JERICHO DIAMOND PROJECT
AQUATIC STUDIES 1995

RL&L
Environmental Services Ltd.

JERICHO DIAMOND PROJECT
AQUATIC STUDIES 1995

Prepared for

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EXECUTIVE SUMMARY

Based on seasonal temperature profiles (summer and fall), the deeper lakes in the Jericho study area can be classified as dimictic (Carat Lake and Jericho Lake), while shallower lakes such as Lake C3 are monomictic. The lack of low oxygen conditions and high water transparency suggested that all study lakes had low biological productivity (oligotrophic). Study lakes were also characterized by low levels of nutrients (TP, NH_3-N, and NO_2+NO3-N), which was typical of oligotrophic waterbodies. Phosphorus was probably the main nutrient that limited production.

In general, background metal concentrations in the study lakes and streams were low. Most parameters analyzed were below methodological detection limits. Results of the present study concurred with those for nearby waterbodies (Beak 1977; and Moore 1978; R.L. & L. 1993). Aluminum concentrations exceeded the CWQG to protect freshwater aquatic life at some sites. Detectable concentrations of aluminum were also identified in field blank samples.

Results obtained for sediment samples collected from the Jericho study area were variable. However, these data were similar to findings for other waterbodies in the vicinity of the Jericho study area (R.L. & L. 1993).

Phytoplankton and zooplankton communities were monitored in the study lakes during summer and fall. Results for both phytoplankton and zooplankton species composition and densities were indicative of subarctic oligotrophic waterbodies.

The lakes in the study area supported populations of lake trout, round whitefish, and Arctic char. Based on one year of sampling, lake trout was the dominant species. Arctic grayling and burbot, although not encountered in the lakes, were captured in study area streams. These results suggest that, although not recorded during the lake sampling program, these species likely were present in study area lakes. Based on abundance indices (i.e., catch rates using standardized gill net sets), fish densities were generally low. Highest indices occurred in Carat Lake, while lower values were recorded for Jericho Lake and Lake C3.

Fish populations in the study area lakes were slow growing, late maturing, and were dominated by older age-classes. Feeding habits of species captured in the study area indicated that fish consumed the most abundant food item available. During summer, the most prevalent food groups consumed by all species were aquatic insects, most of which were benthic faunae (e.g., chironomids), while in fall, zooplankton was more important in fish diets. In addition to these food items, lake trout also consumed fish, while round whitefish ate molluscs and lake trout eggs.

Streams in the study area provided limited amounts of habitat to fish communities residing in study area lakes; most were small and/or exhibited ill-defined channels. Some streams did provide spawning, rearing, and feeding habitat. Systems identified as containing good quality habitat included Stream C1, Stream O6, and Jericho River. Smaller streams were used for rearing by juvenile fish of several species and were likely used for spawning by Arctic grayling. The larger Jericho River may also have been used for overwintering. A significant feature of the Jericho River was a barrier to fish passage situated just downstream of the outlet to Jericho Lake.

Based on the available information, Jericho study area lakes are not used as commercial or domestic fisheries. Sportfishing use is probably restricted to anglers associated with the exploration activities being conducted in the area. However, sport fish populations in these waterbodies may be susceptible to over harvest due to the low productivity of these systems.

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1.0 INTRODUCTION

1.1 BACKGROUND

The Jericho Diamond Project was initiated in 1995 based on the discovery of a kimberlite pipe adjacent to the southern shore of an unnamed lake (locally known as Carat Lake), which is situated 420 km northeast of Yellowknife in the Northwest Territories. Canamera Geological Ltd. (Canamera) of Vancouver is responsible for development of the Jericho Diamond Project.

In anticipation of possible development of this deposit, Canamera initiated a baseline inventory program in 1995. The program involved collection of data on regional meteorological conditions, water quality, hydrology, wildlife and wildlife habitat, aquatic biota, as well as, trace metal concentrations in lake sediments, water and fish.

During the planning phase of this study, in April 1995, Canamera approached R.L. & L. Environmental Services Ltd. and requested a detailed study plan to complete the aquatic biota component of this program. Based on this study plan, R.L. & L. Environmental Services was contracted to complete a comprehensive baseline inventory of the aquatic biota in the vicinity of the Jericho Diamond Project during the 1995 open water period.

Information collected during this program was to be summarized in a detailed report. This report was also to include a summary of water and sediment data collected by Canamera Geological Ltd. personnel during 1995. This water and sediment sampling program was completed concurrently with the aquatic biota sampling program.

1.2 STUDY OBJECTIVES

The objectives of the 1995 study program were as follows:

- to describe the chemical characteristics of waterbodies in the study area using information provided by Canamera Geological Ltd.;
- to describe the seasonal abundance, distribution, and biological characteristics of nonvertebrate communities (benthic macroinvertebrates, zooplankton, phytoplankton, and periphyton) found in waterbodies in the study area;
- to describe the seasonal abundance, distribution, and biological characteristics of fish species found in waterbodies in the study area, as well as the habitat used by these fish;
- to document background concentrations of metals occurring in water and sediment using information provided by Canamera Geological Ltd.;
- to document background concentrations of metals occurring in fish tissue collected from selected waterbodies in the study area, and;
- to assess the importance of waterbodies that may be impacted by development to fish populations residing within, immediately downstream or upstream of the development.

1.3 STUDY AREA

The Jericho Diamond Project Site is located near the northwest end of Contwoyto Lake, Northwest Territories approximately 420 km northeast of Yellowknife at 65° 59' north latitude and 111° 28' west longitude (Figure 1.1).

The study area (hereafter referred to Jericho study area) encompassed several lakes and streams. The aquatic biota sampling program study area included waterbodies in the immediate vicinity of the Jericho Diamond Project Site, while the water and sediment sampling program encompassed a larger area around the project site.

1.3.1 Aquatic Biota

Waterbodies investigated during the aquatic biota sampling program included three unnamed lakes and their principal tributaries (Figure 1.2 and Table 1.1). Two of these lakes were situated downstream of the proposed development: Carat Lake (local name) and Jericho Lake (local name). The third waterbody (Lake C3) was located immediately upstream of the proposed development area.

Fish collections were undertaken at one additional lake situated outside of the Carat Lake drainage. This waterbody, located outside of the proposed development area (i.e., 6 km east), was used as a control lake for assessment of background metal concentrations in fish tissues.

1.3.2 Water and Sediment

Water and sediment samples were collected by Canamera Geological Ltd. personnel at several locations throughout the Carat Lake drainage (Figure 1.2 and Table 1.1). Water samples were collected from Cigar Lake, which is situated upstream of the proposed development area. Sampled waterbodies situated downstream of the proposed development included Carat Lake, Jericho Lake, Jericho River (the local name for the outlet stream to Jericho Lake), and Kathawachaga Lake. Water and sediment samples were also collected from two waterbodies in the immediate vicinity of the Jericho Diamond Project: Tailings Lake (local name) and Seep Creek (local name). These waterbodies were outside of the Carat Lake drainage.

1.4 TIMING AND LOGISTICS

1.4.1 Aquatic Biota

The aquatic biota field program was conducted during three sampling periods. The spring session was completed between 21 and 24 June 1995. This component of the study was designed to investigate fish use of streams for spawning and rearing, and to establish sampling sites for the summer and fall programs.

The second field period commenced on 4 August and was completed on 10 August. The sampling program during this period involved several components. Tributary investigations included collection of fisheries and habitat data from streams previously sampled in spring, as well as collection of periphyton and benthic

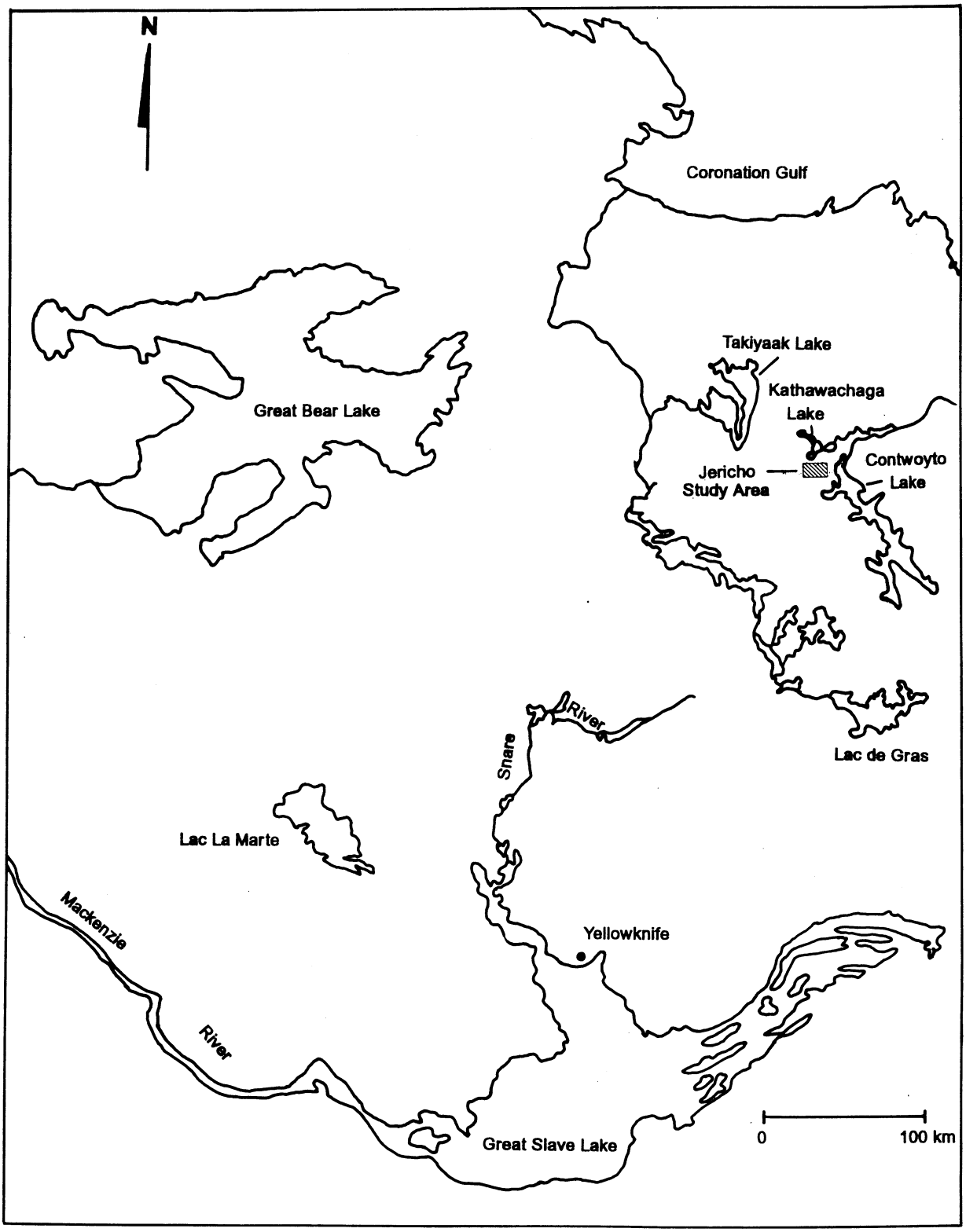

Figure 1.1 Location of Jericho study area 1995.

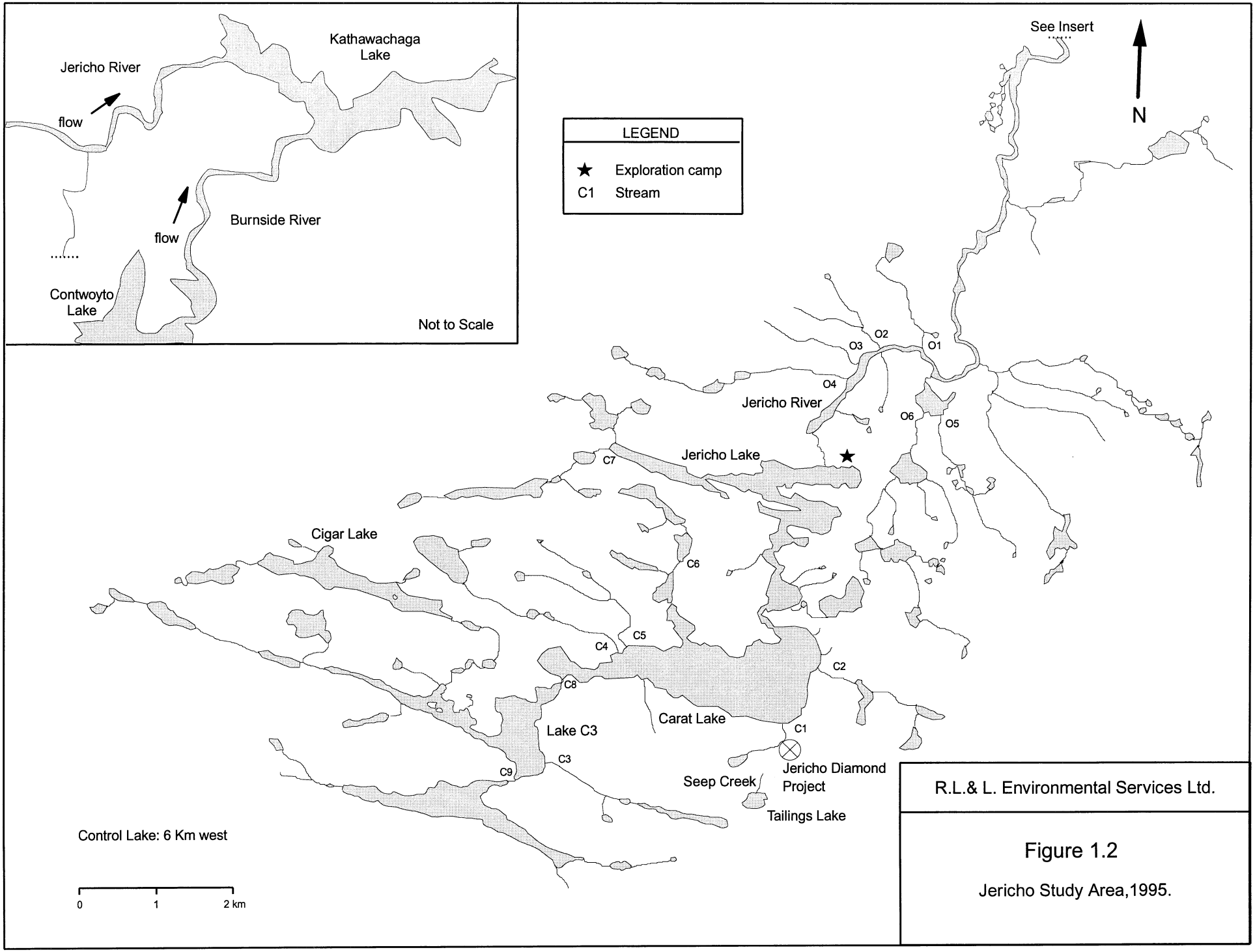

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Figure 1.2

Jericho Study Area,1995.

Table 1.1 Locations of waterbodies investigated during aquatic biota and water and sediment sampling programs, Jericho study area 1995.

Area	Waterbody	UTM Coordinates (Zone 12W)		Sampling Program	
		North	East	Aquatic Biota	Water and Sediment
Lakes	Carat Lake	7320700	477600	*	*
	Cigar Lake	7322000	472600		*
	Lake C3	7319700	474750	*	
	Jericho Lake	7323600	477650	*	*
	Control Lake	7321250	467000	*	
	Kathawachaga Lake	7341250	506250		*
	Tailings Lake	N/D[a]	N/D		*
Streams	Stream C1	7319800	478200	*	
	Stream C2	7327750	478650	*	
	Stream C3	7319300	475100	*	
	Stream C4	7321000	475950	*	
	Stream C5	7321150	476100	*	
	Stream C6	7322250	476675	*	
	Stream C7	7324050	475850	*	
	Stream C8	7320550	475300	*	
	Stream C9	7319050	474600	*	
	Stream O1	7325650	479900	*	
	Stream O2	7325650	479400	*	
	Stream O3	7325400	479100	*	
	Stream O4	7325150	478450	*	
	Stream O5	7324650	480200	*	
	Stream O6	7324675	479975	*	
	Jericho River	7324000	478700	*	*
	Seep Creek	N/D	N/D		*

[a]N/D=no data.

macroinvertebrate samples from selected stream locations. The lake sampling program involved collection of limnological data, and samples of phytoplankton, zooplankton, and benthic macroinvertebrates. Fish species distribution and abundance was also investigated and a tagging program was undertaken in an attempt to estimate the size of selected fish populations and to assess fish movements. In addition to these programs, tissues were collected from fish in selected lakes within the study area to document background concentrations of trace metals.

The third field period (11-14 September) involved documentation of fall fish distribution and abundance in study area lakes. Fish tissue samples also were collected in waterbodies where adequate sample sizes were not obtained during earlier field sessions. Limnological data, and phytoplankton, zooplankton, and benthic macroinvertebrates samples were also collected during this period.

Access to the site was gained by fixed-wing aircraft from Yellowknife. Accommodations were at the Canamera Geological Ltd. exploration camp located on the north shore of Jericho Lake. Transportation of personnel and equipment to sampling sites was provided by helicopter.

1.4.2 Water and Sediment

The water sampling programs were conducted during three sampling periods. The spring session (15 and 18 July), was initiated just after lakes became ice free. The summer collection period commenced on 18 August and was completed on 22 August. The third and final field session involved collection of samples just before lakes became ice covered (10 to 12 September).

Sediment samples were collected once during summer (11 August).

2.0 METHODOLOGY

2.1 FIELD SAMPLING

2.1.1 Limnology

Temperature and dissolved oxygen were measured using an Oxyguard Handy Mark II dissolved oxygen-temperature meter. To develop oxygen-temperature profiles, readings were taken at 1 m intervals in most lakes; however, at sites where water depth was less than 5.0 m, they were taken a 0.5 m intervals. To avoid contamination of the probe by fine sediments, the deepest measurement for each profile was taken between 0.5 m and 1.0 m above the lake bottom. Water transparency was measured to the nearest 0.1 m using a standard Secchi disk (20 cm diameter).

At each site, two additional measurements were taken at the water surface. Conductivity was measured using a Hanna HI 8033 conductivity meter and pH was measured using a Fisher Accumet 1001 pH meter.

2.1.2 Water Quality

Canamera Geological Ltd. personnel were responsible for the collection of water samples. The number of water samples taken from each waterbody was dependent on water depth. In lakes with depths $\geq$20 m, three water samples were taken (20%, 50%, and 80% of maximum depth); in waterbodies with depths ranging between 10 and 20 m, two samples were taken (20% and 80% maximum depth); and, where the maximum depth was $\leq$10 m, one sample was collected (these waterbodies were considered homogeneously mixed). All samples were collected with a Van Dorn water bottle that was pre-washed in lake water.

Samples were placed into appropriate containers prepared and supplied by Analytical Services Laboratories Ltd. (ASL) of Vancouver. Premeasured preservatives supplied by ASL were added prior to placing the labelled samples into coolers. The samples were kept cool on site and shipped to ASL as soon as possible after collection.

2.1.3 Sediments

Canamera Geological Ltd. personnel were responsible for the collection of sediment samples. Sediment samples were collected using a depression corer. Prior to placement of sediment in the sample container, water above the core was decanted. Whenever possible, sediment was gravity fed into the bottle. If this procedure was not possible, the sediment was removed from the core using a pre-washed (5% HNO_3) stainless steel spoon. Sediment samples were stored in containers either supplied or recommended by CanTest Ltd. laboratories of Vancouver. Sediment samples were kept cool on site and shipped to CanTest Ltd. as soon as possible after collection.

2.1.4 Plankton

2.1.4.1 Phytoplankton

Phytoplankton were collected during the summer and fall periods. Samples were taken from the euphotic zone of the lake. This zone is equal to the depth of 1% light penetration (approximately two times the Secchi depth). Collections were made using a weighted plastic tube equipped with a one-way foot valve attached to one end. A sample consisted of a composite of five discrete vertical collections within this zone. In lakes where the Secchi reading was to the bottom, phytoplankton hauls encompassed the entire water column to 1 m above the lake bottom (to avoid contamination of the sample with sediment). Samples were placed in labelled 500 mL glass containers, preserved with 5% acid-Lugol's solution, and stored in the dark. Three drops of 100% formalin were also added to each sample to prevent growth of bacteria during storage.

2.1.4.2 Zooplankton

Zooplankton samples were also collected during summer and fall periods. A sample consisted of a composite of three vertical hauls at a particular site. Each haul was equal to three times the Secchi depth. In lakes where the Secchi reading was to the bottom, zooplankton hauls encompassed the entire water column to 1 m above the lake bottom (to avoid contamination of the sample with sediment). Zooplankton collections were made with a Wisconsin plankton net constructed with Nitex® mesh (net mouth diameter 133.4 mm; mesh aperture 0.080 x 0.080 mm; bucket mesh aperture 0.064 x 0.064 mm). Each sample was immediately preserved in 5% formalin (to prevent predation by cyclopoid copepods) and stored in labelled 500 mL polyethylene bottles. Equipment was thoroughly rinsed after sampling at each site to prevent contamination.

2.1.5 Stream Periphyton

The periphytic algal community in streams was sampled during the summer period to assess the community composition and to measure chlorophyll *a*. At each site, five replicates were collected following the methods described in Charlton et al. (1981) and Hickman et al. (1982). Each replicate consisted of scrapings from the surface (5 cm^2) of three stones, selected at random, from the stream bottom. Samples destined for chlorophyll *a* analysis were filtered onto Whatman GF/C filter paper, covered with anhydrous $MgCO_3$, and frozen. Samples used for algal identification and enumeration were placed in individually labelled 250 mL opaque containers and preserved with acid-Lugol's solution. Shortly after collection, a few drops of 100% formalin was added to each of these samples to prevent growth of bacteria and fungi.

2.1.6 Benthic Macroinvertebrates

2.1.6.1 Lakes

Benthic invertebrates were sampled from sites located in littoral (shallow-water) and profundal (deep-water) zones of selected lakes during summer and fall periods. Five replicate samples were collected at each site using an Ekman grab sampler (area equal to 0.023 m^2). Samples were placed in labelled polyethylene sample bags and preserved in 10% formalin. Water depth and substrate type were recorded for each sample location.

2.1.6.2 Streams

Benthic macroinvertebrates were also collected from stream sites during summer. Five replicate samples were collected at each site. The apparatus used for this purpose was a modified (0.250 mm mesh) Surber sampler (area equal to 0.038 m^2). The substrate within the area enclosed by the sampler was thoroughly stirred by hand to a 5 cm depth to dislodge the invertebrates (larger stones were individually cleaned and rinsed), and excess water was removed using a 212 μm mesh standard sieve. The sample was then preserved with 10% formalin and stored in a labelled bottle. At each site, substrate type was visually classified using the Modified Wentworth Classification System (Appendix A).

2.1.7 Fish

2.1.7.1 Streams

During spring and summer sessions, survey level fish sampling was conducted in major tributaries in the study area to assess fish species composition, relative abundance, and habitat utilization (spawning, rearing, feeding, and movements). A variety of sampling methods were used to document the presence of fish in streams; these included visual observations, snorkelling, backpack electrofishing, and angling. The specific methods utilized depended on habitat conditions and stream discharge at the time of sampling. The backpack electrofisher employed during sampling was a Smith-Root Type XII, which is specifically designed for use in low conductivity water.

2.1.7.2 Lakes

Fish sampling in lakes focused on determining species composition and relative abundance, as well as providing samples for analyses of background concentrations of metals in the tissues of selected fish species. In addition, captured fish not required for other aspects of the program were tagged using numbered Floy anchor tags to assess movements between waterbodies.

Fish sampling in lakes was undertaken during summer and fall. The primary fish-capture method used was gillnetting. Standard gangs of gill nets were set overnight in each of the study area lakes. Each gang consisted of six panels (15.2 m x 2.4 m) of sinking monofilament nylon netting of the following mesh sizes (stretched measure): 1.9 cm, 3.8 cm, 6.4 cm, 8.9 cm, 10.2 cm, and 12.7 cm. In each lake, at least two gangs of net were set, generally perpendicular to shore. Pertinent netting data (i.e., set/pull time, set location/orientation, set depth, net efficiency, habitat conditions at site, etc.) were recorded. Catch rates were assessed by utilizing a net-unit approach (i.e., 100 m^2 surface area of net fished for the equivalent of a 12-hour period constitutes one net-unit of effort). Catch-per-unit-effort (CPUE) was expressed as the number of fish (by species) per standard net-unit.

All captured fish were identified to species and the capture mesh size recorded. Data recorded for captured individuals included fork length (to the nearest 1 mm), weight (to the nearest 2 g), sex, and maturity. An

appropriate ageing structure was also collected from fish that succumbed during capture (Mackay et al. 1990). Data were recorded on standardized record sheets to facilitate data analyses in the laboratory.

To determine feeding habits, stomach contents of fish that succumbed during sampling were analyzed in the field using the method described by Thompson (1959), which is a modification of the numerical method used by Hynes (1950). Each stomach was examined and evaluated for fullness and allotted a designated number of fullness points (i.e., 20 points for a full stomach and 0 points for an empty stomach). After points were allocated for the degree of fullness, the stomach was opened and these points were allotted individual food categories based on an assessment of volume. To account for the presence of empty stomachs, values of zero were incorporated into the analysis.

Attempts were made to document population size (at least for the larger size-classes) of lake trout in study area waterbodies. This involved tagging (using numbered Floy anchor tags) and subsequently recapturing marked fish so that the population size in the lake could be estimated using standard mark-recapture methodologies (modified Petersen equation; Ricker 1975).

2.1.8 Habitat

2.1.8.1 Lakes

The habitat characteristics of major waterbodies in the study area were described. This was accomplished while circumnavigating each lake from the air or by boat. Habitat characteristics recorded included areas of shallow water (<2.0 m), substrate types in the nearshore areas, and the distribution of aquatic vegetation.

2.1.8.2 Streams

The physical habitat available to fish in major study area streams was documented during spring and summer periods. During spring, a reconnaissance level survey was undertaken from the air or on the ground to identify streams that provided some habitat to fish populations residing in study area waterbodies. Streams containing barriers to fish passage at their confluence, or those that were ephemeral (water flow only during spring snow melt or high rainfall events), were characterized as having very little value to fish and were excluded from more detailed surveys.

More detailed surveys were undertaken during summer using a variety of methods. The physical habitat provided by streams was described using a classification system specifically developed for this purpose by R.L. & L. Environmental Services Ltd. (Appendix A). The classification system categorizes stream habitat into discrete habitat types (e.g., Run, Pool, and Riffle). Once the stream was described using this system, several parameters were quantified within representative sections. Cross-sectional transects across the stream channel were used to measure water depth, water velocity, discharge, substrate type, and stream width. For discharge, mean column velocity and depth were measured at ¼, ½, and ¾ of the wetted channel width. Substrate characteristics were recorded according to the Modified Wentworth Classification System (Appendix A).

2.1.9 Fish Tissue

Fish tissues were collected from lake trout and round whitefish from selected lakes in the study area. The tissue sampling procedures included safeguards to prevent contamination. They included the following:

- use of sterile instruments;
- tissue cups rinsed in 5% nitric acid solution; and,
- covering the work area in plastic.

Dorsal musculature (approx. 50 to 100 g) was dissected from each fish and sealed in 120 mL sterile, acid-washed specimen containers. Livers and kidneys also were dissected and stored individually. All tissue samples were kept frozen until the time of analysis.

To allow comparison of metal concentrations in fish tissue from the study area waterbodies to those from lakes unaffected by future development, tissue samples also were collected from fish in a control lake located 6 km east of the study area, which is outside the influence of the project development.

2.2 LABORATORY ANALYSES

2.2.1 Water Quality

2.2.1.1 Analyses

Water samples collected by Canamera Geological Ltd. personnel were analyzed by ASL Analytical Services Laboratories Ltd. of Vancouver. The constituents analyzed and detection limits used are outlined in Tables 2.1 and 2.2. Conventional parameters in water (e.g., pH, dissolved anions, nutrients) were analyzed in accordance with "Methods for Chemical Analysis of Water and Wastes" (United States Environmental Protection Agency), "Manual for Chemical Analyses of Water, Wastewaters, Sediments and Biological Tissues" (British Columbia Ministry of Environment), and/or "Standard Methods for Examination of Water and Wastewater" (American Public Health Association). Metals (dissolved and total) analyses were carried out in accordance with procedures described in "Standard Methods for Examination of Water and Wastewater" 18th Edition published by the American Public Health Association 1993.

The procedures involved a variety of instrumental analyses including atomic emission spectrophotometry (ICP) and atomic absorption spectrophotometry (AA) to obtain the required detection limit for each element.

2.2.1.2 Quality Assurance/Quality Control

Procedures were used to ensure the reliability of the data, in terms of the accuracy and precision of the analysis, and to ensure that contamination did not influence the results. These procedures were applied at three levels.

Table 2.1 Detection limits for chemical and physical constituents analyzed in water samples, Jericho study area 1995.

Chemical and Physical Constituents	Detection Limit (µg/g on "dry weight" basis)	Chemical and Physical Constituents	Detection Limit (µg/g on "dry weight" basis)
Physical Tests		**Nutrients**	
Hardness CaCO3	0.05	Ammonia Nitrogen	0.005
pH @ 20°C	N/A[a]	Nitrate Nitrogen	0.005
Total Suspended Solids	1	Nitrite Nitrogen	0.001
Total Dissolved Solids	1	Dissolved ortho-Phosphate	0.001
Dissolved Anions		Total Dissolved Phosphate	0.001
Acidity as CaCO3	N/A	Total Phosphorus	0.001
Alkalinity - Total as CaCO3	1	**Organic Parameters**	
Alkalinity - Bicarbonate as CaCO3	1	Total Organic Carbon	0.05
Alkalinity - Carbonate as CaCO3	1	Chlorophyll *a*	N/A
Chloride	0.5		
Fluoride	0.02		
Sulphate	1		

[a]N/A = Not Applicable.

Table 2.2 Detection limits for metal constituents analyzed in water samples, Jericho study area 1995.

Metal	Abbreviation	Detection Limit (µg/g on "dry weight" basis)		Metal	Abbreviation	Detection Limit (µg/g on "dry weight" basis)	
		Dissolved	Total			Dissolved	Total
Aluminum	Al	0.005	0.005	Mercury	Hg	0.00005	0.00005
Antimony	Sb	0.0001	0.001	Molybdenum	Mo	0.001	0.001
Arsenic	As	0.0001	0.0001	Nickel	Ni	0.001	0.001
Barium	Ba	0.010	0.010	Phosphorus	P	0.30	0.30
Beryllium	Be	0.005	0.005	Potassium	K	2	2
Bismuth	Bi	0.010	0.010	Selenium	Se	0.0005	0.0005
Boron	B	0.10	0.10	Silicon	Si	0.050	0.050
Cadmium	Cd	0.0002	0.0002	Silver	Ag	0.0001	0.0001
Calcium	Ca	0.050	0.050	Sodium	Na	2	2
Chromium	Cr	0.015	0.015	Strontium	Sr	0.001	0.001
Cobalt	Co	0.001	0.001	Thallium	Tl	0.10	0.10
Copper	Cu	0.010	0.010	Tin	Sn	0.30	0.30
Iron	Fe	0.030	0.030	Titanium	Ti	0.010	0.010
Lead	Pb	0.001	0.001	Tungsten	W	0.10	0.10
Lithium	Li	0.015	0.015	Uranium	U	0.0005	0.0005
Magnesium	Mg	0.005	0.005	Vanadium	V	0.030	0.030
Manganese	Mn	0.005	0.005	Zinc	Zn	0.005	0.005

The first level of QA/QC involved a standardized set of field sampling procedures, practices, and steps. The following procedures were used during collections:

- samples were collected from the bow of the boat while facing upwind with the motor turned off;
- the Van Dorn sampler was triple rinsed with surface water before sample collection;
- the sampler was vertical when collection was made;
- sample bottles used were cleaned and prepared by the laboratory for the specific group of analyses;
- sample bottles were labelled with the sample location, date, and preservative added (if required);
- polyethylene gloves were used to collect the samples;
- sample bottles and the working area were kept clean to reduce possibilities of contamination;
- sample bottles and caps were thoroughly rinsed three times; and,
- samples were stored out of the sun and placed in a cool location (the optimal temperature being 4°C).

The second level involved submission of duplicate, triplicate, blank, and split samples. Duplicate samples were collected during spring and then revised to triplicate samples for all other sampling periods, thus ensuring a more accurate verification of the measurements. Split samples were taken only during the fall sampling period. Blanks were submitted to the laboratory for every sampling period for analyses. The third level occurred in the laboratory and included:

- checks of 20 to 25% of the samples analyzed;
- use of NBS, Canmet, EPA QC and other reference samples to measure accuracy;
- analysis of duplicates to evaluate precision;
- regular recalibration of equipment and rechecks; and,
- routine analysis of low and high QC check samples.

2.2.2 Sediments

2.2.1.1 Analyses

Sediment samples collected by Canamera Geological Ltd. personnel were analyzed by CanTest Ltd. laboratories of Vancouver. The metal constituents analyzed and detection limits used are outlined in Table 2.3.

Undried samples were digested with a mixture of nitric acid and hydrochloric acid ("Aqua Regia"). Analyses of most constituents were performed using Inductively Coupled Argon Plasma Spectroscopy (ICAP) or by specific techniques as described. Arsenic analysis was performed using Zeeman background-corrected Graphite Furnace Atomic Absorption Spectrophotometry. Cadmium and lead analyses were performed using

background-corrected Flame Atomic Absorption Spectrophotometry. Mercury analysis was performed using Cold Vapour Atomic Absorption Spectrophotometry. Moisture was determined gravimetrically at 105°C on a separate portion of the sample.

Table 2.3 Detection limits for metal constituents analyzed in sediment samples, Jericho study area 1995.

Metal	Abbreviation	Detection Limit (µg/g on "dry weight" basis)	Metal	Abbreviation	Detection Limit (µg/g on "dry weight" basis)
Aluminium	Al	10	Magnesium	Mg	0.1
Antimony	Sb	10	Manganese	Mn	0.2
Arsenic	As	0.05	Mercury	Hg	0.001
Barium	Ba	0.1	Molybdenum	Mo	4
Beryllium	Be	1	Nickel	Ni	2
Boron	B	0.5	Phosphorus	PO4	20
Cadmium	Cd	0.25	Silver	Ag	2
Calcium	Ca	1	Sodium	Na	5
Chromium	Cr	2	Strontium	Sr	0.1
Cobalt	Co	1	Tin	Sn	5
Copper	Cu	1	Titanium	Ti	0.3
Iron	Fe	2	Vanadium	V	0.5
Lead	Pb	1	Zinc	Zn	1

All results have been reported as micrograms per gram (µg/g) on a "dry weight" basis.

2.2.2.1 Quality Assurance/Quality Control

Similar to water quality analyses, procedures were used to ensure data reliability (accuracy and precision) and to ensure that contamination did not influence the results. These procedures were applied at two levels.

The first level occurred in the laboratory and included:

- use of NRCC reference samples to measure accuracy;
- analysis of duplicates to evaluate precision;
- regular recalibration of equipment and rechecks; and,
- analysis of blanks.

The second level involved submission of one field duplicate sample.

The third level involved a standardized set of field sampling procedures, practices, and steps. During sampling all components of the corer that were in contact with the substrate were pre-cleaned with 5% HNO_3 and washed with deionized water. Procedures used during sediment collections include the following:

- the sediment corer was rinsed three times with surface water to remove any residual contaminants;
- the sediment corer was deployed in a vertical fashion to ensure it entered the substrate vertically;
- removal of excess water above sediment;
- use of sample bottles that were prepared by the laboratory for the specific group of analyses;
- sample bottles were labelled with the sample location, date, and preservative added (if required);
- polyethylene gloves were used to collect the samples;
- sample bottles and working area were kept clean to reduce possibilities of contamination;
- sample bottles and caps were thoroughly rinsed three times; and,
- samples were stored out of the sun and placed in a cool location (the optimal temperature being 4°C).

2.2.3 Plankton

2.2.3.1 Phytoplankton

Prior to laboratory analysis, the phytoplankton samples were inverted gently, and 10 to 100 mL subsamples were dispensed into sedimentation chambers (Lund et al. 1958). After a 24 h sedimentation period, the basal area was scanned qualitatively with an inverted microscope (WILD M-40).

Taxonomic keys, including Prescott (1970), Taft and Taft (1971), and Webber (1971), were used for identifications. Counts of individual cells were made at a magnification of approximately 775X on horizontal transects of the chamber's diameter; a minimum of 200 algal units were enumerated. Measurements of cell dimensions were recorded for subsequent mean cell volume estimates. Individual mean cell volume estimates obtained in this manner were then used to calculate total cell volumes for each enumerated species. Species encountered, but not enumerated due to low numbers, were recorded as present.

For diatom (Bacillariophyta) identification and enumeration, a separate subsample was concentrated, dried onto a coverslip, ashed in a muffle furnace to remove organic matter, and mounted in Storax.

2.2.3.2 Zooplankton

Zooplankton counts were made using a dissecting stereo-microscope (Wild M-5); identifications were made using a compound microscope equipped with a phase-contrast condenser (Wild M-20). Taxonomic keys used for crustacean plankton were Brooks, Wilson and Yeatman (in Edmondson 1959), supplemented by the keys of Brooks (1957), Smirnov (1971), Brandlova et al. (1972), Flössner (1972), and Kiefer (1978). The taxonomic key used for identification of rotifers was the Voigt revision by Kost (1978), supplemented by keys of Ahlstrom (1943) and Ruttner-Kolisko (1974). Chaoboridae were identified using the keys of Cook (1956) and Saether (1970). Specimens were identified to the lowest taxonomic level possible.

Enumeration of zooplankton in each sample involved different techniques that were dependant on taxonomic group. Cladocerans and copepods (all stages) were enumerated either from three 15-mL subsamples or from the entire sample using a dissecting microscope at magnifications of 12-50X. Subsampling was performed on samples that were subjectively assessed to have large numbers of specimens. Rotifers were enumerated from a subsample: a modified Folsom-style splitter was used to create subsamples. Each 15-mL subsample was allowed to settle for 24 h before processing. An inverted microscope (40-50X) was used to enumerate rotifers by counting either 6 fields (1 field = 0.0105 x 2.5 cm^2) or the entire counting chamber (Area (cm^2): $\pi r^2 = (2.5/2)^2 \bullet \pi$) . Subsamples were continually removed from the original sample until approximately 200 mature or identifiable rotifer organisms were processed. Species that were rare were not counted. Such species were recorded only as "present".

Once numbers of organisms within each sample were established, these values were converted to densities per cubic metre. This was accomplished by determining the total volume filtered (i.e., net mouth area x depth of haul x number of hauls assuming a 100% net efficiency) and multiplying by the number of organisms enumerated.

Biomass of major taxonomic groups in each sample was also calculated. To calculate biomass, lengths were measured from the first 30 individuals observed in a sample. Lengths of larger zooplankton were measured directly with a microscope equipped with a calibrated Sigma Scan digitizing tablet. Smaller zooplankton, such as rotifers, were measured using an eyepiece graticule and corrected for magnification. Lengths were measured from the first 10-30 individuals of each species observed in each sample. Using length measurements from individual organisms, weights were calculated from published length-weight regression equations (Table 2.4). For each sample, a mean individual weight was calculated by averaging the estimated weights generated from the length-weight regression equation (it is important to average weights and not lengths; Bird and Prairie (1985)). Biomass for each taxonomic group was calculated by multiplying the number enumerated for that sample by the mean individual weight.

Table 2.4 Length-weight regression equations used to calculate zooplankton weights.

Organism	Equation	Reference
Copepods (N1-adults)	$\ln W(\mu g) = 1.9526 + 2.399 \cdot \ln L(mm)$	Bottrell et al. 1976
Daphnia spp.	$\ln W(\mu g) = 1.6 + 2.84 \cdot \ln L(mm)$	Bottrell et al. 1976
Holopedium spp.	$\ln W(\mu g) = 6.4957 + 3.052 \cdot \ln L(mm)$	Downing & Rigler. 1984
Rotifers	$\ln W(\mu g) = -10.3815 + 1.574 \cdot \ln L(\mu g)$	Stemberger & Gilbert. 1987

Zooplankton hauls cannot be considered adequately quantitative for sampling rotifers because coarser mesh sizes, especially those >0.065 mm, may allow small forms to escape, or because clogging of the net may occur. Consequently, numbers derived from zooplankton hauls should, at best, be considered as an "order of magnitude" indication of abundance (Green 1977).

2.2.4 Stream Periphyton

In the laboratory, the periphytic algal samples were processed as outlined in Lund et al. (1958). Samples were first mixed and then subjected to serial dilutions; generally 0 to 1000 fold dilutions depending on algal and organic debris in original sample. Then 1 to 10 mL subsamples were dispensed into sedimentation chambers. After a 12 h sedimentation period, the basal area of each chamber was scanned qualitatively with an inverted microscope (Lietz) to identify the best dilution for subsequent quantitative analyses. Once the appropriate dilution was established, taxonomic groups within the sample were identified, enumerated, and cell volume estimated.

Taxonomic keys of Smith (1950), Prescott (1970), and Webber (1971) were used for species identification. Counts were made at a magnification of approximately 450X along horizontal transects across the diameter of the chamber; a minimum of 200 algal units were examined. Rare species that were encountered but not enumerated during routine transect counts, were recorded as present.

To identify and enumerate diatoms, subsamples were treated with a mixture of concentrated sulphuric acid, potassium dichromate and hydrogen peroxide followed by repeated washes in distilled water. The cleaned frustules were then dried on cover glasses and mounted in Storax.

Chlorophyll *a* analysis was conducted using the spectrophotometric acetone extraction method described by Moss (1967a, 1967b).

2.2.5 Benthic Macroinvertebrates

2.2.5.1 Streams

Samples were sorted under a dissecting microscope (6-42X magnification) and organisms were identified to the lowest practical taxonomic level (genus or species where possible). More difficult groups, such as nematodes were categorized to a higher taxonomic level. Keys used for identification included: Baumann et al. (1977), Wiggins (1977), Wiederholm (1983), Merritt and Cummins (1984), Brinkhurst (1986), and Clifford (1991).

2.2.5.2 Lakes

In the laboratory, each sample was processed to remove all extraneous substrate and organic matter. Samples were transferred to an enamel tray where the sucrose floatation method (Hynes 1970) was used to float the organisms to the surface. The water and invertebrates were then decanted onto a 212 μm sieve. This procedure was repeated until invertebrates were no longer observed in the decant water. Using a dissecting microscope (6-42X magnification), invertebrates were then sorted by major taxonomic group and identified to the lowest practical taxonomic level (genus or species where possible). More difficult groups, such as nematodes, were identified to a higher taxonomic level. Keys used for identification included: Baumann et al. (1977), Wiggins (1977), Wiederholm (1983), Merritt and Cummins (1984), Brinkhurst (1986), and Clifford (1991).

2.2.6 Fish Ageing

Fish ageing followed the protocol outlined in Mackay et al. (1990). Otoliths were used to age char species and round whitefish; scales were used to age Arctic grayling. Otoliths, which had been stored dry in labelled envelopes, were first lightly ground and polished with (400 grit) emery cloth to allow sufficient light transmission. Then a binocular dissecting microscope, equipped with a transmitted light source, was used to obtain an age from each structure. Clean, nonregenerated scales were mounted on a glass slide, and a photocopy made using a Canon PC Printer 80 microfiche reader/printer. Scales were then aged using this photocopy. Each structure was aged by two independent readers. When discrepancies in the assigned age occurred, a third reader was used to arrive at a consensus.

Whenever sample sizes permitted, a minimum of 30 structures were aged. When more than 30 structures were available for analysis, a subsample was used. To obtain a subsample, structures were first ordered sequentially based on fish length and then random selections were made from each 10 mm length-class.

2.2.7 Fish Tissues

2.2.7.1 Analyses

Analyses of fish tissue samples for selected metal constituents were conducted at the CanTest Ltd. laboratory in Vancouver (Table 2.5).

Table 2.5 Detection limits for metal constituents analyzed in fish tissue samples, Jericho study area 1995.

Metal	Abbreviation	Detection Limit (µg/g on "dry weight" basis)	Metal	Abbreviation	Detection Limit (µg/g on "dry weight" basis)
Aluminum	Al	5.0	Manganese	Mn	0.1
Antimony	Sb	5.0	Mercury	Hg	0.005
Arsenic	As	0.05	Molybdenum	Mo	1
Barium	Ba	0.05	Nickel	Ni	0.25
Beryllium	Be	0.1	Phosphorus	PO4	10
Boron	B	0.5	Potassium	K	0.5
Cadmium	Cd	0.05	Silver	Ag	1
Calcium	Ca	0.5	Sodium	Na	0.5
Chromium	Cr	1.5	Strontium	Sr	0.05
Cobalt	Co	0.5	Tin	Sn	1
Copper	Cu	0.05	Titanium	Ti	0.15
Iron	Fe	1	Vanadium	V	0.5
Lead	Pb	0.05	Zinc	Zn	0.05
Magnesium	Mg	0.05			

Sample dissolution was achieved after accurately weighing out representative subsamples "as received" into acid washed Pyrex beakers with watch glasses. To each sample seven millimetres (mL) of a Fisher Chemicals Trace Metal Grade Nitric Acid was added and digested over low heat for a period of four (4) hours. After the initial nitric acid digestion, the samples were allowed to cool and 5 mL of a Merck Analytical Grade Hydrogen Peroxide was added. Samples were again allowed to cool and then diluted to 50.0 mL with ultra pure water.

Trace metal analyses were performed using several methods:

- I.C.P. (Plasma) analysis

  Analysis was performed on the "nitric-peroxide" digested solutions for all elements reported. The instrument used was a Jarrell Ash Model #975 Inductively Coupled Argon Plasma Spectrograph (ICAP), equipped with a Minipuls 2 Peristaltic Pump and an "All Glass" MAK High Pressure Nebulizer.

  The instrument was calibrated using standard solutions prepared from pure metals or pure metal salts obtained from Johnson Matthey or form Spex Industries. Calibration was checked after every tenth solution (blanks, Certified Standards, or sample solution) was analyzed; the instrument was recalibrated if the deviation from the standard value was over two percent.

  For this study, the ICP Analysis was undertaken using a "General Purpose" ICP program which consists of thirty elements and their associated calibration standard solutions. This was done to ensure that computer corrections for spectral interferences caused by elements such as aluminum, magnesium and titanium could be carried out. This elemental array with calibration standards are used on a daily basis for analysis of water, biological tissues, geological materials, and alloys.

- Mercury

  Mercury was determined using a Pharmacia Model 100 M Mercury Monitor equipped with a Servo Graphic Recorder Model 410. No pretreatment of the solutions was needed prior to the mercury determination.

- Arsenic, Cadmium, Lead and Nickel

  These elements were determined using a Varian Model Spectral 400 Zeeman Background Corrected Graphite Furnace and a Hewlett Packard Model 4500 Series Inductively Coupled Argon Plasma/Mass Spectrometer (ICP-MS).

- Copper, Zinc and Cross-check of High Cadmium Values

  These elements were determined using a Varian Model 475 Direct Flame Atomic Absorption Spectrophotometer.

Moisture content was determined on separate aliquots after drying at 105°C overnight. All results were reported as micrograms per gram on a "dry weight" basis.

2.2.7.2 Quality Assurance/Quality Control

Procedures were used to ensure the reliability of the data, in terms of the accuracy and precision of the analysis, and to ensure that contamination did not influence the results. These procedures were applied at three levels.

A minimum of three (3) reagent blanks and the NCR number Tort-1 & 2 (Lobster Tissue), Dorm-1 (Dogfish Tissue) or Dolt-2 (Dogfish Liver) certified reference materials were digested and analyzed concurrently. In total, 46 duplicate samples were analyzed to check the reliability of the data.

2.2.8 Data Processing

Data processing and summarization was conducted using an IBM compatible microcomputer. Data were entered into a computer and analyzed using a variety of software programs including PC-File (Ver. 5.0), Lotus for Windows (Ver. 4.0), and SPSS for Windows (Ver. 6.0). Report figures and maps were generated using Freelance for Windows (Ver. 2.0).

Quality assurance and control was implemented during all phases of data processing. This involved use of standardized formats for data record forms (used during field collections) and electronic data files (used during data processing). Data were checked visually during all stages of data processing (data entry, summarization, and presentation).

3.0 RESULTS AND DISCUSSION

3.1 LIMNOLOGY

Limnology is the study of the functional relationships and productivity of freshwater communities as they are affected by their physical, chemical, and biotic environments (Wetzel 1983). This section provides summary results for temperature and dissolved oxygen profiles, and the transparency of selected lakes in the Jericho study area.

Sampled lakes included waterbodies potentially affected by the proposed development (Carat Lake and Jericho Lake): two sites were established on Carat Lake, while one site was located on Jericho Lake (Figure 3.1.1). A third lake (Lake C3), situated upstream of the proposed development area, was also sampled. Specific site sampling locations are provided in Appendix B1.

3.1.1 Temperature and Dissolved Oxygen

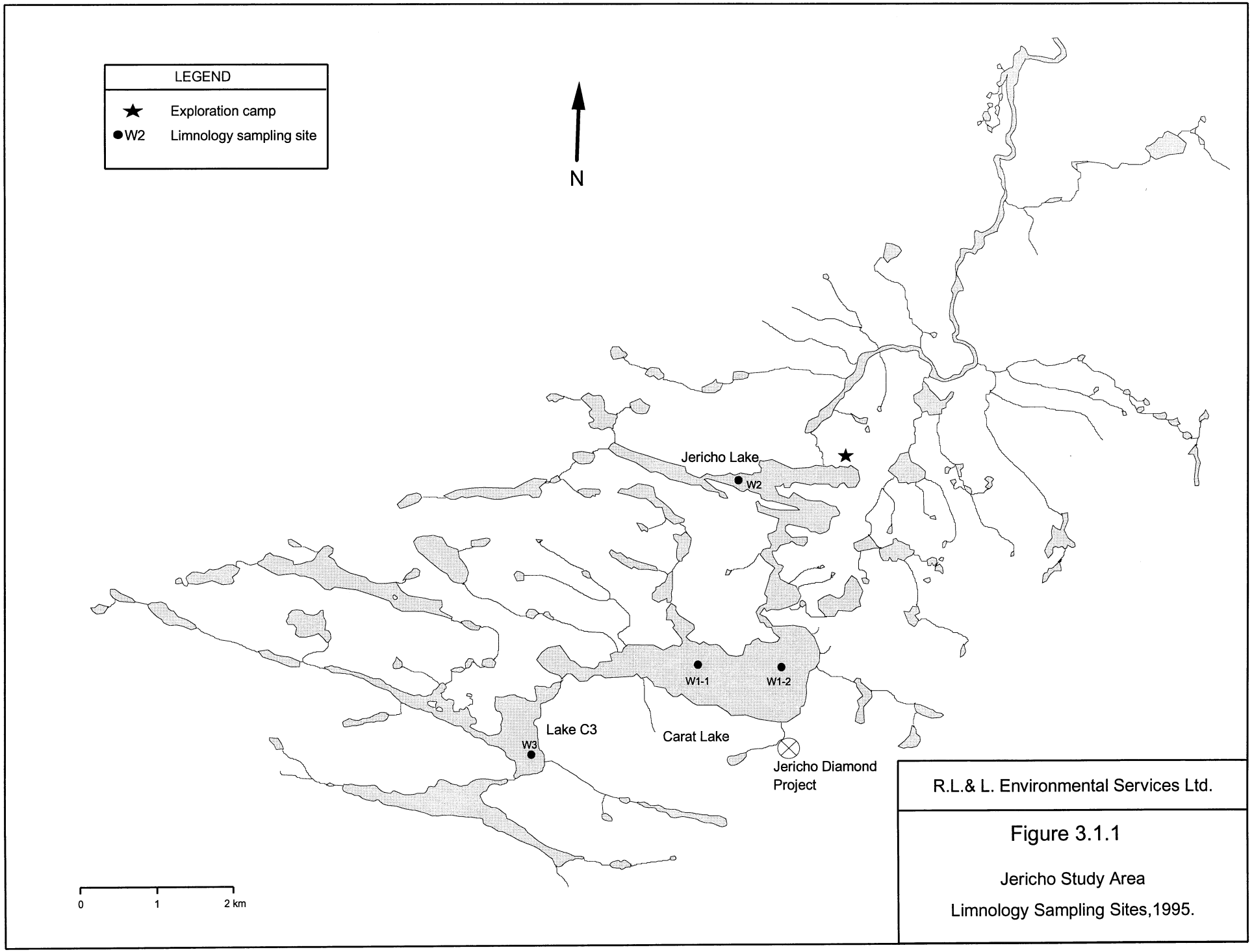
Temperature and dissolved oxygen data from lakes in the Jericho study area were collected in the summer and fall of 1995. Water column profiles were measured at sites depicted in Figure 3.1.1 and all profile data are presented in Appendix B1.

3.1.1.1 Summer

At Site W1-1 in Carat Lake, which was situated in a shallow west basin (11 m depth), the water column was isothermal (8.7°C) and dissolved oxygen was 11.5 mg/L (Figure 3.1.2). In the deeper east basin of Carat Lake (Site W1-2) stratification was evident and water temperature ranged from 10.4°C at the surface to 5.5°C near the bottom (28 m depth). At this site, a thermocline was recorded between 20 and 24 m depth. Dissolved oxygen concentrations also varied from a high of 12.9 mg/L in the lower part of the water column (26 m depth) to a low of 11.9 mg/L at the surface. The increase in dissolved oxygen concentration with depth, likely reflects the effects of temperature on the solubility of oxygen (i.e., colder water can hold greater concentrations of dissolved gases than can warmer water).

The temperature of Jericho Lake (Site W2), ranged from 10.5°C at the surface to 4.5°C near the bottom (15 m depth) (Figure 3.1.3). A thermocline was evident between 11 m and 15 m depth. This thermocline depth differed to that observed at Site W1-2 in Carat Lake. The difference was likely caused by differences in basin morphology of each lake. Dissolved oxygen concentrations did not vary in Jericho Lake; it was 11.0 mg/L at the surface and remained at 11.1 mg/L throughout the rest of the water column.

The temperature of Lake C3 at Site W3, did not deviate significantly throughout the water column (from 11.6°C at the surface to 9.3°C near the bottom; Figure 3.1.4). This was likely due to its relatively shallow depth (13 m). Dissolved oxygen concentrations also varied little, ranging between 10.6 and 11.4 mg/L.



R.L.& L. Environmental Services Ltd.

Figure 3.1.1

Jericho Study Area

Limnology Sampling Sites,1995.

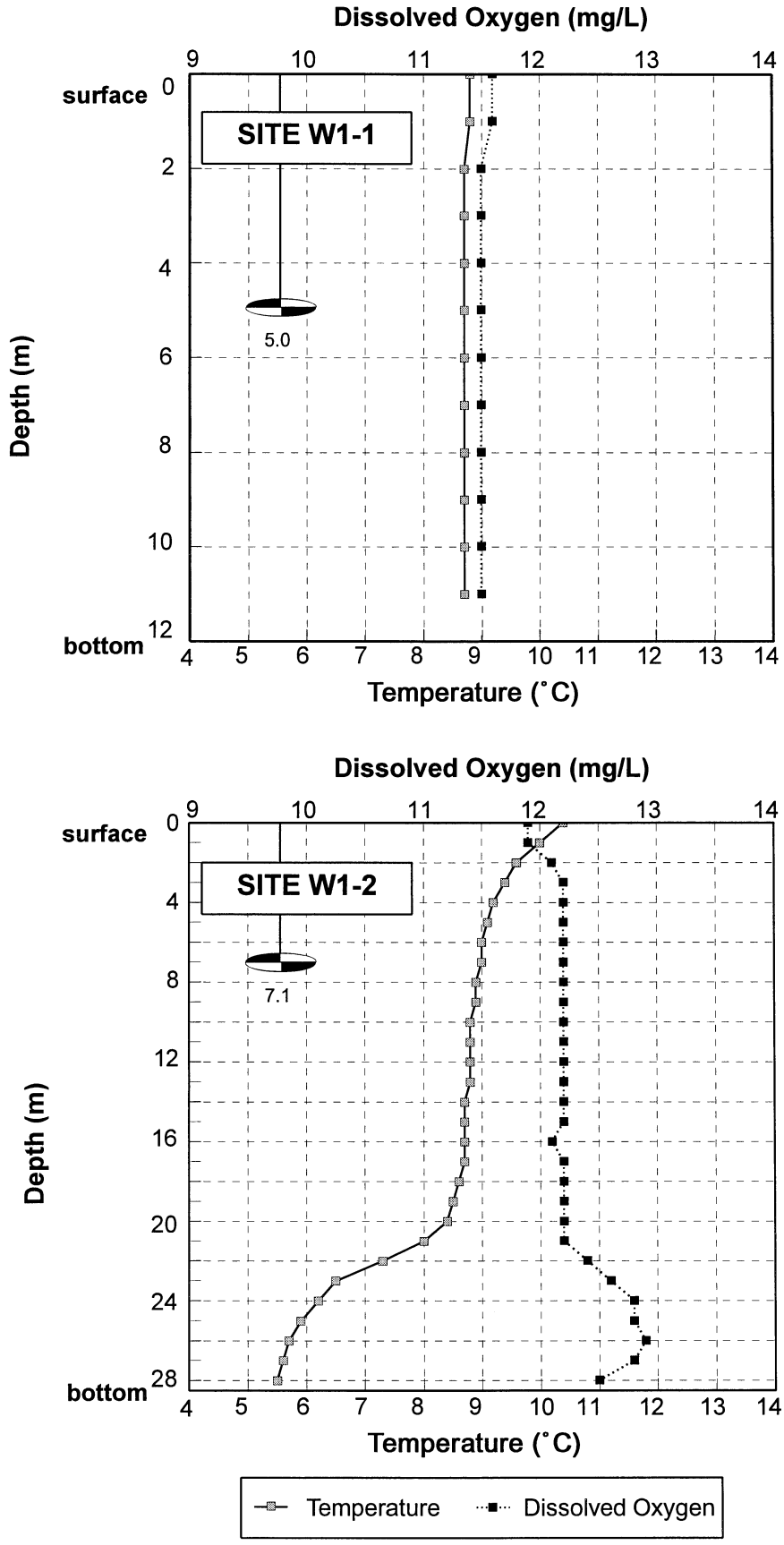


Figure 3.1.2 Dissolved oxygen and temperature profiles, and Secchi depth during summer at Sites W1-1 and W1-2 of Carat Lake, Jericho study area 1995.

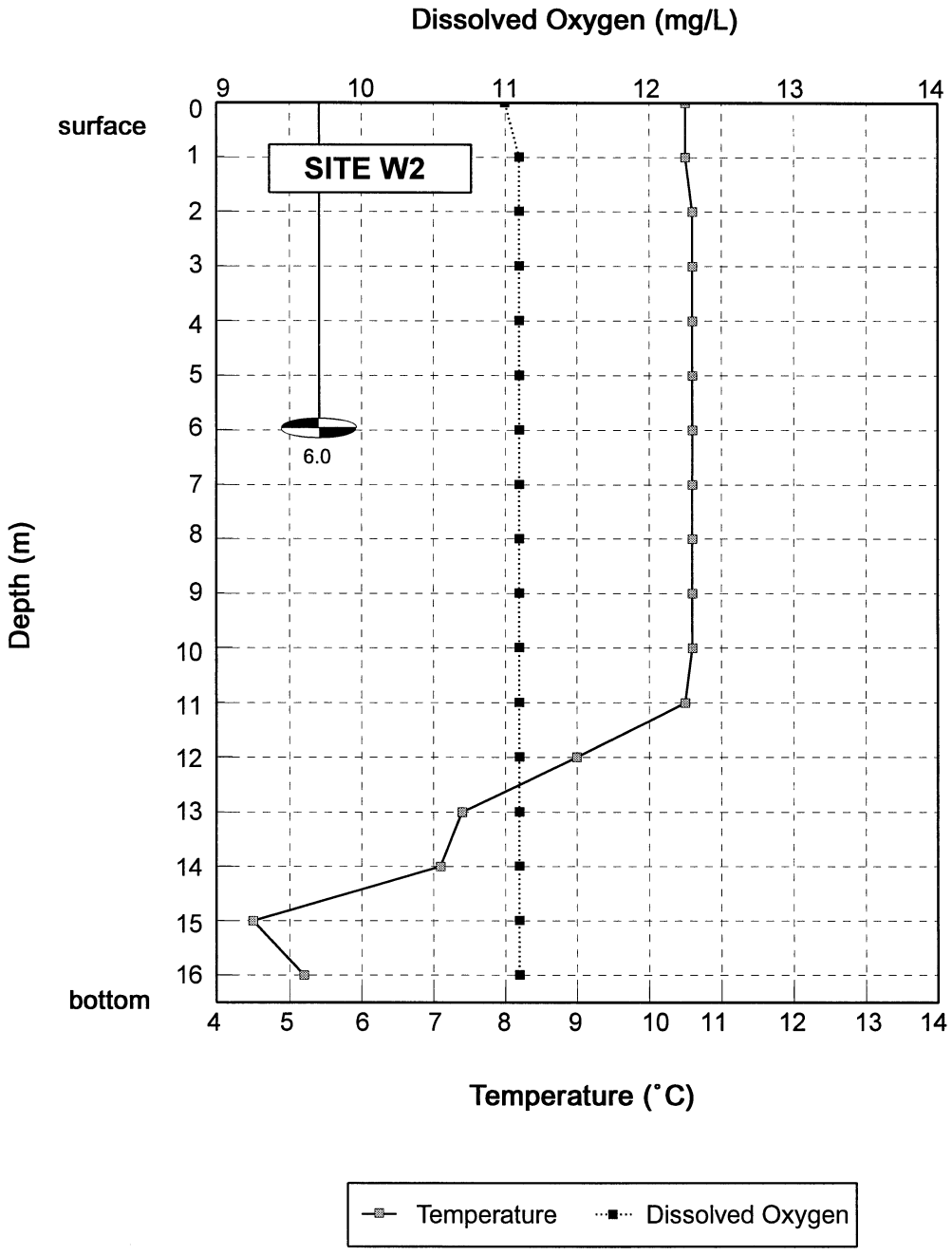


Figure 3.1.3 Dissolved oxygen and temperature profiles, and Secchi depth during summer at Site W2 of Jericho Lake, Jericho study area 1995.

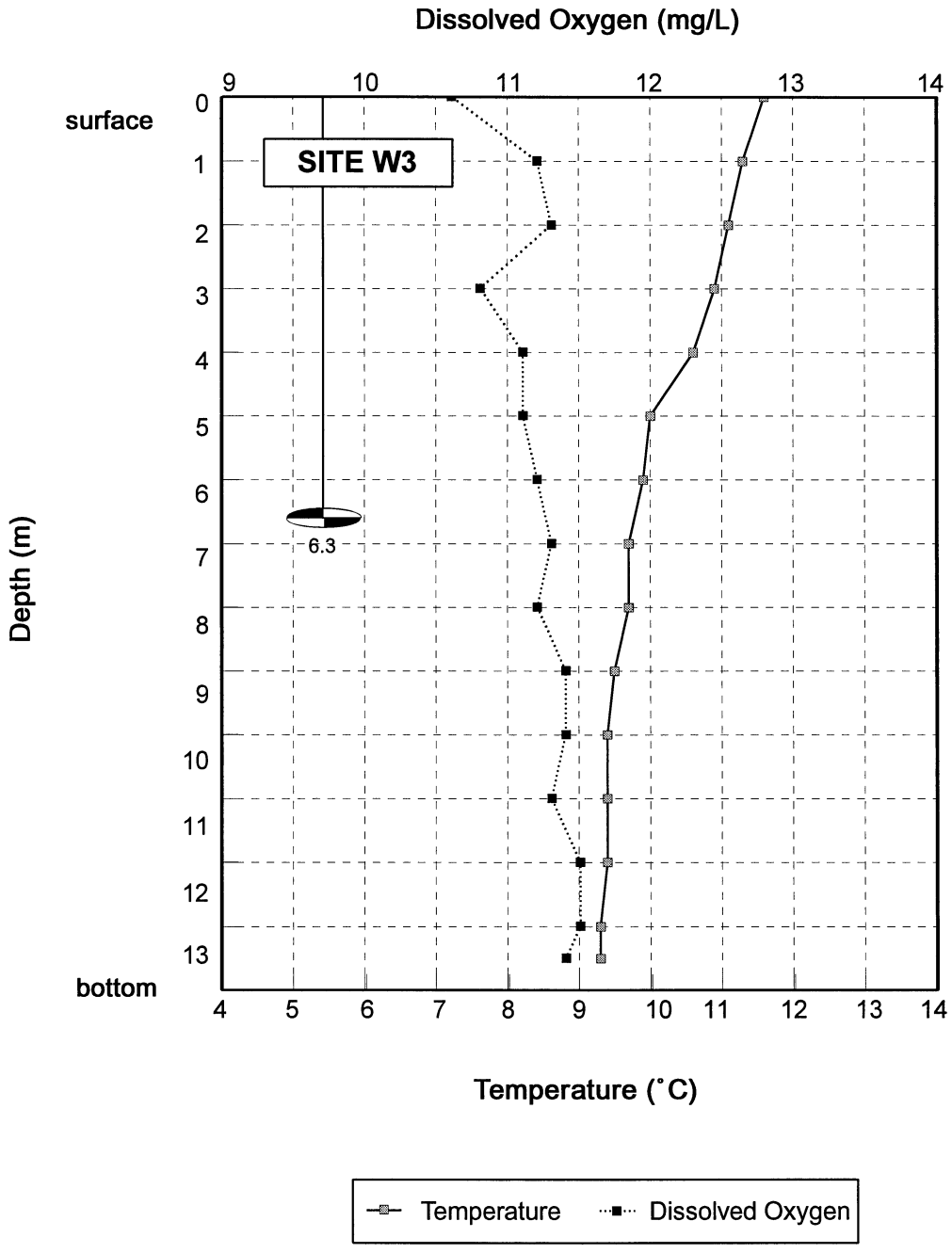


Figure 3.1.4 Dissolved oxygen and temperature profiles, and Secchi depth during summer at Site W3 of Lake C3, Jericho study area 1995.

3.1.1.2 Fall

The temperature and dissolved oxygen profiles of the study lakes were monitored in mid-September after fall turnover had occurred. Temperatures and concentrations of dissolved oxygen were similar throughout the water column (Appendix B1). Carat Lake had isothermal temperatures of approximately 5°C at both Sites W1-1 and W1-2. Dissolved oxygen concentrations at the two Carat Lake sites were between 11.1 and 11.6 mg/L. Similar results were obtained in Jericho Lake and Lake C3 (Appendix B1).

3.1.1.3 Summary

During the 1995 summer monitoring program, the deeper east basin of Carat Lake (Site W1-2) and Site W2 of Jericho Lake (water depths at both sites >15 m) exhibited thermoclines. These data suggest that deeper lakes in the study area will stratify during the summer, and therefore, can be classified as dimictic (thoroughly mix twice a year). Lake C3 at Site W3, was shallower (13 m) and did not exhibit a thermocline, and therefore can be classified as a monomictic lake (continuous mixing).

During summer, all lakes were well oxygenated. The lowest dissolved oxygen concentration (10.6 mg/L) was measured at the surface of Lake C3. The lack of oxygen depletion, particularly below the thermocline, suggested that the lakes had low biological productivity (i.e., low oxygen demand).

During fall, all three study lakes had isothermal temperature profiles, which suggested that they were well mixed before sampling (i.e., lakes had undergone turnover).

3.1.2 Transparency

Water transparencies (Secchi depths) of lakes are presented in Table 3.1.1 and Figures 3.1.2 to 3.1.4. During summer 1995, the water transparency of the study lakes ranged from 5.0 m at Site W1-1 in Carat Lake to 7.1 m at Site W1-2 in the same waterbody. Water transparency was approximately 6.0 m in Jericho Lake and Lake C3 during summer. In fall, transparency values remained relatively constant in Jericho Lake and Lake C3. In Carat Lake, however, they did differ from summer values. At Site W1-1 transparency increased to 7.0 m, whereas, at Site W1-2 it decreased to 6.5 m.

Table 3.1.1 Water transparency in sampled lakes during summer and fall, Jericho study area 1995.

Lake	Site	Secchi Depth (m)	
		Summer	Fall
Carat	W1-1	5.0	7.0
	W1-2	7.1	6.5
Jericho	W2	6.0	6.5
C3	W3	6.3	6.5

In summary, high transparency levels were recorded in the Jericho study area waterbodies. This was a reflection of low amounts of suspended sediments and the low biological productivity of these northern lakes (i.e., low density and biovolume of phytoplankton in the water column).

3.2 WATER QUALITY

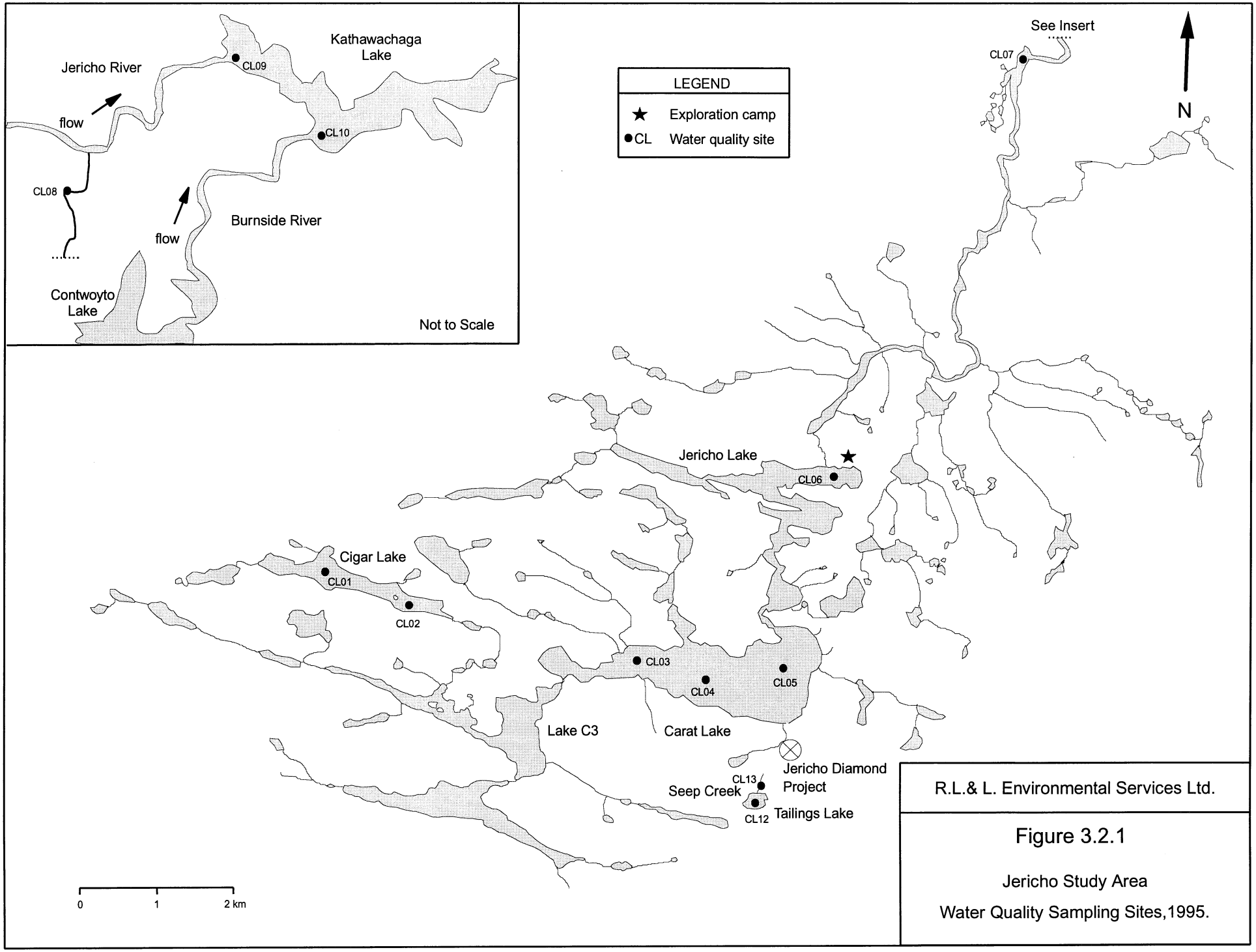
Canamera Geological personnel conducted the water quality sampling program during the 1995 study. These data are summarized in this report.

Water samples were collected from 10 sites distributed throughout the Carat Lake drainage during spring, summer, and fall (Figure 3.2.1 and Table 3.2.1). Sampling site locations were determined based on waterbody position in the drainage relative to the Jericho Diamond Project.

Table 3.2.1 Locations of water quality sampling sites, Jericho study area 1995.

Waterbody Sampled	Site[a]	UTM Coordinates	Dates Sampled and Water Depth (m) at which Sample Collected		
			15-18 July	18-22 Aug	10-12 Sept
Cigar Lake	CL01	12W0472400N 7322878E	3.0 11.0	3.0 11.0	3.0 11.0
	CL02	12W0473213N 7321779E	3.0 10.0	3.0 10.0	3.0 10.0
Carat Lake	CL03 (west basin)	12W0476236N 7320918E	2.0 8.0	2.0 8.0	2.0 8.0
	CL04 (center basin)	12W0477044N 7320792E	6.0 15.0 24.0	6.0 15.0 24.0	6.0 15.0 24.0
	CL05 (east basin)	12W0478038N 7320749E	2.0 9.0	2.0 8.0	2.0 8.0
Jericho Lake	CL06	12W0478652N 7323676E	1.5	2.0	1.5
Jericho River	CL07 (upstream)	12W0481202N 7329967E	0.3	0.3	0.3
	CL08 (downstream)	12W0484019N 7334115E	0.5	0.4	0.5
Kathawachaga Lake	CL09 (near inlet of Jericho River)	12W0491905N 7341283E	0.9	0.75	0.5
	CL10 (near inlet to Burnside River)	12W0495796N 7337630E	1.75	2.0	2.0
Tailings Lake	CL12	12W0477863N 7318546E	N/S[b]	1.0 3.0	1.0 3.0
Seep Creek	CL13	12W0477863N 7318727E	N/S	0.15	0.15

[a]Site CL11 not listed in table because it represents a field blank.
[b]N/S = not sampled.



R.L.& L. Environmental Services Ltd.

Figure 3.2.1

Jericho Study Area

Water Quality Sampling Sites,1995.

Two sites (CL01 and CL02) were established on Cigar Lake, which was situated upstream of a proposed development; it was designated as the reference (control) waterbody. Carat Lake, which was immediately adjacent to the Jericho Diamond Project, contained three sampling sites (CL03, CL04, and CL05); one each located at the east, middle, and west ends of the lake. Several sites were established farther downstream in the watershed. These were Site CL06 (Jericho Lake), Sites CL07 and CL08 on the Jericho River, Site CL09 in Kathawachaga Lake near the inflow of the Jericho River, and finally Site CL10 in Kathawachaga Lake near the outflow to the Burnside River.

