0.0927	0.0795						0.0036	0.0214	0.0036	0.0071	0.0036	0.0361	0.0258	0.0155	0.0155	0.0155
E. lacustris adult male			0.1165	0.0265	0.0132								0.0036			0.0052	0.0052			0.0052
E. lacustris immature 2.0 mm	0.1165		0.1165																	
E. lacustris immature 1.0 mm														0.0627	0.0036					
Total *E. lacustris*	0.1827	0.1165	0.4659	0.1192	0.0927						0.0036	0.0214	0.0071	0.0698	0.0071	0.0412	0.0309	0.0155	0.0155	0.0206
Diaptomus pribilofensis **Juday & Muttkowski**																				
D. pribilofensis adult female	0.1165	0.2329	0.2329	0.2912	0.2329	0.1631	0.0093	0.4892	0.3261	0.4892	0.1881	0.2822	0.3136	0.9407	0.2195	0.2718	0.1812	0.1812	0.1812	0.2718
D. pribilofensis gravid female	0.0662	0.0132	0.0795	0.0397	0.0132	0.0185	0.0278	0.0426	0.0278	0.0556	0.0214	0.0571	0.0143	0.0321	0.0428	0.0052	0.0052	0.0052	0.0361	0.0258
D. pribilofensis adult male		0.4659	0.3494	0.1747	0.2329	0.1631		0.1631	0.1631		0.1881	0.1881	0.2195	0.4390	0.2822	0.2265	0.0453	0.1359	0.1359	0.1359
D. pribilofensis immature 2.0 mm													0.0314							
D. pribilofensis immature 1.0 mm																				
D. pribilofensis immature 0.75 mm															0.0314					
D. pribilofensis immature 0.5 mm																				
Total *D. pribilofensis*	0.1827	0.7121	0.6618	0.5056	0.4791	0.3447	0.0371	0.6948	0.5170	0.5448	0.3977	0.5274	0.5787	1.4118	0.5759	0.5034	0.2316	0.3222	0.3531	0.4334
Diaptomus minutus **Lilljeborg**																				
D. minutus adult female		0.2329	0.3494	0.1747				0.0022	0.2446	0.1631	0.1254	0.0941	0.0009	0.1568	0.0941	0.0006	0.0906	0.0453	0.0453	
D. minutus gravid female	0.1590	0.2120	0.1987	0.2650	0.1987	0.0185	0.0185	0.0112	0.0556	0.0371	0.0036	0.0036					0.0052			
D. minutus adult male	0.6988	0.5823	0.4659	0.2329	0.8153	0.5707	0.2446	0.4076	0.0815	0.3261		0.3136	0.2509	0.3449	0.2822	0.0906	0.1812	0.0906	0.1812	0.2265
D. minutus immature 2.0 mm														0.0314						
D. minutus immature 1.0 mm	0.1165	0.1165	0.1165	0.4659		0.6522	0.4892	0.6522	0.3261	0.8968	0.2195	0.2822	0.5958	0.4076	0.4076	0.1812	0.2718	0.0906	0.2718	0.1359
D. minutus immature 0.75 mm	0.3494	0.2329	0.2329	0.0582		0.4076	0.7338	0.6522	0.4892	0.5707	1.0348	2.0069	2.2891	3.0730	1.9128	2.1741	1.9929	1.4041	1.1776	1.9929

Table JJ.IX-1 Zooplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
Depth:	3.5	3.5	3.5	3.5	3.5	5	5	5	5	5	13	13	13	13	13	9M	9	9	9	9
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	40	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	1	1	1	1	1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	1	1	2.2	1	2.2
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	S&D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INSTAR IDENTIFICATION & SIZE CLASS	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L
D. minutus immature 0.5 mm			0.1165				0.1631	0.0815					0.0314						0.0906	
Total *D. minutus*	1.3237	1.3767	1.4799	1.1967	1.0140	1.6491	1.6491	1.8071	1.1970	1.9938	1.3833	2.7003	3.1679	4.0137	2.6967	2.4464	2.5416	1.6306	1.7665	2.3553
Calanoid nauplius	0.1165																		0.0453	
Total Calanoida ind/L	1.8085	2.2110	2.6207	1.8303	1.5932	2.0977	1.7333	2.5378	1.7297	2.5905	1.8035	3.2577	3.7641	5.5083	3.3040	2.9995	2.8109	1.9757	2.1900	2.8242
CYCLOPOIDA																				
***Cyclops scutifer* Sars**																				
C. scutifer adult female													0.0314	0.0314		0.0052				
C. scutifer gravid female				0.0132			0.0093	0.0022	0.0185											
C. scutifer adult male					0.1165	0.3261	0.0815	0.5707	0.1631	0.0815	0.0314				0.0314					
C. scutifer immature 2.0 mm	0.3494		0.2329	0.4659		0.0815	0.0815			0.2446	0.2509	0.1568	0.3763	0.2509	0.0627	0.0906			0.0453	0.1812
C. scutifer immature 1.0 mm	0.3494	0.3494	0.2329	0.8735	0.2329	0.7338	1.3860	1.2229	0.4076	1.1414	0.7212	1.3484	1.4738	1.2229	0.8153	0.9512	1.1323	0.8153	0.6794	0.9059
C. scutifer immatue 0.75 mm		0.2329	0.1165		0.2329	0.5707	0.5707	0.3261	0.4892	0.4892	0.7526	0.9094	0.5017	1.0661	0.7526	0.8606	1.1323	0.5435	0.4982	0.3623
C. scutifer immature 0.5 mm	0.3494	0.3494	0.3494	0.5823	0.2329	0.0815	0.0815				0.0314	0.2509	0.1568	0.1254	0.1881	0.0906	0.0453	0.0906	0.0453	0.1812
Total *C. scutifer*	1.0482	0.9318	0.9318	1.9350	0.8153	1.7936	2.2105	2.1220	1.0784	1.9567	1.7874	2.6654	2.5399	2.6967	1.8501	1.9981	2.3100	1.4494	1.2682	1.6306
***Cyclops vernalis* Fischer (?) 0.5 mm**	0.2329																			
***Cyclops capillatus* Sars**			0.0029																	
Immature cyclopoid (?)																				
Cyclopoid nauplius	4.4258	6.0564	5.3576	5.1247	4.6588	7.8268	9.2127	7.9898	8.7236	11.2510	5.4248	5.1739	5.2053	6.1774	5.7384	8.1529	6.2052	4.5294	4.8011	6.2505
Total Cyclopoida ind/L	5.7070	6.9882	6.2923	7.0597	5.4741	9.6204	11.4233	10.1118	9.8020	13.2076	7.2122	7.8393	7.7452	8.8741	7.5884	10.1509	8.5152	5.9788	6.0694	7.8811
CLADOCERA																				
***Daphnia middendorffiana* Fischer**																				
D. middendorffiana 3.0 mm						0.0269	0.0185	0.0112	0.0179	0.0157	0.0009	0.0017	0.0026	0.0026	0.0078	0.0034	0.0028	0.0050	0.0057	0.0062
D. middendorffiana 2.5 mm						0.0927	0.1669	0.0556	0.0742	0.0278	0.0017	0.0078	0.0060	0.0069	0.0069	0.0052	0.0051	0.0062	0.0068	0.0075
D. middendorffiana 2.0 mm						0.2504	0.1948	0.2597	0.1020	0.2133		0.0071	0.0107	0.0178	0.0078	0.0103	0.0040	0.0052	0.0052	0.0137
D. middendorffiana 1.5 mm						0.2133	0.1206	0.1577	0.1298	0.1020		0.0143	0.0143	0.0178	0.0036	0.0052		0.0155	0.0206	0.0075
D. middendorffiana 1.0 mm	0.0015			0.0582		0.0742	0.1020	0.0742	0.0371	0.0649		0.0071			0.0036	0.0052				0.0087
D. middendorffiana 0.5 mm							0.0815			0.0093			0.0314							
Total *D. middendorfianna*	0.0015			0.0582		0.6575	0.6843	0.5584	0.3611	0.4330	0.0026	0.0380	0.0649	0.0452	0.0296	0.0292	0.0119	0.0318	0.0382	0.0436
***Holopedium gibberum* Zaddach**																				
H. gibberum 3.0 mm	0.0015	0.0087		0.0087		0.0093		0.0022		0.0022	0.0052	0.0121	0.0060	0.0043	0.0069	0.0028	0.0017	0.0025	0.0017	0.0052
H. gibberum 2.0 mm	0.0015	0.0029	0.0132	0.0029	0.0015	0.0022	0.0093	0.0093		0.0022	0.0078	0.0017	0.0069	0.0017	0.0078	0.0017	0.0006	0.0025	0.0011	0.0052

Table JJ.IX-1 Zooplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
Depth:	3.5	3.5	3.5	3.5	3.5	5	5	5	5	5	13	13	13	13	13	9M	9	9	9	9
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	40	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	1	1	1	1	1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	1	1	2.2	1	2.2
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	S&D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INSTAR IDENTIFICATION & SIZE CLASS	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L
H. gibberum 1.0 mm	0.0132			0.0015	0.0015			0.0093												
H. gibberum 0.5 mm																				
Total *H. gibberum*	0.0162	0.0116	0.0132	0.0131	0.0029	0.0115	0.0093	0.0208		0.0045	0.0129	0.0138	0.0129	0.0060	0.0147	0.0045	0.0023	0.0050	0.0028	0.0103
Eubosmina longispina																				
E. longispina 1.0 mm				0.0015								0.0036	0.0009			0.0052		0.0103		0.0052
E. longispina 0.75 mm				0.0029		0.0093						0.0036		0.0036	0.0036		0.0052	0.0103	0.0052	
E. longispina 0.5 mm		0.0265			0.0015				0.0815								0.0052		0.0453	
E. longispina 0.25 mm								0.0815												
Total *E. longispina*		0.0265		0.0044	0.0015	0.0093		0.0815	0.0815			0.0071	0.0009	0.0036	0.0036	0.0052	0.0103	0.0206	0.0504	0.0052
***Eurycercus lamellatus* (O.F. Muller)**					0.0015															
***Chydorus sphaericus* (O.F. Muller)**			0.1165																	
***Acantholeberis curvirostris* (O.F.Muller)**			0.0073																	
Total Cladocera ind/L	0.0176	0.0381	0.1370	0.0757	0.0058	0.6783	0.6936	0.6607	0.4426	0.4375	0.0155	0.0590	0.0787	0.0548	0.0478	0.0388	0.0245	0.0574	0.0915	0.0591
ROTIFERA																				
***Kellicottia* spp.**	7.2211	14.9081	12.3458	13.8599	14.6752	5.1363	11.9847	11.0064	12.2293	12.8815	3.4806	6.9299	9.4072	7.7766	8.9682	9.5117	8.3340	8.1529	9.5570	8.2435
***Keratella* spp.**														0.0314			0.0453	0.0453		
***Polyarthra* spp.**	0.1165		0.1165	0.1165	0.2329	0.0815	0.0815		0.1631			0.0627	0.0941	0.0627		0.0453	0.0906			
***Conochilus* spp.**	4.7753	4.6588	2.9117	5.2411	3.4941	1.6306	1.7936	2.1197	1.9567	2.2828	0.0314	0.4076	0.2195	0.4704	0.3763	0.7247	1.3135	0.8153	0.4982	0.9512
***Collotheca* spp.**																				
***Lecane* spp.**	0.1165	0.1165		0.0582	0.1165				0.0815	0.0815	0.0314					0.0453		0.0453		
***Synchaeta* sp.**								0.0815		0.0815	0.2822			0.0314					0.0453	0.0453
Total Rotifera ind/L	12.2293	19.6834	15.3740	19.2757	18.5187	6.8484	13.8599	13.2076	14.4306	15.3274	3.8256	7.4003	9.7207	8.3724	9.3444	10.3270	9.7834	9.0587	10.1005	9.2399
Total Calanoida ind/L	1.8085	2.2110	2.6207	1.8303	1.5932	2.0977	1.7333	2.5378	1.7297	2.5905	1.8035	3.2577	3.7641	5.5083	3.3040	2.9995	2.8109	1.9757	2.1900	2.8242
Total Cyclopoida ind/L	5.7070	6.9882	6.2923	7.0597	5.4741	9.6204	11.4233	10.1118	9.8020	13.2076	7.2122	7.8393	7.7452	8.8741	7.5884	10.1509	8.5152	5.9788	6.0694	7.8811
Total Cladocera ind/L	0.0176	0.0381	0.1370	0.0757	0.0058	0.6783	0.6936	0.6607	0.4426	0.4375	0.0155	0.0590	0.0787	0.0548	0.0478	0.0388	0.0245	0.0574	0.0915	0.0591
Total Rotifera ind/L	12.2293	19.6834	15.3740	19.2757	18.5187	6.8484	13.8599	13.2076	14.4306	15.3274	3.8256	7.4003	9.7207	8.3724	9.3444	10.3270	9.7834	9.0587	10.1005	9.2399
Harpacticoid exuvia ind/L															0.0314					
Total Crustaceans + Rotifers ind/L	19.7624	28.9207	24.4240	28.2414	25.5917	19.2448	27.7101	26.5179	26.4049	31.5630	12.8568	18.5563	21.3088	22.8095	20.3160	23.5162	21.1339	17.0706	18.4513	20.0043
Total individuals ennumerated and evaluated	200	280	251	578	254	329	439	443	393	478	472	644	753	770	757	573	520	411	471	508

Table JJ.IX-1 Zooplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
Depth:	12	12	12	12	12	5	5	5	5	5	7.5	7.5	7.5	7.5	7.5	3.75	3.75	3.75	3.75	3.75
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ8O3M	WJ8O3M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	80	80	80	80	80	80	80	80	80	40	40	40	40	40	40	40	40
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	2.2	2.2	2.2	2.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PS	-	PS	-
INSTAR IDENTIFICATION & SIZE CLASS	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L
CALANOIDA																				
***Heterocope septentrionalis* Juday & Muttkowski**																				
H. septentrionalis adult female	0.0121	0.0103	0.0131	0.0215	0.0127	0.0092	0.0112	0.0102	0.0092	0.0132	0.0041	0.0041	0.0014	0.0020	0.0034		0.0027	0.0054		
H. septentrionalis adult male	0.0019	0.0019	0.0037	0.0065	0.0038	0.0020	0.0092	0.0122	0.0071	0.0061	0.0007	0.0007		0.0007	0.0034	0.0054	0.0082	0.0027	0.0041	0.0054
H. septentrionalis 4.0 mm F & M							0.0010		0.0010	0.0071	0.0020	0.0034	0.0048	0.0034	0.0027					
H. septentrionalis 3.0 mm								0.0020		0.0093										
H. septentrionalis 2.0 mm																				
H. septentrionalis 1.0 mm												0.0062								
Total *H. septentrionales*	0.0140	0.0121	0.0168	0.0280	0.0166	0.0112	0.0214	0.0245	0.0173	0.0358	0.0068	0.0143	0.0061	0.0061	0.0095	0.0054	0.0109	0.0082	0.0041	0.0054
***Epischura lacustris* S.A. Forbes**																				
E. lacustris adult female	0.0039	0.0039	0.0039	0.0039	0.0116	0.0815	0.0278	0.0185	0.0185	0.0185					0.0062	0.2174	0.0618	0.0371	0.0177	0.0618
E. lacustris adult male								0.0185		0.0093		0.0062		0.0062			0.0124	0.0124	0.0054	0.0124
E. lacustris immature 2.0 mm																			0.0124	
E. lacustris immature 1.0 mm																0.0544		0.0544		0.0544
Total *E. lacustris*	0.0039	0.0039	0.0039	0.0039	0.0116	0.0815	0.0278	0.0371	0.0185	0.0278		0.0062		0.0062	0.0062	0.2718	0.0742	0.1038	0.0355	0.1285
***Diaptomus pribilofensis* Juday & Muttkowski**																				
D. pribilofensis adult female	0.3397	0.2378	0.2718	0.5435	0.2378	0.5707	0.3261	0.3261	0.3261	0.3261	0.1237	0.0804	0.0815	0.1359	0.0815	0.4892	0.2174	0.1237	0.0495	0.1113
D. pribilofensis gravid female	0.0039	0.0193	0.0193	0.0039	0.0193	0.0093	0.0278		0.0835	0.0093	0.0544			0.0124	0.0124	0.0247	0.0495	0.0124	0.0544	0.0124
D. pribilofensis adult male	0.1359	0.3057	0.4076	0.3397	0.2718	0.0815	0.1631	0.4076	0.1631	0.1631	0.1731	0.1237	0.0272	0.0815	0.1902	0.0544	0.3261	0.1855	0.0866	0.0618
D. pribilofensis immature 2.0 mm																				
D. pribilofensis immature 1.0 mm																0.0544				0.0544
D. pribilofensis immature 0.75 mm																0.0544				
D. pribilofensis immature 0.5 mm																				
Total *D. pribilofensis*	0.4794	0.5628	0.6987	0.8871	0.5289	0.6615	0.5170	0.7338	0.5726	0.4984	0.3511	0.2040	0.1087	0.2298	0.2841	0.6770	0.5930	0.3215	0.1904	0.2398
***Diaptomus minutus* Lilljeborg**																				
D. minutus adult female	0.1019	0.3397	0.2378	0.1019	0.1699	0.1631	0.4892	0.2446		0.4076	0.4348	0.4892	0.7338	0.3533	0.5979	0.5979	0.8153	0.3805	0.2718	0.5979
D. minutus gravid female		0.0340		0.0340	0.0340			0.0185	0.0093	0.0278	0.0247	0.0247	0.0433	0.0309	0.0371	0.3261	0.3957	0.3957	0.3091	0.3833
D. minutus adult male	0.1699	0.2718	0.2718	0.3737	0.3737	0.4076	0.8153	0.5707	0.6522	0.4076	0.5979	0.5435	0.4892	0.5163	0.8425	1.1958	1.1958	0.9240	1.8480	1.3045
D. minutus immature 2.0 mm					0.0340							0.1087	0.0272							
D. minutus immature 1.0 mm	0.8493	0.2378	0.5096	0.4076	0.2038	0.3261	0.3261	0.4076	0.2446	0.8153	0.0544	0.3261	0.1087	0.1902	0.1902	0.4348	0.3261	0.3261	0.1631	0.1631
D. minutus immature 0.75 mm	0.7134	1.2909	1.3928	0.6115	1.1890	2.4459	2.3643	2.3643	1.6306	0.9783	0.0544	0.0544	0.0544	0.0815	0.1359	0.5979	0.9240	0.8153	0.7609	1.1958