Two other sites were incorporated into the sampling program during summer and fall (Figure 3.2.1 and Table 3.2.1). These sites were situated immediately south of the Jericho Diamond Project. Site CL12 was situated on a small lake (Tailings Lake); the other (Site CL13) was situated on Seepage Creek, which received groundwater from Tailings Lake.

Up to three discrete water samples were collected at each site; the number of samples was dependent on maximum depth of the waterbody (see Section 2.2). Three samples were collected only at one location (Site CL04 on Carat Lake), while two or fewer samples were collected at the remaining sites (Table 3.2.1).

Before summarization, data were examined to assess whether they could be pooled for simple descriptive presentation. To accomplish this, values below detectable levels were assumed to be at the methodological detection limit specified for that variable. The variation (Coefficient of Variation) was then determined for grouped data (i.e., season and sampling depths combined), and then compared to the variation determined during QA/QC analyses of replicates. The results suggested that, with few exceptions, the variation among grouped samples were similar to the maximum variation observed around the replicates. Based on this information, it was deemed appropriate to pool the season and depth data at each site to obtain an average concentration for each variable. These results were used to describe trends in the water quality in the Jericho study area (upstream to downstream). They should not be viewed as a statistical interpretation of these data.

3.2.1 Quality Assessment

Detailed results of the quality assessment analyses are presented in Appendix C. Results indicated that analytical precision and accuracy were at acceptable levels. In the case of potential contamination, most water quality variables were within acceptable levels. One variable, total aluminum, was detected in all field blanks at levels above methodological detection limits. This finding was considered when interpreting the results.

3.2.2 Physical Tests/Dissolved Anions/Nutrients/Organics

Results of the physical tests, dissolved anion analyses, nutrient analyses, and organic analyses are summarized in Appendices C5 to C7. Many variables analyzed were below or near methodological detection limits, which reflect the oligotrophic nature of waterbodies in the study area. As such, the following discussion concentrates

on variables that were biologically important and/or that had concentrations considerably above methodological detection limits (Figures 3.2.2 and 3.2.3).

3.2.2.1 pH

The amount or intensity of hydrogen ion activity in a solution is measured as pH, and is defined as the logarithm of the reciprocal of hydrogen ion concentration (Wetzel 1983). The pH of water is affected by basin geology, biological activity, and industrial pollution. The toxicities of some pollutants and the activity of many ions, in turn, are regulated by pH.

Except for Tailings Lake (Site CL12), the average pH of waterbodies in the Jericho study area were slightly acidic and ranged from a value of 6.29 in the Jericho River (Site CL07) to 6.87 in Seep Creek (Site CL13) (Figure 3.2.2). Site CL12 of Tailings Lake had an average pH of 7.03.

The pH of the waterbodies in the Jericho study area were similar to those described in studies of similar subarctic lakes. R.L. & L. (1993) found that the pH of four lakes and various streams located approximately 75 km southwest of the Jericho study area were also slightly acidic and varied around a value of 6.0. Similarly, five waterbodies located about 25 km southeast of Carat Lake had pH values that ranged from 5.4 to 7.4 to 1984 (Reid Crowther 1985).

The Canadian Water Quality Guidelines (CWQG) for pH is between 6.5 and 9.0 for the protection of freshwater aquatic life (CCREM 1987). Only Site CL07 of the Jericho River was noncompliant with this guideline.

3.2.2.2 Alkalinity

Alkalinity refers to the amount of base that titration with strong acid can determine, and thus expresses the ability of water to neutralize acid (Wetzel 1983). Concentrations of carbonate, bicarbonate, and hydroxide are particularly important in determining alkalinity.

Alkalinity (measured as calcium carbonate) tended to be greater in Tailings Lake and Seep Creek than in the other waterbodies sampled in the Jericho study area (Figure 3.2.2). Alkalinity ranged from an average of 3.30 mg/L at Site CL10 of Kathawachaga Lake to 8.43 mg/L in Tailings Lake. The pattern of greater alkalinity in Tailings Lake and Seep Creek was likely due to these sites being isolated from the other waterbodies and not receiving great amounts of water inflow during the open water season. The alkalinity of water in the Jericho study area was similar to the lakes monitored by R.L. & L. (1993) found approximately 75 km to the southwest in 1992 and 1993.

No CWQG have been set for alkalinity, but the U.S. Environmental Protection Agency (USEPA) suggests a minimum of 20 mg/L (USEPA 1986). All alkalinity concentrations in the Jericho study area complied with this criterium.

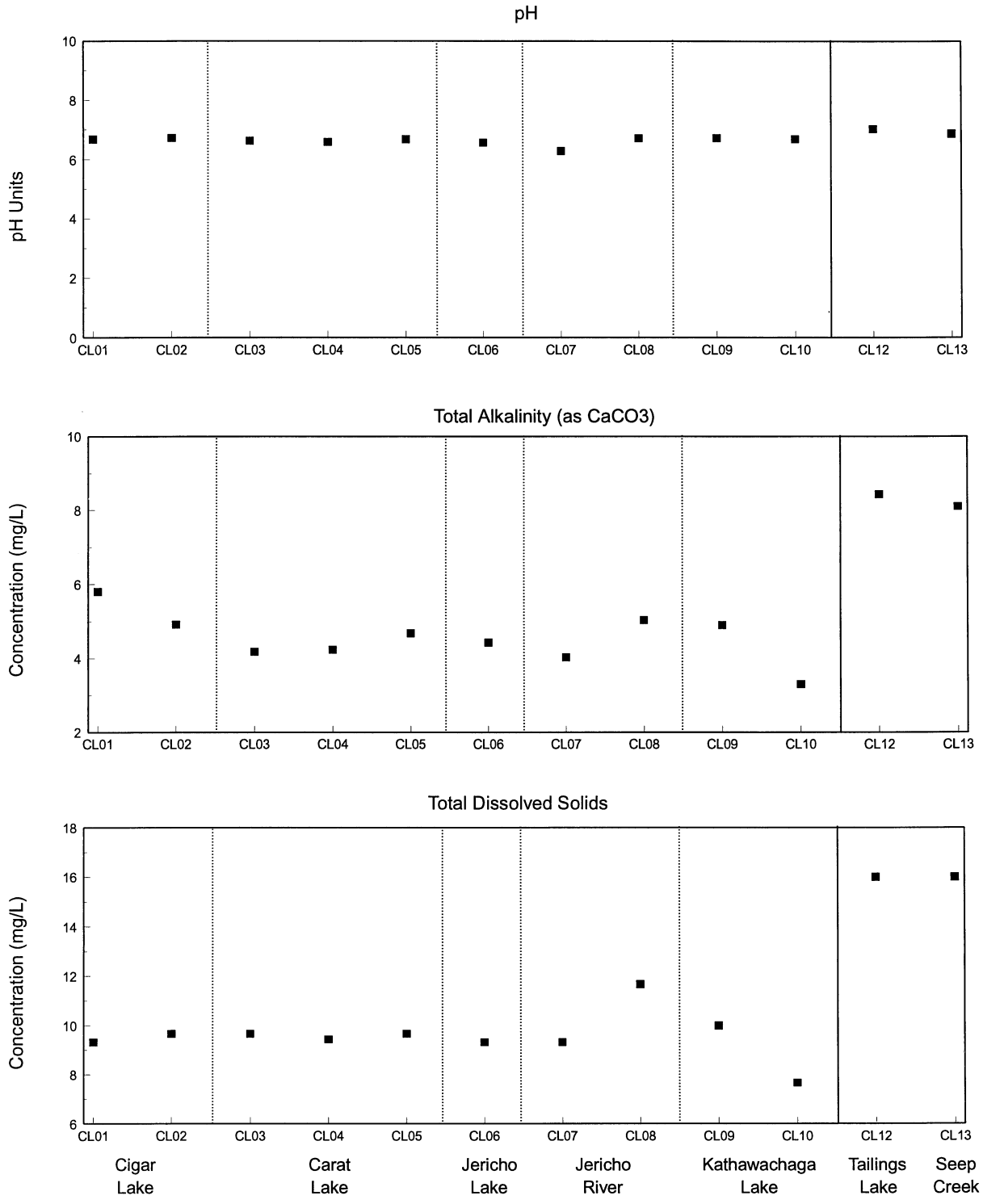


Figure 3.2.2 Trends in average concentrations of chemical and physical constituents in water (seasons and depth zones combined) from sampled waterbodies, Jericho study area 1995 (dashed line separates distinct waterbodies; solid line separates watersheds).

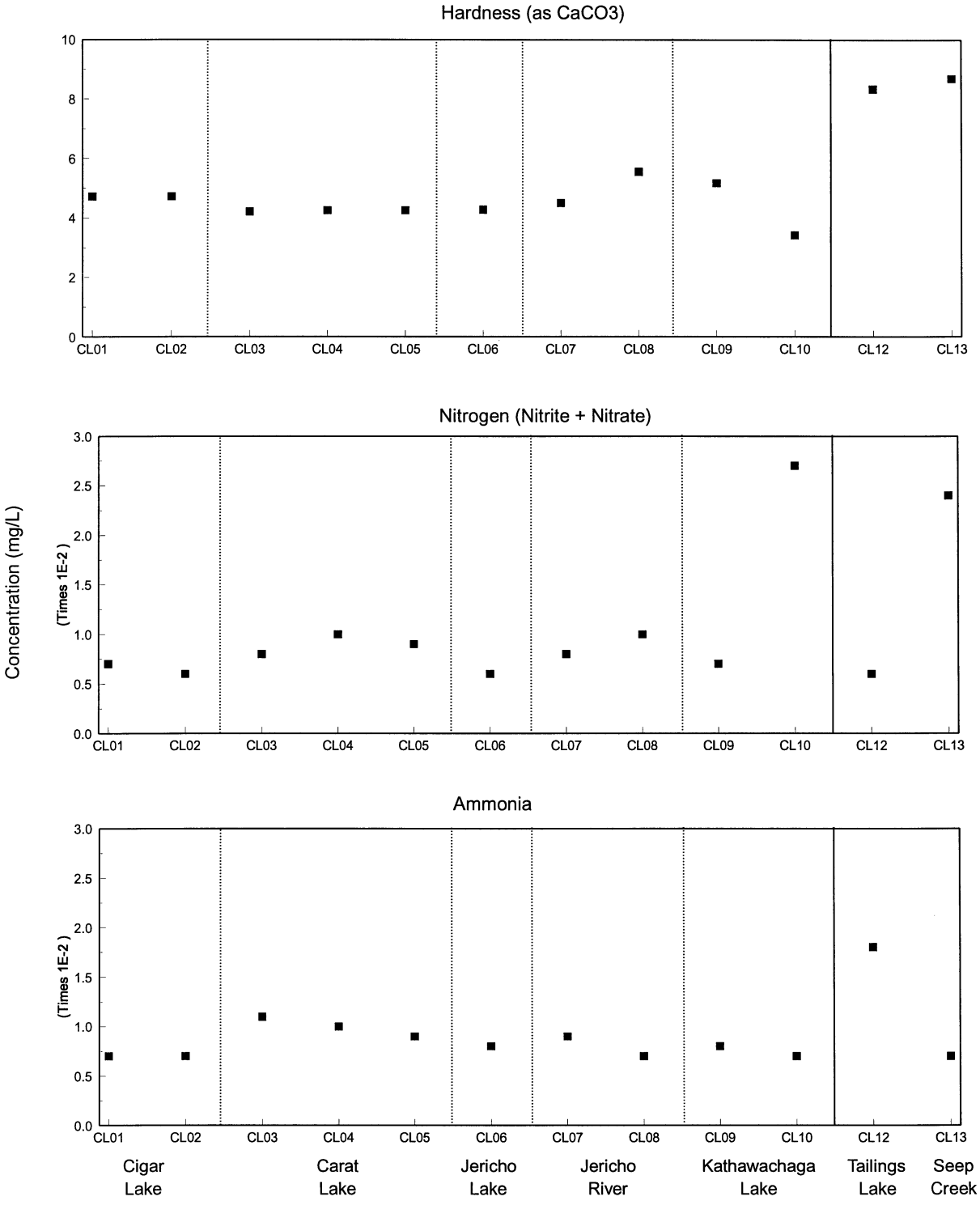


Figure 3.2.2 Continued.

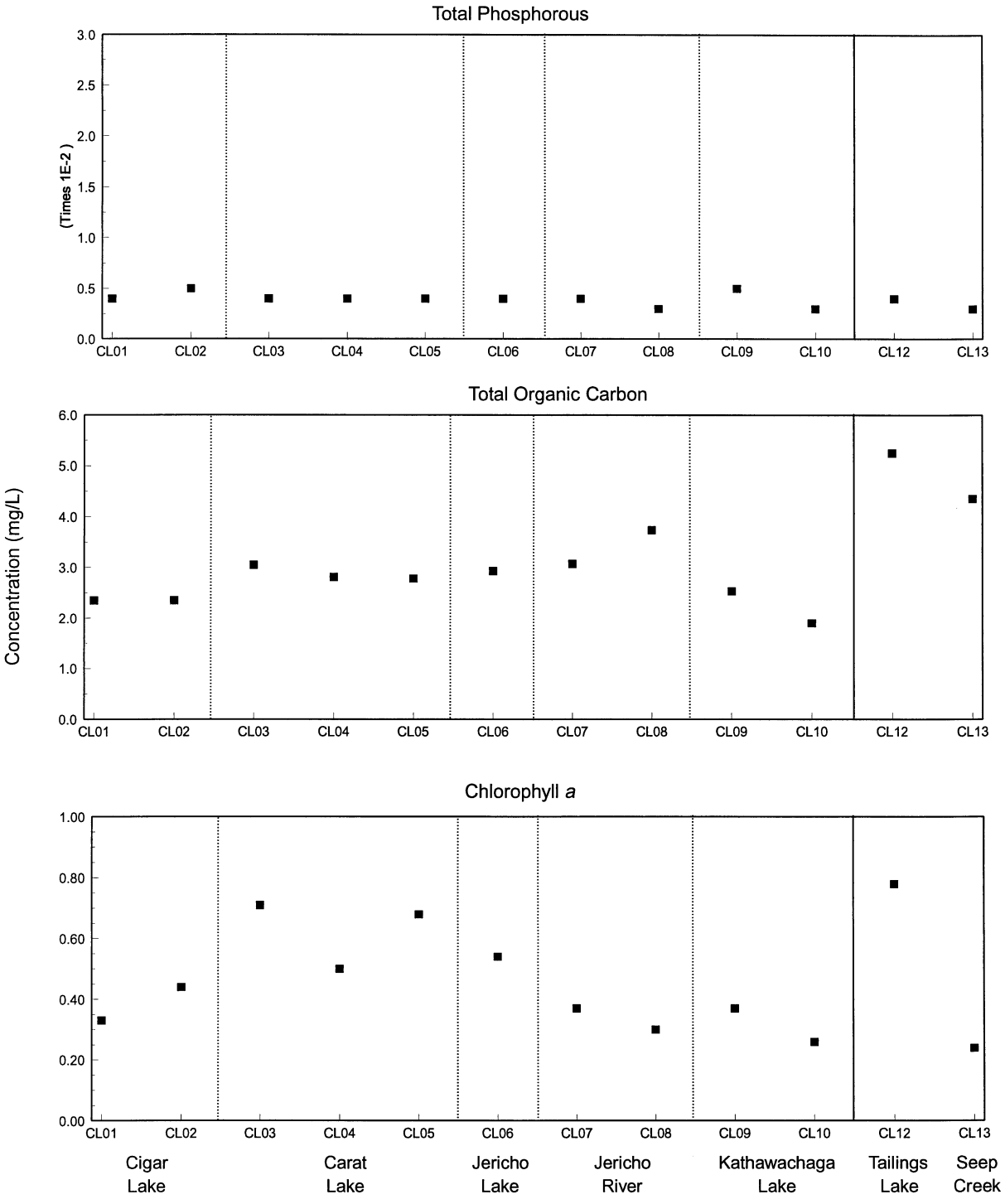


Figure 3.2.2 Concluded.

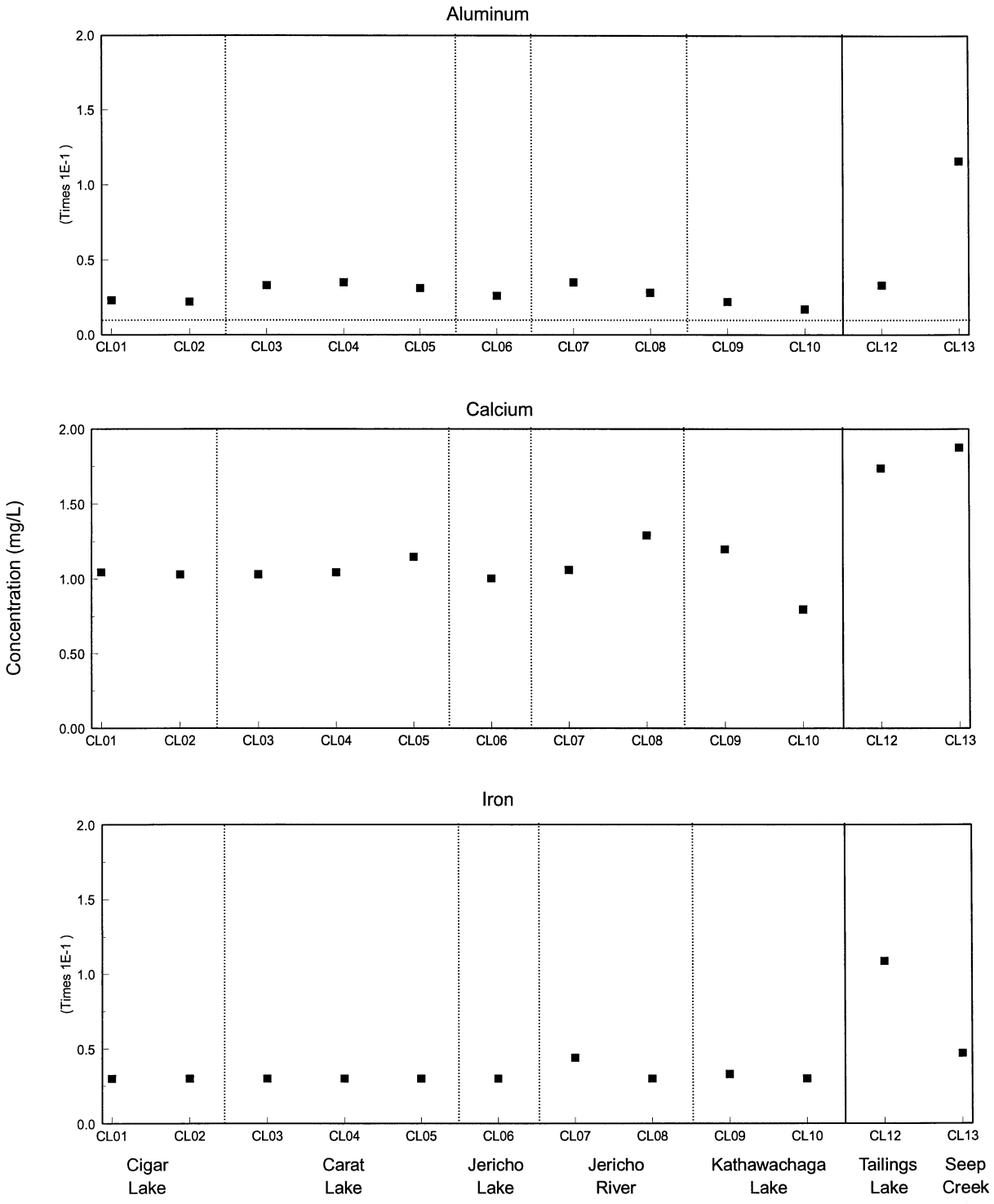


Figure 3.2.3 Trends in average concentrations of total metal constituents in water (seasons and depth zones) combined from sampled waterbodies, Jericho study area 1995 (dashed line separates distinct waterbodies; solid line separates watersheds; horizontal line in aluminium graph depicts average concentration in blank).

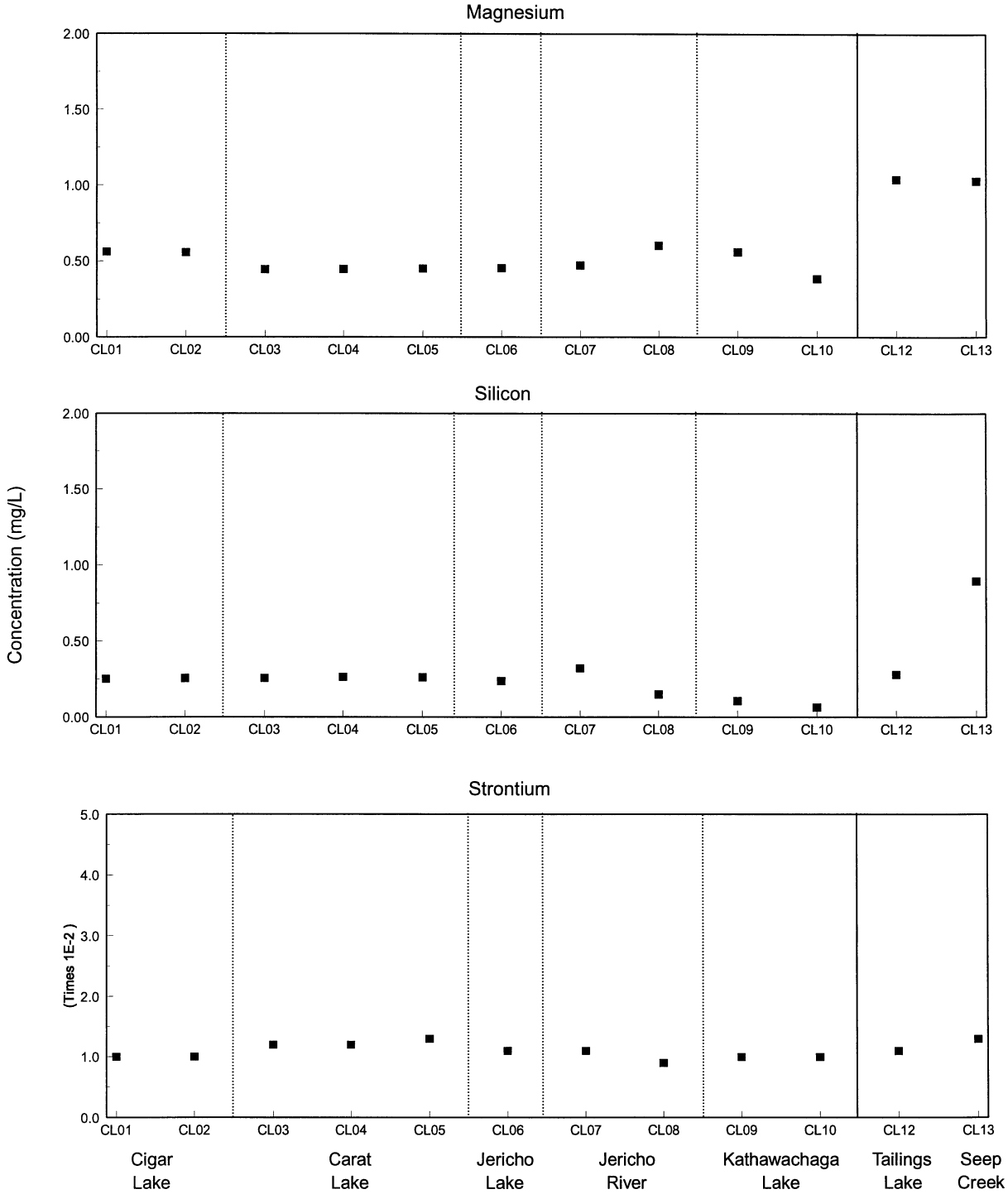


Figure 3.2.3 Concluded.

3.2.2.3 Total Dissolved Solids

Total dissolved solids (TDS) refers to the concentration of substances dissolved in water. Dissolved material originates from the dissolution of stones and soil, leaching of organic material, biological production, and from anthropogenic sources. TDS can be estimated from the sum of analyzed constituents (calculated), or by evaporating filtrate to dryness and weighing (a filterable residue). Filterable residue will generally be 10 to 25% greater than the calculated TDS value because not all individual constituents are analyzed.

During the 1995 surveys, TDS (filterable residue), tended to have greater concentrations in Tailings Lake and Seep Creek than in the other waterbodies sampled in the Jericho study area. Concentrations of TDS ranged from an average of 7.67 mg/L in Kathawachaga Lake (Site Cl10) to 16.00 mg/L in both Tailings Lake and Seep Creek. Similar to alkalinity, patterns of greater TDS concentrations in Tailings Lake and Seep Creek were likely due to these sites being isolated from the other waterbodies and not receiving great amounts of water inflow during the open water season. Estimated TDS (calculated) concentrations in waterbodies approximately 75 km to the southwest of Carat Lake during 1992 and 1993 ranged from 2 to 8 mg/L and were similar to concentrations reported during this study when methodological considerations (i.e., calculated versus filterable residue) are taken into account (R.L. & L. 1993). Total dissolved solids (filterable residue) in lakes found about 25 km to the southeast of Carat Lake ranged from 5 to 335 mg/L (Reid Crowther & Partners 1985), which were greater than concentrations found in the Jericho study area. Reid Crowther & Partners attributed some of their high TDS concentrations to stirring of shallow water sites by caribou and high winds.

There is no CWQG for TDS for the protection of aquatic life (CCREM 1987). The CWQG for irrigation sets upper limits for TDS of between 500 and 3500 mg/L, while the guideline for drinking water is 500 mg/L. TDS concentrations in waterbodies from the Jericho study area were well below these limits.

3.2.2.4 Hardness

Water hardness is frequently used as an assessment of the quality of water used for human consumption (Wetzel 1983). The hardness of water is governed by the content of calcium and magnesium salts, bicarbonate and carbonate, and sulphates, chlorides, and other anions. Geochemical weathering, runoff from soils, atmospheric deposition, and anthropogenic discharges are all sources of the ions and anions in water (CCREM 1987). Calcium, magnesium, and carbonate/bicarbonate, however, are reactive and their concentrations can be affected by temperature, pH, and biological processes.

Similar to alkalinity and TDS, Tailings Lake and Seep Creek had greater hardness concentrations (measured as calcium carbonate) than the other waterbodies sampled in the Jericho study area. Hardness ranged from an average of 3.43 mg/L at Site CL10 of Kathawachaga Lake to 8.68 mg/L in Seep Creek. As with alkalinity and TDS, the higher hardness concentrations in Tailings Lake and Seep Creek was likely due to these sites being isolated from the other waterbodies and not receiving great amounts of water inflow during the open water season. With the exceptions of Tailings Lake and Seep Creek, the hardness of water in the Jericho study area

was similar to the lakes monitored by R.L. & L. (1993) found approximately 75 km to the southwest in 1992 and 1993.

There are no CWQG criteria for hardness and few guidelines have been established for the concentrations of major ions that contribute toward hardness (CCREM 1987). For sulphate, there is a CWQG of 500 mg/L for drinking water and for chloride, the CWQG suggest concentrations of 75 to 700 mg/L as limits for irrigation purposes. Both sulphate and chloride concentrations in waters monitored in the Jericho study area were well below these criteria (Appendices C5 to C7).

3.2.2.5 Nitrogen

Nitrogen is an important nutrient that can influence the growth of algae and macrophytes in fresh water. In aquatic systems, nitrogen occurs in a number of inorganic forms, such as molecular nitrogen, nitrite, nitrate, ammonia (NH_3 and NH_4^+), and in organic forms such as amino acids, amines, and proteins. These different forms are linked together in the nitrogen cycle through the processes of ammonification, nitrification, and denitrification. It is the inorganic forms of nitrogen, specifically nitrate and ammonia that are used by aquatic plants. Nitrate (NO_3^-) is a stable ion, and thus may be abundant in fresh water. Nitrite (NO_2^-) is an intermediate ion that is rare in natural surface waters because it is readily oxidized to nitrate.

Ammonia is produced by heterotrophic bacteria as the result of decomposition of nitrogenous organic compounds (Wetzel 1983). Free ammonia (NH_3) and the ammonium ion (NH_4^+) exist in equilibrium in aquatic systems. The relative proportion of each is determined by pH and temperature; NH_3 increases with temperature, and NH_4^+ predominates when pH is less than 9 (Stumm and Morgan 1981). Free ammonia, which is toxic to aquatic organisms, is rare in most surface waters. The analytical method usually employed is designed to detect both ammonia and ammonium, reporting the total as NH_3-N.

Different nitrogen fractions can be analyzed in water samples. Total Kjeldahl nitrogen (TKN) is a measure of organic nitrogen plus NH_3-N. In most aquatic systems, most of nitrogen in TKN form is organic. Together with ($NO_2^- + NO_3^-$)-N, TKN comprises total nitrogen (TN). In turn, total nitrogen can be divided into particulate (PN) and dissolved (DN) fractions.

Nitrite and Nitrate

With the exceptions of the three sites in Carat Lake (CL03, CL04, and CL05) during spring, the two Jericho River sites (CL07 and CL08) during each of three seasons, Kathawachaga Lake at Site CL10 during all three seasons, and Seep Creek during summer and fall, concentrations of nitrate and nitrite were below or near methodological detection limits (Appendices C5 to C7). The large number of nondetectable results reflect the oligotrophic nature of the waterbodies in the Jericho study area.

During 1995, Site CL10 of Kathawachaga Lake had the greatest average concentration of nitrite+nitrate (0.027 mg/L), while the lowest average concentration of 0.006 mg/L was found at Site CL02 of Cigar Lake and Site CL06 of Jericho Lake. Site CL10 of Kathawachaga Lake is found near the outflow to the Burnside River and was likely influenced by this system. The other sampling site in Kathawachaga Lake (Site CL09) was near the inflow from the Jericho River and had an average nitrite+nitrate concentration of 0.007 mg/L. Seep Creek had an average nitrite+nitrate concentration of 0.024 mg/L and its counterpart, Tailings Lake, only had an average concentration of 0.006 mg/L. In general, nitrite+nitrate concentrations in the surface waters of the Jericho study area were indicative of oligotrophic waterbodies (Wetzel 1983). These data were comparable to those found by R.L. & L. (1993) in lakes located about 75 km southwest of Carat Lake, as well as data of Reid Crowther & Partners (1985) for the waterbodies found about 25 km southeast of Carat Lake.

The CWQG for the protection of freshwater life recommends that nitrate concentrations not reach levels that would result in prolific macrophyte growth (CCREM 1987). Due to short growing seasons, and generally cold waters, macrophytes are not usually abundant in subarctic waterbodies in the Jericho study area. All of the nitrite concentrations in the Jericho study area were below the CWQG of 0.06 mg/L for the protection of freshwater life.

Ammonia

Sites CL01 and CL02 of Cigar Lake, CL08 of the Jericho River, and Site CL10 of Kathawachaga Lake all exhibited low average concentrations of NH_3-N (approximately 0.007 mg/L). The highest average concentration of NH_3-N was in Tailings Lake (0.018 mg/L). Ammonium concentrations in subarctic lakes investigated by R.L. & L. Environmental Services Ltd. (R.L. & L. 1993) were all below methodological detection limits (0.06 mg/L), while those of Reid Crowther & Partners (1985) ranged from less than 0.010 (methodological detection limit) to 0.042 mg/L in their undisturbed waterbodies.

The CWQG for ammonia, which pertains to freshwater aquatic life, are dependent on both pH and temperature (CCREM 1987). At a temperature of 10°C and a pH of 6.5, the guideline for total ammonia is 2.2 mg/L. All samples collected in the Jericho study area complied with this guideline.

3.2.2.6 Total Phosphorus

Phosphorus is a fundamental cellular constituent and is the least abundant of the major nutrients in most freshwater ecosystems. As such, phosphorus is usually the nutrient that controls aquatic productivity (Wetzel 1983). Elevated phosphorus concentrations can result in increased biomass of algae, aquatic macrophytes, and associated biota.

Most of the phosphorus in aquatic systems occurs as organic phosphorus. The most common inorganic form of phosphorus in fresh water is orthophosphate (PO_4^{3-}). Phosphorus can be in either dissolved or particulate

form. Since phosphorus is reactive, it readily adsorbs to inorganic complexes and particulate organic matter; therefore, total phosphorus (TP) concentrations are commonly analyzed.

Average concentrations of TP in the Jericho study area ranged from 0.003 mg/L at Site CL08 of the Jericho River, Site CL10 of Kathawachaga Lake, and Site CL13 of Seep Creek, to 0.005 mg/L at Site CL02 of Cigar Lake and Site CL09 of Kathawachaga Lake. The TP concentrations of the waterbodies sampled in the Jericho study area fall below or within the range that Wetzel (1983) defines as oligotrophic (0.003 to 0.018 mg/L). The TP concentrations of four nearby (about 75 km from Carat Lake) lakes examined by R.L. & L. (1993) were more variable and ranged from less than 0.005 mg/L, the methodological detection limit, to 0.109 mg/L. However, R.L. & L. Environmental Services Ltd. accounted for the high TP concentrations as being a result of contamination from an unknown source. Moore (1978) analyzed TP in the same lakes, but found lower TP concentrations. These levels were comparable to concentrations recorded during the present study. Overall, TP concentrations in the Jericho study area were low.

To date, no CWQG criteria for TP have been established (CCREM 1987). The Alberta Water Quality Guideline for TP, as elemental phosphorus, is 0.05 mg/L (AEP 1993). This guideline was met in all samples collected from the Jericho study area during 1995.

3.2.2.7 Total Organic Carbon

Carbon is an abundant element. In lakes and rivers, organic carbon makes up about 10% of the total carbon (CCREM 1987) and is present in both dissolved and particulate forms. Autochthonous (internal) sources of organic carbon in freshwater are primarily plant photosynthesis and bacterial fixation. Natural allochthonous (external) sources of organic carbon include inputs of terrestrial vegetation and erosion of organic matter from soils.

Total organic carbon (TOC) concentrations in the 12 sites of the Jericho study area ranged from an average of 1.90 mg/L at Site CL10 of Kathawachaga Lake to an average of 5.25 mg/L in Tailings Lake. The TOC concentrations observed in the Jericho study area surveys were similar to those recorded by R.L. & L. (1993) in nearby waterbodies (3.0 to 7.6 mg/L).

3.2.2.8 Chlorophyll a

Results of chlorophyll *a* analyses performed on water samples from the surface of each monitoring site are presented in Figure 3.2.2. Average concentrations ranged from 0.24 μg/L in Seep Creek to 0.78 μg/L in Tailings Lake. Higher concentrations of TDS, hardness, ammonia, in Tailings Lake would explain the greater algal biomass (i.e., chlorophyll *a*) compared to other waterbodies in the Jericho study area. Wetzel (1983) defines chlorophyll *a* concentrations that range between 0.3 and 4.5 μg/L as generally being indicative of oligotrophic lakes. All waterbodies sampled in the Jericho study area had chlorophyll *a* concentrations below or within Wetzel's range.

3.2.3 Total Metals

Metals in water can exist in a number of soluble forms, such as free metal ions or associated with colloids, and in particulate forms, such as in association with clays or organic matter. Concern about metals is due to their toxicity, potential for bioaccumulation, hazards to human health, and effects on the aesthetic quality of drinking water (CCREM 1987). The bioavailability, solubility, and chemical speciation of many metals is regulated by pH. Under basic (alkaline conditions), metals form hydroxides or carbonates that are relatively insoluble and usually precipitate. Under acidic conditions, the solubility of many metals in water increases. The waterbodies in the Jericho study area are relatively acidic (Section 3.2.2) and so a large portion of the metals will be soluble. In addition, the concentration of any given metal in water is usually correlated with pH.

Of the 34 metals analyzed in samples collected from the Jericho study area, aluminum, calcium, iron, magnesium, silicon, and strontium, in at least some samples, were at detectable concentrations (Appendices C8 to C10). These total, extractable metals are discussed below.

3.2.3.1 Aluminum

Natural weathering and acidification processes can liberate aluminum from soils and sediments. Anthropogenic sources of aluminum include atmospheric deposition from smelters and coal combustion, as well as effluents from industries using alum or aluminum in their processing. Aluminum becomes increasingly toxic to aquatic life as water acidity increases (CCREM 1987).

Average concentrations of aluminum within waterbodies of the Jericho study area ranged from 0.017 mg/L at Site CL10 of Kathawachaga Lake to 0.116 mg/L in Seep Creek (Figure 3.2.3). Except for Seep Creek, all aluminum concentrations were 0.040 mg/L or lower (Appendices C8 to C10). Seep Creek had aluminum concentrations that were at least twice that of any other sample location.

In five waterbodies found about 25 km southeast of Carat Lake, Reid Crowther & Partners (1985) found that total aluminum concentrations ranged from less than 0.005, the methodological detection limit, to 0.930 mg/L. R.L. & L. (1993) reported total aluminum concentrations that varied from less than 0.06 mg/L (methodological detection limit) to 0.110 mg/L in waterbodies located about 75 km to the southwest of Carat Lake. It is not known why variable aluminum concentrations were recorded during these two studies and during the present study. However, detectable concentrations were identified in field blanks from all three studies.

The mean concentration of aluminum in the field blanks of the present study was 0.012 $\pm$ 0.003 mg/L and accounted for about half of the reported concentrations in most of the waterbodies sampled in the Jericho study area (Figure 3.2.3). Detectable aluminum in field blank samples has not only been reported in other water quality studies on nearby subarctic lakes, but also, in other aquatic systems such as the Athabasca River in Alberta (Noton and Saffran 1995). It is not known why the field blanks had detectable concentrations of

aluminum during the present study, nor is an explanation provided by Reid Crowther & Partners (1985), R.L. & L. (1993), and Noton and Saffran (1995) in their respective investigations.

The CWQG for aluminum pertaining to the protection of freshwater aquatic life are pH dependent (CCREM 1987). At a pH of less than 6.5, 0.005 mg/L of aluminum is the maximum, while at a pH of greater than 6.5, the limit is 0.1 mg/L. Except for Site CL07 of the Jericho River, the latter guideline is more appropriate for the conditions found in the waterbodies of the Jericho study area (Section 3.2.2.1). For all sites except CL07, total aluminum concentrations were within acceptable limits. However, total aluminum concentrations at Site CL07 on Jericho River exceeded the specified limit.

3.2.3.2 Calcium

In the Jericho study area, average total calcium concentrations varied from 0.795 mg/L at Site CL10 of Kathawachaga Lake to 1.87 mg/L in Seep Creek (Figure 3.2.3). Tailings Lake also had a high average calcium concentration (1.74 mg/L) relative to other waterbodies in the Jericho study area; Tailings Lake is in a separate watershed. Concentrations of total calcium recorded during the present study were similar to concentrations of dissolved calcium described in four lakes located about 75 km to the southwest of Carat Lake (Moore 1978; R.L. & L. 1993); dissolved calcium concentrations in Ham, Izok, Iznogoudh, and Itchen lakes ranged from about 0.5 to 2.6 mg/L. Total calcium concentration in five undisturbed waterbodies (about 25 km southeast of Carat Lake) examined by Reid Crowther & Partners (1985) ranged from 0.850 to 4.38 mg/L.

Federal guidelines have not been established for calcium concentrations to protect freshwater aquatic life (CCREM 1987).

3.2.3.3 Iron

Except for Site CL07 in the Jericho River, Site CL09 of Kathawachaga Lake, Site CL12 of Tailings Lake, and Site CL13 of Seep Creek, the average concentration of total iron in sample sites of the Jericho study area were below methodological detection limits of 0.03 mg/L (Appendices C8 to C10). Tailings Lake had the greatest average iron concentration of 0.109 mg/L and Seep Creek had the second highest concentration of 0.047 mg/L (Figure 3.2.3). Site CL07 of the Jericho River and Site CL09 of Kathawachaga Lake had average iron concentrations of 0.044 mg/L and 0.033 mg/L, respectively. Moore (1978) did not have detectable (greater than 0.05 mg/L) concentrations of total iron in 1976, during his study of lakes approximately 75 km southwest of the Jericho study area. R.L. & L. (1993) investigated the same lakes as Moore during 1992 and 1993, and found that total iron concentrations ranged from below 0.02 mg/L (methodological detection limit) to about 0.07 mg/L. Similar observations were observed by Reid Crowther & Partners (1985) in their undisturbed waterbodies located about 25 km southeast of the Jericho study area.

The CWQG for iron is 0.3 mg/L (CCREM 1987). All water quality samples collected from the Jericho study area during 1995 complied with this guideline.

3.2.3.4 Magnesium

As with calcium, dissolved magnesium is a major constituent of the major ions that contribute towards the hardness of water (Section 3.2.2.4). Similar to calcium, dissolved magnesium concentrations accounted for at least 95% of the total concentrations (Appendices C8 to C13).

In the Jericho study area, average total, extractable magnesium concentrations varied from 0.064 mg/L at Site CL10 of Kathawachaga Lake to 1.04 mg/L in Tailings Lake (Figure 3.2.3). Seep Creek had an average magnesium concentration that was similar to Tailings Lake (1.03 mg/L). The concentrations of total magnesium in the present study were slightly lower than concentrations of dissolved magnesium described in four lakes located about 75 km to the southwest of Carat Lake (Moore 1978; R.L. & L. 1993); dissolved magnesium concentrations in Ham, Izok, Iznogoudh, and Itchen lakes ranged from about 0.5 to 2.6 mg/L. Total magnesium concentrations in undisturbed waterbodies found about 25 km southeast of Carat Lake ranged from 0.28 to 2.51 mg/L (Reid Crowther & Partners 1985). These concentrations were slightly greater than what was observed in the waterbodies of the Jericho study area.

3.4.3.5 Silicon

Silicon ranks next to oxygen in abundance and is a common constituent of igneous stones, quartz, and sand. The oxides of silicon, which in natural waters are primarily silicic acid (variations of H_2SiO_3), and the hydrated form of the oxide H_4SiO_4, is commonly referred to as silica (CCREM 1987). Silica occurs in most surface waters as a result of weathering of aluminosilicate minerals.

In the Jericho study area, average total, extractable silicon concentrations varied from 0.106 mg/L at Site CL10 of Kathawachaga Lake to 0.895 mg/L in Seep Creek (Figure 3.2.3). In general, dissolved silicon concentrations were only 0.001 or 0.002 mg/L lower than total concentrations (Appendices C8 to C13) suggesting that the majority of total silicon concentrations are in a reactive state (e.g., silica). The concentration of total silicon in the present study was similar to concentrations described in four lakes found about 75 km to the southwest of Carat Lake (R.L. & L. 1993); total silicon concentrations in Ham, Izok, Iznogoudh, and Itchen lakes ranged from about 0.10 to 0.93 mg/L. Moore (1978) reported reactive silica concentrations that ranged from 0.20 to 0.60 mg/L. All three investigations, therefore, appear to have comparable silicon or silica concentrations.

There are no federal guidelines with which to evaluate silicon concentrations (CCREM 1987).

3.2.3.6 Strontium

Strontium is generally a minor constituent of the overall metal concentrations in surface waters (APHA 1993). Although found at detectable concentrations in the surface waters of the Jericho study area, its concentrations were low.

The average total strontium concentrations varied from 0.010 mg/L at Site CL08 of the Jericho River to 0.013 mg/L at Site CL05 of Carat Lake and in Seep Creek (Figure 3.2.3). Concentrations of strontium in the undisturbed waterbodies (about 25 km southeast of Carat Lake) examined by Reid Crowther & Partners (1985) ranged from 0.004 to 0.023 mg/L, which was slightly greater than the range reported in the present study. Other than natural variability and possibly different analytical methods, it is not known why strontium concentrations varied between these independent studies.

The CWQG (drinking water, 10 Bq/L) for strontium refers to the radioactivity of ^{90}Sr, not to concentration, and thus cannot be evaluated (CCREM 1987).

3.2.4 Dissolved Metals

The same 34 metals analyzed for total, extractable concentrations also were analyzed for their dissolved concentrations (Appendices C10 to C13). Both total and dissolved concentrations were highly correlated, generally no more than 5% difference in relative concentration, and only six metals were detected in the water quality samples.

3.3 SEDIMENT QUALITY

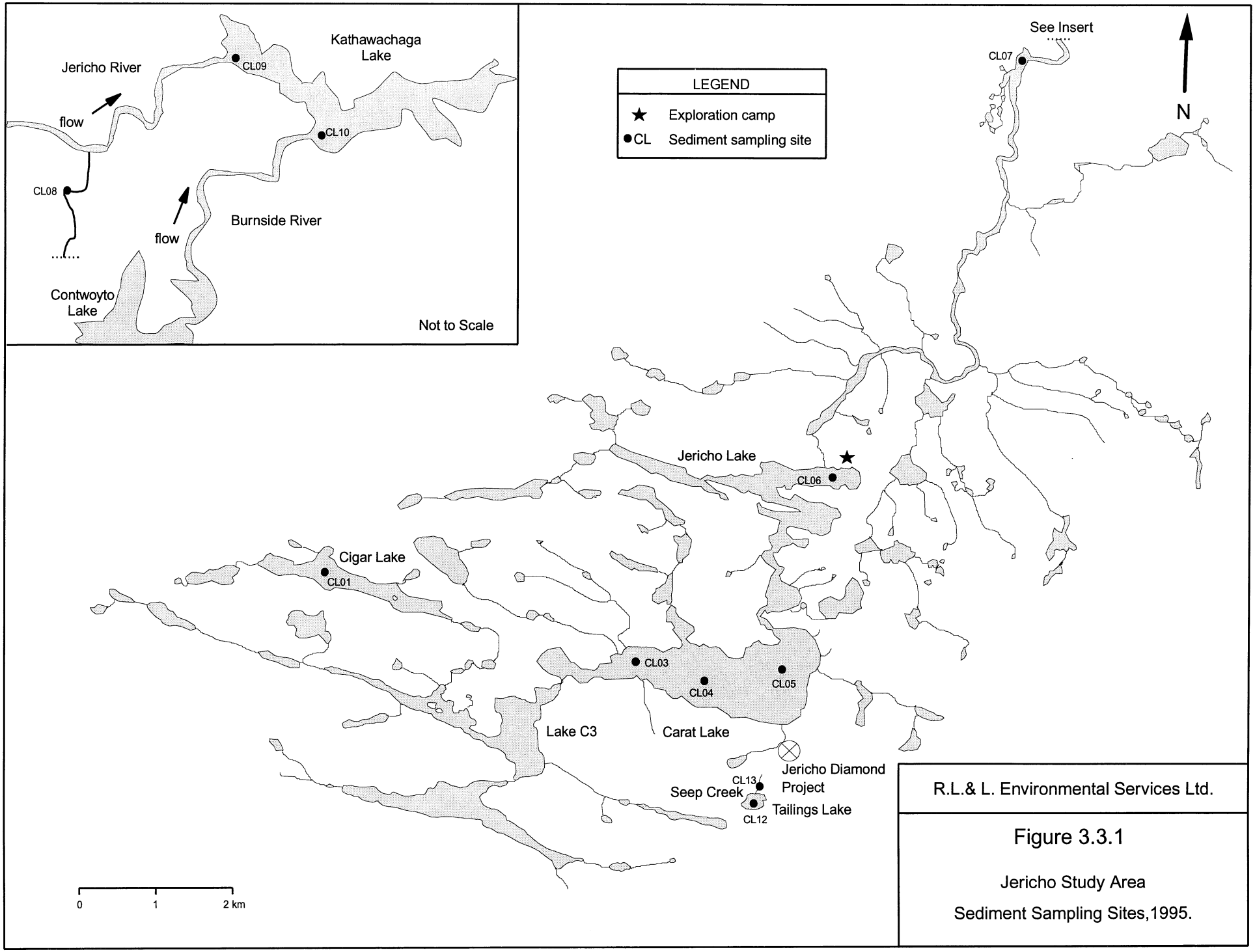
Canamera Geological Ltd. personnel implemented and conducted a sediment quality sampling program in the Jericho study area during 1995. Sediment samples were collected from 10 sites distributed throughout the Jericho study area during August 1995 (Figure 3.3.1 and Table 3.3.1). Selection of the sampling sites was determined using the same rational as for water sampling (see Section 3.2).

3.3.1 Quality Assessment

Results of sediment quality assessment are presented in Appendix D. These data indicated that analytical precision and accuracy of the laboratory analyses were at acceptable levels. Differences observed between the field duplicates, for most of the constituents that were analyzed, were caused by variability in the acid digestion technique. This is a characteristic inherent to analyzing metals in sediments (Richard Jornitz, CanTest Ltd., Vancouver, B.C., pers. comm.).

3.3.2 Metal Constituents

Among the 28 metal constituents analyzed, aluminum, iron, and magnesium concentrations were greater than the other metals (Table 3.3.2). Some metals (beryllium, cadmium, molybdenum, selenium, silver, and tin) had concentrations that were below methodological detection limits. Aluminum concentrations ranged from 6440 μg/g at Site CL07 of the Jericho River to 35 400 μg/g at Site CL12-B, a duplicate sample collected from Tailings Lake. In general, sediment samples from these two sites exhibited the greatest difference in metal concentrations. For example, iron and magnesium concentrations were lowest at Site CL07 (9880 and



R.L.& L. Environmental Services Ltd.

Figure 3.3.1

Jericho Study Area

Sediment Sampling Sites,1995.

3330 μg/g, respectively), while Site CL12-B of Tailings Lake had the greatest concentrations (53 300 and 18 600 μg/g, respectively).

Table 3.3.1 Locations of sediment sampling sites during summer, Jericho study area 1995.

Waterbody Sampled	Site	UTM Coordinates	Water Depth (m)
Cigar Lake	CL01	12W0472400N 7322878E	13
Carat Lake	CL03 (west basin)	12W0476236N 7320918E	9.4
	CL04 (center basin)	12W0477044N 7320792E	30
Jericho Lake	CL06	12W0478652N 7323676E	4.1
Jericho River	CL07 (upstream)	12W0481202N 7329967E	0.6
	CL08 (downstream)	12W0484019N 7334115E	0.8
Kathawachaga Lake	CL09 (near inlet of Jericho River)	12W0491905N 7341283E	1.5
	CL10 (near inlet of Burnside River)	12W0495796N 7337630E	3.6
Tailings Lake	CL12	12W0477863N 7318546E	4.3
Seep Creek	CL13	12W0477863N 7318727E	0.3

Beak (1977) collected sediment data from Izok and Itchen lakes located approximately 75 km southwest of Carat Lake. Reid Crowther & Partners (1985) also collected information on sediment chemistry from several waterbodies near the northwest end of Contwoyto Lake (about 25 km southeast of Carat Lake). In general, metal concentrations reported by Beak (1977) and Reid Crowther & Partners (1985) were more variable compared with those described in the present report. For example, Reid Crowther & Partners (1985) reported mean zinc concentrations between 22.4 and 421.3 μg/g. In comparison, zinc concentrations varied from 25 to 97 μg/g in the sites sampled in the Jericho study area.

R.L. & L. (1993) also sampled lakes near the study area of Beak (1977). R.L. & L. found that mean concentrations of aluminum, iron, and magnesium were greater than for most other metals. In contrast, mean cadmium, beryllium, molybdenum, and thallium concentrations were lower than many other metals analyzed. These trends were similar to findings made in the Jericho study area.

Table 3.3.2 Summary of sediment quality data collected from selected waterbodies in the Jericho study area 1995.

Variable and Detection Limits[a]		Cigar Lake	Carat Lake		Jericho Lake	Jericho River		Kathawachaga Lake		Tailings Lake[b]		Seep Creek
		Site CL01	Site CL03	Site CL04	Site CL06	Site CL07	Site CL08	Site CL09	Site CL10	Site CL12-A	Site CL12-B	Site CL13
Aluminum	10	15 800	11 800	17 100	6900	6440	10 500	10 000	8990	12 300	35 400	29 500
Antimony	10	nd[c]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	0.05	3.70	3.10	6.30	2.20	1.80	1.20	0.95	1.70	100	4.80	9.30
Barium	0.1	92.0	52.0	84.0	36.0	24.0	47.0	50.0	70.0	57.0	200.0	187.0
Beryllium	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	0.5	17.0	12.0	18.0	7.1	7.8	11.0	13.0	7.6	15.0	33.0	30.0
Cadmium	0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calcium	1	2780	3710	4270	1860	1750	3050	2740	1520	2460	5880	4650
Chromium	2	35	29	40	16	12	24	24	20	27	94	38
Cobalt	1	9	7	11	4	3	6	7	5	10	22	31
Copper	1	29	216	39	16	6	12	10	27	78	81	90
Iron	2	24 400	19 100	25 200	10 100	9880	15 900	15 100	10 100	24 400	53 300	41 400
Lead	1	3	2	3	2	1	2	1	1	3	4	56
Magnesium	0.1	7510.0	6370.0	8420.0	3430.0	3330.0	5400.0	4860.0	3600.0	5020.0	18 600.0	7520.0
Manganese	0.2	382.0	296.0	284.0	112.0	97.0	172.0	183.0	171.0	235.0	565.0	4260.0
Mercury	0.001	0.008	0.004	0.015	0.004	0.004	0.006	0.008	0.017	0.030	0.015	0.140
Molybdenum	4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2	25	19	29	14	10	17	16	19	27	56	36
Phosphorus (elemental)	20	1630	1990	2310	1440	1090	1300	1750	870	1880	2860	3050
Selenium	0.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	5	299	319	403	118	127	227	226	133	2070	706	272
Strontium	0.1	17.0	21.0	25.0	9.1	11.0	15.0	15.0	9.0	12.0	33.0	27.0
Tin	5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	0.3	1030.0	876.0	737.0	389.0	441.0	528.0	719.0	487.0	546.0	2040.0	961.0
Uranium	0.05	3.80	2.30	5.70	2.10	1.20	2.00	1.50	3.60	28.00	22.00	43.00
Vanadium	0.5	40.0	34.0	47.0	20.0	16.0	29.0	26.0	21.0	37.0	93.0	62.0
Zinc	1	49	36	60	29	25	51	43	49	57	97	71
Moisture (%)	0.01	27.40	27.90	42.80	34.80	27.10	24.20	25.30	71.90	61.40	59.20	71.20
Total Organic Carbon (%)	0.019	0.320	0.130	0.380	0.170	0.540	0.470	0.540	1.850	2.840	1.370	3.710
Total Kjeldahl Nitrogen (%)	0.0059	0.0600	0.0300	0.0700	0.0400	0.0600	0.0700	0.0600	0.4200	0.3700	0.4100	0.9000
Phosphorus (total)	40	1770	2070	2680	1730	1230	1560	1710	1880	2840	1950	2730

[a]Unless otherwise indicated, all concentrations are expressed as μg/g on a dry weight basis.
[b]Duplicate samples.
[c]nd=Not detected.

3.4 PLANKTON

Plankton refers to aquatic plants and animals that live in the water column of lakes. Plankton is considered to be the lower trophic level in aquatic ecosystems and are, either directly or indirectly, the food of fish, aquatic birds, and mammals.

To provide baseline information on the plankton community in the Jericho study area, a sampling program was undertaken during 1995. Plankton samples were collected in summer and fall at four sites depicted in Figure 3.4.1 (two sites on Carat Lake, and one site on each of Jericho Lake and Lake C3). Site specific sampling data are summarized in Appendix E1.

3.4.1 Phytoplankton

Raw data for phytoplankton (microscopic free-floating algae) analyses are summarized in Appendix E2. Summary results of phytoplankton density (No./mL) and biovolume (microns cubed per meter cubed or $\mu m^3/m^3$) are presented in this section. Both density and biovolume variables have been summarized because density alone does not provide an accurate assessment of a taxa's importance to the system. Taxa that are extremely numerous may have a low biovolume, due principally to the small size of individual organisms. Conversely, those taxa that have large biovolumes (due to large individual organism size), may not be numerically abundant. These large bodied groups can contribute a significant amount to lake productivity. As such, their numbers can influence the abundance and biomass of herbivores that feed on them (generally zooplankton) and they can modify nutrient availability for competing plants or algae.

3.4.1.1 Biovolume

In total, 120 species of algae were identified from the samples collected in the Jericho study area. Table 3.4.1 summarizes biovolumes of major taxonomic groups encountered. During summer, golden brown algae (Chrysophyta) and green algae (Chlorophyta) tended to have the greatest biovolumes. At Site PL1-1 (Carat Lake) and Site PL2 (Jericho Lake) golden-brown algae accounted for 51 and 50% of the total biovolume, respectively. At these sites, green algae contributed only 5 and 3% of the total phytoplankton biovolume, respectively. In contrast, green algae contributed 30 and 26% of the total algal biovolumes at Site PL1-2 of Carat Lake and at Site PL3 on Lake C3.

During fall, golden brown algae were dominant at all sites; this group accounted for 39 to 73% of the algal biovolume among samples. Diatoms (Bacillariophyta) and green algae were either second or third in biovolume during this period.

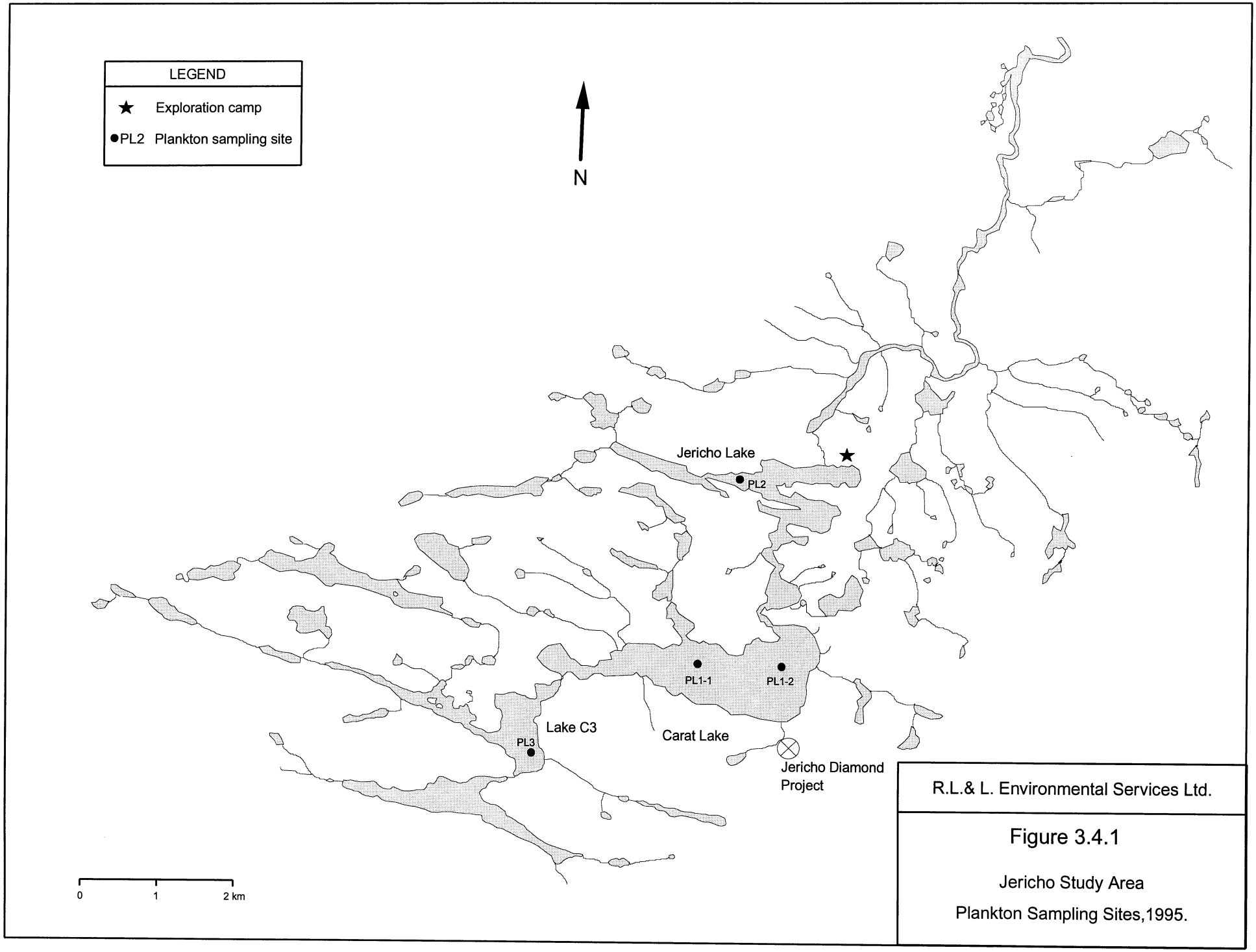


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Figure 3.4.1

Jericho Study Area

Plankton Sampling Sites,1995.

Table 3.4.1 Phytoplankton biovolume in sampled lakes during summer and fall, Jericho study area 1995.

Summer								
Taxonomic Group	Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Biovolume ($\mu m^3/m^3$)	Percent of Total	Biovolume ($\mu m^3/m^3$)	Percent of Total	Biovolume ($\mu m^3/m^3$)	Percent of Total	Biovolume ($\mu m^3/m^3$)	Percent of Total
Bacillariophyta (diatoms)	88 053	19	72 055	16	85 189	15	54 156	9
Cryptophyta (cryptomonads)	44 974	10	39 518	9	52 451	9	17 401	3
Chrysophyta (golden-brown algae)	230 669	51	184 530	42	286 257	50	289 042	48
Pyrrophyta (dinoflagellates)	66 539	15	7840	2	126 374	22	72 341	12
Chlorophyta (green algae)	24 672	5	132 267	30	18 028	3	159 416	26
Cyanophyta (cyanobacteria)	1162	<1	2385	<1	0	0	13 901	2
Total Summer Biovolume	**456 069**	--	**438 595**	--	**568 299**	--	**606 257**	--
Fall								
Taxonomic Group	Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Biovolume ($\mu m^3/m^3$)	Percent of Total	Biovolume ($\mu m^3/m^3$)	Percent of Total	Biovolume ($\mu m^3/m^3$)	Percent of Total	Biovolume ($\mu m^3/m^3$)	Percent of Total
Bacillariophyta (diatoms)	64 990	19	97 583	25	43 259	8	37 445	10
Cryptophyta (cryptomonads)	37 222	11	57 024	14	47 100	9	25 277	7
Chrysophyta (golden-brown algae)	146 691	43	152 498	39	376 294	73	237 075	65
Pyrrophyta (dinoflagellates)	12 136	4	15 099	4	2062	<1	15 832	4
Chlorophyta (green algae)	69 889	20	17 554	4	42 985	8	37 074	10
Cyanophyta (cyanobacteria)	10 195	3	53 902	14	1101	<1	10 626	3
Total Fall Biovolume	**341 123**	--	**393 660**	-	**512 801**	--	**363 329**	--

3.4.1.2 Density

Densities of the four most numerous species within each of the six major taxonomic groups are depicted in Figures 3.4.2 to 3.4.5. Two taxonomic groups, Chrysophyta (golden-brown algae) and Cyanophyta (cyanobacteria), contributed the most toward total phytoplankton biovolume in each season (greater than 50% of sample), as such, the discussion will be restricted to species within these two groups.

During both summer and fall in all three lakes, at least 58% of golden-brown algae sample densities consisted of *Chrysochromulina parva* and *Chrysosphaerella rodhei*. The cyanobacteria were dominated (greater than 48% of sample) by the species *Aphanocapsa elachista, Aphanothece clathrata v. brevis, Gomphosphaeria naegelianum*, and *Merismopedia tenuissima*.

3.4.1.3 Summary

The phytoplankton assemblage in lakes within the study area are indicative of typical of oligotrophic waterbodies (Wetzel 1983), with Chrysophyta (golden-brown algae) and Chlorophyta (green algae) having the greatest biovolumes. Chrysophyta (golden-brown algae) and Cyanophyta (cyanobacteria) algae had the greatest densities. These results are similar to findings made for phytoplankton communities in other subarctic lakes.

R.L. & L. Environmental Services Ltd. (1993) reported that the most common phytoplankton species identified in lakes found approximately 75 km southwest of the Jericho study area were the cyanobacteria *Aphanothece clathrata* and *A. elachista*. These are the same species identified as the most abundant cyanobacteria in the present study. These two species, and *Merismopedia tenuissima* existed as colonies composed of many small cells. Because they were numerically abundant, they also contributed significant amounts to phytoplankton biovolume (see Appendix E2). Similar results were obtained for the golden-brown algae *Chrysochromulina parva* and *Chrysosphaerella rodhei*. R.L. & L. Environmental Services Ltd. (1993) identified these as the dominant golden-brown algae species in their study lakes. Overall, the phytoplankton community was dominated (in terms of both density and biovolume), by the Chrysophyta (golden-brown algae) and the Cyanophyta (cyanobacteria).

Beak (1977) sampled phytoplankton from the same lakes as R.L. & L. Environmental Services Ltd. (1993) in late June 1976 and found the phytoplankton communities at that time were also dominated by Chrysophyta and Chryptophyta. Beak (1977) noted that the species composition and biomass ($\mu g/m^3$) of phytoplankton were typical of ultra-oligotrophic lakes (very low nutrient levels and low biological productivity), and were similar to other lakes at or near the treeline in nonpermafrost areas of Canada.

Moore (1978) reported the results of phytoplankton analyses, conducted in 1976, from the same lakes as R.L. & L. Environmental Services Ltd. (1993) and Beak (1977). He noted a similar dominance of Chrysophyta (primarily *Dinobryon cylindricum* and *Dinobryon bavaricum*) in each of his study lakes. Moore also observed that the phytoplankton assemblage was characteristic of extremely oligotrophic conditions.

3.4.2 Zooplankton

Zooplankton communities are composed of microscopic animals that live in the water column. Summary results for the most abundant taxa in three taxonomic groups (Copepoda, Cladocera, and Rotifera) during each season are presented in Figures 3.4.6 to 3.4.9. Information describing seasonal difference in zooplankton biomass is summarized in Table 3.4.2. Raw data are presented in Appendix E3.

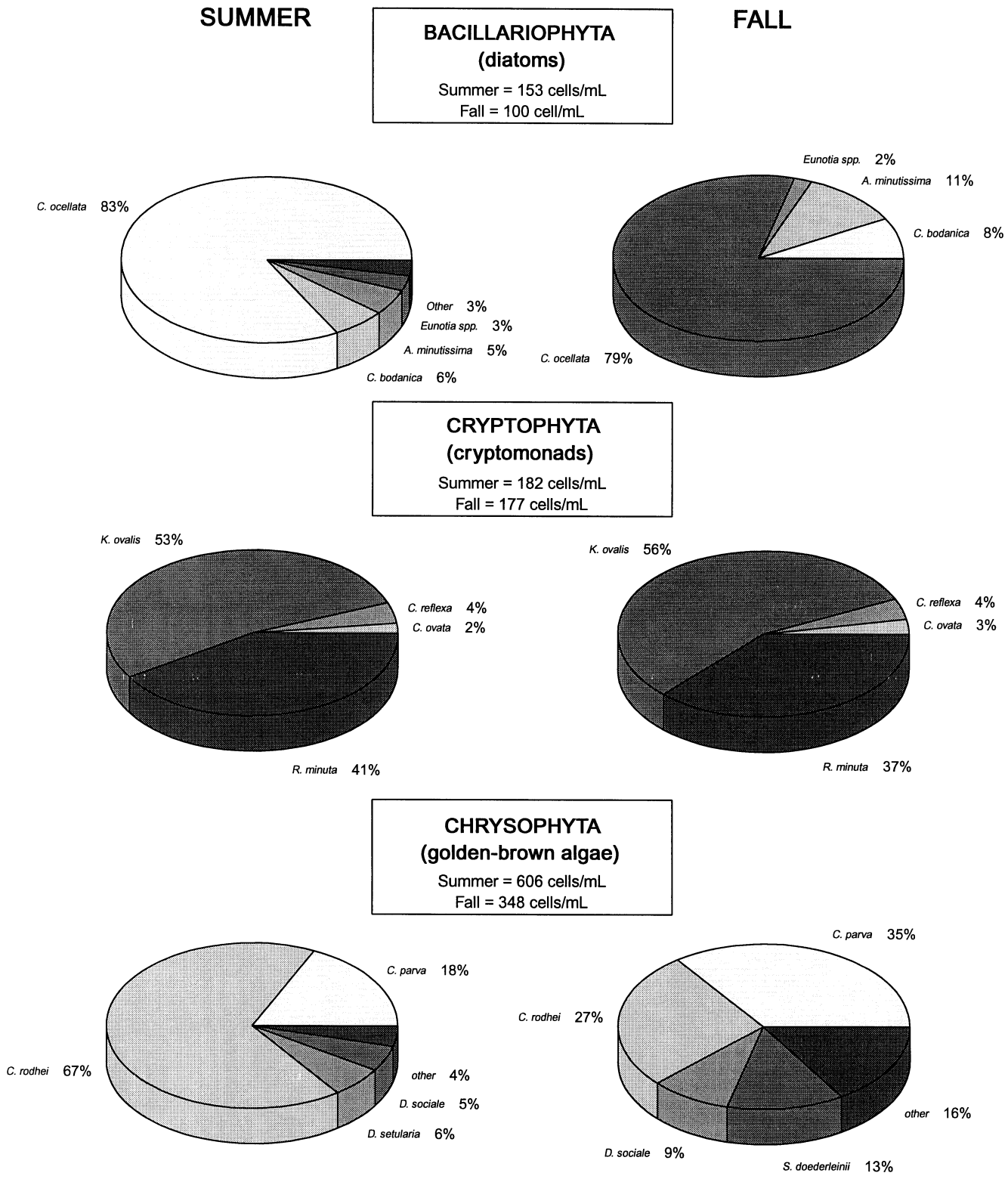


Figure 3.4.2 Densities of the most abundant phytoplankton species within the six major taxonomic groups identified at Site PL1-1 in Carat Lake, Jericho study area 1995.

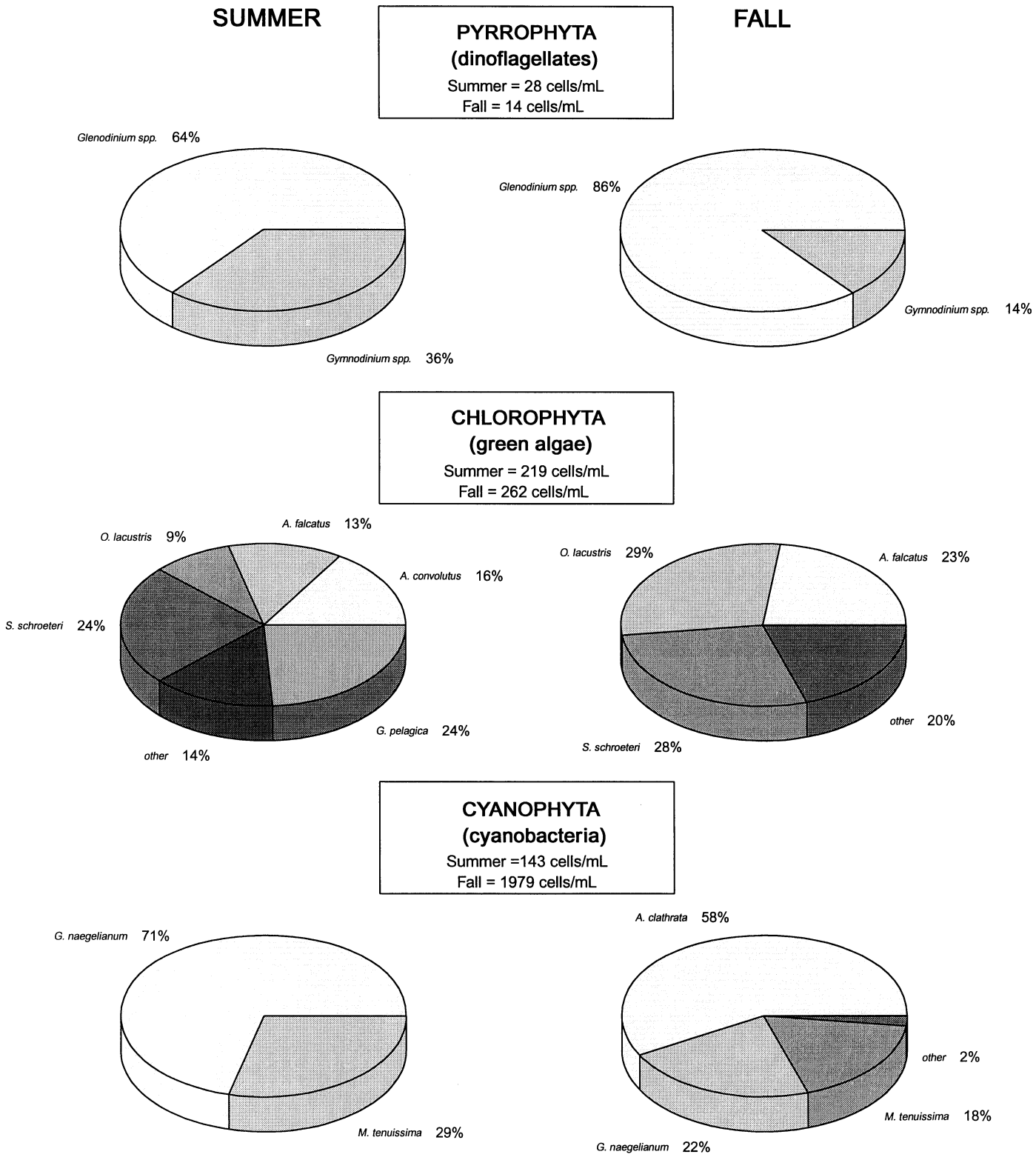


Figure 3.4.2 Continued.

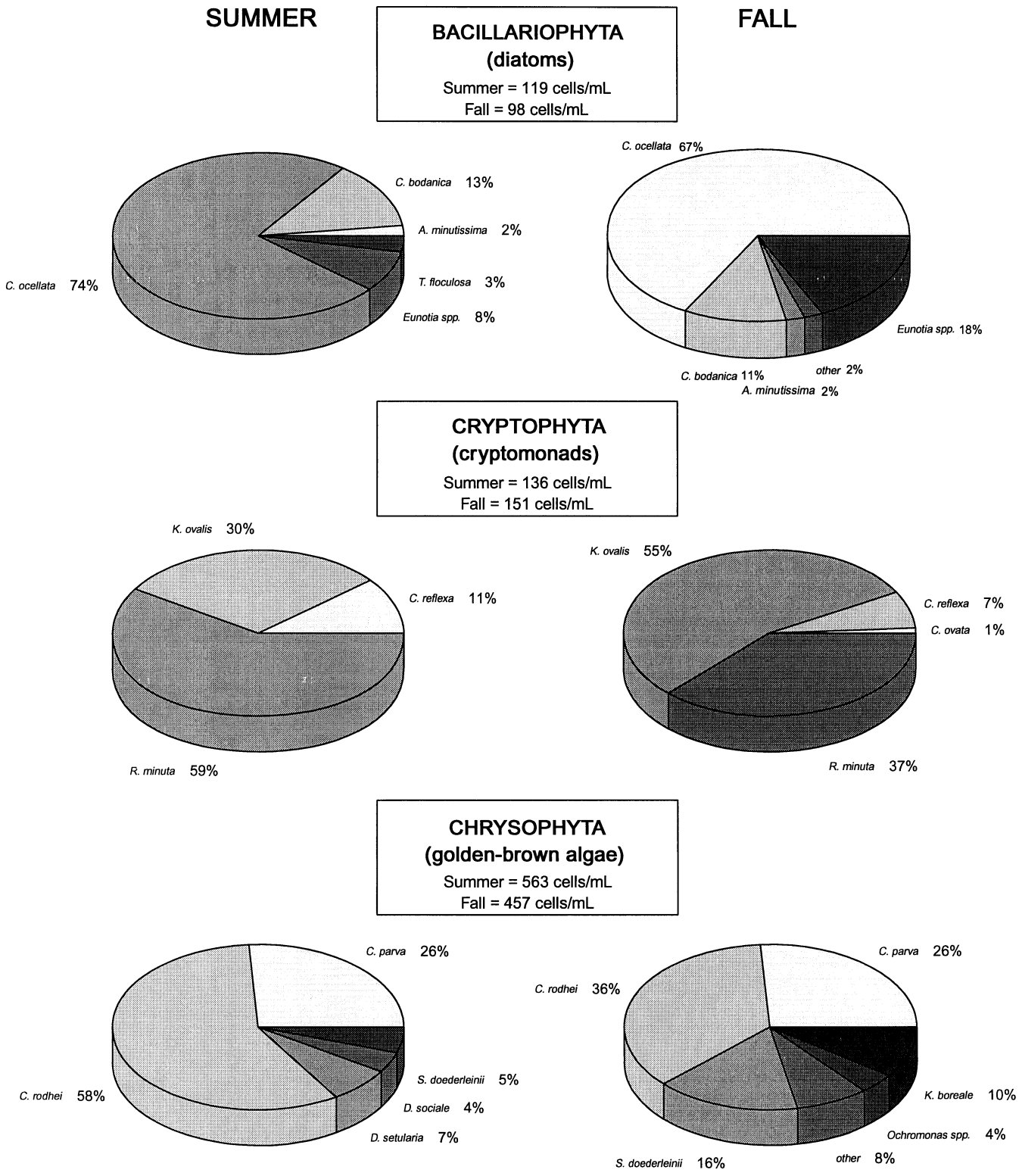


Figure 3.4.3 Densities of the most abundant phytoplankton species within the six major taxonomic groups identified at Site PL1-2 in Carat Lake, Jericho study area 1995.

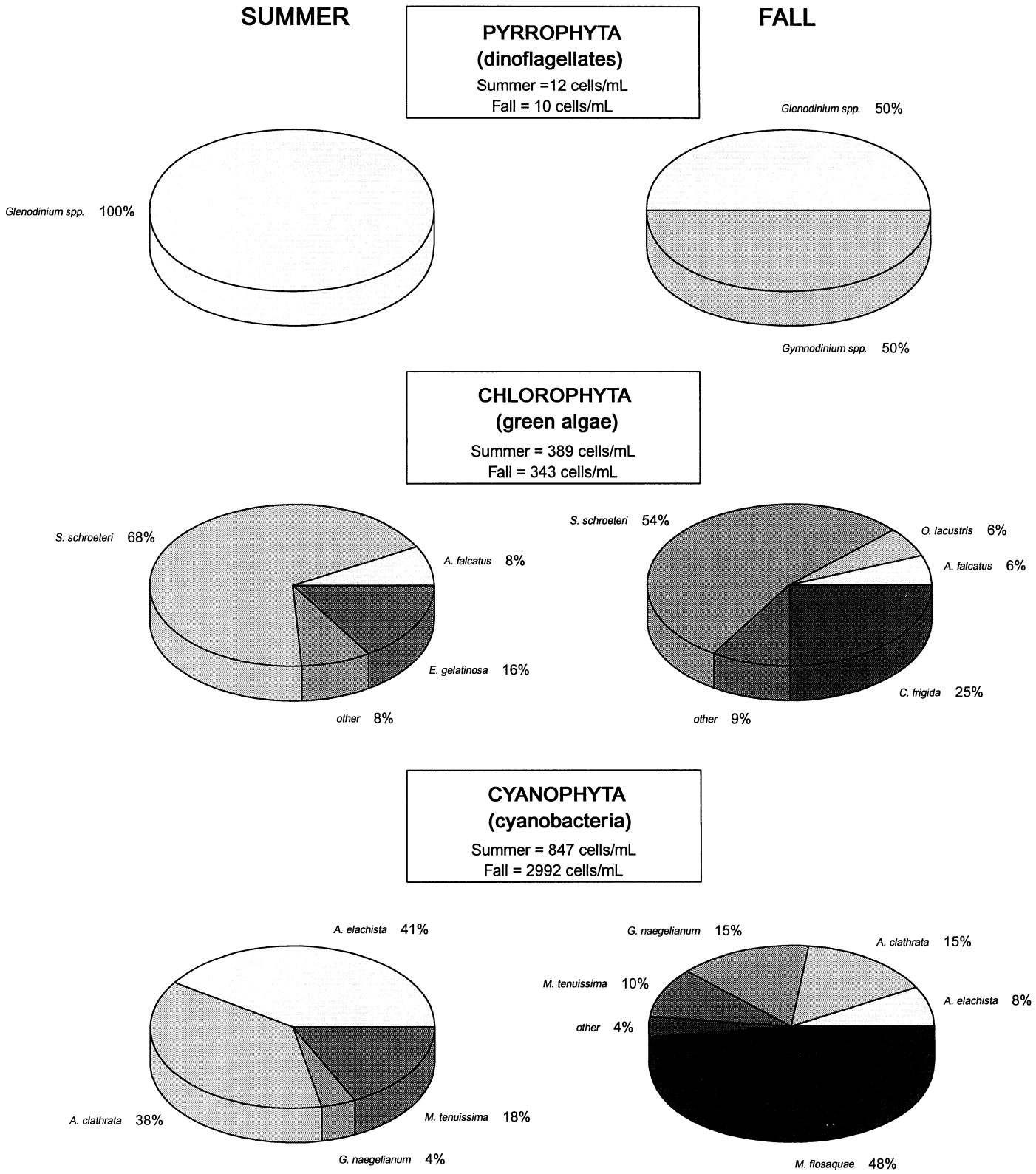


Figure 3.4.3 Continued.

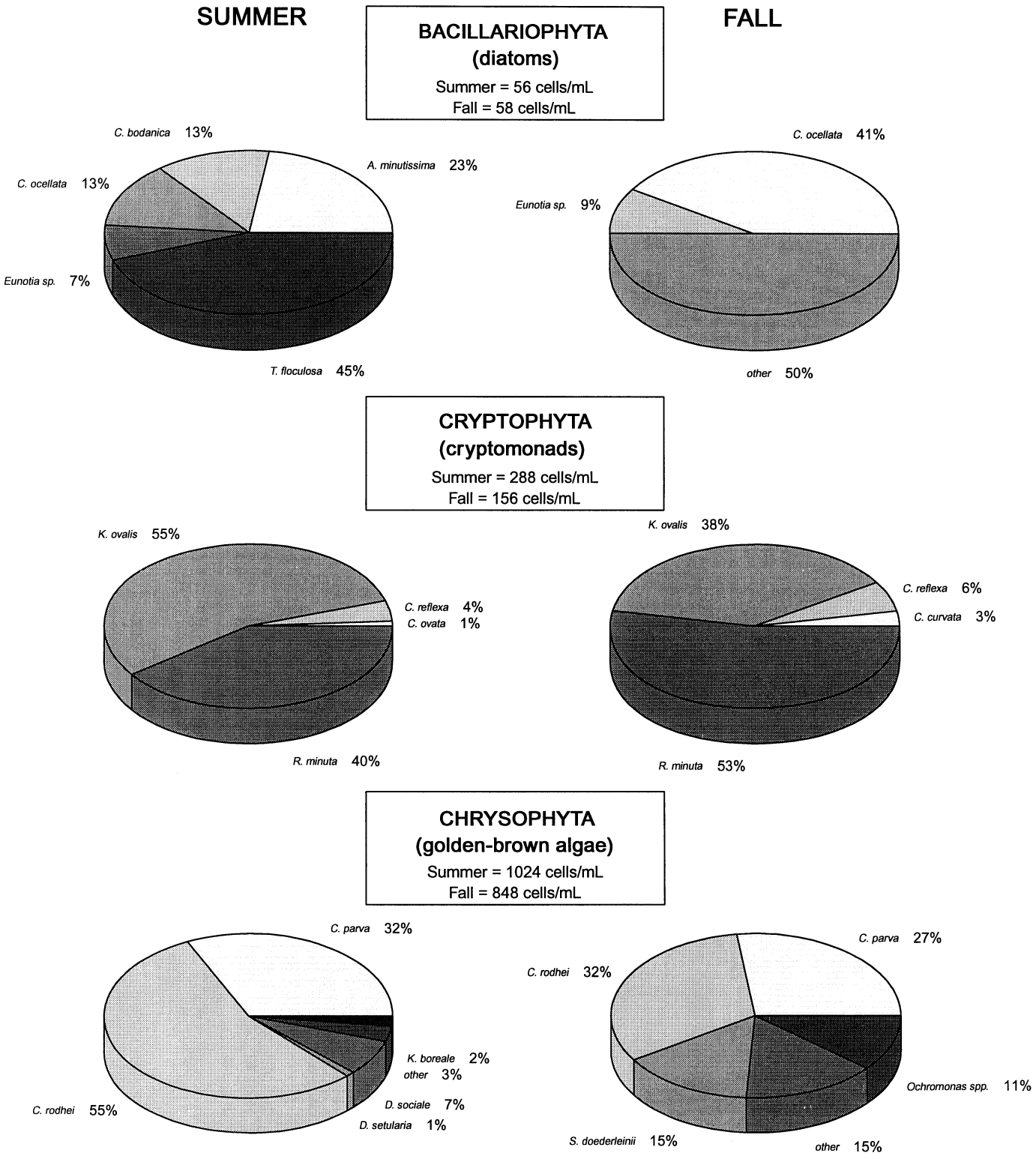


Figure 3.4.4 Densities of the most abundant phytoplankton species within the six major taxonomic groups identified at Site PL2 in Jericho Lake, Jericho study area 1995.

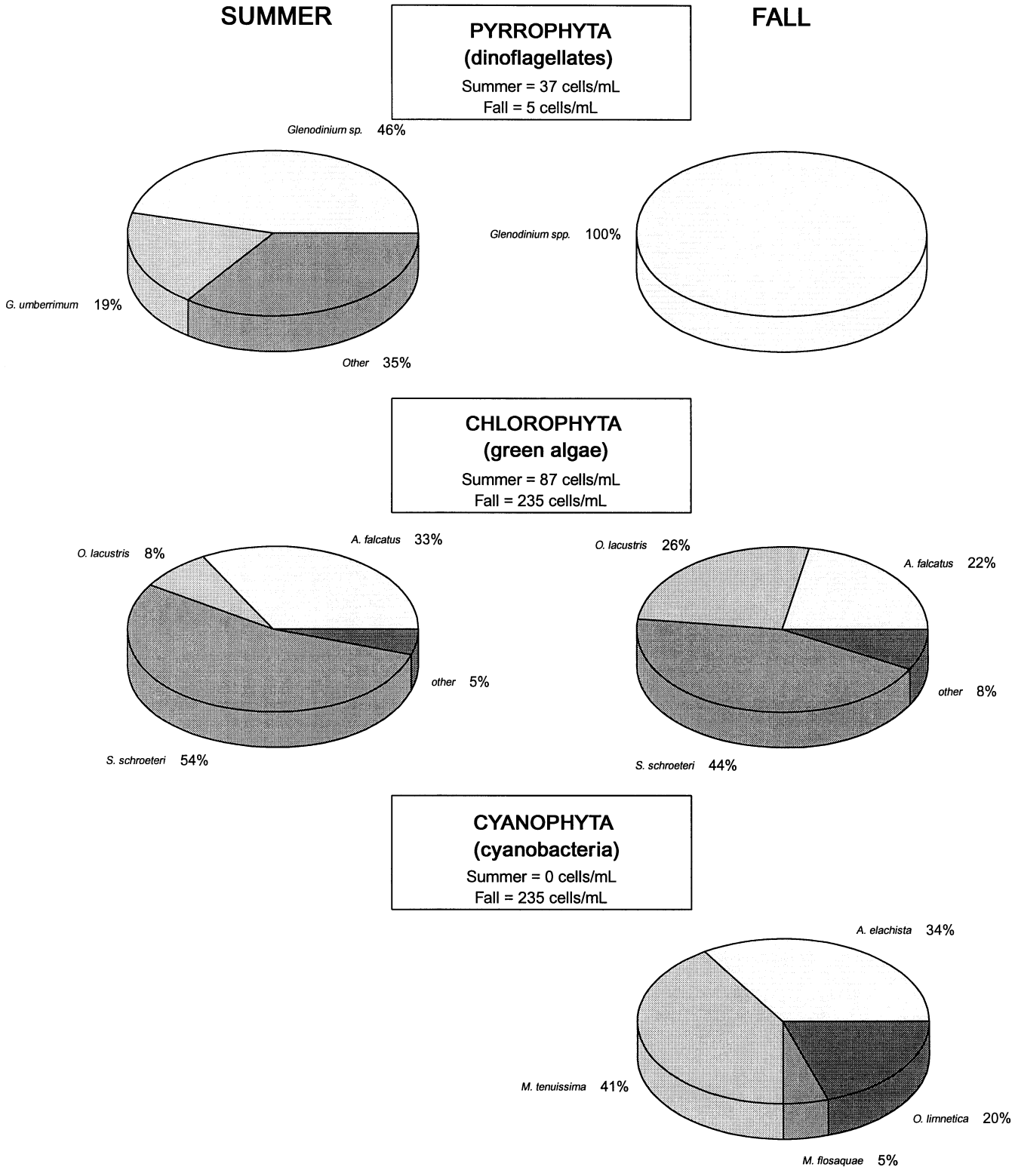


Figure 3.4.4 Continued.

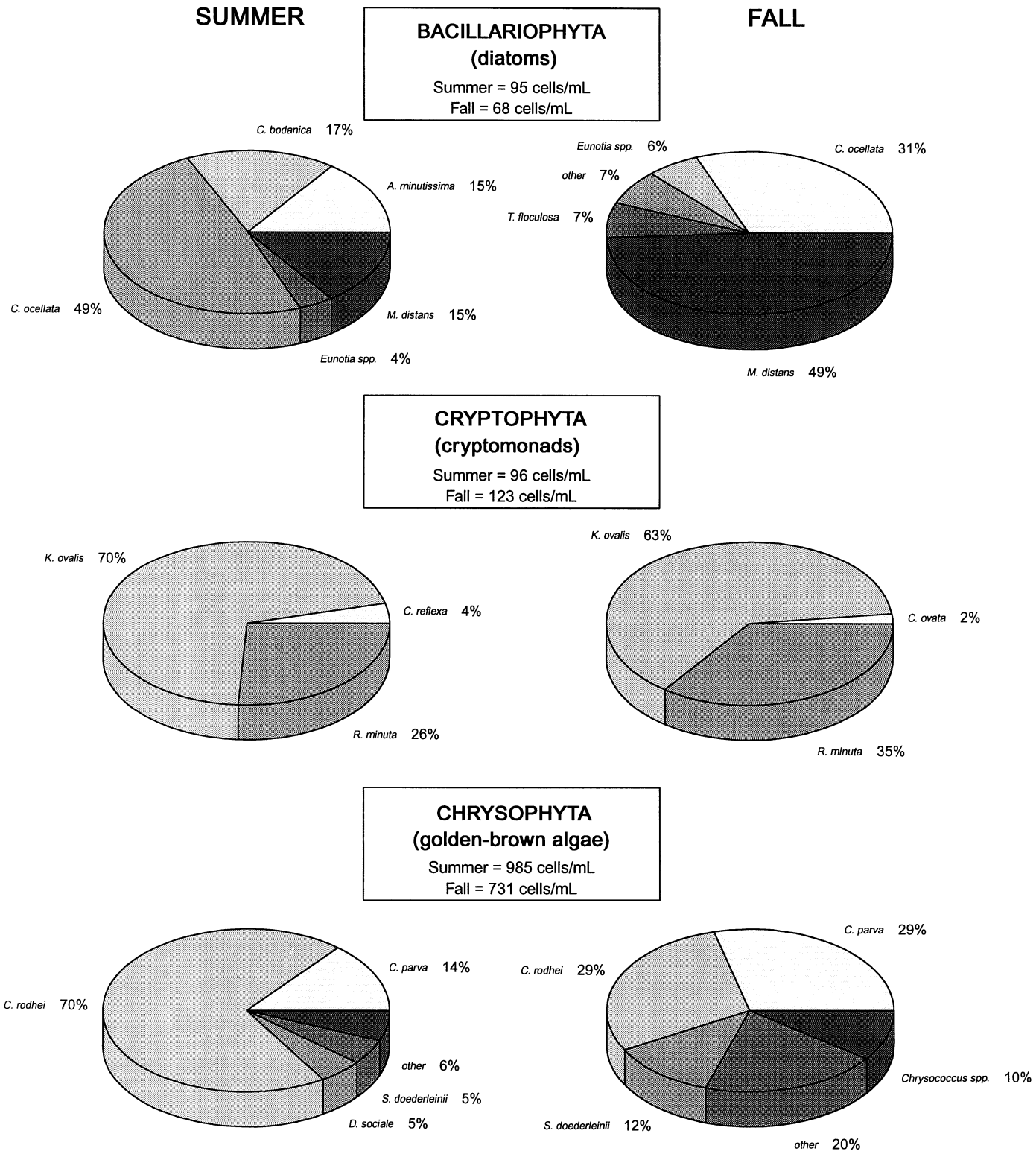


Figure 3.4.5 Densities of the most abundant phytoplankton species within the six major taxonomic groups identified at Site PL3 in Lake C3, Jericho study area 1995.

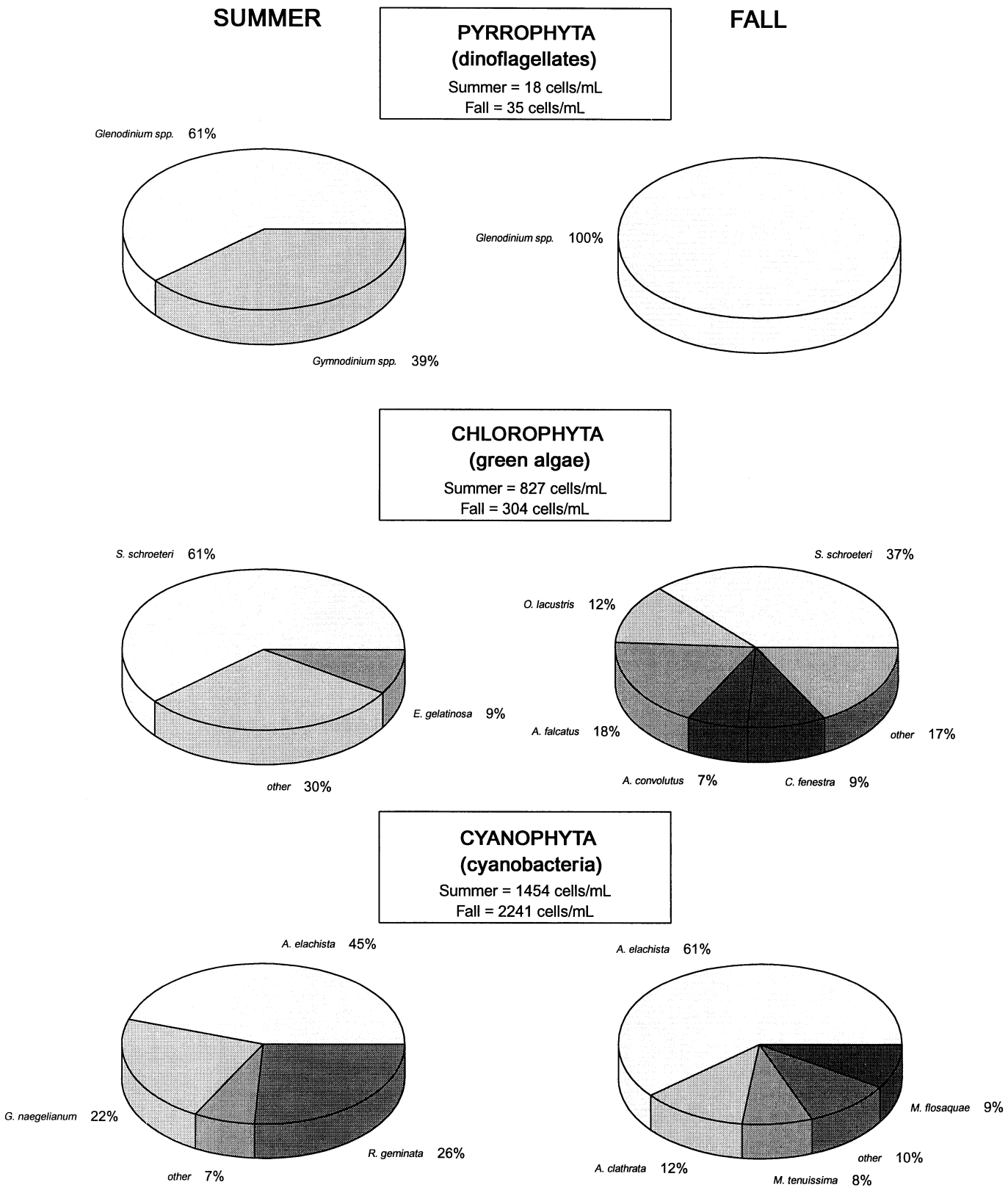


Figure 3.4.5 Continued.

Table 3.4.2 Biomass of zooplankton in sampled lakes during summer and fall, Jericho study area 1995.

Summer								
Taxonomic Group	Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Biomass ($\mu g/m^3$)	Percent of Total	Biomass ($\mu g/m^3$)	Percent of Total	Biomass ($\mu g/m^3$)	Percent of Total	Biomass ($\mu g/m^3$)	Percent of Total
Copepoda	3892	5	6051	2	3815	1	23 874	3
Cladocera	68 100	94	273 650	98	338 487	99	901 474	97
Rotifera	137	<1	224	<1	288	<1	3694	<1
Total Biomass	**72 129**	--	**279 925**	--	**342 590**	--	**929 042**	--
Fall								
Taxonomic Group	Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Biomass ($\mu g/m^3$)	Percent of Total	Biomass ($\mu g/m^3$)	Percent of Total	Biomass ($\mu g/m^3$)	Percent of Total	Biomass ($\mu g/m^3$)	Percent of Total
Copepoda	3806	70	670	52	987	14	1615	7
Cladocera	171	3	0	<1	5429	78	21 117	86
Rotifera	1467	27	627	48	512	7	1766	7
Total Biomass	**5444**	--	**1297**	--	**6928**	--	**24 498**	--

3.4.2.1 Summer

During summer, the most abundant copepod identified in all three lakes was *Dicyclops bicuspidatus*. Densities of *D. bicuspidatus* varied from 283 to 1144 individuals/m^3 (Appendix E3), which comprised between 54 and 69% of the copepod zooplankton sample. *Leptodiaptomus sicilis* was the second most abundant copepod and comprised between 31 and 42% of copepod densities at each site.

Water fleas of the genus *Holopedium* were far more abundant than the only other cladoceran, *Daphnia schodleri*, enumerated in zooplankton samples. *Holopedium* spp. exhibited densities that varied from 51 to 652 individuals/m^3 that comprised between 88 and 100% of the cladoceran sample.

The wheel animal (Rotifera) community in the two Carat Lake sampling sites was dominated by *Cononchiloides unicornis* (1086 individuals/m^3 at Site PL1-1 and 1727 individuals/m^3 at Site PL1-2; Appendix E3) and accounted for 61 and 75% of rotifers at these sites, respectively (Figures 3.4.6 and 3.4.7). In Jericho Lake and Lake C3, three species equally dominated the wheel animal zooplankton community (*C. unicornis, Kellicottia longispina*, and *Keratella cochlearis*) (Figures 3.4.8 and 3.4.9). Densities of these three species varied from 1341 to 1397 individuals/m^3 in Jericho Lake and from 13 450 to 22 117 individuals/m^3 in Lake C3 (Appendix E3).

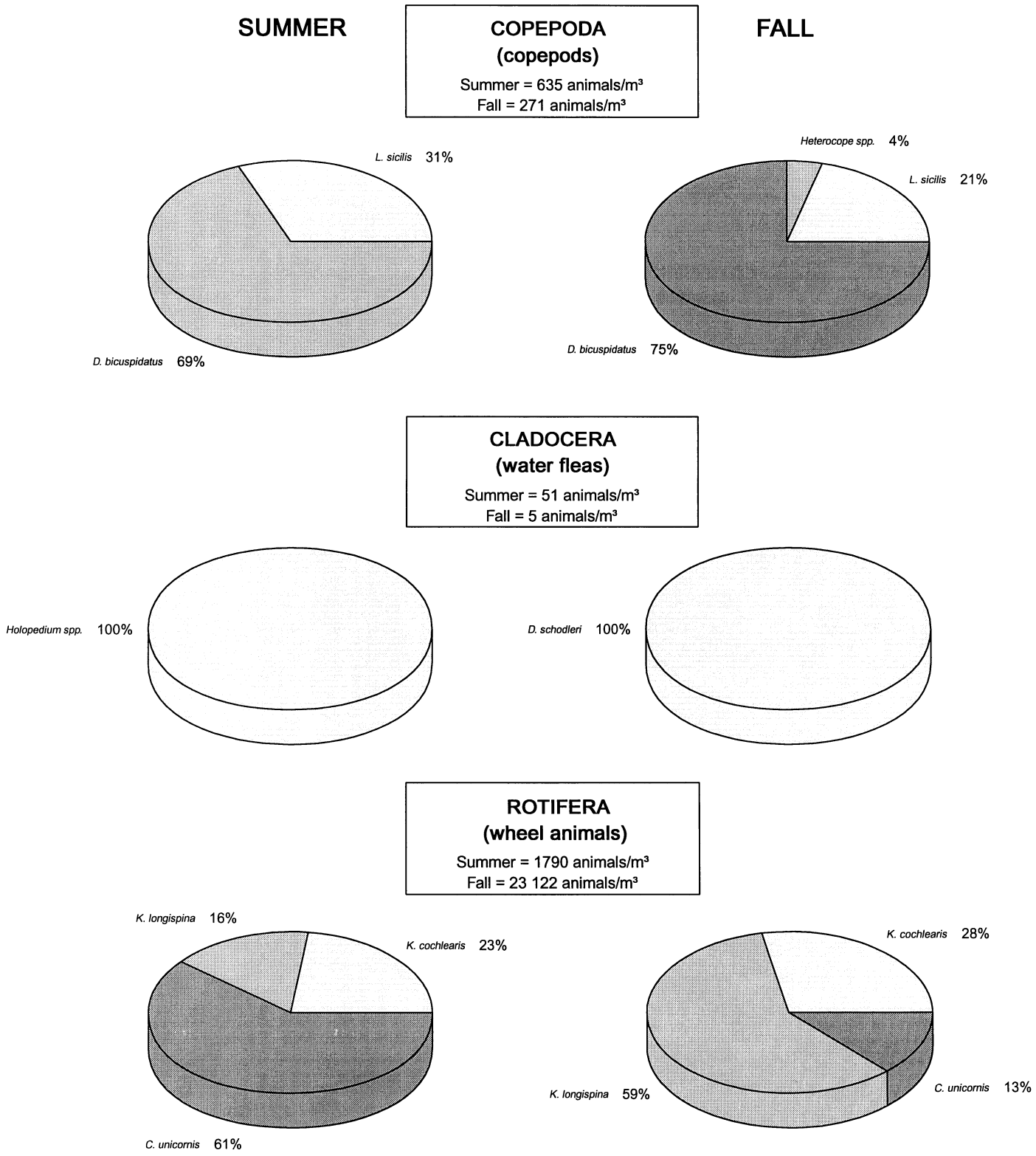


Figure 3.4.6 Densities of the most abundant zooplankton species within the six major taxonomic groups identified at Site PL1-1 in Carat Lake, Jericho study area 1995.

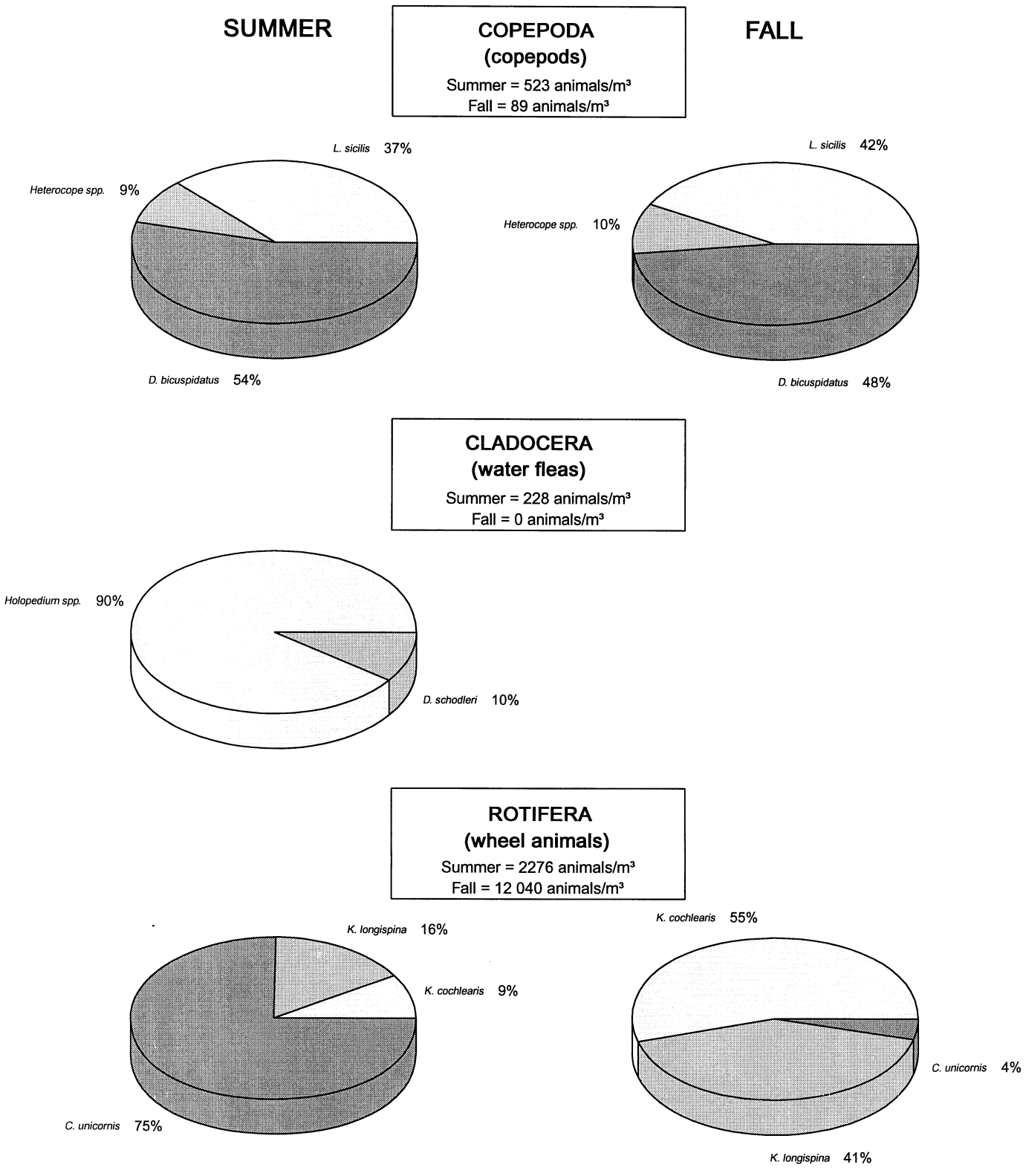


Figure 3.4.7 Densities of the most abundant zooplankton species within the six major taxonomic groups identified at Site PL1-2 in Carat Lake, Jericho study area 1995.

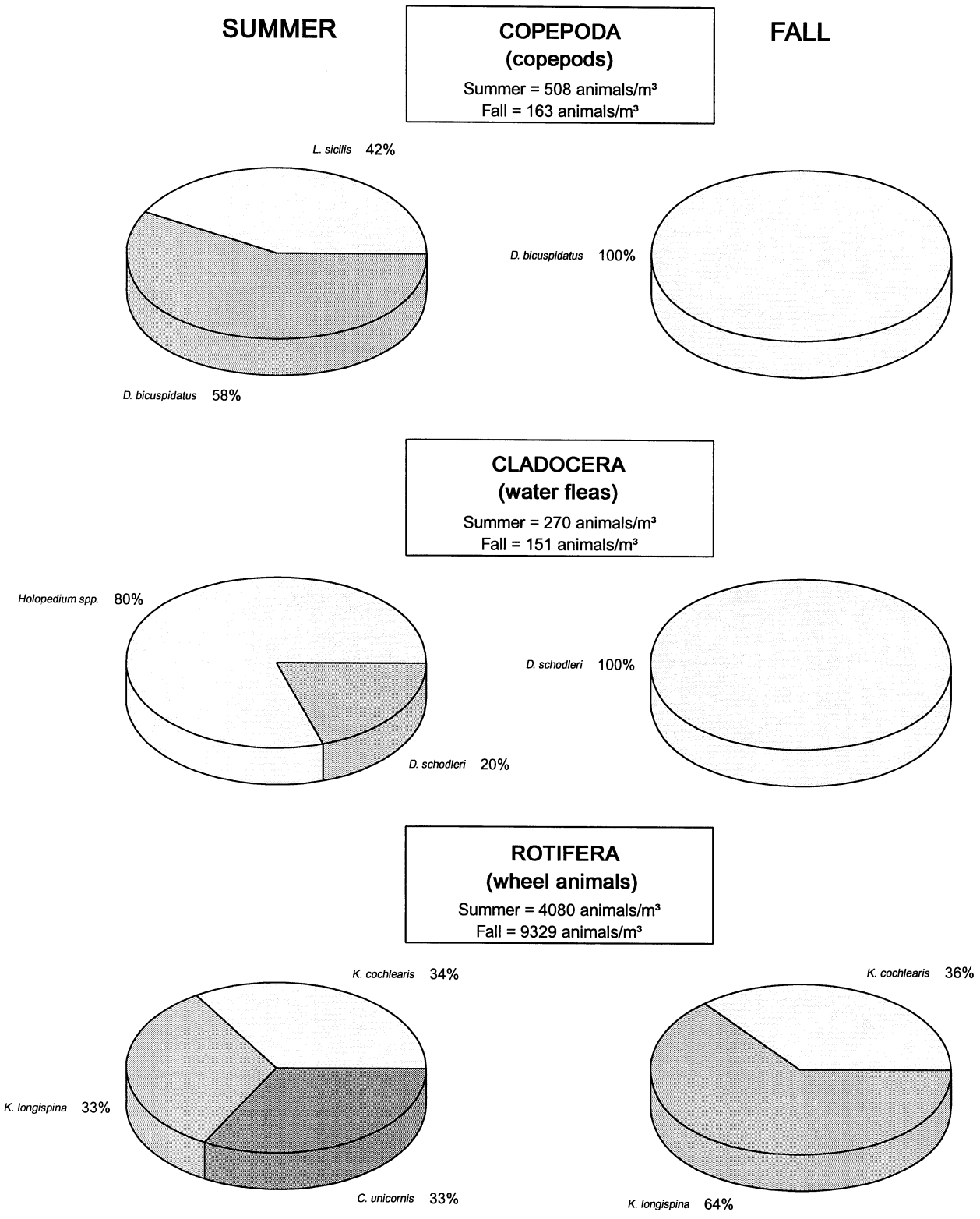


Figure 3.4.8 Densities of the most abundant zooplankton species within the six major taxonomic groups identified at Site PL2 in Jericho Lake, Jericho study area 1995.

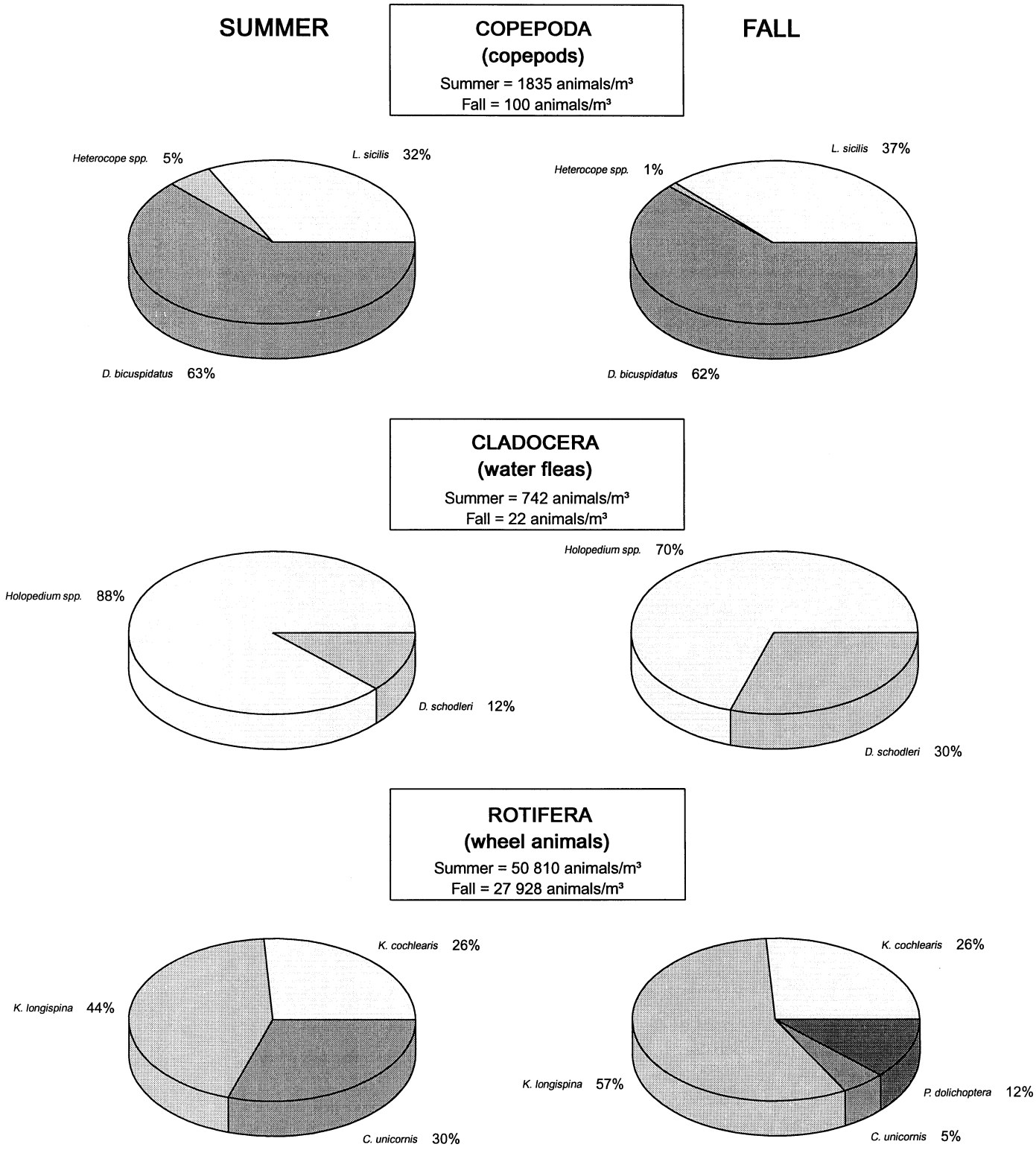


Figure 3.4.9 Densities of the most abundant zooplankton species within the six major taxonomic groups identified at Site PL3 in Lake C3, Jericho study area 1995.

In terms of biomass, water fleas dominated in all samples (68 100 to 901 474 $\mu g/m^3$ or greater than 95% of the total zooplankton biomass) (Table 3.4.2); *Holopedium* spp., which are large organisms, accounted for most of this biomass.

3.4.2.2 Fall

During fall 1995, *D. bicuspidatus* remained the most abundant copepoda; densities varied from 43 to 202 individuals/m^3 (Appendix E3). *Dicyclops bicuspidatus* comprised between 48% and 100% of the copepod zooplankton community (Figures 3.4.6 to 3.4.9). *Leptodiaptomus sicilis* also remained the second most abundant copepod; however, this species was not encountered in the sample collected from Jericho Lake during the fall. In Carat Lake and Lake C3, *L. sicilis* and comprised between 21% and 42% of the total copepod density.

At the time of sampling in fall, water fleas of the genus *Holopedium* were no longer abundant in Carat Lake or Jericho Lake; however, they remained the dominant taxon in Lake C3. *Daphnia schodleri* was the only species in this group found in Carat Lake and Jericho Lake (Appendix E3).

During fall, wheel animals in the two Carat Lake sampling sites differed greatly; Site PL1-1 was dominated by *K. longispina* (59%) whereas Site PL1-2 was dominated by *K. cochlearis* (55%). In Jericho Lake and Lake C3, the wheel animal zooplankton community was dominated by *K. longispina* (64 and 57%, respectively) and *K. cochlearis* (36 and 26%, respectively). In Carat Lake and Jericho Lake, rotifer densities were higher during fall (Appendix E3). Total rotifer density at Site PL1-1 in summer was 1791 rotifers/m^3 compared to 23 123 rotifers/m^3 during fall. Lake C3 showed an opposite trend; total rotifer density during summer (50 810 animals/m^3) was twice that of the fall (24 567 animals/m^3).

In terms of the relative importance of the major taxonomic groups, copepods and wheel animals contributed the most toward zooplankton biomass in Carat Lake (70 and 27% at Site PL1-1, respectively, and 52 and 48% at Site PL1-2, respectively). In Jericho Lake and Lake C3, however, water fleas contributed the most towards the biomass of zooplankton (78 and 86% in Jericho Lake and Lake C3, respectively). The biomass of the zooplankton community decreased considerably from summer to fall. For example, Jericho Lake had a total zooplankton biomass of 342 590 $\mu g/m^3$ in summer and only 6928 $\mu g/m^3$ in the fall (Table 3.4.2). Lower zooplankton biomass during fall may be related to declining temperatures or decreased productivity of autotrophic organisms (phytoplankton).

3.4.2.3 Summary

The zooplankton community in the Jericho study area was similar to other communities in subarctic waterbodies. R.L. & L. Environmental Services Ltd. (1993) reported that the zooplankton populations in four lakes found approximately 75 km southwest of the Jericho study area, were dominated by the rotifers *K. cochlearis* and *K. longispina* and the copepods *L. sicilis* and *Cyclops scutifer*. With the exception of *C. scutifer*, these species were the most abundant taxa in the Jericho study area.

R.L. & L. Environmental Services Ltd. (1993) identified four species of water fleas and one species of a predacious copepod that were dominant in their study area. Similar species were identified during the present study: the cladoceran (*Holopedium* spp.) and the copepod (*Heterocope* spp.). Similar to results of the present study, densities of cladocerans and copepods were low.

3.5 STREAM PERIPHYTON

Periphyton refers to the community of algae, bacteria, fungi, and their secretions that grow on substrates in freshwater systems (Lock et. al. 1984). In addition to having an important role in aquatic trophic relationships, it is well suited for use as a biological indicator of environmental conditions, including those impacted by anthropogenic activities.

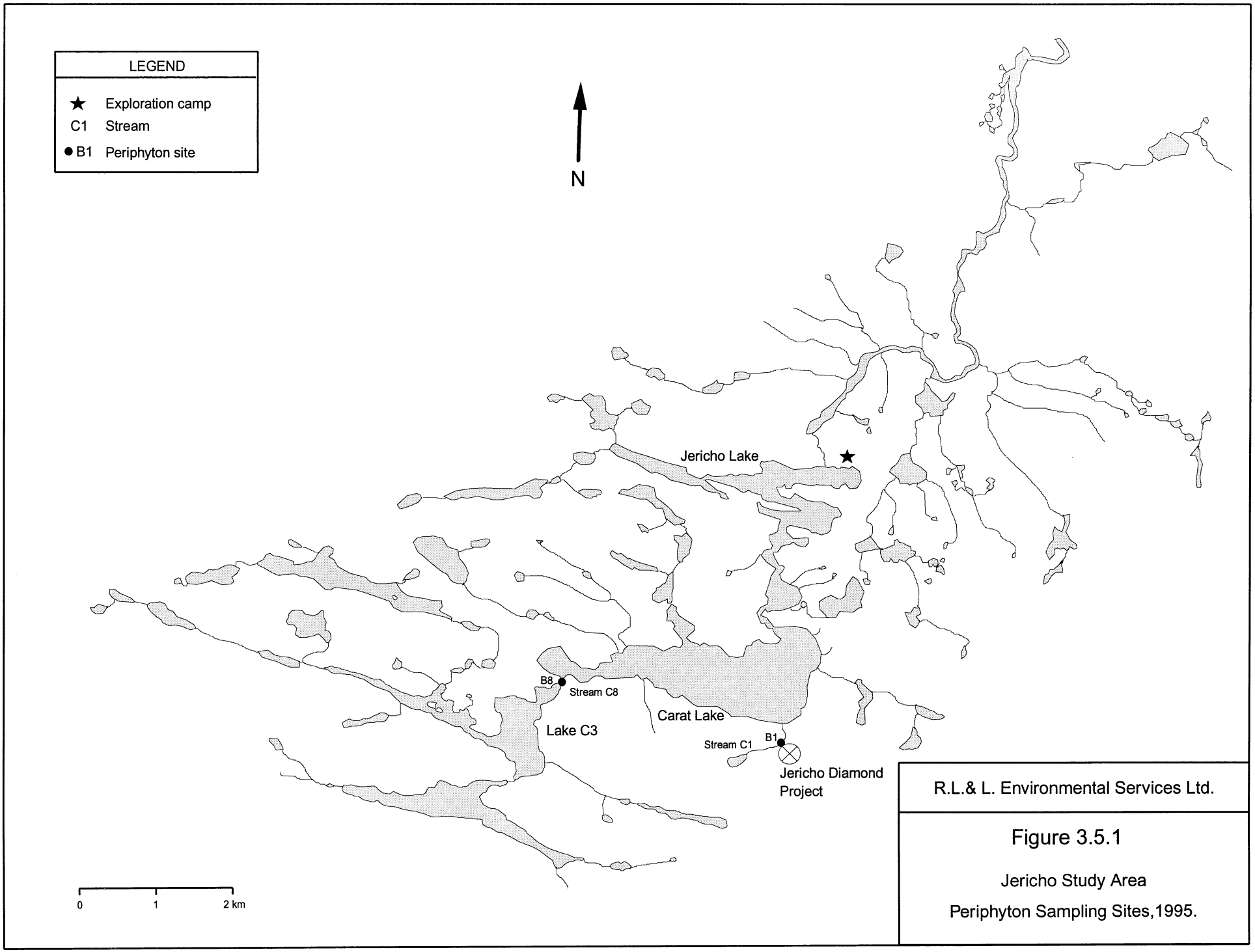
A limited periphyton sampling program was conducted during the summer of 1995. Five replicate periphyton samples were collected from two stream sites in the Jericho study area: Site B1 in Stream C1 and Site B8 in Stream C8 (Figure 3.5.1). Site specific sampling data are summarized in Appendix F1.

In total, 99 periphytic species were identified in the samples (Appendices F2 and F3). The periphytic algal communities in the two study streams were dominated by (in descending order of abundance): cyanobacteria (Cyanophyta), diatoms (Bacillariophyta), and green algae (Chlorophyta). Individual species within these taxonomic groups exhibited a patchy distribution, which was responsible for the large variation observed between replicates at each site (Appendices F2 and F3).

In Stream C1, the periphytic algal community was dominated by the cyanobacteria *Schizothrix calcicola* and *Tolypothrix* spp., and the diatoms *Achnanthes minutissima* and *Gomphonema gracile* (Figure 3.5.2). These species had mean densities ($\pm$ Standard error) of 438 702 $\pm$ 182 704 cells/cm^2, 188 062 $\pm$ 114 076 cells/cm^2, 77 245 $\pm$ 19 064 cells/cm^2, and 37 818 $\pm$ 12 043 cells/cm^2, respectively. The chlorophyte (green algae) *Oocystis pusilla* also was abundant (6243 $\pm$ 4116 cells/cm^2).

Stream C8 tended to have greater densities of cyanobacteria than did Stream C1, with the five most abundant species being *S. calcicola* (302 469 $\pm$ 49 597 cells/cm^2), *Gomphosphaeria lacustris* (115 578 $\pm$ 37 139 cells/cm^2), and *Anacystis* spp. (95 235 $\pm$ 33 022 cells/cm^2) (Figure 3.5.3). These species had densities that were at least 3 times greater than any other algal species recorded. Other than cyanobacteria, the diatoms *A. minutissima* and *G. gracile* had considerable densities (17 324 $\pm$ 5987 and 12 888 $\pm$ 8038 cells/cm^2, respectively).

The chlorophyll *a* content of periphyton communities of Streams C1 and C8 was low (Appendix F1). Periphyton in Stream C1 had a level of 1.07 $\pm$ 0.48 μg/cm^2, while in Stream C8 it was 1.44 $\pm$ 0.81 μg/cm^2. The amount of chlorophyll *a*, which is an indicator of periphyton abundance, is controlled primarily by water velocity and nutrient concentrations (Horner and Welch 1981). Moderate current velocities (20 to 100 cm/s) and increasing



R.L.& L. Environmental Services Ltd.

Figure 3.5.1

Jericho Study Area

Periphyton Sampling Sites,1995.

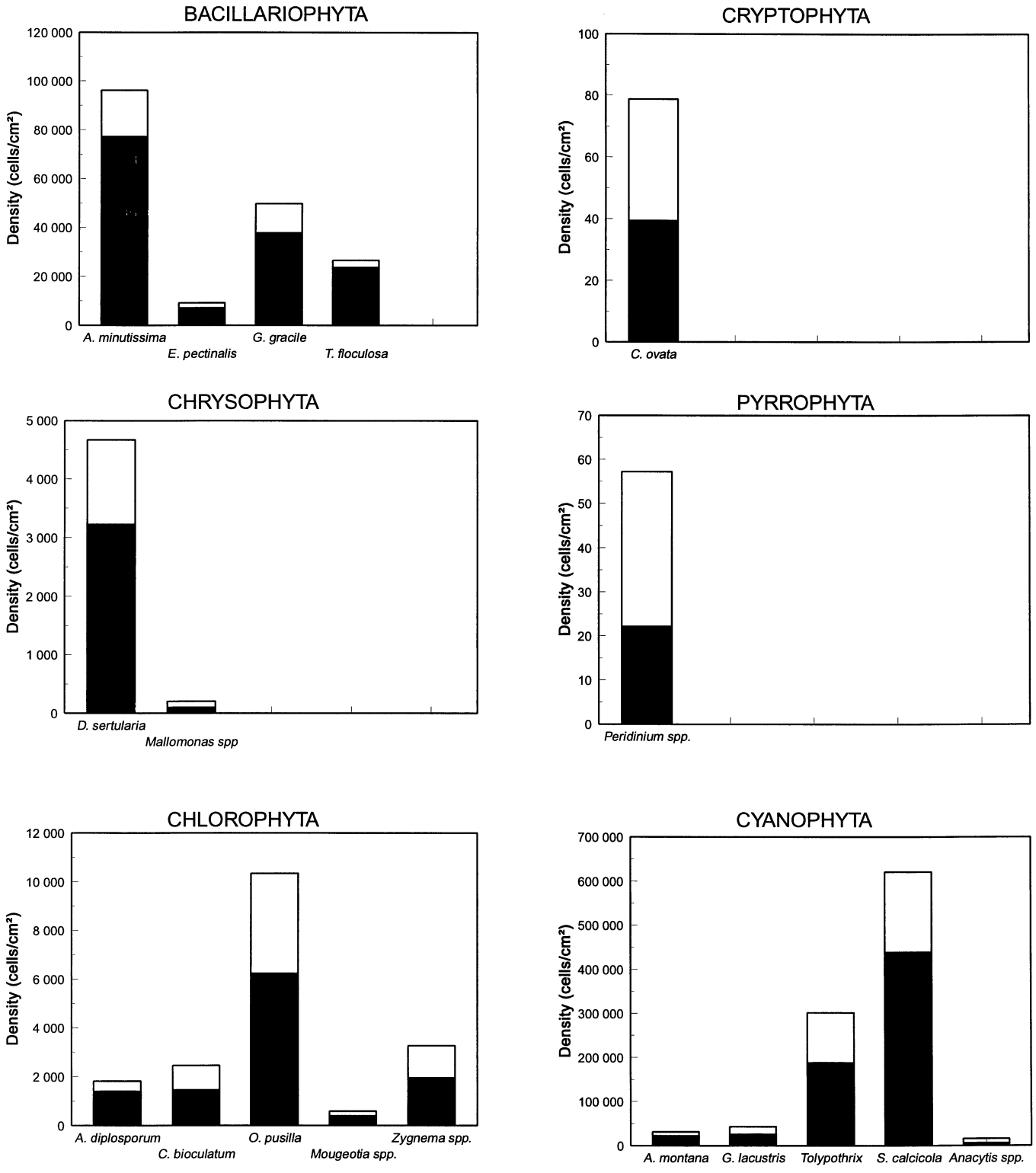


Figure 3.5.2 Mean density (n=5) plus one standard error (clear top portion of bars) of the most numerous species in the six major taxonomic groups of periphytic algae in Stream C1 (Site B1) during summer, Jericho study area 1995 (note differences in scale).

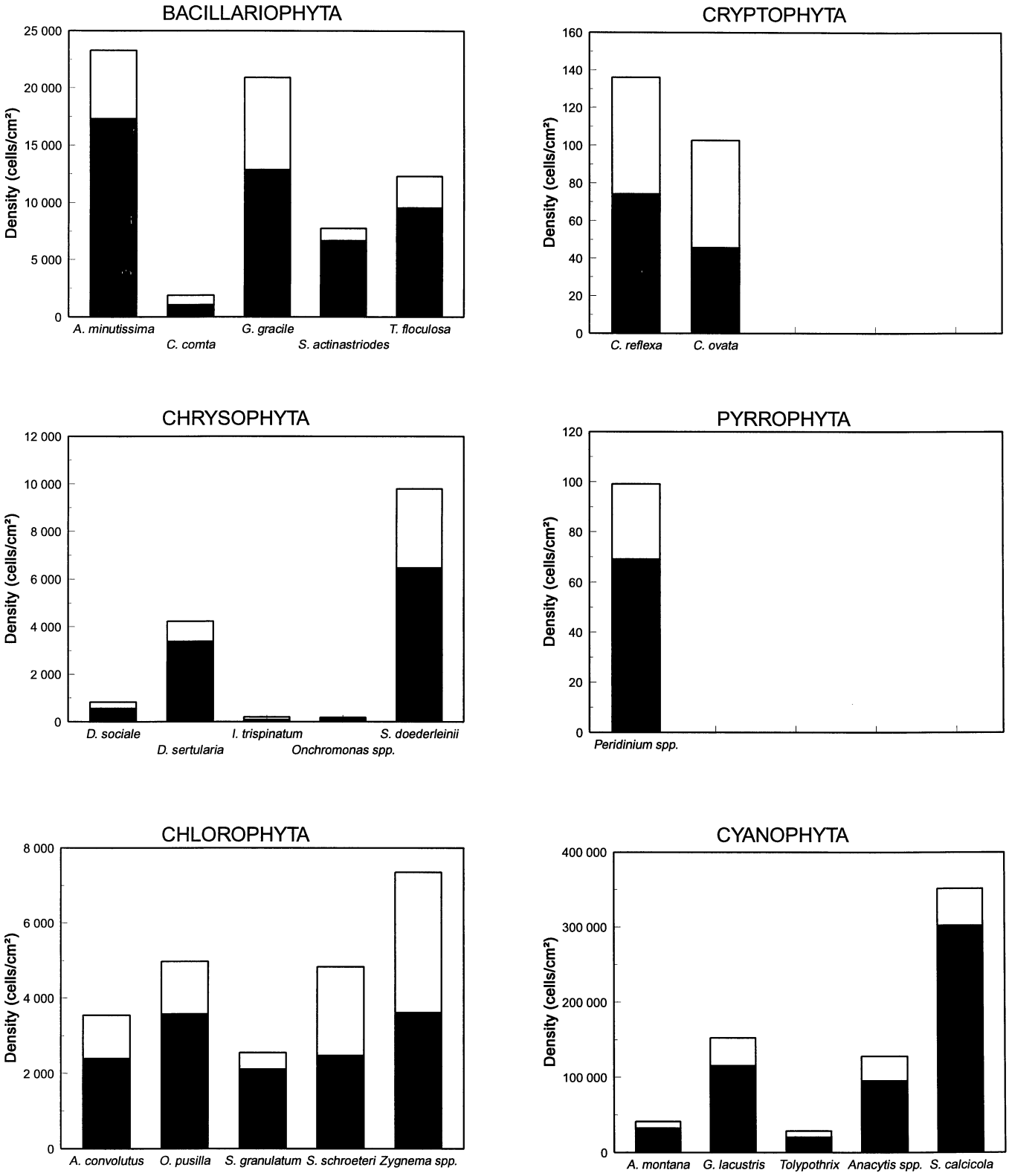


Figure 3.5.3 Mean density (n=5) plus one standard error (clear top portion of bars) of the most numerous species in the six major taxonomic groups of periphytic algae in Stream C8 (Site B8) during summer, Jericho study area 1995 (note differences in scale).

phosphorus concentrations to (50 μg/L) promote periphytic growth. Site locations during the present study exhibited current velocities within the range reported by Horner and Welch (1981) (based on field observations). Therefore, it is likely that phosphate concentrations were low; total phosphorus concentrations in waterbodies in the Jericho study area generally were low (less than 0.001 to 0.012 mg/L) (Appendices C5 to C7).

Summary

Tabellaria flocculosa, *G. gracile*, and *A. minutissima* had moderate to high densities compared with other diatom species in Streams C1 and C8. These findings are similar to those reported by Roeder et al. (1975) and Moore (1978) for periphytic algae communities at similar latitudes. During investigations near Norman Wells, Northwest Territories, Roeder et al. (1975) described the diatom community as being dominated by *A. minutissima*, *Cymbella* spp., and *Gomphonema* spp. Moore (1978) identified *Tabellaria flocculosa* and *A. minutissima* as being the first and second most abundant periphytic algal species in two streams found approximately 100 km southwest of the Jericho study area.

Moore (1978) reported total densities of bottom dwelling algae that ranged from approximately 700 000 cells/cm^2 to 2 100 000 cells/cm^2. Total algal densities in samples collected from Streams C1 and C8 during 1995 were lower (423 000 cells/cm^2 to 1 523 000 cells/cm^2). Possible reasons for this difference could be variation in the timing of sampling (both within seasons and between years) and the characteristics of streams investigated during the present study (e.g., lower nutrient levels).

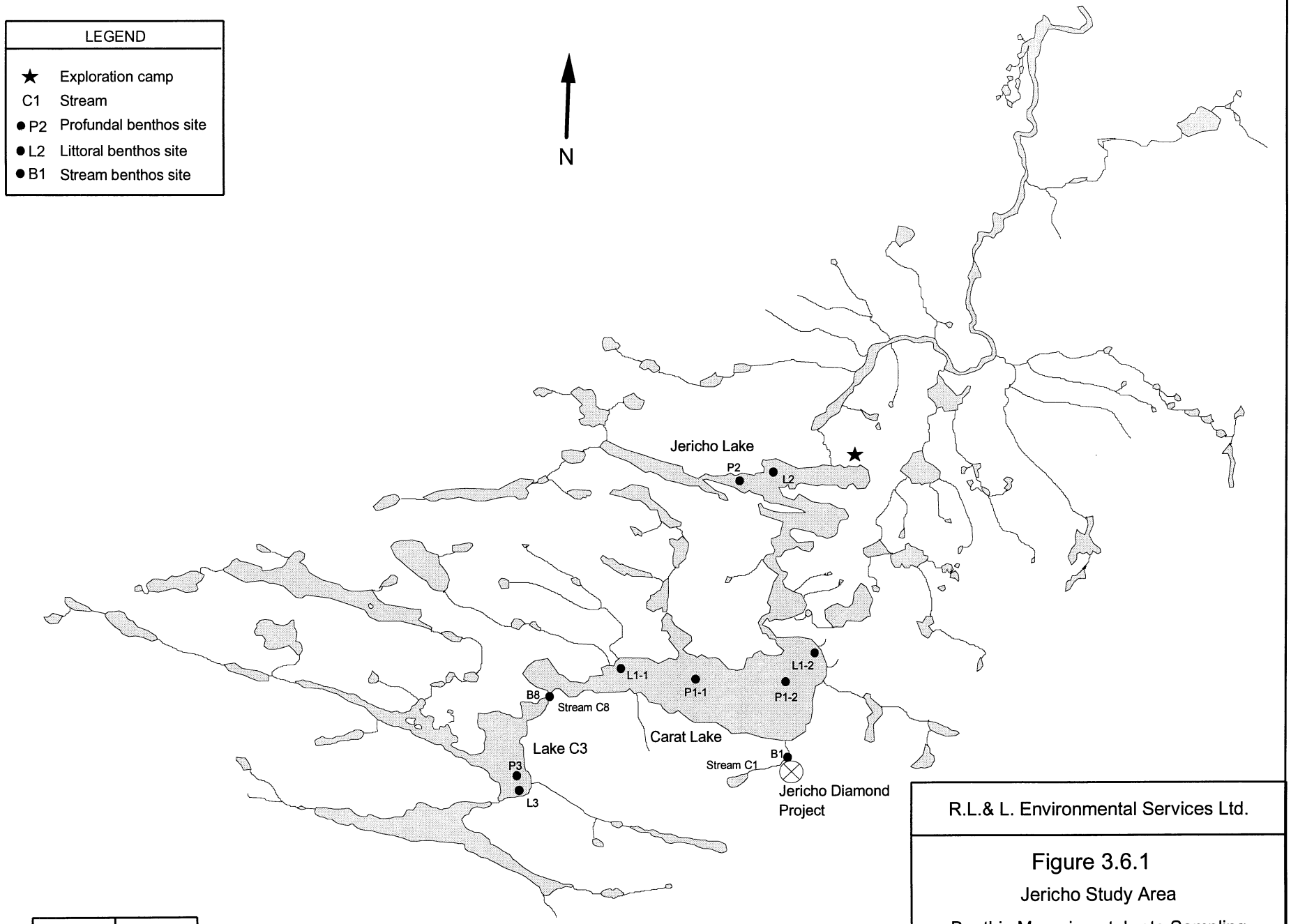
3.6 BENTHIC MACROINVERTEBRATES

Benthic (bottom-dwelling) macroinvertebrates are an important link in aquatic food webs. Most benthic invertebrates are herbivorous, detritivorous, or filter feeders and derive much of their energy from aquatic plants and algae or organic materials. Some benthic macroinvertebrate species are predacious, generally feeding upon other invertebrates.

3.6.1 Streams

A limited benthic macroinvertebrate sampling program was conducted during the summer of 1995. Five replicate invertebrate samples were collected from the same locations as the periphyton samples; Stream C1 (Site B1) and Stream C8 (Site B8) (Figure 3.6.1). Site specific sampling information are summarized in Appendix G1, while raw data are presented in Appendix G2.

In total, 16 different genera were identified (Table 3.6.1). The benthic macroinvertebrate communities in the two study streams were dominated by oligochaetes (aquatic earthworms), hydrachnids (water mites), chironomids (midges), tipulids (crane flies), and plecopterans (stoneflies). These taxonomic groups tended to have sporadic distributions at each site.



R.L.& L. Environmental Services Ltd.

Figure 3.6.1

Jericho Study Area

Benthic Macroinvertebrate Sampling Sites,1995.

Table 3.6.1 Mean density (No./m^2) (n=3) and standard error (S.E.) of benthic macroinvertebrates in sampled streams during summer, Jericho study area 1995.

Taxonomic Group	Stream C1, Site B1	Stream C8, Site B8
ANNELIDA		
OLIGOCHAETA		
Lumbriculidae	37 (13)	47 (10)
Naididae	5 (5)	
ARTHROPODA		
HYDRACHNIDIA	11 (6)	32 (15)
CRUSTACEA		
COPEPODA		
Cyclopoida		5 (5)
INSECTA		
DIPTERA		
Chironomidae	26 (8)	21 (13)
Orthocladiinae		89 (51)
Cricotopus/Orthocladius		58 (36)
Paracricotopus		11 (11)
Tanypodinae		
Procladius	5 (5)	47 (18)
Tanytarsini	11 (11)	
Lauterbornia/Micropsectra		11 (11)
Chironomidae Pupae		16 (11)
Empididae		
Clinocera	5 (5)	
Tipulidae		
Tipula	32 (19)	32 (6)
EPHEMEROPTERA		
Baetidae		
Baetis		11 (5)
PLECOPTERA		
Nemouridae		
Podmosta	63 (26)	137 (17)
TRICHOPTERA		
Brachycentridae		5 (5)
MOLLUSCA		
GASTROPODA		
Planorbidae		5 (5)
NEMATODA		5 (5)
Total No. Aquatic Taxa/m^2	**4 (0.2)**	**7 (1)**
Total No. of Aquatic Invertebrates/m^2	**195 (21)**	**532 (45)**

The overall mean density of benthic macroinvertebrates in Stream C8 (532 $\pm$ 45 invertebrates/m^2) was 2.5 times greater than that in Stream C1 (195 $\pm$ 21 invertebrates/m^2) (Table 3.6.1). The cause for this difference is not known. However, because Stream C8 had greater amounts of periphytic algae (see Section 3.5), it may have been more productive, and therefore, been able to support higher densities of invertebrates.

Overall, stoneflies of the genus *Podmosta* were the most abundant taxon in the two streams; however, when the midge taxa are pooled, they become numerically dominant in Stream C8.

3.6.2 Lakes

The lake sampling program was designed to obtain baseline information from benthic macroinvertebrates communities in selected lakes in the Jericho study area. Samples were collected during summer and fall in the profundal and littoral zones of each of three lakes (Figure 3.6.1). Five replicate samples were collected from each of the sampling sites. Three of the five replicate samples were analyzed in the laboratory, while the remaining two replicates were archived. Summary information is provided Tables 3.6.2 and 3.6.3. Site specific sampling information are summarized in Appendix G3, while raw data are presented in Appendices G4 and G5.

3.6.2.1 Littoral Zone

In total, 35 taxonomic genera were identified in samples from the littoral zones sites (Table 3.6.2): the number of taxa in each sample ranged from 5 to 15 (Appendix G4).

Mean overall densities of all invertebrates varied between summer and fall (Table 3.6.2). At Site L1-1 of Carat Lake, there were 4312 $\pm$ 469 invertebrates/m^2 during the summer and approximately half this density during the fall. At Site L1-2 in the same lake, the opposite trend was recorded: mean densities were 1452 $\pm$ 104 and 22 387 $\pm$ 5912 invertebrates/m^2 during summer and fall, respectively. Macroinvertebrate densities in Jericho Lake were similar between seasons (6756 $\pm$ 2078 invertebrates/m^2 and fall 5956 $\pm$ 667 invertebrates/m^2). The site at Lake C3 exhibited densities that were more than two times greater during fall (3984 $\pm$ 1681 invertebrates/m^2 compared with 1512 $\pm$ 530 invertebrates/m^2). Seasonal variability and differences in sampling site locations (i.e., densities can vary considerably among sample locations that are a few metres apart) between the two seasons likely account for the results obtained.

In terms of taxonomic composition, the macroinvertebrate communities in the three study lakes were dominated by oligochaetes, chironomids, harpacticoid copepods, seed shrimps (Ostracoda), fingernail clams (Sphaeriidae), and roundworms (Table 3.6.2). The taxonomic groups tended to have large variations around the mean, which precluded statistical comparisons of the data. Use of the two remaining archived replicate samples from each site will help to reduce variations and possibly allow statistical analyses during future monitoring programs (Peterman 1990).

Some patterns were apparent among the three study lakes. Harpacticoid copepods were not identified in samples collected from Lake C3, however, large numbers of this taxon were evident in Carat Lake and Jericho Lake (Table 3.6.2). Because harpacticoids are restricted to bottom debris habitats and are especially abundant in sandy substrates (Pennak 1978), it is possible that Lake C3 had a paucity of this substrate type. More likely, the specific sampling location was outside the range of this habitat type in the lake. Fingernail clams were very low in abundance in Lake C3 relative to Carat Lake and Jericho Lake. Usually, bivalves prefer stable gravel,

Table 3.6.2 Mean density (No./m^2) (n=3) and standard error (S.E.) of benthic macroinvertebrates in the littoral zone of sampled lakes, Jericho study area 1995.

Taxonomic Group	Carat Lake				Jericho Lake		Lake C3	
	Site L1-1		Site L1-2		Site L2		Site L3	
	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall
ANNELIDA								
OLIGOCHAETA								
Lumbriculidae	163 (82)	15 (15)	104 (104)	1126 (510)	859 (127)	30 (15)	281 (171)	207 (30)
Naididae	59 (39)	281 (82)	15 (15)		119 (97)	148 (39)	104 (15)	148 (59)
ARTHROPODA								
HYDRACHNIDIA	222 (93)	30 (30)	15 (15)	89 (51)	44 (44)	59 (39)	30 (15)	30 (15)
CRUSTACEA								
CLADOCERA								
Chydoridae						44 (26)		
COPEPODA								
Calanoida		44 (26)		104 (53)		44 (26)		
Cyclopoida	30 (30)	148 (90)	15 (15)	44 (0)	30 (30)		15 (15)	
Harpacticoida	1541 (384)	59 (15)		6963 (1977)	637 (504)			
OSTRACODA	163 (104)	74 (30)	119 (78)	74 (39)	133 (26)	148 (127)	15 (15)	15 (15)
INSECTA								
DIPTERA								
Chrionomidae	15 (15)	59 (59)				281 (238)		
Chironomini		15 (15)	15 (15)	15 (15)	193 (104)			59 (39)
Chironomus					30 (30)	1941 (1538)		
Phaenopsectra						44 (44)		
Stictochironomus					74 (74)			
Diamesinae			30 (15)			30 (30)		
Orthocladiinae	222 (118)	578 (26)	296 (97)	1304 (1110)	1570 (1173)	281 (146)	222 (160)	1289 (1179)
Chaetocladius			15 (15)					
Corynoneura		15 (15)			89 (89)	15 (15)	30 (30)	
Cricotopus/Orthocladius								59 (59)
Eukiefferiella						1126 (476)		
Paracricotopus						15 (15)		
Psectrocladius	74 (74)			252 (252)			237 (171)	
Zalutchia		474 (244)		548 (548)		44 (44)		281 (281)
Tanypodinae								
Procladius		178 (93)	178 (68)	74 (15)	237 (82)	563 (150)	15 (15)	44 (26)
Tanytarsini	30 (30)		15 (15)		341 (150)		148 (65)	
Lauterbornia/Micropsectra		44 (44)						
Paratanytarsus				104 (104)			44 (44)	222 (112)
Rheotanytarsus	30 (30)	15 (15)				400 (400)	89 (68)	
Tanypus		30 (15)		104 (104)				
Tanytarsus					44 (26)	30 (30)		
Chironomidae Pupae	222 (103)		30 (30)		133 (112)		15 (15)	
Empididae								
Chelifera					15 (15)			
TRICHOPTERA								
Brachycentridae								
Amiocentrus	30 (30)							
Brachycentrus		15 (15)						
Limnephilidae								
Apatania				15 (15)				
Gresnia	15 (15)		44 (26)	15 (15)	30 (30)			
Psychoglypha						30 (30)		
Trichoptera Pupae							15 (15)	
MICROTURBELLARIA								
Mesostoma		59 (30)		133 (44)	119 (74)			89 (89)
MOLLUSCA								
GASTROPODA								
Planorbidae					30 (30)			
Valvatidae								
Valvata sincera sincera						15 (15)		
PELECYPODA								
Sphaeriidae		163 (104)	504 (165)	30 (15)	844 (378)	504 (127)	15 (15)	
NEMATODA	1496 (717)	311 (156)	59 (59)	11 393 (4381)	1185 (371)	163 (30)	237 (157)	1541 (446)
Total No. Aquatic Taxa/m^2	**8 (0.6)**	**12 (0.6)**	**7 (1.2)**	**11 (1.2)**	**12 (1.5)**	**12 (1.0)**	**7 (0.9)**	**8 (1.3)**
Total No. of Aquatic Invertebrates/m^2	**4312 (469)**	**2607 (514)**	**1452 (104)**	**22 387 (5912)**	**6756 (2078)**	**5956 (667)**	**1512 (530)**	**3984 (1681)**

sand, and substrates composed of sand or gravel mixed with other material, whereas, bare, stoney bottoms and shifting sands and muds are unsuitable habitats (Pennak 1978). The site in Lake C3 probably had greater amounts of bare stones or other unsuitable habitats relative to Carat and Jericho lakes. Finally, brachycentrid

caddisflies (Trichoptera) were only identified in Carat Lake at Site L1-1. Brachycentrid caddisfly larvae are most commonly found in running water habitats; however, wave swept shores of lake habitats will support populations of brachycentrids (Wiggins 1977).

3.6.2.2 Profundal Zone

In total, 24 different taxonomic groups were identified in profundal zone samples (Table 3.6.3), with a range of two to 15 aquatic taxa per sample (Appendix G5). Similar to findings for the littoral zone, mean densities of all benthic macroinvertebrates varied between summer and fall (Table 3.6.3). Sites P1-1 and P1-2 of Carat Lake exhibited mean densities of 980 and 816 invertebrates/m^2 respectively, during summer and 1541 and 1793 invertebrates/m^2 during fall, respectively. Both Jericho Lake and Lake C3 had higher mean densities during the summer (964 and 2002 invertebrates/m^2, respectively) than in fall (416 and 178 invertebrates/m^2, respectively).

Similar to the littoral zone samples, the profundal macroinvertebrate communities in the three study lakes were dominated by chironomids, seed shrimps, fingernail clams, and roundworms (Table 3.6.3). Unlike the littoral habitat communities, however, cyclopoid copepods were numerically more dominant than harpacticoid copepods. In addition, the microflatworm (Microturbellaria) *Mesostoma* spp. was the third most abundant taxon.

Although differences in taxa abundance were observed among the three study lakes, they did not involve the same taxa, nor were they of the same magnitude, as those recorded for the littoral zone communities. Water mites were only found in samples collected from Carat Lake (Site P1-2) and Jericho Lake (Site P2). Both fingernail clams and roundworms tended to have much greater densities in the two sites of Carat Lake than in Jericho Lake and Lake C3 (Site P3).