Table JJ.IX-1 Zooplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
Depth:	12	12	12	12	12	5	5	5	5	5	7.5	7.5	7.5	7.5	7.5	3.75	3.75	3.75	3.75	3.75
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ8O3M	WJ8O3M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	80	80	80	80	80	80	80	80	80	40	40	40	40	40	40	40	40
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	2.2	2.2	2.2	2.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PS	-	PS	-
INSTAR IDENTIFICATION & SIZE CLASS	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L
D. minutus immature 0.5 mm											0.0544		0.0272			0.4348	0.4892	0.3261	0.3805	0.4892
Total *D. minutus*	1.8344	2.1741	2.4119	1.5287	2.0042	3.3427	3.9949	3.6058	2.5367	2.6367	1.2205	1.5466	1.4836	1.1723	1.8035	3.5873	4.1460	3.1677	3.7333	4.1336
Calanoid nauplius		0.0340			0.0679				0.0815	0.0815	0.0544	0.0544	0.0272	0.0272	0.0815	0.1631	0.1087		0.0544	0.2718
Total Calanoida ind/L	2.3317	2.7869	3.1313	2.4476	2.6292	4.0969	4.5611	4.4011	3.2267	3.2803	1.6327	1.8255	1.6256	1.4416	2.1849	4.7045	4.9328	3.6011	4.0176	4.7792
CYCLOPOIDA																				
***Cyclops scutifer* Sars**																				
C. scutifer adult female																0.0544				0.0371
C. scutifer gravid female																0.0124		0.0124		
C. scutifer adult male			0.0340		0.0340		0.1631	0.0815		0.0815				0.0062		0.0544		0.0495	0.0544	0.0124
C. scutifer immature 2.0 mm	0.1019		0.1019	0.2038				0.3261		0.2446	0.0544				0.0272		0.1087			0.0544
C. scutifer immature 1.0 mm	0.2378	0.4756	0.5096	0.1699	0.3397	1.1414	1.1414	0.4892	0.8153	0.8968		0.1631	0.0272	0.1902	0.0815	0.0544		0.0544	0.1087	0.1087
C. scutifer immatue 0.75 mm	0.3737	0.4416	0.6454	0.2718	0.7134	0.4892	0.7338	0.6522	1.1414	0.8968	0.1087	0.1087	0.1087	0.1631	0.2718					0.1087
C. scutifer immature 0.5 mm	0.0679	0.1699	0.0679	0.0679	0.1359	0.2446	0.0815	0.1631	0.2446	0.1631	0.0544		0.0272	0.0272	0.0272		0.1087	0.3805	0.1631	
Total *C. scutifer*	0.7813	1.0870	1.3588	0.7134	1.2229	1.8752	2.1197	1.7121	2.2013	2.2828	0.2174	0.2718	0.1631	0.3866	0.4076	0.1754	0.2174	0.4966	0.3261	0.3212
***Cyclops vernalis* Fischer (?) 0.5 mm**																	0.0544			
***Cyclops capillatus* Sars**																				
Immature cyclopoid (?)													0.0272						0.0544	0.0544
Cyclopoid nauplius	3.4989	4.4161	4.7558	4.0764	5.6730	5.2994	8.2344	8.3159	8.2344	12.0662	3.8047	3.0981	3.2611	2.9350	3.1524	0.8153	1.2501	1.1958	1.4132	1.4132
Total Cyclopoida ind/L	4.2803	5.5032	6.1147	4.7898	6.8960	7.1745	10.3541	10.0280	10.4357	14.3490	4.0221	3.3699	3.4514	3.3217	3.5601	0.9907	1.5219	1.6924	1.7936	1.7887
CLADOCERA																				
***Daphnia middendorffiana* Fischer**																				
D. middendorffiana 3.0 mm	0.0028		0.0028	0.0019		0.0020	0.0010	0.0051		0.0112	0.0007				0.0014					
D. middendorffiana 2.5 mm	0.0028		0.0028	0.0037	0.0013	0.0010	0.0041	0.0082	0.0041	0.0183	0.0007				0.0014	0.0027				
D. middendorffiana 2.0 mm	0.0037	0.0056	0.0028	0.0056	0.0017	0.0031	0.0020	0.0041		0.0173						0.0014				
D. middendorffiana 1.5 mm	0.0065	0.0019	0.0056	0.0056	0.0155	0.0010	0.0093		0.0010	0.0122		0.0007	0.0007			0.0247				
D. middendorffiana 1.0 mm			0.0019	0.0077		0.0093				0.0093						0.0544			0.0124	
D. middendorffiana 0.5 mm										0.0010	0.0062					0.0544				
Total *D. middendorfianna*	0.0159	0.0075	0.0159	0.0245	0.0184	0.0164	0.0164	0.0173	0.0051	0.0694	0.0075	0.0007	0.0007		0.0027	0.1375			0.0124	
***Holopedium gibberum* Zaddach**																				
H. gibberum 3.0 mm				0.0019	0.0004								0.0007			0.0027	0.0041			
H. gibberum 2.0 mm		0.0009	0.0009	0.0019												0.0041	0.0027	0.0041		0.0068

Table JJ.IX-1 Zooplankton Abundance in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
Depth:	12	12	12	12	12	5	5	5	5	5	7.5	7.5	7.5	7.5	7.5	3.75	3.75	3.75	3.75	3.75
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ8O3M	WJ8O3M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	80	80	80	80	80	80	80	80	80	40	40	40	40	40	40	40	40
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	2.2	2.2	2.2	2.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PS	-	PS	-
INSTAR IDENTIFICATION & SIZE CLASS	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L	ind/L
H. gibberum 1.0 mm																	0.0014	0.0014		
H. gibberum 0.5 mm																				
Total *H. gibberum*		0.0009	0.0009	0.0037	0.0004								0.0007			0.0068	0.0082	0.0054		0.0068
Eubosmina longispina																				
E. longispina 1.0 mm		0.0039	0.0019	0.0028	0.0004			0.0093												
E. longispina 0.75 mm	0.0039		0.0019		0.0039	0.0093		0.0093	0.0020	0.0020						0.0544			0.0124	0.0544
E. longispina 0.5 mm	0.0077		0.0340	0.0077	0.0039		0.0815				0.1087	0.0544	0.0272			0.2174		0.0544		
E. longispina 0.25 mm																				
Total *E. longispina*	0.0116	0.0039	0.0377	0.0105	0.0082	0.0093	0.0815	0.0185	0.0020	0.0020	0.1087	0.0544	0.0272			0.2718		0.0544	0.0124	0.0544
***Eurycercus lamellatus* (O.F. Muller)**																0.1087			0.0014	
***Chydorus sphaericus* (O.F. Muller)**																0.0544			0.0124	
***Acantholeberis curvirostris* (O.F.Muller)**						0.0031					0.0062									
Total Cladocera ind/L	0.0275	0.0123	0.0545	0.0388	0.0270	0.0287	0.0979	0.0359	0.0071	0.0714	0.1224	0.0550	0.0285		0.0027	0.5791	0.0082	0.0598	0.0385	0.0611
ROTIFERA																				
***Kellicottia* spp.**	5.9788	9.4777	10.1571	6.8620	8.8662	9.2943	15.1643	17.1210	10.5987	21.1159	14.2947	11.3053	13.8599	15.4633	14.8654	2.9894	10.7618	13.9686	11.3053	13.6968
***Keratella* spp.**		0.0340	0.0340								0.0544	0.1087	0.0544	0.0272	0.0815			0.0544	0.1087	0.1631
***Polyarthra* spp.**	0.0679	0.0340	0.0679	0.0340	0.1019		0.0815	0.0815	0.0815	0.3261	0.2174		0.0544	0.1087	0.0544		0.0544	0.1631	0.3805	0.1087
***Conochilus* spp.**	0.1699	0.2038	0.5435	0.4756	0.3057	0.1631	0.8153	0.1631	0.2446	0.8153		0.1087	0.0815	0.0815	0.0815	0.1631	1.4675	1.7393	1.0327	1.1414
***Collotheca* spp.**									0.0815					0.0272						
***Lecane* spp.**		0.0340									0.0544		0.0272	0.0272						
***Synchaeta* sp.**			0.0340																	
Total Rotifera ind/L	6.2166	9.7834	10.8365	7.3716	9.2739	9.4573	16.0611	17.3656	11.0064	22.2573	14.6208	11.5227	14.0773	15.7350	15.0828	3.1524	12.2836	15.9253	12.8272	15.1100
Total Calanoida ind/L	2.3317	2.7869	3.1313	2.4476	2.6292	4.0969	4.5611	4.4011	3.2267	3.2803	1.6327	1.8255	1.6256	1.4416	2.1849	4.7045	4.9328	3.6011	4.0176	4.7792
Total Cyclopoida ind/L	4.2803	5.5032	6.1147	4.7898	6.8960	7.1745	10.3541	10.0280	10.4357	14.3490	4.0221	3.3699	3.4514	3.3217	3.5601	0.9907	1.5219	1.6924	1.7936	1.7887
Total Cladocera ind/L	0.0275	0.0123	0.0545	0.0388	0.0270	0.0287	0.0979	0.0359	0.0071	0.0714	0.1224	0.0550	0.0285		0.0027	0.5791	0.0082	0.0598	0.0385	0.0611
Total Rotifera ind/L	6.2166	9.7834	10.8365	7.3716	9.2739	9.4573	16.0611	17.3656	11.0064	22.2573	14.6208	11.5227	14.0773	15.7350	15.0828	3.1524	12.2836	15.9253	12.8272	15.1100
Harpacticoid exuvia ind/L												0.0544				0.0544			0.0544	
Total Crustaceans + Rotifers ind/L	12.8560	18.0858	20.1370	14.6478	18.8261	20.7575	31.0743	31.8306	24.6759	39.9581	20.3981	16.8274	19.1828	20.4983	20.8305	9.4811	18.7464	21.2786	18.7312	21.7391
Total individuals ennumerated and evaluated	422	565	644	506	621	282	418	446	340	596	442	364	724	772	797	192	419	470	406	471

S&D = sedimentand detritus; PS = partial spoilage; ind/L = individuals per litre; n/a = not available

Table JJ.IX-2 Zooplankton Biomass in Lakes in the Local Study Area, 2007

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Sep	Sep	Sep	Sep	Sep	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug
Day:	n/a	n/a	n/a	n/a	n/a	2	2	2	2	2	31	31	31	31	31	31	31	31	31	31
Depth:	3.5	3.5	3.5	3.5	3.5	5	5	5	5	5	13	13	13	13	13	9M	9	9	9	9
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	40	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	1	1	1	1	1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	1	1	2.2	1	2.2
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	SED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INSTAR IDENTIFICATION & SIZE CLASSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CALANOIDA																				
***Heterocope septentrionalis* Juday & Muttkowski**																				
H. septentrionalis adult female	1.853377	2.780065	4.633442	3.706753	2.780065	8.503816	24.29661	12.14831	7.288984	10.93347	10.50672	4.94434	3.090212	7.416511	8.652592	2.43083	4.456522	2.673913	6.077075	7.130435
H. septentrionalis adult male		0.916395	3.665579	1.832789	1.832789	4.675935	1.558645	9.351871	1.558645	15.58645	3.447109	1.378844	4.825952	2.068265	6.894218	3.697396	0.410822	2.711423	0.821643	3.615232
H. septentrionalis 4.0 mm F & M																				
H. septentrionalis 3.0 mm																				
H. septentrionalis 2.0 mm										1.457082										
H. septentrionalis 1.0 mm						1.490941									0.065229					
Total *H. septentrionales*	1.853377	3.69646	8.29902	5.539543	4.612854	14.67069	25.85525	21.50018	8.847629	27.977	13.95383	6.323183	7.916164	9.484776	15.61204	6.128225	4.867344	5.385336	6.898718	10.74567
***Epischura lacustris* S.A. Forbes**																				
E. lacustris adult female	6.242681	10.97614	21.95228	8.739753	7.491217						0.369337	2.216023	0.369337	0.738675	0.369337	3.73441	2.667436	1.600462	1.600462	1.600462
E. lacustris adult male			13.21016	3.005312	1.502656								0.404561			0.584366	0.584366			0.584366
E. lacustris immature 2.0 mm	8.695247		8.695247																	
E. lacustris immature 1.0 mm														2.07514	0.118024					
Total *E. lacustris*	14.93793	10.97614	43.85769	11.74506	8.993873						0.369337	2.216023	0.773898	2.813815	0.487361	4.318776	3.251802	1.600462	1.600462	2.184828
***Diaptomus pribilofensis* Juday & Muttkowski**																				
D. pribilofensis adult female	10.71847	21.43694	21.43694	26.79619	21.43694	15.00586	0.853459	45.01759	30.01173	45.01759	17.31446	25.97169	28.85743	86.57229	20.2002	25.00977	16.67318	16.67318	16.67318	25.00977
D. pribilofensis gravid female	5.487865	1.097573	6.585438	3.292718	1.097573	1.536602	2.304903	3.529119	2.304903	4.609806	1.773002	4.728007	1.182002	2.659503	3.546005	0.426834	0.426834	0.426834	2.987837	2.134169
D. pribilofensis adult male		33.42001	25.06501	12.5325	16.71	11.697		11.697	11.697		13.49654	13.49654	15.74596	31.49193	20.24481	16.24583	3.249167	9.747501	9.747501	9.747501
D. pribilofensis immature 2.0 mm													1.811744							
D. pribilofensis immature 1.0 mm																				
D. pribilofensis immature 0.75 mm															0.573439					
D. pribilofensis immature 0.5 mm																				
Total *D. pribilofensis*	16.20634	55.95452	53.08739	42.62141	39.24452	28.23946	3.158361	60.24371	44.01363	49.6274	32.58401	44.19624	47.59714	120.7237	44.56445	41.68244	20.34918	26.84752	29.40852	36.89144
***Diaptomus minutus* Lilljeborg**																				
D. minutus adult female		10.21995	15.32993	7.664964				0.098367	10.73095	7.153964	5.50305	4.127288	0.037833	6.878813	4.127288	0.02484	3.974425	1.987213	1.987213	
D. minutus gravid female	5.498321	7.331094	6.872901	9.16387	6.872901	0.753428	0.753428	0.455369	2.260284	1.506856	0.142242	0.142242					0.209286			
D. minutus adult male	28.64829	23.87358	19.09886	9.549429	33.42301	21.51739	9.22174	15.36957	3.073913	12.29565		12.5048	10.00384	13.75528	11.25432	3.612498	7.224996	3.612498	7.224996	9.031246
D. minutus immature 2.0 mm														1.469957						
D. minutus immature 1.0 mm	4.64464	4.64464	4.64464	18.57856		26.00999	19.50749	26.00999	13.005	35.76373	8.753359	11.25432	23.75912	16.25624	16.25624	7.224996	10.83749	3.612498	10.83749	5.418747
D. minutus immature 0.75 mm	6.496989	4.331325	4.331325	1.082831		7.57982	13.64368	12.12771	9.095784	10.61175	19.24108	37.31603	42.5636	57.14019	35.56685	40.42571	37.0569	26.10827	21.89725	37.0569

Table JJ.IX-2 Zooplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year :	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**
Day:	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**2**	**2**	**2**	**2**	**2**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**
Depth:	**3.5**	**3.5**	**3.5**	**3.5**	**3.5**	**5**	**5**	**5**	**5**	**5**	**13**	**13**	**13**	**13**	**13**	**9M**	**9**	**9**	**9**	**9**
Collected by:	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**
Gear:	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**
Fraction #1:	**80**	**80**	**80**	**40**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**
Fraction #2:	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**
Fraction #3:	**1**	**1**	**1**	**1**	**1**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**1**	**1**	**2.2**	**1**	**2.2**
Net mouth diameter (mm):	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**
Notes:	**-**	**-**	**SED**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
INSTAR IDENTIFICATION & SIZE CLASSES	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**	**μg/L**
D. minutus immature 0.5 mm			0.710652				0.994912	0.497456					0.191329						0.552729	
Total *D. minutus*	45.28824	50.40059	50.98831	46.03966	40.29591	55.86063	44.12125	54.55846	38.16593	67.33196	33.63974	65.34468	76.55573	95.50049	67.2047	51.28805	59.3031	35.32048	42.49969	51.50689
Calanoid nauplius	0.341018																		0.132618	
Total Calanoida μg/L	78.6269	121.0277	156.2324	105.9457	93.14715	98.77078	73.13487	136.3023	91.02719	144.9364	80.54691	118.0801	132.8429	228.5228	127.8686	103.4175	87.77143	69.1538	80.54	101.3288
CYCLOPOIDA																				
***Cyclops scutifer* Sars**																				
C. scutifer adult female													3.628838	3.628838		0.596238				
C. scutifer gravid female				1.565831			0.724464	0.175145	1.448928											
C. scutifer adult male					6.743328	18.20687	4.551716	31.86201	9.10343	4.551716	1.815512				1.815512					
C. scutifer immature 2.0 mm	28.4174		18.94493	37.88986		5.743665	5.743665			17.231	19.28025	12.05016	28.92037	19.28025	4.820061	6.962311			3.481156	13.92462
C. scutifer immature 1.0 mm	18.11226	18.11226	12.07484	45.28065	12.07484	38.03575	71.84529	63.39292	21.13097	59.16671	37.38556	69.89477	76.39657	63.39292	42.26194	49.3056	58.69717	42.26194	35.21828	46.95771
C. scutifer immatue 0.75 mm		5.562565	2.781283		5.562565	13.62829	13.62829	7.787593	11.68139	11.68139	17.97137	21.7154	11.98091	25.45943	17.97137	20.55059	27.04026	12.97932	11.89771	8.65288
C. scutifer immature 0.5 mm	2.690125	2.690125	2.690125	4.483541	1.793416	0.627696	0.627696				0.241421	1.931372	1.207107	0.965686	1.448529	0.69744	0.34872	0.69744	0.34872	1.39488
Total *C. scutifer*	49.21979	26.36495	36.49117	89.21988	26.17415	76.24226	97.12112	103.2177	43.36472	92.63081	76.69411	105.5917	122.1338	112.7271	68.31741	78.11218	86.08615	55.9387	50.94587	70.93009
***Cyclops vernalis* Fischer (?) 0.5 mm**	1.285483																			
***Cyclops capillatus* Sars**			0.342663																	
Immature cyclopoid (?)																				
Cyclopoid nauplius	12.15922	16.63893	14.71905	14.07909	12.79918	21.50262	25.31037	21.95059	23.96646	30.91002	14.90366	14.21447	14.30062	16.97121	15.76514	22.39856	17.04779	12.44364	13.19026	17.17223
Total Cyclopoida μg/L	62.66449	43.00388	51.55289	103.299	38.97332	97.74488	122.4315	125.1683	67.33117	123.5408	91.59777	119.8062	136.4344	129.6983	84.08255	100.5107	103.1339	68.38234	64.13613	88.10232
CLADOCERA																				
***Daphnia middendorffiana* Fischer M + F**																				
D. middendorffiana 3.0 mm						42.32838	29.18093	17.63682	28.21893	24.69156	1.356679	2.713358	4.070036	4.070036	12.21011	5.344492	4.453743	7.838589	8.907487	9.798237
D. middendorffiana 2.5 mm						84.26024	151.6684	50.55615	67.4082	25.27807	1.56697	7.051364	5.484394	6.26788	6.26788	4.681125	4.629684	5.658503	6.172912	6.790202
D. middendorffiana 2.0 mm						116.1854	90.36645	120.4886	47.33479	98.97279		3.310126	4.965191	8.275318	3.601126	4.781295	1.838959	2.390647	2.390647	6.357542
D. middendorffiana 1.5 mm						41.61744	23.52289	30.7607	25.33235	19.90398		2.783775	2.783775	3.479719	0.695944	1.005252		3.015757	4.021009	1.458167
D. middendorffiana 1.0 mm	0.08128			3.251192		4.142019	5.695273	4.142019	2.071009	3.624266		0.398271			0.199135	0.28764				0.486776
D. middendorffiana 0.5 mm							0.581826			0.066183			0.223779							
Total *D. middendorfianna*	0.08128			3.251192		288.5335	301.0158	223.5843	170.3653	172.5368	2.923649	16.25689	17.52718	22.09295	22.97419	16.0998	10.92239	18.9035	21.49205	24.89092
***Holopedium gibberum* Zaddach**																				
H. gibberum 3.0 mm	2.04506	12.27036		12.27036		13.02703		3.149392		3.149392	7.267828	16.95826	8.479132	6.056524	9.690437	3.976505	2.385903	3.499325	2.385903	7.23724
H. gibberum 2.0 mm	0.781456	1.562912	7.11125	1.562912	0.781456	1.203442	4.977874	4.977874		1.203442	4.165761	0.925725	3.702899	0.925725	4.165761	0.911699	0.303899	1.337158	0.607799	2.765486