3.6.3 Summary

Streams

Results of the benthic macroinvertebrate sampling program in streams were similar to results of other studies. Beak (1977) sampled the benthic macroinvertebrate community in a stream found approximately 75 km southwest of the Jericho study area. Stoneflies and midges dominated the community in this stream, which is similar to the findings of the present study. The species composition and low densities reported for Streams C1 and C8 are indicative of oligotrophic systems.

Lakes

Overall, mean densities and number of taxonomic groups of benthic macroinvertebrates were greater in the littoral habitats than the profundal habitats of the three study lakes. This reflects the overall greater productivity of shallow-water, littoral habitats because of higher temperatures and greater light penetration. Anoxia of the profundal zone was not recorded during the 1995 open water season (see Section 3.1) and probably was not a factor in benthic macroinvertebrate production.

Table 3.6.3 Mean density (No./m^2) (n=3) and standard error (S.E.) of benthic macroinvertebrates in the profundal zone of sampled lakes, Jericho study area 1995.

Taxonomic Group	Carat Lake				Jericho Lake		Lake C3	
	Site P1-1		Site P1-2		Site P2		Site P3	
	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall
ANNELIDA								
OLIGOCHAETA								
Lumbriculidae		30 (15)		15 (15)				
ARTHROPODA								
HYDRACHNIDIA			15 (15)	44 (44)	15 (15)	15 (15)		
CRUSTACEA								
CLADOCERA								
Daphnidae								
Daphnia					15 (15)	15 (15)		
Chydoridae				15 (15)				
COPEPODA								
Calanoida		30 (30)	44 (26)					
Cyclopoida		281 (194)	89 (44)	30 (30)	222 (44)	30 (30)	311 (268)	
Harpacticoida		59 (30)	15 (15)					
OSTRACODA		15 (15)		30 (15)		15 (15)	504 (263)	
INSECTA								
DIPTERA								
Chironomidae	44 (44)	59 (59)					30 (30)	
Chironomini	30 (15)	44 (44)		30 (15)	30 (30)	15 (15)		15 (15)
Stictochironomus		222 (160)	30 (30)		415 (415)	133 (133)	311 (228)	
Diamesinae								
Protanypus	44 (44)	59 (15)	15 (15)		15 (15)			
Orthocladiinae	15 (15)	89 (89)	44 (26)	281 (281	30 (15)	15 (15)	104 (82)	30 (15)
Abiskomyia	30 (30)			30 (15)				
Cricotopus/Orthocladius	89 (89)	15 (15)	30 (30)				74 (74)	
Eukiefferiella				59 (39)				
Psectrocladius		30 (30)		15 (15)			15 (15)	
Zalutchia					59 (59)			
Tanypodinae								
Procladius	119 (74)	30 (15)	89 (26)	89 (68)	59 (30)	30 (15)	133 (68)	59 (15)
Tanytarsini				15 (15)	15 (15)			
Lauterbornia/Micropsectra	15 (15)	133 (77)						
Paratanytarsus				44 (44)				
Rheotanytarsus		15 (15)					119 (78)	
Tanypus	30 (30)							
Tanytarsus						44 (44)		
Chironomidae Pupae							193 (150)	
MICROTURBELLARIA								
Mesostoma		119 (53)		74 (39)	74 (39)	30 (15)	30 (30)	
MOLLUSCA								
PELECYPODA								
Sphaeriidae	533 (245)	222 (44)	415 (90)	933 (291)	15 (15)	59 (39)	163 (30)	44 (44)
NEMATODA	30 (15)	89 (89)	30 (30)	89 (68)		15 (15)	15 (15)	30 (15)
Total No. Aquatic Taxa/m^2	**5 (0.9)**	**10 (0.9)**	**6 (0.3)**	**9 (4)**	**6 (1.5)**	**5 (1.5)**	**6 (1.2)**	**3 (0.6)**
Total No. of Aquatic Invertebrates/m^2	**979 (464)**	**1541 (417)**	**816 (97)**	**1793 (558)**	**964 (331)**	**416 (146)**	**2002 (723)**	**178 (45)**

Beak (1977) sampled the benthic macroinvertebrate community in the littoral and profundal habitats of Izok Lake, found approximately 75 km southwest of the Jericho study area. The benthic macroinvertebrate community in the littoral zone was dominated by oligochaetes, chironomids, and nematodes; whereas, in the profundal zone it was dominated by chironomids and fingernail clams. Moore (1978) also sampled Izok Lake, as well as two other lakes in the immediate vicinity (Itchen and Iznogoudh lakes), and found that chironomids, fingernail clams, and oligochaetes dominated the benthic macroinvertebrate community.

3.7 FISH

3.7.1 Species Composition and Abundance

The fish sampling program was designed to provide information on species composition and abundance in the Jericho study area. Sampling was conducted during spring, summer, and fall using a variety of methods. The following section provides summary information that describes fish communities in selected lakes and streams in the study area.

3.7.1.1 Lakes

Although two sampling techniques were employed to capture fish in lakes (angling and gillnetting), gillnetting was the primary sampling method. Therefore, unless otherwise specified, data from gill net sampling was used to generate summary information. Locations of gill net sites on each of the three sampled lakes are illustrated in Figure 3.7.1. Information for each individual gill net site and catch are provided in Appendices H1 and H2.

In total, three species of fish were captured from sampled lakes in the Jericho study area. In order of total numbers captured, they included: lake trout (*Salvelinus namaycush*), round whitefish *(Prosopium cylindraceum)* and Arctic char (*Salvelinus alpinus*) (Table 3.7.1). In terms of percent composition, lake trout accounted for most of the catch (77%), while round whitefish and Arctic char each contributed 13% and 10%, respectively. The relative importance of each species in terms of fish numbers was not constant between lakes. Although lake trout was the most numerous fish in each of the three sampled lakes, the relative composition of the remaining two species varied. Round whitefish was the second most numerous species in Carat Lake and Lake C3. In comparison, nearly twice as many Arctic char as round whitefish were recorded from Jericho Lake (19 versus 10 fish).

Table 3.7.1 Percent composition of fish species recorded in sampled lakes, Jericho study area 1995 (all sampling methods and periods combined).

Species	Carat Lake		Jericho Lake		Lake C3		Total	
	No.	%	No.	%	No.	%	No.	%
Lake trout	108	83.0	108	78.8	33	60.0	249	77.4
Round whitefish	14	10.8	10	7.3	17	30.9	41	12.7
Arctic char	8	6.2	19	13.9	5	9.1	32	9.9
Total	**130**	**100.0**	**137**	**100.0**	**55**	**100.0**	**322**	**100.0**

Relative abundance (Catch-per-unit-effort or CPUE) summaries from the gill net catch were consistent with the percent composition data. The relative species abundance in each lake was consistent between seasons (Figure 3.7.2). Lake trout predominated in all lakes during both summer and fall. In summer, the highest catch rate for this species occurred in Carat Lake (5.5 fish/100 $m^2 \cdot 12$ h), while in fall it was highest in Jericho Lake (8.8 fish/100 $m^2 \cdot 12$ h). During both seasons, abundance indices for lake trout were lowest in Lake C3.

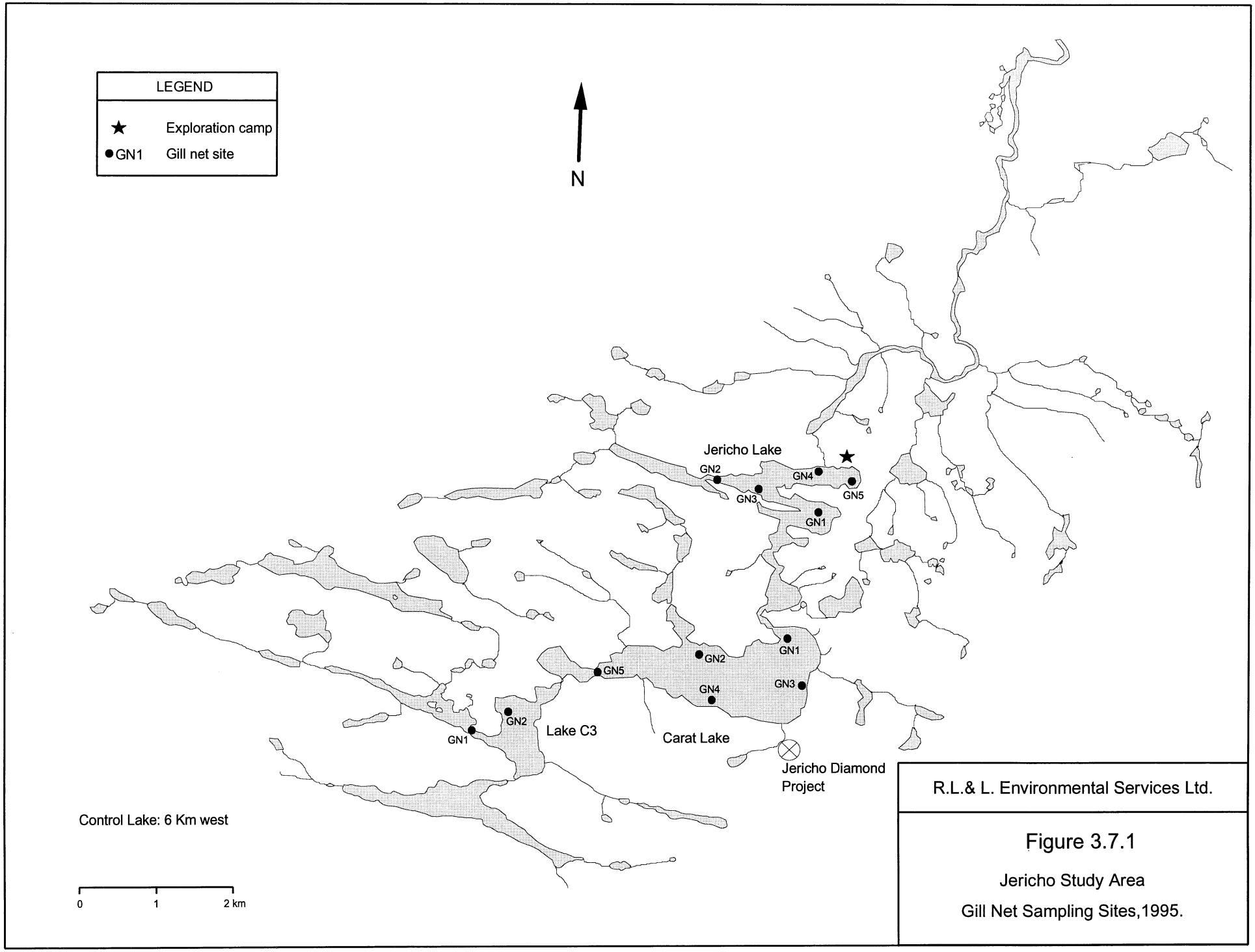


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Figure 3.7.1

Jericho Study Area

Gill Net Sampling Sites,1995.

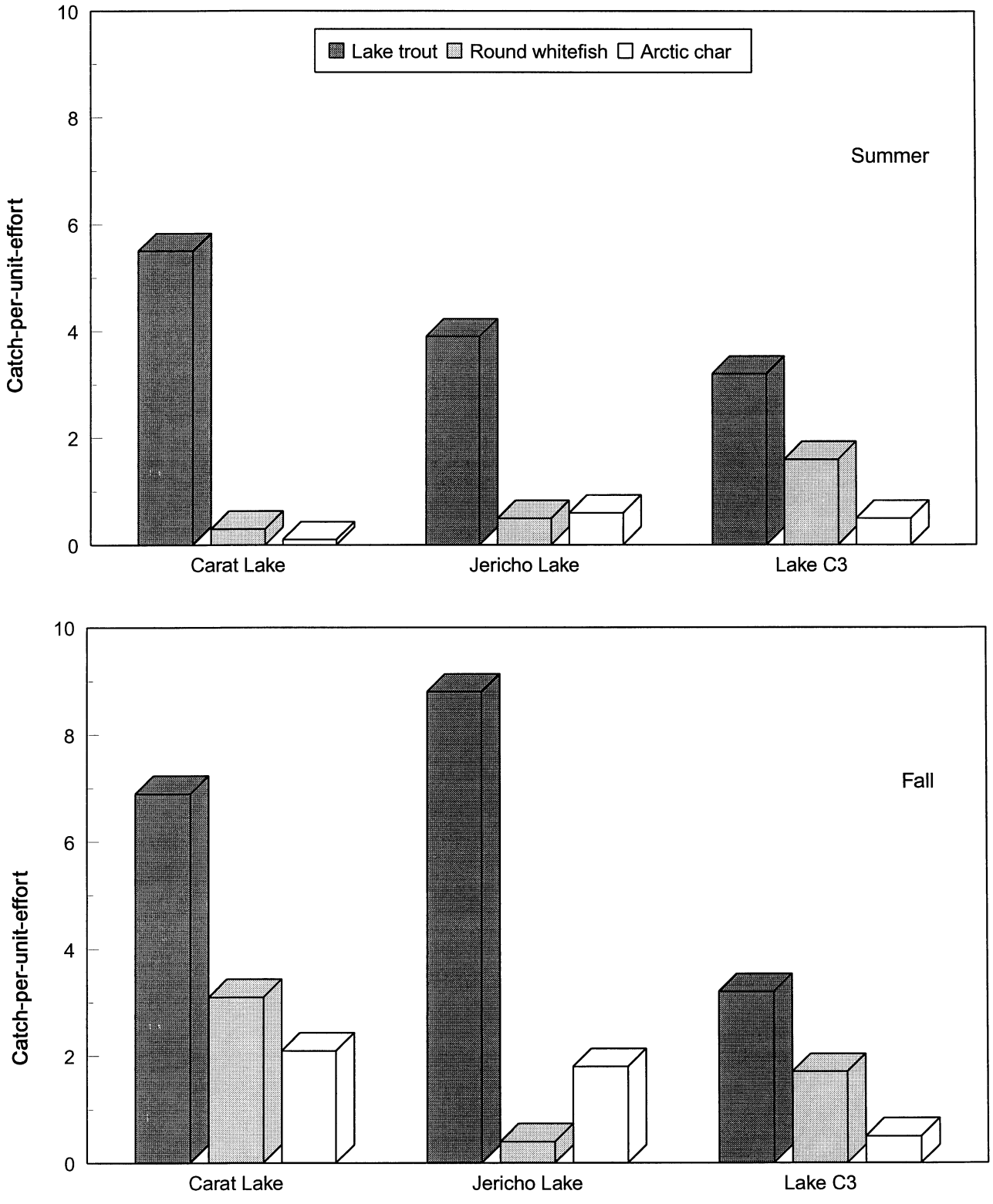

Figure 3.7.2 Catch-per-unit-effort (fish/100 m² ·12h) for lake trout, round whitefish and Arctic char in sampled lakes during summer and fall, Jericho study area 1995.

In contrast to lake trout, catch rates for round whitefish tended to be lower (maximum value did not exceed 3.1 fish/100 $m^2 \cdot 12$ h). CPUE values for this species were highest in Lake C3 during summer and in Carat Lake during fall (1.6 fish/100 $m^2 \cdot 12$ h and 3.1 fish/100 $m^2 \cdot 12$ h, respectively). They did not exceed 0.5 fish/100 $m^2 \cdot 12$ h in Jericho Lake during either summer or fall.

Arctic char also exhibited low catch rates in most lakes (maximum value did not exceed 2.1 fish/100 $m^2 \cdot 12$ h). However, CPUE values recorded for this species tended to be higher during fall.

3.7.1.2 Streams

To assess fish species composition and abundance, tributaries in the Jericho study area were sampled using a variety of methods including backpack electrofishing, snorkelling, angling, and visual observations. Because multiple survey methods were used and most sampling was at a synoptic level, no standardized catch-per-unit-effort data were calculated.

In total, 16 streams were sampled within 4 general locations in the Jericho study area: 2 streams in Lake C3 area, 6 streams in the Carat Lake area, 1 stream in the Jericho Lake area, and 7 streams in the Jericho River area (Figure 3.7.3). A description of sampling effort and fish encountered is given in Appendix H3.

Species recorded in the Jericho study area streams were Arctic grayling (*Thymallus arcticus*), round whitefish, lake trout, burbot (*Lota lota*), ninespine stickleback (*Pungitius pungitius*), and sculpin (*Cottus* spp.) (Table 3.7.2). A small number of preserved sculpin specimens ($n=3$) indicated that captured fish were slimy sculpin (*Cottus cognatus*). Overall, Arctic grayling was the most numerous fish encountered in Jericho study area streams (43%), closely followed by sculpin spp. (38%). Each of the remaining species were much less important in terms of total numbers encountered (none exceeded 7% of the sample).

Table 3.7.2 Percent composition of fish species recorded in sampled streams, Jericho study area 1995 (all sampling methods and periods combined).

Species	Carat Lake Streams		Jericho Lake Streams		Lake C3 Streams		Jericho River Streams		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Arctic grayling	50	29.4	1	100.0			83	61.9	134	43.1
Burbot	7	4.1					5	3.8	12	3.9
Lake trout	6	3.5			3	50.0	4	3.0	13	4.2
Ninespine stickleback							19	14.2	19	6.1
Round whitefish	12	7.1					3	2.2	15	4.8
Sculpin spp.	95	55.9			3	50.0	20	14.9	118	37.9
Total	**170**	**100.0**	**1**	**100.0**	**6**	**100.0**	**134**	**100.0**	**311**	**100.0**

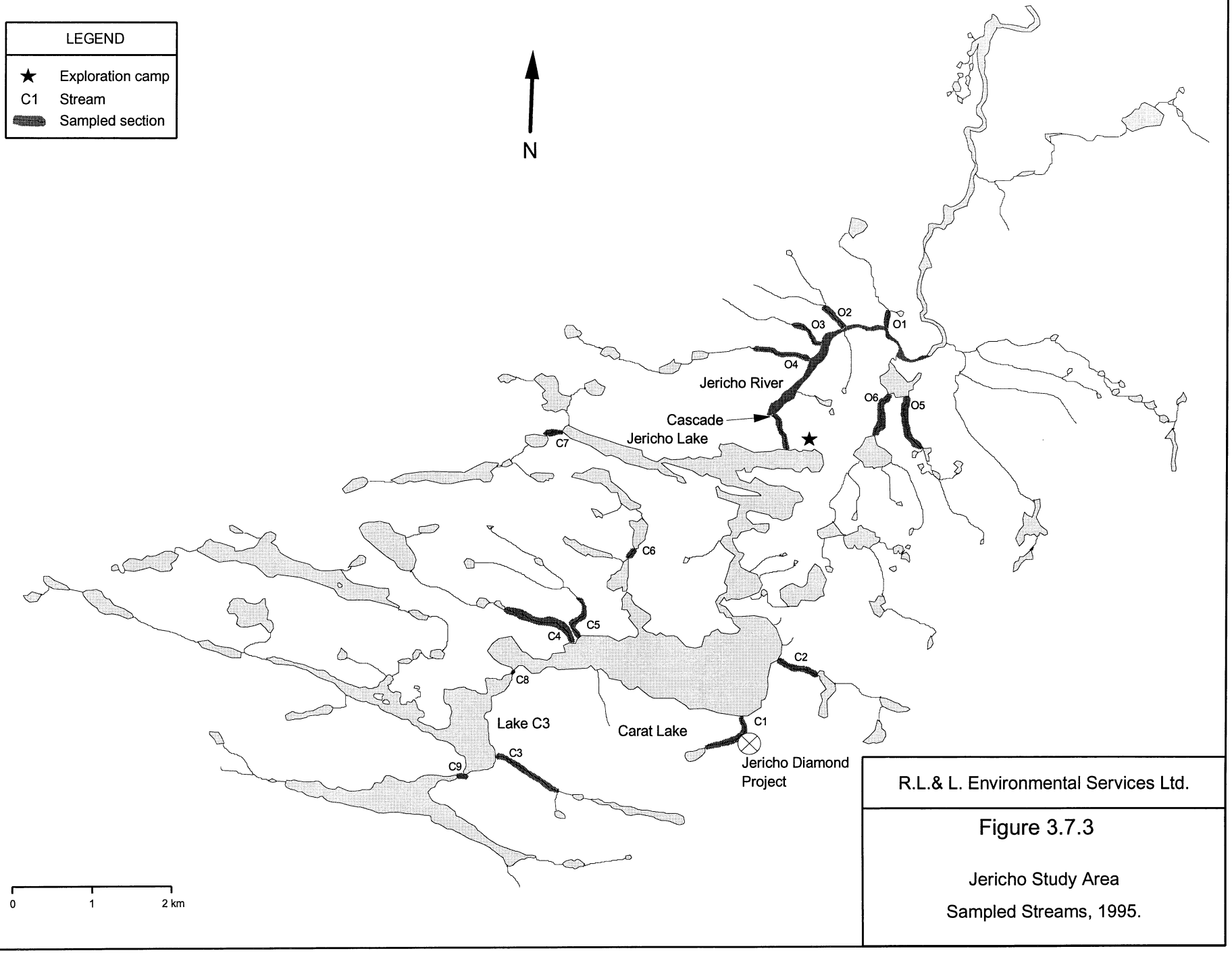

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Figure 3.7.3

Jericho Study Area

Sampled Streams, 1995.

The number of fish encountered varied between areas within the drainage. The highest number of fish was recorded in Carat Lake area streams (170 fish) followed by streams located in the Jericho River area (134 fish). Fewer than seven fish were recorded in each of the remaining locations (Lake C3 and Jericho Lake streams).

Species diversity reflected this pattern of abundance. Highest diversity was recorded in the Carat Lake and Jericho River areas. Five species (all except ninespine stickleback) occurred in the Carat Lake area and six species were represented in the Jericho River system. It should be noted that ninespine stickleback were not recorded in any waterbody upstream of the cascade on Jericho River (situated immediately downstream of Jericho Lake). No more than three species were represented in Lake C3 and Jericho Lake streams; Arctic grayling, lake trout, and sculpin spp. being the only species encountered in these waterbodies.

The relative importance of each species recorded in the Carat Lake drainage also varied depending on area. In the Carat Lake streams, sculpin spp. predominated the sample (56%), followed by a lower percentage of Arctic grayling (29%). Species such as burbot, lake trout, and round whitefish were also present, but were not as important in terms of numbers recorded (<8 fish). In the Jericho River area, the relative importance of major species changed. Arctic grayling accounted for 62% of the sample compared with only 15% for sculpin spp. Ninespine stickleback was also important in terms of percent composition of the sample (14%). In the remaining two areas (Lake C3 and Jericho Lake), limited numbers of fish were recorded, therefore it was difficult to identify the relative importance of different species. In Lake C3 streams lake trout and sculpin spp. were equally important, while Arctic grayling was the only species encountered in the Jericho Lake stream.

Within each area, the number of fish and species encountered varied between individual streams (Figure 3.7.4). Of the six streams inventoried in the Carat Lake area, Stream C1 exhibited the highest species diversity (4) and number of fish recorded (65). The majority of fish recorded in this stream were Arctic grayling (39). Stream C4 contained more than 50 fish, however, these were dominated by sculpin spp. Fish numbers tended to be low in other streams in the Carat Lake area (C2, C5, and C6). Burbot and sculpins spp. were encountered in Streams C2 and C5. Like Stream C1, Arctic grayling were also found in Stream C6 (10). Round whitefish and lake trout were recorded in Stream C8. The presence of these later two species in this relatively large, but short, inlet stream to Carat Lake, likely represents use of the system for feeding purposes by these lake dwelling fish.

Two streams in the Lake C3 area were inventoried; a small tributary (C3) and the large short inlet to the lake (C9). Few fish were encountered in either stream. Sculpin spp. were recorded in Stream C3, while lake trout occurred in Stream C9.

One Arctic grayling was recorded in Stream (C7); the only stream inventoried in the Jericho Lake area.

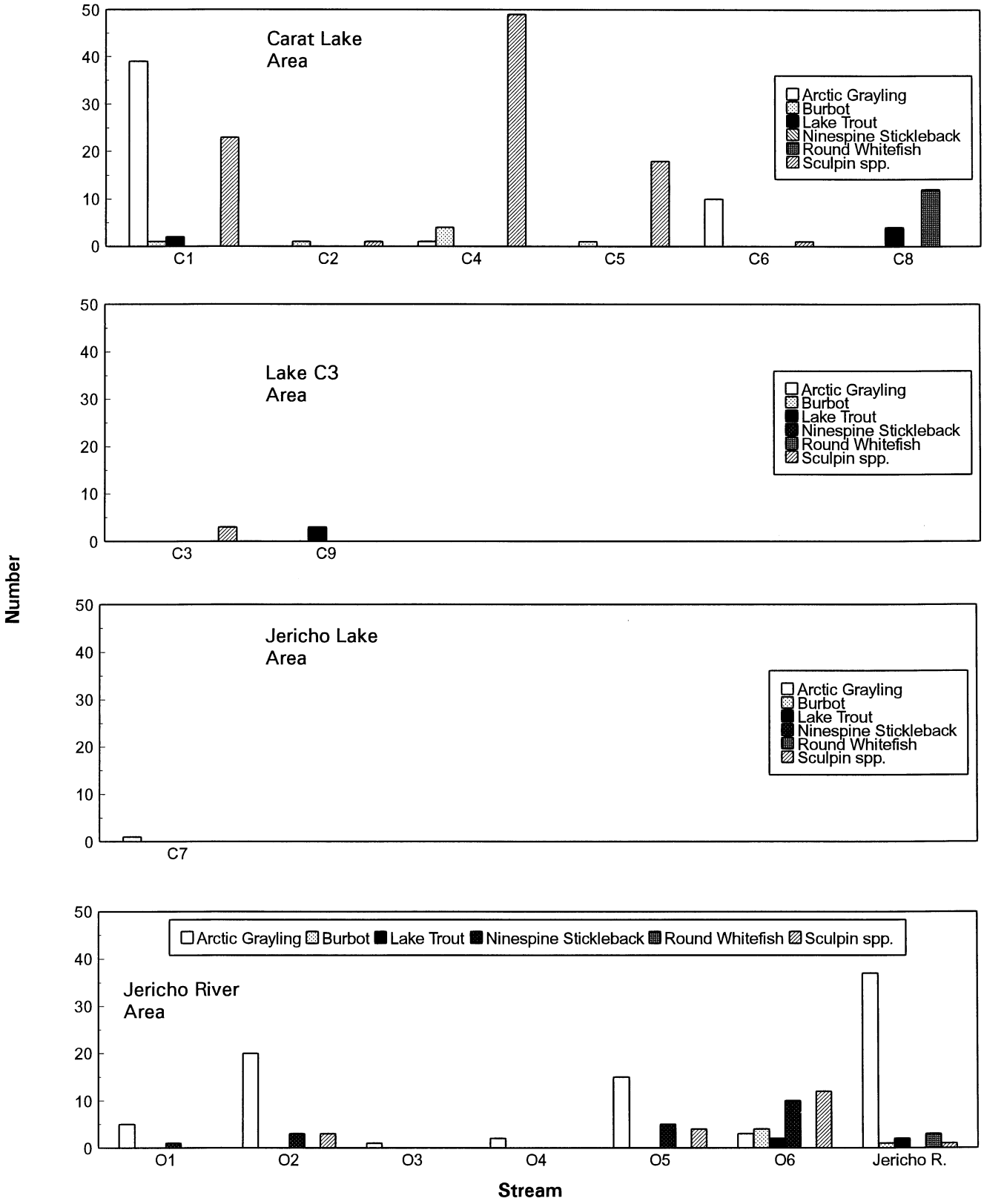


Figure 3.7.4 Comparison of fish numbers recorded in sampled streams within four areas, Jericho study area 1995.

In total, seven streams were inventoried in the Jericho River area. These streams consisted of the one large outlet stream to the Carat Lake watershed (Jericho River) and six small tributaries (O1 to O6) that fed into this major stream. Species diversity was highest in Stream O6 and Jericho River, and in terms of fish numbers, these two streams also contained the most fish (>30 fish recorded in each stream). In the remaining five streams (O1 to O5) species diversity and fish numbers were lower. No more than three species were recorded in each of these streams and only Streams O2 and O5 contained more than 20 fish.

Arctic grayling dominated numerically in six of the seven streams. Highest numbers were recorded in Jericho River (37), O2 (20), and O5 (15). In general, sculpin spp. and ninespine stickleback were the next most numerous fish in the outlet area streams. Although not abundant, lake trout and round whitefish were two species encountered in Jericho River.

3.7.1.3 Summary

Sampled lakes in the study area supported populations of lake trout, round whitefish, and Arctic char. Lake trout was the predominant species with round whitefish and Arctic char being less numerous. Based on abundance indices (catch rates using standardized gill net sets), overall fish densities were highest in Carat Lake followed by Jericho Lake and Lake C3. It is unclear why catch rates differed between lakes. It is possible that they were related to differences in lake size and productivity.

Several fish species were also encountered in study area streams. Arctic grayling and sculpin spp. were the most numerous, followed by lower numbers of lake trout, round whitefish, and burbot. One species, ninespine stickleback, was also relatively numerous, but this fish was present only in the Jericho River area. With the possible exception of Jericho River, sampled streams provided habitat to fish only during the open water period (most likely froze to the channel bottom in winter). Therefore, the presence of species such as Arctic grayling and burbot in study area streams indicated that adults of these species were present in the lakes, even though they were not encountered during lake sampling.

Overall, low numbers of fish were recorded in sampled streams, particularly in tributaries in the Jericho Lake and Lake C3 areas. Low numbers of fish were recorded in most Carat Lake area streams, however, Stream C1 supported a diverse assemblage of species and it contained the highest number of Arctic grayling recorded in the area. Streams in the Jericho River area also contained relatively high numbers of Arctic grayling, and as stated earlier, ninespine stickleback were recorded only at this location. Jericho River and Stream O6 contained the highest numbers of fish and the greatest species diversity in the area.

The fish community in the Jericho study area was typical of those found in subarctic aquatic systems. In the Lupin Mine Site area of Contwoyto Lake (situated 25 km southeast of the Jericho study area), lake trout, round whitefish, Arctic char, and burbot were encountered in lakes, while Arctic grayling, ninespine stickleback, and slimy sculpin were recorded in streams (Reid Crowther & Partners 1985). The only species recorded during

that investigation, but not during the present study, was cisco (*Coregonus artedii*). The absence of cisco from lakes in the Jericho study area may be a reflection of the size of sampled lakes. Cisco are typically found in waterbodies such as Contwoyto Lake, which are much larger than lakes investigated during the present study. Several lakes situated approximately 75 km southwest of the Jericho study area in the Izok Mine Site study area also contained a similar species assemblage (R.L. & L. 1993). The fish community in that study area was dominated by lake trout, followed by lower numbers of round whitefish and Arctic grayling.

3.7.2 Age-Growth Relationships and Sexual Maturity

Length-frequency, length-weight, mean length-at-age, and age-at-maturity analyses were used to describe the biological characteristics of major fish species encountered in the study area (lake trout, round whitefish, Arctic char and Arctic grayling). Since many of these relationships changed during the growing season (e.g., length-at-age in summer versus fall), only data from summer sampling were used for the analyses unless otherwise stated. Raw data used for these analyses are presented in Appendix H4.

3.7.2.1 Lake trout

Lake trout captured in the Jericho study area ranged in fork length from 93 to 848 mm (Figure 3.7.5). Few fish less than 140 mm in length were captured in any of the three sampled lakes. In Carat Lake, the majority of the fish were between 440 and 500 mm compared to fish in Jericho Lake, which exhibited a bimodal grouping (160 to 220 mm and 480 to 540 mm). The largest lake trout encountered in the study area was an individual captured in Carat Lake measuring 848 mm fork length. The sample size of lake trout in Lake C3 was too small to establish an accurate assessment of the length-frequency distribution for this species (n=33). Fork lengths of lake trout in Lake C3 ranged from 153 to 826 mm.

Length weight-regression equations for lake trout in each of the sampled lakes are presented in Table 3.7.3.

Table 3.7.3 Length-weight regression equations for lake trout sampled from lakes during summer, Jericho study area 1995.

Lake	Equation	Sample Size	r^2 Value
Carat	weight (g) = $1.9795 * 10^{-5} *$ fork length$^{2.9167}$	60	0.960
Jericho	weight (g) = $1.6927 * 10^{-5} *$ fork length$^{2.9319}$	58	0.985
C3	weight (g) = $6.4527 * 10^{-5} *$ fork length$^{2.7241}$	16	0.985

Ages of lake trout in the Jericho study area ranged from 1 to 35 years (Table 3.7.4). Growth rates of these fish were generally similar among the three lakes (Figure 3.7.6), although the data suggested that fish in Jericho Lake may have exhibited higher mean length-at-age than samples from the other two study area lakes.

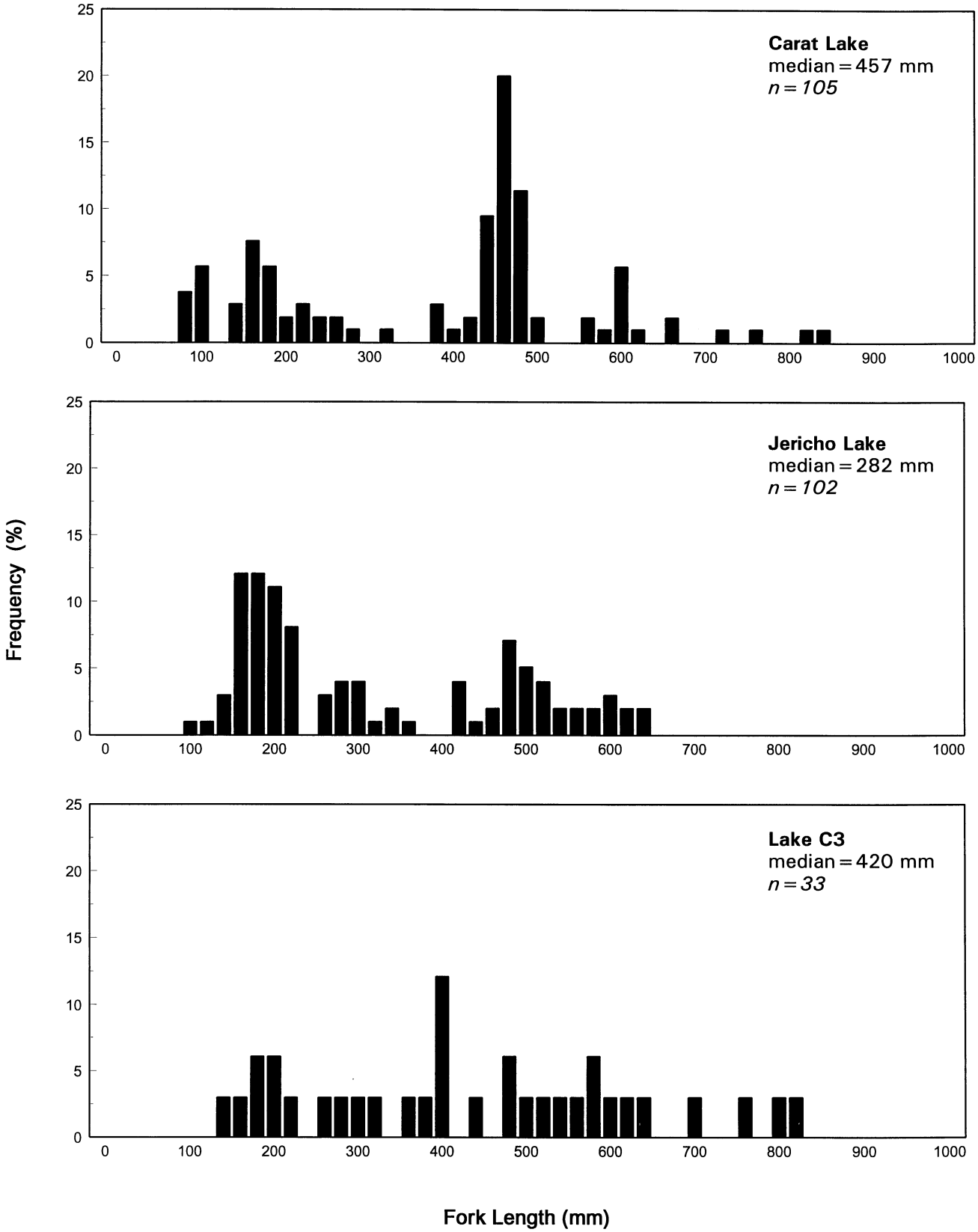


Figure 3.7.5 Length-frequency distribution of lake trout captured in standard gill net sets, Jericho study area 1995 (summer and fall sampling periods combined).

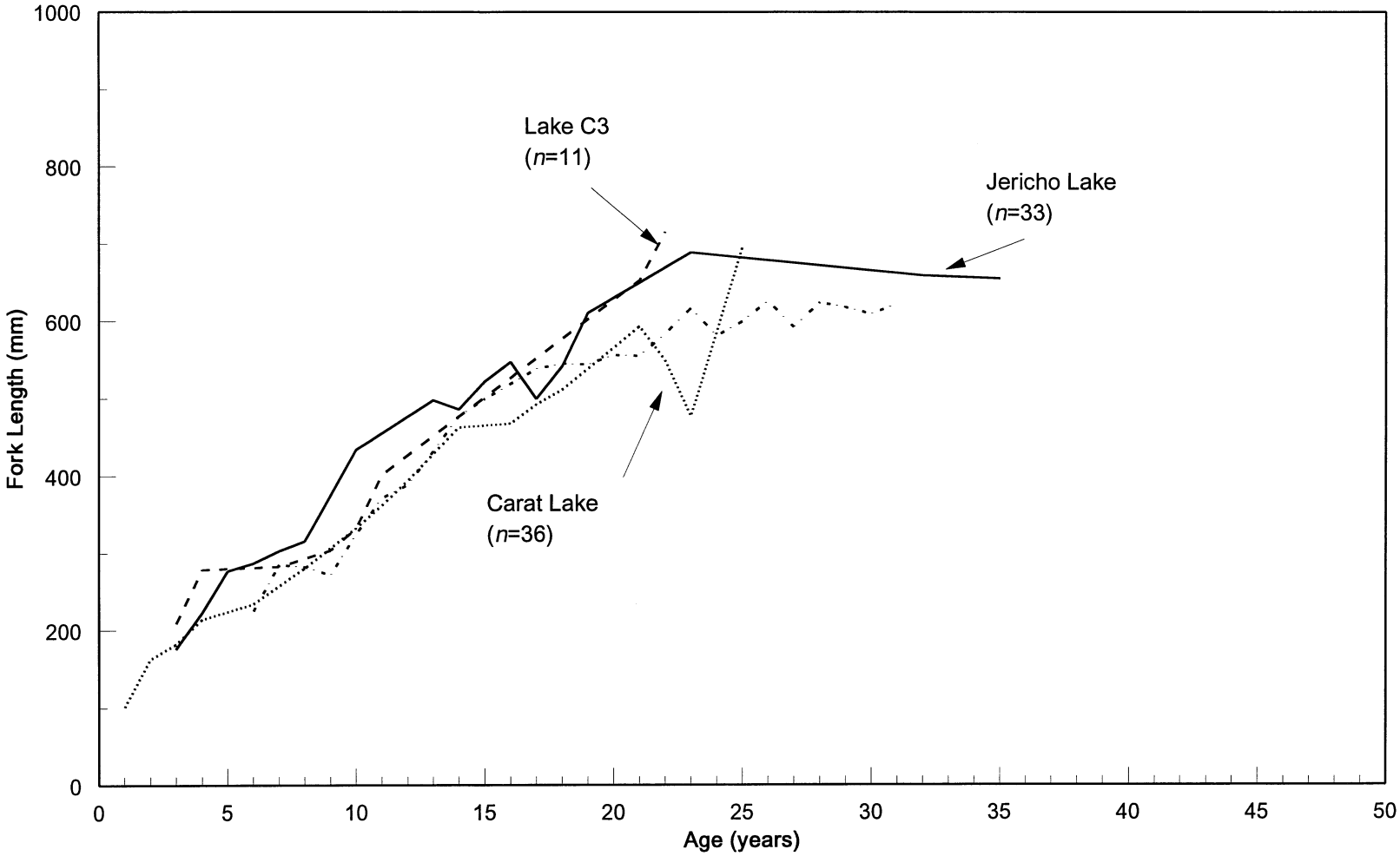


Figure 3.7.6 Comparison of growth curves from lake trout sampled from three lakes during summer, Jericho study area 1995.

Table 3.7.4 Age-length relationship for lake trout sampled from lakes during summer, Jericho study area 1995 (sample sizes in brackets).

Mean Fork Length (mm) at Age			
Age	**Carat Lake**	**Jericho Lake**	**Lake C3**
0			
1	100.3 (4)		
2	162.7 (3)		
3	182.0 (3)	176.0 (5)	208.0 (4)
4	214.0 (1)	222.5 (2)	279.0 (1)
5		277.0 (1)	
6	234.0 (2)	287.0 (1)	
7		303.5 (2)	283.0 (1)
8	280.5 (2)	316.0 (2)	304.0 (1)
9			
10	333.0 (1)	434.0 (1)	332.0 (1)
11	362.3 (3)		402.0 (1)
12	394.0 (1)		
13		498.5 (2)	
14	463.0 (3)	486.3 (3)	
15		523.0 (1)	
16	468.0 (1)	548.0 (2)	
17	493.0 (1)	500.0 (1)	
18	511.8 (5)	542.3 (4)	
19		611.0 (3)	
20			653.0 (1)
21	594.0 (1)		716.0 (1)
22	550.5 (2)	690.0 (1)	
23	478.0 (1)		
24			
25	695.5 (2)		
32		660.0 (1)	
35		656.0 (1)	

Age-at-maturity data were limited due to the preponderance of nonfecund fish in the sample (i.e., fish that did not spawn that year). The percentage of nonfecund mature females in the sample was 35% in Carat Lake (n=23), 44% in Jericho Lake (n=16), and 83% in Lake C3 (n=6). Percentages of nonfecund male lake trout were not calculated because mature nonspawning males cannot be easily distinguished from immature fish in the field (Benoit and Power 1983). Limited data from the present study suggested that male and female lake trout in the Jericho study area become sexually mature between 13 and 15 years of age.

3.7.2.2 Round whitefish

Due to limited sample sizes, data for all lakes and seasons were combined for the analyses of round whitefish. Round whitefish captured in the Jericho study area ranged in length from 102 to 498 mm (Figure 3.7.7). The majority of sampled fish were greater than 360 mm fork length.

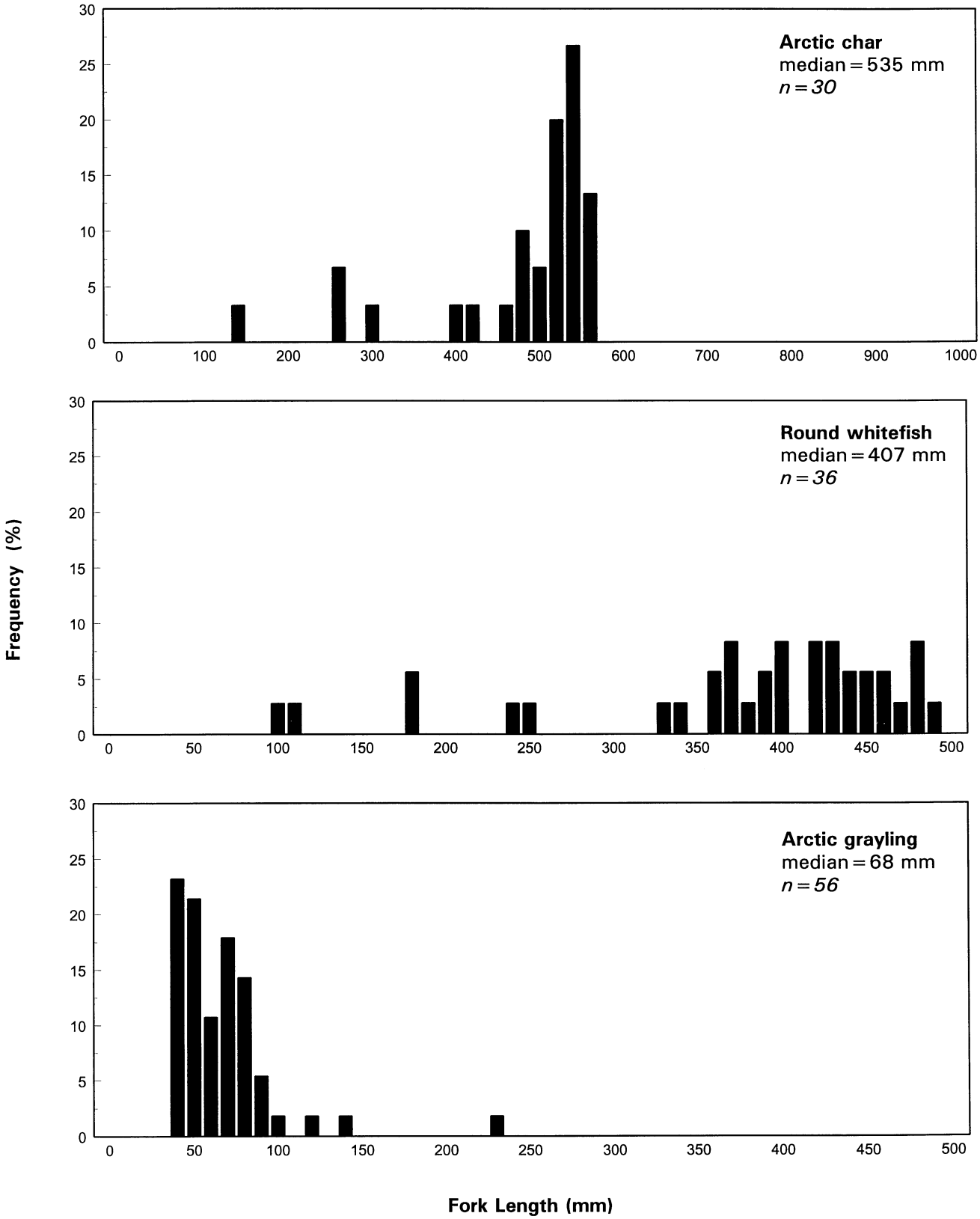


Figure 3.7.7 Length-frequency distribution of Arctic char, round whitefish, and Arctic grayling, Jericho study area 1995 (Graphs for round whitefish and Arctic char generated using gill net data from all lakes and sampling periods combined; graph for Arctic grayling includes data from all areas, periods, and capture methods).

The length-weight regression equation was calculated (summer data only) was found to be:

$$\text{Weight (g)} = 2.9003 * 10^{-6} * \text{Fork Length (mm)}^{3.2555}$$

Where: $n=18$; and, $r^2=0.994$.

Ages of round whitefish ranged from 1 to 21 years (Table 3.7.5) and age-at-length data are illustrated in (Figure 3.7.8).

Table 3.7.5 Age-length relationships for round whitefish, Arctic char, and Arctic grayling, Jericho study area 1995 (data for all lakes and streams and all sampling periods combined; sample sizes in brackets).

Mean Fork Length (mm) at Age			
Age	**Round Whitefish**	**Arctic Char**	**Arctic Grayling**
0			
1	109.5 (2)		66.6 (53)
2		160.0 (1)	132.0 (2)
3			
4	184.0 (1)	315.0 (1)	240 (1)
5	211.5 (2)		
6	257.0 (1)		
7	342.5 (2)	548.0 (1)	
8	370.0 (3)		
9	369.0 (1)	560.0 (1)	
10	395.5 (2)	538.5 (2)	
11	408.7 (6)		
12	451.1 (9)	516.0 (2)	
13	498.0 (1)	568.0 (1)	
14	429.5 (2)	561.0 (1)	
15	443.5 (2)		
16			
17			
18	485.0 (1)		
19			
20			
21	463.0 (1)		
22			
23			
24			

Limited age-at-maturity data for round whitefish suggested that fish in the Jericho study area became sexually mature between 8 to 13 years of age. No nonfecund adults were recorded from the small number of fish sampled from study area lakes.

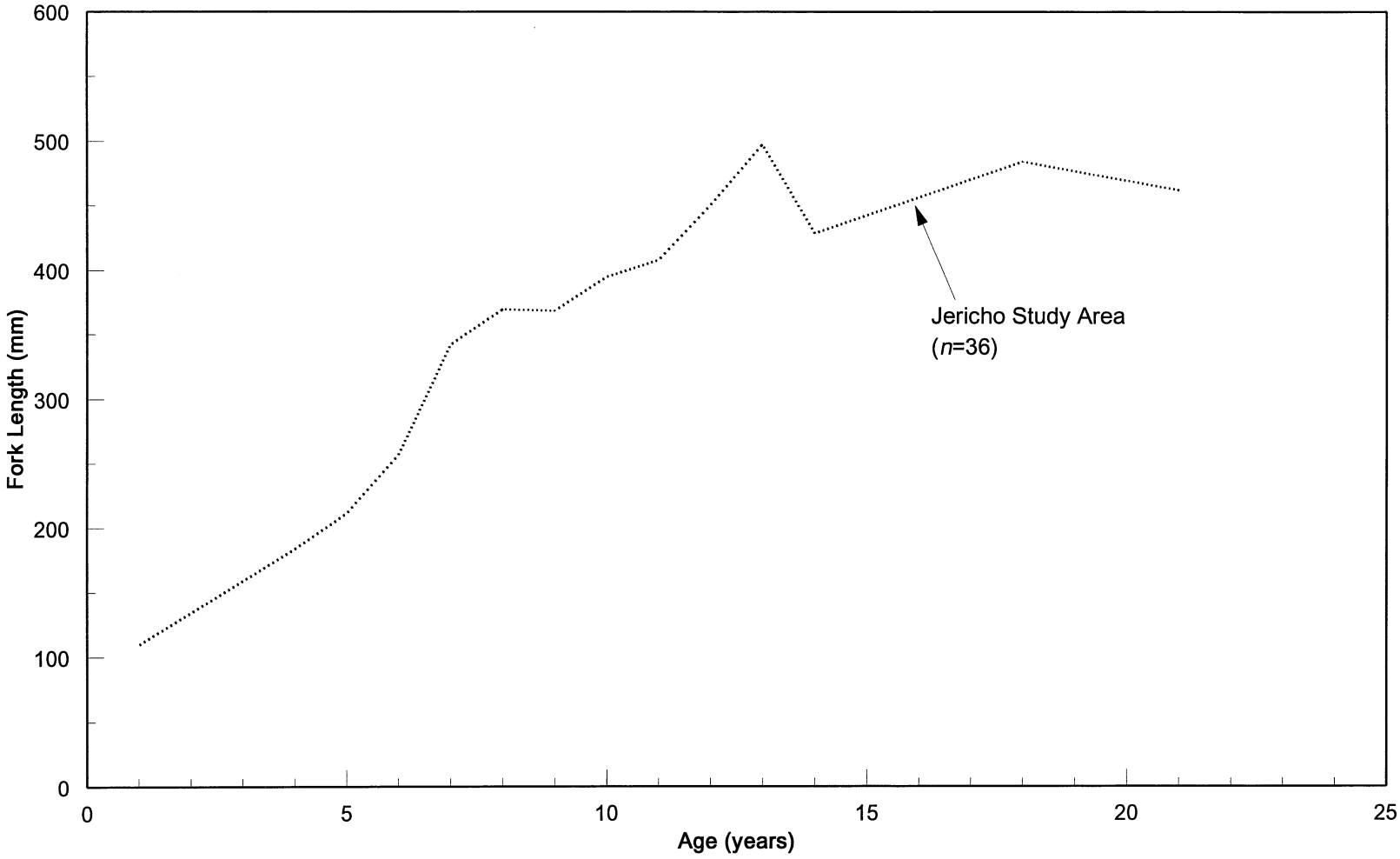


Figure 3.7.8 Growth curve of round whitefish from sampled lakes, Jericho study area 1995 (data represents ages from fish in all study lakes and sampling periods).

3.7.2.3 Arctic char

Because of limited sample sizes, data for all lakes and seasons have been combined for the analyses. Sampled Arctic char ranged in length from 160 to 580 mm in fork length (Figure 3.7.7). However, fish less than 400 mm were infrequent in the catch.

The length-weight regression equation for Arctic char (summer data only) was found to be:

$$\text{Weight (g)} = 3.4975 * 10^{-5} * \text{Fork Length}^{2.8093}$$

Where: $n=15$ and $r^2=0.977$.

Arctic char ranged in age from 2 to 14 years (Table 3.7.5), however, most sampled fish (40%) were between 10 and 12 years old. As such, a useful growth curve could not be generated.

Age-at-maturity data suggested that Arctic char females mature between the ages of 10 and 12 years. Only one sexually mature male Arctic char was identified and it was 14 years of age.

3.7.2.4 Arctic grayling

Due to limited sample sizes, data for the entire study area and all sampling periods (spring, summer, and fall) have been combined for the analyses. Arctic grayling captured in the Jericho study area ranged in length from 41 to 240 mm (Figure 3.7.7). Most of these fish were less than 100 mm in fork length; only four individuals exceeded 100 mm. Arctic grayling in the sample represented fish that were present in study area streams (no Arctic grayling were sampled from lakes). The single individual that exceeded 240 mm in fork length was a mature male captured during spring sampling.

The length-weight regression equation, which represents the length-weight relationship for fish less than 200 mm fork length, was:

$$\text{Weight (g)} = 1.3087 * 10^{-7} * \text{Fork Length (mm)}^{3.8497}$$

Where: $n=21$ and $r^2=0.93896$.

Arctic grayling ranged in age from 1 to 4 years (Table 3.7.5). However, most fish (95% of the sample) were 1 year of age. As such, the age-at-length relationship was not illustrated for Arctic grayling in the Jericho study area.

One fish in the sample, a male 4 years of age, was in spawning condition.

3.7.2.5 Summary

Fish populations in the Jericho study area lakes were slow growing, late maturing, and were generally dominated by older age-classes. To some extent, this reflected the sampling methodology employed (smaller size-classes were not effectively sampled using gill nets), however, these data are typical of subarctic fish populations residing in cold, oligotrophic waterbodies.

The results are very similar to findings made by Reid Crowther & Partners (1985) in the Contwoyto Lake area and by R.L. & L. (1993) in the Izok Mine Site area. Populations in these areas were also slow growing and matured at a late age.

3.7.3 Feeding Habits

Stomach contents of three species (lake trout, round whitefish and arctic char) were analyzed to assess seasonal feeding habits. Data were collected from fish that succumbed during capture or that were sacrificed for tissue samples. The information is presented as frequency of occurrence and percent composition of food items by volume. The raw data used for these analyses can be found in Appendix H4.

3.7.3.1 Lake trout

The diet of lake trout in the Jericho study area consisted principally of zooplankton, fish, and insects (Figures 3.7.9 and 3.7.10). The relative importance of these food items generally remained constant among lakes, but changed between seasons. Zooplankton was the major food group consumed during both summer and fall: values ranged from 38% to 75% occurrence and 36% to 100% composition by volume. In fall, zooplankton increased in importance in lake trout diets: this occurred in all three lakes. This increase in importance was due to changes in the amount of insect matter consumed. During summer, values for insect matter ranged from 17% to 38% occurrence and 17% to 28% composition by volume; in fall, no insects were encountered in lake trout stomachs. The dominant insect group encountered were chironomids. Fish were also found in lake trout stomachs during both summer and fall, however, values did not exceed 16% occurrence or 36% composition. The fish species most often encountered in lake trout stomachs were burbot and other lake trout.

3.7.3.2 Round whitefish

Round whitefish consumed principally insects and zooplankton during both the summer and fall (Figures 3.7.11 and 3.7.12). During summer, insects were the most important item in the round whitefish diet (56% occurrence and 71% composition). Similar to findings for lake trout, the importance of insects decreased during fall, although this food group was still consumed. During fall, zooplankton (38% occurrence and 33% composition) and insects (31% occurrence and 23% composition) dominated the diet. Two other food items that were not present in round whitefish stomachs during summer, lake trout eggs and molluscs (principally pelecypods), were

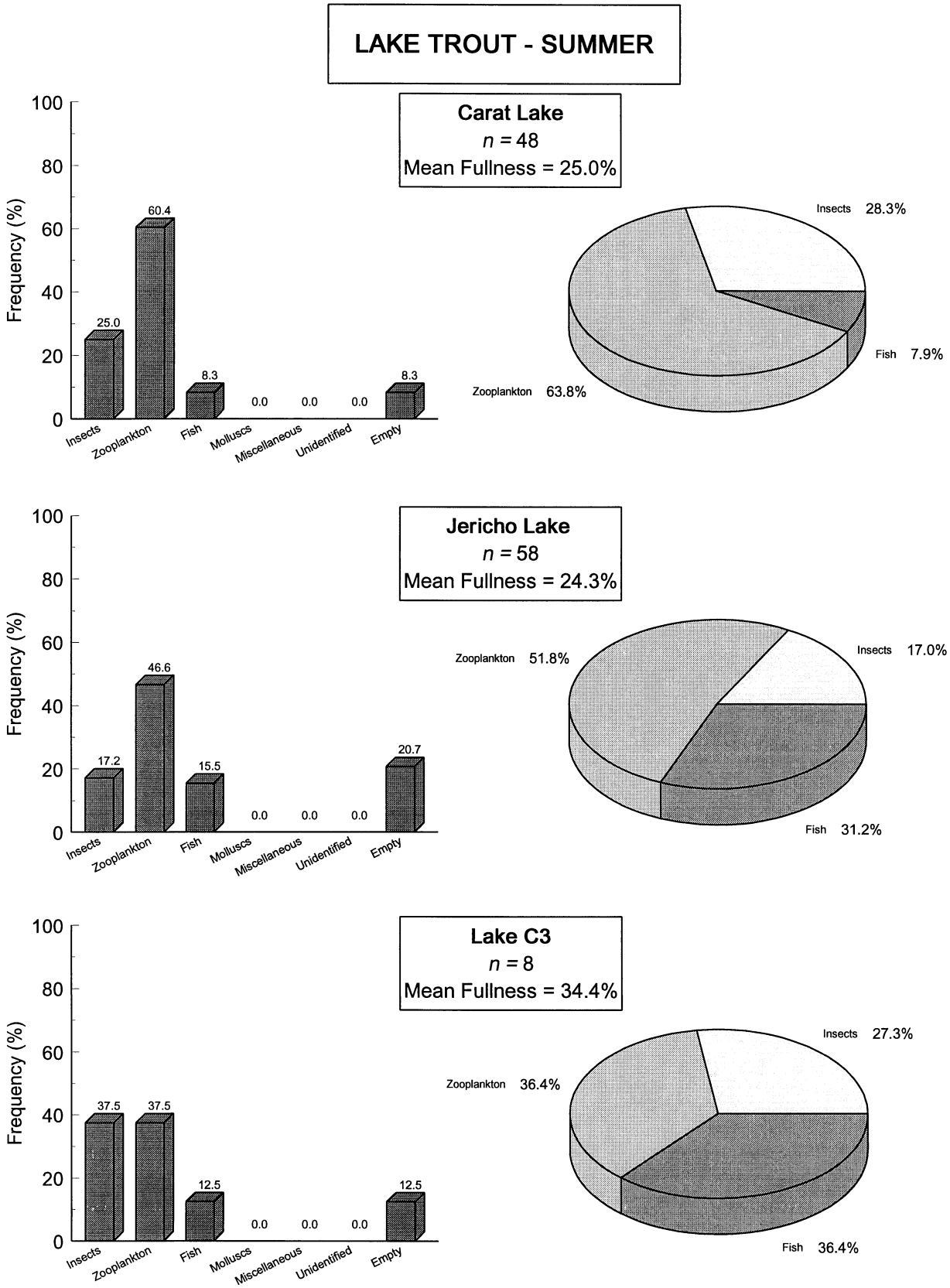


Figure 3.7.9 Frequency of occurrence (bars) and percent composition (pies) of food items encountered in stomachs of lake trout captured from sampled lakes during summer, Jericho study area 1995.

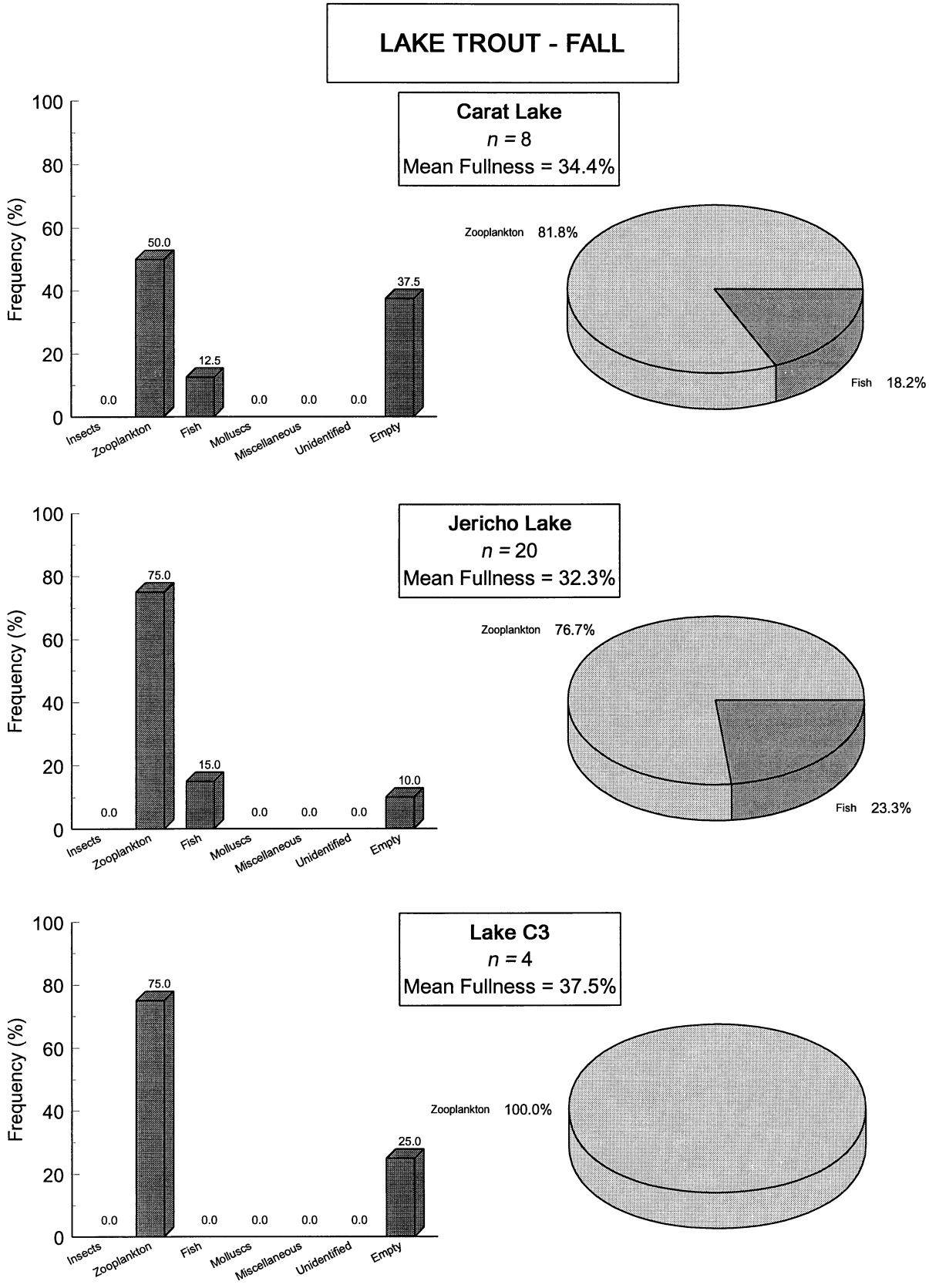


Figure 3.7.10 Frequency of occurrence (bars) and percent composition (pies) of food items encountered in stomachs of lake trout captured from sampled lakes during fall, Jericho study area 1995.

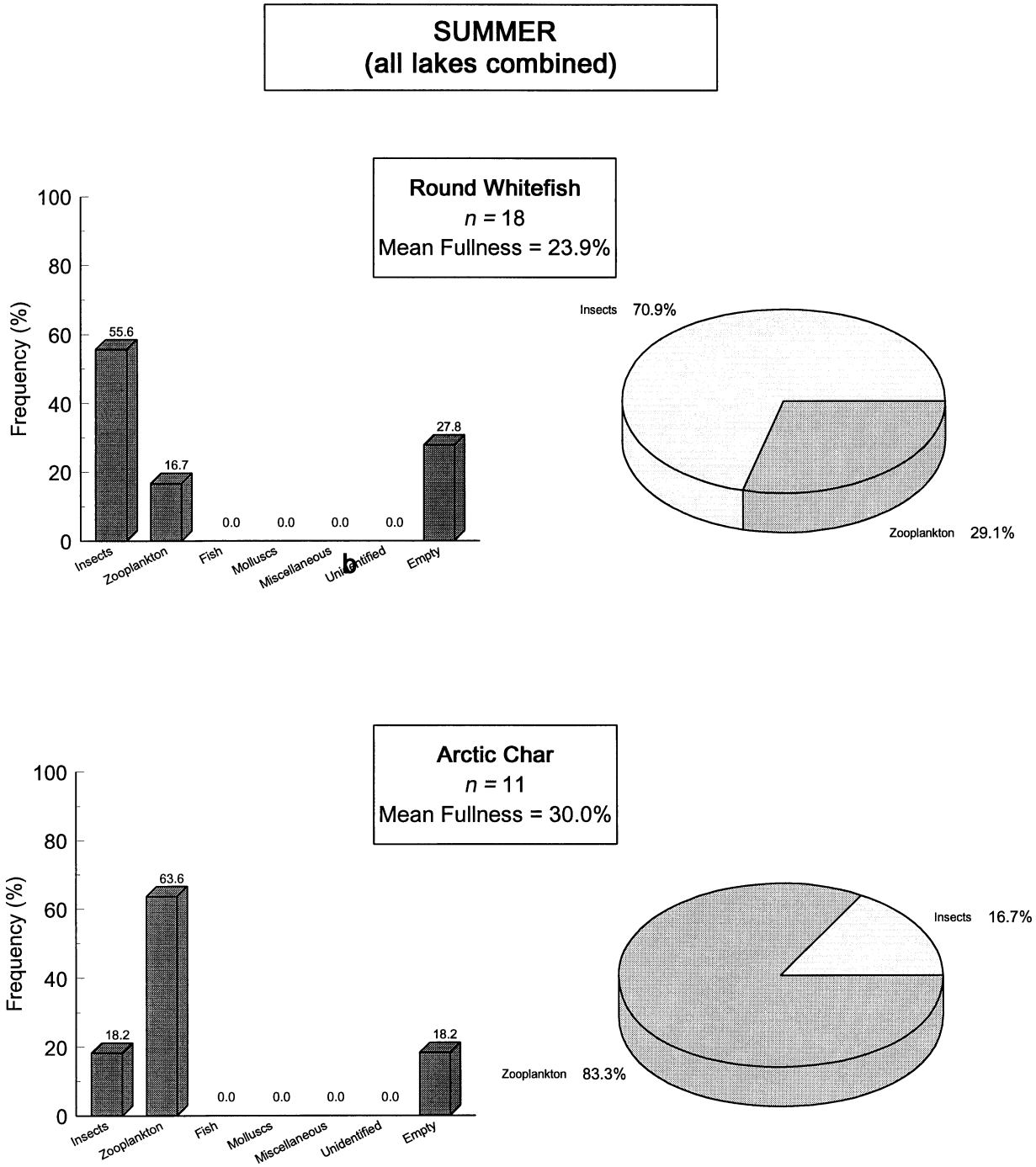


Figure 3.7.11 Frequency of occurrence (bars) and percent composition (pies) of food items encountered in stomachs of round whitefish and Arctic char captured from sampled lakes during summer, Jericho study area 1995.

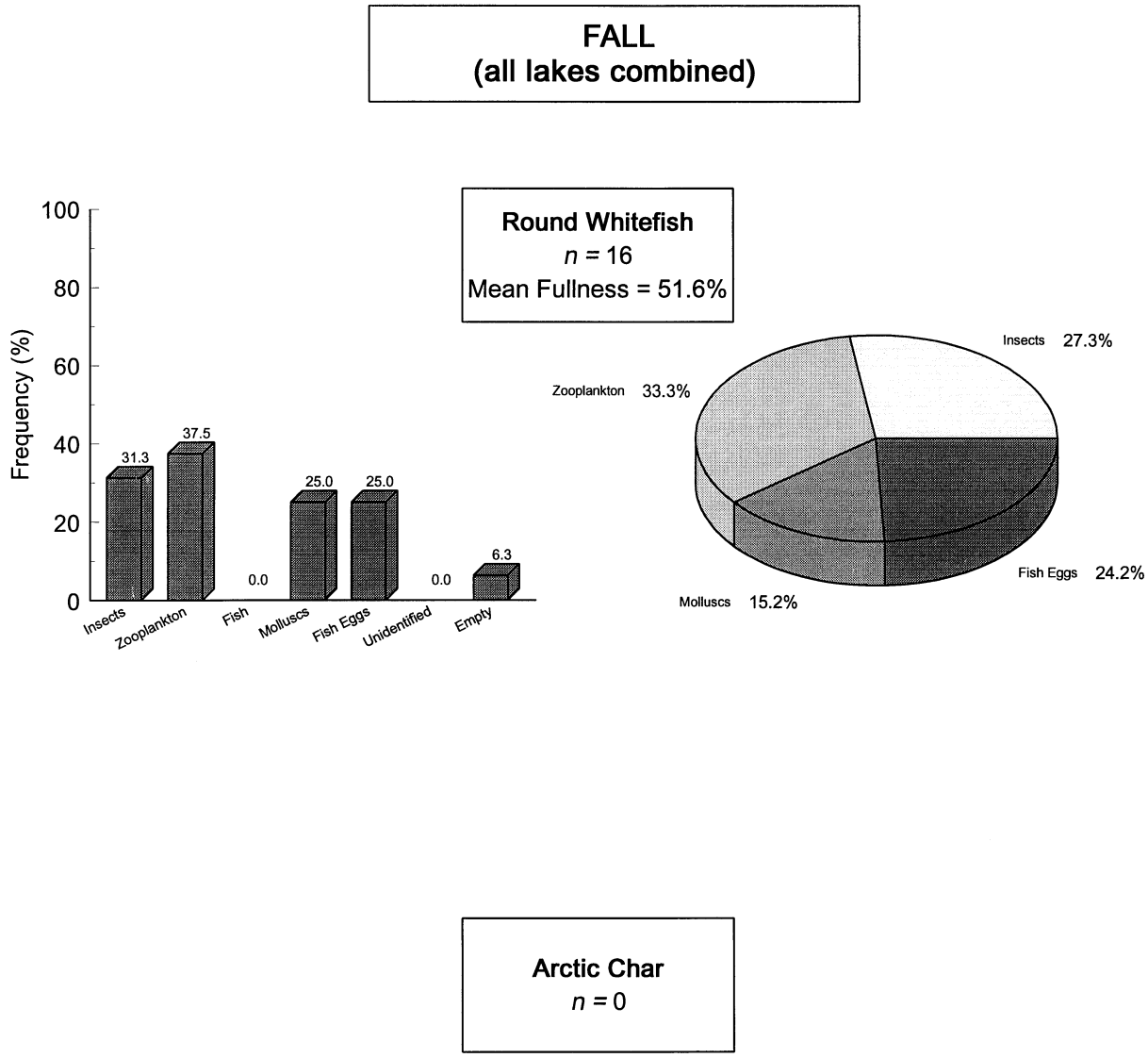


Figure 3.7.12 Frequency of occurrence (bars) and percent composition (pies) of food items encountered in stomachs of round whitefish and Arctic char captured from sampled lakes during fall, Jericho study area 1995.

important foods during fall (25% occurrence and 15% composition, and 25% occurrence and 24% composition, respectively).

3.7.3.3 Arctic char

Both zooplankton and insects were consumed by Arctic char in the summer season (Figure 3.7.11). Similar to findings for lake trout, zooplankton was the dominant food item, accounting for 64% occurrence and 83% composition by volume. No other food items were found in this limited sample and no stomachs were collected from this species during the fall session.

3.7.3.4 Summary

Feeding habits of sport fish in the study area appeared to be related to the most abundant food item available. During summer, the most prevalent food group consumed by all species was aquatic insects, most of which were benthic faunae (chironomids). Zooplankton was also present in fish stomachs in summer, however, during fall, zooplankton became much more prominent in the diet. Other food items consumed included other fish (in lake trout stomachs), as well as molluscs and lake trout eggs (in round whitefish stomachs).

The feeding habits described are typical for the species examined (Scott and Crossman, 1973). Fish may have taken advantage of whatever food items were readily available. Feeding habitats of Jericho study area fish were very similar to those described for lake trout and round whitefish in the Izok Mine Site area (R.L. & L. 1993). Food items in fish stomachs from this area were dominated by insects and zooplankton.

3.7.4 Population Estimates

During the 1995 field program, attempts were made to estimate the size of fish populations inhabiting Jericho Lake and Carat Lake, two waterbodies that could be potentially affected by any proposed development. Because lake trout were the most numerous fish encountered in the study area lakes and they were easily captured by the sampling techniques employed (gillnetting and angling), this species was targeted for population estimates. Captured lake trout in good physical condition were marked with a numbered Floy tag during summer and fall lake sampling. It was hoped that a sufficient number of the fish would be subsequently recaptured to generate useful population estimates.

Despite extensive sampling effort expended in both lakes, only 57 lake trout were marked and released during field sampling (Table 3.7.6). Given the size of the two study lakes (surface areas of Carat Lake and Jericho Lake are approximately 313 ha and 129 ha, respectively), the number of marked fish released into the system was too low to ensure an adequate recapture rate of tagged fish. As a consequence, only four marked lake trout were recaptured; all from Jericho Lake. To ensure reasonable precision around a population estimate generated from mark-recapture information, a minimum number of recaptured fish is required. For the estimate method proposed for this study (Peterson's Single Census Population Estimate) the minimum number required was seven recaptured fish (Seber 1982). As such, reliable population estimates could not be generated from these data.

Table 3.7.6 Number of lake trout marked (and recaptured) and the amount of gillnetting effort expended in Carat Lake and Jericho Lake during summer and fall sampling, Jericho study area 1995.

Lake	Number Tagged (Number Recaptured)					
	Summer		Fall		Total	
	Effort[a]	Number	Effort	Number	Effort	Number
Carat Lake	192.0	18	34.7	9	226.7	27
Jericho Lake	193.6	13	61.2	17 (4)	254.8	30 (4)
Total	**385.6**	**31**	**95.9**	**26 (4)**	**481.5**	**57 (4)**

[a]Unit of effort represents 100 m/h of gillnetting.

3.7.5 Fish Movements

The Jericho study area contains several lakes that are interconnected by large streams. As such, the potential exists for fish to undertake movements between waterbodies. Also, some species, such as Arctic grayling, may make small scale movements into streams to complete several of their life requisites (e.g., spawning and rearing).

In an attempt to assess movement patterns of fish in the Jericho study area, a limited tagging program was initiated during the 1995 study. During this time, lake trout, Arctic char, and Arctic grayling in good physical condition were tagged and released. Round whitefish were not included in the program because captured individuals generally were in poor physical condition.

During the tagging program, 69 lake trout and 17 Arctic char were tagged and released in the three study lakes (Table 3.7.7). One other fish, an Arctic grayling was tagged and released during spring in Stream C6, which enters Carat Lake at its northwest end. Of these tagged fish four lake trout were recaptured (all in Jericho Lake); no Arctic char or Arctic grayling were recaptured during the study. These marked fish were originally released in Jericho Lake.

These limited results make it difficult to assess movement patterns of fish in the Jericho study area. However, characteristics of the major watercourses in the area and fish capture data can also be used to indicate whether movements of large numbers of fish occur between waterbodies.

Four main watercourses existed in the study area. Two streams, one flowing into Lake C3 (Stream C9) and the other connecting Lake C3 and Carat Lake (Stream C8) had similar characteristics. Both were short (<400 m), but had wide, shallow, poorly defined channels dominated by boulder substrates (see Section 3.8). A third watercourse, connecting Carat Lake and Jericho Lake, was simply a narrowing of the basin between these two waterbodies. It had little water flow and was dominated by sand substrates. The characteristics of these three watercourses would hamper, but not prevent, movement of large adult fish between lakes.

Table 3.7.7 Number of lake trout, Arctic char and Arctic grayling tagged (and recaptured) in sampled waterbodies, Jericho study area 1995.

Area	Summer	Fall	Total
Carat Lake			
Lake Trout	18	9	27 (0)
Arctic Char	1	6	7 (0)
Sub-total	**19 (0)**	**15 (0)**	**34 (0)**
Jericho Lake			
Lake Trout	13	17 (4)	30 (4)
Arctic Char	1	7	8 (0)
Sub-total	**14 (0)**	**24 (4)**	**38 (4)**
Lake C3			
Lake Trout	5	7	12 (0)
Arctic Char	0	2	2 (0)
Sub-total	**5 (0)**	**9 (0)**	**14 (0)**
Stream C6			
Arctic Grayling			1[a] (0)
Combined			
Lake Trout	36	33 (4)	69 (4)
Arctic Char	2	15 (0)	17 (0)
Arctic Grayling			1 (0)
Total	**38 (0)**	**48 (4)**	**87 (4)**

[a]Single fish represents a ripe male tagged during spring sampling period.

The fourth main watercourse in the study area was the outlet system (Jericho River). This stream flowed from Jericho Lake in a northward direction to connect with the Burnside River drainage system. Because Jericho River was relatively large (see Section 3.8) and was connected to the larger Burnside River system, there was the potential for annual movements of fish into and through the study area. However, the presence of a cascade area at the outlet of Jericho Lake, (caused by a decrease in elevation of 15 m) created a major, but not impassable, barrier to fish. The presence of this barrier would severely limit movements of fish into study area lakes.

To establish whether fish attempted to move into the study area via the outlet system, snorkel surveys were undertaken in Jericho River during spring, summer, and fall. The surveys were used to count any large fish that may have been staging immediately downstream of the cascade area. Results during each of the three surveys identified no fish concentrations at the base of the cascade. As such, large numbers of fish probably do not undertake annual upstream migrations into the Jericho study area.

3.7.6 Resource and Potential Harvest

Based on available information, waterbodies in the study area were not used extensively for commercial or domestic fisheries, and recreational use was restricted to anglers associated with exploration activity being conducted in the area. A limited number of personnel housed in the Canamera Geological Ltd. exploration camp actively fished Jericho Lake during the 1995 study period, but angling was restricted to the immediate vicinity around the camp along the shore. No anglers were observed using the study area tributaries.

The relatively small size of study area lakes and their low productivity make their sport fish populations susceptible to over harvest. An estimate of the annual sport fish harvest a waterbody can support, an equation that employs a lake's surface area, was developed by Evans et al. (1990) for Northern Ontario. This equation has been recommended to calculate potential annual harvest of lake trout in inland lakes (Oliver et al. 1991) and is as follows:

$$\log_{10} H = 0.60 + 0.72 \log_{10} A$$

Where: H = potential annual harvest of lake trout (kg)
A = surface area (ha) of lake

(lake surface areas based on 1:50 000 scale N.T.S. maps)

Using this formula, the potential annual harvest of lake trout from each of the three study area lakes ranged between 99 kg in Lake C3 to 249 kg in Carat Lake, with the larger lakes having the highest potential harvest (Table 3.7.8). These values indicate that lake trout residing in these lakes are susceptible to over harvest. Caution should be used when interpreting these values since there are a number of factors that would cause differences between sub-Arctic lakes within the study area and lakes in northern Ontario. These include lower nutrient levels, a colder water temperature regime, and a shorter open water period in the sub-Arctic region. These factors would likely reduce the harvest potential of these lakes relative to those in northern Ontario.

Table 3.7.8 Surface areas and potential annual harvests of lake trout populations in sampled lakes, Jericho study area 1995.

Lake	Surface Area (ha)[a]	Potential Harvest of Lake Trout (kg/yr)[b]
Carat Lake	312.8	249.2
Jericho Lake	129.1	131.8
Lake C3	87.1	99.2

[a]Lake surface area measured from 1:50 000 scale N.T.S. maps using a Keuffel and Esser planimeter.
[b]Based on Evan's formula for harvest.

3.8 HABITAT AND HABITAT USE

Aquatic habitat in the Jericho study area was inventoried during spring and summer sampling periods. During these inventories, lake and stream habitat was described and its value to fish communities assessed. Summary information has been presented in this section; raw data are provided in Appendix I1.

3.8.1 Lakes

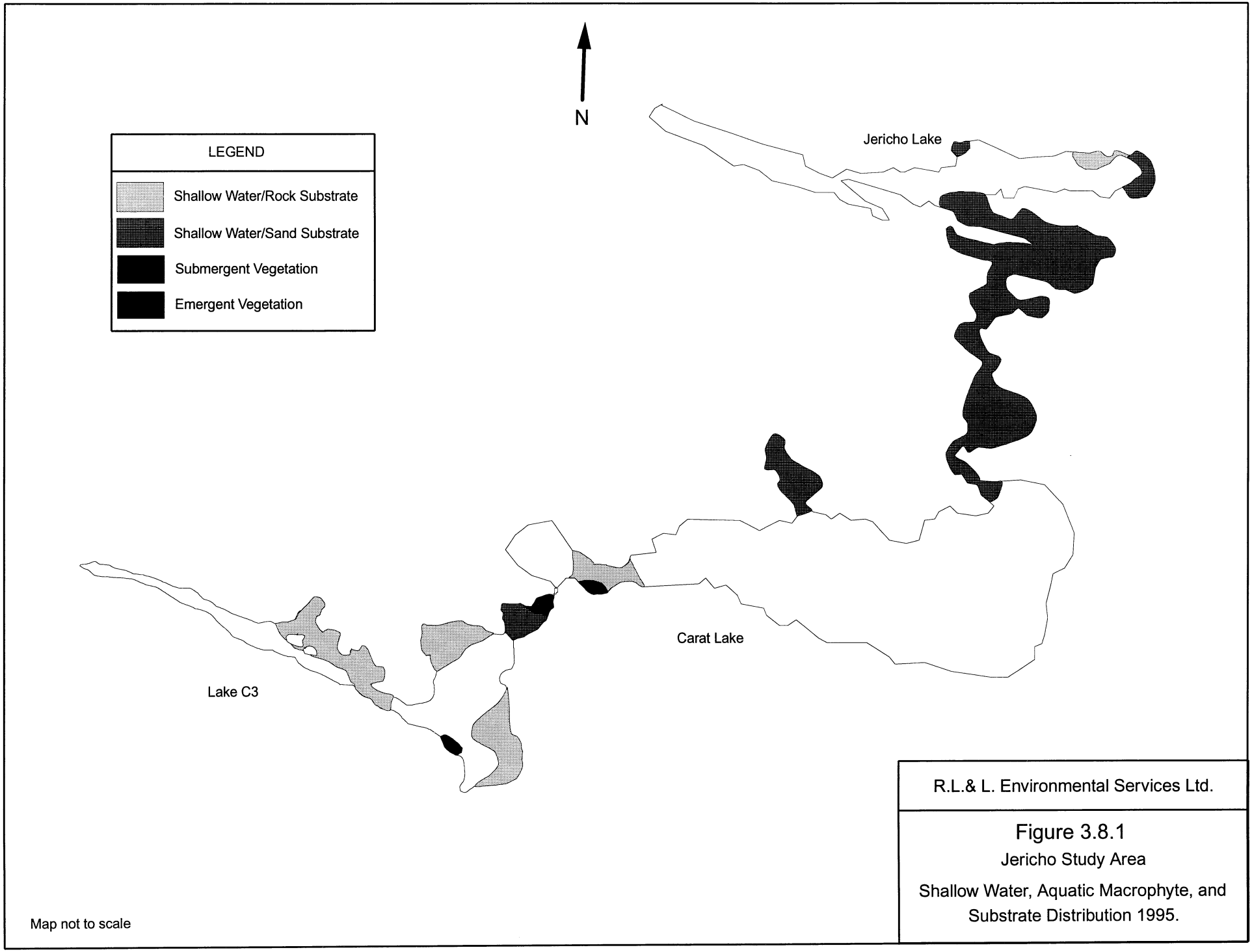
Three lakes were surveyed: Carat Lake, Jericho Lake, and Lake C3 (Figure 3.8.1). These lakes are characterized as oligotrophic systems that are nutrient poor (see Sections 3.1 and 3.2). These characteristics limit primary productivity, which in turn, reduces the growth potential of a fish population. A second factor that could influence a fish population was limited availability of critical habitats such as spawning and rearing areas.

To assess fish habitat in each lake, shoreline surveys were conducted during the summer sampling period. They were designed to identify shallow water areas containing aquatic macrophytes; locations that provide rearing habitat for many lake fish species. The survey was also designed to identify potential spawning habitat in each of the lakes.

Rearing areas provided by shallow water areas containing aquatic macrophytes were not abundant in any of the three lakes (Figure 3.8.1). This was likely due to several factors including restricted littoral zones (limited amounts of shallow water), a paucity of plant nutrients, cold water temperatures, and lack of suitable substrates (fine sediments).

Aquatic macrophytes recorded during the survey included both emergent and submergent plant communities. Emergents identified in the study area were sedges (*Carex* spp.) and aquatic grasses (*Glyceria* spp.). Overall, they were sparsely distributed along the shoreline perimeter. Only one area contained an extensive zone of these plants (southwest corner of Carat Lake). Submergent vegetation that could be observed from the water's surface was also limited in abundance. The only species encountered was coontail (*Ceratophyllum demersum*), and it was restricted to two small areas in Lake C3.

For many lake species, including lake trout, Arctic char, round whitefish, and burbot, shallow water areas containing aquatic macrophytes provide food and shelter for younger age-classes, as well as feeding areas for adults. Few areas in the Jericho study area exhibited these characteristics. Although there was extensive shallow water in the southern basin of Jericho Lake and in the central basin of Lake C3, these sections provided little shelter due to the absence of aquatic macrophytes. Fish capture data from these areas suggested that they were not used extensively by juvenile fish (zero juvenile fish captured). The habitat in the remainder of each of the study lakes was deep and had rocky shorelines.


N
LEGEND
Shallow Water/Rock Substrate
Shallow Water/Sand Substrate
Submergent Vegetation
Emergent Vegetation
Jericho Lake
Carat Lake
Lake C3
Map not to scale
R.L.& L. Environmental Services Ltd.
Figure 3.8.1
Jericho Study Area
Shallow Water, Aquatic Macrophyte, and Substrate Distribution 1995.

Spawning areas for lake dwelling species such as lake trout, Arctic char and round whitefish, which require gravel to boulder sized substrate in areas sufficiently deep enough to avoid freezing (Scott and Crossman 1973), were widely distributed in all three lakes. Gillnetting data during fall indicated that individuals of all three species in spawning or prespawning condition, were widely distributed and no concentrations of spawning fish were encountered. This information suggests that spawning habitat was not limited in any of the three lakes surveyed.

3.8.2 Streams

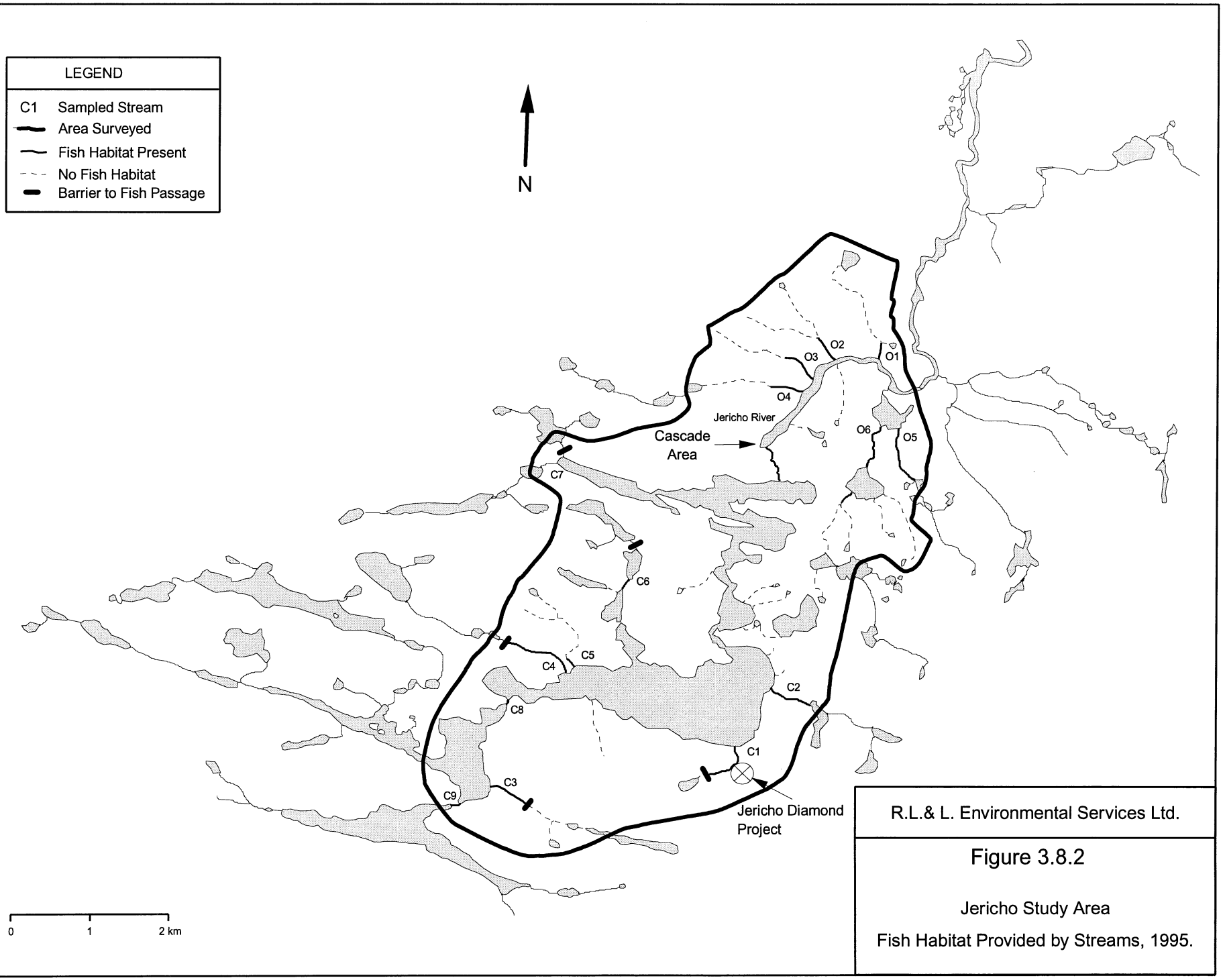
Investigations of streams in the study area were undertaken during spring and summer. During spring, a reconnaissance level survey was conducted from the air or from the ground to identify streams that provided some habitat for fish communities residing in study area lakes and to assess their potential as spawning habitat (i.e., use by spring spawning Arctic grayling). Surveys during summer were used to provide a more detailed description of stream characteristics and to assess their overall potential as fish habitat.

In total, 26 water courses feeding into the three study area lakes and Jericho River were examined (Figure 3.8.2). Of these, nine were ephemeral (contained water only during the snow melt period or during rainfall events) and one contained a barrier to fish passage near its mouth (3 m vertical drop). These watercourses were deemed to have no value to fish communities, and therefore, did not receive more extensive investigation.

Sixteen other streams in the study area were deemed to have some potential as fish habitat. These streams were located in four general areas: Carat Lake (6), Lake C3 (2), Jericho Lake (1), and Jericho River (7). The majority of these streams were small (13). As such, intermittent or zero flow occurred in these watercourses during summer. The three remaining surveyed streams were part of the main drainage system within the study area. Consequently, they were larger and maintained water flow during the entire open water period. Stream C9 was the primary inlet stream to Lake C3, while Stream C8 was the inlet stream to Carat Lake. Jericho River was the outlet system for the study area lakes. These watercourses were larger than the other tributary streams in the area (channel widths >30 m compared to <3 m, respectively).

The habitat potential of inventoried streams for fish communities residing in study area lakes varied. During the open water period, they were used for feeding by adult fish, for spawning by species such as Arctic grayling, and for rearing by younger age-classes of all fish species. Their value as habitat was dependant on several factors such as stream size, channel characteristics, and substrate type.

In general, streams in the study area provided low quality fish habitat. For smaller streams, this was due to limited water flow during summer. Most of the larger systems were limited by the lack of deep water caused by poorly defined channels.



R.L.& L. Environmental Services Ltd.

Figure 3.8.2

Jericho Study Area

Fish Habitat Provided by Streams, 1995.

3.8.2.1 Lake C3 Streams

Stream C9

Stream C9 is the inlet tributary situated at the south end of the Lake C3. It is characterized by a short length, a wide shallow poorly defined channel, and a preponderance of boulder substrates (Table 3.8.1). These characteristics created an abundance of RUN, RIFFLE and RAPID habitats. Lake trout was the only species encountered in Stream C9 (Table 3.8.2). These individuals, which were adults, were recorded at the confluence of the stream and Lake C3. Given its physical characteristics, Stream C9 provided limited habitat to fish. It was used for feeding purposes by adult fish, however there was limited potential as spawning or rearing habitat (Table 3.8.3).

Stream C3

Stream C3 is a small, ill-defined water course that drains a series of small waterbodies situated to the east of Lake C3. Due to its small size, this stream had zero flow during summer and parts of the channel exhibited sub-surface flow during the spring survey. A barrier to fish passage occurred approximately 700 m upstream from its mouth. Stream C3 exhibited a moderate slope and was dominated by RIFFLE habitat and contained gravel, cobble, and boulder substrates. A small number of sculpin were the only fish recorded in this stream. Its small size and poorly defined channel, severely limited the value of Stream C3 as habitat for the fish community in Lake C3.

3.8.2.2 Carat Lake Streams

Stream C8

Stream C8, which is the inlet to Carat Lake, was the largest stream in this area. It exhibited characteristics very similar to Stream C9, in that it was short, wide, shallow, and exhibited a poorly defined channel that was dominated by boulder substrates. Juvenile lake trout and round whitefish were recorded in the surveyed section of this stream, which suggested that Stream C8 was used for rearing purposes by these species. Two adult lake trout were also enumerated at the mouth of the stream, which indicated that larger fish may feed in the stream.

Stream C1

Stream C1 is a small watercourse that drains a headwater lake situated to the south of Carat Lake. This stream is within the Jericho Diamond Project area.

The lowermost 200 m of this stream consisted of a series of small channels, which amalgamated into a single channel further upstream. A small cascade occurred approximately 100 m downstream of the headwater lake; this cascade is likely a barrier to fish passage during low flow periods. Although small, this stream exhibited water flow during spring and summer. The stream contained varying amounts of gravel, cobble, and boulder substrates, and the channel was dominated equally by RIFFLE, FLAT, and RUN habitat.

Table 3.8.1 Summary of habitat characteristics[a] of inventoried streams during spring and summer, Jericho study area 1995.

Area	Stream	Surveyed Length (m)	Average Width (m)	Discharge[b] (m^3/s)	Slope (%)	Channel Type (%)		Bank Type (%)		Habitat Type (%)							Substrate Type (%)				
						Single	Multiple	Distinct	Indistinct	Pool	Run	Flat	Cascade	Riffle	Rapid	Dispersed	Si/Sa	Gr	Co	Bo	Bed
Carat L.	C1	454	1.6	0.16	2.0	22.0	78.0	22.0	78.0		24.2			75.8			7.3	17.9	49.7	26.5	
	C2	300	0.5	0.04	5.0		100.0		100.0					100.0				40.0	50.0	10.0	
	C4	800	0.6	0.10	1.5	27.9	72.1	73.1	26.9	5.2	94.8						71.5	4.8	3.2	20.5	
	C5	300	0.3	0.01	0.5		100.0		100.0			100.0					100.0				
	C6	150	0.4	0.02	4.0	100.0		100.0			76.7	23.3						2.3	15.3	82.3	
	C8	300	60.0	N/D[c]	1.0	100.0			100.0		33.3	33.3		33.3					1.7	86.7	11.7
Lake C3	C3	800	0.4	0.02	4.0		100.0		100.0					80.0		20.0		40.0	50.0	10.0	
	C9	230	70.0	N/D	1.5	100.0			100.0		39.1			43.5	17.4				8.0	86.7	5.2
Jericho L.	C7	251	2.5	0.05	1.0	2.8	97.2		100.0		47.4	15.5		2.8		34.3	25.9			74.1	
Jericho R.	O1	369	0.4	0.03	1.0	37.1	62.9	31.7	68.3	1.9	98.1						82.7	3.8	7.9	5.7	
	O2	529	0.9	0.01	2.0	100.0		6.0	94.0	6.3	93.7						89.6	1.9	1.9	6.7	
	O3	150	0.4	0.01	1.5	100.0		100.0			100.0						50.0	10.0	30.0	10.0	
	O4	347	1.0	0.08	4.0	3.5	96.5	3.5	96.5	3.5	71.4			25.1			53.1	1.4	12.5	33.1	
	O5	900	1.7	0.04	2.0	55.6	44.4	55.6	44.4		55.6	44.4					18.9	10.0	62.8	5.6	
	O6	800	2.8	0.23	1.0	100.0		100.0			87.6				12.5		23.8	14.4	26.9	35.0	
	Jericho R.	1715	37.9	N/D	1.5	93.0	7.0	100.0			7.0	78.7	7.0		7.3		25.7		41.5	27.1	5.7

[a]For classification system see Appendix A.
[b]Discharge measured during late spring immediately after snow melt.
[c]N/D=no data.

Table 3.8.2 Number of fish recorded in sampled streams according to age-class, Jericho study area 1995 (all sampling methods and periods combined).

Area	Tributary	Species	Age-Class[a]			
			Young-of-the-year	Juvenile	Adult	Combined
Carat Lake	C1	Arctic grayling		39		39
		Burbot		1		1
		Lake trout		2		2
		Sculpin spp.				23
	C2	Burbot		1		1
		Sculpin spp.				1
	C4	Arctic grayling		1		1
		Burbot		4		4
		Sculpin spp.				52
	C5	Burbot		1		1
		Sculpin spp.				18
	C6	Arctic grayling		9	1	10
		Sculpin spp.				1
	C8	Lake trout		2	2	4
		Round whitefish		12		12
Lake C3	C3	Sculpin spp.				3
	C9	Lake trout			3	3
Jericho Lake	C7	Arctic grayling		1		1
Jericho River	O1	Arctic grayling		5		5
		Ninespine stickleback				1
	O2	Arctic grayling		20		20
		Ninespine stickleback				3
		Sculpin spp.				3
	O3	Arctic grayling		1		1
	O4	Arctic grayling		2		2
	O5	Arctic grayling		15		15
		Ninespine stickleback				5
		Sculpin spp.				4
	O6	Arctic grayling		3		3
		Burbot		3	1	4
		Lake trout		2		2
		Ninespine stickleback				10
		Sculpin spp.				12
	Jericho River	Arctic grayling		33	4	37
		Burbot		1		1
		Lake trout			2	2
		Round whitefish		3		3
		Sculpin spp.				1

[a]Age-class designations based on size differences of fish for each species.

Table 3.8.3 Fish habitat quality ratings for sampled streams, Jericho study area 1995.

Area	Stream	Rating of Habitat Quality[a]		
		Spawning	Rearing	Feeding
Carat Lake	C1	Low	Moderate	Nil
	C2	Nil	Low	Low
	C4	Low	Low	Nil
	C5	Nil	Low	Nil
	C6	Low	Low	Nil
	C8	Nil	Low	Low
Lake C3	C3	Nil	Low	Nil
	C9	Nil	Nil	Low
Jericho Lake	C7	Low	Low	Nil
Jericho River	O1	Moderate	Moderate	Nil
	O2	Low	Moderate	Low
	O3	Low	Low	Nil
	O4	Low	Moderate	Nil
	O5	Moderate	High	Moderate
	O6	Moderate	High	Moderate
	Jericho River	Low	Moderate	High

[a]Rating of habitat quality based on qualitative assessment of stream habitat and fish numbers recorded during survey.

A diverse assemblage of fish were recorded in Stream C1. Species recorded included juvenile lake trout, Arctic grayling, and burbot, as well as sculpin spp. Most of these fish were encountered in the lower most 200 m of the stream. These data suggested that this system provided good rearing habitat. Young-of-the-year Arctic grayling were not encountered in this stream; nor were spawning adults encountered during spring. However, the high number of juveniles in this system and moderate amounts of spawning habitat indicated that it could also be used for spawning purposes by this species.

Stream C4

Stream C4 is a small well-defined tributary that drains a series of headwater lakes at the northwest corner of Carat Lake. The stream channel exhibited a low slope for much of its surveyed length; however, the gradient increased dramatically and the flow became subsurface immediately downstream of the first headwater lake. This area was a barrier to fish passage, particularly during low flow periods. The stream contained multiple POOL-RUN habitat complexes and an abundance of silt substrate. Small pockets of gravel substrates were also present in the numerous small pools.

One juvenile Arctic grayling and several burbot were recorded in this stream along with numerous sculpin. This information suggested that Stream C4 was used for rearing purposes and that the potential existed for use as spawning habitat.

Stream C5

Stream C5 is situated immediately to the east of C4 and is much smaller than its counterpart. The stream exhibited a very low slope, a poorly defined channel, and was dominated by silt substrate. Water flow was zero during the summer sampling period. One juvenile burbot and several sculpin were captured in the lower section of the stream during spring sampling, however, the small size of this ephemeral stream severely limited its value as fish habitat.

Stream C6

This tributary is a short watercourse that connects a north basin of Carat Lake to several headwater lakes. The stream exhibited a low slope and was dominated by boulder substrate and RUN habitat in its lower section. As the channel approached the first headwater lake, it became less well-defined and contained small patches of gravel substrate.

One adult grayling in spawning condition (ripe male) was captured in the upper section of the stream. Egg sweeps in the area confirmed the presence of Arctic grayling eggs. In addition to these findings, several juveniles of this species were recorded during summer sampling. These data confirmed that Arctic grayling used Stream C6 for spawning and rearing. However, it is unclear whether these fish originated from Carat Lake or the headwater system.

3.8.2.3 Jericho Lake Streams

Stream C7

This stream, which is located at the west end of Jericho Lake, connects this waterbody to several headwater lakes. The channel is poorly defined and is dominated by boulders for much of its length. During summer, there was zero water flow. One adult Arctic grayling was recorded in this stream near the first headwater lake. As such, it is possible that Stream C7 was used for spawning and rearing purposes by this species. However, the paucity of suitable spawning habitat, and the absence of juvenile fish during summer sampling, suggests that Stream C7 had limited value as fish habitat.

3.8.2.4 Jericho River Streams

Jericho River

The Jericho River serves as the outlet system to waterbodies in the Jericho study area. It is unique in that it is the largest stream in the study area and several small tributaries drain into the section investigated. A major barrier to fish passage exists on the Jericho River immediately downstream of Jericho Lake (Figure 3.8.2). Within this 120 m section, the stream drops approximately 15 m. The channel disperses over bedrock and boulders as it falls through a series of cascades. Although this section is a major barrier to fish passage, it is not a complete barrier, particularly during high flow periods.

After the Jericho River completes its decent from Jericho Lake, its channel becomes well-defined. Habitat within this section was dominated by deep long FLAT habitats interspersed by short RAPID sections. Water depth varied within this portion of the Jericho River, but observations during snorkelling suggested that depths greater than 3.0 m were not uncommon. The substrate varied between sand in FLAT habitats, to boulder and cobble in RAPID habitats.

Due to its large size and habitat diversity, the surveyed section of the Jericho River provided good quality fish habitat. Because of its depth, it provided feeding areas for adult fish and possibly overwintering areas. Surveys documented the presence of adult lake trout and Arctic grayling at several locations in this stream. Indirect evidence (presence of numerous juvenile Arctic grayling in feeder streams) also suggested that this species was able to overwinter in the Jericho River. The absence of gravel substrates in the section investigated indicated that the stream was not used for spawning by Arctic grayling, however, conditions were suitable for spawning by species such as lake trout.

Streams O1, O2, O3

Due to the similarity in habitat characteristics, these streams will be discussed as a group. These tributaries to the Jericho River are small, exhibit low to moderate slopes, are dominated by small substrates (sand, gravel, and cobble), and have zero flow during periods of low rainfall. All contain an abundance of RUN habitat. The presence of smaller substrates in these streams, in combination with moderate to low gradients, created rearing and spawning habitat for species such as Arctic grayling. Their value as rearing habitat was confirmed by the presence of juvenile Arctic grayling in all three streams. Although adult Arctic grayling were not encountered during spring sampling, habitat conditions suggest that these streams were also used for spawning purposes.

Stream O4

Habitat characteristics of the surveyed section of Stream O4 were similar to characteristics in Streams O1, O2, and O3. Unlike the smaller water courses, however, it had stable flows during the summer sampling period. Only the lower portion of the surveyed section provided useful fish habitat. Approximately 300 m upstream from its confluence with Jericho River, the channel dispersed over an extensive area dominated by boulders. The lower section was characterized by a series of POOL, RUN, and RIFFLE habitats. The presence of juvenile Arctic grayling in this section suggested that Stream O4 was used for rearing purposes by this species.

Streams O5 and O6

Streams O5 and O6 are associated with a small lake that drains into the Jericho River. Both Streams O5 and O6 are larger than the systems previously discussed. Both had well-defined channels over much of their lengths, and substrates were composed of sand, gravel, cobble, and boulder. The principle habitat types encountered were RUN, FLAT, and RIFFLE. These characteristics created good quality spawning and rearing habitat for species such as Arctic grayling. Also, Stream O6 had sufficient depth to be used as feeding habitat by adult fish.

Juvenile Arctic grayling were recorded in both streams, however, adult fish in spawning condition were not encountered during the spring survey. Other species observed in Stream O6 included burbot, lake trout, and sculpin spp.

3.8.3 Summary

Streams in the Jericho study area generally provided limited habitat for fish communities originating from study area lakes. This was true for streams in the Lake C3 and Jericho Lake areas, and most streams in the Carat Lake area. The primary reasons for low quality fish habitat in these streams were small size, a preponderance of boulder substrates, and poorly defined channels. Some streams did provide better quality habitat. These included one stream in the Carat Lake area (Stream C1) and Streams O1 to O6 of the Jericho River. These systems contained small amounts of spawning and rearing habitat that could be used by species such as Arctic grayling.

Larger streams connecting lakes in the study area (Streams C8 and C9) provided poor quality fish habitat. Despite their large size, poorly defined channels and shallow water limited their value to fish.

The Jericho River, which was situated downstream of study area lakes, did contain good habitat. It was the largest stream in the study area, exhibited a well-defined channel and contained a mixture of slow, deep water areas and fast shallow water areas. As such, rearing habitat was available for juveniles and feeding habitat was present for use by adult fish. The depth of the Jericho River also suggested that it may provide overwintering habitat for fish.

A significant feature of the Jericho River was the presence of a cascade area approximately 15 m in height that was located near the outlet of Jericho Lake. Although not an absolute barrier, this area creates a significant impediment to fish passage between the Jericho River system and lakes within the Jericho study area. This may explain why ninespine stickleback were recorded downstream of the cascade area, but were absent from waterbodies situated further upstream.

3.9 METAL CONSTITUENTS IN FISH TISSUE

During 1995, a monitoring program was initiated in the Jericho study area to document background metal concentrations in kidney, liver, and muscle tissues of fish. Samples were collected from two lakes. These were Jericho Lake, which is situated downstream of the Jericho Diamond Project and Control Lake, which was outside the influence of any potential development (i.e., 6 km east of the Jericho Diamond Project). Species of interest at these locations included lake trout and round whitefish.

In total, 41 lake trout were sampled for tissue analysis; these included 21 fish from Jericho Lake and 20 fish from Control Lake. Twenty round whitefish were also sampled from Control Lake, however, only one

individual was collected from Jericho Lake. The size range of fish collected for tissue samples is provided in Table 3 9.1.

Table 3.9.1 Number, mean length, and size range of fish collected for kidney, liver, and muscle tissue analyses, Jericho study area 1995.

Lake	Species	Sample Size	Fork Length (mm)			
			Mean	Standard Deviation	Minimum	Maximum
Jericho Lake	Lake trout	21	523	82.7	314	656
	Round whitefish	1	338	--	338	338
Control Lake	Lake trout	20	445	50.5	390	553
	Round whitefish	20	412	54.1	262	468

The concentrations of 27 metal elements in kidney, liver, and muscle tissues of each tested fish are presented in Appendices J1 and J2. Average metal concentrations (including standard deviation, range, and number of samples below analytical detection limits) are summarized for each lake, fish species, and tissue type in Appendix J3. For analytical purposes, values below the detection limits were coded as one half the detection limit.

The average concentrations of some of the potentially toxic metals (aluminum, arsenic, cadmium, mercury, lead, nickel, copper, and zinc) in the tissues of study area fish are presented in Tables 3.9.2 to 3.9.3. The results are discussed separately for each of the metals.

3.9.1 Aluminum

The availability of aluminum to aquatic organisms has been correlated with the pH of the aquatic environment (Holtze and Hutchinson 1989); however, it is unclear at what pH threshold, or at what concentration, aluminum becomes toxic to fish. Aluminum can be acutely toxic at high exposure levels, but it does not bioaccumulate in aquatic organisms (Neville 1985).

In the Jericho study area, detectable concentrations of aluminum (greater than 5.0 μg/g) were recorded in 75% of lake trout kidney samples and 68% of lake trout liver samples (Table 3.9.2). For muscle tissue, the mean aluminum level did not exceed the detection limit in either lake. Mean aluminum levels in kidney tissue samples were highest from Control Lake fish (26.7 μg/g). The highest mean aluminum levels in liver tissue samples occurred in fish from Jericho Lake (15.0 μg/g). Maximum recorded aluminum concentrations in lake trout from the Jericho study area were 272.5 μg/g (kidney samples) and 55.9 μg/g (liver samples).

Aluminum concentrations in round whitefish tissues were generally lower than in lake trout tissues. Detectable concentrations of aluminum were recorded in 79% of round whitefish kidney samples and 57% of round whitefish liver samples (Table 3.9.3). For muscle tissue, the mean aluminum level did not exceed the detection

Table 3.9.2 Mean concentrations of metals in lake trout tissue samples, Jericho study area 1995.

Lake	Tissue	Parameter	Metal Concentrations (µg/g of dry weight)							
			Al	As	Cd	Cu	Pb	Hg	Ni	Zn
Jericho	Kidney	n < D.L.[a]	7	5	0	0	0	0	0	0
	n=20	**Mean (µg/g)**	**11.4**	**0.72**	**8.75**	**6.48**	**0.18**	**4.631**	**2.02**	**123.83**
		Sd[b] (µg/g)	9.7	0.78	5.22	1.96	0.11	2.261	1.23	35.64
		Min. (µg/g)	<5.0	<0.05	1.68	3.72	0.06	1.195	0.40	72.14
		Max. (µg/g)	38.8	2.88	21.49	12.53	0.46	11.438	4.32	202.78
	Liver	n < D.L.[a]	6	14	0	0	7	0	15	0
	n=21	**Mean (µg/g)**	**15.0**	**0.09**	**1.64**	**55.33**	**0.08**	**3.245**	**0.19**	**129.48**
		Sd[b] (µg/g)	15.0	0.12	1.25	42.71	0.07	2.599	0.12	27.58
		Min. (µg/g)	<5.0	<0.05	0.26	8.35	<0.05	0.645	<0.25	53.98
		Max. (µg/g)	55.9	0.43	4.80	216.03	0.30	11.795	0.51	183.19
	Muscle	n < D.L.[a]	21	21	21	1	14	0	19	0
	n=21	**Mean (µg/g)**	**<5.0**	**<0.05**	**<0.05**	**1.19**	**0.06**	**1.522**	**0.17**	**14.24**
		Sd[b] (µg/g)	0.0	0.00	0.00	0.42	0.05	0.979	0.16	2.30
		Min. (µg/g)	<5.0	<0.05	<0.05	<0.05	<0.05	0.532	<0.25	11.39
		Max. (µg/g)	<5.0	<0.05	<0.05	2.13	0.14	4.536	0.67	20.74
Control	Kidney	n < D.L.[a]	3	1	0	0	0	0	0	0
	n=20	**Mean (µg/g)**	**26.7**	**1.04**	**10.88**	**12.73**	**0.37**	**3.270**	**1.78**	**173.56**
		Sd[b] (µg/g)	58.6	2.79	16.68	21.99	0.73	4.023	2.32	305.99
		Min. (µg/g)	<5.0	<0.05	3.52	3.25	0.05	0.800	0.52	75.71
		Max. (µg/g)	272.5	12.82	80.14	105.79	3.21	18.593	11.22	1470.00
	Liver	n < D.L.[a]	7	4	0	0	5	0	14	0
	n=20	**Mean (µg/g)**	**7.6**	**0.13**	**1.61**	**65.03**	**0.10**	**1.318**	**0.27**	**132.46**
		Sd[b] (µg/g)	4.8	0.08	0.88	43.77	0.11	0.848	0.33	23.69
		Min. (µg/g)	<5.0	<0.05	0.27	0.70	<0.05	0.509	<0.25	89.50
		Max. (µg/g)	18.4	0.32	3.61	175.30	0.52	3.029	1.25	162.95
	Muscle	n < D.L.[a]	20	20	20	0	20	0	18	0
	n=20	**Mean (µg/g)**	**<5.0**	**<0.05**	**<0.05**	**1.07**	**<0.05**	**0.891**	**0.15**	**12.97**
		Sd[b] (µg/g)	0.0	0.00	0.00	0.22	0.00	0.562	0.08	1.14
		Min. (µg/g)	<5.0	<0.05	<0.05	0.81	<0.05	0.358	<0.25	11.51
		Max. (µg/g)	<5.0	<0.05	<0.05	1.70	<0.05	2.125	0.42	15.86

[a]number of samples below detection limit.
[b]standard deviation.

Table 3.9.3 Mean concentrations of metals in round whitefish tissue samples, Jericho study area 1995.

Lake	Tissue	Parameter	Metal Concentrations (µg/g of dry weight)							
			Al	As	Cd	Cu	Pb	Hg	Ni	Zn
Jericho	Kidney	n < D.L.[a]	0	0	0	0	0	0	0	0
	n=1	**Mean (µg/g)**	**40.0**	**0.34**	**0.68**	**264.67**	**23.75**	**0.984**	**2.04**	**37.33**
		Sd[b] (µg/g)								
		Min. (µg/g)	40.0	0.34	0.68	264.67	23.75	0.984	2.04	37.33
		Max. (µg/g)	40.0	0.34	0.68	264.67	23.75	0.984	2.04	37.33
	Liver	n < D.L.[a]	1	0	1	0	0	0	1	0
	n=1	**Mean (µg/g)**	**<5.0**	**0.10**	**<0.05**	**6.63**	**0.20**	**0.260**	**<0.25**	**81.07**
		Sd[b] (µg/g)								
		Min. (µg/g)	<5.0	0.10	<0.05	6.63	0.20	0.260	<0.25	81.07
		Max. (µg/g)	<5.0	0.10	<0.05	6.63	0.20	0.260	<0.25	81.07
	Muscle	n < D.L.[a]	1	0	1	0	0	0	1	0
	n=1	**Mean (µg/g)**	**<5.0**	**0.07**	**<0.05**	**1.43**	**0.09**	**0.195**	**<0.25**	**13.98**
		SD[b] (µg/g)								
		Min. (µg/g)	<5.0	0.07	<0.05	1.43	0.09	0.195	<0.25	13.98
		Max. (µg/g)	<5.0	0.07	<0.05	1.43	0.09	0.195	<0.25	13.98
Control	Kidney	n < D.L.[a]	4	2	0	0	1	0	0	0
	n=18	**Mean (µg/g)**	**23.2**	**0.28**	**7.59**	**8.97**	**0.40**	**1.686**	**3.39**	**72.30**
		Sd[b] (µg/g)	16.5	0.16	4.45	6.59	0.67	0.834	1.60	18.08
		Min. (µg/g)	<5.0	<0.05	0.88	5.29	<0.05	0.399	0.33	50.60
		Max. (µg/g)	54.2	0.55	15.75	34.20	2.87	3.729	7.28	124.66
	Liver	n < D.L.[a]	8	5	0	0	6	0	5	0
	n=20	**Mean (µg/g)**	**6.9**	**0.10**	**1.05**	**9.74**	**0.30**	**0.555**	**0.48**	**84.45**
		Sd[b] (µg/g)	4.8	0.06	1.17	8.34	0.89	0.371	0.81	19.65
		Min. (µg/g)	<5.0	<0.05	0.16	5.99	<0.05	0.290	<0.25	18.60
		Max. (µg/g)	18.2	0.22	5.68	44.48	4.06	2.044	3.87	122.30
	Muscle	n < D.L.[a]	20	17	20	0	18	0	20	0
	n=20	**Mean (µg/g)**	**<5.0**	**0.04**	**<0.05**	**1.20**	**0.03**	**0.286**	**<0.25**	**13.85**
		Sd[b] (µg/g)	0.0	0.04	0.00	0.37	0.03	0.117	0.00	0.99
		Min. (µg/g)	<5.0	<0.05	<0.05	0.71	<0.05	0.134	<0.25	12.18
		Max. (µg/g)	<5.0	0.18	<0.05	2.36	0.16	0.565	<0.25	15.82

[a]number of samples below detection limit.
[b]standard deviation.

limit in either lake. Mean aluminum levels in kidney tissue samples were highest from Jericho Lake (40.0 µg/g), however, this represents a value from a single fish. The highest mean aluminum levels in liver tissue samples occurred in fish from Control Lake (6.9 µg/g). Maximum recorded aluminum concentrations in round whitefish from the Jericho study area were 54.2 µg/g (kidney samples) and 18.2 µg/g (liver samples).

3.9.2 Arsenic

Arsenic is more common in the earth's crust than is mercury or cadmium, and is more toxic to plants than to animals (Demayo et al. 1979). It does not appear to biomagnify through different trophic levels, and demersal

species are more likely to accumulate arsenic than pelagic fish (Demayo et al. 1979). Arsenic concentrates mainly in the liver and is a cumulative toxin (Falk et al. 1973).

Detectable concentrations of arsenic (greater than 0.05 μg/g) were recorded in 85% of lake trout kidney samples and 56% of lake trout liver samples (Table 3.9.2). For muscle tissue, the mean arsenic level did not exceed the detection limit in either lake. Mean arsenic levels in kidney and liver tissue samples were highest from Control Lake (1.04 μg/g and 0.13 μg/g, respectively). Maximum recorded arsenic concentrations in lake trout from the Jericho study area were 12.82 μg/g (kidney samples) and 0.43 μg/g (liver samples).

Arsenic concentrations in round whitefish also were low. Detectable concentrations of arsenic were recorded in 89% of round whitefish kidney samples and 76% of round whitefish liver samples (Table 3.9.3). For muscle tissue, 10% of samples exceeded the detection limit. Mean arsenic levels in kidney tissue samples were highest from Jericho Lake (0.34 μg/g), however, this represents a value from a single fish. Mean arsenic levels in liver tissue samples were 0.10 μg/g in both lakes. Maximum recorded arsenic concentrations in round whitefish from the Jericho study area were 0.55 μg/g (kidney samples), 0.22 μg/g (liver samples), and 0.18 μg/g (muscle samples).

3.9.3 Cadmium

Cadmium does not bioaccumulate in the food web (Reeder et al. 1979a). The rate of cadmium uptake is generally faster in hard waters, although cadmium toxicity decreases in hard water (Reeder et al. 1979a).

Detectable concentrations of cadmium (greater than 0.05 μg/g) were recorded in all lake trout kidney and liver samples, but was not detected in trout muscle samples. Mean cadmium levels in kidney tissue samples were highest from Control Lake (10.88 μg/g), while mean values for liver were higher in Jericho Lake (1.61 μg/g). Maximum recorded cadmium concentrations in lake trout from the Jericho study area were 80.14 μg/g (kidney samples) and 4.80 μg/g (liver samples).

Cadmium concentrations in round whitefish were low. Detectable concentrations of cadmium were recorded in 100% of round whitefish kidney samples and 95% of round whitefish liver samples. Cadmium was not detected in round whitefish muscle tissue. Mean cadmium levels in both kidney and liver tissue samples were highest from Control Lake (7.59 μg/g and 1.05 μg/g, respectively). Maximum recorded concentrations in round whitefish from the Jericho study area were 15.75 μg/g (kidney samples) and 5.68 μg/g (liver samples).

3.9.4 Copper

In contrast to the non-essential trace metals (e.g. arsenic, cadmium, mercury, lead), copper is important for biochemical functions; however, in excess amounts copper is toxic to freshwater fish (Förstner and Wittman 1979). The toxicity of copper varies not only with the species of fish, but also with ambient water characteristics such as pH and alkalinity. Copper is not considered to be a cumulative systematic poison as most

of it is excreted from the body (Falk et al. 1973). The main areas of the body where it concentrates are the liver, muscle, and brain tissues (Demayo and Taylor 1981).

Detectable concentrations of copper (greater than 0.05 μg/g) were recorded in most of lake trout kidney, liver and muscle samples (98% or greater). Mean copper levels in kidney and liver tissue samples were highest from Control Lake (12.73 μg/g and 65.03 μg/g, respectively). Mean copper levels in lake trout muscle tissue were highest in Jericho Lake (1.19 μg/g). Maximum recorded copper concentrations in lake trout from the Jericho study area were 105.79 μg/g (kidney samples), 216.03 μg/g (liver samples), and 2.13 μg/g (muscle samples).

Detectable concentrations of copper were recorded in all round whitefish. Mean copper levels in kidney tissue samples were highest from Jericho Lake (264.67 μg/g), however, this represents a value from a single fish. Mean copper levels in liver and muscle tissue samples were highest in Control Lake (9.74 μg/g). For muscle tissues, it was highest in Jericho Lake (1.43 μg/g). Maximum recorded copper concentrations in round whitefish from the Jericho study area were 264.67 μg/g (kidney samples), 44.48 μg/g (liver samples), and 2.36 μg/g (muscle samples).

3.9.5 Lead

Lead tends to deposit in bone as a cumulative toxin (Falk et al. 1973). It is more toxic in soft water than in hard water (Demayo et al. 1980).

Lead concentrations in the Jericho study area lake trout were low. Detectable concentrations of lead (greater than 0.05 μg/g) were recorded in all lake trout kidney samples (100%), most liver samples (71%), and in 17% of the muscle samples. Mean lead levels in kidney and liver tissue samples were highest from Control Lake (0.37 μg/g and 0.10 μg/g, respectively). Mean lead levels in lake trout muscle tissue were highest in Jericho Lake (0.06 μg/g). Maximum recorded copper concentrations in lake trout from the Jericho study area were 3.21 μg/g (kidney samples), 0.52 μg/g (liver samples), and 0.14 μg/g (muscle samples).

Detectable concentrations of lead were recorded in most round whitefish kidney and liver samples (95 and 71%, respectively), and in 14% of the muscle samples. Mean lead levels in kidney tissue samples were highest from Jericho Lake (23.75 μg/g), however, this represents a value from a single fish. Highest mean lead levels in liver (0.30 μg/g) and muscle tissue samples (0.09 μg/g) occurred in fish from Control Lake and Jericho Lake, respectively. Maximum recorded lead concentrations in round whitefish from the Jericho study area were 23.75 μg/g (kidney samples), 4.06 μg/g (liver samples), and 0.16 μg/g (muscle samples).

3.9.6 Mercury

Mercury in fish tissue is most commonly present in the form of methyl mercury, although the number of mercury forms potentially present in the environment means that total mercury is recommended as the form used

for setting guidelines (Reeder et al. 1979b). The maximum allowable level of mercury in muscle tissue of fish sold in Canada for human consumption is 0.5 μg/g (wet weight), which is comparable to about 2.5 μg/g when expressed on a "dry weight" basis (assuming 80% moisture content).

Mean mercury level in lake trout muscle tissue was highest in Jericho Lake (1.522 μg/g). Five of the 21 lake trout muscle samples in Jericho Lake (24%) had mercury levels equal to or higher than allowed for human consumption (2.5 μg/g). No muscle tissues from Control Lake exceeded this level.

In lake trout, mercury concentrations in kidney and liver tissues generally were higher than in the muscle tissue. Highest average levels were observed from samples in Jericho Lake (4.631 μg/g for kidney samples and 3.245 μg/g for liver samples); concentrations in individual fish in this lake were as high as 11.438 μg/g and 11.795 μg/g for kidney and liver tissues, respectively. Mean mercury levels were lower in the Control Lake (3.270 μg/g and 1.318 μg/g for kidney and liver samples, respectively). The highest value for kidney samples was recorded in this lake (18.593 μg/g).

In round whitefish, mean muscle tissue concentrations of mercury were considerably lower compared to lake trout (0.286 μg/g in Control Lake and 0.195 μg/g in Jericho Lake; the maximum recorded value in round whitefish muscle tissue was 0.565 μg/g. Mercury concentrations in kidney and liver tissues generally were higher than in the muscle tissue. Highest average levels were observed from samples in Control Lake (1.686 μg/g for kidney samples and 0.555 μg/g for liver samples); concentrations in individual fish did not exceed 3.729 μg/g for kidney samples and and 2.044 μg/g for liver tissues. Mean and maximum values for mercury in Jericho Lake kidney and liver tissues were lower.

3.9.7 Nickel

The toxicity of nickel increases with decreasing water hardness and increasing acidity (CCREM 1987); it also increases when nickel is present with copper, likely as a result of synergism (Taylor et al. 1979). Nickel has the greatest effect on the early life stages of fish, including fertilized eggs. Nickel does not biomagnify in the food web (Taylor et al. 1979). Hutchinson et al. (1975) reported that nickel concentrations were highest in plants and lowest in top predators.

Nickel concentrations in the Jericho study area lake trout were low. Detectable concentrations of nickel (greater than 0.25 μg/g) were recorded in lake trout kidney samples (100%), in liver samples (29%), and in 10% of the muscle samples. Mean nickel levels in kidney and muscle tissue samples were highest from Jericho Lake (2.02 μg/g and 0.17 μg/g, respectively). Mean nickel levels in lake trout liver tissue were highest in Control Lake (0.27 μg/g). Maximum recorded nickel concentrations in lake trout from the Jericho study area were 11.22 μg/g (kidney samples), 1.25 μg/g (liver samples), and 0.67 μg/g (muscle samples).

Detectable concentrations of nickel were recorded in most round whitefish kidney and liver samples (100 and 71%, respectively). Detectable concentrations of nickel were not recorded in the muscle tissue samples. Mean nickel levels in kidney tissue samples were highest from Control Lake (3.39 μg/g). Highest mean nickel levels in liver also occurred in the Control Lake sample (0.48 μg/g). Maximum recorded nickel concentrations in round whitefish from the Jericho study area were 7.28 μg/g (kidney samples) and 3.87 μg/g (liver samples).

3.9.8 Zinc

Zinc primarily affects gill epithelial tissues. In excessive amounts, it can cause outright mortality or induce stress that leads to death at a later time (Falk et al. 1973). Zinc, however, is essential for plant and animal health. Zinc toxicity increases with increasing pH and decreasing water hardness. Zinc concentrations are usually greater in omnivorous than in piscivorous species, and greater in benthic invertebrates than in fish (CCREM 1987).

Zinc concentrations in lake trout tissues were similar within the study area lakes. Mean levels in the kidney tissues were 123.83 μg/g in Jericho Lake and 173.56 μg/g in Control Lake samples; mean levels in liver tissues were 129.48 μg/g and 132.46 μg/g, and; in the muscle tissues levels were 14.24 μg/g and 12.97 μg/g. Maximum recorded zinc concentrations in lake trout from the Jericho study area were 1470.00 μg/g (kidney samples), 183.19 μg/g (liver samples), and 20.74 μg/g (muscle samples).

Zinc concentrations in round whitefish tissues were generally lower than levels recorded in lake trout samples. Mean levels in the kidney tissues were 37.33 μg/g in Jericho Lake and 72.30 μg/g in Control Lake samples; mean levels in liver tissues were 81.07 μg/g and 84.45 μg/g, and; in muscle tissues, levels were 13.98 μg/g and 13.85 μg/g. Maximum recorded zinc concentrations in round whitefish from the Jericho study area were 124.66 μg/g (kidney samples), 122.30 μg/g (liver samples), and 15.82 μg/g (muscle samples).

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APPENDIX A - METHODOLOGY

APPENDIX A

HABITAT CLASSIFICATION AND RATING SYSTEM

Riffle - Portion of channel with increased velocity relative to Run and Pool habitat types; broken water surface due to effects of submerged or exposed bed materials; relatively shallow (less than 25 cm) during moderate to low flow periods.

> Riffle (RF) - Typical riffle habitat type; limited submerged or overhead cover for juveniles and adult life stages; coarse substrate
>
> Riffle-Boulder Garden (RF/BG) - Riffle habitat type with significant occurrence of large boulders; availability of significant instream cover for juveniles (to lesser extent adults) at moderate to high flow events.

Rapids (RA) - Portion of channel with highest velocity relative to other habitat types. Deeper than Riffle (ranging from 25-50 cm); often formed by channel constriction. Substrate extremely coarse; dominated by large cobble and boulder material. Instream cover provided in pocket eddies (P3) and associated with cobble/boulder substrate.

Run - Portion of channel characterized by moderate to high current velocity relative to Pool and Flat habitat; water surface largely unbroken. Deeper than Riffle habitat type. Can be differentiated into four types; deep-slow, deep-fast, shallow-slow, and shallow-fast.

> Run (Class 1) (R1) - Highest quality Run habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m. High instream cover at all flow conditions (submerged boulders/bedrock fractures, depth). Generally of deep-slow type (to lesser extent deep-fast) and situated proximal to upstream food production area (i.e., RF, R3).
>
> Run (Class 2) (R2) - Moderate quality Run habitat type. Maximum depth reaching or exceeding 1.0 m, generally exceeding 0.75 m. High instream cover during all but low flow events (baseflow). Generally of either deep-fast type or moderately deep-slow type.
>
> Run (Class 2)/Boulder garden (R2/BG) - Moderate quality Run habitat type; presence of large boulders in channel; high instream cover (boulder, bedrock fractures, turbulence) at all but low-flow events (baseflow). Depth characteristics similar to R2; however, required maximum depth lower due to cover afforded by boulders.
>
> Run (Class 3) (R3) - Lowest quality Run habitat type. Maximum depth of 0.75 m, but averaging <0.50 m. Low instream cover at all but high flow events. Generally of shallow-fast or shallow-slow types.
>
> Run (Class 3)/Boulder garden (R3/BG) - Similar to R3 in depth and velocity characteristics; presence of large boulders in channel offers improved instream cover during moderate and high flow events.

Flat (FL) - Area of channel characterized by low current velocities (relative to RF and Run cover types); near-laminar (i.e., non-turbulent) flow character. Depositional area featuring predominantly sand/silt substrate. Differentiated from Pool habitat type on basis of high channel uniformity and lack of direct riffle/run association. More depositional in nature than R3 habitat (sand/silt substrate, lower food production, low cover, etc.).

Flat (Class 1) (F1) - High quality Flat habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m or greater.

Flat (Class 2) (F2) - Moderate quality Flat habitat type. Maximum depth exceeding 1.0 m; generally exceeding 0.75 m.

Flat (Class 3) (F3) - Low quality Flat habitat type. Maximum depth of 0.75 m, averaging less than 0.50 m.

Pool - Discrete portion of channel featuring increased depth and reduced velocity (downstream oriented) relative to Riffle and Run habitat types.

Pool (Class 1) (P1) - Highest quality Pool habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m or greater; high instream cover at all flow-conditions (submerged boulder, bedrock fractures, depth, bank irregularities). Generally featuring high Riffle and/or Run association (i.e., food input). Often intergrades with deep-slow type of R1.

Pool (Class 2) (P2) - Moderate quality Pool habitat type. Maximum depth reaching or exceeding 1.0 m, generally exceeding 0.75 m. High instream cover at all but low flow events (baseflow).

Pool (Class 3) (P3) - Low quality pool habitat type. Maximum depth of 0.75 m, averaging <0.50 m. Low instream cover at all but high flow events. Includes small pocket eddy type habitat.

Dispersed - Portion of channel exhibiting no defined channel. water flow often dispersed over boulder fields with areas of subsurface flow.

Habitat Features - Includes the following instream features:

Chutes (CH) - Area of channel constriction; generally resulting in channel deepening and increased velocity. Associated habitat types are R1, R2.

Ledges (LG) - Areas of bedrock intrusion into the channel; often creates Chutes and Pool habitat.

Falls (FAL) - Area of channel exhibiting rapid vertical decent over boulder and bedrock. Often a barrier to fish passage.

Cascade (CAS) - Area of channel exhibiting rapid decent over boulder and bedrock, but, with no well defined vertical decent (i.e., falls).

Channel Type - Includes the following categories:

Single (C1) - Entire water flow of stream through one active channel.

Multiple (C2) - Water flow of stream through more than one active channel.

Bank Type - Includes the following categories:

Well-defined (D1) - Well-defined boundary at water-bank interface of active stream channel.

Ill-defined (D2) - Poorly defined boundary at water-bank interface of active stream channel.

SUBSTRATE CLASSIFICATION SYSTEM

Modified Wentworth classification for substrate particle sizes

CLASSIFICATION	PARTICLE SIZE RANGE (mm)
Boulder	>256
Cobble (Rubble)	64-256
Pebble	32-64
	16-32
Gravel	8-16
	4-8
	2-4
	1-2
Very coarse sand	0.2-1
Coarse sand	0.25-0.5
Medium sand	0.125-0.25
Very fine sand	0.0625-0.125
Silt	0.0039-0.0625
Clay	<0.0039

APPENDIX B - LIMNOLOGY

Appendix B1 Temperature and dissolved oxygen profile data from sampled lakes, Jericho study area 1995.

Carat Lake
Site W1-1

7 August 95			13 September 95		
Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)	Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)
0	8.8	11.6	0	4.9	11.2
1	8.8	11.6	1	4.9	11.2
2	8.7	11.5	2	4.9	11.2
3	8.7	11.5	3	4.9	11.2
4	8.7	11.5	4	4.9	11.1
5	8.7	11.5	5	4.9	11.2
6	8.7	11.5	6	4.9	11.1
7	8.7	11.5	7	4.9	11.1
8	8.7	11.5	8	4.9	11.1
9	8.7	11.5	9	4.9	11.1
10	8.7	11.5	10	4.9	11.1
			11	4.9	11.1
Secchi Disk Reading = 5 m			Secchi Disk Reading = 7 m		
GPS Coordinates = 12W 0478174 7320854			GPS Coordinates = 12W 0478282 7321090		
pH = 6.34			pH = 6.76		
Conductivity = 9.4 µS/cm			Conductivity = 8.6 µS/cm		

Carat Lake
Site W1-2

8 August 95			13 September 95		
Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)	Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)
0	10.4	11.9	0	4.7	11.6
1	10.0	11.9	1	4.7	11.6
2	9.6	12.1	2	4.7	11.6
3	9.4	12.2	3	4.7	11.5
4	9.2	12.2	4	4.7	11.5
5	9.1	12.2	5	4.7	11.5
6	9.0	12.2	6	4.7	11.4
7	9.0	12.2	7	4.7	11.4
8	8.9	12.2	8	4.7	11.3
9	8.9	12.2	9	4.7	11.3
10	8.8	12.2	10	4.7	11.3
11	8.8	12.2	11	4.7	11.3
12	8.8	12.2	12	4.7	11.3
13	8.8	12.2	13	4.7	11.3
14	8.7	12.2	14	4.7	11.3
15	8.7	12.2	15	4.6	11.3
16	8.7	12.1	16	4.6	11.3
17	8.7	12.2	17	4.6	11.3
18	8.6	12.2	18	4.6	11.3
19	8.5	12.2	19	4.6	11.3
20	8.4	12.2	20	4.6	11.3
21	8.0	12.2	21	4.6	11.3
22	7.3	12.4	22	4.6	11.3
23	6.5	12.6	23	4.6	11.2
24	6.2	12.8			
25	5.9	12.8			
26	5.7	12.9			
27	5.6	12.8			
28	5.5	12.5			
Secchi Disk Reading = 7.1 m			Secchi Disk Reading = 6.5 m		
GPS Coordinates = 12W 0476096 7321014			GPS Coordinates = 12W 0478100 7320850		
pH = 14.1			pH = 6.72		
Conductivity = 6.78 µS/cm			Conductivity = 8.6 µS/cm		

Jericho Lake
Site W2

5 August 95			13 September 95		
Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)	Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)
0	10.5	11.0	0	3.5	14.2
1	10.5	11.1	1	2.9	14.5
2	10.6	11.1	2	2.7	14.8
3	10.6	11.1	3	2.6	15.5
4	10.6	11.1	4	2.6	15.6
5	10.6	11.1	5	2.5	15.7
6	10.6	11.1	6	2.5	15.7
7	10.6	11.1	7	2.4	15.6
8	10.6	11.1	8	2.4	15.6
9	10.6	11.1	9	2.4	15.5
10	10.6	11.1	10	2.4	15.4
11	10.5	11.1	11	2.4	15.5
12	9.0	11.1	12	2.5	15.4
13	7.4	11.1	13	2.5	15.3
14	7.1	11.1	14	2.6	15.2
15	4.5	11.1	15	2.6	15.0
16	5.2	11.1			
Secchi Disk Reading = 6 m			Secchi Disk Reading = 6.5 m		
GPS Coordinates = 12W 0477483 7323615			GPS Coordinates = 12W 0477682 7323681		
pH = 7.11			pH = 5.35		
Conductivity = 12.4 µS/cm			Conductivity = 11.2 µS/cm		

Lake C3
Site W3

9 August 95			14 September 95		
Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)	Depth (m)	Temp. (°C)	Dissolved Oxygen (mg/L)
0	11.6	10.6	0	2.8	14.6
1	11.3	11.2	1	2.7	14.9
2	11.1	11.3	2	2.7	15.4
3	10.9	10.8	3	2.7	15.5
4	10.6	11.1	4	2.6	15.6
5	10.0	11.1	5	2.6	15.6
6	9.9	11.2	6	2.6	15.5
7	9.7	11.3	7	2.6	15.6
8	9.7	11.2	8	2.6	15.5
9	9.5	11.4	9	2.7	15.5
10	9.4	11.4	10	2.6	15.4
11	9.4	11.3	11	2.6	15.4
12	9.4	11.5	12	2.6	15.4
13	9.3	11.5			
13.5	9.3	11.4			
Secchi Disk Reading = 6.3 m			Secchi Disk Reading = 6.5 m		
GPS Coordinates = 12W 0474915 7319380			GPS Coordinates = 12W 0474901 7319307		
pH = 6.95			pH = 5.33		
Conductivity = 14.9 µS/cm			Conductivity = 11.2 µS/cm		

APPENDIX C - WATER

APPENDIX C
Water Quality Assessment

Laboratory

ASL analytical laboratories in Vancouver, B.C., conducted routine quality control programs to verify the accuracy and precision of analyses conducted on the water quality samples and to ensure that laboratory contamination did not occur (Janice Chow, Laboratory Analyst ASL Laboratories Ltd., pers. comm.).

Field

Replicate Samples

The precision of replicate water quality samples is summarized in Table C1. Variability was measured as the coefficient of variation (CV), which is the ratio of the standard deviation to the mean expressed as a percentage. This variability reflects both natural variability in waters of the Carrot Lake study area, as well as error introduced through sample collection, handling, and laboratory analyses.

Only those variables that had one or more concentrations above methodological detection limits were analyzed for precision (Tables C1 to C3). The CVs for the three sets of replicates varied from 0 to 76%. In general, most variables had a precision of 80% or better (i.e., a CV of 20% or lower). Some of the largest CV estimates were found in Cigar Lake, Site CL01, on 17 July 1995 for the variables total phosphorus and total aluminum (CV = 71% and 76%, respectively). Total and dissolved aluminum CVs were all greater than 10%. Aluminum is of particular concern because it has been reported to have concentrations in subarctic waterbodies that are above federal guidelines for the protection of freshwater aquatic life (CCREM 1987; R.L. & L. 1993).

Split Samples

One split sample was submitted for analysis during the 1995 water quality sampling program, and all variables that had concentrations above methodological detection limits are summarized in Table C4. Except for sulphate and total phosphorus, the precision of the remaining variables was greater than 85% (C.V. of less than 15%). The precision of sulphate was 71.7% and for total phosphorus it was 84.3%.

Blank Samples

The results of blank samples submitted with the field samples are summarized with the raw data (Tables C5 through C13). Except for fluoride and ammonia during the spring sampling session and chlorophyll *a* during the fall sampling session, variables were at or near values expected for noncontaminated blanks (Tables C5 to C7). Fluoride and ammonia had concentrations of 0.03 mg/L and 0.012 mg/L, respectively, during the spring sampling session

while chlorophyll *a* had a concentration of 0.04 mg/L during the fall sampling session. Based on this information the reported concentrations for fluoride, ammonia, and chlorophyll *a* during their respective sampling sessions may be slightly greater than actual, "true" concentrations.

Among the total metal analyses, only aluminum was detected in blank samples (Tables C8 to C10). Total aluminum concentrations were 0.009 mg/L, 0.013 mg/L, and 0.014 mg/L during the spring, summer, and fall sampling sessions, respectively. These results suggest that reported concentrations for total aluminum are slightly greater than actual, "true" concentrations. This may have important implications for the assessment of this variable for the protection of freshwater aquatic life (CCREM 1987).

Among the dissolved metal analyses, arsenic was the only variable that had a reported concentration in the blank samples (Tables C11 to C13). During the spring sampling session, dissolved arsenic in the blank sample was at the methodological detection limit of 0.0001 mg/L.

Appendix C1 Precision of water samples collected during spring, Jericho study area 1995.

Variable (mg/L unless indicated otherwise)	Cigar Lake, Site CL01, 17 July 95, 11 m				
	Replicate		Mean	Standard Deviation	Coefficient of Variation (%)
	A	B			
Physical/Anions/Nutrients					
Total Dissolved Solids (calculated)	9.0	10.0	9.5	0.7	7.4
Hardness as CaCO3	4.75	4.66	4.71	0.06	1.4
pH units	6.42	6.55	6.48	0.09	1.4
Alkalinity-Total as CaCO3	5.6	5.7	5.7	0.1	1.3
Alkalinity-Bicarbonate	5.6	5.7	5.7	0.1	1.3
Flouride	0.03	0.03	0.03	0.00	0.0
Ammonia Nitrogen	0.012	0.010	0.011	0.001	12.9
Total Dissolved Phosphate	0.002	0.003	0.003	0.001	28.3
Total Phosphorus	0.004	0.012	0.008	0.006	70.7
Total Organic Carbon	2.8	2.6	2.7	0.1	5.2
Total Metals					
Aluminum	0.009	0.030	0.020	0.015	76.1
Calcium	1.05	1.03	1.04	0.01	1.4
Magnesium	0.556	0.561	0.559	0.004	0.6
Silicon	0.262	0.259	0.261	0.002	0.8
Strontium	0.009	0.008	0.009	0.001	8.3
Dissolved Metals					
Aluminum	0.009	0.007	0.008	0.001	17.7
Calcium	1.01	0.98	0.99	0.02	2.3
Magnesium	0.541	0.540	0.541	0.001	0.1
Silicon	0.249	0.242	0.246	0.005	2.0
Strontium	0.008	0.008	0.008	0.000	0.0

Appendix C2 Precision of water samples collected during summer, Jericho study area 1995.

Variable (mg/L unless indicated otherwise)	Carat Lake, Site CL04, 19 August 95, 6 m					
	Replicate			Mean	Standard Deviation	Coefficient of Variation (%)
	A	B	C			
Physical/Anions/Nutrients						
Total Dissolved Solids (calculated)	8.0	8.0	8.0	8.0	0.0	0.0
Hardness as CaCO3	4.35	4.34	4.37	4.35	0.02	0.4
pH units	6.64	6.76	6.73	6.71	0.06	0.9
Alkalinity-Total as CaCO3	4.2	3.8	4.1	4.0	0.2	5.2
Alkalinity-Bicarbonate	3.6	4.1	3.8	3.8	0.3	6.6
Chloride	nd[1]	0.5	0.5	0.5	0.0	0.0
Flouride	0.02	0.02	0.02	0.02	0.00	0.0
Ammonia Nitrogen	0.009	0.007	0.006	0.007	0.002	20.8
Total Organic Carbon	2.7	2.7	2.8	2.7	0.1	2.1
Total Metals						
Aluminum	0.026	0.025	0.035	0.029	0.006	19.2
Calcium	1.05	1.04	1.07	1.05	0.02	1.5
Magnesium	0.439	0.464	0.445	0.449	0.013	2.9
Silicon	0.258	0.253	0.249	0.253	0.005	1.8
Strontium	0.012	0.012	0.012	0.012	0.000	0.0
Dissolved Metals						
Aluminum	0.015	0.020	0.015	0.017	0.003	17.3
Calcium	1.02	1.02	1.02	1.02	0.00	0.0
Magnesium	0.439	0.433	0.445	0.439	0.006	1.4
Silicon	0.258	0.220	0.249	0.242	0.020	8.2
Strontium	0.01	0.01	0.01	0.01	0.00	5.6

[1]nd = Not detected

Appendix C3 Precision of water samples collected from Jericho Lake during fall, Jericho study area 1995.

Variable (mg/L unless indicated otherwise)	Jericho Lake, Site CL06, 10 September 95, 1.5 m					
	Replicate			Mean	Standard Deviation	Coefficient of Variation (%)
	A	B	C			
Physical/Anions/Nutrients						
Total Dissolved Solids (calculated)	10.0	14.0	10.0	11.3	2.3	20.4
Hardness as CaCO3	4.19	4.22	4.25	4.22	0.03	0.7
pH units	6.56	6.57	6.62	6.58	0.03	0.5
Total Suspended Solids	1.00	1.00	nd[1]	1.00	0.00	0.0
Alkalinity-Total as CaCO3	4.2	4.2	3.5	4.0	0.4	10.2
Alkalinity-Bicarbonate	4.2	4.2	3.5	4.0	0.4	10.2
Chloride	0.5	nd	0.6	0.5	0.1	10.8
Fluoride	0.02	0.02	0.02	0.02	0.00	0.0
Sulphate	1.5	2.0	1.6	1.7	0.3	15.6
Dissolved ortho-Phosphate	nd	nd	0.002	0.001	0.001	43.3
Total Dissolved Phosphate	0.002	0.002	0.002	0.002	0.000	0.0
Total Phosphorus	0.004	0.004	0.004	0.004	0.000	0.0
Total Organic Carbon	2.7	5.5	2.7	3.6	1.6	44.5
Total Metals						
Aluminum	0.026	0.023	0.029	0.026	0.003	11.5
Calcium	0.995	1.010	0.991	0.999	0.010	1.0
Iron	0.030	0.030	0.036	0.032	0.003	10.8
Magnesium	0.464	0.450	0.454	0.456	0.007	1.6
Nickel	0.003	0.001	0.001	0.002	0.001	69.3
Silicon	0.222	0.219	0.224	0.222	0.003	1.1
Strontium	0.013	0.013	0.013	0.013	0.000	0.0
Dissolved Metals						
Aluminum	0.013	0.019	0.017	0.016	0.003	18.7
Calcium	0.947	0.950	0.968	0.955	0.011	1.2
Magnesium	0.443	0.449	0.444	0.445	0.003	0.7
Silicon	0.205	0.206	0.213	0.208	0.004	2.1
Strontium	0.013	0.013	0.012	0.013	0.001	4.6

[1]nd = not detected

Appendix C4 Precision of water samples collected from Tailings Lake during fall, Jericho study area 1995.

Variable (mg/L unless indicated otherwise)	Tailings Lake, Site CL12, 10 September 95, 1 m				
	Split		Mean	Standard Deviation	Coefficient of Variation (%)
	A	B			
Physical/Anions/Nutrients					
Total Dissolved Solids (calculated)	15.0	18.0	16.5	2.1	12.9
Hardness as CaCO3	8.19	8.20	8.20	0.01	0.1
pH units	6.87	6.88	6.88	0.01	0.1
Alkalinity-Total as CaCO3	8.9	8.7	8.8	0.1	1.6
Alkalinity-Bicarbonate	8.9	8.7	8.8	0.1	1.6
Chloride	nd[1]	0.6	0.6	0.1	11.8
Flouride	0.03	0.03	0.03	0.00	0.0
Sulphate	nd	1.5	1.3	0.4	28.3
Total Dissolved Phosphate	0.003	0.003	0.003	0.000	0.0
Total Phosphorus	0.004	0.005	0.005	0.001	15.7
Total Organic Carbon	4.8	5.2	5.0	0.3	5.7
Total Metals					
Aluminum	0.027	0.030	0.029	0.002	7.4
Calcium	1.69	1.67	1.68	0.01	0.8
Iron	0.100	0.097	0.099	0.002	2.2
Magnesium	1.06	1.02	1.04	0.03	2.7
Silicon	0.265	0.255	0.260	0.007	2.7
Strontium	0.013	0.011	0.012	0.001	11.8
Dissolved Metals					
Aluminum	0.012	0.012	0.012	0.000	0.0
Calcium	1.64	1.63	1.64	0.01	0.4
Iron	0.051	0.057	0.054	0.004	7.9
Magnesium	0.995	1.000	0.998	0.004	0.4
Silicon	0.246	0.249	0.248	0.002	0.9
Strontium	0.011	0.011	0.011	0.000	0.0

[1]nd = Not detected

Appendix C5 Summary of physical tests, dissolved anions, nutrients, and organic analyses of water samples collected during spring, Jericho study area 1995.