Table JJ.IX-2 Zooplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kirk Lake					Lake N16					Kennady Lake - Basin K1					Kennady Lake - Basin K2				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year :	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**
Day:	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**2**	**2**	**2**	**2**	**2**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**
Depth:	**3.5**	**3.5**	**3.5**	**3.5**	**3.5**	**5**	**5**	**5**	**5**	**5**	**13**	**13**	**13**	**13**	**13**	**9M**	**9**	**9**	**9**	**9**
Collected by:	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**
Gear:	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**
Fraction #1:	**80**	**80**	**80**	**40**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**
Fraction #2:	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**
Fraction #3:	**1**	**1**	**1**	**1**	**1**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**1**	**1**	**2.2**	**1**	**2.2**
Net mouth diameter (mm):	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**
Notes:	**-**	**-**	**SED**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
INSTAR IDENTIFICATION & SIZE CLASSES	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
H. gibberum 1.0 mm	1.529857			0.168116	0.168116			1.0709												
H. gibberum 0.5 mm																				
Total *H. gibberum*	4.356373	13.83327	7.11125	14.00139	0.949572	14.23047	4.977874	9.198166		4.352834	11.43359	17.88399	12.18203	6.982248	13.8562	4.888204	2.689803	4.836483	2.993702	10.00273
Eubosmina longispina																				
E. longispina 1.0 mm				0.238932								0.585384	0.141521			0.845555		1.691109		0.845555
E. longispina 0.75 mm				0.187935		0.598573						0.23022		0.23022	0.23022		0.33254	0.665081	0.33254	
E. longispina 0.5 mm		0.437659			0.024047				1.346642								0.0851		0.748135	
E. longispina 0.25 mm								0.13103												
Total E. longispina		0.437659		0.426867	0.024047	0.598573		0.13103	1.346642			0.815604	0.141521	0.23022	0.23022	0.845555	0.417641	2.35619	1.080675	0.845555
Eurycercus lamellatus (O.F. Muller)					5.063204															
***Chydorus sphaericus* (O.F. Muller)**			0.861537																	
***Acantholeberis curvirostris* (O.F.Muller)**			4.506482																	
Total Cladocera µg/L	4.437653	14.27093	12.47927	17.67944	6.036823	303.3626	305.9937	232.9135	171.7119	176.8897	14.35724	34.95648	29.85073	29.30542	37.06061	21.83356	14.02983	26.09617	25.56643	35.7392
ROTIFERA																				
***Kellicottia* spp.**	1.547381	3.194593	2.645522	2.969972	3.144677	1.100637	2.568152	2.358508	2.620564	2.760328	0.745853	1.484986	2.015819	1.66641	1.921747	2.038217	1.785866	1.747043	2.047922	1.766454
***Keratella* spp.**														0.004928			0.007118	0.007118		
***Polyarthra* spp.**	0.088184		0.088184	0.088184	0.176368	0.061729	0.061729		0.123458			0.047484	0.071226	0.047484		0.034294	0.068588			
***Conochilus* spp.**	2.86515	2.795269	1.747043	3.144677	2.096452	0.978344	1.076179	1.271847	1.174013	1.369682	0.018814	0.244586	0.1317	0.282215	0.225772	0.43482	0.78811	0.489172	0.298938	0.570701
***Collotheca* spp.**																				
***Lecane* spp.**	0.063226	0.063226		0.031613	0.063226				0.044258	0.044258	0.017022					0.024588		0.024588		
***Synchaeta* sp.**								0.05707		0.05707	0.19755			0.02195					0.031706	0.031706
Total Rotifera µg/L	4.563941	6.053088	4.480749	6.234446	5.480723	2.14071	3.70606	3.687425	3.962293	4.231338	0.97924	1.777056	2.218744	2.022986	2.147519	2.531918	2.649681	2.26792	2.378566	2.368861
Total Calanoida µg/L	78.6269	121.0277	156.2324	105.9457	93.14715	98.77078	73.13487	136.3023	91.02719	144.9364	80.54691	118.0801	132.8429	228.5228	127.8686	103.4175	87.77143	69.1538	80.54	101.3288
Total Cyclopoida µg/L	62.66449	43.00388	51.55289	103.299	38.97332	97.74488	122.4315	125.1683	67.33117	123.5408	91.59777	119.8062	136.4344	129.6983	84.08255	100.5107	103.1339	68.38234	64.13613	88.10232
Total Cladocera µg/L	4.437653	14.27093	12.47927	17.67944	6.036823	303.3626	305.9937	232.9135	171.7119	176.8897	14.35724	34.95648	29.85073	29.30542	37.06061	21.83356	14.02983	26.09617	25.56643	35.7392
Total Rotifera µg/L	4.563941	6.053088	4.480749	6.234446	5.480723	2.14071	3.70606	3.687425	3.962293	4.231338	0.97924	1.777056	2.218744	2.022986	2.147519	2.531918	2.649681	2.26792	2.378566	2.368861
Total Crustaceans + Rotifers µg/L	150.293	184.3556	224.7453	233.1585	143.638	502.0189	505.2661	498.0715	334.0326	449.5982	188.4604	274.6198	301.3468	389.5495	251.1592	228.2937	207.5849	165.9002	172.6211	227.5392

Table JJ.IX-2 Zooplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Year :	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Month:	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Aug	Sep	Sep	Sep	Sep	Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep	Aug/Sep
Day:	31	31	31	31	31	31	31	31	31	31	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a
Depth:	12	12	12	12	12	5	5	5	5	5	7.5	7.5	7.5	7.5	7.5	3.75	3.75	3.75	3.75	3.75
Collected by:	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC	AMEC
Gear:	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ8O3M	WJ8O3M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M	WJ803M
Fraction #1:	80	80	80	80	80	80	80	80	80	80	80	80	40	40	40	40	40	40	40	40
Fraction #2:	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Fraction #3:	2.2	2.2	2.2	2.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Net mouth diameter (mm):	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5	1962.5
Notes:	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PS	-	PS	-
INSTAR IDENTIFICATION & SIZE CLASSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CALANOIDA																				
***Heterocope septentrionalis* Juday & Muttkowski**																				
H. septentrionalis adult female	8.704095	7.365007	9.373647	15.39956	9.13017	7.182598	8.77873	7.980662	7.182598	10.37487	3.006293	3.006293	1.002098	1.503146	2.505243		1.837835	3.67567		
H. septentrionalis adult male	1.549145	1.549145	3.098289	5.422007	3.168705	1.702734	7.662307	10.21641	5.959572	5.108205	0.488109	0.488109		0.488109	2.440543	3.186885	4.780328	1.593443	2.390164	3.186885
H. septentrionalis 4.0 mm F & M							0.77069		0.77069	5.394828	1.541379	2.568965	3.596552	2.568965	2.055173					
H. septentrionalis 3.0 mm								1.257967		5.723753										
H. septentrionalis 2.0 mm																				
H. septentrionalis 1.0 mm												0.113063								
Total *H. septentrionales*	10.25324	8.914152	12.47194	20.82157	12.29888	8.885333	17.21173	19.45504	13.91286	26.60165	5.03578	6.17643	4.59865	4.56022	7.000959	3.186885	6.618163	5.269113	2.390164	3.186885
***Epischura lacustris* S.A. Forbes**																				
E. lacustris adult female	0.400115	0.400115	0.400115	0.400115	1.200346	8.441994	2.88083	1.920554	1.920554	1.920554					0.640185	24.65897	7.012393	4.207436	2.003541	7.012393
E. lacustris adult male								2.103718		1.051859		0.701239		0.701239			1.402479	1.402479	0.616474	1.402479
E. lacustris immature 2.0 mm																			0.912505	
E. lacustris immature 1.0 mm																1.798455		1.798455		1.798455
Total *E. lacustris*	0.400115	0.400115	0.400115	0.400115	1.200346	8.441994	2.88083	4.024272	1.920554	2.972413		0.701239		0.701239	0.640185	26.45742	8.414872	7.40837	3.53252	10.21333
***Diaptomus pribilofensis* Juday & Muttkowski**																				
D. pribilofensis adult female	31.26222	21.88355	25.00977	50.01954	21.88355	49.97256	28.55576	28.55576	28.55576	28.55576	11.37945	7.39664	7.502932	12.50489	7.502932	47.26772	21.00788	11.94823	4.779291	10.7534
D. pribilofensis gravid female	0.320125	1.600627	1.600627	0.320125	1.600627	0.812054	2.436162		7.308488	0.812054	4.502863			1.024401	1.024401	2.048803	4.097605	1.024401	4.502863	1.024401
D. pribilofensis adult male	9.747501	21.93188	29.2425	24.36876	19.495	5.790907	11.58181	28.95454	11.58181	11.58181	12.41831	8.870226	1.9495	5.8485	13.6465	3.937626	23.62576	13.43715	6.27067	4.47905
D. pribilofensis immature 2.0 mm																				
D. pribilofensis immature 1.0 mm																2.011101				2.011101
D. pribilofensis immature 0.75 mm																0.99396				
D. pribilofensis immature 0.5 mm																				
Total *D. pribilofensis*	41.32985	45.41605	55.8529	74.70843	42.97918	56.57552	42.57373	57.51029	47.44606	40.94962	28.30062	16.26687	9.452432	19.37779	22.17383	56.25921	48.73125	26.40978	15.55282	18.26796
***Diaptomus minutus* Lilljeborg**																				
D. minutus adult female	4.471227	14.9041	10.43286	4.471227	7.452048	7.153964	21.4619	10.73095		17.88491	19.07724	21.4619	32.19285	15.50026	26.2312	26.2312	35.76983	16.69259	11.92328	26.2312
D. minutus gravid female		1.379905		1.379905	1.379905			0.753428	0.376714	1.130142	1.004571	1.004571	1.757999	1.255714	1.506856	15.69102	19.03844	19.03844	14.87378	18.44348
D. minutus adult male	6.773435	10.83749	10.83749	14.90155	14.90155	16.25624	32.51248	22.75874	26.00999	16.25624	23.84249	21.67499	19.50749	20.59124	33.59623	49.02042	49.02042	37.87941	75.75882	53.47683
D. minutus immature 2.0 mm					1.592454							5.095851	1.273963							
D. minutus immature 1.0 mm	33.86717	9.482807	20.3203	16.25624	8.128123	13.005	13.005	16.25624	9.753746	32.51248	2.167499	13.005	4.334999	7.586245	7.586245	17.33999	13.005	13.005	6.502496	6.502496
D. minutus immature 0.75 mm	13.26468	24.00277	25.89771	11.36973	22.10781	45.47892	43.96295	43.96295	30.31928	18.19157	1.010643	1.010643	1.010643	1.515964	2.526607	11.11707	17.18093	15.15964	14.149	22.23414

Table JJ.IX-2 Zooplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year :	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**
Day:	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**1**	**1**	**1**	**1**	**1**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Depth:	**12**	**12**	**12**	**12**	**12**	**5**	**5**	**5**	**5**	**5**	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**	**3.75**	**3.75**	**3.75**	**3.75**	**3.75**
Collected by:	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**
Gear:	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ8O3M**	**WJ8O3M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**
Fraction #1:	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**
Fraction #2:	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**
Fraction #3:	**2.2**	**2.2**	**2.2**	**2.2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Net mouth diameter (mm):	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**
Notes:	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**PS**	**-**	**PS**	**-**
INSTAR IDENTIFICATION & SIZE CLASSES	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
D. minutus immature 0.5 mm											0.331637		0.165819			2.6531	2.984738	1.989825	2.321463	2.984738
Total *D. minutus*	58.37652	60.60708	67.48837	48.37866	55.5619	81.89412	110.9423	94.46231	66.45972	85.97535	47.43408	63.25295	60.24376	46.44942	71.44714	122.0528	136.9993	103.7649	125.5288	129.8729
Calanoid nauplius		0.099463			0.198927				0.238712	0.238712	0.159142	0.159142	0.079571	0.079571	0.238712	0.477425	0.318283		0.159142	0.795708
Total Calanoida µg/L	110.3597	115.4369	136.2133	144.3088	112.2392	155.797	173.6086	175.4519	129.9779	156.7378	80.92962	86.55662	74.37441	71.16824	101.5008	208.4338	201.0819	142.8522	147.1635	162.3368
CYCLOPOIDA																				
***Cyclops scutifer* Sars**																				
C. scutifer adult female																8.254828				5.63392
C. scutifer gravid female																1.461441		1.461441		
C. scutifer adult male			1.966804		1.966804		9.440659	4.72033		4.72033				0.357958		3.733153		3.397169	3.733153	0.849292
C. scutifer immature 2.0 mm	7.832598		7.832598	15.6652				25.06432		18.79824	4.177387				2.088693		8.354775			4.177387
C. scutifer immature 1.0 mm	12.3264	24.6528	26.41372	8.804572	17.60914	59.16671	59.16671	25.35717	42.26194	46.48814		8.452387	1.408731	9.861118	4.226194	2.817463		2.817463	5.634927	5.634927
C. scutifer immatue 0.75 mm	8.923282	10.5457	15.41294	6.48966	17.03536	11.68139	17.52208	15.57518	27.25657	21.41588	2.595864	2.595864	2.595864	3.893796	6.48966					2.595864
C. scutifer immature 0.5 mm	0.52308	1.3077	0.52308	0.52308	1.04616	1.883088	0.627696	1.255391	1.883088	1.255391	0.418464		0.209232	0.209232	0.209232		0.836928	2.929248	1.255391	
Total *C. scutifer*	29.60536	36.5062	52.14914	31.48252	37.65747	72.73118	86.75714	71.9724	71.40159	92.67798	7.191715	11.04825	4.213828	14.3221	13.01378	16.26689	9.191703	10.60532	10.62347	18.89139
***Cyclops vernalis* Fischer (?) 0.5 mm**																	0.299946			
***Cyclops capillatus* Sars**																				
Immature cyclopoid (?)													0.149973						0.168812	0.168812
Cyclopoid nauplius	9.612713	12.13255	13.06583	11.19928	15.58566	14.55906	22.62254	22.84653	22.62254	33.14986	10.45266	8.511451	8.959424	8.063481	8.660777	2.239856	3.434445	3.285123	3.882415	3.882415
Total Cyclopoida µg/L	39.21807	48.63875	65.21497	42.68179	53.24313	87.29024	109.3797	94.81893	94.02414	125.8278	17.64438	19.5597	13.32323	22.38558	21.67456	18.50674	12.92609	13.89044	14.6747	22.94262
CLADOCERA																				
***Daphnia middendorffiana* Fischer M + F**																				
D. middendorffiana 3.0 mm	4.409207		4.409207	2.939471		3.206695	1.603347	8.016738		17.63682	1.068898				2.137797					
D. middendorffiana 2.5 mm	2.546326		2.546326	3.395101	1.157421	0.925937	3.703747	7.407494	3.703747	16.66686	0.617291				1.234582	2.469165				
D. middendorffiana 2.0 mm	1.733875	2.600814	1.300407	2.600814	0.788125	1.418626	0.94575	1.891501		8.038878						0.6305				
D. middendorffiana 1.5 mm	1.275897	0.364542	1.093626	1.093626	3.015757	0.198841	1.809454		0.198841	2.386093		0.132561	0.132561			4.825209				
D. middendorffiana 1.0 mm			0.104309	0.43146		0.517752				0.517752						3.034445			0.690336	
D. middendorffiana 0.5 mm										0.007273	0.044122					0.387884				
Total *D. middendorfianna*	9.965305	2.965356	9.453875	10.46047	4.961303	6.26785	8.062298	17.31573	3.902588	45.25368	1.730311	0.132561	0.132561		3.372379	11.3472			0.690336	
***Holopedium gibberum* Zaddach**																				
H. gibberum 3.0 mm				2.624493	0.596476								0.954361			3.817445	5.726168			
H. gibberum 2.0 mm		0.501434	0.501434	1.002868												2.188076	1.458718	2.188076		3.646794

Table JJ.IX-2 Zooplankton Biomass in Lakes in the Local Study Area, 2007 (continued)

Lake:	Kennady Lake - Basin K3					Kennady Lake - Basin K4A					Kennady Lake - Basin K5					Lake 410				
Sample:	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Year :	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
Month:	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Aug**	**Sep**	**Sep**	**Sep**	**Sep**	**Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**	**Aug/Sep**
Day:	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**1**	**1**	**1**	**1**	**1**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Depth:	**12**	**12**	**12**	**12**	**12**	**5**	**5**	**5**	**5**	**5**	**7.5**	**7.5**	**7.5**	**7.5**	**7.5**	**3.75**	**3.75**	**3.75**	**3.75**	**3.75**
Collected by:	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**	**AMEC**
Gear:	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ8O3M**	**WJ8O3M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**	**WJ803M**
Fraction #1:	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**
Fraction #2:	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**	**9.1**
Fraction #3:	**2.2**	**2.2**	**2.2**	**2.2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Net mouth diameter (mm):	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**	**1962.5**
Notes:	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**PS**	**-**	**PS**	**-**
INSTAR IDENTIFICATION & SIZE CLASSES	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
H. gibberum 1.0 mm																	0.156908	0.156908		
H. gibberum 0.5 mm																				
Total *H. gibberum*		0.501434	0.501434	3.627362	0.596476								0.954361			6.005521	7.341794	2.344985		3.646794
Eubosmina longispina																				
E. longispina 1.0 mm		0.634166	0.30663	0.459945	0.069689			1.521998												
E. longispina 0.75 mm	0.249405		0.120592		0.249405	0.598573		0.598573	0.131554	0.131554						3.508118			0.798097	3.508118
E. longispina 0.5 mm	0.12765		0.561101	0.12765	0.063825		1.346642				1.795524	0.897762	0.448881			3.591047		0.897762		
E. longispina 0.25 mm																				
Total *E. longispina*	0.377056	0.634166	0.988322	0.587595	0.382919	0.598573	1.346642	2.120571	0.131554	0.131554	1.795524	0.897762	0.448881			7.099165		0.897762	0.798097	3.508118
***Eurycercus lamellatus* (O.F. Muller)**																371.7865			4.64733	
***Chydorus sphaericus* (O.F. Muller)**																1.202954			0.273672	
***Acantholeberis curvirostris* (O.F.Muller)**						1.892723					3.827505									
Total Cladocera µg/L	10.34236	4.100956	10.94363	14.67543	5.940697	8.759146	9.40894	19.4363	4.034142	45.38524	7.353341	1.030322	1.535803		3.372379	397.4413	7.341794	3.242746	6.409435	7.154912
ROTIFERA																				
***Kellicottia* spp.**	1.281165	2.030937	2.176524	1.470428	1.899909	1.991629	3.249499	3.66879	2.271156	4.52484	3.063148	2.422567	2.969972	3.313558	3.185441	0.640582	2.306096	2.993266	2.422567	2.935033
***Keratella* spp.**		0.005338	0.005338								0.008541	0.017082	0.008541	0.004271	0.012812			0.008541	0.017082	0.025623
***Polyarthra* spp.**	0.051441	0.02572	0.051441	0.02572	0.077161		0.061729	0.061729	0.061729	0.246915	0.16461		0.041153	0.082305	0.041153		0.041153	0.123458	0.288068	0.082305
***Conochilus* spp.**	0.101911	0.122293	0.326115	0.28535	0.18344	0.097834	0.489172	0.097834	0.146752	0.489172		0.065223	0.048917	0.048917	0.048917	0.097834	0.88051	1.043567	0.619618	0.684841
***Collotheca* spp.**									0.012812					0.004271						
***Lecane* spp.**		0.018441									0.029506		0.014753	0.014753						
***Synchaeta* sp.**			0.023779																	
Total Rotifera µg/L	1.434516	2.20273	2.583196	1.781498	2.16051	2.089463	3.8004	3.828353	2.492449	5.260927	3.265805	2.504872	3.083336	3.468074	3.288322	0.738417	3.227758	4.168831	3.347335	3.727802
Total Calanoida µg/L	110.3597	115.4369	136.2133	144.3088	112.2392	155.797	173.6086	175.4519	129.9779	156.7378	80.92962	86.55662	74.37441	71.16824	101.5008	208.4338	201.0819	142.8522	147.1635	162.3368
Total Cyclopoida µg/L	39.21807	48.63875	65.21497	42.68179	53.24313	87.29024	109.3797	94.81893	94.02414	125.8278	17.64438	19.5597	13.32323	22.38558	21.67456	18.50674	12.92609	13.89044	14.6747	22.94262
Total Cladocera µg/L	10.34236	4.100956	10.94363	14.67543	5.940697	8.759146	9.40894	19.4363	4.034142	45.38524	7.353341	1.030322	1.535803		3.372379	397.4413	7.341794	3.242746	6.409435	7.154912
Total Rotifera µg/L	1.434516	2.20273	2.583196	1.781498	2.16051	2.089463	3.8004	3.828353	2.492449	5.260927	3.265805	2.504872	3.083336	3.468074	3.288322	0.738417	3.227758	4.168831	3.347335	3.727802
Total Crustaceans + Rotifers µg/L	161.3547	170.3793	214.9551	203.4475	173.5836	253.9358	296.1976	293.5355	230.5286	333.2118	109.1931	109.6515	92.31678	97.0219	129.8361	625.1202	224.5776	164.1542	171.5949	196.1621

SED = sediment; PS = partial spoilage; µg/L = micrograms per litre; n/a = not available.