Variable and Detection Limits (mg/L unless otherwise indicated)		Cigar Lake 17 July Site CL01 Depth (m) 3	Cigar Lake 17 July Site CL01 Depth (m) 11-RepA[2]	Cigar Lake 17 July Site CL01 Depth (m) 11-RepB	Cigar Lake 17 July Site CL02 Depth (m) 3	Cigar Lake 17 July Site CL02 Depth (m) 10	Carat Lake 15 July Site CL03 Depth (m) 2	Carat Lake 15 July Site CL03 Depth (m) 8	Carat Lake 15 July Site CL04 Depth (m) 6	Carat Lake 15 July Site CL04 Depth (m) 15	Carat Lake 15 July Site CL04 Depth (m) 24	Carat Lake 15 July Site CL05 Depth (m) 2	Carat Lake 15 July Site CL05 Depth (m) 9	Jericho Lake 15 July Site CL06 Depth (m) 1.5	Jericho River 15 July Site CL07 Depth (m) 0.3	Jericho River 15 July Site CL08 Depth (m) 0.5	Kathawachaga Lake 18 July Site CL09 Depth (m) 0.9	Kathawachaga Lake 18 July Site CL10 Depth (m) 1.75	Blank 18 July Site CL11 N/A[1] N/A
Physical Tests																			
Total Dissolved Solids	1	9	9	10	9	9	11	10	10	10	11	11	10	10	9	9	10	7	1
Hardness as CaCO3	0.05	4.69	4.75	4.66	4.65	4.67	4.11	4.18	4.17	4.27	4.23	4.18	4.11	4.30	4.21	5.26	5.51	3.44	nd
pH units (@ 20°C)	N/A	6.51	6.42	6.55	6.56	6.45	6.33	6.38	6.35	6.39	6.37	6.41	6.31	6.38	6.36	6.51	6.54	6.56	5.20
Total Suspended Solids	1	nd[3]	nd	nd	1	nd	nd	nd	nd	nd	nd	2	2	nd	nd	3	4	1	nd
Dissolved Anions																			
Acidity as CaCO3	1.0	1.1	2.1	nd	1.7	1.4	2.3	1.7	1.7	1.7	1.7	1.9	1.4	1.3	1.3	1.4	2.1	1.1	nd
Alkalinity - Total as CaCO3	1.0	5.9	5.6	5.7	5.1	5.2	4.4	4.9	4.9	4.9	5.3	5.6	6.1	5.4	3.8	4.4	4.8	3.2	nd
Alkalinity - Bicarbonate	1.0	5.9	5.6	5.7	5.1	5.2	4.4	4.9	4.9	4.9	5.3	5.6	6.1	5.4	3.8	4.4	4.8	3.2	nd
Alkalinity - Carbonate	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloride	0.5	nd	nd	0.5	nd	nd	0.9	0.8	0.9	0.7	0.9	0.9	0.5	0.7	0.6	nd	0.6	nd	nd
Fluoride	0.02	0.03	0.03	0.03	0.03	0.03	0.14	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Sulphate	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nutrients																			
Ammonia Nitrogen	0.005	0.013	0.012	0.010	0.013	0.011	0.017	0.017	0.014	0.012	0.014	0.013	0.018	0.013	0.010	0.011	0.011	0.011	0.012
Nitrate Nitrogen	0.005	nd	nd	nd	nd	nd	0.010	0.010	0.011	0.013	0.016	0.013	0.015	nd	0.005	0.012	nd	0.028	nd
Nitrite Nitrogen	0.001	nd	0.001	nd	nd	nd	nd	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	nd
Dissolved ortho-Phosphate	0.001	nd	0.001	0.001	0.001	0.003	nd	0.001	0.001	0.001	0.003	nd	0.001	0.001	nd	nd	nd	nd	0.001
Total Dissolved Phosphate	0.001	0.002	0.002	0.003	0.002	0.003	0.003	0.003	0.006	0.003	0.003	0.002	0.003	0.003	0.003	0.002	0.003	0.002	0.001
Total Phosphorus	0.001	0.006	0.004	0.012	0.004	0.007	0.005	0.005	0.006	0.005	0.005	0.005	0.005	0.004	0.004	0.004	0.006	0.003	0.002
Organics																			
Chlorophyll a (ug/L)	0.04	0.16	-	-	0.38	-	0.19	-	0.40	-	-	0.37	-	0.11	0.06	0.06	0.19	0.15	-
Total Organic Carbon	0.5	2.7	2.8	2.6	2.6	2.8	4.3	3.3	3.2	3.2	3.3	3.2	3.0	3.2	3.3	2.8	3.1	2.3	1.1

[1] N/A = not applicable.

[2] Replicate samples collected at same depth.

[3] nd = Not detected.

Appendix C6 Summary of physical tests, dissolved anions, nutrients, and organic analyses of water samples collected during summer,Jericho study area 1995.

Variable and Detection Limits (mg/L unless otherwise indicated)		Cigar Lake 20 August				Carat Lake 19 August									Jericho Lake 20 August	Jericho River 22 August		Kathawachaga Lake 22 August		Tailings Lake 18 August		Seep Creek 18 August	Blank 23 August
		Site CL01		Site CL02		Site CL03		Site CL04					Site CL05		Site CL06	Site CL07	Site CL08	Site CL09	Site CL10	Site CL12		Site CL13	Site CL11
		Depth (m)		Depth (m)		Depth (m)		Depth (m)					Depth (m)		Depth (m)	Depth (m)		Depth (m)		Depth (m)		Depth (m)	N/A[1]
		3	11	3	10	2	8	6-RepA[2]	6-RepB	6-RepC	15	24	2	9	2	0.3	0.4	0.75	2	1	3	0.15	N/A
Physical Tests																							
Total Dissolved Solids	1	8	8	10	8	8	7	8	8	8	7	8	9	8	8	8	15	10	6	16	16	15	nd
Hardness as CaCO3	0.05	4.64	4.75	4.84	4.69	4.24	4.18	4.35	4.34	4.37	4.22	4.21	4.33	4.29	4.35	4.51	5.55	5.88	3.54	8.46	8.44	8.81	nd
pH units (@ 20˚C)	N/A	6.65	6.81	6.84	6.83	6.77	6.75	6.64	6.76	6.73	6.71	6.52	6.77	6.74	6.76	5.68	6.89	6.86	6.71	7.15	7.16	6.89	5.68
Total Suspended Solids	1	nd[3]	nd	nd	nd	1	1	nd	nd	nd	2	nd	nd	2	nd	nd	nd	1	3	1	nd	nd	nd
Dissolved Anions																							
Acidity as CaCO3	1.0	2.4	2.6	2.6	2.2	2.4	3.0	3.0	2.6	2.2	2.6	3.3	2.4	2.0	2.4	2.4	2.2	2.6	2.2	2.4	2.8	3.7	2.4
Alkalinity - Total as CaCO3	1.0	5.0	4.8	8.1	4.8	3.5	3.1	4.2	3.8	4.1	3.6	3.8	4.0	3.7	4.0	4.1	5.1	5.5	3.3	8.3	8.3	8.5	nd
Alkalinity - Bicarbonate	1.0	4.8	8.1	4.8	4.0	3.1	4.2	3.6	4.1	3.8	3.8	4.0	5.0	3.7	3.7	4.1	5.1	5.5	3.3	8.3	8.3	8.5	nd
Alkalinity - Carbonate	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloride	0.5	nd	nd	nd	nd	nd	nd	nd	0.5	0.5	nd	nd	0.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoride	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	nd	0.03	0.03	0.03	nd
Sulphate	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nutrients																							
Ammonia Nitrogen	0.005	nd	nd	nd	nd	0.010	0.010	0.009	0.007	0.006	0.011	0.014	0.005	0.007	nd	0.012	nd	0.007	nd	0.034	0.019	0.009	nd
Nitrate Nitrogen	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.020	nd	nd	nd	0.010	0.008	nd	0.023	nd	nd	0.026	nd
Nitrite Nitrogen	0.001	nd	nd	nd	nd	nd	0.001	nd	nd	nd	0.001	0.001	0.001	nd	nd	0.001	nd	0.001	0.001	0.001	0.001	0.001	nd
Dissolved ortho-Phosphate	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd		0.002	0.002	0.001	nd	nd	nd	nd
Total Dissolved Phosphate	0.001	0.002	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.001	nd	nd	0.001	nd
Total Phosphorus	0.001	0.006	0.003	0.004	0.004	0.004	nd	nd	nd	nd	nd	0.006	0.005	0.003	0.004	0.004	0.003	0.005	0.003	0.003	0.003	0.003	nd
Organics																							
Chlorophyll a (ug/L)	0.04	0.36	-	0.45	-	0.97	-	0.66	-	-	-	-	0.68	-	0.66	0.53	0.50	0.64	0.38	0.67	-	0.25	-
Total Organic Carbon	0.5	2.3	2.3	2.2	2.2	2.8	2.7	2.7	2.7	2.8	2.6	2.7	2.8	2.7	2.9	3.0	5.8	2.7	1.6	5.8	5.6	4.7	nd

[1] N/A = not applicable.

[2] Replicate samples collected at same depth.

[3] nd = Not detected.

Appendix C7 Summary of physical tests, dissolved anions, nutrients, and organic analyses of water samples collected during fall, Jericho study area 1995.

Variable and Detection Limits (mg/L unless otherwise indicated)		Cigar Lake 13 Sept. Site CL01 Depth (m) 3	Cigar Lake 13 Sept. Site CL01 Depth (m) 11	Cigar Lake 13 Sept. Site CL02 Depth (m) 3	Cigar Lake 13 Sept. Site CL02 Depth (m) 10	Carat Lake 12 Sept. Site CL03 Depth (m) 2	Carat Lake 12 Sept. Site CL03 Depth (m) 8	Carat Lake 12 Sept. Site CL04 Depth (m) 6	Carat Lake 12 Sept. Site CL04 Depth (m) 15	Carat Lake 12 Sept. Site CL04 Depth (m) 24	Carat Lake 10 Sept. Site CL05 Depth (m) 2	Carat Lake 10 Sept. Site CL05 Depth (m) 9	Jericho Lake 10 Sept. Site CL06 Depth (m) 1.5-RepA[2]	Jericho Lake 10 Sept. Site CL06 Depth (m) 1.5-RepB	Jericho Lake 10 Sept. Site CL06 Depth (m) 1.5-RepC	Jericho River 10 Sept. Site CL07 Depth (m) 0.3	Jericho River 13 Sept. Site CL08 Depth (m) 0.5	Kathawachaga Lake 12 Sept. Site CL09 Depth (m) 0.5	Kathawachaga Lake 12 Sept. Site CL10 Depth (m) 2	Tallings Lake 10 Sept. Site CL12 Depth (m) 1-SplitA	Tallings Lake 10 Sept. Site CL12 Depth (m) 1-SplitB	Tallings Lake 10 Sept. Site CL12 Depth (m) 3	Seep Creek 10 Sept. Site CL13 Depth (m) 0.15	Blank 13 Sept. Site CL11 N/A[1] N/A
Physical Tests																								
Total Dissolved Solids	1	11	11	11	11	11	11	10	10	11	10	10	10	14	10	11	11	10	10	15	18	17	17	nd
Hardness as CaCO3	0.05	4.78	4.69	4.62	4.83	4.22	4.30	4.44	4.14	4.32	4.29	4.34	4.19	4.22	4.25	4.78	5.84	4.13	3.31	8.19	8.20	8.25	8.55	nd
pH units (@ 20˚C)	N/A	6.82	6.85	6.85	6.86	6.75	6.77	6.80	6.79	6.78	6.92	6.91	6.56	6.57	6.62	6.84	6.75	6.78	6.80	6.87	6.88	6.93	6.85	5.82
Total Suspended Solids	1	nd[3]	nd	nd	nd	1	nd	2	3	3	nd	nd	1	1	nd	3	1	1	1	nd	nd	1	nd	nd
Dissolved Anions																								
Acidity as CaCO3	1.0	1.7	2.5	3.5	1.7	3.1	3.1	1.9	2.3	2.1	1.9	2.3	4.8	3.5	2.7	4.1	1.9	1.7	2.5	3.5	2.9	4.7	3.7	1.9
Alkalinity - Total as CaCO3	1.0	5.1	5.3	5.1	5.3	4.3	4.2	4.2	3.6	3.9	4.1	3.6	4.2	4.2	3.5	4.2	5.6	4.4	3.4	8.9	8.7	8.2	7.7	nd
Alkalinity - Bicarbonate	1.0	5.1	5.3	5.1	5.3	4.3	4.2	4.2	3.6	3.9	4.1	3.6	4.2	4.2	3.5	4.2	5.6	4.4	3.4	8.9	8.7	8.2	7.7	nd
Alkalinity - Carbonate	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloride	0.5	nd	nd	0.6	0.6	0.7	0.9	0.7	0.7	0.8	0.7	0.5	0.5	<0.5	0.6	nd	nd	nd	0.5	nd	0.6	nd	0.5	nd
Fluoride	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	nd	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	nd
Sulphate	1.0	1.8	2.0	1.1	1.3	2.0	1.0	1.3	1.2	1.8	1.6	1.6	1.5	2.0	1.6	2.2	1.6	2.0	2.3	nd	1.5	1.6	1.4	nd
Nutrients																								
Ammonia Nitrogen	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.016	nd	nd
Nitrate Nitrogen	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.006	0.007	0.008	0.026	nd	nd	nd	0.019	nd
Nitrite Nitrogen	0.001	0.001	nd	nd	nd	nd	nd	nd	nd	nd	0.001	0.001	nd	nd	nd	nd	0.001	0.002	0.001	nd	nd	0.001	0.001	nd
Dissolved ortho-Phosphate	0.001	nd	nd	0.001	0.002	nd	nd	0.002	0.002	0.003	nd	nd	nd	nd	0.002	nd	nd	0.001	nd	nd	nd	0.001	0.001	nd
Total Dissolved Phosphate	0.001	0.003	0.002	0.003	0.002	0.002	0.002	0.002	0.003	0.003	nd	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.001	0.003	0.003	0.003	0.002	0.001
Total Phosphorus	0.001	0.004	0.004	0.005	0.004	0.004	0.003	0.006	0.005	0.003	0.003	0.004	0.004	0.004	0.004	0.005	0.003	0.005	0.002	0.004	0.005	0.005	0.003	0.001
Organics																								
Chlorophyll a (ug/L)	0.04	0.46	-	0.50	-	0.96	-	0.45	-	-	1.00	-	0.85	0.88	0.88	0.52	0.33	0.29	0.25	0.88	0.76	-	0.23	0.04
Total Organic Carbon	0.5	2.1	1.9	2.2	2.1	2.4	2.8	2.5	2.6	2.5	2.5	2.5	2.7	5.5	2.7	2.9	2.6	1.8	1.8	4.8	5.2	4.8	4.0	0.6

[1] N/A = not applicable.

[2] Replicate and split samples collected at same depth.

[3] nd = Not detected.

Appendix C8 Total metals in water samples collected during spring, Jericho study area 1995.

Variable and Detection Limits (mg/L)		Cigar Lake 17 July					Carat Lake 15 July							Jericho Lake 15 July	Jericho River 15 July		Kathawachaga Lake 18 July		Blank 18 July
		Site CL01			Site CL02		Site CL03		Site CL04			Site CL05		Site CL06	Site CL07	Site CL08	Site CL09	Site CL10	Site CL11
		Depth (m)			Depth (m)		Depth (m)		Depth (m)			Depth (m)		Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	N/A[1]
		3	11-RepA[2]	11-RepB	3	10	2	8	6	15	24	2	9	1.5	0.3	0.5	0.9	1.75	N/A
Aluminum	0.005	0.025	0.009	0.030	0.030	0.029	0.036	0.035	0.035	0.036	0.033	0.034	0.036	0.030	0.030	0.019	0.026	0.017	0.009
Antimony	0.001	nd[3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Beryllium	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.0002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calcium	0.05	1.02	1.05	1.03	1.02	1.03	1.00	0.99	0.98	0.99	0.99	1.01	0.98	0.99	1.01	1.22	1.28	0.77	nd
Chromium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Copper	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Iron	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.032	nd	nd	nd	nd
Lead	0.001	nd	nd	nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lithium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Magnesium	0.005	0.553	0.556	0.561	0.548	0.563	0.444	0.445	0.445	0.445	0.450	0.448	0.426	0.442	0.447	0.573	0.595	0.389	nd
Manganese	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mercury	0.00005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phosphorus	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Potassium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Selenium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silicon	0.05	0.24	0.26	0.26	0.24	0.27	0.28	0.28	0.28	0.28	0.29	0.28	0.28	0.22	0.18	0.12	0.09	0.07	nd
Silver	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	0.001	0.009	0.009	0.008	0.009	0.009	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.008	0.009	0.009	nd
Thallium	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tungsten	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vanadium	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[1] N/A = Not applicable.

[2] Replicate samples collected at the same depth.

[3] nd = Not detected.

Appendix C9 Total metals in water samples collected during summer, Jericho study area 1995.

Variable and Detection Limits (mg/L)		Cigar Lake				Carat Lake									Jericho Lake	Jericho River		Kathawachaga Lake		Tailings Lake		Seep Creek	Blank
		20 August				19 August									20 August	22 August		22 August		18 August		18 August	23 August
		Site CL01		Site CL02		Site CL03		Site CL04					Site CL05		Site CL06	Site CL07	Site CL08	Site CL09	Site CL10	Site CL12		Site CL13	Site CL11
		Depth (m)		Depth (m)		Depth (m)		Depth (m)					Depth (m)		Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)		Depth (m)	N/A[1]
		3	11	3	10	2	8	6-RepA[2]	6-RepB	6-RepC	15	24	2	9	2	0.3	0.4	0.75	2	1	3	0.15	N/A
Aluminum	0.005	0.017	0.021	0.016	0.024	0.038	0.027	0.026	0.025	0.035	0.030	0.025	0.026	0.025	0.023	0.038	0.035	0.016	0.015	0.040	0.039	0.082	0.013
Antimony	0.001	nd[3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Beryllium	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.0002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calcium	0.05	1.02	1.06	1.04	1.05	1.05	1.01	1.05	1.04	1.07	1.06	1.03	1.08	1.06	1.02	1.05	1.31	1.36	0.83	1.77	1.78	1.91	nd
Chromium	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Copper	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Iron	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.049	nd	0.038	nd	0.116	0.120	0.037	nd
Lead	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lithium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Magnesium	0.005	0.555	0.551	0.565	0.557	0.452	0.444	0.439	0.464	0.445	0.435	0.433	0.456	0.441	0.456	0.472	0.616	0.633	0.392	1.020	1.040	1.030	nd
Manganese	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.006	nd	nd	nd
Mercury	0.00005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.002	nd	nd	nd	nd	nd	0.001	nd
Phosphorus	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Potassium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Selenium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silicon	0.05	0.25	0.28	0.27	0.29	0.25	0.28	0.26	0.25	0.25	0.26	0.32	0.27	0.27	0.28	0.30	0.14	0.14	0.07	0.29	0.30	0.70	nd
Silver	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	0.001	0.009	0.009	0.009	0.009	0.012	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.010	0.010	0.009	0.010	0.010	0.010	0.012	0.012	nd
Thallium	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tungsten	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001	nd
Vanadium	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[1] N/A = Not applicable.

[2] Replicate samples collected at the same depth.

[3] nd = Not detected.

Appendix C10 Total metals in water samples collected during fall, Jericho study area 1995.

Variable and Detection Limits (mg/L)		Cigar Lake				Carat Lake					Carat Lake		Jericho Lake			Jericho River		Kathawachaga Lake		Tailings Lake			Seep Creek	Blank
		13 Sept.				12 Sept.					10 Sept.		10 Sept.			10 Sept.	13 Sept.	12 Sept.		10 Sept.			10 Sept.	13 Sept.
		Site CL01		Site CL02		Site CL03		Site CL04			Site CL05		Site CL06			Site CL07	Site CL08	Site CL09	Site CL10	Site CL12			Site CL13	Site CL11
		Depth (m)		Depth (m)		Depth (m)		Depth (m)			Depth (m)		Depth (m)			Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)			Depth (m)	N/A[1]
		3	11	3	10	2	8	6	15	24	2	9	1.5-RepA[2]	1.5-RepB	1.5-RepC	0.3	0.5	0.5	2	1-SplitA	1-SplitB	3	0.15	N/A
Aluminum	0.005	0.039	0.025	0.022	0.013	0.032	0.031	0.035	0.029	0.069	0.038	0.026	0.026	0.023	0.029	0.037	0.03	0.025	0.019	0.027	0.03	0.026	0.15	0.014
Antimony	0.001	nd[3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Beryllium	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.0002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calcium	0.05	1.09	1.03	1.03	1.01	1.06	1.07	1.08	1.03	1.19	1.72	1.03	1.00	1.01	0.99	1.12	1.34	0.95	0.79	1.69	1.67	1.71	1.84	nd
Chromium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Copper	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Iron	0.03	0.03	nd	nd	0.03	nd	nd	nd	nd	nd	0.03	nd	nd	nd	0.04	0.05	nd	nd	nd	0.10	0.10	0.10	0.06	nd
Lead	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lithium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.023	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Magnesium	0.005	0.583	0.576	0.548	0.564	0.44	0.446	0.467	0.443	0.462	0.466	0.467	0.464	0.45	0.454	0.496	0.619	0.455	0.378	1.06	1.02	1.04	1.03	nd
Manganese	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mercury	0.00005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phosphorus	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Potassium	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Selenium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silicon	0.05	0.24	0.24	0.23	0.24	0.23	0.23	0.24	0.22	0.23	0.24	0.23	0.22	0.22	0.22	0.49	0.19	0.09	0.06	0.27	0.26	0.26	1.09	nd
Silver	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	0.001	0.011	0.011	0.011	0.011	0.013	0.013	0.013	0.013	0.013	0.017	0.013	0.013	0.013	0.013	0.011	0.01	0.01	0.011	0.013	0.011	0.011	0.013	nd
Thallium	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tungsten	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vanadium	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[1] N/A = Not applicable.
[2] Replicate and split samples collected at the same depth.
[3] nd = Not detected.

Appendix C11 Dissolved metals in water samples collected during spring, Jericho study area 1995.

Variable and Detection Limits (mg/L)		Cigar Lake					Carat Lake							Jericho Lake	Jericho River		Kathawachaga Lake		Blank
		17 July					15 July							15 July	15 July		18 July		18 July
		Site CL01			Site CL02		Site CL03		Site CL04			Site CL05		Site CL06	Site CL07	Site CL08	Site CL09	Site CL10	Site CL11
		Depth (m)			Depth (m)		Depth (m)		Depth (m)			Depth (m)		Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	N/A[1]
		3	11-RepA[2]	11-RepB	3	10	2	8	6	15	24	2	9	1.5	0.3	0.5	0.9	1.75	N/A
Aluminum	0.005	0.011	0.009	0.007	0.007	0.007	0.018	0.018	0.017	0.018	0.018	0.017	0.017	0.014	0.014	0.006	0.007	nd	nd
Antimony	0.001	nd[3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	0.0001	nd	nd	nd	nd	nd	0.0001	0.0001	nd	nd	0.0001	nd	nd	nd	nd	nd	nd	0.0002	0.0001
Barium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Beryllium	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.0002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calcium	0.05	1.01	1.01	0.98	0.98	0.99	0.95	0.95	0.94	0.98	0.97	0.97	0.94	0.99	0.98	1.16	1.23	0.75	nd
Chromium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Copper	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Iron	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lead	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lithium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Magnesium	0.005	0.529	0.541	0.540	0.535	0.535	0.426	0.438	0.441	0.445	0.441	0.429	0.426	0.442	0.431	0.573	0.591	0.380	nd
Manganese	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mercury	0.00005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phosphorus	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Potassium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Selenium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silicon	0.05	0.23	0.25	0.24	0.23	0.25	0.25	0.25	0.25	0.26	0.26	0.25	0.25	0.21	0.16	0.12	0.09	0.06	nd
Silver	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	0.001	0.008	0.008	0.008	0.008	0.008	0.009	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.008	0.008	0.009	nd
Thallium	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tungsten	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vanadium	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[1] N/A = Not applicable.

[2] Replicate samples collected at the same depth.

[3] nd = Not detected.

Appendix C12 Dissolved metals in water samples collected during summer, Jericho study area 1995.

Variable and Detection Limits		Cigar Lake				Carat Lake									Jericho Lake	Jericho River		Kathawachaga Lake		Tailings Lake		Seep Creek	Blank
		20 August				19 August									20 August	22 August		22 August		18 August		18 August	23 August
		Site CL01		Site CL02		Site CL03		Site CL04					Site CL05		Site CL06	Site CL07	Site CL08	Site CL09	Site CL10	Site CL12		Site CL13	Site CL11
		Depth (m)		Depth (m)		Depth (m)		Depth (m)					Depth (m)		Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)		Depth (m)	N/A[1]
(mg/L)		3	11	3	10	2	8	6-RepA[2]	6-RepB	6-RepC	15	24	2	9	2	0.3	0.4	0.75	2	1	3	0.15	N/A
Aluminum	0.005	0.006	0.008	0.006	0.007	0.014	0.016	0.015	0.020	0.015	0.015	0.017	0.015	0.016	0.016	0.010	nd	0.008	0.005	0.025	0.028	0.073	nd
Antimony	0.001	nd[3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Beryllium	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.0002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calcium	0.05	0.99	1.01	1.04	0.99	0.98	0.97	1.02	1.02	1.02	0.98	0.99	1.01	0.99	0.99	1.03	1.25	1.34	0.79	1.71	1.71	1.87	nd
Chromium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Copper	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Iron	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.049	0.049	nd	nd
Lead	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lithium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Magnesium	0.005	0.525	0.540	0.542	0.536	0.436	0.428	0.439	0.433	0.445	0.430	0.425	0.436	0.440	0.456	0.472	0.588	0.619	0.383	1.020	1.010	1.010	nd
Manganese	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mercury	0.00005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phosphorus	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Potassium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Selenium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silicon	0.05	0.25	0.28	0.27	0.24	0.25	0.24	0.26	0.22	0.25	0.22	0.30	0.25	0.27	0.23	0.24	0.14	0.14	0.07	0.29	0.30	0.68	nd
Silver	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	2.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	0.001	0.009	0.009	0.009	0.009	0.010	0.010	0.011	0.010	0.010	0.010	0.010	0.010	0.011	0.010	0.010	0.009	0.009	0.009	0.010	0.010	0.012	nd
Thallium	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tungsten	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vanadium	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[1] N/A = Not applicable.

[2] Replicate samples collected at the same depth.

[3] nd = Not detected.

Appendix C13 Dissolved metals in water samples collected during fall, Jericho study area 1995.

Variable and Detection Limits (mg/L)		Cigar Lake				Carat Lake							Jericho Lake			Jericho River		Kathawachaga Lake		Tailings Lake			Seep Creek	Blank
		13 Sept.				12 Sept.					10 Sept.		10 Sept.			10 Sept.	13 Sept.	12 Sept.		10 Sept.			10 Sept.	13 Sept.
		Site CL01		Site CL02		Site CL03		Site CL04			Site CL05		Site CL06			Site CL07	Site CL08	Site CL09	Site CL10	Site CL12			Site CL13	Site CL11
		Depth (m)		Depth (m)		Depth (m)		Depth (m)			Depth (m)		Depth (m)			Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)			Depth (m)	N/A[1]
		3	11	3	10	2	8	6	15	24	2	9	1.5-RepA[2]	1.5-RepB	1.5-RepC	0.3	0.5	0.5	2	1-SplitA	1-SplitB	3	0.15	N/A
Aluminum	0.005	nd[3]	nd	nd	0.007	0.014	0.013	0.013	0.014	0.014	0.015	0.025	0.013	0.019	0.017	0.021	0.007	0.025	nd	0.012	0.012	0.012	0.076	nd
Antimony	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.0001	nd	nd	nd	nd	nd
Barium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Beryllium	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.0002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calcium	0.05	0.99	0.99	0.95	1.01	0.99	0.99	1.02	0.99	1.00	1.00	1.00	0.95	0.95	0.97	1.10	1.31	0.91	0.73	1.64	1.63	1.64	1.77	nd
Chromium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Copper	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Iron	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.051	0.057	0.052	0.033	nd
Lead	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lithium	0.015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Magnesium	0.005	0.560	0.541	0.544	0.563	0.427	0.446	0.460	0.407	0.446	0.438	0.445	0.443	0.449	0.444	0.496	0.619	0.452	0.361	0.995	1.000	1.010	1.010	nd
Manganese	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mercury	0.00005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phosphorus	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Potassium	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Selenium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silicon	0.05	0.23	0.22	0.22	0.23	0.21	0.22	0.22	0.21	0.21	0.22	0.22	0.21	0.21	0.21	0.48	0.16	0.08	0.05	0.25	0.25	0.24	1.04	nd
Silver	0.0001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	0.001	0.010	0.010	0.010	0.010	0.013	0.013	0.013	0.012	0.013	0.013	0.013	0.013	0.013	0.012	0.011	0.010	0.010	0.010	0.011	0.011	0.011	0.013	nd
Thallium	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	0.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tungsten	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.0005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vanadium	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

[1] N/A = Not applicable.
[2] Replicate and split samples collected at the same depth.
[3] nd = Not detected.

APPENDIX D - SEDIMENT

APPENDIX D

Sediment Quality Assessment

Laboratory

CanTesT Ltd. laboratories in Vancouver, B.C., analyzed the sediment quality samples collected by Canamera Geological Ltd. and conducted routine quality control programs to verify the accuracy and precision of analyses conducted.

Replicate Samples

To assess the degree of variability in the sample data due to laboratory procedures, one sample, choosen at random, was analyzed in duplicate. Variability was measured as the coefficient of variation (CV), the ratio of the standard deviation to the mean expressed as a percentage.

A summary of the variability between the duplicate analyses is compiled in Appendix D1. Variability was generally less than 25% for most of the variables. Only arsenic (29%) showed a variability greater than 25%.

Blank Samples

To assess the degree of potential sample contamination in laboratory procedures, triplicate blank samples were analyzed (Appendix D2). Of the 28 variables examined only seven had detectable concentrations (barium, boron, calcium, iron, magnesium, titanium, and zinc). Calcium, magnesium, and zinc had the greatest variablities at 51%, 74%, and 43%, respectively. It should be noted, however, that in cases where concentrations are very low, as with some of these metals, a one-digit change in value can produce relatively high coefficients of variation.

Certified Standard

To assess the accuracy of laboratory analytical procedures one National Research Council of Canada (NRC), certified reference material was analyzed (Appendix D3). The percent recovery of the NRC sample ranged from 18 to 129% for 28 variables. Cadmium, copper, lead, and elemental phosphorus were the only variables that were within the certified concentration 95% confidence limits. It is not known why a large portion of the variables either were below or exceeded their certified concentration.

Field

Replicate Samples

Canamera Geological Ltd. collected one set of duplicate sediment quality samples from Tailings Lake and the results of the quality assurance analyses are presented in Appendix D4. The CVs of the 32 variables ranged from 0%,

because results were below methodological detection limits, to 82%. Copper, lead, moisture, and total Kjeldahl nitrogen were the only variables that had CVs less than 25%. The relatively low CVs obtained in the laboratory duplicate analyses compared to the field duplicates suggests that any combination of natural variability, sampling variability, and sample handling occurred.

Appendix D1 Precision of laboratory, duplicate sediment quality analyses, Jericho study area 1995.

Variable and Detection limits[1]		Tailings Lake, Site CL12-RepA, 11 August 1995, 4.3 m				
		Replicate		Mean	Standard Deviation	Coefficient of Variation (%)
		A	B			
Aluminum	10	12600	12100	12350.0	353.6	2.9
Antimony	10	nd[2]	nd	N/A[3]	N/A	N/A
Arsenic	0.05	12.00	7.90	9.95	2.90	29.14
Barium	0.1	58.0	55.0	56.5	2.1	3.8
Beryllium	1	nd	nd	N/A	N/A	N/A
Boron	0.5	15.0	15.0	15.0	0.0	0.0
Cadmium	0.25	nd	nd	N/A	N/A	N/A
Calcium	1	2590	2330	2460.0	183.8	7.5
Chromium	2	28	26	27.0	1.4	5.2
Cobalt	1	10	10	10.0	0.0	0.0
Copper	1	79	76	77.5	2.1	2.7
Iron	2	25000	23800	24400.0	848.5	3.5
Lead	1	4	3	3.5	0.7	20.2
Magnesium	0.1	5070.0	4960.0	5015.0	77.8	1.6
Manganese	0.2	240.0	230.0	235.0	7.1	3.0
Mercury	0.001	0.030	0.030	0.030	0.000	0.000
Molybdenum	4	nd	nd	N/A	N/A	N/A
Nickel	2	28	27	27.5	0.7	2.6
Phosphorus	20	1960	1810	1885.0	106.1	5.6
Selenium	0.5	nd	nd	N/A	N/A	N/A
Silver	2	nd	nd	N/A	N/A	N/A
Sodium	5	232	183	207.5	34.6	16.7
Strontium	0.1	14.0	11.0	12.5	2.1	17.0
Tin	5	nd	nd	N/A	N/A	N/A
Titanium	0.3	584.0	508.0	546.0	53.7	9.8
Vanadium	0.5	38.0	36.0	37.0	1.4	3.8
Zinc	1	58	56	57.0	1.4	2.5
Moisture (%)	0.01	61.40	nd	N/A	N/A	N/A

[1] Unless otherwise indicated, all concentrations are expressed as µg/g on a dry weight basis.

[2] nd = Not detected.

[3] N/A = Not applicable.

Appendix D2 Precision of laboratory sediment quality blank analyses, Jericho study area 1995.

Variable and Detection limits[1]		Blank			Mean	Standard Deviation	Coefficient of Variation (%)
		1	2	3			
Aluminum	0.15	nd[2]	nd	nd	N/A[3]	N/A	N/A
Antimony	0.15	nd	nd	nd	N/A	N/A	N/A
Arsenic	0.01	nd	nd	nd	N/A	N/A	N/A
Barium	0.001	0.001	0.001	0.001	0.001	0.000	0.000
Beryllium	0.006	nd	nd	nd	N/A	N/A	N/A
Boron	0.01	0.04	0.05	0.04	0.04	0.01	13.32
Cadmium	0.005	nd	nd	nd	N/A	N/A	N/A
Calcium	0.01	0.08	0.05	0.14	0.09	0.05	50.92
Chromium	0.03	nd	nd	nd	N/A	N/A	N/A
Cobalt	0.02	nd	nd	nd	N/A	N/A	N/A
Copper	0.015	nd	nd	nd	N/A	N/A	N/A
Iron	0.03	nd	nd	0.03	0.03	0.00	0.00
Lead	0.08	nd	nd	nd	N/A	N/A	N/A
Magnesium	0.001	0.010	nd	0.010	0.007	0.005	74.231
Manganese	0.003	nd	nd	nd	N/A	N/A	N/A
Mercury	0.0002	nd	nd	nd	N/A	N/A	N/A
Molybdenum	0.04	nd	nd	nd	N/A	N/A	N/A
Nickel	0.025	nd	nd	nd	N/A	N/A	N/A
Phosphorus	0.4	nd	nd	nd	N/A	N/A	N/A
Potassium	<1	nd	nd	nd	N/A	N/A	N/A
Selenium	0.05	nd	nd	nd	N/A	N/A	N/A
Silver	0.03	nd	nd	nd	N/A	N/A	N/A
Sodium	0	nd	nd	nd	N/A	N/A	N/A
Strontium	0.001	nd	nd	nd	N/A	N/A	N/A
Tin	0.03	nd	nd	nd	N/A	N/A	N/A
Titanium	0.006	nd	0.007	0.008	0.007	0.001	14.286
Vanadium	0.01	nd	nd	nd	N/A	N/A	N/A
Zinc	0.015	0.040	0.020	0.020	0.027	0.012	43.301

[1] Unless otherwise indicated, all concentrations are expressed as µg/g on a dry weight basis.

[2] nd = Not detected.

[3] N/A = Not applicable.

Appendix D3 Accuracy of laboratory sediment quality analyses, Jericho study area 1995.

Variable and Detection limits[1]		Result	Certified Value[2] (+95% Confidence Limit)	Percent Recovery
Aluminum	10	5	12.23 (0.22)	40
Calcium	1	2	2.92 (0.09)	55
Iron	2	6	6.96 (0.12)	91
Magnesium	0.1	1.8	2.41 (0.09)	73
Potassium	0.01	0.28	1.50 (0.09)	18
Sodium	5	2	4.40 (0.11)	53
Antimony	10	85	171 (14)	50
Arsenic	0.05	175.00	211 (11)	83
Barium	0.1	375.0	-	-
Beryllium	<3.0	nd	-	-
Boron	0.5	90.0	-	-
Cadmium	0.25	2.25	2.38 (0.2)	95
Chromium	2	67	113 (8)	59
Cobalt	1	13	17.5 (1.1)	74
Copper	1	435	452 (16)	96
Lead	1	400	404 (20)	99
Manganese	0.1	322.0	470 (12)	69
Mercury	0.001	5.900	4.57 (0.16)	129
Molybdenum	4	7	12.9 (0.9)	50
Nickel	2	37	44.1 (2.0)	83
Phosphorus	20	2950	3110 (0.11)	95
Selenium	0.5	0.5	1.09 (0.11)	41
Silver	<15	nd	-	-
Strontium	0.1	95.5	277 (11)	34
Tin	5	26	41.1 (3.1)	63
Titanium	0.3	1800.0	4210 (66)	43
Vanadium	0.5	95.0	127 (5)	75
Zinc	1	795	824 (22)	96

[1] Unless otherwise indicated, all concentrations are expressed as µg/g on a dry weight basis.

[2] National Research Council of Canada (NRC), Certified Reference Material PACS-1.

Appendix D4 Field precision of duplicate sediment quality analyses, Jericho study area 1995.

Variable and Detection limits[1]		Tailings Lake, Site CL12, 11 August 1995, 4.3 m				
		Replicate		Mean	Standard Deviation	Coefficient of Variation (%)
		A[2]	B			
Aluminum	10	12300	35400	23850.0	16334.2	68.5
Antimony	10	nd[3]	nd	N/A[3]	N/A	N/A
Arsenic	0.05	10.00	4.80	7.40	3.68	49.69
Barium	0.1	57.0	200.0	128.5	101.1	78.7
Beryllium	1	nd	nd	N/A	N/A	N/A
Boron	0.5	15.0	33.0	24.0	12.7	53.0
Cadmium	0.25	nd	nd	N/A	N/A	N/A
Calcium	1	2460	5880	4170.0	2418.3	58.0
Chromium	2	27	94	60.5	47.4	78.3
Cobalt	1	10	22	16.0	8.5	53.0
Copper	1	78	81	79.5	2.1	2.7
Iron	2	24400	53300	38850.0	20435.4	52.6
Lead	1	3	4	3.5	0.7	20.2
Magnesium	0.1	5020.0	18600.0	11810.0	9602.5	81.3
Manganese	0.2	235.0	565.0	400.0	233.3	58.3
Mercury	0.001	0.030	0.015	0.023	0.011	47.140
Molybdenum	4	nd	nd	N/A	N/A	N/A
Nickel	2	27	56	41.5	20.5	49.4
Phosphorus	20	1880	2860	2370.0	693.0	29.2
Selenium	0.5	nd	nd	N/A	N/A	N/A
Silver	2	nd	nd	N/A	N/A	N/A
Sodium	5	2070	706	1388.0	964.5	69.5
Strontium	0.1	12.0	33.0	22.5	14.8	66.0
Tin	5	nd	nd	N/A	N/A	N/A
Titanium	0.3	546.0	2040.0	1293.0	1056.4	81.7
Uranium	0.05	28.00	22.00	25.00	4.24	16.97
Vanadium	0.5	37.0	93.0	65.0	39.6	60.9
Zinc	1	57	97	77.0	28.3	36.7
Moisture (%)	0.01	61.40	59.20	60.30	1.56	2.58
Total Organic Carbon (%)	0.019	2.840	1.370	2.105	1.039	49.380
Total Kjeldahl Nitrogen (%)	0.0059	0.3700	0.4100	0.3900	0.0283	7.2524
Phosphorus (phosphates)	40	2840	1950	2395.0	629.3	26.3

[1] Unless otherwise indicated, all concentrations are expressed as µg/g on a dry weight basis.

[2] This sample was the laboratory duplicate quality assurance sample. Reported concentrations are means of duplicate analyses.

[3] nd = Not detected at specified limit. N/A = Not applicable.

APPENDIX E - PLANKTON

Appendix E1 Summary of phytoplankton and zooplankton collection data from sampled lakes during summer and fall, Jericho study area 1995.

Lake	Site	Zooplankton							Phytoplankton			
		Date	UTM Coordinates	No. of Replicates	Area Sampled (m^2)	Secchi Disk Depth (m)	Haul Depth (m)	Volume Filtered (m^3)	Date	UTM Coordinates	No. Hauls	Haul Depth (m)
Carat	PL1-1	7 Aug 95	12 W 0478174 7320854	3	0.014	5.0	10[1]	0.420	7 Aug 95	12 W 0478174 7320854	5	10[1]
Carat	PL1-2	8 Aug 95	N/D[2]	3	0.014	7.1	21	0.882	8 Aug 95	N/D	5	14
Jericho	PL2	4 Aug 95	12 W 0477483 7323615	3	0.014	6.0	14[1]	0.588	4 Aug 95	12 W 0477483 7323615	5	12
C3	PL3	10 Aug 95	12 W 0474915 7319380	3	0.014	6.3	12[1]	0.504	10 Aug 95	12 W 0474915 7319380	5	12[1]
Carat	PL1-1	13 Sept 95	N/D	3	0.014	7.0	10[1]	0.420	13 Sept 95	N/D	5	10[1]
Carat	PL1-2	13 Sept 95	N/D	3	0.014	6.5	19	0.798	13 Sept 95	N/D	5	13
Jericho	PL2	15 Sept 95	12 W 0477682 7323681	3	0.014	6.5	14[1]	0.588	15 Sept 95	12 W 0477682 7323681	5	13
C3	PL3	14 Sept 95	12 W 0474901 7319307	3	0.014	6.5	11[1]	0.462	14 Sept 95	12 W 0474901 7319307	5	11[1]

[1] Haul depths 1.0 m off bottom.

[2] N/D = no data

Appendix E2 Density and biovolume of phytoplankton collected from sampled lakes during summer and fall, Jericho study area 1995.

Taxonomic Group	Density (No./mL)								Biovolume (µm³/m³)							
	Carat Lake				Jericho Lake		Lake C3		Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3		Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall
BACILLARIOPHYTA (Diatoms)																
Achnanthes minutissima	8	11	2	2	13	P	14	2	410	3,127	759	1,124	2,139	P	3,809	785
Achnanthes minutissima v. cryptocepala	P[1]		P	P		P			P			P	P	P		
Achnanthes flexella	P												P			
Asterionella formosa			P	P	P				P		P	P	P			
Cyclotella bodanica	9	8	15	11	7	P	16	P	37,996	51,078	50,424	74,954	50,949	P	33,842	P
Cyclotella comta				P		P						P		P		
Cyclotella ocellata	127	79	87	64	7	24	47	21	38,001	9,620	9,916	12,208	601	1,224	2,724	1,828
Cymbella affinis		P		2				P		P		1,275				P
Cymbella minuta				P								P				
Cymbella sp.	3		2		P		P		2,354		1,306		P		P	
Eunotia sp. A	5	P	9		4		4		7,471	P	3,616		1,535		1,475	
Eunotia sp. B		2	P	17	P	5		4		1,165		7,185	P	2,296		1,930
Eunotia triodon	P			P								P	P			
Fragilaria construens v. venter			P		P						P		P			
Frustulia rhomboides v. amphipleuroides				P								P				
Frustulia vulgaris		P	P	P		P	P	3	P	P	P	P		P	P	467
Gomphonema augur				P								P				
Gomphonema gracilis v. lanceolata				2				P				837				P
Gyrosigma sp.				P								P				
Melosira distans	P	P	P	P	P	P	14	33	P	P	P	P	P	P	12,306	21,982
Melosira italica				P	P			P					P			P
Navicula exigua				P								P				
Navicula pupula				P								P				
Navicula sp.				P								P				
Navicula viridula				P								P				
Nitzschia angustata				P								P				
Nitzschia palea				P			P		P			P				
Nitzschia sp.				P				P				P				P
Oestrupia sp.				P								P				
Opephora martyi				P								P				
Pinnularia subcapitata v. paucistriata			P						P							
Pinnularia dactylus					P								P			
Pinnularia rupestris					P								P			
Pinnularia sp.				P		P						P		P		
Stauroneis anceps			P	P					P			P				
Stephanodiscus astraea				P	P							P	P			
Stephanodiscus hantzschii					P								P			
Synedra ulna				P								P				
Tabellaria fenestrata			P	P					P			P				
Tabularia floculosa	1	P	4	P	25	29	P	5	1,821	P	6,034	P	29,965	39,739	P	10,453
Total Bacillariophyta	153	100	119	98	56	58	95	68	88,053	64,990	72,055	97,583	85,189	43,259	54,156	37,445

[1]P = present, but not encountered in routine cell counts.

Appendix E2 Continued.

Taxonomic Group	Density (No./mL)								Biovolume (µm³/m³)							
	Carat Lake				Jericho Lake		Lake C3		Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3		Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall
CRYPTOPHYTA (Cryptomonads)																
Cryptomonas curvata		P		2	P	5		P		P		4,182	P	14,288		P
Cryptomonas ovata	3	5	P	11	2		P	2	5,976	12,378	P	28,846	5,304		P	5,931
Cryptomonas reflexa	8	7	15	4	11	9	4	P	12,761	5,440	19,896	2,935	10,843	10,316	3,373	P
Cyanomonas sp.		P		P				P		P		P				P
Katablepharis ovalis	96	100	41	80	159	60	67	78	11,961	8,904	4,581	10,432	17,584	8,280	7,245	8,584
Rhodomonas minuta	75	65	80	54	116	82	25	43	14,276	10,500	15,041	10,629	18,720	14,216	6,783	10,762
Sennia sp.			P								P					
Total Cryptophyta	182	177	136	151	288	156	96	123	44,974	37,222	39,518	57,024	52,451	47,100	17,401	25,277
CHRYSOPHYTA (Golden-Brown Algae)																
Bitichia longispina	3	5	P	5	4	19	31	5	2,910	496	P	424	364	2,188	3,147	511
Chromulina erkensis		5		5				5		1,428		1,458				830
Chrysochromulina parva	110	123	144	118	330	232	140	211	5,263	24,865	9,815	5,140	10,757	12,637	13,725	10,249
Chrysococcus sp.								72								6,152
Chrysoikos skujai		2			4					69			1,057			
Chrysosphaerella rodhei	404	93	329	163	563	272	687	215	93,127	20,182	71,201	44,801	84,671	79,041	172,105	59,630
Chrysostephanosphaera globulifera				7	13	P						2,444	36,275	P		
Dinobryon sertularia	35	5	37	9	14	10	11	15	78,772	12,239	69,059	18,145	7,214	18,999	21,024	16,192
Dinobryon divergens						P								P		
Dinobryon sociale	33	32	22	7	71	41	54	18	33,406	38,163	17,942	11,100	136,117	43,396	54,904	18,939
Isthmochloron trispinatum	5		P	P		2		2	9,678		P	P		468		649
Kephyrion boreale	3	14	P	45	25	22	4	23	1,544	7,406	P	22,516	9,802	10,133	1,514	12,329
Mallomonas sp.		P	2	P	P	P	4	9		P	3,442	P	P	P	1,953	7,137
Ochromonas stellaris		P		P	P	14	4	P		P		P	P	24,466	6,747	P
Ochromonas sp. A		6		7	P	5		21		2,077		1,761	P	1,117		5,846
Ochromonas sp. B		19		20		96		44		22,152		18,931		144,490		61,012
Ophiocytium sp.			2		P						3,134		P			
Pseudokephyrion sp.								5								1,718
Stelexmonas dichotoma						5								102		
Stichogloea doederleinii	13	44	27	71		127	50	86	5,969	15,377	9,937	16,274		37,312	13,923	16,008
Synura sp.			P	P				P			P	P				P
Unidentified Statospores		2		9		5		24		2,237		9,504		1,945		19,873
Total Chrysophyta	606	350	563	466	1,024	850	985	755	230,669	146,691	184,530	152,498	286,257	376,294	289,042	237,075
PYRROPHYTA (Dinoflagellates)																
Ceratium hirudinella			P								P					
Glenodinium sp.	18	12	12	5	17	5	11	35	16,495	4,367	7,840	2,081	9,430	2,062	4,615	15,832
Glenodinium helveticum				P								P				
Gymnodinium umberrimum	P	P	P	P	7	P	7	P	P	P	P	P	70,605	P	67,726	P
Gymnodinium sp.	10	2		5		P	P	P	50,044	7,769		13,018		P	P	P
Peridinium sp.			P		P		P				P		P		P	
Unidentified cysts	P				13				P				46,339			
Total Pyrrophyta	28	14	12	10	37	5	18	35	66,539	12,136	7,840	15,099	126,374	2,062	72,341	15,832

[1]P = present, but not encountered in routine cell counts.

Appendix E2 Continued.

Taxonomic Group	Density (No./mL)								Biovolume (µm³/m³)							
	Carat Lake				Jericho Lake		Lake C3		Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3		Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall
CHLOROPHYTA (Green Algae)																
Ankistrodesmus convolutus	34	9	4	6	P	2	21	21	699	237	179	139	P	84	302	497
Ankistrodesmus falcatus	29	60	31	20	29	52	22	56	1,755	1,484	1,077	1,443	528	2,227	933	965
Arthrodesmus sp.	P	2	7	P	P	5	P	2	P	173	3,420	P	P	1,675	P	1,009
Chlamydomonas frigida		5		87		P		19		2,056		1,955		P		1,587
Chlamydomonas sp.	P	14	5	2	P	P	32	P	P	618	623	1,713	P	P	4,052	P
Coeloastrum microporum							43								11,005	
Cosmarium tetraphthalmum	P								P							
Cosmarium sp.	3	P	2	P	P	6	21	6	967	P	1,710	P	P	7102	9124	3,950
Crucigenia fenestrata	P	P	P	9	P	P	29	28	P	P	P	349	P	P	485	768
Dictyosphaerium ehrenbergianum	P	P	P	P		P	P	P	P	P	P	P		P	P	P
Elakatothrix gelatinosa	13	9	64	P	P	2	74	P	441	187	1,356	P	P	71	1338	P
Euastrum elegans	P				P				P				P			
Euastrum sp. A	P			P					P			P				
Euastrum sp. B					P	P							P	P		
Genicularia elegans								P								P
Gloeotilla pelagica	53						P		568						P	
Kirchneriella lunaris		2		5				16		54		253				87
Micractinium pusillum		9								2,359						
Monoraphidium sp.	5	P	2			P	18		68	P	8			P	155	
Mougeotia sp.	P	P							P	P						
Oocystis lacustris	20	76	P	21	7	60	22	36	7,428	25,929	P	11,101	2,085	22,880	3,614	7,100
Oocystis pusilla	P	P		5	P	P	20	P	P	P		204	P	P	3,190	P
Pediastrum boryanum				P								P				
Scenedesmus quadricauda			P	P							P	P				
Scenedesmus bijuga			P	P							P	P				
Scenedesmus ecornis			1								202					
Sphaerocystis schroeteri	52	74	266	186	47	103	507	113	12,568	36,735	123,423	268	15,160	8,829	124,601	20,937
Staurastrum sp.				P								P				
Tetraedron arthrodesmiforme	10	2	7	2	4	5	18	7	178	57	269	129	255	117	617	174
Tetraedron minimum		P	P	P				P		P	P	P				P
Tetraedron muticum		P								P						
Total Chlorophyta	219	262	389	343	87	235	827	304	24,672	69,889	132,267	17,554	18,028	42,985	159,416	37,074

[1]P = present, but not encountered in routine cell counts.

Appendix E2 Concluded.

Taxonomic Group	Density (No./mL)								Biovolume (µm³/m³)							
	Carat Lake				Jericho Lake		Lake C3		Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3		Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall
CYANOPHYTA (Cyanobacteria)																
Anabaena planctonica				P		P		33				P		P		3,371
Anabaena sp.			P		P						P		P			
Aphanocapsa elachista			349	246	P	79	659	1,357			1,802	288	P	92	1,990	1,106
Aphanothece clathrata v. brevis	P	1,148	319	454	P		P	274	P	1,122	183	295	P		P	184
Chroococcus dispersus		51		64			P	153		198		550			P	1,028
Chroococcus limneticus		P			P			33		P			P			267
Dactylococcopsis linearis		2	P	2		P	54	2		332	P	190		P	3,508	76
Gomphosphaeria naegelianum	102	431	30	449	P		313	P	1,000	7,762	237	5,503	P		3,570	P
Lyngby aerugineocaerulea		P								P						
Lyngby contorta						P								P		
Merismopedia tenuissima	41	347	149	307	P	96	43	177	162	781	163	625	P	269	114	482
Microcytis flosaquae				1,432		12		207				46,016		191		4,017
Nostoc sp.		P								P						
Oscillatoria limnetica		P		38		48		5		P		435		549		95
Radiocystis geminata			P				385	P			P				4,719	P
Total Cyanophyta	143	1,979	847	2,992	0	235	1,454	2,241	1,162	10,195	2,385	53,902	0	1,101	13,901	10,626
Total Algal Density per Sample (No./mL)	1,331	2,882	2,066	4,060	1,492	1,539	3,475	3,526								
Total Algal Biovolume per Sample (µm³/m³)									456,069	341,123	438,595	393,660	568,299	512,801	606,257	363,329
Total Number of Taxa per Sample	51	60	53	85	58	55	47	64								

[1]P = present, but not encountered in routine cell counts.

Appendix E3 Density and biomass of zooplankton collected from sampled lakes during summer and fall, Jericho study area 1995.

Taxonomic Group	Density (No./m³)								Biomass (µg/m³)							
	Carat Lake				Jericho Lake		Lake C3		Carat Lake				Jericho Lake		Lake C3	
	Site PL1-1		Site PL1-2		Site PL2		Site PL3		Site PL1-1		Site PL1-2		Site PL2		Site PL3	
	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall	Summer	Fall
CALANOIDA																
Heterocope sp.		12	47	9	P		96	P		719	2,851	0			5,960	
Leptodiaptomus sicilis	197	57	193	38	212		595	37	1,554	451	1,263	247	1,931		5,650	350
copepodids	25	7	67		32				98	28	257		122			
nauplii	P[1]	P	18		26	P	1,793	1,034			6		9		514	296
CYCLOPOIDA																
Dicyclops bicuspidatus	438	202	283	43	296	163	1,144	63	1,919	887	1,195	180	1,240	683	5,665	311
copepodids	95	88	153	29	196	42	390	48	255	236	409	77	440	95	866	106
nauplii	533	12,031	743	1,771	595	1,696	39,154	4,138	66	1,485	70	166	73	209	5,219	552
CLADOCERA																
Bosminidae																
Bosmina spp.			P		P			P								
Holopedidae																
Holopedium spp.	51		204		217		652	15	68,100		272,803		336,587		897,993	20,864
Daphnidae																
Ceriodaphnia spp.							P									
Daphnia schodleri		5	24	P	53	151	90	6		171	847		1,900	5,429	3,481	253
Simocephalus spp.	P															
Chydoridae							P	P								
ROTIFERA																
Keratella cochlearis	419	6,580	195	6,551	1,397	3,392	13,450	7,241	18	279	7	232	56	137	547	294
Kellicottia longispina	286	13,535	354	4,957	1,341	5,936	22,117	16,033	19	910	24	336	85	375	1,501	1,088
Conochiloides unicornis	1,086	3,008	1,727	531	1,341	P	15,243	1,293	100	278	193	59	147		1,646	140
Keratella quadrata	P		P		P											
Polyarthra dolichoptera	P	P	P	P	P		P	3,362								244
Branchionus rubens	P															
Trichotria tetractis					P											
Euchlanis spp.					P											
Platyas patulus					P											
Lecane luna							P									
Monostyla lunaris		P														
Total Density and Biomass	3,130	35,525	4,008	13,929	5,706	11,380	94,724	33,270	72,129	5,444	279,925	1,297	342,590	6,928	929,042	24,498

[1]P = Present, but not encountered in routine cell counts.

APPENDIX F - PERIPHYTON

Appendix F1 Summary of periphyton collection data from sampled streams, Jericho study area 1995.

Stream	Site	Location	Date	Replicate No.	Area Sampled (cm^2)	Volume Sample Diluted to (mL)	Volume Filtered For Chlorophyll a Analysis (mL)	Volume Preserved For Periphyton Algal ID (mL)	Chlorophyll a Concentration (ug/cm^2)	Mean Chlorophyll a Concentration
C1	B1	100 m upstream of Carat Lake	7 Aug 95	1	5	100	45	15	1.35	1.07
				2	5	100	45	15	0.02	
				3	5	100	45	15	0.05	
				4	5	100	45	15	2.58	
				5	5	100	45	15	1.35	
C8	B8	50 m upstream of Carat Lake	5 Aug 95	1	5	100	45	15	4.28	1.44
				2	5	100	45	15	0.27	
				3	5	100	45	15	2.23	
				4	5	100	45	15	0.43	
				5	5	100	45	15	0.00	

Appendix F2 Density of periphyton in Stream C1, Site B1, Jericho study area 1995.

Taxonomic Group	Density (cells/cm²) Stream C1, Site B1					Mean	Standard Error
	Repl. #1	Repl. #2	Repl. #3	Repl. #4	Repl. #5		
BACILLARIOPHYTA (Diatoms)							
Achnanthes minutissima	104,697	7,844	83,670	117,659	72,357	77,245	19,064
Achnanthes minutissima v. cryptocepala			P			0	0
Achnanthes flexella	1,306	508	884	1,496	1,009	1,041	171
Cyclotella bodanica	3,218	784	778	P		956	625
Cyclotella ocellata	7,723		P	P		1,545	1,994
Cymbella minuta		P	P	P		0	0
Cymbella gracilis	P[1]	P	778	P		156	174
Eunotia pectinalis	7,671	6,887	7,202	13,295	348	7,081	2,054
Eunotia praerupta		P		P	P	0	0
Eunotia triodon	P	P	P	222	P	44	44
Fragilaria vaucheriae		P			P	0	0
Frustulia vulgaris	2,574	P	4,670	6,320	P	2,713	1,257
Gomphonema sp.		P	P		P	0	0
Gomphonema gracile v. lanceolata	42,588	2,352	19,590	55,542	69,019	37,818	12,043
Gomphonema subclatatum v. commutatum		P				0	0
Meloisra islandica	P	P	3,371	P	1,195	913	657
Navicula sp.	P	1,307	P	P		261	292
Navicula laevissima		P			943	189	298
Nitzschia sp.		P	778	P	471	250	171
Pinnularia sp.	P					0	0
Pinnularia subcapitata		277	P	222		100	66
Pinnularia abaujensishis	P	370	30	P	1,092	298	210
Stauroneis anceps	2,253	P	402	P		531	481
Synedra actinastroides				712	471	237	76
Synedra sp.			P			0	0
Tabellaria floculosa	24,811	33,902	16,088	20,885	23,194	23,776	2,928
Tabellaria fenestrata	P	P		P	P	0	0
Unidentified diatom		569	7,005	4,038	3,300	2,982	1,183
Total Bacilariophyta	196,841	54,800	145,246	220,391	173,399	158,136	43,788
CRYPTOPHYTA (Cryptomonads)							
Cryptomonas reflexa		P		P	P	0	0
Cryptomonas ovata	197					39	0
Total Cryptophyta	197	0	0	0	0	39	0
CHRYSOPHYTA (Golden-Brown Algae)							
Dinobryon sertularia	8,155	555	722	4,807	1,886	3,225	1,449
Mallomonas sp.		523				105	0
Total Chrysophyta	8,155	1,078	722	4,807	1,886	3,330	1,449
PYRROPHYTA (Dinoflagellates)							
Gymnodinium uberrimum				P		0	0
Peridinium sp.		P		111		22	35
Total Pyrrophyta	0	0	0	111	0	22	35
CHLOROPHYTA (Green Algae)							
Ankistrodesmus falcatus	P		P		354	71	91
Ankistrodesmus convolutus				P		0	0
Actinotaenium diplosporum	1,051	1,109	1,986	2,660	224	1,406	420
Actinium sp.			P			0	0
Bulbochaete sp.				P		0	0
Closterium sp.	132	185		P	P	63	42
Coeloastrum printzii		P			P	0	0
Cosmarium bioculatum	5,149	1,204	665	299		1,463	1,004
Cosmarium capitulum		P				0	0
Cosmarium obtusatum	295	P	1,204	P	P	300	233
Cosmarium septentrionale	P					0	0
Cosmarium undulatum		P	241	P	187	86	56
Cosmarium sp#1			1,557	222	187	393	349
Cosmarium sp#2	394		P		P	79	102

[1] Present, but not encountered in routine cell counts.

Appendix F2 Continued.

Taxonomic Group	Density (cells/cm²) Stream C1, Site B1					Mean	Standard Error
	Repl. #1	Repl. #2	Repl. #3	Repl. #4	Repl. #5		
Euastrum sp.				P	P	0	0
Euastrum bidentatum	P	P	P		P	0	0
Euastrum bidentatum v. maius		P	P	P		0	0
Euastrum crenulatum	394			P		79	125
Euastrum genatum		185				37	0
Oocystis pusilla	1,931	22,486	4,670	712	1,414	6,243	4,116
Mougeotia sp.	689	P	320	997	P	401	196
Pediastrum boryanum	787					157	0
Scenedesmus ecornis		P			P	0	0
Sphaerozosma granulatum				665	P	133	210
Staurastrum sp.	197					39	0
Staurastrum dejectum	591	P	241	554	P	277	128
Staurastrum furigerum			P			0	0
Staurastrum pteropsorum			241		P	48	76
Staurastrum polymorphum	P		241	111	P	70	51
Staurastrum polymorphum v. pusillum		P		P		0	0
Staurastrum gladiosum			P	P		0	0
Tetraedron minimum					P	0	0
Zygnema sp.		P	3,491	6,151	149	1,958	1,319
Total Chlorophyta	11,610	25,169	14,857	12,371	2,515	13,303	8,518
CYANOPHYTA (Cyanobacteria)							
Anacystis montana		P	41,250	47,064	22,862	22,235	9,484
Anacystis thermalis	15,447	1,046	5,779		8,485	6,151	2,691
Anacystis sp.	P		3,852	12,105	7,542	4,700	2,312
Anabaena sp.	1,575		P	P		315	407
Gomphosphaeria lacustris	P		65,010	66,049		26,212	16,922
Tolypothrix sp.	8,662	631,708	80,167	49,134	170,640	188,062	114,076
Schizothrix calcicola	180,212	210,744	147,355	1,111,699	543,501	438,702	182,704
Stigonema sp.				P	31,824	6,365	10,064
Total Cyanophyta	205,896	843,498	343,413	1,286,051	784,854	692,742	338,660
Total cells/cm²	422,699	924,545	504,238	1,523,731	962,654	867,573	392,450
Total Number of Taxa/cm²	40	48	47	51	45	46	2

[1] Present, but not encountered in routine cell counts.

Appendix F3 Density of periphyton in Stream C8, Site B8, Jericho study area 1995.

Taxonomic Group	Density (cells/cm²) Stream C8, Site B8					Mean	Standard Error
	Repl. #1	Repl. #2	Repl. #3	Repl. #4	Repl. #5		
BACILLARIOPHYTA (Diatoms)							
Achnanthes minutissima	15,359	38,315	8,102	20,764	4,081	17,324	5,987
Achnanthes minutissima v. cryptocepala		274			408	136	42
Achnanthes flexella		188	P	P	P	38	42
Cyclotella comta		1,577		3,719	P	1,059	835
Cyclotella ocellata	1,375			P	P	275	355
Cymbella affinis	P[1]	274		P	P	55	61
Cymbella minuta	P	274		P	105	76	58
Cymbella gracilis	P	P		112		22	29
Diploneis elliptica					P	0	0
Eunotia pectinalis	P	2,469	465	549	P	697	458
Eunotia praerupta	P	P			P	0	0
Frustulia vulgaris	P	P	P	4,649	P	930	930
Gomphonema sp.	P	P	P		P	0	0
Gomphonema gracile v. lanceolata	5,082	44,625	1,063	9,181	4,490	12,888	8,038
Meloisra distans				P		0	0
Melosira islandica	915	188		279	210	318	155
Navicula sp.	P	P		930	P	186	208
Navicula cryptocephala				1,860		372	0
Navicula laevissima	P	P			P	0	0
Nitzschia sp.	P	480		465	P	189	122
Nitzschia angustata				P		0	0
Nitzschia filiformis	229	94				65	43
Pinnularia sp.				P		0	0
Pinnularia subcapitata					P	0	0
Pinnularia abaujensishis	P			P	P	0	0
Stauroneis anceps	P	549		496	P	209	135
Synedra actinastroides	8,023	9,739	6,641	5,811	3,265	6,696	1,086
Synedra sp.		411	731			228	101
Tabellaria floculosa	6,666	6,241	18,304	13,401	3,210	9,564	2,747
Tabellaria fenestrata	P	P		P	P	0	0
Unidentified Diatom	P	274	P	P		55	61
Total Bacillariophyta	37,649	105,972	35,306	62,216	15,769	51,382	21,493
CRYPTOPHYTA (Cryptomonads)						0	0
Cryptomonas reflexa	P	274	88			72	63
Cryptomonas ovata	229					46	0
Total Cryptophyta	229	274	88	0	0	118	63
CHRYSOPHYTA (Golden-Brown Algae)						0	0
Chrysostephanosphaera globulifera	229					46	0
Dinobryon sociale	1,605	549	266		408	566	273
Dinobryon sertularia	5,845	4,664	1,060	2,324	3,061	3,391	846
Isthmochloron trispinatum	458			P	P	92	118
Mallomonas sp.		P				0	0
Ochromonas sp.				465	408	175	18
Stichogloea doederleinii	13,066	P	266	15,805	3,268	6,481	3,326
Total Chrysophyta	21,203	5,213	1,592	18,594	7,145	10,751	4,581
PYRROPHYTA (Dinoflagellates)						0	0
Gymnodinium uberrimum	P	P				0	0
Peridinium sp.	87	94	165		P	69	30
Gymnodinium sp.						0	0
Total Pyrrophyta	87	94	165	0	0	69	30
CHLOROPHYTA (Green Algae)						0	0
Ankistrodesmus falcatus	458	549	175	1,395	2,653	1,046	450
Ankistrodesmus convolutus	6,189	274	P	1,860	3,673	2,399	1,152
Actinotaenium diplosporum	338	282		P	597	243	110
Arthrodesmus sp.	240	P	P	224		93	60
Bulbochaete sp.	P		P			0	0

[1] Present, but not encountered in routine cell counts.

Appendix F3 Continued.

Taxonomic Group	Density (cells/cm²) Stream C8, Site B8					Mean	Standard Error
	Repl. #1	Repl. #2	Repl. #3	Repl. #4	Repl. #5		
Chlamydomonas frigida			266			53	0
Closterium sp.	P	P		56	P	11	13
Coeloastrum printzii	349	282		223	631	297	81
Cosmarium bioculatum	87	282	P	112	105	117	46
Cosmarium undulatum	349	345	P	93	158	189	69
Cosmarium sp#1	P	P	88	P		18	20
Cosmarium sp#2		P				0	0
Cosmarium sp#3		P		P		0	0
Cosmarium sp#4				P	P	0	0
Crucigenia fenestrata				P		0	0
Crucigenia rectangularis				P		0	0
Dictyosphaerium sp.				P		0	0
Elakatothrix gelatinosa	688		P	1,860	105	531	382
Euastrum sp.			P			0	0
Euastrum bidentatum	261	188	P	112	210	154	45
Euastrum bidentatum v. maius		P		P	P	0	0
Euastrum crenulatum		P		P	P	0	0
Gloeotilla pelagica			876			175	0
Gonatozygon monotaenum		55	P			11	17
Oocystis pusilla	5,502	1,646	P	7,902	2,857	3,581	1,405
Quadrigula closteroides	688				P	138	218
Micractinium pusillum	P					0	0
Mougeotia sp.	131	447	533	P		222	113
Onychonema laeve				112		22	0
Pediastrum boryanum				P		0	0
Pediastrum simplex	P					0	0
Scenedesmus ecornis	523			223	P	149	117
Sphaerozosma granulatum	2,980	964	1,198	3,124	2,289	2,111	445
Sphaerocystis schroeteri		1,097	1,063	10,227		2,477	2,362
Staurastrum dejectum	87	376	44	P	P	101	71
Staurastrum sp.		94				19	0
Staurastrum furcigerum		94				19	0
Staurastrum pterosporum				P		0	0
Staurastrum polymorphum		P	P	112		22	29
Staurastrum polymorphum. pusillum				P	210	42	66
Staurastrum gladiosum		P				0	0
Tetraedron minimum	458					92	0
Zygnema sp.	87		17,066	725	210	3,618	3,742
Total Chlorophyta	19,415	6,975	21,309	28,360	13,698	17,950	11,013
CYANOPHYTA (Cyanobacteria)						0	0
Anacystis montana	49,858	39,503	48,343	930	23,672	32,461	9,154
Anacystis thermalis	28,883	36,485		P	P	13,074	8,553
Anacystis sp.	203,788	112,474	P	89,713	70,201	95,235	33,022
Anabaena sp.	688	P		3,681		874	875
Dactylcoccopsis linearis	P				408	82	129
Merismopedia tenuissima	5,960	P		16,269	P	4,446	3,432
Gomphosphaeria lacustris	181,782	127,837	6,375	203,932	57,966	115,578	37,139
Nostoc commune	3,399	P		P	2,526	1,185	781
Pseudanabaena constricta	2,522	15,500		4,016	5,157	5,439	2,639
Tolypothrix sp.	P	38,133	42,796	10,041	11,632	20,520	8,415
Radiocystis geminata	48,827	P	P			9,765	12,607
Schizothrix calcicola	191,409	272,956	313,431	250,080	484,469	302,469	49,597
Stigonema sp.	9,239	1,880	26,562	10,598	14,208	12,497	4,048
Total Cyanophyta	726,355	644,768	437,507	589,260	670,239	613,625	170,391
Total cells/cm²	804,938	763,296	495,967	698,430	706,851	693,895	207,571
Total Number of Taxa/cm²	65	66	42	68	59	60	5

[1] Present, but not encountered in routine cell counts.

APPENDIX G - BENTHIC MACROINVERTEBRATES

Appendix G1 Summary of benthic macroinvertebrate data collected from sampled streams, Jericho study area 1995.

Stream	Site	Location	Date	Area Sampled (m^2)	Replicate No.	Water Depth (cm)	Substrate Composition
C8	B8	50 m upstream of Carat Lake	5 Aug 95	0.038025	1	14	Gravel/Sand
				0.038025	2	20	Gravel/Sand
				0.038025	3	20	Gravel/Detritus
				0.038025	4	10	Gravel/Sand
				0.038025	5	20	Gravel/Detritus
C1	B1	100 m upstream of Carat Lake	7 Aug 95	0.038025	1	10	Gravel/Detritus
				0.038025	2	15	Gravel/Detritus
				0.038025	3	15	Gravel/Detritus
				0.038025	4	10	Gravel/Detritus
				0.038025	5	8	Gravel/Detritus

Appendix G2 Benthic macroinvertebrates (No./m²) collected from streams during summer, Jericho study area 1995.

Taxonomic Group	Stream C1, Site B1					Stream C8, Site B8				
	Replicate					Replicate				
	1	2	3	4	5	1	2	3	4	5
ANNELIDA										
OLIGOCHAETA										
Lumbriculidae		27	27	80	53	27	27	53	80	53
Naididae	26									
ARTHROPODA										
HYDRACHNIDIA	27			27		80	53			27
CRUSTACEA										
COPEPODA										
Cyclopoida						27				
INSECTA										
DIPTERA										
Chironomidae	27	27	27		53			53		53
Orthocladiinae								53	53	80
Cricotopus/Orthocladius						184		27	27	53
Eukiefferiella							266			
Paracricotopus								53		
Tanypodinae										
Procladius			27			80	80	27		53
Tanytarsini					53					
Lauterbornia/Micropsectra								53		
Chironomidae Pupae								53		27
Empididae										
Clinocera			27							
Tipulidae										
Tipula	106	27		27		27		27	27	80
EPHEMEROPTERA										
Baetidae										
Baetis						27				27
PLECOPTERA										
Nemouridae										
Podmosta	27	158	27	27	80	80	131	106	184	184
TRICHOPTERA										
Brachycentridae							27			
MOLLUSCA										
GASTROPODA										
Planorbidae								27		
NEMATODA								27		
TERRESTRIAL ADULTS										
DIPTERA			27		27					
Total No. of Taxa/m²	**5**	**4**	**4**	**4**	**4**	**8**	**6**	**10**	**5**	**8**
Total No. of Aquatic Invertebrates/m²	**213**	**238**	**133**	**160**	**239**	**530**	**584**	**559**	**370**	**636**

Appendix G3 Summary of lake benthic macroinvertebrate collection data from sampled lakes during summer and fall, Jericho study area 1995.

Lake	Date	Site	UTM Coordinates	Sample Depth (m)	No. of Replicates	Substrate Composition
Carat	7Aug 95	P1-1	12 W 0478174 7320854	11.0	5	silt/sand
		L1-1	12 W 0478523 7321307	1.5	5	silt/sand
Carat	8 Aug 95	P1-2	N/D[1]	10.0	5	silt/sand
		L1-2	12 W 0476096 7321014	4.0	5	silt/sand
Jericho	4 Aug 95	P2	12 W 0477483 7323615	14.0	5	silt
		L2	12 W 0478081 7323335	1.5	5	silt/sand
C3	9 Aug 95	P3	12 W 0474915 7319380	13.5	5	silt
		L3	12 W 0474991 319166	2.5	5	silt/sand/gravel
Carat	13 Sept 95	P1-1	N/D	22.0	5	silt
		L1-1	N/D	4.0	5	silt/sand
Carat	13 Sept 95	P1-2	N/D	11.0	5	silt
		L1-2	N/D	3.0	5	silt/sand
Jericho	15 Sept 95	P2	12 W 0477682 7323681	15.0	5	silt
		L3	N/D	3.0	5	silt/sand
C3	14 Sept 95	P3	12 W 0474901 7319307	12.5	5	silt
		L3	N/D	2.5	5	silt/sand/gravel

[1] N/D = no data.

Appendix G4 Number of benthic macroinvertebrates collected from the littoral zone of sampled lakes during summer and fall (three replicates), Jericho study area 1995.

Taxonomic Group	Carat Lake, Site L1-1						Carat Lake, Site L1-2						Jericho Lake, Site L2						Lake C3, Site L3					
	Summer			Fall			Summer			Fall			Summer			Fall			Summer			Fall		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
ANNELIDA																								
OLIGOCHAETA																								
Lumbriculidae		267	222	44					311	933	2089	356	756	1111	711		44	44	133	89	622	267	178	178
Naididae	133	44		444	178	222			44				311	44		89	133	222	89	89	133	267	89	89
ARTHROPODA																								
HYDRACHNIDIA	178	400	44			89	44			133	89		133			44		133			44	44		44
Lebertia			44							44									44					
CRUSTACEA																								
CLADOCERA																								
Daphnidae																								
Daphnia																								
Chydoridae																	44	89						
COPEPODA																								
Calanoida				44		89				178		133												
Epischura/Heterocope					44											89		44						
Cyclopoida	89			133	267		44			44	44	44	89							44				
Harpacticoida	800	1733	2089	44	89	44				3911	10667	6311	1644	89	178									
OSTRACODA		356	133	133	44	44	267		89	89		133	133	178	89	400	44		44					44
INSECTA																								
DIPTERA																								
Chironomidae		44		178													756	89						
Chironomini					44				44	44			356	222								133		44
Parachironomus													89			4978		844						
Phaenopsectra																	133							
Stictochironomus sp. 1															222									
Stictochironomus sp. 2																								
Diamesinae								44	44							89								
Protanypus																								
Orthocladiinae	267		400	533	622	578	178	489	222	3511	400		3911	267	533		489	356	533	133		3644		222
Abiskomyia																								
Chaetocladius									44															
Corynoneura					44										267			44	89					
Cricotopus/Orthocladius																								178
Paraeukiefferiella sp. 1																	1200	1911						
Paraeukiefferiella sp. 2																267								
Limnophyes																								
Paracricotopus																	44							
Psectrocladius			222									756							89	44	578			
Zalutchia				889	489	44				1644								133					844	
Tanypodinae																								
Procladius				356	133	44	311	89	133	89	89	44	400	133	178	756	267	667			44	44		89
Tanytarsini		89					44						444		44				133	44	267			
Lauterborniia/Micropsectra				133																				
Paratanytarsus												311							133			444	133	89

Appendix G4 continued

Taxonomic Group	Carat Lake, Site L1-1						Carat Lake, Site L1-2						Jericho Lake, Site L2						Lake C3, Site L3					
	Summer			Fall			Summer			Fall			Summer			Fall			Summer			Fall		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Rheotanytarsus	89				44												1200			44	222			
Tanypus sp. 1					44	44					311													
Tanypus sp. 2																								
Tanytarsus sp. 1													89		44			89						
Tanytarsus sp. 2														533										
Chironomidae Pupae	222	44	400					89					44	356							44			
Chironomidae Adults	89															44	44							
Culicidae Adults																				44				
Empididae																								
Chelifera														44										
Simuliidae Adults																								
Tipulidae Adults	44	44					222													44				
TRICHOPTERA																								
Brachycentridae																								
Amiocentrus	89																							
Brachycentrus						44																		
Limnephilidae																								
Apatania												44												
Gresnia			44				44	89		44			89											
Psychoglypha																		89						
Trichoptera Pupae																			44					
MICROTURBELLARIA																								
Mesostoma				89		89				222	89	89	267	44	44							267		
MOLLUSCA																								
GASTROPODA																								
Planorbidae													89											
Valvatidae																								
Valvata sincera sincera																44								
PELECYPODA																								
Sphaeriidae					133	356	711	622	178	44		44	444	1600	489	400	756	356	44					
NEMATODA	2844	400	1244	444	489				178	14000	17333	2844	1600	444	1511	133	222	133		178	533	2133	1822	667
TARDIGRADA																								
Macrobiotus	89																							
TERRESTRIAL ADULTS						44																		
DIPTERA	44																							
HOMOPTERA	44																44							
HYMENOPTERA																								
THYSANOPTERA																		44						
Total Number of Taxa	12	9	7	11	11	12	9	4	7	13	8	12	15	10	11	11	12	14	9	9	8	9	5	9
Total Number of Animals (No./m²)	5021	3421	4842	3464	2664	1731	1865	1422	1287	24930	31111	11109	10888	5065	4310	7333	5420	5287	1375	753	2487	7243	3066	1644

Appendix G5 Number of benthic macroinvertebrates collected from the profundal zone of sampled lakes during summer and fall (three replicates), Jericho study area 1995.

Taxonomic Group	Carat Lake, Site P1-1						Carat Lake, Site P1-2						Jericho Lake, Site P2						Lake C3, Site P3					
	Summer			Fall			Summer			Fall			Summer			Fall			Summer			Fall		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
ANNELIDA																								
OLIGOCHAETA																								
Lumbriculidae					44	44				44														
Naididae																								
ARTHROPODA																								
HYDRACHNIDIA									44	133				44										
Lebertia																		44						
CRUSTACEA																								
CLADOCERA																								
Daphnidae																								
Daphnia														44				44						
Chydoridae										44														
COPEPODA																								
Calanoida						89	44		89															
Epischura/Heterocope				44						44														
Cyclopoida				89	44	667	44	178	44	44			178	178	311			89	844	89				
Harpacticoida				89		89	44																	
OSTRACODA						44				44	44							44	622		889			
INSECTA																								
DIPTERA																								
Chironomidae	133					178													89					
Chironomini	44	44		133						44	44						44							44
Parachironomus																								
Phaenopsectra																								
Stictochironomus sp. 1					533	133		89							1244	400				178	756			
Stictochironomus sp. 2													89											
Diamesinae																								
Protanypus			133	44	89	44		44					44											
Orthocladiinae	44					267	89	44		311				44	44			44	267		44	44	44	
Abiskomyia			89							44	44													
Chaetocladius																								
Corynoneura																								
Cricotopus/Orthocladius			267	44					89												222			
Paraeukiefferiella sp. 1											44	133												
Paraeukiefferiella sp. 2																								
Limnophyes										533														
Paracricotopus																								
Psectrocladius					89					44									44					
Zalutchia													178											
Tanypodinae																								
Procladius	44	44	267	44	44		133	89	44	222	44		89	89		44	44		222		178	44	44	89
Tanytarsini													44											
Lauterbornia/Micropsectra	44			133	267																			
Paratanytarsus											133													
Rheotanytarsus						44													267		89			
Tanypus sp. 1			89																					
Tanypus sp. 2										44														

Appendix G5 continued.

Taxonomic Group	Carat Lake, Site P1-1						Carat Lake, Site P1-2						Jericho Lake, Site P2						Lake C3, Site P3					
	Summer			Fall			Summer			Fall			Summer			Fall			Summer			Fall		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Tanytarsus sp. 1																		133						
Tanytarsus sp. 2																								
Chironomidae Pupae																			489	89				
Chironomidae Adults	44												2622	44							44			
Culicidae Adults													356											
Empididae																								
Chelifera																								
Simuliidae Adults								44					356											
Tipulidae Adults	44				44		44						178						89					
TRICHOPTERA																								
Brachycentridae																								
Amiocentrus																								
Brachycentrus																								
Limnephilidae																								
Apatania																								
Gresnia																								
Psychoglypha																								
Trichoptera Pupae																								
MICROTURBELLARIA																								
Mesostoma				89	44	222				133	89		133	89		44	44		89					
MOLLUSCA																								
GASTROPODA																								
Planorbidae																								
Valvatidae																								
Valvata sincera sincera																								
PELECYPODA																								
Sphaeriidae	578	89	933	267	133	267	267	400	578	711	1511	578	44			133		44	133	222	133	133		
NEMATODA		44	44			267		89		222		44						44		44		44	44	
TARDIGRADA																								
Macrobiotus																								
TERRESTRIAL ADULTS																								
DIPTERA													44											
HOMOPTERA		44			356	44																		
HYMENOPTERA				44																				
THYSANOPTERA														44										
Total Number of Taxa/m²	6	5	7	11	11	14	7	8	6	12	8	3	12	7	3	4	3	8	9	4	7	4	3	2
Total Number of Invertebrates/m²	975	265	1822	1020	1687	2399	665	977	888	2661	1953	755	4355	576	1599	621	132	486	3155	622	2355	265	132	133

APPENDIX H - FISH

Appendix H1 Gill net sampling effort in sampled lakes during summer and fall, Jericho study area 1995.

Session	Lake	Site	UTM Coordinates	Set		Pull		Depth (m)		Substrate		Water Temp. (˚C)
				Date	Time	Date	Time	Nearshore	Offshore	Nearshore	Offshore	
Summer	Carat	1	12W0478191 7321462	7 Aug	16:30	8 Aug	09:30	3.0	6.0	sand	sand	9.0
		2	12W0476871 7321162	7 Aug	16:50	8 Aug	11:30	2.5	5.0	boulder sand	boulder	9.0
		3	12W0478384 7320744	8 Aug	17:10	9 Aug	09:30	2.5	5.0	boulder sand	boulder	10.4
		4	12W0477283 7320264	8 Aug	17:30	9 Aug	10:30	3.0	7.0	boulder	boulder	10.4
		5	12W0475705 7320826	8 Aug	17:45	9 Aug	11:00	3.0	4.5	boulder sand	silt	10.4
	Jericho	1	12W0478389 7323366	4 Aug	16:45	5 Aug	09:30	2.5	5.0	sand	boulder sand	11.0
		2	12W0477229 7323752	4 Aug	17:05	5 Aug	10:15	3.0	7.0	boulder	boulder	11.0
		3	12W0477783 7323589	4 Aug	17:20	5 Aug	11:45	2.0	7.0	boulder	boulder	11.0
		4	12W0478650 7323643	5 Aug	16:15	6 Aug	09:00	3.0	4.5	boulder sand	boulder sand	10.5
		5	12W0479083 7323668	5 Aug	16:35	6 Aug	10:15	2.5	3.5	sand	sand	10.5
	C3	1	12W0474274 7319753	9 Aug	16:30	10 Aug	09:30	2.5	5.0	boulder	boulder	13.0
		2	12W0474635 7320085	9 Aug	16:50	10 Aug	10:00	3.5	5.0	boulder	boulder silt	13.0
	Control	1	12W0469800 7321000	6 Aug	16:00	7 Aug	10:15	3.0	7.0	boulder	boulder	10.0
		2	12W0466931 7321090	6 Aug	16:20	7 Aug	09:30	3.0	17.0	boulder	boulder	10.0
		3	12W0467263 7321271	6 Aug	16:40	7 Aug	11:00	2.5	3.5	boulder	boulder silt	10.0
		4	12W0467428 7320915	6 Aug	17:00	7 Aug	11:30	2.5	7.0	boulder	boulder	10.0
Fall	Carat	1	12W0478282 7321090	13 Sept	18:50	14 Sept	10:25	3.0	7.0	boulder	sand	5.0
	Jericho	1	12W0478515 7323346	14 Sept	19:45	15 Sept	09:45	2.5	7.0	boulder	silt	3.5
		4	12W0478692 7327650	14 Sept	20:10	15 Sept	10:40	2.5	10.0	boulder	silt	3.5
	C3	2	12W0474635 7321990	13 Sept	17:00	14 Sept	15:00	2.5	5.5	boulder	boulder	4.0
	Control	3	12W0467385 7321362	11 Sept	20:25	12 Sept	10:30	2.5	5.5	boulder	silt	3.0
		5	12W0467126 7321279	11 Sept	20:50	12 Sept	12:20	2.5	6.0	boulder	boulder silt	3.0

Appendix H2 Number of fish captured and catch-per-unit effort (CPUE) by gill net sampling in lakes during the summer and fall, Jericho study area 1995.

Session	Lake	Site	Time (h)	Effort (100m/h)	Lake Trout		Round Whitefish		Arctic Char		Total	
					Number	CPUE[1]	Number	CPUE	Number	CPUE	Number	CPUE
Summer	Carat	1	17.0	37.8	23	7.3					23	7.3
		2	18.7	41.6	13	3.7	3	0.9			16	4.6
		3	16.3	36.3	17	5.6			1	0.3	18	6.0
		4	17.0	37.8	31	9.8	1	0.3	1	0.3	33	10.5
		5	17.3	38.5	4	1.2	1	0.3			5	1.6
		Total	**86.3**	**192.1**	**88**	**5.5**	**5**	**0.3**	**2**	**0.1**	**95**	**5.9**
	Jericho	1	16.8	37.4	8	2.6			1	0.3	9	2.9
		2	17.2	38.3	19	6.0	3	0.9	4	1.3	26	8.2
		3	18.4	40.9	9	2.6	1	0.3	1	0.3	11	3.2
		4	16.8	37.4	13	4.2	2	0.6	2	0.6	17	5.5
		5	17.8	39.6	14	4.2	2	0.6	2	0.6	18	5.5
		Total	**87.0**	**193.6**	**63**	**3.9**	**8**	**0.5**	**10**	**0.6**	**81**	**5.0**
	C3	1	17.0	37.8	13	4.1	1	0.3	1	0.3	15	4.8
		2	17.2	38.3	7	2.2	9	2.8	2	0.6	18	5.6
		Total	**34.2**	**76.1**	**20**	**3.2**	**10**	**1.6**	**3**	**0.5**	**33**	**5.2**
	Control	1	18.3	40.7	14	4.1	9	2.7			23	6.8
		2	16.8	37.4	18	5.8	6	1.9	1	0.3	25	8.0
		3	18.2	40.5	18	5.3	3	0.9	1	0.3	22	6.5
		4	18.5	41.2	24	7.0	2	0.6			26	7.6
		Total	**71.8**	**159.8**	**74**	**5.6**	**20**	**1.5**	**2**	**0.2**	**96**	**7.2**
Fall	Carat	1	15.6	34.7	20	6.9	9	3.1	6	2.1	35	12.1
	Jericho	1	13.0	28.9	7	2.9	1	0.4	7	2.9	15	6.2
		4	14.5	32.3	38	14.1	1	0.4	2	0.7	41	15.2
		Total	**27.5**	**61.2**	**45**	**8.8**	**2**	**0.4**	**9**	**1.8**	**56**	**11.0**
	C3	1	22.0	49.0	13	3.2	7	1.7	2	0.5	22	5.4
	Control	3	14.1	31.4	18	6.9	5	1.9			23	8.8
		5	15.5	34.5	18	6.3	6	2.1			24	8.3
		Total	**29.6**	**65.9**	**36**	**6.6**	**11**	**2.0**	**0**	**0.0**	**47**	**8.6**

[1] CPUE denotes catch-per-unit-effort (number of fish per $100m^2 \cdot 12h$).

Appendix H3 Backpack electrofishing and snorkelling effort, and number of fish recorded in sampled streams, Jericho study area 1995.

Session	Method	Stream	Date	Effort [1]	Arctic Grayling			Burbot		Lake Trout		Ninespine	Round Whitefish		Sculpin	Total Number
					Young of the Year	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Stickleback	Juvenile	Adult	spp.	of Fish
Spring	Electrofishing	C1	21 June	1188		34		1		2					18	**55**
		C2	21 June	257				1							1	**2**
		C3	21 June	407											3	**3**
		C4	22 June	1065				1							14	**15**
		C5	22 June	721				1							18	**19**
		C6	22 June	369		1	1									**2**
		C7	22 June	286		1										**1**
		O1	23 June	621		5						1				**6**
		O2	23 June	317		19						3			3	**25**
		O3	23 June	215		1										**1**
		O4	23 June	257		1										**1**
		O5	24 June	502		15						5			4	**24**
		O6	24 June	354		3		3	1	2		10			12	**31**
	Snorkelling	O6	28 June	200												0
		Jericho	28 June	900		1	1	1			2				1	6
Summer	Electrofishing	C1	07 August	544		5									5	**10**
		C4	05 August	886		1		3							38	**42**
		C6	05 August	447		8									1	**9**
		C7	05 August	147												**0**
		O1	06 August	620												**0**
		O2	06 August	524		1										**1**
		O3	10 August	178												**0**
		O4	06 August	551		1										**1**
		Jericho	10 August	178		4										**4**
	Snorkelling	C8	10 August	50						2	2		12			**16**
		C9	10 August	50							3					**3**
		O7	10 August	900		28	3						3			**34**
Fall	Snorkelling	Jericho	15 September	900		1	3				1					

[1] Backpack electrofishing effort in seconds; snorkelling effort in meters.

Appendix H4 R.L. & L. ENVIRONMENTAL SERVICES LTD ABBREVIATIONS AND CODES

ABBR.	COMMON NAME	SCIENTIFIC NAME	ABBR.	COMMON NAME	SCIENTIFIC NAME
RBTR	Rainbow trout	*Oncorhynchus mykiss*	WALL	Walleye	*Stizostedion vitreum*
STEE	Steelhead	*Salmo gairdneri*	SAUG	Sauger	*Stizostedion canadense*
BNTR	Brown trout	*Salmo trutta*	YLPR	Yellow perch	*Perca flavescens*
CTTR	Cutthroat trout	*Oncorhynchus clarki*	BURB	Burbot	*Lota lota*
BLTR	Bull trout	*Salvelinus malma*	SLSC	Slimy sculpin	*Cottus cognatus*
LKTR	Lake trout	*Salvelinus namaycush*	SPSC	Spoonhead sculpin	*Cottus ricei*
ARCH	Arctic char	*Salvelinus alpinus*	PRSC	Prickly sculpin	*Cottus asper*
BKTR	Brook trout	*Salvelinus fontinalis*	CSSC	Coastrange sculpin	*Cottus aleuticus*
ARGR	Arctic grayling	*Thymallus arcticus*	SHSC	Shorthead sculpin	*Cottus confusus*
MNWH	Mountain whitefish	*Prosopium williamsoni*	PSSC	Pacific staghorn sculpin	*Leptocottus armatus*
RNWH	Round whitefish	*Prosopium cylindraceum*	MTSC	Mottled sculpin	*Cottus bairdi*
PGWH	Pygmy whitefish	*Prosopium coulteri*	TRSC	Torrent sculpin	*Cottus rhotheus*
LKWH	Lake whitefish	*Coregonus clupeaformis*	BRST	Brook stickleback	*Culaea inconstans*
BRWH	Broad whitefish	*Coregonus nasus*	NNST	Ninespine stickleback	*Pungitius pungitius*
CISC	Ciscoe	*Coregonus artedii*	THST	Threespine stickleback	*Gasterosteus aculeatus*
INCO	Inconnu	*Stenodus leucichthys*	RDSH	Redside shiner	*Richardsonius balteatus*
PINK	Pink salmon	*Oncorhynchus gorbuscha*	NRSQ	Northern squawfish	*Ptychocheilus oregonensis*
CHUM	Chum salmon	*Oncorhynchus keta*	PRDC	Pearl dace	*Semotilus margarita*
COHO	Coho salmon	*Oncorhynchus kisutch*	PEAM	Peamouth	*Mylocheilus caurinus*
SOCK	Sockeye salmon	*Oncorhynchus nerka*	FLCH	Flathead chub	*Platygobid gracilis*
KOKA	Kokanee	*Oncorhynchus nerka*	LKCH	Lake chub	*Couesius plumbeus*
CHIN	Chinook salmon	*Oncorhynchus tshawytscha*	LNDC	Longnose dace	*Rhinichthys cataractae*
LNSC	Longnose sucker	*Catostomus catostomus*	FNDC	Finescale dace	*Pfrille neogaeus*
WHSC	White sucker	*Catostomus commersoni*	NRDC	Northern redbelly dace	*Chrosomus eos*
LRSC	Largescale sucker	*Catostomus macrocheilus*	LPDC	Leopard dace	*Rhinichthys falcatus*
BRSC	Bridgelip sucker	*Catostomus columbianus*	EMSH	Emerald shiner	*Notropis atherinoides*
MNSC	Mountain sucker	*Catostomus platyrhynchus*	SPSH	Spottail shiner	*Notropis hudsonius*
CARP	Carp	*Cyprinus carpio*	FTMN	Fathead minnow	*Pimephales promelas*
CHIS	Chiselmouth	*Acrocheilus alutaceus*	TRPR	Trout-perch	*Percopsis omiscomaycus*
SMBS	Smallmouth bass	*Micropterus dolomievi*	IWDR	Iowa darter	*Etheostoma exile*
LKST	Lake sturgeon	*Acipenser fulvescens*	STFL	Starry flounder	*Platichthys stellatus*
WHST	White sturgeon	*Acipenser transmontanus*	LNSM	Longfin smelt	*Spirinchus thaleichthys*
GOLD	Goldeye	*Hiodon alosdides*	EUAL	Eualchon	*Thaleichthys pacificus*
NRPK	Northern pike	*Esox lucius*	PCLM	Pacific lamprey	*Entosphenus tridentatus*
WBLM	Western brook lamprey	*Lampetra richardsoni*	ARLM	Arctic lamprey	*Lampetra japonica*
LSCS	Least cisco	*Coregonus sardinella*	ARCS	Arctic cisco	*Coregonus autumnalis*

SEX AND MATURITY DESCRIPTIONS

M	F	CLASS	DESCRIPTION
		Immature A	Sex indeterminable due to small gonad size.
01	11	Immature B	Small gonad size; fish has never spawned and will not spawn during the coming spawning season.
02	12	Maturity questionable	Small gonad size; it cannot be determined if fish is immature or if it will spawn during the coming spawning season.
03	13	Developing A	Definite gonad development; fish has never spawned before but will spawn during the coming season.
04	14	Developing B	Definite gonad development; the fish has spawned before and will spawn during the coming season.
05	15	Developing C	Definite gonad development; the fish has spawned before but will not spawn during the coming spawning season, i.e., alternate year spawners.
06	16	Developing D	Used to indicate definite gonad development when the classification into categories "developing A,B, or C cannot be determined, or when such a breakdown is unsuitable or unnecessary.
07	17	Gravid/fully developed	Sexual organs fill ventral cavity testes white, drops of milt fall with pressure; eggs completely round, some already translucent.
08	18	Ripe	Roe or milt are extruded by slight pressure on the belly.
09	19	Spent	Spawning completed; resorption of residual ovarian tissue is not yet complete.
10	20	External	Sex determined by external characteristics; maturity and sex not verified by gonad examination.
97	97	Adult	Based on fish size; sex not determined.
98	98	Juvenile	Based on fish size; sex not determined.

OTHER CODES

CODE	AGEING METHODS	CODE	AGEING METHODS
SC	Scales	CL	Cleithra
OT	Otoliths	CS	Cleithra and scales
SO	Scales and otoliths	VE	Vertebrae
FR	Fin ray	OB	Other bones
SF	Scales and fin rays	LF	Length-frequency

CODE	CAPTURE METHODS (COL. 33-34)
FD	Found dead
SL	Set line
DN	Dip net
GN	Gill net
ES	Electroshocker - Boat shocker
EF	Electrofisher - backpack shocker
BS	Beach seine
OB	Observed - not captured
TU	Trap - fish moving upstream
TD	Trap - fish moving downstream
AL	Angling (Using lures)
AF	Angling (Using flies)
AB	Angling (Using bait)
CR	Creel - sampled from a fisherman's creel
CF	Commercial fisherman's catch
DF	Domestic fisherman's catch
GT	Gee minnow trap

CODE	TAG CODE (COL. 38)
Y, W, R	Color code for tag (i.e., Yellow, White, or Red)
F	Fin clip: 1=Adipose, 2=R. Pectoral, 3=L. Pectoral, 4=R. Pelvic, 5=L. Pelvic, 6=Dorsal, 9=Fin Punch.

CODE	CAPTURE CODE (COL. 60)
0	First capture, released
1	First capture, sacrificed
2	Recapture, released
3	Recapture, sacrificed

CODE	PRESERVATION CODE (COL. 61)
1	Whole specimen preserved
2	Stomach only preserved
3	Whole specimen and stomach preserved separately
4	Stomach contents evacuated and preserved
5	Gonads preserved
6	Parasites preserved
7	Head preserved

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT	
C	663	LKTR	562	1590	1	18	OT	GN	38		5	8	95	JERIC	1	1	ST0	T
C	664	LKTR	172	55	99	3	OT	GN	38		5	8	95	JERIC	1	1	ST0	
C	665	ARCH	564	1530	12		OT	GN	64		5	8	95	JERIC	3	1	ST0	
C	666	LKTR	640	2870	11	19	OT	GN	64		5	8	95	JERIC	3	1	ST10(FSH)	T
C	667	LKTR	287	330	1	6	OT	GN	64		5	8	95	JERIC	3	1	ST5(ZOO)	
C	668	ARCH	561	1580	8	14	OT	GN	102		5	8	95	JERIC	1	1	ST5(INV)	
C	669	LKTR	656	2760	12	35	OT	GN	38		5	8	95	JERIC	2	1	ST10(FSH)	T
C	670	LKTR	483	1640	7	14	OT	GN	38		5	8	95	JERIC	2	1	ST10(INV)	T
C	671	LKTR	173	75	99		SC	GN	38		5	8	95	JERIC	2	1	ST0	
C	672	LKTR	510	1475	12	13	OT	GN	19		5	8	95	JERIC	1	1	ST5(ZOO)	T
C	673	LKTR	288		11		OT	GN	19		5	8	95	JERIC	1	1	ST5(ZOO)	
C	674	LKTR	523	1500	7	15	OT	GN	89		5	8	95	JERIC	2	1	ST1(INV)	
C	675	LKTR	536	1580	7	16	OT	GN	89		5	8	95	JERIC	2	1	ST5(INV)	T
C	676	LKTR	466	1620	17	14	OT	GN	127		5	8	95	JERIC	1	1	ST10(INV)	T
C	677	LKTR	582	2080	12	18	OT	GN	38		5	8	95	JERIC	3	1	ST1(FSH)	T
C	678	LKTR	380	680	11		OT	GN	38		5	8	95	JERIC	3	1	ST5(ZOO)	T
C	679	LKTR	314	450	99	7	OT	GN	38		5	8	95	JERIC	3	1	ST5(ZOO)	T
C	680	LKTR	180	75	99		SC	GN	38		5	8	95	JERIC	3	1	ST1(ZOO)	
C	681	LKTR	220	130	99		OT	GN	38		5	8	95	JERIC	3	1	ST5(ZOO)	
C	683	LKTR	221	120	99		SC	GN	38		5	8	95	JERIC	3	1	ST5(ZOO)	
C	684	LKTR	107	25	99		SC	GN	19		5	8	95	JERIC	3	1	ST0	
C	685	RNWH	102	10	99	1	SC	GN	19		5	8	95	JERIC	3	1	ST0	
C	686	LKTR	298	310	11		OT	GN	64		5	8	95	JERIC	2	1	ST5(INV)	
C	687	ARCH	484	1260	1		SC	GN	64		5	8	95	JERIC	2	1	ST10(INV)	
C	688	ARCH	529	1720	17	12	OT	GN	64		5	8	95	JERIC	2	1	ST10(ZOO)	
C	689	LKTR	328	490	99	8	OT	GN	64		5	8	95	JERIC	2	1	ST5(ZOO)	
C	690	ARCH	560	1770	1	9	OT	GN	64		5	8	95	JERIC	2	1	ST10(ZOO)	
C	691	ARCH	538	2060	17	10	OT	GN	102		5	8	95	JERIC	2	1	ST5(ZOO)	
C	692	LKTR	222	130	99		SC	GN	102		5	8	95	JERIC	2	1	ST5(ZOO)	
C	693	LKTR	226	140	99		SC	GN	38		5	8	95	JERIC	2	1	ST0	
C	694	LKTR	228	145	99		SC	GN	38		5	8	95	JERIC	2	1	ST0	
C	695	LKTR	158	35	99	3	SC	GN	38		5	8	95	JERIC	2	1	ST5(ZOO)	
C	696	LKTR	162	60	99		SC	GN	38		5	8	95	JERIC	2	1	ST5(INV)	
C	697	LKTR	160	45	99		SC	GN	38		5	8	95	JERIC	2	1	ST0	
C	698	LKTR	182	50	99		SC	GN	38		5	8	95	JERIC	2	1	ST10(ZOO)	
C	699	LKTR	172	40	99		SC	GN	38		5	8	95	JERIC	2	1	ST5(ZOO)	
C	700	LKTR	230	130	11		SC	GN	38		5	8	95	JERIC	2	1	ST0	
C	701	LKTR	221	110	99		SC	GN	38		5	8	95	JERIC	2	1	ST5(ZOO)	
C	702	LKTR	218	120	99		SC	GN	38		5	8	95	JERIC	2	1	ST10(FSH)	
C	703	LKTR	188	70	99		SC	GN	38		5	8	95	JERIC	2	1	ST0	
C	704	RNWH	241	160	99	5	SC	GN	38		5	8	95	JERIC	2	1	ST10(TRI)	
C	705	RNWH			99		SC	GN	38		5	8	95	JERIC	2	1	HEADLESS	
C	706	LKTR	277	265	11	5	OT	GN	64		5	8	95	JERIC	1	1	ST10(ZOO)	
C	707	LKTR	304	360	11	8	OT	GN	64		5	8	95	JERIC	1	1	ST5(ZOO)	
C	708	LKTR	293	245	11	7	OT	GN	64		5	8	95	JERIC	1	1	ST0	
C	727	LKTR	129		99		OT	GN	38		6	8	95	JERIC	5	1	ST5(ZOO)	
C	728	LKTR	185	60	99	3	OT	GN	38		6	8	95	JERIC	5	1	ST5(ZOO)	
C	729	LKTR					SC	GN	38		6	8	95	JERIC	5	1	HEADLESS	
C	730	LKTR			99		SC	GN	38		6	8	95	JERIC	5	1	HEADLESS	
C	731	LKTR			99		SC	GN	38		6	8	95	JERIC	5	1	HEADLESS	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT	
C	732	RNWH	184	70	99	4	OT	GN	38		6	8	95	JERIC	5	1		
C	733	ARCH	539	1980	1	10	OT	GN	89		6	8	95	JERIC	5	1	ST15(ZOO)	
C	734	LKTR	198	90	1		OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	
C	735	LKTR	175	70	99	3	OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	
C	736	LKTR	198	100	1		OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	
C	737	LKTR	206	90	99	4	OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	
C	738	LKTR	180	60	99		OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	
C	739	LKTR	239	130	1	4	OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	
C	740	LKTR	192	80	11		OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	
C	741	RNWH	182	60	99	5	OT	GN	38		6	8	95	JERIC	4	1	ST0	
C	742	ARCH	160	50	99	2	OT	GN	38		6	8	95	JERIC	4	1	ST0	
C	743	ARCH	548	1860	1	7	OT	GN	102		6	8	95	JERIC	4	1	ST5(ZOO)	
C	744	LKTR	510	1270	1	14	OT	GN	89		6	8	95	JERIC	4	1	ST0	
C	745	LKTR	190	70	11	3	OT	GN	38		6	8	95	JERIC	5	1	ST0	
C	746	LKTR	434	1140	1	10	OT	GN	38		6	8	95	JERIC	4	1	ST5(ZOO)	T
C	747	LKTR	628	2180	1		OT	GN	38		6	8	95	JERIC	4	1	ST1(INV)	T
C	748	LKTR	582	2010	1	19	OT	GN	38		6	8	95	JERIC	4	1	ST1(INV)	T
C	749	LKTR	507	1640	7	18	OT	GN	102		6	8	95	JERIC	5	1	ST5(INV)	T
C	750	LKTR	560	1760	12	16	OT	GN	102		6	8	95	JERIC	5	1	ST1(FSH)SCUL	T
C	751	LKTR	487	1460	7	13	OT	GN	102		6	8	95	JERIC	5	1	ST5(INV)	T
C	752	LKTR	554	2130	1		OT	GN	102		6	8	95	JERIC	5	1	ST20(FSH)RNWH/LT	T
C	753	LKTR	518	1320	12	18	OT	GN	89		6	8	95	JERIC	5	1	ST15(FSH)LKTR	T
C	754	LKTR	500	1560	17	17	OT	GN	38		6	8	95	JERIC	5	1	ST10(ZOO)	T
C	755	LKTR	611	2560	17	19	OT	GN	38		6	8	95	JERIC	5	1	ST1(FSH)	T
C	756	ARCH	539	1550	18		FR	GN	89	163	6	8	95	JERIC	5	0		
C	757	LKTR	232	250			FR	GN	127	162	6	8	95	JERIC	5	0		
C	761	ARCH	520	1880	7	11	OT	GN	102		7	8	95	LCC	2	1	ST10(PEL)	
C	762	LKTR	320	310	11		OT	GN	38		7	8	95	LCC	1	1	ST0	
C	763	LKTR	398	770	1		OT	GN	89		7	8	95	LCC	4	1	ST5(ZOO)	
C	764	LKTR	405	810	7		OT	GN	89		7	8	95	LCC	3	1	ST1(ZOO)	
C	765	LKTR	425	900	7	11	OT	GN	89		7	8	95	LCC	3	1	ST1(ZOO)	
C	766	LKTR	400	650	11		OT	GN	89		7	8	95	LCC	3	1	ST15(ZOO)	
C	767	LKTR	405	780	17		OT	GN	89		7	8	95	LCC	3	1	ST5(ZOO)	
C	768	LKTR	330	460	11	9	OT	GN	89		7	8	95	LCC	1	1	ST5(ZOO)	
C	769	LKTR	410	710	1		OT	GN	38		7	8	95	LCC	2	1	ST5(FSH)	
C	770	LKTR	210	100	99	4	OT	GN	38		7	8	95	LCC	2	1	ST5(ZOO)	
C	771	LKTR	223	110	99		OT	GN	38		7	8	95	LCC	2	1	ST0	
C	772	LKTR	215	110	99	5	OT	GN	38		7	8	95	LCC	2	1	ST10(ZOO)	
C	773	LKTR	178	70	99		OT	GN	38		7	8	95	LCC	2	1	ST5(ZOO)	
C	774	LKTR	283	260	11	7	OT	GN	38		7	8	95	LCC	2	1	ST5(ZOO)	
C	775	LKTR	314	320	11	8	OT	GN	38		7	8	95	LCC	2	1	ST10(FSH)SCUL	
C	776	LKTR	161	50	11	3	OT	GN	38		7	8	95	LCC	2	1	ST1(ZOO)	
C	777	LKTR	166	60	99	3	OT	GN	38		7	8	95	LCC	2	1	ST5(INV)	
C	778	LKTR	261	200	11	6	OT	GN	38		7	8	95	LCC	2	1	ST1(ZOO)	
C	779	LKTR	196	80	1		OT	GN	38		7	8	95	LCC	2	1	ST5(ZOO)	
C	780	LKTR	182	70	99		OT	GN	38		7	8	95	LCC	2	1	ST0	
C	781	RNWH	100	10	99	1	SC	GN	38		7	8	95	LCC	2	1		
C	782	RNWH	211	110	99	4	OT	GN	38		7	8	95	LCC	2	1	ST5(INV)	
C	783	LKTR	401	770	7		OT	GN	102		7	8	95	LCC	3	1	ST0	
C	784	LKTR	409	800	7	16	OT	GN	102		7	8	95	LCC	3	1	ST10(ZOO)	
C	785	LKTR	393	680	7		OT	GN	102		7	8	95	LCC	3	1	ST5(ZOO)	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT	
C	786	LKTR	416	870	7		OT	GN	102		7	8	95	LCC	3	1	ST10(ZOO/PEL)	
C	787	LKTR	449	880	1	15	OT	GN	38		7	8	95	LCC	4	1	ST5(INV)	
C	788	LKTR	261	190	99		OT	GN	38		7	8	95	LCC	4	1	ST10(FSH)BURB	
C	789	LKTR	356	530	1	9	OT	GN	38		7	8	95	LCC	4	1	ST10(PEL)	
C	790	LKTR	189	70	11	3	OT	GN	38		7	8	95	LCC	4	1	ST5(INV)	
C	791	LKTR	200	100	99		OT	GN	38		7	8	95	LCC	4	1	ST0	
C	792	LKTR	191	70	99	4	OT	GN	38		7	8	95	LCC	4	1	ST0	
C	793	LKTR	241	160	1	6	OT	GN	38		7	8	95	LCC	4	1	ST10(FSH)SCUL	
C	794	LKTR	233	140	99	5	OT	GN	38		7	8	95	LCC	4	1	ST5(ZOO)	
C	795	LKTR	180	60	99		OT	GN	38		7	8	95	LCC	4	1	ST0	
C	796	RNWH	222	110	99	4	OT	GN	38		7	8	95	LCC	4	1	ST0	
C	797	LKTR	520	1500	7		OT	GN	64		7	8	95	LCC	1	1	ST0	
C	798	LKTR	410	830	12		OT	GN	64		7	8	95	LCC	1	1	ST10(PEL)	
C	799	LKTR	342	410	11	8	OT	GN	64		7	8	95	LCC	1	1	ST5(ZOO)	
C	800	LKTR	425	770	11		OT	GN	64		7	8	95	LCC	1	1	ST5(INV)	
C	801	LKTR	415	840	7		OT	GN	64		7	8	95	LCC	1	1	ST1(INV)	
C	802	LKTR	420	900	7		OT	GN	38		7	8	95	LCC	3	1	ST5(ZOO)	
C	803	LKTR	321	410	1	8	OT	GN	38		7	8	95	LCC	3	1	ST10(ZOO)	
C	804	LKTR	192	70	11		OT	GN	38		7	8	95	LCC	3	1	ST5(INV)	
C	805	LKTR	216	100	11		OT	GN	38		7	8	95	LCC	3	1	ST5(ZOO)	
C	806	LKTR	301	260	1	8	OT	GN	64		7	8	95	LCC	2	1	ST5(ZOO)	
C	807	ARCH	410	920	17	9	OT	GN	64		7	8	95	LCC	3	1	ST5(DIP)	
C	808	LKTR	410	740	7		OT	GN	64		7	8	95	LCC	3	1	ST10(DIP)	
C	809	LKTR	319	380	1		OT	GN	64		7	8	95	LCC	3	1	ST5(ZOO)	
C	810	LKTR	87		99	1	SC	GN	19		7	8	95	LCC	1	1	ST5(FSH)	
C	811	LKTR	415	840	7		OT	GN	19		7	8	95	LCC	1	1	ST10(ZOO)	
C	812	LKTR	432	810	11		OT	GN	89		7	8	95	LCC	2	1	ST1(INV)	
C	813	LKTR	241	160	11	7	OT	GN	89		7	8	95	LCC	2	1	ST5(ZOO)	
C	814	RNWH	431	910	7		OT	GN	102		7	8	95	LCC	1	1	ST5(INV)	T
C	815	LKTR	460	960	1	14	OT	GN	102		7	8	95	LCC	1	1	ST5(INV)	T
C	816	LKTR	511	1500	17	26	OT	GN	89		7	8	95	LCC	4	1	ST5(INV)	T
C	817	LKTR	550	1940	17	20	OT	GN	89		7	8	95	LCC	4	1	ST10(FSH)LKTR	T
C	818	LKTR	456	800	11	13	OT	GN	89		7	8	95	LCC	4	1	ST5(FSH)	T
C	819	LKTR	408	800	11	16	OT	GN	89		7	8	95	LCC	4	1	ST5(ZOO)	T
C	820	LKTR	445	880	11	13	OT	GN	89		7	8	95	LCC	4	1	ST5(INV)	T
C	821	LKTR	410	640	11	13	OT	GN	64		7	8	95	LCC	4	1	ST1(INV)	T
C	822	LKTR	390	660	11	10	OT	GN	64		7	8	95	LCC	4	1	ST5(ZOO)	T
C	823	LKTR	420	780	2	14	OT	GN	64		7	8	95	LCC	4	1	ST5(INV)	T
C	824	LKTR	392	620	1	9	OT	GN	64		7	8	95	LCC	4	1	ST5(ZOO)	T
C	825	LKTR	410	750	7	18	OT	GN	64		7	8	95	LCC	4	1	ST5(ZOO)	T
C	826	LKTR	410	810	7	14	OT	GN	64		7	8	95	LCC	4	1	ST5(ZOO)	T
C	827	LKTR	408	790	7	13	OT	GN	102		7	8	95	LCC	2	1	ST5(ZOO)	T
C	828	LKTR	553	2040	7	24	OT	GN	38		7	8	95	LCC	4	1	ST20(FSH)LKTR	T
C	829	LKTR	512	1440	7	23	OT	GN	89		7	8	95	LCC	1	1	ST5(INV/PEL)	T
C	830	LKTR	420	780	11	15	OT	GN	89		7	8	95	LCC	1	1	ST5(INV)	T
C	831	LKTR	438	840	7		OT	GN	38		7	8	95	LCC	1	1	ST5(INV)	
C	832	LKTR	426	730	11	14	OT	GN	38		7	8	95	LCC	1	1	ST5(INV)	T
C	833	LKTR	409	770	11	21	OT	GN	89		7	8	95	LCC	3	1	ST10(ZOO)	T
C	834	LKTR	478	1020	1	16	OT	GN	89		7	8	95	LCC	3	1	ST5(INV)	T
C	836	RNWH	446	1070	7		OT	GN	64		7	8	95	LCC	2	1	ST0	T
C	837	RNWH	348	490	1	7	OT	GN	64		7	8	95	LCC	2	1	ST5(INV)	T

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT	
C	838	RNWH	324	380	1	6	SC	GN	64		7	8	95	LCC	2	1	ST0	T
C	839	RNWH	329	420	11	6	OT	GN	64		7	8	95	LCC	2	1	ST5(INV)	T
C	840	LKTR	428	925	17	17	OT	GN	89		7	8	95	LCC	3	1	ST5(BOS)	T
C	841	RNWH	440	950	7		OT	GN	89		7	8	95	LCC	3	1	ST5(INV)	T
C	842	RNWH	432	930	17		OT	GN	89		7	8	95	LCC	3	1	ST5(INV)	T
C	843	RNWH	426	920	7	15	OT	GN	38		7	8	95	LCC	1	1	ST0	T
C	844	LKTR	462	980	12	18	OT	GN	38		7	8	95	LCC	2	1	ST1(FSH)	
C	845	LKTR	434	890	11		OT	GN	38		7	8	95	LCC	2	1	ST5(ZOO)	
C	846	RNWH	388	640	7	8	OT	GN	102		7	8	95	LCC	3	1	ST5(INV)	T
C	847	RNWH	448	1060	7	14	OT	GN	89		7	8	95	LCC	1	1	ST10(TRI)	T
C	848	RNWH	446	1000	7	15	OT	GN	64		7	8	95	LCC	1	1	ST1(INV)	T
C	849	RNWH	452	990	7		SC	GN	64		7	8	95	LCC	1	1	ST10(TRI)	T
C	850	RNWH	262		17	7	OT	GN	64		7	8	95	LCC	1	1	ST5(INV)	T
C	851	RNWH	444	1005	7		OT	GN	64		7	8	95	LCC	1	1	ST5(INV)	T
C	852	RNWH	428	945	17	12	OT	GN	64		7	8	95	LCC	1	1	ST1(INV)	T
C	853	RNWH	430	930	7		OT	GN	64		7	8	95	LCC	1	1	ST1(INV)	T
C	854	LKTR	457	1150			FR	GN	102		8	8	95	CARAT	1	0		
C	855	LKTR	442	1100			FR	GN	102	164	8	8	95	CARAT	1	0		
C	856	LKTR	455	1100			FR	GN	102		8	8	95	CARAT	1	0		
C	857	LKTR	848	6200			FR	GN	89	165	8	8	95	CARAT	1	0		
C	858	LKTR	497	1250			FR	GN	89	166	8	8	95	CARAT	1	0		
C	859	LKTR	825	7800			FR	GN	64	167	8	8	95	CARAT	1	0		
C	860	LKTR	511	1400			FR	GN	64	168	8	8	95	CARAT	1	0		
C	861	LKTR	498	1700			FR	GN	38	169	8	8	95	CARAT	1	0		
C	862	LKTR	471	1100			FR	GN	38	170	8	8	95	CARAT	1	0		
C	863	LKTR	455	1050			FR	GN	38		8	8	95	CARAT	1	0		
C	864	LKTR	676	2550			FR	GN	38		8	8	95	CARAT	1	0		
C	865	LKTR	178				FR	GN	38		8	8	95	CARAT	1	0		
C	866	LKTR	493	1350	11	17	OT	GN	64		8	8	95	CARAT	1	1	ST10(ZOO)	
C	867	LKTR	192		99		SC	GN	38		8	8	95	CARAT	1	1	ST5(ZOO)	
C	868	LKTR	187		99	3	SC	GN	38		8	8	95	CARAT	1	1	ST5(ZOO)	
C	869	LKTR	242	150	1	6	OT	GN	38		8	8	95	CARAT	1	1	ST5(ZOO)	
C	870	LKTR	463	1250	7		OT	GN	102		8	8	95	CARAT	1	1	ST10(ZOO)	
C	871	LKTR	476	1200	17		OT	GN	102		8	8	95	CARAT	1	1	ST10(INV)	
C	872	LKTR	615	2300	12	25	OT	GN	127		8	8	95	CARAT	1	1	ST5(3FSH/2INV)	
C	873	LKTR	483	1400	17	14	OT	GN	89		8	8	95	CARAT	1	1	ST5(INV)	
C	874	LKTR	506	1250	11	18	OT	GN	89		8	8	95	CARAT	1	1	ST1(FSH)	
C	875	LKTR	464	1200	12	14	OT	GN	89		8	8	95	CARAT	1	1	ST10(ZOO)	
C	876	LKTR	490	1350	7		OT	GN	89		8	8	95	CARAT	1	1	ST10(INV)	
C	877	LKTR	620	2700			FR	GN	102	173	8	8	95	CARAT	2	0		
C	878	LKTR	462	1300			FR	GN	102	175	8	8	95	CARAT	2	0		
C	879	LKTR	666	2600			FR	GN	89	174	8	8	95	CARAT	2	0		
C	880	LKTR	404	800			FR	GN	64	124	8	8	95	CARAT	2	0		
C	881	LKTR	578	2100			FR	GN	38	110	8	8	95	CARAT	2	0		
C	882	LKTR	570	2050			FR	GN	38	150	8	8	95	CARAT	2	0		
C	883	LKTR	446	1100			FR	GN	38	116	8	8	95	CARAT	2	0		
C	884	LKTR	98			1	SC	GN	19		8	8	95	CARAT	2	0		
C	885	LKTR	183		99		SC	GN	38		8	8	95	CARAT	2	1	ST1(ZOO)	
C	886	LKTR	189		99		SC	GN	38		8	8	95	CARAT	2	1	ST0	
C	887	RNWH	257		1	6	OT	GN	38		8	8	95	CARAT	2	1	ST5(INV)	
C	888	LKTR	388	600	1	11	OT	GN	64		8	8	95	CARAT	2	1	ST10(FSH)	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	889	LKTR	468	1400	17	16	OT	GN	64		8	8	95	CARAT	2	1	ST10(ZOO)
C	890	RNWH	478	1350	7	12	OT	GN	102		8	8	95	CARAT	2	1	ST10(INV)
C	891	RNWH	443	1200	7	11	OT	GN	102		8	8	95	CARAT	2	1	ST10(ZOO)
C	892	LKTR	776	5000	17	25	OT	GN	127		8	8	95	CARAT	2	1	ST1(ZOO)
C	893	LKTR	469	1300	17		OT	GN	102		9	8	95	CARAT	5	1	ST5(INV)
C	894	RNWH	444	1050	17	11	OT	GN	102		9	8	95	CARAT	5	1	ST1(INV)
C	895	LKTR	628	2900	11	26	OT	GN	127		9	8	95	CARAT	4	1	ST5(INV)
C	896	LKTR	486	1650	17	22	OT	GN	89		9	8	95	CARAT	3	1	ST5(ZOO)
C	897	LKTR	478	1500	7	23	OT	GN	89		9	8	95	CARAT	3	1	ST5(ZOO)
C	898	LKTR	615	2300	1	22	OT	GN	89		9	8	95	CARAT	4	1	ST5(FSH)
C	899	LKTR	477	1250	7		OT	GN	89		9	8	95	CARAT	4	1	ST5(ZOO)
C	900	LKTR	480	1450	7	18	OT	GN	89		9	8	95	CARAT	4	1	ST5(ZOO)
C	901	LKTR	440	1400	17		OT	GN	102		9	8	95	CARAT	3	1	ST10(ZOO)
C	902	LKTR	104		99		SC	GN	19		9	8	95	CARAT	4	1	ST1(INV)
C	903	LKTR	106		99	1	SC	GN	19		9	8	95	CARAT	4	1	ST5(TRI)
C	904	LKTR	112		99		SC	GN	19		9	8	95	CARAT	4	1	ST5(INV)
C	905	LKTR	93		99	1	SC	GN	19		9	8	95	CARAT	4	1	ST1(ZOO)
C	906	LKTR	104		99		SC	GN	19		9	8	95	CARAT	3	1	ST5(ZOO)
C	907	LKTR	99		99		SC	GN	19		9	8	95	CARAT	3	1	ST5(ZOO)
C	908	LKTR	175		99		SC	GN	38		9	8	95	CARAT	3	1	ST1(ZOO)
C	909	LKTR	193		99		SC	GN	38		9	8	95	CARAT	3	1	ST1(ZOO)
C	910	LKTR	168		99		SC	GN	38		9	8	95	CARAT	3	1	ST5(INV)
C	911	LKTR	237		99		SC	GN	38		9	8	95	CARAT	3	1	ST1(ZOO)
C	912	LKTR	470	1200	7		OT	GN	64		9	8	95	CARAT	3	1	ST10(INV)
C	913	ARCH	568	1450	1	13	OT	GN	64		9	8	95	CARAT	3	1	ST1(INV)
C	914	LKTR	447	1300	17		OT	GN	64		9	8	95	CARAT	3	1	ST1(ZOO)
C	915	LKTR	333	450	1	10	OT	GN	64		9	8	95	CARAT	3	1	ST5(ZOO)
C	916	LKTR	467	1600	17		OT	GN	102		9	8	95	CARAT	4	1	ST5(INV)
C	917	LKTR	487	1650	17	18	OT	GN	102		9	8	95	CARAT	4	1	ST5(ZOO)
C	918	LKTR	607	2400	1	18	OT	GN	102		9	8	95	CARAT	4	1	ST0
C	919	LKTR	479	1550	7	18	OT	GN	102		9	8	95	CARAT	4	1	ST5(ZOO)
C	920	LKTR	594	1950	11	21	OT	GN	102		9	8	95	CARAT	4	1	ST5(INV)
C	921	LKTR	462	1300	11		OT	GN	64		9	8	95	CARAT	4	1	ST10(ZOO)
C	922	LKTR	458	1400	17		OT	GN	64		9	8	95	CARAT	4	1	ST5(ZOO)
C	923	LKTR	394	950	1	12	OT	GN	64		9	8	95	CARAT	4	1	ST1(ZOO)
C	924	RNWH	459	1500	17	12	SC	GN	64		9	8	95	CARAT	4	1	ST10(ZOO)
C	925	LKTR	271	200	1	11	OT	GN	38		9	8	95	CARAT	4	1	ST0
C	926	LKTR	159		99	2	SC	GN	38		9	8	95	CARAT	4	1	
C	927	LKTR	169		99	3	SC	GN	38		9	8	95	CARAT	4	1	
C	928	LKTR	158		99	2	SC	GN	38		9	8	95	CARAT	4	1	
C	929	LKTR	171		99	2	SC	GN	38		9	8	95	CARAT	4	1	
C	930	LKTR	190		99	3	SC	GN	38		9	8	95	CARAT	4	1	
C	931	LKTR	179		99		SC	GN	38		9	8	95	CARAT	4	1	
C	932	LKTR	176		99		SC	GN	38		9	8	95	CARAT	4	1	
C	933	LKTR	160		99		SC	GN	38		9	8	95	CARAT	4	1	
C	934	LKTR	442	1150	7	14	OT	GN	38		9	8	95	CARAT	5	1	ST10(ZOO)
C	935	LKTR	214		99	4	OT	GN	65		9	8	95	CARAT	5	1	ST0
C	936	LKTR	104		99	1	OT	GN	19		9	8	95	CARAT	5	1	
C	937	LKTR	820	6200			FR	GN	89	231	10	8	95	LC3	1	0	
C	938	LKTR	765	4050			FR	GN	64	233	10	8	95	LC3	1	0	
C	939	LKTR	635	3400			FR	GN	64	234	10	8	95	LC3	1	0	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	940	LKTR	460	1000			FR	GN	38	235	10	8	95	LC3	1	0	
C	941	LKTR	496	1500			FR	GN	38		10	8	95	LC3	1	0	
C	942	LKTR	593	2000			FR	GN	38		10	8	95	LC3	1	0	
C	943	LKTR	653	3050	11	21	OT	GN	102		10	8	95	LC3	1	1	ST20(FSH)1RNWH2LKTR
C	944	ARCH	503	1600	17	12	OT	GN	102		10	8	95	LC3	1	1	ST5(ZOO)
C	945	LKTR	826	6400			FR	GN	127	236	10	8	95	LC3	2	0	
C	946	LKTR	560	1800			FR	GN	38		10	8	95	LC3	2	0	
C	947	ARCH	412	800			FR	GN	38		10	8	95	LC3	2	0	
C	948	ARCH	315	400	99	4	OT	GN	38		10	8	95	LC3	2	1	ST5(ZOO)
C	949	LKTR	204		99	3	SC	GN	38		10	8	95	LC3	2	1	ST5(ZOO)
C	950	RNWH	432	1000	11	15	OT	GN	38		10	8	95	LC3	2	1	ST0
C	951	RNWH	399	850	7	11	OT	GN	38		10	8	95	LC3	2	1	ST5(ZOO)
C	952	LKTR	716	3700	1	22	OT	GN	89		10	8	95	LC3	1	1	ST0
C	953	RNWH	374	750	17	8	OT	GN	89		10	8	95	LC3	1	1	ST10(INV)
C	954	RNWH	424	1050	17	12	OT	GN	102		10	8	95	LC3	2	1	ST5(INV)
C	955	RNWH	391	900	17	11	OT	GN	89		10	8	95	LC3	2	1	ST0
C	956	LKTR	279	250	1	4	SC	GN	38		10	8	95	LC3	1	1	
C	957	LKTR	238		99	3	SC	GN	38		10	8	95	LC3	1	1	
C	958	LKTR	214		99	3	SC	GN	38		10	8	95	LC3	1	1	
C	959	LKTR	176			3	SC	GN	38		10	8	95	LC3	1	1	
C	960	LKTR	576	1900	11			GN	64		10	8	95	LC3	1	1	ST5(INV)
C	961	RNWH	463	1200	7	21	OT	GN	64		10	8	95	LC3	2	1	ST5(INV)
C	962	RNWH	433	1050	7	12	OT	GN	64		10	8	95	LC3	2	1	ST0
C	963	RNWH	404	1100	7	12	OT	GN	64		10	8	95	LC3	2	1	ST5(INV)
C	964	RNWH	426	1000	17	12	OT	GN	64		10	8	95	LC3	2	1	ST5(INV)
C	965	RNWH	364	750	17	8	OT	GN	64		10	8	95	LC3	2	1	ST5(INV)
C	966	LKTR	402	850	1	11	OT	GN	64		10	8	95	LC3	2	1	ST10(ZOO)
C	967	LKTR	332	550	11	10	OT	GN	64		10	8	95	LC3	2	1	ST5(INV)
C	968	LKTR	304	450	1	9	OT	GN	64		10	8	95	LC3	2	1	ST5(ZOO)
C	969	LKTR	283	300	1	7	OT	GN	64		10	8	95	LC3	2	1	ST5(INV)
C	970	LKTR	660	3050	1	32	SO	AL			13	7	95	JERIC	1		ST20(FSH)
C	971	LKTR	480				SC	AL		25	14	7	95	JERIC	0		
C	972	LKTR	520				SC	AL		24	14	7	95	JERIC	0		
C	973	LKTR	540				SC	AL		23	14	7	95	JERIC	0		
C	974	LKTR	500				SC	AL		22	14	7	95	JERIC	0		
C	975	LKTR	690	3000		23	OT	AL			18	7	95	JERIC	1		ST0
C	976	LKTR	530				SC	AL		21	18	7	95	JERIC	0		
C	977	LKTR	540				SC	AL		20	18	7	95	JERIC	0		
C	978	LKTR	500				SC	AL		19	18	7	95	JERIC	0		
C	979	LKTR	470				SC	AL		18	18	7	95	JERIC	0		
C	980	LKTR	510				SC	AL		17	18	7	95	JERIC	0		
C	981	LKTR	510				SC	AL		16	18	7	95	JERIC	0		
C	982	LKTR	490				SC	AL		15	18	7	95	JERIC	0		
C	983	LKTR	490				SC	AL		14	18	7	95	JERIC	0		
C	1346	RNWH	448	970	1		OT	GN	102		12	9	95	LCC	3	1	ST1 (ZOO) T
C	1347	RNWH	468	1160	11	15	OT	GN	89		12	9	95	LCC	5	1	ST10 (TRI)
C	1348	RNWH	421	942	11		OT	GN	89		12	9	95	LCC	5	1	ST10 (EGGS)
C	1349	RNWH	438	1096	1		OT	GN	89		12	9	95	LCC	3	1	ST10 (INV)
C	1350	RNWH	466	986	1	16	OT	GN	89		12	9	95	LCC	3	1	ST5 (INV)
C	1351	RNWH	434	828	1		OT	GN	19		12	9	95	LCC	5	1	
C	1352	LKTR	410	790	9		OT	GN	64		12	9	95	LCC	3	1	ST5 (ZOO)

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	1353	LKTR	268	200	1	7	OT	GN	38		12	9	95	LCC	3	1	ST10 (FSH)
C	1354	LKTR	230	116	99		OT	GN	38		12	9	95	LCC	3	1	ST0
C	1355	LKTR	192	68	99		OT	GN	38		12	9	95	LCC	3	1	ST0
C	1356	RNWH	413	914		11	OT	GN	38		12	9	95	LCC	3	1	ST15 (TRI)
C	1357	LKTR	418	742	11		OT	GN	89		12	9	95	LCC	5	1	ST10 (ZOO)
C	1358	LKTR	438	982	8		OT	GN	89		12	9	95	LCC	5	1	ST10 (ZOO)
C	1359	LKTR	453	890	1		OT	GN	89		12	9	95	LCC	5	1	ST0
C	1360	LKTR	430	884			OT	GN	64		12	9	95	LCC	5	1	ST10 (ZOO)
C	1361	LKTR	406	848	8		OT	GN	64		12	9	95	LCC	5	1	ST1510ZOO/2PEL/3EGG
C	1362	LKTR	292	272	11	8	OT	GN	64		12	9	95	LCC	5	1	ST0
C	1363	RNWH	344	448	11	6	OT	GN	64		12	9	95	LCC	5	1	ST5 (ZOO)
C	1364	RNWH	310	314	1	7	OT	GN	64		12	9	95	LCC	5	1	ST5 (TRI)
C	1365	RNWH	305	300	11	6	OT	GN	64		12	9	95	LCC	3	1	ST1 (ZOO)
C	1366	LKTR	331	390	11		OT	GN	64		12	9	95	LCC	3	1	ST10 (ZOO)
C	1367	LKTR	423	762	11		OT	GN	64		12	9	95	LCC	3	1	ST15 (ZOO)
C	1368	LKTR	415	730	9		OT	GN	64		12	9	95	LCC	3	1	ST10 (ZOO)
C	1369	LKTR	480	872	8		OT	GN	64		12	9	95	LCC	3	1	ST10(8ZOO/2EGGS)
C	1370	LKTR	350	480	11		OT	GN	64		12	9	95	LCC	3	1	ST15 (ZOO)
C	1371	LKTR	328	312	1		OT	GN	64		12	9	95	LCC	3	1	ST5 (ZOO)
C	1372	LKTR	401	1100			FR	GN	102	329	12	9	95	LCC	5	0	
C	1373	LKTR	287	450			FR	GN	19	336	12	9	95	LCC	5	0	
C	1374	LKTR	785	7000	8		FR	GN	102	376	12	9	95	LCC	5	0	
C	1375	LKTR	332	750			FR	GN	38	399	12	9	95	LCC	3	0	
C	1376	LKTR	360	900			FR	GN	38	398	12	9	95	LCC	3	0	
C	1377	LKTR	406	1100			FR	GN	89		12	9	95	LCC	3	0	
C	1378	LKTR	415	1000	8		FR	GN	89	397	12	9	95	LCC	3	0	
C	1379	LKTR	405	1050			FR	GN	89		12	9	95	LCC	3	0	
C	1380	LKTR	430	1100			FR	GN	102	396	12	9	95	LCC	3	0	
C	1381	LKTR	430	1100			FR	GN	102	395	12	9	95	LCC	3	0	
C	1382	LKTR	510	1750	8		FR	GN	89	330	12	9	95	LCC	5	0	
C	1383	LKTR	445	1250	18		FR	GN	102	327	12	9	95	LCC	5	0	
C	1384	LKTR	325	600			FR	GN	64	332	12	9	95	LCC	5	0	
C	1385	LKTR	552	1900	8		FR	GN	89	331	12	9	95	LCC	5	0	
C	1386	LKTR	312	500			FR	GN	64	333	12	9	95	LCC	5	0	
C	1387	LKTR	435	1200	8		FR	GN	102	328	12	9	95	LCC	5	0	
C	1388	LKTR	406	1100	8		FR	GN	38	335	12	9	95	LCC	5	0	
C	1389	LKTR	785	6450	8		FR	GN	38	334	12	9	95	LCC	5	0	
C	1390	LKTR	495	1800	19		FR	GN	89	340	14	9	95	CARAT	1	0	
C	1391	LKTR	497	1750	19		FR	GN	89	342	14	9	95	CARAT	1	0	
C	1392	LKTR	470	1600			FR	GN	89	341	14	9	95	CARAT	1	0	
C	1393	LKTR	491	1800	19		FR	GN	102	339	14	9	95	CARAT	1	0	
C	1394	LKTR	490	1750	8		FR	GN	38	349	14	9	95	CARAT	1	0	
C	1395	LKTR	465	1600	8		FR	GN	38	345	14	9	95	CARAT	1	0	
C	1396	LKTR	446	1500			FR	GN	38	347	14	9	95	CARAT	1	0	
C	1397	LKTR	736	4700			FR	GN	64	343	14	9	95	CARAT	1	0	
C	1398	LKTR	474	1750	18		FR	GN	102	338	14	9	95	CARAT	1	0	
C	1399	ARCH	532	2200			FR	GN	38	348	14	9	95	CARAT	1	0	
C	1400	ARCH	554	2500	8		FR	GN	19	301	14	9	95	CARAT	1	0	
C	1401	ARCH	505	2000	18		FR	GN	102	337	14	9	95	CARAT	1	0	
C	1402	ARCH	555	2000	8		FR	GN	64	344	14	9	95	CARAT	1	0	
C	1403	ARCH	550	2800	8		FR	GN	38	346	14	9	95	CARAT	1	0	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT	
C	1404	ARCH	491	2000	19		FR	GN	38	350	14	9	95	CARAT	1	0		
C	1405	RNWH	485	1330	17	12	OT	GN	38		14	9	95	CARAT	1	1	ST10 (PEL)	
C	1406	LKTR	261	192	99	8	OT	GN	38		14	9	95	CARAT	1	1	ST0	
C	1407	LKTR	226	114	99	6	OT	GN	38		14	9	95	CARAT	1	1	ST10 (FSH)	
C	1408	LKTR	178	56	99		OT	GN	38		14	9	95	CARAT	1	1	ST0	
C	1409	LKTR	300	256	1	8	OT	GN	64		14	9	95	CARAT	1	1	ST0	
C	1410	LKTR	260	184	1		OT	GN	64		14	9	95	CARAT	1	1	ST5 (ZOO)	
C	1411	LKTR	428	954	11	11	OT	GN	64		14	9	95	CARAT	1	1	ST10 (ZOO)	
C	1412	RNWH	347	446	11	7	OT	GN	64		14	9	95	CARAT	1	1	ST5 (TRI)	
C	1413	RNWH	467	1304	17	12	OT	GN	89		14	9	95	CARAT	1	1	ST5 (PEL)	
C	1414	RNWH	372	728	17	8	OT	GN	89		14	9	95	CARAT	1	1	ST0	
C	1415	RNWH	498	1574	7	13	OT	GN	89		14	9	95	CARAT	1	1	ST20(15EGGS/5ZOO)	
C	1416	RNWH	455	1354	17	15	OT	GN	102		14	9	95	CARAT	1	1	ST5 (PEL)	
C	1417	RNWH	484	1408	7	12	OT	GN	127		14	9	95	CARAT	1	1	ST10(5EGGS/5ZOO)	
C	1418	RNWH	485	1584	7	18	OT	GN	127		14	9	95	CARAT	1	1	ST15 (EGGS)	
C	1419	RNWH	410	862	17	10	OT	GN	64		14	9	95	CARAT	1	1	ST15(5EGGS/10TRI)	
C	1420	LKTR	453	1323	9		OT	GN	102		14	9	95	CARAT	1	1	ST15 (ZOO)	
C	1421	RNWH	374	665	1	11	OT	GN	89		14	9	95	LC3	2	1	ST5 (ZOO)	
C	1422	RNWH	431	1126	17	14	OT	GN	89		14	9	95	LC3	2	1	ST10 (ZOO)	
C	1423	RNWH	401	792	7	11	OT	GN	89		14	9	95	LC3	2	1	ST15 (ZOO)	
C	1424	RNWH	428	946	17	14	OT	GN	64		14	9	95	LC3	2	1	ST15(10TRI/5PEL)	
C	1425	RNWH	369	692	17	9	OT	GN	64		14	9	95	LC3	2	1	ST15 (TRI)	
C	1426	RNWH	381	692	17	10	OT	GN	64		14	9	95	LC3	2	1	ST15 (ZOO)	
C	1427	LKTR	189	64	1		OT	GN	38		14	9	95	LC3	2	1	ST5 (ZOO)	
C	1428	LKTR	410	1036	12		OT	GN	64		14	9	95	LC3	2	1	ST15 (ZOO)	
C	1429	LKTR	361	538	1		OT	GN	89		14	9	95	LC3	2	1	ST10 (ZOO)	
C	1430	LKTR	483	1060	12		OT	GN	89		14	9	95	LC3	2	1	ST0	
C	1431	LKTR	513	1600			FR	GN	38	466	14	9	95	LC3	2	0		
C	1432	LKTR	595	2300			FR	GN	38	467	14	9	95	LC3	2	0		
C	1433	LKTR	153				FR	GN	38		14	9	95	LC3	2	0		
C	1434	LKTR	196				FR	GN	38		14	9	95	LC3	2	0		
C	1435	LKTR	383	1000			FR	GN	89	468	14	9	95	LC3	2	0		
C	1436	LKTR	530	2000			FR	GN	89	469	14	9	95	LC3	2	0		
C	1437	LKTR	420	1200	8		FR	GN	89	470	14	9	95	LC3	2	0		
C	1438	LKTR	415	1300			FR	GN	102	475	14	9	95	LC3	2	0		
C	1439	LKTR	610	3000	18		FR	GN	127	474	14	9	95	LC3	2	0		
C	1440	ARCH	480	1700	8		FR	GN	102	473	14	9	95	LC3	2	0		
C	1441	ARCH	482	1800	19		FR	GN	102	472	14	9	95	LC3	2	0		
C	1442	RNWH	338	498	17	7	OT	GN	64		15	9	95	JERIC	4	1	ST5 (TRI)	T
C	1443	LKTR	576	2070	12		OT	GN	64		15	9	95	JERIC	4	1	ST0	
C	1444	LKTR	273	202	11		OT	GN	64		15	9	95	JERIC	4	1	ST10 (FSH)RNWH	
C	1445	LKTR	305	258	1		OT	GN	64		15	9	95	JERIC	4	1	ST5 (ZOO)	
C	1446	LKTR	316	300	11		OT	GN	64		15	9	95	JERIC	4	1	ST10 (FSH)	
C	1447	LKTR	429	866	1		OT	GN	64		15	9	95	JERIC	4	1	ST1 (ZOO)	
C	1448	LKTR	234	130	11		OT	GN	38		15	9	95	CARAT	1	1	ST15 (ZOO)	
C	1449	LKTR	113		99		OT	GN	19		15	9	95	CARAT	1	1		
C	1450	LKTR	96		99		OT	GN	19		15	9	95	CARAT	1	1		
C	1451	LKTR	602	2500	19		FR	GN	89	464	15	9	95	JERIC	1	0		
C	1452	LKTR	435	1400			FR	GN	89	465	15	9	95	JERIC	1	0		
C	1453	LKTR	350	1000			FR	GN	64	460	15	9	95	JERIC	1	0		
C	1454	LKTR	610	3200	18		FR	GN	64	463	15	9	95	JERIC	1	0		

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	1455	ARCH	545	2300	8		FR	GN	64	462	15	9	95	JERIC	1	0	
C	1456	ARCH	554	2300	18		FR	GN	64	461	15	9	95	JERIC	1	0	
C	1457	ARCH	559	2400	18		FR	GN	38	459	15	9	95	JERIC	1	0	
C	1458	ARCH	440	1500	18		FR	GN	38	457	15	9	95	JERIC	1	0	
C	1459	LKTR	500	2200	8		FR	GN	38	458	15	9	95	JERIC	1	0	
C	1460	LKTR	198				FR	GN	38		15	9	95	JERIC	1	0	
C	1461	LKTR	192				FR	GN	38		15	9	95	JERIC	1	0	
C	1462	ARCH	265				FR	GN	19	455	15	9	95	JERIC	1	0	
C	1463	ARCH	580	2360	8		FR	GN	19	456	15	9	95	JERIC	1	0	
C	1464	RNWH	117			1	SC	GN	19		15	9	95	JERIC	1	0	
C	1465	LKTR	531		8		FR	GN	127	454	15	9	95	JERIC	4	0	
C	1466	LKTR	481	1700	8		FR	GN	102	453	15	9	95	JERIC	4	0	
C	1467	LKTR	475	1750	8		FR	GN	102	452	15	9	95	JERIC	4	0	
C	1468	LKTR	510	2100			FR	GN	102	24	15	9	95	JERIC	4	2	
C	1469	LKTR	480	1800	18		FR	GN	102	15	15	9	95	JERIC	4	2	
C	1470	LKTR	480	1700	8		FR	GN	89	25	15	9	95	JERIC	4	2	
C	1471	LKTR	490	1900	18		FR	GN	89	351	15	9	95	JERIC	4	0	
C	1472	LKTR	450	1500	18		FR	GN	89	451	15	9	95	JERIC	4	0	
C	1473	LKTR	510	2000	19		FR	GN	64	352	15	9	95	JERIC	4	0	
C	1474	LKTR	642	3100	19		FR	GN	64	353	15	9	95	JERIC	4	0	
C	1475	LKTR	492	1750	8		FR	GN	64	19	15	9	95	JERIC	4	2	
C	1476	LKTR	425	1400			FR	GN	38	354	15	9	95	JERIC	4	0	
C	1477	LKTR	186				FR	GN	38		15	9	95	JERIC	4	0	
C	1478	LKTR	342	800			FR	GN	38	355	15	9	95	JERIC	4	0	
C	1479	LKTR	265				FR	GN	38	357	15	9	95	JERIC	4	0	
C	1480	LKTR	215				FR	GN	38	360	15	9	95	JERIC	4	0	
C	1481	LKTR	530	2100	18		FR	GN	38	358	15	9	95	JERIC	4	0	
C	1482	ARCH	270				FR	GN	38	356	15	9	95	JERIC	4	0	
C	1483	LKTR	206	88	11		OT	GN	38		15	9	95	JERIC	4	1	ST5 (ZOO)
C	1484	LKTR	204	86	1		OT	GN	38		15	9	95	JERIC	4	1	ST5 (ZOO)
C	1485	LKTR	199	72	99		OT	GN	38		15	9	95	JERIC	4	1	ST5 (ZOO)
C	1486	LKTR	203	74	99		OT	GN	38		15	9	95	JERIC	4	1	ST1 (ZOO)
C	1487	LKTR	176	56	11		OT	GN	38		15	9	95	JERIC	4	1	ST15 (ZOO)
C	1488	LKTR	174	46	11		OT	GN	38		15	9	95	JERIC	4	1	ST15 (ZOO)
C	1489	LKTR	178	58	99		OT	GN	38		15	9	95	JERIC	4	1	ST1 (ZOO)
C	1490	LKTR	202	84	1		OT	GN	38		15	9	95	JERIC	4	1	ST10 (FSH)
C	1491	LKTR	188	66	99		OT	GN	38		15	9	95	JERIC	4	1	ST5 (ZOO)
C	1492	LKTR	172	48	99		OT	GN	38		15	9	95	JERIC	4	1	ST1 (ZOO)
C	1493	LKTR	201	80	11		OT	GN	38		15	9	95	JERIC	4	1	ST10 (ZOO)
C	1494	LKTR	204	88	1		OT	GN	38		15	9	95	JERIC	4	1	ST10 (ZOO)
C	1495	LKTR	159	42	99		OT	GN	38		15	9	95	JERIC	4	1	ST0
C	1496	LKTR	171	42	1		OT	GN	38		15	9	95	JERIC	4	1	ST15 (ZOO)
C	1497	LKTR	205	80	11		OT	GN	38		15	9	95	JERIC	4	1	ST5 (ZOO)
C	1498	LKTR	800	7300	8		FR	GN	64	400	12	9	95	LCC	3	0	
C	1538	RNWH						GN	19		6	8	95	JERIC	4	0	RND
C	1539	LKTR						GN	64		6	8	95	JERIC	4	0	RND
C	1540	LKTR						GN	64		6	8	95	JERIC	4	0	RND
C	1541	RNWH						GN	19		6	8	95	JERIC	5	0	RND
C	1542	LKTR						GN	19		7	8	95	LCC	3	0	RND
C	1543	LKTR						GN	19		7	8	95	LCC	4	0	RND
C	1544	LKTR						GN	38		7	8	95	LCC	4	0	RND