APPENDIX JJ.X

BENTHIC INVERTEBRATES – SUPPORTING DATA

Table JJ.X-1 Benthic Invertebrate Site Locations and Habitat Data for Lake Sites in the Gahcho Kué Local Study Area, Fall 2007

Lake	Site	Date	UTM Coordinates [(a)] (NAD 83)	Water Depth (m)	Water Temperature (°C)		Dissolved Oxygen (mg/L)		Dissolved Oxygen (%)		Specific Conductivity (µS/cm)		Sediment Chemistry Data					
					Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Moisture Content (%)	Total Organic Carbon (%)	Sand (%)	Silt (%)	Clay (%)	Fines (silt + clay) (%)
Lake N16 [(b)]	N16-1	02-Sep-2007	12V.584225.7039353	5.0	9.8	9.8	9.7	10.1	85.0	89.1	12.2	12.0	92.2	4.5	14.4	44.4	41.3	85.6
	N16-2	02-Sep-2007	12V.584539.7039365	4.0	9.9	9.9	10.4	10.3	92.2	91.3	12.0	12.0	82.2	1.3	68.0	21.7	10.3	32.0
	N16-3	02-Sep-2007	12V.584275.7039352	4.0	10.0	10.0	10.2	10.2	90.2	90.9	12.0	12.0	94.6	4.6	28.2	41.0	30.8	71.8
	N16-4	02-Sep-2007	12V.583437.7039311	6.0	9.9	9.9	10.2	10.3	90.5	90.6	11.9	12.0	85.1	3.1	23.6	42.3	34.1	76.4
Kennady Lake	K1-1	29-Aug-2007	12V.588851.7037118	4.0	9.7	9.6	10.1	9.5	89.4	83.5	12.8	13.1	82.8	2.1	44.4	33.9	21.8	55.7
	K1-2	30-Aug-2007	12V.588896.7037553	4.5	9.5	9.4	10.2	9.5	89.2	82.8	12.5	12.9	74.4	0.9	69.4	17.3	13.3	30.6
	K1-3	30-Aug-2007	12V.588849.7038253	5.5	9.3	9.2	9.3	9.3	80.7	80.9	13.0	13.0	91.2	4.4	58.0	23.3	18.7	42.0
	K1-4	30-Aug-2007	12V.589881.7038566	3.5	9.2	9.1	9.3	9.8	79.4	84.6	13.1	13.1	81.5	3.8	17.8	42.0	40.2	82.2
	K1-6 [(c)]	30-Aug-2007	12V.589634.7038386	5.0	9.7	9.2	9.2	9.8	81.1	85.2	13.0	13.0	87.1	3.3	31.6	32.7	35.7	68.4
	K5-1	01-Sep-2007	12V.591838.7035784	6.0	10.4	9.2	9.1	10.0	82.0	86.9	13.3	13.4	82.9	3.3	31.1	41.6	27.4	69.0
	K5-2	01-Sep-2007	12V.592183.7036095	6.0	10.7	9.1	9.8	9.3	88.6	80.2	13.5	13.4	90.5	4.1	14.2	39.6	46.2	85.8
	K5-3	01-Sep-2007	12V.593086.7036926	4.0	10.5	8.8	9.0	8.6	86.3	73.7	13.5	13.3	92.4	4.5	8.1	38.3	53.6	91.9
	K5-4	01-Sep-2007	12V.593641.7037445	3.0	10.9	9.0	9.7	10.8	87.2	93.8	13.4	13.3	92.2	4.6	17.8	34.0	48.2	82.3
	K5-5	01-Sep-2007	12V.593448.7037892	3.0	10.8	9.4	9.6	8.3	86.8	73.0	13.4	13.3	92.3	4.5	26.9	29.9	43.2	73.1

(a) UTM Coordinate format = UTM Zone.Easting.Northing.

(b) Only four Lake N16 sites were sampled because weather conditions prevented sampling of site N16-5.

(c) Substrate at site K1-5 was not appropriate for benthic invertebrate sampling using an Ekman grab. Site K1-6 was sampled instead.

UTM = Universal Transverse Mercator; NAD = North American Datum; m = metres; % = percent; °C = degrees celsius; µS/cm = microSiemens per centimetre; mg/L = milligram per litre

Table JJ.X-2 Benthic Invertebrate Summary Variables for Lake Sites in the Gahcho Kué Local Study Area, Fall 2007

Lake	Site	Total Density (no./m²) (mean ± 1 SE)	Total Richness (taxa/site)	Mean Total Richness (taxa/site) (mean ± 1 SE)	Simpson's Index of Diversity	Evenness
Lake N16	N16-1	941 ± 140	12	5.5 ± 0.7	0.74	0.33
	N16-2	2,222 ± 511	18	9.8 ± 1.4	0.84	0.34
	N16-3	2,622 ± 787	16	7.5 ± 1.1	0.70	0.21
	N16-4	274 ± 109	8	3.2 ± 1.1	0.79	0.60
Kennady Lake	K1-1	2,274 ± 580	18	10.0 ± 1.4	0.88	0.46
	K1-2	3,037 ± 1,035	16	9.5 ± 1.3	0.85	0.41
	K1-3	2,081 ± 548	20	10.5 ± 1.2	0.84	0.32
	K1-4	1,674 ± 632	19	8.8 ± 1.6	0.87	0.39
	K1-6	489 ± 82	12	6.2 ± 0.9	0.85	0.56
	K5-1	1,637 ± 343	18	9.5 ± 1.4	0.86	0.39
	K5-2	541 ± 203	13	4.3 ± 1.1	0.84	0.49
	K5-3	807 ± 325	13	4.3 ± 0.8	0.55	0.17
	K5-4	9,044 ± 2,159	22	13.5 ± 0.6	0.79	0.21
	K5-5	8,467 ± 1,783	20	13.3 ± 0.6	0.84	0.31

no./m² = number per square metres

SE = standard error

Table JJ.X-3 Mean Relative Density of Major Taxa at Lake Sites in the Gahcho Kué Local Study Area, Fall 2007

Taxon	Lake N16				Kennady Lake									
	N16-1 (%)	N16-2 (%)	N16-3 (%)	N16-4 (%)	K1-1 (%)	K1-2 (%)	K1-3 (%)	K1-4 (%)	K1-6 (%)	K5-1 (%)	K5-2 (%)	K5-3 (%)	K5-4 (%)	K5-5 (%)
Nematoda (round worms)	20	25	12	27	13	10	20	15	27	2	11	3	22	20
Oligochaeta (aquatic worms)	3	14	4	11	4	2	12	8	6	7	1	1	9	7
Gastropoda (snails)	1	2	1	0	3	3	2	1	5	4	4	3	3	8
Pelecypoda (fingernail clams)	9	9	5	5	11	11	11	8	5	19	11	6	6	14
Chironomidae (midges)	66	49	77	54	68	73	52	66	56	67	73	85	59	50
Other	1	1	1	3	1	1	3	2	2	1	0	2	1	1
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: Sum of column values may not equal 100 due to rounding to whole numbers.

% = percent.

Table JJ.X-4 Benthic Invertebrate Site Locations and Field Data for Stream Sites in the Gahcho Kué Local Study Area, Fall 2007

Site	Date	Replicate	UTM Coordinates [(a)] (NAD 83)	Water Temperature (°C)	Water Depth (m)	Channel Width (m)	Current Velocity (m/s)	Substrate (%)					
								B	LC	SC	LG	SG	F
M2	28-Aug-2007	1	12V.596641.7045216	8	0.14	1.1	0.14	0	0	60	30	10	0
		2	12V.596673.7045204	8	0.14	5.5	0.10	0	50	30	7.5	7.5	5
		3	12V.596682.7045206	8	0.18	5.5	0.33	5	30	35	20	10	0
		4	12V.596727.7045212	8	0.12	11.0	0.15	5	20	60	10	5	0
		5	12V.596741.7045222	8	0.15	11.0	0.14	0	20	45	25	10	0
M4	28-Aug-2007	1	12V.596268.7041777	8	0.15	10.0	0.09	0	15	40	25	10	10
		2	12V.596206.7041783	8	0.15	-	0.13	0	25	25	25	15	10
		3	12V.596264.7041789	8	0.15	-	0.09	0	50	30	15	5	0
		4	12V.596256.7041793	8	0.17	-	0.10	0	20	35	25	15	5
		5	12V.596256.7041826	8	0.15	20.0	0.06	0	15	40	25	20	0
L2	28-Aug-2007	1	12V.593888.7038999	8	0.15	7.0	0.20	0	20	40	25	15	0
		2	12V.593886.7038991	8	0.16	-	0.10	0	15	40	25	15	5
		3	12V.593884.7038982	8	0.16	-	0.11	0	40	30	20	10	0
		4	-	8	0.23	-	0.18	0	15	40	25	15	5
		5	-	8	0.19	-	0.18	0	20	35	30	10	5
L3	29-Aug-2007	1	12V.593182.7038504	6	0.16	-	0.13	0	45	40	15	0	0
		2	12V.593240.7038587	6	0.17	5.0	0.12	0	70	20	10	0	0
		3	12V.593311.7038626	6	0.13	4.0	0.10	0	10	45	35	10	0
		4	12V.593320.7038636	6	0.16	4.0	0.14	0	30	40	20	10	0
		5	12V.593327.7038632	6	0.15	4.0	0.15	0	20	30	40	10	0
K5	29-Aug-2007	1	12V.593194.7038412	6	0.16	8.0	0.13	0	10	50	30	10	0
		2	12V.593199.7038412	6	0.19	-	0.09	0	0	70	20	0	10
		3	12V.593214.7038410	6	0.14	-	0.10	0	15	35	25	15	10
		4	12V.593227.7038409	6	0.16	-	0.22	0	20	40	30	10	0
		5	12V.593276.7038428	6	0.15	6.0	0.18	0	10	30	40	20	0

Note: Substrate categories are as follows: B = boulder; LC = large cobble; SC = small cobble; LG = large gravel; SG = small gravel; F = fines.

[(a)] UTM Coordinate format = UTM Zone.Easting.Northing.

- = not available.

UTM = Universal Transverse Mercator; NAD = North American Datum; m = metres; % = percent; °C = degrees celsius; m/s = metres per second

Table JJ.X-5 Benthic Invertebrate Summary Variables for Stream Sites in the Gahcho Kué Local Study Area, Fall 2007

Station	Total Density (no./m²) (mean ± 1 SE)			Total Richness (taxa/station)	Mean Total Richness (taxa/station) (mean ± 1 SE)			Total EPT Richness (taxa/station)	Mean Total Richness (taxa/station) (mean ± 1 SE)			Simpson's Index of Diversity	Evenness
M2	1,129	±	425	30	16.0	±	1.6	7	4.2	±	0.7	0.88	0.27
M4	749	±	311	30	13.0	±	1.0	10	3.6	±	0.7	0.82	0.18
L2	884	±	155	26	14.0	±	1.2	4	1.6	±	0.6	0.86	0.27
L3-1	822	±	130	22	10.4	±	1.7	5	2.0	±	0.3	0.82	0.26
K5	1,271	±	348	25	13.4	±	1.2	5	2.6	±	0.5	0.90	0.39

no./m² = number per square metre; EPT = Ephemeroptera, Plecoptera and Trichoptera combined; SE = standard error.

Table JJ.X-6 Mean Relative Density of Major Taxa at Stream Sites in the Gahcho Kué Local Study Area, Fall 2007

Taxon	M2 (%)	M4 (%)	L2 (%)	L3-1 (%)	K5 (%)
Nematoda (round worms)	3	2	5	7	4
Oligochaeta (aquatic worms)	2	4	3	2	3
Ephemeroptera (mayflies)	2	1	0	1	0
Plecoptera (stoneflies)	5	5	2	2	4
Trichoptera (caddisflies)	32	12	13	6	24
Chironomidae (midges)	44	72	56	71	50
Other	12	4	21	11	15
TOTAL	**100**	**100**	**100**	**100**	**100**

Note: Sum of column values may not equal 100 due to rounding to whole numbers.

% = percent.

Table JJ.X-7 Raw Stream Benthic Invertebrate Data (no./sample) Collected Using a Surber Sampler, Fall 2007

Major Taxon	Family	Subfamily/Tribe	Genus/Species	Site M2					Site M4					Site L2					Site L3					Site K5				
				M2-1	M2-2	M2-3	M2-4	M2-5	M4-1	M4-2	M4-3	M4-4	M4-5	L2-1	L2-2	L2-3	L2-4	L2-5	L3-1	L3-2	L3-3	L3-4	L3-5	K5-1	K5-2	K5-3	K5-4	K5-5
Hydrozoa	-	-	*Hydra* sp.	0	0	0	0	0	0	0	0	0	0	5	8	0	21	8	19	1	0	6	2	0	0	0	0	0
Nematoda	-	-	-	0	2	10	0	5	0	4	0	1	1	12	0	5	1	2	0	1	2	6	17	3	4	10	4	2
Oligochaeta	Lumbriculidae	-	-	0	0	0	0	7	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3	1	3	0	0
	Naididae	-	-	0	0	0	0	0	4	4	2	0	0	1	0	2	6	0	0	0	0	0	2	2	1	5	0	0
	Tubificidae	-	-	0	0	0	1	0	0	0	0	0	2	0	0	1	0	0	0	0	0	2	2	0	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	3	6	1	0	0	0	0	2	0	4	0	0	2	1	0	0	0	0	0	0	0	0	9	17
Acari	-	-	-	3	2	0	1	2	0	4	1	1	0	0	3	1	0	1	0	0	0	2	1	0	2	0	0	0
Cladocera	-	-	-	2	5	8	8	0	10	3	7	2	3	0	7	21	2	1	5	1	0	5	4	1	1	1	3	1
Copepoda-Cyclopoida	-	-	-	0	0	4	0	0	0	0	0	0	0	0	0	0	3	2	0	0	1	4	1	0	0	0	1	1
Ephemeroptera	Baetidae	-	*Baetis* sp.	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
	Ephemerellidae	-	*Ephemerella* sp.	2	2	5	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae	-	*Paraleptophlebia* sp.	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Plecoptera	Nemouridae	-	*Nemoura* sp.	0	7	4	5	10	8	5	0	0	3	0	8	0	0	1	1	0	0	2	5	4	2	0	13	4
Hemiptera	Corixidae	-	*Callicorixa audei*	0	0	0	0	0	0	0	0	0	0	0	1	6	1	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Brachycentridae	-	*Brachycentrus* sp.	4	13	101	8	12	0	1	0	0	0	21	4	0	4	21	2	4	7	0	3	1	1	0	107	20
	Hydroptilidae	-	*Agraylea* sp.	0	2	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		-	*Oxyethira* sp.	5	8	4	0	0	0	20	3	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
	Leptoceridae	-	*Mystacides* sp.	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
	Limnephilidae	-	*Limnophilus* sp.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		-	early larvae	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia* sp.	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	2	2	2	0	0
	Polycentropodidae	-	*Polycentropus* sp.	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
Coleoptera	Dytiscidae	-	*Ilybius* sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
		-	*Stictotarsus* sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Gyrinidae	-	*Gyrinus* sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Table JJ.X-7 Raw Stream Benthic Invertebrate Data (no./sample) Collected Using a Surber Sampler, Fall 2007 (continued)

Major Taxon	Family	Subfamily/Tribe	Genus/Species	Site M2					Site M4					Site L2					Site L3					Site K5				
				M2-1	M2-2	M2-3	M2-4	M2-5	M4-1	M4-2	M4-3	M4-4	M4-5	L2-1	L2-2	L2-3	L2-4	L2-5	L3-1	L3-2	L3-3	L3-4	L3-5	K5-1	K5-2	K5-3	K5-4	K5-5
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	2	0	0	0	1	0	0	0	1	2	2	4	0	0	0	0	0	0	0	1	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	1	2	0	6	0	0	0	0	1	1	0	0	0	1	0	0	0	0	1	1	0	5	1	0
			Procladius sp.	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
			early larvae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	1	0	1	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0
		Orthocladiinae	*Cricotopus/Orthocladius* sp.	10	8	22	2	10	8	11	1	2	0	6	3	13	17	6	0	1	3	0	5	2	0	0	11	6
			Eukiefferiella sp.	1	1	2	0	4	4	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
			Heterotrissocladius marcidus gp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0
			Psectrocladius sp.	0	0	0	0	0	0	0	0	1	0	0	0	6	0	2	0	0	0	0	0	0	0	0	0	0
			Pseudosmittia sp.	0	3	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Tvetenia sp.	2	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			early larvae	0	0	8	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Cryptochironomus sp.	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0
			Dicrotendipes sp.	0	9	0	3	8	2	6	1	3	2	2	0	1	0	8	13	9	14	7	4	7	5	13	1	0
			Endochironomus sp.	7	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	10	0	0
			Microtendipes pedellus gp.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	8	4	39	0	0
			Parachironomus sp.	0	0	0	0	0	0	0	0	0	0	6	1	3	0	1	0	0	1	0	0	3	12	28	1	18
			Polypedilum sp.	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	11	10	37	0	0
			Micropsectra/Tanytarsus sp.	0	0	0	1	20	46	6	13	7	1	10	2	74	8	28	4	1	2	14	39	3	8	26	0	3
			Paratanytarsus sp.	0	0	0	2	0	4	1	0	0	1	3	0	0	0	0	0	1	5	4	0	0	0	0	0	0
			Rheotanytarsus sp.	5	6	39	3	4	76	29	5	4	2	6	1	1	0	7	0	52	56	14	6	0	0	0	0	0
	Empididae	-	*Clinocera* sp.	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Simuliidae	-	*Simulium* sp.	6	1	15	0	0	0	0	0	0	0	0	0	0	7	0	0	5	6	0	0	0	0	0	38	2
		-	early larvae	1	0	6	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	Tipulidae	-	*Tipula* sp.	0	1	3	2	0	1	0	0	1	0	1	1	1	0	2	0	0	0	0	0	1	1	2	4	4
			TOTAL	**52**	**79**	**261**	**46**	**97**	**172**	**104**	**38**	**26**	**22**	**80**	**41**	**138**	**75**	**100**	**44**	**76**	**106**	**68**	**97**	**56**	**59**	**188**	**198**	**80**

Note: Surber sampler bottom sampling area was 0.09 m².

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site N16-1					
				N16-1-1	N16-1-2	N16-1-3	N16-1-4	N16-1-5	N16-1-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	0	4	3	3	9	6
Oligochaeta	Enchytraeidae	-	-	0	1	1	0	2	0
	Lumbriculidae	-	-	0	0	0	0	0	0
	Naididae	-	-	0	0	0	0	0	0
	Tubificidae	-	-	0	0	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	1	0	0	0	0	0
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	4	1	1	0	3	3
Acari	-	-	-	0	0	0	0	0	1
Cladocera	-	-	-	8	3	3	2	0	6
Copepoda-Cyclopoida	-	-	-	0	0	0	1	1	1
Copepoda-Calanoida	-	-	-	0	0	0	0	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	1	1	0	0	0	0
			Procladius sp.	0	1	0	0	0	1
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	0	0	0	0	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	1	0	0	0	0	0
			Microtendipes pedellus gp.	3	9	11	11	6	12
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	1	0
			Polypedilum sp.	0	1	0	0	0	1
			Stictochironomus sp.	0	0	0	0	0	0
			early larvae	0	0	0	2	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	0	7	1	5	0	9
			Paratanytarsus sp.	0	0	0	0	0	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**18**	**28**	**20**	**24**	**22**	**40**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site N16-2					
				N16-2-1	N16-2-2	N16-2-3	N16-2-4	N16-2-5	N16-2-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	4	19	0	17	13	22
Oligochaeta	Enchytraeidae	-	-	0	8	3	7	2	6
	Lumbriculidae	-	-	0	1	0	0	0	2
	Naididae	-	-	1	4	0	4	0	5
	Tubificidae	-	-	0	0	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	1	1	2	0	2	1
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	5	2	1	8	4	6
Acari	-	-	-	0	0	0	0	0	1
Cladocera	-	-	-	1	12	0	0	3	5
Copepoda-Cyclopoida	-	-	-	1	3	0	0	0	3
Copepoda-Calanoida	-	-	-	0	0	0	8	0	6
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	1
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	1	3	0	1	0	4
			Procladius sp.	0	1	0	0	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	1	3	0	2	1	2
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	14	1	3	0	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	2	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	0	0	0	2	0	0
			Microtendipes pedellus gp.	9	20	3	11	26	11
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	0	0	0	3	0	0
			early larvae	0	0	1	2	0	0
		Tanytarsini	*Cladotanytarsus* sp.	1	4	0	0	0	0
			Micropsectra/ Tanytarsus sp.	0	6	0	2	1	2
			Paratanytarsus sp.	0	0	0	3	0	1
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**25**	**101**	**11**	**73**	**54**	**78**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site N16-3					
				N16-3-1	N16-3-2	N16-3-3	N16-3-4	N16-3-5	N16-3-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	7	10	0	18	0	9
Oligochaeta	Enchytraeidae	-	-	0	4	0	3	0	0
	Lumbriculidae	-	-	0	0	0	0	0	0
	Naididae	-	-	1	2	0	1	2	1
	Tubificidae	-	-	0	0	0	0	1	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	1	1	0	0	0
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	2	3	2	3	3	3
Acari	-	-	-	0	0	0	2	0	1
Cladocera	-	-	-	0	2	0	2	0	1
Copepoda-Cyclopoida	-	-	-	0	1	0	0	0	0
Copepoda-Calanoida	-	-	-	0	1	0	2	0	6
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	1	0
			Conchapelopia sp.	0	0	0	0	0	0
			Procladius sp.	0	0	1	2	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	1	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	0	0	2	0	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	1	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	0	0	0	0	0	0
			Microtendipes pedellus gp.	31	29	6	59	23	27
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	2	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	0	0	1	10	7	8
			early larvae	0	0	0	2	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	3	9	3	35	1	10
			Paratanytarsus sp.	0	0	0	0	0	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**44**	**62**	**14**	**145**	**38**	**66**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site N16-4					
				N16-4-1	N16-4-2	N16-4-3	N16-4-4	N16-4-5	N16-4-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	0	1	0	8	0	1
Oligochaeta	Enchytraeidae	-	-	0	0	0	0	0	0
	Lumbriculidae	-	-	0	2	0	1	0	0
	Naididae	-	-	0	0	0	0	0	0
	Tubificidae	-	-	0	1	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	0	0	0	0	0
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	0	1	1	0	0	0
Acari	-	-	-	0	1	0	0	0	0
Cladocera	-	-	-	0	3	1	0	2	0
Copepoda-Cyclopoida	-	-	-	0	0	0	0	0	0
Copepoda-Calanoida	-	-	-	0	2	0	0	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	0	0	0	0	0
			Procladius sp.	0	0	0	0	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	0	0	0	0	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	0	0	0	0	0	0
			Microtendipes pedellus gp.	0	1	1	2	0	0
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	2	1	0	0	1	0
			early larvae	0	0	0	0	1	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	1	3	2	5	0	0
			Paratanytarsus sp.	0	0	0	0	0	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**3**	**16**	**5**	**16**	**4**	**1**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K1 - 1					
				K1-1-1	K1-1-2	K1-1-3	K1-1-4	K1-1-5	K1-1-6
Microturbellaria	-	-	-	1	1	0	0	0	0
Nematoda	-	-	-	6	6	0	18	9	0
Oligochaeta	Enchytraeidae	-	-	0	0	0	5	2	0
	Lumbriculidae	-	-	0	0	1	3	0	0
	Naididae	-	-	0	0	0	0	0	0
	Tubificidae	-	-	0	0	0	1	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	1	1	3	0	4
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	3	2	3	10	9	6
Acari	-	-	-	0	1	0	0	1	0
Cladocera	-	-	-	9	2	0	0	0	0
Copepoda-Cyclopoida	-	-	-	1	0	1	1	0	0
Copepoda-Calanoida	-	-	-	4	2	2	6	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	1	1	0	0	0	0
			Conchapelopia sp.	1	0	0	0	0	0
			Procladius sp.	1	0	0	1	0	1
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	5	4	0	7	0	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	2	1	3	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	3	3	0	4	1	0
			Microtendipes pedellus gp.	19	8	2	7	25	6
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	13	7	2	13	5	3
			early larvae	0	0	0	5	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	5	9	0	9	4	4
			Paratanytarsus sp.	5	6	0	12	2	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**77**	**55**	**13**	**108**	**58**	**24**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K1 - 2					
				K1-2-1	K1-2-2	K1-2-3	K1-2-4	K1-2-5	K1-2-6
Microturbellaria	-	-	-	0	2	0	1	0	1
Nematoda	-	-	-	0	15	3	10	3	10
Oligochaeta	Enchytraeidae	-	-	0	0	0	0	0	0
	Lumbriculidae	-	-	0	0	0	0	0	0
	Naididae	-	-	0	2	0	1	0	1
	Tubificidae	-	-	0	2	0	1	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	4	2	3	0	3	2
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	6	19	4	9	5	1
Acari	-	-	-	0	0	0	0	0	0
Cladocera	-	-	-	0	39	1	34	1	7
Copepoda-Cyclopoida	-	-	-	0	4	0	3	1	1
Copepoda-Calanoida	-	-	-	0	1	0	0	1	2
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	0	0	0	0	0
			Procladius sp.	1	11	0	0	0	2
		Diamesinae	*Potthastia longimana*	0	0	0	1	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	7	0	11	0	3
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	3	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	0	1	1	0	1	2
			Microtendipes pedellus gp.	6	14	3	21	13	3
			Parachironomus sp.	0	0	0	0	0	1
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	3	15	6	15	5	2
			early larvae	0	4	0	0	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	4	51	0	38	2	24
			Paratanytarsus sp.	0	7	2	17	0	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**24**	**196**	**23**	**165**	**35**	**62**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K1 - 3					
				K1-3-1	K1-3-2	K1-3-3	K1-3-4	K1-3-5	K1-3-6
Microturbellaria	-	-	-	0	0	0	0	0	1
Nematoda	-	-	-	1	9	2	10	10	23
Oligochaeta	Enchytraeidae	-	-	0	1	1	1	0	8
	Lumbriculidae	-	-	0	0	1	1	1	0
	Naididae	-	-	1	0	0	1	0	5
	Tubificidae	-	-	1	5	0	3	0	5
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	1	1	0	1	1	1
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	4	2	9	4	8	4
Acari	-	-	-	0	1	0	3	1	1
Cladocera	-	-	-	0	3	1	7	0	3
Copepoda-Cyclopoida	-	-	-	0	3	0	1	0	2
Copepoda-Calanoida	-	-	-	0	13	3	0	0	5
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	1	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	0	0	0	0	0
			Procladius sp.	0	1	0	2	0	1
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	1	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	0	0	0	0	7
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	1	1
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	1	0	0	0	0
			Dicrotendipes sp.	0	1	0	0	0	3
			Microtendipes pedellus gp.	0	2	15	8	1	10
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	5	1	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	1	26	5	5	16	27
			Paratanytarsus sp.	0	1	1	0	0	4
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**11**	**75**	**39**	**47**	**39**	**111**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K1 - 4					
				K1-4-1	K1-4-2	K1-4-3	K1-4-4	K1-4-5	K1-4-6
Microturbellaria	-	-	-	1	0	0	0	0	0
Nematoda	-	-	-	23	2	0	6	0	2
Oligochaeta	Enchytraeidae	-	-	10	0	0	1	1	0
	Lumbriculidae	-	-	2	0	0	1	0	0
	Naididae	-	-	3	0	0	0	0	0
	Tubificidae	-	-	1	0	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	0	2	0	0	0
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	5	3	3	2	4	1
Acari	-	-	-	0	0	0	0	0	0
Cladocera	-	-	-	0	0	0	1	0	0
Copepoda-Cyclopoida	-	-	-	0	0	0	0	0	1
Copepoda-Calanoida	-	-	-	1	0	0	2	0	2
Ostracoda	Cyclocypridae	-	-	0	0	0	1	0	1
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	2	0	0	0	0	1
			Procladius sp.	1	0	0	0	0	0
		Diamesinae	*Potthastia longimana*	0	0	1	0	0	1
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	1	0	0	1	0	1
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	10	1	0	1	0	0
			Microtendipes pedellus gp.	6	6	4	4	6	5
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	3	0	0	0	2	0
			early larvae	3	0	0	1	3	1
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	17	5	2	7	4	9
			Paratanytarsus sp.	19	2	4	4	6	6
	Empididae	-	*Chelifera* sp.	1	0	0	0	0	0
			TOTAL	**109**	**19**	**16**	**32**	**26**	**31**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K1 - 6					
				K1-6-1	K1-6-2	K1-6-3	K1-6-4	K1-6-5	K1-6-6
Microturbellaria	-	-	-	0	0	0	1	0	0
Nematoda	-	-	-	7	3	0	4	0	4
Oligochaeta	Enchytraeidae	-	-	0	0	0	0	0	0
	Lumbriculidae	-	-	0	0	0	1	0	0
	Naididae	-	-	0	0	0	0	0	0
	Tubificidae	-	-	0	1	0	1	1	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	2	0	0	1	0
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	0	0	0	1	2	0
Acari	-	-	-	0	0	0	0	0	0
Cladocera	-	-	-	0	0	0	1	0	0
Copepoda-Cyclopoida	-	-	-	0	0	0	0	0	0
Copepoda-Calanoida	-	-	-	0	1	0	0	1	1
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	0	0	0	0	0
			Procladius sp.	0	0	0	0	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	1	0	0	0	1
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	1	1	1	0	0	0
			Microtendipes pedellus gp.	1	3	1	2	3	1
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	1	1	1	1	0	4
			early larvae	0	0	0	1	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	3	1	1	1	1	0
			Paratanytarsus sp.	1	3	0	1	0	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**14**	**17**	**4**	**15**	**9**	**11**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K5 - 1					
				K5-1-1	K5-2-1	K5-1-3	K5-1-4	K5-1-5	K5-1-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	0	0	1	2	1	0
Oligochaeta	Enchytraeidae	-	-	0	0	0	0	0	0
	Lumbriculidae	-	-	0	0	0	0	0	0
	Naididae	-	-	0	2	0	3	1	4
	Tubificidae	-	-	0	1	0	5	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	1	4	1	3	0
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	3	3	8	7	9	11
Acari	-	-	-	0	1	0	1	0	0
Cladocera	-	-	-	0	1	0	11	0	4
Copepoda-Cyclopoida	-	-	-	0	0	0	1	0	0
Copepoda-Calanoida	-	-	-	0	0	0	0	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	0	0	0	0	0
			Procladius sp.	1	0	2	5	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	1	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	2	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	1	0	0
			Psectrocladius sp.	0	0	0	4	0	4
			Zalutschia tatrica gp.	7	17	4	8	3	11
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	1	1	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	0	1	1	1	0	0
			Microtendipes pedellus gp.	1	0	0	1	0	0
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	0	0	0
			Stictochironomus sp.	1	4	5	22	1	6
			early larvae	0	0	0	1	4	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	4	6	2	6	2	5
			Paratanytarsus sp.	1	1	0	0	0	1
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**18**	**39**	**27**	**83**	**25**	**46**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K5-2					
				K5-2-1	K5-2-1	K5-2-3	K5-2-4	K5-2-5	K5-2-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	8	0	0	0	0	0
Oligochaeta	Enchytraeidae	-	-	0	0	0	0	0	0
	Lumbriculidae	-	-	0	0	0	0	0	0
	Naididae	-	-	0	0	0	0	0	0
	Tubificidae	-	-	0	0	0	0	0	1
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	0	1	0	0	0	2
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	1	1	0	0	2	4
Acari	-	-	-	0	0	0	0	0	0
Cladocera	-	-	-	0	3	0	3	0	1
Copepoda-Cyclopoida	-	-	-	0	0	2	0	0	1
Copepoda-Calanoida	-	-	-	0	0	0	0	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	1	0	0	0	0
			Procladius sp.	0	1	0	0	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	1	0	0	0	0	0
			Zalutschia tatrica gp.	8	3	0	2	0	6
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	1	0	0	0	0	3
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	0	0	0	0	0	0
			Microtendipes pedellus gp.	6	1	0	0	0	0
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	0	0	1	0	0
			Stictochironomus sp.	0	3	2	1	1	7
			early larvae	1	0	0	0	1	1
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	2	0	0	0	0	0
			Paratanytarsus sp.	0	0	0	0	0	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**28**	**14**	**4**	**7**	**4**	**26**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K5 - 3					
				K5-3-1	K5-3-2	K5-3-3	K5-3-4	K5-3-5	K5-3-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	0	3	0	0	0	0
Oligochaeta	Enchytraeidae	-	-	0	0	0	0	0	0
	Lumbriculidae	-	-	1	0	0	0	0	0
	Naididae	-	-	0	0	0	0	0	0
	Tubificidae	-	-	0	0	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	1	1	0	1	0	0
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	0	0	2	3	2	0
Acari	-	-	-	2	0	0	0	0	0
Cladocera	-	-	-	0	0	0	3	0	1
Copepoda-Cyclopoida	-	-	-	0	1	0	0	0	0
Copepoda-Calanoida	-	-	-	0	2	0	2	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	0	0	0	0	0
			Procladius sp.	0	1	1	2	0	0
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	0	0	0	1	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	0	1	0	0	0	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	0	0	0	0	0	0
			Dicrotendipes sp.	0	0	0	0	0	0
			Microtendipes pedellus gp.	1	0	0	1	0	0
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	0	1	0	0	0	0
			Stictochironomus sp.	0	0	1	5	0	5
			early larvae	0	0	0	0	0	0
		Tanytarsini	*Cladotanytarsus* sp.	1	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	4	15	0	40	2	11
			Paratanytarsus sp.	0	0	0	0	0	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**10**	**25**	**4**	**57**	**5**	**17**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K5 - 4					
				K5-4-1	K5-4-2	K5-4-3	K5-4-4	K5-4-5	K5-4-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	11	68	13	91	30	53
Oligochaeta	Enchytraeidae	-	-	3	6	1	51	6	4
	Lumbriculidae	-	-	0	0	1	3	2	1
	Naididae	-	-	3	12	0	0	0	6
	Tubificidae	-	-	1	7	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	4	1	6	2	15	10
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	5	10	19	13	18	9
Acari	-	-	-	1	0	3	0	1	2
Cladocera	-	-	-	1	8	0	16	2	10
Copepoda-Cyclopoida	-	-	-	0	4	0	4	1	0
Copepoda-Calanoida	-	-	-	0	0	0	0	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	1	0	0	0
	Phryganeidae	-	*Agrypnia sp.*	0	0	0	0	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	0	0	0	1	2
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	0	0	4	0	0
			Procladius sp.	0	2	4	14	5	4
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	0	0	0	0	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	0	0	0	0	0
		Chironomini	*Chironomus* sp.	1	1	2	0	0	0
			Cladopelma sp.	0	0	0	2	0	0
			Cryptochironomus sp.	1	0	1	1	1	2
			Dicrotendipes sp.	0	7	0	17	16	2
			Microtendipes pedellus gp.	8	12	11	35	18	20
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	8	0	3	0
			Polypedilum sp.	2	4	0	4	0	10
			Stictochironomus sp.	0	0	6	0	0	0
			early larvae	0	0	0	0	0	0
		Tanytarsini	*Cladotanytarsus* sp.	0	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	7	90	58	152	52	112
			Paratanytarsus sp.	0	0	6	12	0	8
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**48**	**232**	**140**	**421**	**171**	**255**

Table JJ.X-8 Raw Lake Benthic Invertebrate Data (no./sample) Collected Using an Ekman Grab Sampler, Fall 2007 (continued)

Major taxon	Family	Subfamily/Tribe	Genus/Species	Site K5 - 5					
				K5-5-1	K5-5-2	K5-5-3	K5-5-4	K5-5-5	K5-5-6
Microturbellaria	-	-	-	0	0	0	0	0	0
Nematoda	-	-	-	19	25	37	93	37	18
Oligochaeta	Enchytraeidae	-	-	0	3	14	28	5	1
	Lumbriculidae	-	-	2	2	2	2	2	2
	Naididae	-	-	2	6	0	0	1	4
	Tubificidae	-	-	0	0	0	0	0	0
Gastropoda	Valvatidae	-	*Valvata sincera helicoidea*	13	8	29	20	16	7
Pelecypoda	Sphaeriidae	-	*Pisidium sp.*	11	1	40	39	69	5
Acari	-	-	-	0	0	0	0	0	1
Cladocera	-	-	-	0	2	2	0	0	0
Copepoda-Cyclopoida	-	-	-	0	0	0	8	0	0
Copepoda-Calanoida	-	-	-	0	0	0	0	0	0
Ostracoda	Cyclocypridae	-	-	0	0	0	4	0	0
Trichoptera	Leptoceridae	-	*Oecetis* sp.	0	0	0	0	1	0
	Phryganeidae	-	*Agrypnia sp.*	1	0	0	1	0	0
Diptera	Ceratopogonidae	-	*Bezzia* gp.	0	1	0	0	0	0
	Chironomidae	Tanypodinae	*Ablabesmyia* sp.	0	0	0	0	0	0
			Conchapelopia sp.	0	1	0	0	0	1
			Procladius sp.	3	0	2	12	0	7
		Diamesinae	*Potthastia longimana*	0	0	0	0	0	0
			Protanypus sp.	0	0	0	0	0	0
		Prodiamesinae	*Monodiamesa* sp.	0	0	0	0	0	0
		Orthocladiinae	*Corynoneura* sp.	0	0	0	0	0	0
			Cricotopus/ Orthocladius sp.	0	0	0	0	0	0
			Psectrocladius sp.	0	0	0	0	0	0
			Zalutschia tatrica gp.	0	0	0	0	0	0
			early larvae	0	2	0	0	0	0
		Chironomini	*Chironomus* sp.	0	0	0	0	0	0
			Cladopelma sp.	0	0	0	0	0	0
			Cryptochironomus sp.	1	2	0	1	0	1
			Dicrotendipes sp.	1	4	4	13	31	4
			Microtendipes pedellus gp.	8	8	17	10	23	10
			Parachironomus sp.	0	0	0	0	0	0
			Phaenopsectra sp.	0	0	0	0	0	0
			Polypedilum sp.	1	18	3	15	5	11
			Stictochironomus sp.	0	0	0	0	0	0
			early larvae	3	0	0	0	0	0
		Tanytarsini	*Cladotanytarsus* sp.	1	0	0	0	0	0
			Micropsectra/ Tanytarsus sp.	21	41	48	118	38	60
			Paratanytarsus sp.	1	7	6	4	4	0
	Empididae	-	*Chelifera* sp.	0	0	0	0	0	0
			TOTAL	**88**	**131**	**204**	**368**	**232**	**132**

Note:
Ekman sampler bottom sampling area was 0.0225 m².

sp. = unknown species; gp. = genus or species group with similar type of larva.

Table JJ.X-9 Number of Organisms Recovered from Second Sorting and Sorting Efficiency for Benthic Invertebrate Samples Collected in Fall 2007

Taxa	Stream Samples			Lake Samples							
	M4-4	L2-4	L3-1	N16-1-3	N16-3-2	N16-4-2	K1-2-5	K1-6-2	K1-6-5	K5-4-1	K5-5-2
Nematoda	0	0	0	0	0	0	0	0	0	2	6
Acari	1	0	0	0	0	0	0	0	0	0	0
Micropsectra/Tanytarsus sp.	0	3	0	0	0	0	0	0	0	0	0
Total organisms recovered in resort	1	3	0	0	0	0	0	0	0	2	6
Total organisms enumerated in initial sort	26	75	44	20	62	16	35	17	9	48	131
Percent error	3.8%	4.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.2%	4.6%

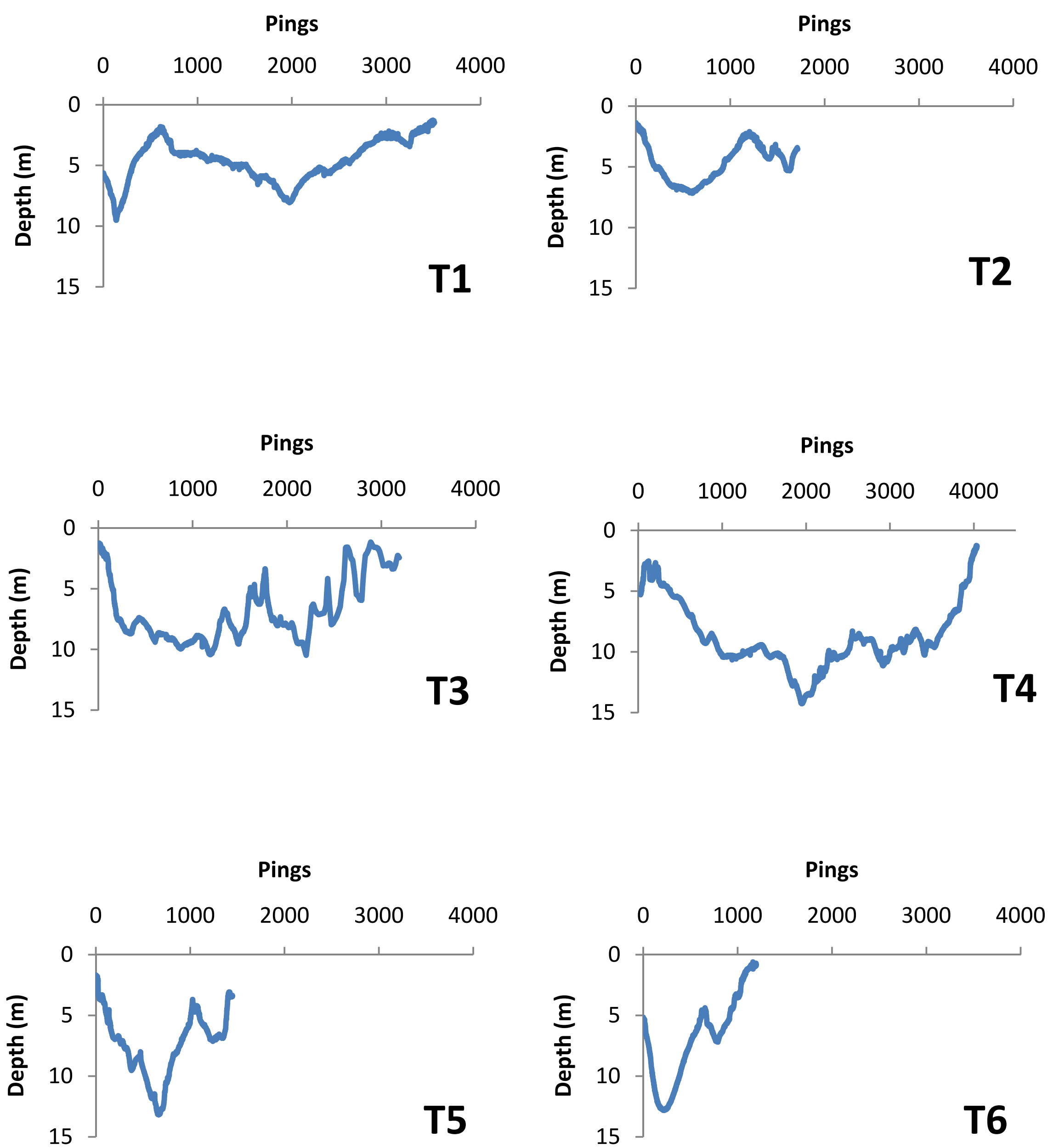
Note: Percent error = (no. organisms in resort/ no. organisms in initial sort) x 100

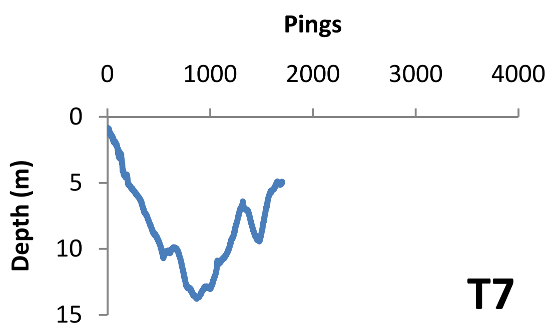
no. = number; sp = species; % = percent.

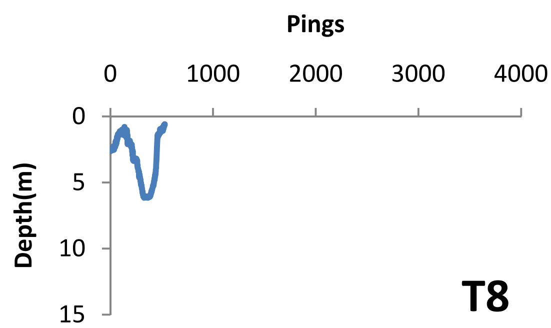
APPENDIX JJ.XI

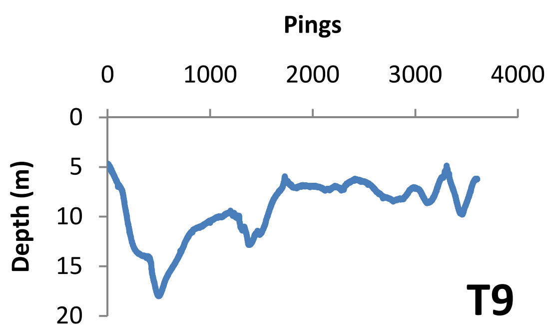
HYDROACOUSTIC SURVEYS – DEPTH TRANSECTS, 2010

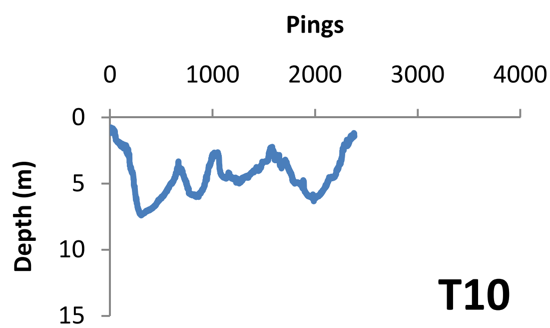
Depth of water sampled versus position along study transects (measured in pings) for the acoustic surveys in Kennady Lake (August 16, 2010).

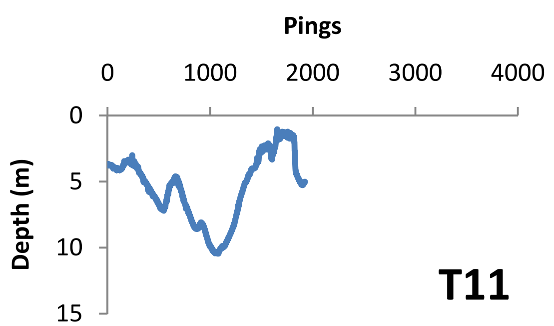


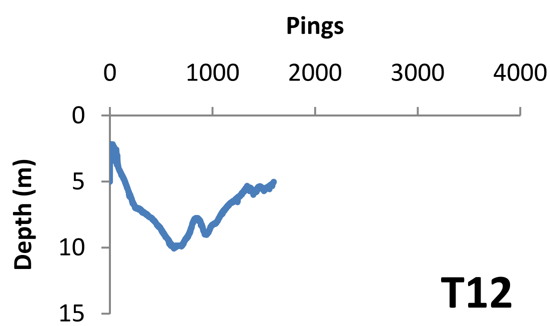

Pings
0 1000 2000 3000 4000
Depth (m)
0 5 10 15
T7

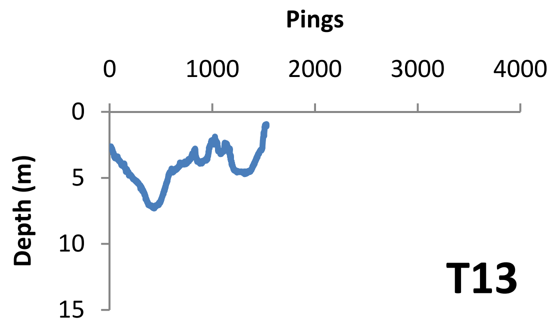

Pings
0 1000 2000 3000 4000
Depth(m)
0 5 10 15
T8

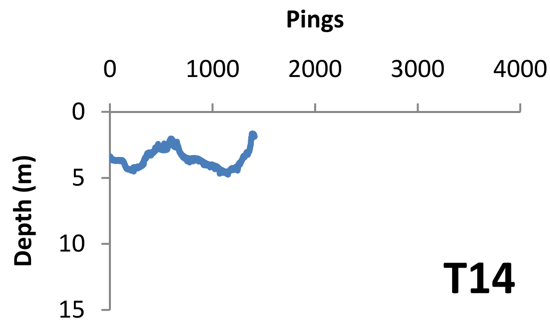

Pings
0 1000 2000 3000 4000
Depth (m)
0 5 10 15 20
T9


Pings
0 1000 2000 3000 4000
Depth (m)
0 5 10 15
T10


Pings
0 1000 2000 3000 4000
Depth (m)
0 5 10 15
T11


Pings
0 1000 2000 3000 4000
Depth (m)
0 5 10 15
T12





Depths sampled from hydroacoustic surveys on 14 transects (T1 to T14) in Kennady Lake (August 16, 2010).

Note: Transects were surveyed three times along similar paths in their respective sub-basin.

APPENDIX JJ.XII

HYDROACOUSTIC SURVEYS – FISH CAPTURE AND EFFORT DATA, 2010

Table JJ.XII-1 Gill Net Effort and Catch Data for Kennady Lake, August 2010

Gill Net ID	Basin	Easting	Northing	Date	Start Time	Duration (h)	Net Area (m^2)	Effort (m^2-ha)	Mesh Size (mm)	Species Caught[(a)]	Fork Length (mm)	Weight (g)
T1-GN1	K1	589452	7038205	15-Aug-10	10:26	1.57	30	47.0	64, 89	-	-	-
T1-GN2	K1	590169	7038333	15-Aug-10	10:38	1.58	30	47.5	64, 89	-	-	-
T1-GN3	K1	589101	7038272	20-Aug-10	15:26	0.98	15	14.8	38	-	-	-
T1-GN4	K1	589376	7038320	20-Aug-10	15:31	0.98	30	29.5	64, 89	-	-	-
T2-GN1	K1	589678	7038038	15-Aug-10	10:52	1.55	30	46.5	64, 89	NRPK	675	-
T2-GN2	K1	589287	7037995	15-Aug-10	11:01	1.48	30	44.5	64, 89	-	-	-
T2-GN3	K1	589342	7037925	20-Aug-10	15:17	0.97	30	29.0	64, 89	-	-	-
T2-GN4	K1	589037	7038066	20-Aug-10	15:22	0.97	30	29.0	64, 89	-	-	-
T3-GN1	K1	589667	7037581	15-Aug-10	11:13	1.62	30	48.5	64, 89	-	-	-
T3-GN2	K1	589003	7036929	15-Aug-10	11:22	1.63	30	49.0	64, 89	-	-	-
T3-GN3	K1	588143	7036291	20-Aug-10	14:46	0.98	30	29.5	64, 89	-	-	-
T3-GN4	K1	588585	7036589	20-Aug-10	14:52	0.88	30	26.5	64, 89	-	-	-
T3-GN5	K1	588896	7037073	20-Aug-10	14:58	1.00	30	30.0	64, 89	-	-	-
T3-GN6	K1	589616	7037651	20-Aug-10	15:14	0.92	15	13.8	38	-	-	-
T4-GN1	K1	588618	7036318	15-Aug-10	13:24	1.10	30	33.0	64, 89	-	-	-
T4-GN2	K1	589225	7036697	15-Aug-10	13:30	1.12	30	33.5	64, 89	-	-	-
T4-GN3	K1	589747	7037453	20-Aug-10	11:42	2.40	30	72.0	64, 89	-	-	-
T4-GN4	K1	589430	7037196	20-Aug-10	11:50	2.43	30	73.0	64, 89	-	-	-
T4-GN5	K1	589066	7036880	20-Aug-10	11:58	2.40	30	72.0	64, 89	-	-	-
T4-GN6	K1	588836	7036373	20-Aug-10	12:01	2.48	30	74.5	64, 89	LKTR	570	-
T4-GN7	K1	588638	7036102	20-Aug-10	12:07	2.72	30	81.5	64, 89	-	-	-
T5-GN1	K1	589751	7037001	15-Aug-10	13:40	1.22	30	36.5	64, 89	-	-	-
T5-GN2	K1	589827	7037121	15-Aug-10	13:47	1.15	30	34.5	64, 89	-	-	-
T5-GN3	K1	589347	7036676	20-Aug-10	11:28	2.30	15	34.5	38	-	-	-
T5-GN4	K1	589542	7037077	20-Aug-10	11:35	2.30	30	69.0	64, 89	-	-	-
T5-GN5	K1	589830	7037357	20-Aug-10	11:39	2.35	15	35.2	38	-	-	-
T6-GN1	K2	590193	7036929	15-Aug-10	13:52	1.20	30	36.0	64, 89	-	-	-
T6-GN2	K2	589894	7036670	15-Aug-10	13:58	1.30	30	39.0	64, 89	-	-	-
T6-GN3	K2	589814	7036496	20-Aug-10	9:21	1.23	30	37.0	64, 89	-	-	-
T6-GN4	K2	589978	7036568	20-Aug-10	9:25	1.27	30	38.0	64, 89	-	-	-
T6-GN5	K2	590254	7036886	20-Aug-10	9:32	1.23	30	37.0	64, 89	-	-	-

Table JJ.XII-1 Gill Net Effort and Catch Data for Kennady Lake, August 2010 (continued)

Gill Net ID	Basin	Easting	Northing	Date	Start Time	Duration (h)	Net Area (m^2)	Effort (m^2-ha)	Mesh Size (mm)	Species Caught[a]	Fork Length (mm)	Weight (g)
T7-GN1	K2	590161	7036615	15-Aug-10	15:20	1.00	30	30.0	64, 89	-	-	-
T7-GN2	K2	589741	7036174	15-Aug-10	15:26	1.07	30	32.0	64, 89	-	-	-
T7-GN3	K2	590279	7036726	20-Aug-10	9:35	1.28	30	38.5	64, 89	-	-	-
T7-GN4	K2	589729	7036186	20-Aug-10	9:44	1.23	15	18.5	38	-	-	-
T7-GN5	K2	589726	7036117	20-Aug-10	9:45	1.28	15	19.2	38	-	-	-
T8-GN1	K2	589374	7036114	15-Aug-10	15:36	1.07	30	32.0	64, 89	-	-	-
T8-GN2	K2	589405	7036039	15-Aug-10	15:40	1.17	30	35.0	64, 89	-	-	-
T8-GN3	K2	589382	7036127	20-Aug-10	9:53	1.23	30	37.0	64, 89	-	-	-
T8-GN4	K2	589395	7036020	20-Aug-10	9:56	1.33	30	40.0	64, 89	-	-	-
T9-GN1	K3	588030	7034540	17-Aug-10	9:01	1.58	30	47.5	64, 89	-	-	-
T9-GN2	K3	588197	7034587	17-Aug-10	9:12	1.47	30	44.0	64, 89	-	-	-
T9-GN3	K3	589169	7035386	17-Aug-10	9:24	1.47	30	44.0	64, 89	-	-	-
T9-GN4	K3	589129	7035317	17-Aug-10	9:31	1.42	30	42.5	64, 89	-	-	-
T9-GN5	K3	588549	7034866	19-Aug-10	10:46	3.17	30	95.0	64, 89	-	-	-
T9-GN6	K3	588553	7034975	19-Aug-10	10:49	3.20	30	96.0	64, 89	LKTR	524	-
T9-GN7	K3	588892	7035087	19-Aug-10	11:03	3.17	15	47.5	38	-	-	-
T9-GN8	K3	589024	7035260	19-Aug-10	11:10	3.22	15	48.3	38	-	-	-
T9-GN9	K3	589057	7035313	19-Aug-10	14:29	2.60	30	78.0	64, 89	-	-	-
T9-GN10	K3	589299	7035448	19-Aug-10	14:40	2.48	30	74.5	64, 89	LKTR	571	-
T10-GN1	K3	588941	7034802	17-Aug-10	9:41	1.40	30	42.0	64, 89	-	-	-
T10-GN2	K3	589075	7034931	17-Aug-10	9:47	1.38	30	41.5	64, 89	LKTR	490	702
T10-GN3	K3	589127	7034726	19-Aug-10	10:39	3.02	30	90.5	64, 89	-	-	-
T10-GN4	K3	589485	7035346	19-Aug-10	14:49	2.50	15	37.5	38	-	-	-
T10-GN5	K3	589398	7035144	19-Aug-10	14:53	2.62	15	39.2	38	LKCH	102	-

Table JJ.XII-1 Gill Net Effort and Catch Data for Kennady Lake, August 2010 (continued)

Gill Net ID	Basin	Easting	Northing	Date	Start Time	Duration (h)	Net Area (m^2)	Effort (m^2-ha)	Mesh Size (mm)	Species Caught[a]	Fork Length (mm)	Weight (g)
T11-GN1	K3	589122	7034618	17-Aug-10	11:25	2.00	30	60.0	64, 89	-	-	-
T11-GN2	K3	589545	7034646	17-Aug-10	11:31	2.03	30	61.0	64, 89	-	-	-
T11-GN3	K3	589678	7034971	17-Aug-10	11:54	1.85	30	55.5	64, 89	LKTR	500	776
T11-GN4	K3	589521	7034824	19-Aug-10	10:34	2.97	30	89.0	64, 89	-	-	-
T11-GN5	K3	588906	7034432	19-Aug-10	13:43	3.05	30	91.5	64, 89	-	-	-
T12-GN1	K4	590120	7034931	17-Aug-10	11:41	2.25	30	67.5	64, 89	-	-	-
T12-GN2	K4	590280	7034892	17-Aug-10	11:47	2.30	30	69.0	64, 89	RNWH	271	216
										RNWH	295	258
										RNWH	302	326
										RNWH	295	283
T12-GN3	K4	590132	7034949	19-Aug-10	10:20	2.67	30	80.0	64, 89	-	-	-
T12-GN4	K4	590035	7035168	19-Aug-10	10:29	2.65	30	79.5	64, 89	-	-	-
T12-GN5	K4	590206	7034781	19-Aug-10	13:19	3.10	30	93.0	64, 89	-	-	-
T12-GN6	K4	590153	7034830	19-Aug-10	13:23	3.17	30	95.0	64, 89	-	-	-
T13-GN1	K4	590363	7035099	17-Aug-10	14:17	1.90	30	57.0	64, 89	RNWH	338	444
										RNWH	305	307
T13-GN2	K4	590411	7035120	17-Aug-10	14:21	1.93	30	58.0	64, 89	-	-	-
T13-GN3	K4	590467	7035433	17-Aug-10	14:28	1.95	30	58.5	64, 89	-	-	-
T14-GN1	K4	590776	7035392	17-Aug-10	14:39	1.85	30	55.5	64, 89	-	-	-
T14-GN2	K4	590953	7035122	17-Aug-10	14:44	1.93	30	58.0	64, 89	-	-	-
T14-GN3	K4	590851	7035140	17-Aug-10	14:48	1.77	30	53.0	64, 89	-	-	-

(a) LKTR = lake trout; LKCH = lake chub; NRPK = northern pike; RNWH = round whitefish

ID = identification ; m^2 = square metres; mm = milimetres; g = grams; m^2-h a= square metres per hectares.

APPENDIX JJ.XIII

FISH INVENTORY SURVEYS – FISH CAPTURE AND EFFORT DATA, 2007 AND 2010

Table JJ.XIII-1 Summary of Effort, Catch and Catch-Per-Unit-Effort for Gill Nets Set in Lakes, 2007

Lake	Date	Site ID	Mesh Size (inches)	Set Time	Pull Time	Effort (hh:mm)	Effort (h)	Shallow End UTM (a)		Shallow End Depth (m)	Deep End UTM (a)		Deep End Depth (m)	Number of Fish Captured by Species				Total Fish Caught	CPUE by Species(fish/100 m^2/12 h)				Total CPUE
								Easting	Northing		Easting	Northing		ARGR	LKTR	NRPK	RNWH		ARGR	LKTR	NRPK	RNWH	
A1	19-Jul-07	GN 1	2.0	10:58	12:15	1:17	1.28	590395	7037760	1.5	590323	7037731	3.0	0	0	0	2	2	0	0	0	8.7	8.7
A1	19-Jul-07	GN 2	1.5	11:18	12:30	1:12	1.20	590756	7037899	1.5	590670	7037929	4.0	0	0	0	5	5	0	0	0	23.1	23.1
A1	19-Jul-07	GN 3	2.5	11:27	12:40	1:13	1.22	590652	7037652	1.0	590646	7037731	1.5	2	0	0	5	7	9.1	0	0	22.8	32.0
A3	19-Jul-07	GN 4	2.5	15:30	16:20	0:50	0.83	591037	7038994	2.0	591025	7038895	4.0	0	0	0	0	0	0	0	0	0	0.0
A3	19-Jul-07	GN 5	1.5	15:36	16:47	1:11	1.18	591262	7038695	1.0	591216	7038617	3.0	0	1	0	0	1	0	4.7	0	0	4.7
A3	19-Jul-07	GN 6	2.0	15:45	16:52	1:07	1.12	590950	7038444	1.5	590951	7038530	7.0	1	2	0	0	3	5.0	10.0	0	0	14.9
A3	19-Jul-07	GN 7	2.0	17:06	17:50	0:44	0.73	590855	7038417	2.0	590813	7038456	3.5	0	0	0	0	0	0	0	0	0	0.0
A3	19-Jul-07	GN 8	1.5	17:13	17:59	0:46	0.77	590891	7038626	6.5	590987	7038622	9.5	0	0	0	0	0	0	0	0	0	0.0
A3	19-Jul-07	GN 9	2.5	17:30	18:09	0:39	0.65	591080	7038537	1.5	590997	7038496	2.0	0	1	1	0	2	0	8.5	8.5	0	17.1
D2	20-Jul-07	GN 10	2.5	7:50	8:50	1:00	1.00	587174	7036443	1.0	587225	7036519	1.0	0	0	0	0	0	0	0	0	0	0.0
D2	20-Jul-07	GN 11	1.5	8:12	9:06	0:54	0.90	587364	7036651	1.0	587460	7036661	1.0	0	0	1	0	1	0	0	6.2	0	6.2
D2	20-Jul-07	GN 12	2.0	8:24	9:30	1:06	1.10	587419	7036578	1.0	587524	7036558	1.0	0	0	0	0	0	0	0	0	0	0.0
D3	21-Jul-07	GN 13	2.0	8:00	8:50	0:50	0.83	586572	7037348	1.0	586543	7037276	1.0	0	0	0	0	0	0	0	0	0	0.0
D3	21-Jul-07	GN 14	1.5	8:10	9:10	1:00	1.00	586689	7037271	1.0	586620	7037204	1.0	0	0	0	0	0	0	0	0	0	0.0
D3	21-Jul-07	GN 15	2.5	8:17	9:18	1:01	1.02	586738	7037259	1.0	586703	7037170	1.0	0	0	0	0	0	0	0	0	0	0.0
D3	21-Jul-07	GN 16	2.5	10:40	11:24	0:44	0.73	586615	7037099	2.0	586578	7037010	2.0	0	0	0	0	0	0	0	0	0	0.0
D3	21-Jul-07	GN 17	1.5	10:48	11:34	0:46	0.77	586701	7037062	2.0	586665	7036969	2.0	0	0	0	0	0	0	0	0	0	0.0
D3	21-Jul-07	GN 18	2.0	10:49	11:45	0:56	0.93	586759	7036947	2.0	586689	7036883	2.0	0	0	0	0	0	0	0	0	0	0.0
E1	25-Jul-07	GN 19	2.0	7:52	9:10	1:18	1.30	586553	7035672	0.8	586478	7035596	1.5	0	0	1	0	1	0	0	4.3	0	4.3
E1	25-Jul-07	GN 20	1.5	8:01	9:18	1:17	1.28	586435	7035666	1.0	586373	7035586	3.0	0	0	0	0	0	0	0	0	0	0.0
E1	25-Jul-07	GN 21	2.5	8:13	9:18	1:05	1.08	586562	7035470	0.3	586535	7035381	3.0	0	0	1	0	1	0	0	5.1	0	5.1
E1	25-Jul-07	GN 22	2.5	9:40	11:05	1:25	1.42	586857	7035061	1.0	586803	7035143	1.5	0	0	0	0	0	0	0	0	0	0.0
E1	25-Jul-07	GN 23	1.5	9:49	11:14	1:25	1.42	586742	7035456	0.5	586681	7035363	3.0	0	0	0	0	0	0	0	0	0	0.0
E1	25-Jul-07	GN 24	2.0	9:55	11:22	1:27	1.45	586622	7035306	1.0	586686	7035229	3.0	0	0	0	0	0	0	0	0	0	0.0
E1	25-Jul-07	GN 25	2.0	11:32	12:07	0:35	0.58	586343	7035544	1.0	586364	7035462	3.0	0	0	1	0	1	0	0	9.5	0	9.5
E1	25-Jul-07	GN 26	1.5	11:38	12:24	0:46	0.77	586558	7035715	1.0	586516	7035632	1.0	0	0	0	0	0	0	0	0	0	0.0
E1	25-Jul-07	GN 27	2.5	11:41	12:17	0:36	0.60	586501	7035616	1.0	586452	7035514	1.5	0	0	0	0	0	0	0	0	0	0.0

(a) UTM Coordinates in NAD 83, Zone 12.

\- = Data not recorded.

ID = identification; hh:mm = hours:minutes ; h = hours; m = metres; CPUE = catch-per-unit-effort; - = no data.

Table JJ.XIII-2 Summary of Effort, Catch and Catch-Per-Unit-Effort for Shoreline Electrofishing, 2007

Lake	Date	Site ID	Start Time (hh:mm)	End Time (hh:mm)	Shocker Effort (sec)	Distance Sampled (m)	Start UTM [(a)]		End UTM [(a)]		Number of Fish Captured by Species [(b)]								CPUE (fish/100 m) [(b)]							
							Easting	Northing	Easting	Northing	BURB	NRPK	LNSC	SCKR	NNST	SLSC	UNKN	Total Fish Caught	BURB	NRPK	LNSC	SCKR	NNST	SLSC	UNKN	Total CPUE
Kirk Lake	23-Jul-07	EF 7	09:50	10:50	1658	150	591309	7060962	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kirk Lake	23-Jul-07	EF 8	11:50	12:30	400	100	591205	7061171	-	-	0	1	0	0	0	0	0	1	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
410	23-Jul-07	EF 9	15:00	16:30	1627	200	596356	7050853	-	-	0	0	0	0	0	1	0	1	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50
E1	25-Jul-07	EF 15	08:30	08:55	592	50	586355	7035571	-	-	0	0	0	0	0	2	0	2	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
A1	19-Jul-07	EF 41.1	12:40	13:00	106	40	-	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A1	19-Jul-07	EF 41.2	13:20	13:50	155	30	-	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A3	19-Jul-07	EF 42	15:20	15:48	593	75	590849	7038564	-	-	0	0	0	0	0	0	1	1	0.00	0.00	0.00	0.00	0.00	0.00	1.33	1.33
D2	20-Jul-07	EF 43	07:18	08:15	609	100	507356	7036457	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D2	20-Jul-07	EF 44	10:20	10:40	226	75	-	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D3	21-Jul-07	EF 48	08:04	08:30	527	100	-	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D3	21-Jul-07	EF 49	09:30	10:00	366	70	-	-	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D3	21-Jul-07	EF 50	10:15	10:57	460	100	586806	7067231	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y1	28-Jul-07	EF 27	08:10	08:24	404	100	583077	7032085	-	-	0	0	0	0	4	0	0	4	0.00	0.00	0.00	0.00	4.00	0.00	0.00	4.00
Y1	28-Jul-07	EF 28	08:46	09:03	414	75	583209	7032234	-	-	0	0	0	0	5	0	0	5	0.00	0.00	0.00	0.00	6.67	0.00	0.00	6.67
Y2	28-Jul-07	EF 29	09:14	09:36	727	100	583209	7032234	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y4	28-Jul-07	EF 31	11:18	11:35	426	50	583946	7032878	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y6	28-Jul-07	EF 33	12:45	12:57	204	40	584520	7033365	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y7	28-Jul-07	EF 34	12:58	13:07	190	50	584520	7033365	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y8	28-Jul-07	EF 35	13:20	13:35	494	80	584697	7033465	-	-	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y9	28-Jul-07	EF 36	14:02	14:12	294	60	584954	7033513	-	-	1	0	2	13	0	0	0	16	1.67	0.00	3.33	21.67	0.00	0.00	0.00	26.67
Y10	28-Jul-07	EF 37	14:30	14:50	415	75	584966	7033506	-	-	5	0	0	0	0	2	0	7	6.67	0.00	0.00	0.00	0.00	2.67	0.00	9.33

(a) UTM Coordinates in NAD 83, Zone 12.

(b) Where BURB = burbot; NRPK = northern pike; LNSC = longnose sucker; SCKR = unknown sucker species; NNST = ninespine stickleback; SLSC = slimy sculpin; UNKN = unknown species; sec = seconds; m = metres; UTM = Universal Transverse Mercator

- = Data not recorded; CPUE = catch-per-unit-effort.

hh:mm = hours: minutes; sec = seconds; m = metres;UTM = Universal Transverse Mercator; NAD = North American Datum

Table JJ.XIII-3 Summary of Effort, Catch and Catch-Per-Unit-Effort for Stream Backpack Electrofishing, 2007

Stream	Date	Site ID	Start Time (hh:mm)	End Time (hh:mm)	Shocker Effort (sec)	Distance Sampled (m)	Start UTM [(a)]		End UTM [(a)]		Number of Fish Captured by Species [(b)]										CPUE (fish/100 m) [(b)]									
							Easting	Northing	Easting	Northing	ARGR	BURB	LKCH	LKTR	LNSC	NNST	NRPK	SCKR	SLSC	Total Fish Caught	ARGR	BURB	LKCH	LKTR	LNSC	NNST	NRPK	SCKR	SLSC	Total CPUE
410	26-Aug-07	EF 60	14:30	15:45	2325	50		-	-	-	0	2	1	0	0	0	0	0	21	24	0.00	4.00	2.00	0.00	0.00	0.00	0.00	0.00	42.00	48.00
A1	19-Jul-07	EF 39	10:55	11:09	549	50	590254	7037817	-	-	0	0	0	0	0	0	0	0	2	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00
A1	19-Jul-07	EF 40	11:30	11:50	538	50	590254	7037817	-	-	0	1	0	0	0	0	0	0	2	3	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	6.00
Control Lake Outlet	28-Jul-07	EF 38	08:00	8:24	597	50	585995	7040488	-	-	1	6	1	0	2	0	0	0	38	48	2.00	12.00	2.00	0.00	4.00	0.00	0.00	0.00	76.00	96.00
K5	20-Jul-07	EF 45	15:15	15:44	516	40	593204	7038422	-	-	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K5	20-Jul-07	EF 46	16:00	16:15	409	40	593204	7038422	-	-	0	0	0	0	0	0	0	0	1	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	2.50
K5	26-Aug-07	EF 56	07:50	8:12	850	40	593204	7038422	-	-	1	0	0	0	0	0	0	0	3	4	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	10.00
Kirk	27-Aug-07	EF 61	10:35	11:08	958	50	599015	7076783	-	-	0	0	0	0	0	0	0	0	30	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	60.00
L1a	26-Jul-07	EF 21.1	14:30	14:55	404	40	594634	7039437	-	-	3	0	3	0	0	0	0	0	2	8	7.50	0.00	7.50	0.00	0.00	0.00	0.00	0.00	5.00	20.00
L1a	26-Jul-07	EF 21.2	15:30	15:50	391	40	594634	7039437	-	-	3	1	0	0	0	0	0	0	4	8	7.50	2.50	0.00	0.00	0.00	0.00	0.00	0.00	10.00	20.00
L1a	26-Jul-07	EF 21.3	16:07	16:28	389	40	594634	7039437	-	-	3	0	1	0	0	0	0	0	4	8	7.50	0.00	2.50	0.00	0.00	0.00	0.00	0.00	10.00	20.00
L1a	26-Aug-07	EF 59.1	12:00	12:20	745	40	594634	7039437	-	-	1	0	0	0	0	0	0	0	10	11	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	27.50
L1a	26-Aug-07	EF 59.2	12:30	12:51	690	40	594634	7039437	-	-	1	1	0	0	0	0	0	0	10	12	2.50	2.50	0.00	0.00	0.00	0.00	0.00	0.00	25.00	30.00
L1a	26-Aug-07	EF 59.3	13:00	13:19	601	40	594634	7039437	-	-	1	0	0	0	0	0	0	0	9	10	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.50	25.00
L1b	26-Jul-07	EF 20	13:10	13:34	404	30	594309	7039226	-	-	1	0	0	0	0	0	0	0	4	5	3.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.33	16.67
L1c	26-Jul-07	EF 19	12:00	12:30	464	40	594126	7039120	-	-	0	0	0	0	0	0	0	0	1	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	2.50
L2	26-Jul-07	EF 18.1	08:30	9:10	451	30	593878	7038997	-	-	9	0	0	0	0	0	0	0	28	37	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.33	123.33
L2	26-Jul-07	EF 18.2	10:00	10:16	404	30	593878	7038997	-	-	9	0	0	0	0	0	0	0	22	31	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73.33	103.33
L2	26-Jul-07	EF 18.3	10:36	10:55	401	30	593878	7038997	-	-	4	1	0	0	0	0	0	0	19	24	13.33	3.33	0.00	0.00	0.00	0.00	0.00	0.00	63.33	80.00
L2	26-Aug-07	EF 58.1	09:40	10:00	451	30	593878	7038997	-	-	2	2	0	0	0	0	0	0	19	23	6.67	6.67	0.00	0.00	0.00	0.00	0.00	0.00	63.33	76.67
L2	26-Aug-07	EF 58.2	10:10	10:34	460	30	593878	7038997	-	-	0	1	0	0	0	0	0	0	32	33	0.00	3.33	0.00	0.00	0.00	0.00	0.00	0.00	106.67	110.00
L2	26-Aug-07	EF 58.3	10:48	11:07	454	30	593878	7038997	-	-	0	0	0	0	0	0	0	0	10	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.33	33.33
L2	3-Sep-07	EF 63.1	09:05	9:20	453	30	593878	7038997	-	-	2	0	0	0	0	1	0	0	10	13	6.67	0.00	0.00	0.00	0.00	3.33	0.00	0.00	33.33	43.33
L2	3-Sep-07	EF 63.2	09:30	9:50	318	30	593878	7038997	-	-	1	0	0	0	0	0	0	0	6	7	3.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	23.33
L2	3-Sep-07	EF 63.3	09:58	10:10	300	30	593878	7038997	-	-	0	0	0	0	0	0	0	0	9	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00
L3	20-Jul-07	EF 47	17:00	17:20	272	50	593228	7038594	-	-	0	0	0	0	0	0	1	0	0	1	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
L3	26-Aug-07	EF 57	08:35	8:56	509	30	-	-	-	-	1	1	0	0	0	0	0	0	0	2	3.33	3.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.67
M1	27-Jul-07	EF 26	13:35	13:57	498	20	596412	7045358	-	-	0	2	0	0	0	0	0	0	12	14	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	70.00
M2	27-Jul-07	EF 25	11:39	12:00	527	35	596560	7045209	-	-	0	0	0	0	0	0	1	0	7	8	0.00	0.00	0.00	0.00	0.00	0.00	2.86	0.00	20.00	22.86
M3	27-Jul-07	EF 24	10:10	10:28	465	40	597271	7044461	-	-	0	1	0	0	0	0	1	0	6	8	0.00	2.50	0.00	0.00	0.00	0.00	2.50	0.00	15.00	20.00
M4	27-Jul-07	EF 23	08:00	8:30	608	60	596261	7041732	-	-	0	0	0	0	0	0	1	0	3	4	0.00	0.00	0.00	0.00	0.00	0.00	1.67	0.00	5.00	6.67
N1	25-Jul-07	EF 16	16:10	17:00	761	60	595770	7046021	-	-	0	1	1	0	0	0	0	0	18	20	0.00	1.67	1.67	0.00	0.00	0.00	0.00	0.00	30.00	33.33
N1	25-Jul-07	EF 17	17:35	17:55	635	40	595770	7046021	-	-	0	2	0	0	0	0	0	0	3	5	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	12.50

Table JJ.XIII-3 Summary of Effort, Catch and Catch-Per-Unit-Effort for Stream Backpack Electrofishing, 2007 (continued)

Stream	Date	Site ID	Start Time (hh:mm)	End Time (hh:mm)	Shocker Effort (sec)	Distance Sampled (m)	Start UTM [(a)]		End UTM [(a)]		Number of Fish Captured by Species [(b)]										CPUE (fish/100 m) [(b)]									
							Easting	Northing	Easting	Northing	ARGR	BURB	LKCH	LKTR	LNSC	NNST	NRPK	SCKR	SLSC	Total Fish Caught	ARGR	BURB	LKCH	LKTR	LNSC	NNST	NRPK	SCKR	SLSC	Total CPUE
N2	22-Jul-07	EF 6.1	16:00	16:14	395	60	591042	7044513	-	-	4	1	1	0	0	0	0	0	0	6	6.67	1.67	1.67	0.00	0.00	0.00	0.00	0.00	0.00	10.00
N2	22-Jul-07	EF 6.2	16:27	16:40	276	60	591042	7044513	-	-	3	2	1	0	0	0	0	0	1	7	5.00	3.33	1.67	0.00	0.00	0.00	0.00	0.00	1.67	11.67
N2	22-Jul-07	EF 6.3	16:54	17:10	291	60	591042	7044513	-	-	0	2	0	0	0	0	0	0	0	2	0.00	3.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.33
N2	25-Aug-07	EF 54.1	13:10	13:33	513	60	591042	7044513	-	-	4	2	3	0	0	1	0	0	0	10	6.67	3.33	5.00	0.00	0.00	1.67	0.00	0.00	0.00	16.67
N2	25-Aug-07	EF 54.2	13:43	14:06	515	60	591042	7044513	-	-	0	1	0	0	0	1	0	0	4	6	0.00	1.67	0.00	0.00	0.00	1.67	0.00	0.00	6.67	10.00
N2	25-Aug-07	EF 54.3	14:10	14:38	488	60	591042	7044513	-	-	1	1	1	0	0	1	0	0	1	5	1.67	1.67	1.67	0.00	0.00	1.67	0.00	0.00	1.67	8.33
N3	22-Jul-07	EF 5.1	13:00	13:20	536	60	591463	7044140	-	-	16	3	7	0	0	0	0	0	18	44	26.67	5.00	11.67	0.00	0.00	0.00	0.00	0.00	30.00	73.33
N3	22-Jul-07	EF 5.2	13:40	14:00	360	60	591463	7044140	-	-	16	2	3	0	0	0	0	0	11	32	26.67	3.33	5.00	0.00	0.00	0.00	0.00	0.00	18.33	53.33
N3	22-Jul-07	EF 5.3	14:20	14:40	350	60	591463	7044140	-	-	9	0	1	0	0	0	0	0	4	14	15.00	0.00	1.67	0.00	0.00	0.00	0.00	0.00	6.67	23.33
N3	25-Aug-07	EF 53.1	11:10	11:23	335	60	591463	7044140	-	-	1	0	1	0	0	0	0	0	2	4	1.67	0.00	1.67	0.00	0.00	0.00	0.00	0.00	3.33	6.67
N3	25-Aug-07	EF 53.2	11:30	11:46	391	60	591463	7044140	-	-	0	0	0	0	0	0	0	0	3	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00
N3	25-Aug-07	EF 53.3	11:50	12:05	370	60	591463	7044140	-	-	0	0	0	0	0	0	0	0	7	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.67	11.67
N4	22-Jul-07	EF 4.1	10:00	10:22	404	40	590950	7043274	-	-	31	3	3	0	0	0	0	0	10	47	77.50	7.50	7.50	0.00	0.00	0.00	0.00	0.00	25.00	117.50
N4	22-Jul-07	EF 4.2	10:50	11:15	339	40	590950	7043274	-	-	34	1	3	0	0	0	0	0	8	46	85.00	2.50	7.50	0.00	0.00	0.00	0.00	0.00	20.00	115.00
N4	22-Jul-07	EF 4.3	11:35	12:00	299	40	590950	7043274	-	-	3	3	0	0	0	0	0	0	0	6	7.50	7.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
N4	25-Aug-07	EF 52	09:47	10:10	520	40	590950	7043274	-	-	0	2	0	0	0	1	0	0	7	10	0.00	5.00	0.00	0.00	0.00	2.50	0.00	0.00	17.50	25.00
N5	22-Jul-07	EF 3	08:00	8:30	1009	72	591035	7043017	-	-	0	1	2	0	0	3	0	0	6	12	0.00	1.39	2.78	0.00	0.00	4.17	0.00	0.00	8.33	16.67
N6	21-Jul-07	EF 2	16:00	16:40	619	80	590494	7041302	-	-	7	3	4	0	0	0	0	0	1	15	8.75	3.75	5.00	0.00	0.00	0.00	0.00	0.00	1.25	18.75
N6	25-Aug-07	EF 51	7:35	8:00	474	35	590494	7041302	-	-	0	0	4	0	0	3	0	0	1	8	0.00	0.00	11.43	0.00	0.00	8.57	0.00	0.00	2.86	22.86
N9	24-Jul-07	EF 13	13:15	13:40	598	40	590775	7039432	-	-	0	2	3	0	0	0	0	0	1	6	0.00	5.00	7.50	0.00	0.00	0.00	0.00	0.00	2.50	15.00
N11	24-Jul-07	EF 14	17:35	18:00	460	50	589342	7043374	-	-	0	7	12	0	0	1	0	0	8	28	0.00	14.00	24.00	0.00	0.00	2.00	0.00	0.00	16.00	56.00
N11	27-Aug-07	EF 62	13:45	14:15	775	50	589342	7043374	-	-	0	1	0	0	0	0	0	0	12	13	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	24.00	26.00
N12	24-Jul-07	EF 12	10:30	11:00	291	50	588317	7040244	-	-	8	1	30	0	0	1	0	0	1	41	16.00	2.00	60.00	0.00	0.00	2.00	0.00	0.00	2.00	82.00
N17	21-Jul-07	EF 1	13:00	13:45	676	32	584696	7037533	-	-	0	3	20	0	0	0	0	0	0	23	0.00	9.38	62.50	0.00	0.00	0.00	0.00	0.00	0.00	71.88
N17	26-Jul-07	EF 22	17:15	17:40	454	40	584684	7037598	-	-	0	3	1	1	1	0	0	0	1	7	0.00	7.50	2.50	2.50	2.50	0.00	0.00	0.00	2.50	17.50
N18	24-Jul-07	EF 10	07:20	7:45	390	50	586869	7039196	-	-	0	2	0	0	0	0	0	0	0	2	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
N18	24-Jul-07	EF 11	08:30	9:00	531	50	587042	7039678	-	-	16	0	1	1	0	0	0	0	1	19	32.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	2.00	38.00
N18	25-Aug-07	EF 55	15:00	15:25	1196	70	-	-	-	-	2	2	0	0	0	0	0	0	1	5	2.86	2.86	0.00	0.00	0.00	0.00	0.00	0.00	1.43	7.14
Y3	28-Jul-07	EF 30	10:20	10:33	180	20	583871	7032983	-	-	2	2	0	0	0	0	0	0	1	5	10.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	25.00
Y5	28-Jul-07	EF 32	12:03	12:16	198	30	586231	7032978	-	-	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(a) UTM Coordinates in NAD 83, Zone 12.

(b) Where ARGR = Arctic grayling; BURB = burbot; LKCH = lake chub; LKTR = lake trout; LNSC = longnose sucker; NNST = ninespine stickleback; NRPK = northern pike; SCKR = unknown sucker species; SLSC = slimy sculpin; s = seconds; m = metres; UTM = Universal Traverse Mercator

- = Data not recorded; CPUE = catch-per-unit-effort; ID = identification; hh:mm = hours:minutes ; sec = seconds; m = metres;

Table JJ.XIII-4 Summary of Effort, Catch and Catch-Per-Unit-Effort for Minnow Trapping, 2007

Stream or Lake	Site ID	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)	Site UTM Coordinates (NAD 83, Zone 12)		Number of Fish Captured by Species [(a)]			CPUE by Species (fish/trap-days) [(a)]		
										Easting	Northing	LKCH	NNST	Total Fish Caught	LKCH	NNST	Total CPUE
N17 (stream)	MT 1	6	26-Jul	17:00	27-Jul	7:10	14:10	85.02	3.54	-	-	3	1	4	0.85	0.28	1.13
D2 (lake)	MT 1	-	20-Jul	10:36	21-Jul	18:00	31:24	31.40	1.31	-	-	0	0	0	0.00	0.00	0.00
D2 (lake)	MT 2	-	20-Jul	10:39	21-Jul	18:00	31:21	31.35	1.31	-	-	0	0	0	0.00	0.00	0.00
D2 (lake)	MT 3	-	20-Jul	10:41	21-Jul	18:00	31:19	31.32	1.31	-	-	0	0	0	0.00	0.00	0.00
D3 (lake)	MT 5	-	20-Jul	12:00	21-Jul	8:00	20:00	20.00	0.83	-	-	0	0	0	0.00	0.00	0.00
D3 (lake)	MT 6	-	20-Jul	12:00	21-Jul	8:00	20:00	20.00	0.83	-	-	0	0	0	0.00	0.00	0.00
D3 (lake)	MT 7	-	20-Jul	12:00	21-Jul	8:00	20:00	20.00	0.83	-	-	0	0	0	0.00	0.00	0.00
E1 (lake)	MT 8	-	25-Jul	8:00	26-Jul	16:50	32:50	32.83	1.37	-	-	0	0	0	0.00	0.00	0.00
E1 (lake)	MT 9	-	25-Jul	8:00	26-Jul	16:50	32:50	32.83	1.37	-	-	0	0	0	0.00	0.00	0.00
E1 (lake)	MT 10	-	25-Jul	8:00	26-Jul	16:50	32:50	32.83	1.37	-	-	0	0	0	0.00	0.00	0.00

(a) Where LKCH = lake chub; NNST = ninespine stickleback.

- = Data not recorded; CPUE = catch-per-unit-effort. ID = identification; hh:mm = hours:minutes ; NAD = North American Datum

Table JJ.XIII-5 Summary of Effort, Catch and Catch-Per-Unit-Effort for Gill Nets Set in Lakes, 2010

Lake	Date	Mesh Size (inches)	Set Time	Pull Time	Effort (h)	Shallow End UTM [(a)]		Shallow End Depth (m)	Deep End UTM [(a)]		Deep End Depth (m)	Number of Fish Captured by Species [(b)]					CPUE (fish/100 m^2/12 h) [(b)]				
						Easting	Northing		Easting	Northing		ARGR	LKTR	LNSC	NRPK	Total Fish Caught	ARGR	LKTR	LNSC	NRPK	Total CPUE
A3	23-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	9:15	13:08	3.88	590903	7038487	4.0	-	-	4.3	0	1	0	0	**1**	0.00	2.83	0.00	0.00	**2.83**
A3	23-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	9:10	13:00	3.83	591218	7038966	4.0	591158	7038987	4.3	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
D2	24-Jul-10	1, 1.5, 2, 2.5, 3, 4. 5, 6	9:55	13:08	3.22	587497	7036533	0.8	587488	7036590	0.9	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
D2	24-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	10:05	13:19	3.23	587296	7036468	0.8	587255	7036519	0.9	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
D3	24-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	14:41	17:33	2.87	586577	7037069	2.5	586605	7037135	3.0	0	0	0	1	**1**	0.00	0.00	0.00	3.84	**3.84**
D3	24-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	14:20	17:50	3.50	586587	7036652	2.4	586588	-	2.5	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
E1	26-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	13:55	17:21	3.43	586698	7035385	3.8	586661	7035323	2.5	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
E1	26-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	13:45	17:11	3.43	586442	7035569	3.0	586412	7035514	3.2	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
L2	21-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	10:15	13:51	3.60	593465	7038912	1.5	593523	7038940	2.0	0	0	0	2	**2**	0.00	0.00	0.00	6.12	**6.12**
L2	21-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	10:27	13:45	3.30	593341	7038957	-	593398	7038994	0.0	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
L3	21-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	14:50	18:05	3.25	593060	7038405	1.0	593117	7038421	1.1	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
L13	22-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	10:08	13:55	3.78	592982	7038624	1.0	592869	7038422	1.0	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
L18	22-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	15:05	17:04	1.98	591727	7038636	3.5	591671	7038686	4.5	3	1	0	0	**4**	16.65	5.55	0.00	0.00	**22.20**
L18	22-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	15:19	17:30	2.18	591919	7038597	3.5	591861	7038597	4.5	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
N14	25-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	13:11	16:40	3.48	586068	7036070	2.2	586111	7036118	3.0	1	1	0	0	**2**	3.16	3.16	0.00	0.00	**6.32**
N14	25-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	13:16	16:35	3.32	586285	7036103	2.0	-	-	3.4	3	0	3	0	**6**	9.96	0.00	9.96	0.00	**19.92**
N14a	25-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	8:40	11:58	3.30	585935	7036550	2.0	586712	7037059	3.4	0	0	5	0	**5**	0.00	0.00	16.68	0.00	**16.68**
N14b	26-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	9:20	12:35	3.25	586875	7036092	0.5	586866	7036039	0.8	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
N17	27-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	9:50	15:16	5.43	585080	7036054	3.9	585060	7035995	4.5	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**
N17	27-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	10:00	15:25	5.42	584713	7036178	3.5	584648	7036200	5.0	0	2	0	0	**2**	0.00	4.06	0.00	0.00	**4.06**
N17	27-Jul-10	1, 1.5, 2, 2.5, 3, 4, 5, 6	11:55	15:30	3.58	584722	7036227	9.0	584750	7036206	12.0	0	0	0	0	**0**	0.00	0.00	0.00	0.00	**0.00**

(a) NAD 83, Zone 12

(b) Where ARGR = Arctic grayling, LKTR = lake trout, NRPK = northern pike, LNSC = longnose sucker.

\- = not recorded; CPUE = catch-per-unit-effort;; hh:mm = hours:minutes; h = hours; m = metres; m^2 = square metres.

Table JJ.XIII-6 Summary of Effort, Catch and Catch-Per-Unit-Effort for Stream Backpack Electrofishing, 2010

Stream	Date	Start Time (hh:mm)	End Time (hh:mm)	Shocker Effort (sec)	Distance Sampled (m)	Start UTM Coordinates [(a)]		End UTM Coordinates [(a)]		Number of Fish Captured by Species [(b)]			CPUE (fish/100 m) [(b)]		
						Easting	Northing	Easting	Northing	RNWH	SLSC	Total Fish Caught	RNWH	SLSC	Total CPUE
L11	19-Jul-10	9:00	9:53	168	226.6	593299	7039074	593144	7039013	0	0	0	0.00	0.00	0.00
L13	19-Jul-10	11:54	12:25	358	300.0	593051	7038782	593120	7038895	0	0	0	0.00	0.00	0.00
L14	19-Jul-10	14:35	14:50	474	152.3	592811	7038412	592700	7038402	2	0	2	1.31	0.00	1.31
L15	19-Jul-10	17:00	17:17	341	125.0	592350	7038290	592461	7038301	1	0	1	0.80	0.00	0.80
L18	20-Jul-10	-	-	425	245.0	591912	7038440	592116	7038410	6	3	9	2.45	1.22	3.67

(a) NAD 83, Zone 12

(b) Where RNWH = round whitefish, SLSC = slimy sculpin.

- = not recorded; CPUE = catch-per-unit-effort.; sec = seconds; m = metres; hh:mm = hours:minutes; CPUE = catch-per-unit-effort UTM = Universal Transverse Mercator; NAD = North American Datum.

Table JJ.XIII-7 Summary of Effort, Catch and Catch-Per-Unit-Effort for Minnow Trapping, 2010

Stream / Lake	Site ID	Effort ID	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)	UTM Coordinates [a]		Number of Fish Captured by Species						Total Fish Caught	CPUE by Species (fish/trap-days)						Total CPUE (fish/trap-days)
											Easting	Northing	RNWH	SLSC	NRPK	BURB	LKCH	NNST		RNWH	SLSC	NRPK	BURB	LKCH	NNST	
Stream	L11	1	3	19-Jul-10	8:50	19-Jul-10	15:42	6:52	20.60	0.86	593243	7039098	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L11	2	2	19-Jul-10	8:45	19-Jul-10	15:41	6:56	13.87	0.58	593265	7039100	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L13	1	3	19-Jul-10	10:58	20-Jul-10	8:06	21:08	63.40	2.64	593061	7038797	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L13	2	2	19-Jul-10	11:00	20-Jul-10	8:04	21:04	42.13	1.76	593097	7038846	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L14	1	2	19-Jul-10	11:40	20-Jul-10	8:15	20:35	41.17	1.72	592706	7038403	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L14	2	3	19-Jul-10	11:42	20-Jul-10	8:13	20:31	61.55	2.56	592715	7038419	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L15	1	2	19-Jul-10	16:00	20-Jul-10	8:24	16:24	32.80	1.37	592383	7038295	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L15	2	2	19-Jul-10	16:03	20-Jul-10	8:29	16:26	32.87	1.37	592417	7038299	1	-	-	-	-	-	1	0.7	-	-	-	-	-	0.7
Stream	L15	3	1	19-Jul-10	16:04	20-Jul-10	8:28	16:24	16.40	0.68	592397	7038308	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Stream	L18	1	3	20-Jul-10	9:27	21-Jul-10	8:43	23:16	69.80	2.91	591956	7038457	-	1	-	-	-	-	1	-	0.3	-	-	-	-	0.3
Stream	L18	2	2	20-Jul-10	9:33	21-Jul-10	8:43	23:10	46.33	1.93	59197	7038427	-	1	-	-	-	-	1	-	0.5	-	-	-	-	0.5
Stream	N14a	1	3	20-Jul-10	14:00	21-Jul-10	8:06	18:06	54.30	2.26	585903	7036365	-	3	-	-	-	-	3	-	1.3	-	-	-	-	1.3
Stream	N14a	2	2	20-Jul-10	13:57	21-Jul-10	8:18	18:21	36.70	1.53	585882	7036353	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	A3	1	5	23-Jul-10	9:00	24-Jul-10	8:21	23:21	116.75	4.86	591241	7038617	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	A3	2	5	23-Jul-10	9:05	24-Jul-10	8:26	23:21	116.75	4.86	591117	7038521	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	A4	1	3	23-Jul-10	13:42	24-Jul-10	8:11	18:29	55.45	2.31	591341	7039458	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	A4	2	2	23-Jul-10	13:48	24-Jul-10	8:09	18:21	36.70	1.53	591305	7039519	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	D2	1	4	23-Jul-10	16:17	24-Jul-10	13:30	21:13	84.87	3.54	537265	7036644	-	-	1	-	-	-	1	-	-	0.3	-	-	-	0.3
Lake	D2	2	5	24-Jul-10	9:32	24-Jul-10	13:40	4:08	20.67	0.86	587326	7036675	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	D3	1	5	24-Jul-10	14:10	25-Jul-10	8:14	18:04	90.33	3.76	586407	7036907	-	-	1	-	-	-	1	-	-	0.3	-	-	-	0.3
Lake	D3	2	5	24-Jul-10	14:13	25-Jul-10	8:14	18:01	90.08	3.75	586388	7036940	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	E1	1	4	26-Jul-10	13:25	27-Jul-10	8:38	19:13	76.87	3.20	586317	7035639	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	E1	2	5	26-Jul-10	13:20	27-Jul-10	8:49	19:29	97.42	4.06	586328	7035565	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	L2	1	5	21-Jul-10	9:50	21-Jul-10	14:04	4:14	21.17	0.88	593452	7038881	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	L2	2	5	21-Jul-70	9:51	22-Jul-10	8:49	22:58	114.83	4.78	593468	7038879	-	-	1	-	-	-	1	-	-	0.2	-	-	-	0.2
Lake	L3	1	5	21-Jul-10	15:00	22-Jul-10	9:32	18:32	92.67	3.86	592954	7038405	-	-	1	-	-	-	1	-	-	0.3	-	-	-	0.3
Lake	L3	2	5	21-Jul-10	14:55	22-Jul-10	9:51	18:56	94.67	3.94	592928	7038387	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	L13	1	5	21-Jul-10	16:12	22-Jul-10	13:49	21:37	108.08	4.50	592904	7038447	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	L13	2	5	22-Jul-10	10:04	22-Jul-10	13:44	3:40	18.33	0.76	592926	7038508	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	L18	1	5	22-Jul-10	15:00	22-Jul-10	17:42	2:42	13.50	0.56	591686	7038504	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	L18	2	5	22-Jul-10	14:35	23-Jul-10	8:10	17:35	87.92	3.66	591623	7038731	-	-	-	1	-	-	1	-	-	-	0.3	-	-	0.3
Lake	N14	1	5	25-Jul-10	13:27	26-Jul-10	8:37	19:10	95.83	3.99	586176	7035995	-	1	-	-	2	1	4	-	0.3	-	-	0.5	0.3	1.0
Lake	N14	2	5	25-Jul-10	13:29	26-Jul-10	8:40	19:11	95.92	4.00	586195	7035970	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	N14a	2	5	24-Jul-10	18:04	25-Jul-10	10:18	16:14	81.17	3.38	585869	7036741	-	-	-	-	42	-	42	-	-	-	-	12.4	-	12.4
Lake	N14a	1	4	24-Jul-10	18:07	25-Jul-10	11:14	17:07	68.47	2.85	585925	7036447	-	2	-	-	25	-	27	-	0.7	-	-	8.8	-	9.5
Lake	N14b	1	4	25-Jul-10	17:37	26-Jul-10	12:30	18:53	75.53	3.15	586880	7036003	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	N14b	2	5	25-Jul-10	17:30	26-Jul-10	12:24	18:54	94.50	3.94	586868	7036047	-	-	-	-	-	-	0	-	-	-	-	-	-	0.0
Lake	N17	1	5	26-Jul-10	17:45	27-Jul-10	14:20	20:35	102.92	4.29	584743	7036008	-	2	-	-	2	-	4	-	0.5	-	-	0.5	-	0.9
Lake	N17	2	5	26-Jul-10	17:48	27-Jul-10	14:32	20:44	103.67	4.32	584718	7036029	-	-	-	1	2	-	3	-	-	-	-	-	-	0.7

(a) UTM Coordinates in NAD 83, Zone 12.

- = not captured; CPUE = catch-per-unit-effort; hh:mm = hours:minutes; CPUE = catch-per-unit-effort; UTM = Universal Transverse Mercator.