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	1545	RNWH						GN	38		7	8	95	LCC	4	0	RND
C	1546	LKTR						GN	38		9	8	95	CARAT	3	0	RND
C	1547	LKTR						GN	38		9	8	95	CARAT	3	0	RND
C	1565	LKTR						GN	64		11	9	95	LCC	5	0	RND
C	1566	RNWH						GN	19		11	9	95	LCC	5	0	RND
C	1567	LKTR						GN	19		14	9	95	CARAT	1	0	RND
C	1568	RNWH						GN	38		14	9	95	LC3	2	0	RND
C	1569	ARCH						GN	64		15	9	95	JERIC	1	0	RND
C	1570	ARCH						GN	89		15	9	95	JERIC	4	0	RND
C	1571	LKTR						GN	38		15	9	95	JERIC	4	0	RND
C	1577	RNWH						GN	19		5	8	95	JERIC	2	0	RND
C	1578	LKTR	462	1150				GN	102	226	9	8	95	CARAT	4	0	
C	1579	LKTR	474	1200				GN	38		9	8	95	CARAT	4	0	
C	1580	LKTR	476	1350				GN	38		9	8	95	CARAT	4	0	
C	1581	LKTR	492	1500				GN	102	227	9	8	95	CARAT	4	0	
C	1582	LKTR	474	1200				GN	38		9	8	95	CARAT	4	0	
C	1583	LKTR	390	650				GN	38		9	8	95	CARAT	4	0	
C	1584	ARCH	528	1450				GN	19	228	9	8	95	CARAT	4	0	
C	1585	LKTR	620	2750				GN	102	229	9	8	95	CARAT	3	0	
C	1586	LKTR	614	2850				GN	38	230	9	8	95	CARAT	3	0	
C	1587	LKTR	216	100				GN	38		9	8	95	CARAT	3	0	
C	1588	SCUL	26					EF			21	6	95	TC1		0	
C	1589	ARGR						EF			21	6	95	TC1		0	OBS
C	1590	ARGR						EF			21	6	95	TC1		0	OBS
C	1591	ARGR						EF			21	6	95	TC1		0	OBS
C	1592	ARGR						EF			21	6	95	TC1		0	OBS
C	1593	ARGR						EF			21	6	95	TC1		0	OBS
C	1594	ARGR						EF			21	6	95	TC1		0	OBS
C	1595	ARGR						EF			21	6	95	TC1		0	OBS
C	1596	SCUL						EF			21	6	95	TC1		0	OBS
C	1597	SCUL						EF			21	6	95	TC1		0	OBS
C	1598	SCUL						EF			21	6	95	TC1		0	OBS
C	1599	SCUL						EF			21	6	95	TC1		0	OBS
C	1600	SCUL	45					EF			21	6	95	TC1		0	
C	1601	SCUL	40					EF			21	6	95	TC1		0	
C	1602	SCUL	40					EF			21	6	95	TC1		0	
C	1603	SCUL	31					EF			21	6	95	TC1		0	
C	1604	ARGR	48					EF			21	6	95	TC1		0	
C	1605	ARGR	45					EF			21	6	95	TC1		0	
C	1606	ARGR	53					EF			21	6	95	TC1		0	
C	1607	ARGR	47					EF			21	6	95	TC1		0	
C	1608	ARGR	47					EF			21	6	95	TC1		0	
C	1609	ARGR	41					EF			21	6	95	TC1		0	
C	1610	ARGR	47					EF			21	6	95	TC1		0	
C	1611	ARGR	51					EF			21	6	95	TC1		0	
C	1612	ARGR	59					EF			21	6	95	TC1		0	
C	1613	SCUL	67					EF			21	6	95	TC1		0	
C	1614	SCUL	44					EF			21	6	95	TC1		0	
C	1615	ARGR	51					EF			21	6	95	TC1		0	
C	1616	ARGR	58					EF			21	6	95	TC1		0	
C	1617	ARGR	47					EF			21	6	95	TC1		0	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	1618	ARGR	49					EF			21	6	95	TC1		0	
C	1619	ARGR	57					EF			21	6	95	TC1		0	
C	1620	ARGR	55					EF			21	6	95	TC1		0	
C	1621	ARGR	50					EF			21	6	95	TC1		0	
C	1622	ARGR	47					EF			21	6	95	TC1		0	
C	1623	ARGR	56					EF			21	6	95	TC1		0	
C	1624	ARGR	54					EF			21	6	95	TC1		0	
C	1625	SCUL	58					EF			21	6	95	TC1		0	
C	1626	SCUL	67					EF			21	6	95	TC1		0	
C	1627	SCUL	59					EF			21	6	95	TC1		0	
C	1628	LKTR	140	28			SC	EF			21	6	95	TC1		0	
C	1629	LKTR	177	54			SC	EF			21	6	95	TC1		0	
C	1630	ARGR	85					EF			21	6	95	TC1		0	
C	1631	BURB	57					EF			21	6	95	TC2		0	
C	1632	SCUL	55					EF			21	6	95	TC2		0	
C	1633	SCUL	47					EF			21	6	95	TC3		0	
C	1634	SCUL	74					EF			21	6	95	TC3		0	
C	1635	SCUL	61					EF			21	6	95	TC3		0	
C	1636	SCUL	39					EF			22	6	95	TC4		0	
C	1637	SCUL	70					EF			22	6	95	TC4		0	
C	1638	SCUL	82					EF			22	6	95	TC4		0	
C	1639	SCUL	81					EF			22	6	95	TC4		0	
C	1640	SCUL	85					EF			22	6	95	TC4		0	
C	1641	SCUL	70					EF			22	6	95	TC4		0	
C	1642	SCUL	63					EF			22	6	95	TC4		0	
C	1643	SCUL	72					EF			22	6	95	TC4		0	
C	1644	SCUL	54					EF			22	6	95	TC4		0	
C	1645	BURB	83					EF			22	6	95	TC4		0	
C	1646	SCUL	83					EF			22	6	95	TC4		0	
C	1647	SCUL	64					EF			22	6	95	TC4		0	
C	1648	SCUL	70					EF			22	6	95	TC4		0	
C	1649	SCUL	62					EF			22	6	95	TC4		0	
C	1650	SCUL	86					EF			22	6	95	TC4		0	
C	1651	BURB	90					EF			22	6	95	TC5		0	
C	1652	SCUL						EF			22	6	95	TC5		0	OBS
C	1653	SCUL						EF			22	6	95	TC5		0	OBS
C	1654	SCUL						EF			22	6	95	TC5		0	OBS
C	1655	SCUL	80					EF			22	6	95	TC5		0	
C	1656	SCUL	75					EF			22	6	95	TC5		0	
C	1657	SCUL	70					EF			22	6	95	TC5		0	
C	1658	SCUL	66					EF			22	6	95	TC5		0	
C	1659	SCUL	54					EF			22	6	95	TC5		0	
C	1660	SCUL	91					EF			22	6	95	TC5		0	
C	1661	SCUL	75					EF			22	6	95	TC5		0	
C	1662	SCUL	56					EF			22	6	95	TC5		0	
C	1663	SCUL	73					EF			22	6	95	TC5		0	
C	1664	SCUL	50					EF			22	6	95	TC5		0	
C	1665	SCUL	46					EF			22	6	95	TC5		0	
C	1666	SCUL	80					EF			22	6	95	TC5		0	
C	1667	ARGR	240	122	8	4	SC	EF		2776	22	6	95	TC6		0	
C	1668	ARGR						EF			22	6	95	TC7		0	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	1669	NNST	40					EF			23	6	95	TO1		0	
C	1670	ARGR						EF			23	6	95	TO1		0	OBS
C	1671	ARGR	65					EF			23	6	95	TO1		0	
C	1672	ARGR	76	2				EF			23	6	95	TO1		0	
C	1673	ARGR	64					EF			23	6	95	TO1		0	
C	1674	ARGR	86	6				EF			23	6	95	TO2		0	
C	1675	ARGR						EF			23	6	95	TO2		0	OBS
C	1676	ARGR						EF			23	6	95	TO2		0	OBS
C	1677	ARGR						EF			23	6	95	TO2		0	OBS
C	1678	ARGR						EF			23	6	95	TO2		0	OBS
C	1679	ARGR						EF			23	6	95	TO2		0	OBS
C	1680	NNST						EF			23	6	95	TO2		0	OBS
C	1681	SCUL	35					EF			23	6	95	TO2		0	
C	1682	ARGR	84	4				EF			23	6	95	TO2		0	
C	1683	ARGR	78					EF			23	6	95	TO2		0	
C	1684	ARGR	85	4				EF			23	6	95	TO2		0	
C	1685	ARGR	67					EF			23	6	95	TO2		0	
C	1686	ARGR	80	4				EF			23	6	95	TO2		0	
C	1687	ARGR	69					EF			23	6	95	TO2		0	
C	1688	ARGR	69					EF			23	6	95	TO2		0	
C	1689	SCUL	75					EF			23	6	95	TO2		0	
C	1690	SCUL	30					EF			23	6	95	TO2		0	
C	1691	NNST	49					EF			23	6	95	TO2		0	
C	1692	ARGR	84	4				EF			23	6	95	TO2		0	
C	1693	ARGR	78					EF			23	6	95	TO3		0	
C	1694	ARGR						EF			23	6	95	TO4		0	OBS
C	1695	ARGR	77	2				EF			24	6	95	TO5		0	
C	1696	NNST						EF			24	6	95	TO5		0	OBS
C	1697	NNST						EF			24	6	95	TO5		0	OBS
C	1698	ARGR						EF			24	6	95	TO5		0	OBS
C	1699	ARGR						EF			24	6	95	TO5		0	OBS
C	1700	ARGR						EF			24	6	95	TO5		0	OBS
C	1701	ARGR						EF			24	6	95	TO5		0	OBS
C	1702	ARGR	77	2	1	SC		EF			24	6	95	TO5		0	
C	1703	ARGR	76	2	1	SC		EF			24	6	95	TO5		0	
C	1704	ARGR	72	2	1	SC		EF			24	6	95	TO5		0	
C	1705	ARGR	74	2	1	SC		EF			24	6	95	TO5		0	
C	1706	SCUL	54					EF			24	6	95	TO5		0	
C	1707	SCUL	53					EF			24	6	95	TO5		0	
C	1708	SCUL	54					EF			24	6	95	TO5		0	
C	1709	NNST	47					EF			24	6	95	TO5		0	
C	1710	ARGR	76					EF			24	6	95	TO5		0	
C	1711	ARGR	69					EF			24	6	95	TO5		0	
C	1712	SCUL	91					EF			24	6	95	TO5		0	
C	1713	LKTR	151	32			SC	EF			24	6	95	TO6		0	
C	1714	NNST						EF			24	6	95	TO6		0	OBS
C	1715	NNST						EF			24	6	95	TO6		0	OBS
C	1716	SCUL						EF			24	6	95	TO6		0	OBS
C	1717	SCUL	57					EF			24	6	95	TO6		0	
C	1718	SCUL	59					EF			24	6	95	TO6		0	
C	1719	SCUL	63					EF			24	6	95	TO6		0	

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	1720	SCUL	51					EF			24	6	95	TO6		0	
C	1721	LKTR	152	34			SC	EF			24	6	95	TO6		0	
C	1722	ARGR						EF			24	6	95	TO6		0	OBS
C	1723	SCUL						EF			24	6	95	TO6		0	OBS
C	1724	ARGR	123	18		2	SC	EF			24	6	95	TO6		0	
C	1725	BURB	404	398				EF			24	6	95	TO6		0	
C	1726	SCUL	56					EF			24	6	95	TO6		0	
C	1727	SCUL	83	8				EF			24	6	95	TO6		0	
C	1728	SCUL	57					EF			24	6	95	TO6		0	
C	1729	NNST						EF			24	6	95	TO6		0	OBS
C	1730	NNST						EF			24	6	95	TO6		0	OBS
C	1731	NNST						EF			24	6	95	TO6		0	OBS
C	1732	BURB						EF			24	6	95	TO6		0	OBS
C	1733	BURB	73					EF			24	6	95	TO6		0	
C	1734	SCUL	48					EF			24	6	95	TO6		0	
C	1866	ARGR						EF			21	6	95	TC1		0	OBS
C	1867	ARGR						EF			21	6	95	TC1		0	OBS
C	1868	ARGR						EF			21	6	95	TC1		0	OBS
C	1869	ARGR						EF			21	6	95	TC1		0	OBS
C	1870	ARGR						EF			21	6	95	TC1		0	OBS
C	1871	ARGR						EF			21	6	95	TC1		0	OBS
C	1872	ARGR						EF			21	6	95	TC1		0	OBS
C	1873	BURB						EF			21	6	95	TC1		0	OBS
C	1874	SCUL						EF			21	6	95	TC1		0	OBS
C	1875	SCUL						EF			21	6	95	TC1		0	OBS
C	1876	SCUL						EF			21	6	95	TC1		0	OBS
C	1877	SCUL						EF			21	6	95	TC1		0	OBS
C	1878	SCUL						EF			22	6	95	TC5		0	OBS
C	1879	SCUL						EF			22	6	95	TC5		0	OBS
C	1880	SCUL						EF			22	6	95	TC5		0	OBS
C	1881	ARGR						EF			22	6	95	TC6		0	OBS
C	1882	ARGR						EF			23	6	95	TO1		0	OBS
C	1883	ARGR						EF			23	6	95	TO2		0	OBS
C	1884	ARGR						EF			23	6	95	TO2		0	OBS
C	1885	ARGR						EF			23	6	95	TO2		0	OBS
C	1886	ARGR						EF			23	6	95	TO2		0	OBS
C	1887	ARGR						EF			23	6	95	TO2		0	OBS
C	1888	NNST						EF			23	6	95	TO2		0	OBS
C	1889	BURB						EF			24	6	95	TO6		0	OBS
C	1890	NNST						EF			24	6	95	TO6		0	OBS
C	1891	NNST						EF			24	6	95	TO6		0	OBS
C	1892	NNST						EF			24	6	95	TO6		0	OBS
C	1893	ARGR						EF			24	6	95	TO5		0	OBS
C	1894	ARGR						EF			24	6	95	TO5		0	OBS
C	1895	ARGR						EF			24	6	95	TO5		0	OBS
C	1896	ARGR						EF			24	6	95	TO5		0	OBS
C	1897	NNST						EF			24	6	95	TO5		0	OBS
C	1898	NNST						EF			24	6	95	TO5		0	OBS
C	1899	ARGR						EF			24	6	95	TO6		0	OBS
C	1900	NNST						EF			24	6	95	TO6		0	OBS
C	1901	NNST						EF			24	6	95	TO6		0	OBS

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	1902	SCUL						EF			24	6	95	TO6		0	OBS
C	1903	SCUL						EF			24	6	95	TO6		0	OBS
C	1989	ARGR						SN			28	6	95	TJERI		0	OBS
C	1990	ARGR						SN			28	6	95	TJERI		0	OBS
C	1991	BURB						SN			28	6	95	TJERI		0	OBS
C	1992	LKTR						SN			28	6	95	TJERI		0	OBS
C	1993	LKTR						SN			28	6	95	TJERI		0	OBS
C	1994	SCUL						SN			28	6	95	TJERI		0	OBS
C	2439	ARGR						EF			5	8	95	TC6		0	OBS
C	2440	ARGR						EF			5	8	95	TC6		0	OBS
C	2441	ARGR	90	4		1	SC	EF			5	8	95	TC6		0	
C	2442	SCUL	69	4				EF			5	8	95	TC6		0	
C	2443	ARGR	105	6		1	SC	EF			5	8	95	TC6		0	
C	2444	ARGR	90	5		1	SC	EF			5	8	95	TC6		0	
C	2445	ARGR	96	3		1	SC	EF			5	8	95	TC6		0	
C	2446	ARGR	100	6		1	SC	EF			5	8	95	TC6		0	
C	2447	ARGR	87	4		1	SC	EF			5	8	95	TC6		0	
C	2448	SCUL						EF			5	8	95	TC4		0	OBS
C	2449	SCUL						EF			5	8	95	TC4		0	OBS
C	2450	SCUL						EF			5	8	95	TC4		0	OBS
C	2451	SCUL						EF			5	8	95	TC4		0	OBS
C	2452	SCUL						EF			5	8	95	TC4		0	OBS
C	2453	SCUL						EF			5	8	95	TC4		0	OBS
C	2454	SCUL						EF			5	8	95	TC4		0	OBS
C	2455	SCUL						EF			5	8	95	TC4		0	OBS
C	2456	SCUL						EF			5	8	95	TC4		0	OBS
C	2457	SCUL						EF			5	8	95	TC4		0	OBS
C	2458	SCUL						EF			5	8	95	TC4		0	OBS
C	2459	SCUL						EF			5	8	95	TC4		0	OBS
C	2460	SCUL						EF			5	8	95	TC4		0	OBS
C	2461	SCUL						EF			5	8	95	TC4		0	OBS
C	2462	SCUL						EF			5	8	95	TC4		0	OBS
C	2463	SCUL						EF			5	8	95	TC4		0	OBS
C	2464	SCUL						EF			5	8	95	TC4		0	OBS
C	2465	SCUL						EF			5	8	95	TC4		0	OBS
C	2466	SCUL						EF			5	8	95	TC4		0	OBS
C	2467	SCUL						EF			5	8	95	TC4		0	OBS
C	2468	SCUL						EF			5	8	95	TC4		0	OBS
C	2469	SCUL						EF			5	8	95	TC4		0	OBS
C	2470	SCUL						EF			5	8	95	TC4		0	OBS
C	2471	SCUL						EF			5	8	95	TC4		0	OBS
C	2472	SCUL						EF			5	8	95	TC4		0	OBS
C	2473	SCUL						EF			5	8	95	TC4		0	OBS
C	2474	SCUL						EF			5	8	95	TC4		0	OBS
C	2475	SCUL						EF			5	8	95	TC4		0	OBS
C	2476	SCUL						EF			5	8	95	TC4		0	OBS
C	2477	SCUL						EF			5	8	95	TC4		0	OBS
C	2478	SCUL						EF			5	8	95	TC4		0	OBS
C	2479	SCUL						EF			5	8	95	TC4		0	OBS
C	2480	SCUL						EF			5	8	95	TC4		0	OBS
C	2481	SCUL						EF			5	8	95	TC4		0	OBS

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	2482	SCUL						EF			5	8	95	TC4		0	OBS
C	2483	SCUL						EF			5	8	95	TC4		0	OBS
C	2484	ARGR	46					EF			5	8	95	TC4		0	
C	2485	BURB	90					EF			5	8	95	TC4		0	
C	2486	BURB	150					EF			5	8	95	TC4		0	
C	2487	BURB	65					EF			5	8	95	TC4		0	
C	2488	SCUL	115					EF			5	8	95	TC4		0	
C	2489	SCUL	110					EF			5	8	95	TC4		0	
C	2491	ARGR	141	28		2	SC	EF			6	8	95	TO4		0	
C	2492	ARGR	99	5		1	SC	EF			6	8	95	TO2		0	
C	2493	SCUL	42					EF			7	8	95	TC1		0	
C	2494	ARGR	46					EF			7	8	95	TC1		0	
C	2495	ARGR	42					EF			7	8	95	TC1		0	
C	2496	ARGR	58					EF			7	8	95	TC1		0	
C	2497	ARGR	59					EF			7	8	95	TC1		0	
C	2498	ARGR	60					EF			7	8	95	TC1		0	
C	2499	SCUL	56					EF			7	8	95	TC1		0	
C	2500	SCUL	86					EF			7	8	95	TC1		0	
C	2501	SCUL	48					EF			7	8	95	TC1		0	
C	2502	SCUL	58					EF			7	8	95	TC1		0	
C	2503	ARGR						EF			10	8	95	TJERI		0	OBS
C	2504	ARGR						SN			10	8	95	TJERI		0	OBS
C	2505	ARGR						SN			10	8	95	TJERI		0	OBS
C	2506	ARGR						EF			10	8	95	TJERI		0	OBS
C	2507	ARGR						EF			10	8	95	TJERI		0	OBS
C	2508	ARGR						EF			10	8	95	TJERI		0	OBS
C	2509	ARGR						SN			10	8	95	TJERI		0	OBS
C	2510	ARGR						SN			10	8	95	TJERI		0	OBS
C	2511	ARGR						SN			10	8	95	TJERI		0	OBS
C	2512	ARGR						SN			10	8	95	TJERI		0	OBS
C	2513	ARGR						SN			10	8	95	TJERI		0	OBS
C	2514	ARGR						SN			10	8	95	TJERI		0	OBS
C	2515	ARGR						SN			10	8	95	TJERI		0	OBS
C	2516	ARGR						SN			10	8	95	TJERI		0	OBS
C	2517	ARGR						SN			10	8	95	TJERI		0	OBS
C	2518	ARGR						SN			10	8	95	TJERI		0	OBS
C	2519	ARGR						SN			10	8	95	TJERI		0	OBS
C	2520	ARGR						SN			10	8	95	TJERI		0	OBS
C	2521	ARGR						SN			10	8	95	TJERI		0	OBS
C	2522	ARGR						SN			10	8	95	TJERI		0	OBS
C	2523	ARGR						SN			10	8	95	TJERI		0	OBS
C	2524	ARGR						SN			10	8	95	TJERI		0	OBS
C	2525	ARGR						SN			10	8	95	TJERI		0	OBS
C	2526	ARGR						SN			10	8	95	TJERI		0	OBS
C	2527	ARGR						SN			10	8	95	TJERI		0	OBS
C	2528	ARGR						SN			10	8	95	TJERI		0	OBS
C	2529	ARGR						SN			10	8	95	TJERI		0	OBS
C	2530	ARGR						SN			10	8	95	TJERI		0	OBS
C	2531	ARGR						SN			10	8	95	TJERI		0	OBS
C	2532	ARGR						SN			10	8	95	TJERI		0	OBS
C	2533	ARGR						SN			10	8	95	TJERI		0	OBS

Appendix H4 Jericho Study Area Fish data (1995)

S	SNUM	SPEC	LEN	WT	SE	AG	ME	CA	MES	TAG	DA	MO	YR	LOC	SITE	C	COMMENT
C	2534	ARGR						SN			10	8	95	TJERI		0	OBS
C	2535	ARGR						SN			10	8	95	TJERI		0	OBS
C	2536	ARGR						SN			10	8	95	TJERI		0	OBS
C	2537	RNWH						SN			10	8	95	TJERI		0	OBS
C	2538	RNWH						SN			10	8	95	TJERI		0	OBS
C	2539	RNWH						SN			10	8	95	TJERI		0	OBS
C	2540	ARGR						SN			10	8	95	TJERI		0	OBS
C	2541	LKTR						SN			10	8	95	TC9		0	OBS
C	2542	LKTR						SN			10	8	95	TC9		0	OBS
C	2543	LKTR						SN			10	8	95	TC9		0	OBS
C	2544	LKTR						SN			10	8	95	TC8		0	OBS
C	2545	LKTR						SN			10	8	95	TC8		0	OBS
C	2546	LKTR						SN			10	8	95	TC8		0	OBS
C	2547	LKTR						SN			10	8	95	TC8		0	OBS
C	2548	RNWH						SN			10	8	95	TC8		0	OBS
C	2549	RNWH						SN			10	8	95	TC8		0	OBS
C	2550	RNWH						SN			10	8	95	TC8		0	OBS
C	2551	RNWH						SN			10	8	95	TC8		0	OBS
C	2552	RNWH						SN			10	8	95	TC8		0	OBS
C	2553	RNWH						SN			10	8	95	TC8		0	OBS
C	2554	RNWH						SN			10	8	95	TC8		0	OBS
C	2555	RNWH						SN			10	8	95	TC8		0	OBS
C	2556	RNWH						SN			10	8	95	TC8		0	OBS
C	2557	RNWH						SN			10	8	95	TC8		0	OBS
C	2558	RNWH						SN			10	8	95	TC8		0	OBS
C	2559	RNWH						SN			10	8	95	TC8		0	OBS

TOTALS:	SNUM	1,136,459
	LEN	187,674
	WT	456,378
	SEX	11,322
	MESH	28,374
	DAY	9,920
	MO	6,084
	YR	75,050
	SITE	1,259
	CAPCODE	339

Printed 790 of the 790 records.

PRIMARY SORT FIELD: SNUM

SELECTION CRITERIA:
All records

APPENDIX I - FISH HABITAT

Appendix I1 Habitat characteristics[1] measured during stream surveys, Jericho study area 1995.

Stream	Date Sampled	Water Temp. (°C)	Habitat Type	Stream Width (m)	Habitat Length (m)	Bank Type	Channel Type	Bank Type (%)			Substrate Type (%)				
								Shrub	Grass	Rock	Silt/Sand	Gravel	Cobble	Boulder	Bedrock
C1	7 Aug 95	8	R3	1.3	100	D1	C1	0.0	100.0	0.0	15.0	5.0	50.0	30.0	0.0
			R3BG	1.8	10	D2	C2	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			RF	1.5	84	D2	C2	0.0	95.0	5.0	0.0	10.0	70.0	20.0	0.0
			RF		65	D2	C2	35.0	60.0	5.0	5.0	15.0	30.0	60.0	0.0
			RF	3.0	100	D2	C2	35.0	60.0	5.0	5.0	20.0	50.0	25.0	0.0
			RF	0.5	95	D2	C2	70.0	30.0	0.0	0.0	40.0	50.0	10.0	0.0
C2	21 Jun 95	8	DISPERSED		300	D2	C2	70.0	30.0	0.0	0.0	40.0	50.0	10.0	0.0
C3	21 Jun 95	9	RFBG	0.4	800	D2	C2	70.0	30.0	0.0	0.0	40.0	50.0	10.0	0.0
C4	5 Aug 95	8	P3	2.0	4	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3		8	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3		2	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	0.7	1	D1	C1	0.0	100.0	0.0	90.0	10.0	0.0	0.0	0.0
			P3	0.5	1	D1	C1	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0
			P3	0.8	3	D1	C1	0.0	100.0	0.0	20.0	0.0	0.0	80.0	0.0
			P3	0.9	1	D1	C1	0.0	100.0	0.0	0.0	80.0	0.0	20.0	0.0
			R3		19	D1	C1	0.0	100.0	0.0	95.0	0.0	0.0	5.0	0.0
			R3	0.6	4	D1	C1	0.0	100.0	0.0	95.0	0.0	0.0	5.0	0.0
			R3		9	D1	C1	0.0	100.0	0.0	95.0	0.0	0.0	5.0	0.0
			R3	0.6	25	D1	C1	0.0	100.0	0.0	95.0	0.0	0.0	5.0	0.0
			R3	0.4	27	D1	C1	0.0	100.0	0.0	95.0	0.0	0.0	5.0	0.0
			R3	0.8	40	D1	C2	0.0	100.0	0.0	10.0	30.0	30.0	30.0	0.0
			R3	0.5	128	D1	C2	0.0	100.0	0.0	60.0	0.0	0.0	40.0	0.0
			R3		100	D2	C2	0.0	100.0	0.0	90.0	5.0	0.0	5.0	0.0
C5	22 Jun 95	8	F3	0.3	300	D2	C2	20.0	80.0	0.0	100.0	0.0	0.0	0.0	0.0
C6	22 Jun 95	8	F3BG		35	D1	C1	0.0	10.0	90.0	0.0	0.0	0.0	100.0	0.0
			R3BG	0.3	80	D1	C1	70.0	20.0	10.0	0.0	0.0	20.0	80.0	0.0
			R3BG	0.7	35	D1	C1	80.0	0.0	20.0	0.0	10.0	20.0	70.0	0.0
C7	5 Aug 95	7	RFBG	0.7	7	D2	C1	80.0	0.0	20.0	0.0	0.0	0.0	100.0	0.0
			F3BG		25	D2	C2	10.0	0.0	90.0	0.0	0.0	0.0	100.0	0.0
			F3BG	1.5	14	D2	C2	80.0	0.0	20.0	0.0	0.0	0.0	100.0	0.0
			DISPERSED		26	D2	C2	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0
			DISPERSED		60	D2	C2	80.0	0.0	20.0	0.0	0.0	0.0	100.0	0.0
			R3BG		93	D2	C2	30.0	70.0	0.0	70.0	0.0	0.0	30.0	0.0
			R3BG		26	D2	C2	50.0	50.0	0.0	0.0	0.0	0.0	100.0	0.0
C8	5 Aug 95	9	F3BG	60.0	100	D2	C1	5.0	15.0	80.0	0.0	0.0	0.0	100.0	0.0
			R3BG	60.0	100	D2	C1	5.0	15.0	80.0	0.0	0.0	0.0	70.0	30.0
			RFBG	60.0	100	D2	C1	5.0	15.0	80.0	0.0	0.0	5.0	90.0	5.0
C9	5 Aug 95	9	R3BG	70.0	30	D2	C1	5.0	15.0	80.0	0.0	0.0	5.0	95.0	0.0
			R3BG	70.0	60	D2	C1	5.0	15.0	80.0	0.0	0.0	20.0	80.0	0.0
			RA		40	D2	C1	5.0	5.0	90.0	0.0	0.0	0.0	70.0	30.0
			RFBG	70.0	100	D2	C1	5.0	15.0	80.0	0.0	0.0	5.0	95.0	0.0
O1	6 Aug 95	8	P3	0.5	2	D1	C1	60.0	40.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	2.0	5	D1	C1	50.0	50.0	0.0	100.0	0.0	0.0	0.0	0.0
			R3	3.7	80	D1	C1	0.0	100.0	0.0	80.0	15.0	5.0	0.0	0.0
			R3	1.5	30	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			R3		20	D2	C1	0.0	100.0	0.0	20.0	0.0	80.0	0.0	0.0
			R3		30	D2	C2	0.0	100.0	0.0	0.0	0.0	30.0	70.0	0.0
			R3		150	D2	C2	50.0	50.0	0.0	100.0	0.0	0.0	0.0	0.0
			R3	0.4	32	D2	C2	50.0	50.0	0.0	100.0	0.0	0.0	0.0	0.0
			R3	0.3	20	D2	C2	0.0	100.0	0.0	90.0	10.0	0.0	0.0	0.0

[1] For definition of stream habitat characteristics see Appendix A.

Appendix I1 Concluded.

Stream	Date Sampled	Water Temp. (°C)	Habitat Type	Stream Width (m)	Habitat Length (m)	Bank Type	Channel Type	Bank Type (%)			Substrate Type (%)				
								Shrub	Grass	Rock	Silt/Sand	Gravel	Cobble	Boulder	Bedrock
O2	6 Aug 95	8	P3	0.6	3	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	0.4	6	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	0.3	3	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	0.6	2	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	0.6	1	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	4.0	4	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3		2	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	0.3	10	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3	0.4	1	D1	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			P3		2	D2	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			R3	0.8	260	D2	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
			R3		200	D2	C1	30.0	60.0	10.0	75.0	5.0	5.0	15.0	0.0
			R3		3	D2	C1	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0
			R3	0.8	22	D2	C1	0.0	100.0	0.0	90.0	0.0	0.0	10.0	0.0
			R3		10	D2	C1	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
O3	23 Jun 95	7	R3	0.4	150	D1	C1	0.0	100.0	0.0	50.0	10.0	30.0	10.0	0.0
O4	6 Aug 95		P3		6	D1	C1	70.0	30.0	0.0	10.0	0.0	20.0	70.0	0.0
			P3	1.0	6	D1	C1	60.0	30.0	10.0	20.0	80.0	0.0	0.0	0.0
			R3		132	D2	C2	60.0	30.0	10.0	70.0	0.0	10.0	20.0	0.0
			R3BG	1.2	116	D2	C2	30.0	70.0	0.0	70.0	0.0	10.0	20.0	0.0
			RFBG	0.7	87	D2	C2	60.0	40.0	0.0	10.0	0.0	20.0	70.0	0.0
O5	23 Jun 95	7	R2BG	2.0	250	D1	C1	30.0	40.0	30.0	10.0	10.0	50.0	20.0	0.0
			R3BG	1.2	250	D1	C1	30.0	40.0	30.0	10.0	10.0	80.0	0.0	0.0
			F3BG	1.8	400	D2	C2	30.0	70.0	0.0	30.0	10.0	60.0	0.0	0.0
O6	23 Jun 95	7	R1BG	3.0	250	D1	C1	30.0	40.0	30.0	40.0	10.0	50.0	0.0	0.0
			R2BG	2.8	450	D1	C1	30.0	40.0	30.0	20.0	20.0	20.0	40.0	0.0
			RABG	2.5	100	D1	C1	50.0	10.0	40.0	0.0	0.0	0.0	100.0	0.0
Jericho R.	27 Jun 95	6	F1BG	45.0	1100	D1	C1	0.0	50.0	50.0	40.0	0.0	60.0	0.0	0.0
			F3BG	35.0	250	D1	C1	0.0	10.0	90.0	0.0	0.0	10.0	80.0	10.0
			R2BG	29.0	120	D1	C1	0.0	20.0	80.0	0.0	0.0	10.0	80.0	10.0
			RABG	21.0	50	D1	C1	0.0	10.0	90.0	0.0	0.0	0.0	40.0	60.0
			RABG	25.0	75	D1	C1	0.0	20.0	80.0	0.0	0.0	20.0	70.0	10.0
			CASCADE		120	D1	C2	0.0	10.0	90.0	0.0	0.0	0.0	80.0	20.0

[1] For definition of stream habitat characteristics see Appendix A.

APPENDIX J - METALS IN FISH TISSUES

Appendix J1 Metal concentrations in liver, kidney, and muscle tissue samples collected from Jericho Lake, Jericho study area 1995.

Laboratory Label	Sample No.	Species	Fork Length (mm)	Tissue Type	Moisture H²O (%)	Metal Concentrations in ug/g 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	PO4	K	Ag	Na	Sr	Sn	Ti	V	Zn
						5.0	*5.0*	*0.05*	*0.05*	*0.1*	*0.5*	*0.05*	*0.5*	*1.5*	*0.5*	*0.05*	*1*	*0.05*	*0.05*	*0.1*	*0.005*	*1*	*0.25*	*10*	*0.5*	*1*	*0.5*	*0.05*	*1*	*0.15*	*0.5*	*0.05*
4666K-183	663	LKTR	562	Liver	77.0	14.6	<	0.13	0.07	<	5.3	1.95	220.0	<	0.7	93.94	6351	0.07	560.00	4.6	7.389	<	<	42000	9860.0	<	5720.0	0.40	<	<	<	143.88
4666K-184	663	LKTR	562	Kidney	74.5	13.9	<	1.50	0.54	<	5.4	8.92	1480.0	<	0.7	6.78	3551	0.14	590.00	1.3	7.031	<	2.36	34200	8670.0	<	8570.0	6.42	<	0.50	<	141.68
4666K-185	666	LKTR	640	Liver	77.0	<	<	0.21	<	<	2.7	1.00	280.6	<	<	48.24	2698	0.06	573.25	5.0	3.872	<	0.40	45700	10400.0	<	6480.0	0.52	<	<	<	141.79
4666K-186	666	LKTR	640	Kidney	81.0	<	<	0.64	3.35	<	2.7	7.08	895.0	<	<	7.08	3590	0.06	642.59	2.1	4.926	<	0.97	44000	12400.0	<	9590.0	2.25	<	<	<	151.31
4666K-187	669	LKTR	656	Liver	77.2	40.6	<	0.26	0.08	<	5.8	1.23	245.2	<	1.0	55.06	6050	0.08	571.63	5.5	6.336	<	0.33	44000	10419.4	<	5690.0	0.47	<	<	0.9	134.09
4666K-188	669	LKTR	656	Kidney	79.7	38.8	<	2.88	0.58	<	4.0	8.63	1539.3	<	1.1	6.11	2700	0.14	766.06	1.9	6.229	<	4.32	35000	11200.0	<	10290.0	6.47	<	1.40	0.8	138.83
4666K-189	670	LKTR	483	Liver	76.7	11.9	<	0.20	<	<	3.9	1.59	222.0	<	<	64.33	3370	<	579.78	6.8	1.982	<	<	44100	11200.0	<	5680.0	0.48	<	<	<	146.14
4666K-190	670	LKTR	483	Kidney	74.0	8.7	<	1.55	0.56	<	3.1	6.83	623.9	<	<	3.72	1870	0.31	422.12	1.5	2.477	<	1.37	30800	8570.0	<	6180.0	2.05	<	0.22	<	99.94
4666K-191	672	LKTR	510	Liver	79.3	44.7	<	<	0.10	<	5.7	4.00	407.1	<	<	61.73	6010	0.30	657.30	5.0	2.629	<	<	53900	13200.0	<	13200.0	0.70	<	<	1.3	162.82
4666K-192	672	LKTR	510	Kidney	77.7	19.8	<	0.34	2.32	<	4.4	21.49	1150.0	<	<	5.09	2310	0.28	605.13	1.8	4.632	<	2.21	37600	12700.0	<	12700.0	4.02	<	0.45	0.7	117.63
4666K-193	674	LKTR	523	Liver	76.2	9.4	<	<	<	<	4.0	1.13	249.2	<	<	22.47	2980	0.12	567.47	5.5	1.744	<	<	43100	11000.0	<	11000.0	0.55	<	<	<	128.11
4666K-194	674	LKTR	523	Kidney	80.1	<	<	<	1.11	<	4.9	7.48	915.1	<	<	5.81	1020	0.16	605.56	1.8	3.199	<	1.75	43400	14200.0	<	14200.0	3.98	<	<	<	132.89
4666K-195	675	LKTR	536	Liver	76.9	55.9	<	0.43	0.11	<	8.2	3.26	200.8	<	1.2	50.57	9040	0.11	498.52	5.0	4.282	<	0.36	45100	9790.0	<	9790.0	0.47	<	<	0.8	129.11
4666K-196	675	LKTR	536	Kidney	76.7	15.6	<	0.95	0.68	<	4.6	14.97	721.0	<	<	7.48	4390	0.34	466.64	1.4	5.177	<	3.81	36100	11600.0	<	11600.0	2.65	<	<	<	92.51
4666K-197	676	LKTR	466	Liver	76.0	<	<	<	0.08	<	2.5	1.00	440.0	<	<	8.88	1950	0.19	778.19	<	1.908	<	<	49600	14000.0	<	3960.0	0.61	<	<	<	89.69
4666K-198	676	LKTR	466	Kidney	77.1	<	<	0.13	7.94	<	2.3	7.94	867.0	<	<	4.50	1420	0.07	404.37	1.3	3.038	<	0.79	34100	9790.0	<	9790.0	2.51	<	<	<	72.14
4666K-199	677	LKTR	582	Liver	76.9	23.0	<	<	0.11	<	6.2	1.24	322.6	<	0.9	216.03	5980	0.07	627.65	5.8	3.729	<	0.26	48100	11300.0	2	11300.0	0.58	<	<	0.5	183.19
4666K-200	677	LKTR	582	Kidney	78.9	12.5	<	1.13	0.88	<	61.3	14.40	1280.0	<	1.9	8.76	2570	0.19	650.91	2.1	5.320	<	3.32	39600	12200.0	<	12200.0	5.26	<	<	<	202.78
4666K-201	678	LKTR	380	Liver	81.3	14.0	<	<	0.15	<	4.0	1.91	440.0	<	<	33.05	3020	<	940.00	8.1	1.285	<	0.51	61700	16800.0	<	5300.0	0.95	<	<	<	160.09
4666K-202	678	LKTR	380	Kidney	77.2	<	<	<	0.89	<	4.3	3.78	380.0	<	<	6.39	735	0.14	470.00	2.2	1.902	<	0.69	41300	12200.0	<	6150.0	1.17	<	<	<	81.72
4666K-203	679	LKTR	314	Liver	78.3	<	<	<	0.09	<	1.9	0.49	340.0	<	<	28.68	919	0.13	520.00	4.9	0.645	<	<	41600	11400.0	<	5200.0	1.08	<	<	<	101.28
4666K-204	746	LKTR	314	Kidney	99.9	<	<	0.07	0.15	<	0.9	0.73	90.0	<	<	1.82	110	<	110.00	0.6	0.291	<	<	10500	3200.0	<	1460.0	0.32	<	<	<	24.96
4666K-205	746	LKTR	434	Liver	77.7	<	<	<	0.07	<	3.1	0.53	310.0	<	<	36.99	2390	<	580.00	6.6	0.991	<	<	46400	11100.0	<	4790.0	0.92	<	<	<	123.51
4666K-206	746	LKTR	434	Kidney	74.4	<	<	<	0.40	<	1.9	2.15	372.7	<	<	4.38	597	0.08	434.05	1.9	1.195	<	0.40	35800	9600.0	<	5500.0	1.39	<	<	<	74.46
4666K-207	747	LKTR	628	Liver	78.8	17.1	<	<	0.12	<	8.4	1.21	243.1	<	1.3	81.81	8560	0.14	462.95	3.4	11.795	<	0.36	32700	8260.0	<	5140.0	0.41	<	<	<	136.70
4666K-208	747	LKTR	628	Kidney	78.9	19.9	<	1.20	0.57	<	6.8	15.95	2215.8	<	1.9	12.53	4530	0.46	825.92	1.8	11.438	<	4.10	36700	11000.0	<	10700.0	9.11	<	0.51	<	182.27
4666K-209	748	LKTR	582	Liver	75.8	13.5	<	<	0.08	<	4.2	1.00	456.8	<	<	62.58	2920	<	568.11	4.3	3.503	<	<	41000	9350.0	<	5700.0	0.95	<	<	<	132.02
4666K-210	748	LKTR	582	Kidney	76.7	15.2	<	0.34	1.01	<	4.9	7.88	1339.5	<	<	7.32	1580	0.23	607.84	2.0	4.694	<	2.31	37500	10700.0	<	8050.0	6.19	<	0.45	<	126.07
4666K-211	749	LKTR	507	Liver	76.1	10.9	<	<	0.06	<	4.2	1.31	415.3	<	<	51.00	3150	<	546.27	6.1	1.976	<	<	42100	8670.0	<	5300.0	0.78	<	<	<	130.16
4666K-212	749	LKTR	507	Kidney	77.0	9.8	<	<	0.85	<	3.3	8.49	579.4	<	<	5.03	960	0.13	482.09	1.8	2.881	<	1.44	37000	11600.0	<	6860.0	1.83	<	<	<	105.83
4666K-213	750	LKTR	560	Liver	76.2	6.1	<	<	0.06	<	3.6	3.61	289.0	<	0.7	65.30	3360	0.06	578.00	4.7	2.579	<	<	47000	9060.0	<	4950.0	0.44	<	<	<	150.34
4666K-214	750	LKTR	560	Kidney	77.8	6.9	<	0.13	0.43	<	3.3	1.69	785.7	<	<	6.51	942	0.13	442.76	1.3	4.028	<	1.69	40000	8810.0	<	6900.0	2.43	<	<	<	105.48
4666K-215	751	LKTR	487	Liver	75.4	9.6	<	<	<	<	3.9	4.80	278.0	<	<	42.28	3270	<	533.81	6.0	1.610	<	<	41400	10800.0	<	5490.0	0.57	<	<	<	130.45
4666K-216	751	LKTR	487	Kidney	79.0	8.8	<	0.09	0.65	<	3.4	1.68	563.3	<	1.2	5.59	917	0.14	553.97	2.3	3.594	<	0.93	43200	11200.0	<	8050.0	1.72	<	0.28	<	112.19
4666K-217	752	LKTR	554	Liver	74.0	<	<	<	<	<	1.9	0.31	271.4	<	<	25.11	1080	<	508.62	4.9	2.286	<	<	41100	8810.0	<	4630.0	0.65	<	<	<	100.22
4666K-218	752	LKTR	554	Kidney	74.7	<	<	<	0.57	<	1.9	2.87	484.5	<	<	4.94	566	0.06	574.71	1.7	3.989	<	0.86	41600	11300.0	<	6440.0	1.72	<	<	<	114.37
4666K-219	753	LKTR	518	Liver	74.6	21.0	<	<	0.08	<	6.3	1.60	200.7	<	<	56.39	6140	0.08	526.07	4.6	4.103	<	<	47900	10200.0	<	5050.0	0.34	<	<	<	122.47
4666K-220	753	LKTR	518	Kidney	77.2	27.6	<	0.80	0.73	<	4.5	11.64	1338.0	<	1.5	8.00	1720	0.29	647.20	1.7	6.181	<	3.78	45700	12700.0	<	7640.0	5.53	<	1.31	<	178.16
4666K-221	754	LKTR	500	Liver	75.3	6.7	<	0.29	<	<	3.2	0.99	300.0	<	<	49.20	1850	0.06	490.00	4.7	1.080	<	<	38000	9080.0	<	4920.0	0.64	<	<	<	119.06
4666K-222	754	LKTR	500	Kidney	81.2	<	<	1.84	1.05	<	3.5	12.29	1390.0	<	<	7.99	1440	0.09	660.00	2.7	3.800	<	1.32	47100	14500.0	<	10100.0	5.18	<	<	<	143.05
4666K-223	755	LKTR	611	Liver	76.9	<	<	0.07	<	<	1.8	0.26	181.9	<	<	8.35	1290	0.06	377.32	3.1	2.411	<	<	23900	6020.0	<	2650.0	0.26	<	<	<	53.98
4666K-224	755	LKTR	611	Kidney	73.9	13.4	<	0.84	0.84	<	3.8	8.93	1020.0	<	<	5.58	1320	0.17	520.00	1.7	6.896	<	2.01	33000	10400.0	<	8030.0	3.96	4	0.39	<	103.21
4666K-297	746	LKTR	434	Muscle	76.6	<	<	<	<	<	1.9	<	265.9	<	<	2.13	10	<	1120.00	0.2	0.536	<	0.67	33100	20000.0	<	790.0	0.28	<	<	<	12.60
4666K-298	747	LKTR	628	Muscle	82.9	<	<	<	<	<	2.6	<	284.0	<	1.8	1.78	19	<	1200.00	0.4	4.536	<	0.63	36200	24400.0	<	1980.0	0.16	<	<	<	17.85
4666K-299	752	LKTR	554	Muscle	76.8	<	<	<	0.07	<	2.4	<	1210.0	<	<	1.60	10	<	1210.00	0.3	1.149	<	<	34900	20800.0	<	1210.0	1.85	<	<	<	12.37
4666K-300	663	LKTR	562	Muscle	80.2	<	<	<	<	<	2.4	<	631.2	<	<	1.36	13	<	1190.00	0.4	2.565	<	<	36600	24200.0	<	1380.0	0.67	<	<	<	20.74
4666K-301	666	LKTR	640	Muscle	79.2	<	<	<	<	<	1.6	<	790.0	<	<	1.15	8	<	1160.00	0.5	2.170	<	<	35500	23000.0	<	1150.0	0.86	<	<	<	13.18
4666K-302	669	LKTR	656	Muscle	81.5	<	<	<	0.15	<	3.8	<	2500.0	<	<	1.52	12	<	1200.00	0.8	2.280	<	<	39700	23400.0	<	1180.0	3.29	<	<	<	15.23
4666K-303	670	LKTR	483	Muscle	75.8	<	<	<	<	<	2.2	<	370.0	<	<	1.38	15	<	1090.00	0.3	0.764	<	<	31900	18400.0	<	940.0	0.31	<	<	<	11.91
4666K-304	672	LKTR	510	Muscle	77.1	<	<	<	0.17	<	2.8	<	1850.0	<	<	1.12	13	<	1150.00	0.6	1.226	<	<	36100	20100.0	<	1050.0	2.37	<	<	<	14.24
4666K-305	674	LKTR	523	Muscle	76.0	<	<	<	0.07	<	1.7	<	1327.8	<	<	1.01	12	<	1120.00	0.5	1.043	<	<	34300	20600.0	<	1150.0	1.94	<	<	<	12.73
4666K-306	675	LKTR	536	Muscle	77.8	<	<	<	<	<	2.0	<	979.4	<	<	1.15	21	<	1189.59	0.4	1.463	<	<	34700	20100.0	<	1390.0	1.23	<	<	<	14.28
4666K-307	676	LKTR	466	Muscle	75.7	<	<	<	<	<	1.6	<	420.1	<	<	1.14	14	<	1079.71	0.2	0.907	<	<	30100	17500.0	<	900.0	0.35	<	<	<	11.39
4666K-308	677	LKTR	533	Muscle	79.9	<	<	<	<	<	2.1	<	1090.0	<	<	1.53	24	0.14	1160.00	0.6	1.762	<	<	34400	21500.0	<	1200.0	1.26	<	<	<	13.48
4666K-309	678	LKTR	380	Muscle	77.8	<	<	<	<	<	1.8	<	467.7	<	<	1.07	9	0.11	1260.00	0.3	0.763	<	<	35000	20300.0	<	950.0	0.50	<	<	<	16.48
4666K-310	679	LKTR	314	Muscle	78.1	<	<	<	<	<	1.3	<	510.0	<	<	1.04	9	0.13	1230.00	0.4	0.566	<	<	37100	21200.0	<	1130.0	0.72	<	<	<	16.27
4666K-311	682	LKTR	582	MBL677	79.9	<	<	<	<	<	3.1	<	284.2	<	<	1.07	12	0.14	1140.39	0.4	1.771	<	<	34400	21200.0	<	1120.0	0.14	<	<	<	12.15
4666K-312	748	LKTR	582	Muscle	80.1	<	<	<	<	<	1.7	<	1050.0	<	<	1.04	8	0.13	1180.00	0.5	1.320	<	<	35500	22400.0	<	1040.0	1.42	<	<	<	12.95
4666K-313	749	LKTR	507	Muscle	76.6	<	<	<	<	<	2.1	<	253.9	<	<	1.15	14	0.12	1130.14	0.2	0.729	<	<	31500	18200.0	<	930.0	0.16	<	<	<	12.69
4666K-314	750	LKTR	560	Muscle	80.0	<	<	<	0.18	<	2.3	<	3590.0	<	<	1.29	16	0.09	1230.00	0.5	1.557	<	<	40300	21500.0	<	940.0	5.08	<	<	<	15.25
4666K-315	751	LKTR	487	Muscle	74.7	<	<	<	<	<	1.6	<	532.2	<	<	0.98	12	0.09	1040.00	0.4	0.532	<	<	29000	12800.0	<	800.0	0.53	<	<	<	12.28
4666K-316	753	LKTR	518	Muscle	80.0	<	<	<	0.14	<	0.9	<	1130.0	<	<	<	19	<	1260.00	0.6	2.468	<	<	38200	22900.0	<	1950.0	1.22	<	<	<	15.92
4666K-317	754	LKTR	500	Muscle	77.8	<	<	<	0.30	<	2.7	<	1290.0	<	<	0.77	7	<	1170.00	0.4	0.990	<	<	35400	19300.0	<	880.0	1.76	<	0.39	<	15.01
4666K-318	755	LKTR	611	Muscle	79.4	<	<	<	<	<	1.4	<	925.1	<	<	0.79	12	<	1200.00	0.5	2.639	<	<	33900	21500.0	<	1240.0	1.01	<	<	<	12.28
4954K-14	1442	RNWH	338	Muscle	76.3	<	<	0.07	0.06	<	1.2	<	488.2	<	<	1.43	16	0.09	1420.00	<	0.195	<	<	36600	21600.0	<	728.7	0.87	<	<	<	13.98
4954K-15	1442	RNWH	338	Liver	74.6	<	<	0.10	0.05	<	2.4	<	213.6	<	<	6.63	174	0.20	1060.00	6.1	0.260	<	<	59400	18000.0	<	2180.0	0.56	<	<	<	81.07
4954K-16	1442	RNWH	338	Kidney	82.1	40.0	<	0.34	0.34	<	6.1	0.68	575.1	<	<	264.67	1100	23.75	166.27	1.0	0.984	<	2.04	42200	2610.0	<	1430.0	1.53	<	<	<	37.33

Note: < = below detection limit; LKTR = lake trout; RNWH = round whitefish

Appendix J2 Metal concentrations in liver, kidney, and muscle tissue samples collected from the Control Lake, Jericho study area 1995.

Laboratory Label	Sample No.	Species	Fork Length (mm)	Tissue Type	Moisture H²O (%)	Metal Concentrations in ug/g 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	PO4	K	Ag	Na	Sr	Sn	Ti	V	Zn
						5.0	*5.0*	*0.05*	*0.05*	*0.1*	*0.5*	*0.05*	*0.5*	*1.5*	*0.5*	*0.05*	*1*	*0.05*	*0.05*	*0.1*	*0.005*	*1*	*0.25*	*10*	*0.5*	*1*	*0.5*	*0.05*	*1*	*0.15*	*0.5*	*0.05*
4666K-225	814	RNWH	431	Liver	80.2	12.4	<	0.22	<	<	2.0	1.89	350.0	<	<	10.19	1240	0.07	660.00	7.3	0.706	<	0.58	49900	15400.0	<	5630.0	0.66	<	<	<	122.30
4666K-226	814	RNWH	431	Kidney	82.0	19.8	<	0.35	3.49	<	5.8	12.79	460.3	<	<	9.76	842	0.35	461.43	3.0	2.069	<	4.30	37700	16200.0	<	8260.0	1.05	<	<	<	79.04
4666K-227	815	LKTR	460	Liver	77.6	<	<	0.22	<	<	3.0	1.15	331.3	<	<	62.33	2070	0.05	606.87	5.5	0.590	<	<	41200	12900.0	<	4930.0	0.49	<	<	<	139.42
4666K-228	815	LKTR	460	Kidney	77.5	9.1	<	0.24	0.30	<	3.0	4.84	955.9	<	<	7.26	805	0.12	540.28	2.1	1.307	<	0.85	38100	11900.0	<	6530.0	1.63	<	0.36	<	112.53
4666K-229	816	LKTR	511	Liver	77.3	<	<	0.05	<	<	2.8	0.70	450.7	<	<	19.93	1370	0.06	798.07	8.1	2.653	<	<	52700	13600.0	<	5570.0	0.57	<	<	<	110.04
4666K-230	816	LKTR	511	Kidney	82.1	46.6	<	0.67	0.47	<	5.0	10.12	1110.0	<	<	10.12	2180	0.13	658.59	3.0	7.166	<	2.23	47400	14300.0	<	11000.0	3.24	<	2.50	<	126.86
4666K-231	817	LKTR	550	Liver	75.8	<	<	<	<	<	1.8	0.27	396.5	<	<	6.10	592	0.05	791.10	6.6	1.691	<	<	48200	11600.0	<	5340.0	0.56	<	<	<	89.50
4666K-232	817	LKTR	550	Kidney	79.4	13.5	<	0.39	0.79	<	3.7	6.77	789.3	<	<	6.20	750	0.11	569.44	1.7	4.358	<	1.30	44300	12500.0	<	9300.0	1.80	<	0.62	<	106.56
4666K-233	818	LKTR	456	Liver	80.1	7.4	<	0.15	<	<	3.9	2.22	674.9	<	1.1	111.33	2900	0.10	798.02	5.9	2.665	<	0.34	49500	11900.0	<	5120.0	0.74	<	<	<	153.69
4666K-234	818	LKTR	456	Kidney	79.2	<	<	0.56	0.22	<	4.0	6.28	503.4	<	<	11.21	1100	0.45	483.24	1.7	3.812	<	1.35	43800	13900.0	<	5810.0	1.01	<	0.67	<	111.00
4666K-235	819	LKTR	408	Liver	79.4	8.5	<	0.32	0.07	<	3.4	2.76	1410.0	<	<	65.76	2290	<	643.47	4.2	0.930	<	<	47100	12700.0	<	5160.0	1.52	<	<	<	149.55
4666K-236	819	LKTR	408	Kidney	80.0	18.8	<	0.51	0.65	<	3.6	13.71	2160.0	<	<	10.11	931	0.22	599.84	2.4	2.007	<	1.08	47100	13800.0	<	6740.0	3.10	<	0.72	<	121.99
4666K-237	820	LKTR	445	Liver	76.4	6.0	<	0.12	<	<	4.4	1.01	304.9	<	<	135.31	1980	0.08	592.00	4.8	0.870	<	<	39300	10500.0	<	4630.0	0.52	<	<	<	159.07
4666K-238	820	LKTR	445	Kidney	76.7	9.3	<	0.31	0.21	<	3.5	4.33	489.2	<	<	8.25	763	0.10	427.82	1.5	1.356	<	1.34	36600	10300.0	<	5360.0	1.19	<	0.36	<	89.17
4666K-239	821	LKTR	410	Liver	78.8	6.9	<	0.21	<	<	4.2	0.90	705.3	<	<	41.00	1800	0.07	628.86	7.6	0.618	<	<	42000	11000.0	<	7610.0	1.15	<	<	<	127.86
4666K-240	821	LKTR	410	Kidney	81.6	272.5	<	12.82	6.41	<	64.1	80.14	19900.0	<	<	105.79	7930	3.21	6570.00	33.7	18.593	<	11.22	513000	178000.0	<	95500.0	38.47	<	12.82	<	1470.00
4666K-241	822	LKTR	390	Liver	78.4	<	<	0.18	<	<	3.8	1.60	360.0	<	<	88.38	1580	0.18	600.00	5.0	0.637	<	<	43700	12100.0	<	5860.0	0.60	<	<	<	151.58
4666K-242	822	LKTR	390	Kidney	77.9	<	<	0.45	0.22	<	4.4	4.38	400.0	<	<	8.43	527	0.22	430.00	1.7	0.955	<	0.56	33500	14300.0	<	6300.0	0.79	<	<	<	78.66
4666K-243	823	LKTR	420	Liver	75.0	<	<	0.10	0.06	<	2.4	1.10	590.0	<	<	38.67	2250	0.52	580.00	3.9	0.509	<	0.29	32900	9060.0	<	4320.0	0.84	<	<	<	95.72
4666K-244	823	LKTR	420	Kidney	78.3	<	<	0.40	0.33	<	2.0	3.52	470.0	<	<	6.58	704	0.33	410.00	1.4	0.843	<	1.00	33900	11000.0	<	6460.0	1.20	<	<	<	75.71
4666K-245	824	LKTR	392	Liver	78.0	<	<	0.12	0.08	<	3.1	1.33	260.0	<	<	34.92	1340	0.12	530.00	4.3	0.530	<	<	40600	10800.0	<	5890.0	0.55	<	<	<	104.37
4666K-246	824	LKTR	392	Kidney	80.4	17.2	<	0.09	0.60	<	8.6	3.53	395.6	<	<	7.14	618	0.17	528.05	1.6	0.800	<	0.52	42900	14700.0	<	7070.0	0.95	<	0.69	<	81.70
4666K-247	825	LKTR	410	Kidney	78.7	8.2	<	0.27	0.71	<	3.7	7.07	1870.0	<	<	6.52	1910	0.05	488.13	1.6	1.848	<	1.03	35800	11600.0	<	7560.0	3.59	<	<	<	77.73
4666K-248	825	LKTR	410	Liver	76.2	11.5	<	0.14	0.07	<	5.2	2.61	227.9	<	<	175.30	5610	0.14	477.46	6.3	1.481	<	<	40100	8890.0	<	5440.0	0.35	<	<	<	144.28
4666K-249	826	LKTR	410	Liver	77.5	<	<	0.15	0.08	<	3.2	1.58	285.1	<	<	59.28	2080	0.11	574.01	5.6	0.840	<	<	42700	10600.0	<	5970.0	0.49	<	<	<	132.81
4666K-250	826	LKTR	410	Kidney	78.8	10.5	<	0.19	0.68	<	3.3	6.81	611.0	<	<	5.70	811	0.12	562.70	1.7	1.294	<	0.56	40200	13100.0	<	7240.0	1.24	<	<	<	102.14
4666K-251	827	LKTR	408	Liver	78.9	14.9	<	<	0.07	<	6.3	2.92	378.9	<	0.7	65.69	5530	0.10	615.22	5.2	1.557	<	<	41000	10100.0	<	5320.0	0.49	<	<	<	148.07
4666K-252	827	LKTR	408	Kidney	80.6	13.2	<	0.33	0.61	<	3.6	12.11	1270.0	<	<	10.46	1650	1.43	502.59	2.0	2.296	<	1.54	41300	11600.0	<	6720.0	2.53	<	0.55	0.6	116.70
4666K-253	828	LKTR	553	Liver	73.9	14.5	<	0.11	0.08	<	3.1	1.06	262.4	<	0.7	0.70	2560	0.08	407.15	3.1	3.029	<	1.25	31900	6800.0	<	5080.0	0.45	<	<	<	104.02
4666K-254	828	LKTR	553	Kidney	77.5	18.2	<	1.21	0.65	<	2.8	10.09	1120.0	<	<	7.66	1190	0.08	597.06	1.7	5.886	<	3.27	39900	10400.0	<	9360.0	4.44	<	0.73	<	141.60
4666K-255	829	LKTR	512	Liver	79.2	10.2	<	0.18	0.12	<	4.8	2.72	471.5	<	<	77.32	4750	<	638.14	5.0	2.166	<	1.19	44700	12700.0	<	7240.0	0.79	<	<	<	151.77
4666K-256	829	LKTR	512	Kidney	80.7	19.0	<	0.83	1.06	<	5.6	15.74	2718.0	<	<	7.87	1970	0.14	597.30	2.9	3.519	<	2.36	46800	12000.0	<	8240.0	6.02	<	0.74	<	109.27
4666K-257	830	LKTR	420	Liver	75.8	8.6	<	0.11	0.07	<	3.1	1.14	279.3	<	0.7	85.61	2080	0.07	535.05	4.3	0.721	<	0.29	44200	10900.0	<	5210.0	0.57	<	<	<	125.20
4666K-258	830	LKTR	420	Kidney	78.3	12.7	<	0.30	0.37	<	5.4	3.80	565.1	<	<	7.45	908	0.07	455.65	1.6	1.325	<	1.12	38500	9380.0	<	8490.0	1.64	<	0.45	<	120.61
4666K-259	832	LKTR	426	Liver	76.8	8.9	<	0.16	0.10	<	2.9	1.31	447.1	<	<	64.55	1570	<	556.30	3.8	0.509	<	<	38900	11700.0	<	6720.0	0.94	<	<	<	162.69
4666K-260	832	LKTR	426	Kidney	78.8	10.6	<	0.39	0.28	<	2.8	4.56	611.2	<	<	6.11	772	0.06	498.43	1.3	1.011	<	0.94	38600	12000.0	<	7610.0	1.78	<	<	<	117.80
4666K-261-1	833	LKTR	409	Liver	82.7	18.4	<	<	0.07	<	5.1	3.61	458.6	<	<	102.50	3570	<	648.50	5.2	1.222	<	<	50300	13600.0	<	7880.0	0.72	<	<	<	162.95
4666K-262	833	LKTR	409	Kidney	70.6	15.9	<	0.23	0.49	<	2.2	3.90	2310.0	<	<	3.25	890	0.06	347.55	1.3	1.186	<	0.88	25800	8410.0	<	5750.0	4.22	<	0.62	<	78.28
4666K-263	834	LKTR	478	Liver	79.2	11.7	<	0.15	0.15	<	4.3	1.22	513.1	<	<	51.80	3770	<	635.25	4.8	2.502	<	0.29	48100	11400.0	<	6690.0	0.78	<	<	<	132.91
4666K-264	834	LKTR	478	Kidney	81.3	12.3	<	0.58	0.39	<	5.2	7.10	710.1	<	<	10.97	1620	0.19	544.86	1.7	4.009	<	1.29	46200	13100.0	<	7170.0	2.07	<	0.39	<	154.29
4666K-265	836	RNWH	446	Liver	78.2	18.2	<	0.18	1.05	<	4.2	5.68	316.9	<	3.1	7.62	890	0.12	476.27	2.7	2.044	<	3.87	37200	11800.0	<	6270.0	0.88	<	0.76	<	67.95
4666K-266	836	RNWH	446	Kidney	75.4	6.2	<	0.07	0.11	<	3.5	0.88	184.3	<	<	6.59	579	<	531.22	5.1	0.399	<	0.33	35000	10600.0	<	4100.0	0.40	<	<	<	78.80
4666K-267	837	RNWH	348	Liver	77.5	<	<	<	0.15	<	4.0	0.30	230.9	<	<	10.59	555	0.35	660.56	9.1	0.393	<	0.30	47100	12400.0	<	3730.0	0.61	<	<	<	95.80
4666K-268	837	RNWH	348	Kidney	77.2	<	<	0.43	2.24	<	4.6	1.28	730.5	<	2.2	6.08	831	0.21	510.82	4.5	0.576	<	1.81	37400	8780.0	<	6250.0	1.92	<	<	<	76.80
4666K-269	838	RNWH	324	Liver	78.0	<	<	0.19	0.19	<	3.8	0.24	275.3	<	<	8.99	724	0.09	662.13	6.6	0.312	<	0.33	41300	14800.0	<	4920.0	0.66	<	<	<	97.90
4666K-270	838	RNWH	324	Kidney	99.9	<	<	0.06	0.65	<	1.9	0.39	54.8	<	0.6	2.19	191	<	77.33	0.5	0.148	<	<	7230	1980.0	<	1250.0	0.15	<	<	<	11.90
4666K-271	839	RNWH	329	Liver	78.5	<	<	<	0.17	<	5.5	0.23	203.6	<	<	11.02	423	0.12	852.50	11.6	0.336	<	<	54600	15000.0	<	2670.0	0.52	<	<	<	93.90
4666K-272	839	RNWH	329	Kidney	99.9	<	<	<	0.39	<	1.6	0.33	59.1	<	<	1.63	160	<	90.10	0.9	0.140	<	<	7100	1720.0	<	992.4	0.20	<	<	<	13.10
4666K-273	840	LKTR	428	Liver	77.2	7.5	<	<	<	<	2.4	1.01	424.4	<	<	14.17	1417	0.06	856.76	14.8	0.647	<	<	55000	15270.0	<	4650.0	0.43	<	<	<	103.70
4666K-274	840	LKTR	428	Kidney	78.9	19.9	<	<	0.68	<	5.2	8.72	691.1	<	<	7.47	1100	0.12	423.39	2.3	1.837	<	1.12	37600	9900.0	<	8340.0	1.37	<	0.81	<	78.50
4666K-275	841	RNWH	440	Liver	72.2	7.2	<	<	0.10	<	2.2	1.00	142.4	<	<	6.88	894	0.07	491.87	4.5	0.561	<	<	32400	9840.0	<	3610.0	0.28	<	<	<	80.80
4666K-276	841	RNWH	440	Kidney	80.2	25.7	<	<	3.32	<	5.4	15.75	481.7	<	2.7	8.13	1050	0.17	552.19	3.2	2.380	<	4.48	39500	23700.0	<	79500.0	1.33	<	1.16	1.2	95.35
4666K-277	842	RNWH	432	Liver	74.9	<	<	<	0.13	<	1.8	0.56	264.7	<	<	6.27	508	0.07	729.51	7.6	0.462	<	<	41800	5410.0	<	3660.0	0.53	<	<	<	75.26
4666K-278	842	RNWH	432	Kidney	80.9	39.0	<	0.09	10.21	<	5.1	5.20	429.7	<	<	7.70	877	0.19	718.33	3.5	1.364	<	3.06	47400	33900.0	<	4850.0	1.21	<	1.02	<	69.61
4666K-279	843	RNWH	426	Liver	75.8	6.9	<	<	0.20	<	1.8	1.02	234.5	<	<	7.34	816	<	615.90	5.7	0.489	<	0.41	41200	7380.0	<	4490.0	0.41	<	<	<	86.88
4666K-280	843	RNWH	426	Kidney	78.8	28.0	<	<	1.75	<	6.0	11.38	392.0	<	2.6	7.35	817	0.18	538.13	2.5	2.441	<	5.43	40900	26700.0	<	6560.0	0.96	<	1.14	<	75.25
4666K-281	846	RNWH	388	Liver	77.3	<	<	0.12	0.18	<	1.9	0.33	490.0	<	<	8.68	551	0.06	610.00	6.9	0.383	<	0.30	45600	12600.0	<	5090.0	1.23	<	<	<	99.09
4666K-282	846	RNWH	388	Kidney	75.9	<	<	0.29	7.22	<	3.9	2.60	390.0	<	2.4	7.13	586	0.10	560.00	3.6	0.819	<	1.83	36300	12200.0	<	5770.0	1.25	<	<	<	85.74
4666K-283	847	RNWH	448	Liver	76.6	7.8	<	0.10	0.10	<	2.4	0.62	210.0	<	<	6.82	685	<	450.00	4.2	0.516	<	0.32	32700	9610.0	<	3600.0	0.42	<	<	<	72.70
4666K-284	847	RNWH	448	Kidney	82.9	24.3	<	0.27	2.25	<	4.3	6.49	370.0	<	2.2	5.95	1208	0.09	560.00	3.2	2.273	<	3.70	42100	14500.0	<	6020.0	0.90	<	0.90	<	79.36
4666K-285	848	RNWH	446	Liver	76.8	15.3	<	0.17	0.13	<	2.4	1.31	230.0	<	<	8.30	1687	0.09	680.00	7.4	0.577	<	0.39	45300	12900.0	<	4680.0	0.48	<	<	<	98.76
4666K-286	848	RNWH	446	Kidney	81.0	26.6	<	0.39	1.55	<	2.2	10.52	384.9	<	2.2	7.20	1070	0.17	559.42	3.2	1.767	<	3.82	39600	14600.0	<	5820.0	1.22	<	0.72	<	59.82
4666K-287	849	RNWH	452	Liver	75.9	5.4	<	0.10	0.13	<	0.8	1.18	170.3	<	<	6.38	593	0.06	542.18	5.7	0.376	<	0.45	37800	11300.0	<	3670.0	0.38	<	<	<	79.41
4666K-288	849	RNWH	452	Kidney	78.9	16.4	<	0.23	1.33	<	2.4	10.96	288.9	<	3.6	6.50	774	0.08	507.29	3.1	1.190	<	3.84	34800	12900.0	<	5040.0	0.78	<	1.33	<	58.71
4666K-289	850	RNWH	262	Liver	75.9	<	<	0.08	0.12	<	1.7	0.16	393.5	<	<	6.74	288	<	745.73	8.7	0.290	<	0.32	40500	10900.0	<	5200.0	0.95	<	<	<	87.66
4666K-290	850	RNWH	262	Kidney	75.7	<	<	0.18	3.47	<	2.9	0.91	259.2	<	<	5.29	460	0.18	428.94	1.8	0.438	<	1.28	29700	11000.0	<	3970.0	0.91	<	<	<	51.11
4666K-291	851	RNWH	444	Liver	75.4	5.8	<	0.11	0.11	<	1.5	0.98	208.7	<	<	6.89	1060	<	547.93	6.5	0.523	<	0.36	36800	10600.0	<	4320.0	0.44	<	<	<	90.72
4666K-292	851	RNWH	444	Kidney	76.4	16.2	<	0.22	1.68	<	3.4	7.84	280.2	<	2.2	5.60	919	0.11	403.42	2.5	1.580	<	3.25	32600	9970.0	<	4400.0	0.73	<	0.73	<	50.99
4666K-293	852	RNWH	428	Liver	74.2	8.9	<	0.09	0.10	<	1.0	0.77	227.8	<	<	5.99	328	<	746.71	10.1	0.728	<	<	45000	13300.0	<	3700.0	0.43	<	<	<	79.98
4666K-294	852	RNWH	428	Kidney	79.1	53.3	<	0.39	3.09	<	5.3	10.04	474.3	<	<	6.80	927	0.23	582.45	3.6	2.294	<	3.48	43200	12500.0	<	5430.0	1.31	<	1.31	<	71.84
4666K-295	853	RNWH	430	Liver	76.7	<	<	0.09	0.13	<	2.5	0.82	200.4	<	<	7.76	1120	<	581.71	6.0	0.603	<	0.30	39200	12000.0	<	4250.0	0.09	<	<	<	93.94
4666K-296	853	RNWH	430	Kidney	81.2	<	<	0.29	4.02	<	6.0	8.52	315.0	<	2.4	7.85	1130	0.10	462.49	2.7	1.561	<	2.97	38300	12200.0	<	6370.0	0.96	<	<	<	67.03

Note: < = below detection limit; LKTR = lake trout; RNWH = round whitefish

Appendix J3 Mean concentrations of metals in tissue samples collected from Jericho and Control lakes, Jericho study area 1995.

Lake		Metal Concentrations in ug/g on dry weight basis (detection limits in italics)																									
Tissue		Ag	Al	As	Ba	Be	B	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	Pb	PO4	Sb	Sn	Sr	Ti	V	Zn
Species	Parameter	*1*	*5.0*	*0.05*	*0.05*	*0.1*	*0.5*	*0.5*	*0.05*	*0.5*	*1.5*	*0.05*	*1*	*0.005*	*0.5*	*0.05*	*0.1*	*1*	*0.5*	*0.25*	*0.05*	*10*	*5.0*	*1*	*0.05*	*0.15*	*0.5*	*0.05*
Jericho	n<D.L.	20	7.0	5.00	0.00	20.0	0.0	0.0	0.00	14.0	20.0	0.00	0	0.000	0.0	0.00	0.0	20	0.0	0.00	0.00	0	20.0	19	0.00	11.00	18.0	0.00
Kidney	Mean	<1	11.4	0.72	1.30	<0.1	6.7	997.0	8.75	0.6	<1.5	6.48	1936	4.631	11267.0	568.60	1.8	<1	8977.0	2.02	0.18	38685	<5.0	1	3.79	0.32	0.3	123.83
LKTR	SD	0	9.7	0.78	1.71	0.0	12.9	469.9	5.22	0.6	0.0	1.96	1240	2.261	1663.5	114.54	0.4	0	2439.8	1.23	0.11	4486	0.0	1	2.18	0.39	0.2	35.64
n=5	Min.	<1	<5.0	<0.05	0.40	<0.1	1.9	372.7	1.68	<0.5	<1.5	3.72	566	1.195	8570.0	404.37	1.3	<1	5500.0	0.40	0.06	30800	<5.0	<1	1.17	<0.15	<0.5	72.14
	Max.	<1	38.8	2.88	7.94	0.1	61.3	2215.8	21.49	1.9	<1.5	12.53	4530	11.438	14500.0	825.92	2.7	<1	14200.0	4.32	0.46	47100	<5.0	4	9.11	1.40	0.8	202.78
Jericho	n<D.L.	20	6.0	14.00	7.00	21.0	0.0	0.0	0.00	15.0	21.0	0.00	0	0.000	0.0	0.00	1.0	21	0.0	15.00	7.00	0	21.0	21	0.00	21.00	17.0	0.00
Liver	Mean	1	15.0	0.09	0.07	<0.1	4.3	300.6	1.64	0.5	<1.5	55.33	3923	3.245	10510.4	573.57	5.0	<1	6282.9	0.19	0.08	43829	<5.0	<1	0.61	<0.15	0.4	129.48
LKTR	SD	0	15.0	0.12	0.04	0.0	1.9	85.9	1.25	0.4	0.0	42.71	2367	2.599	2231.5	114.34	1.6	0	2671.4	0.12	0.07	7413	0.0	0	0.22	0.00	0.3	27.58
n=5	Min.	<1	<5.0	<0.05	<0.05	<0.1	1.8	181.9	0.26	<0.5	<1.5	8.35	919	0.645	6020.0	377.32	<0.1	<1	2650.0	<0.25	<0.05	23900	<5.0	<1	0.26	<0.15	<0.5	53.98
	Max.	2	55.9	0.43	0.15	<0.1	8.4	456.8	4.80	1.3	<1.5	216.03	9040	11.795	16800.0	940.00	8.1	<1	13200.0	0.51	0.30	61700	<5.0	<1	1.08	<0.15	1.3	183.19
Jericho	n<D.L.	21	21.0	21.00	14.00	21.0	0.0	0.0	21.00	20.0	21.0	1.00	0	0.000	0.0	0.00	0.0	21	0.0	19.00	14.00	0	21.0	21	0.00	20.00	21.0	0.00
Muscle	Mean	<1	<5.0	<0.05	0.07	<0.1	2.0	1022.3	<0.05	0.3	<1.5	1.19	13	1.522	20671.4	1169.97	0.4	<1	1151.4	0.17	0.06	34924	<5.0	<1	1.28	0.09	<0.5	14.24
LKTR	SD	0	0.0	0.00	0.08	0.0	0.6	812.5	0.00	0.3	0.0	0.42	5	0.979	2607.1	57.98	0.1	0	319.5	0.16	0.05	2813	0.0	0	1.19	0.07	0.0	2.30
n=5	Min.	<1	<5.0	<0.05	<0.05	<0.1	0.9	253.9	<0.05	<0.5	<1.5	<0.05	7	0.532	12800.0	1040.00	0.2	<1	790.0	<0.25	<0.05	29000	<5.0	<1	0.16	<0.15	<0.5	11.39
	Max.	<1	<5.0	<0.05	0.30	<0.1	3.8	3590.0	<0.05	1.8	<1.5	2.13	24	4.536	24400.0	1260.00	0.8	<1	1980.0	0.67	0.14	40300	<5.0	<1	5.08	0.39	<0.5	20.74
Jericho	n<D.L.	1	0.0	0.00	0.00	1.0	0.0	0.0	0.00	1.0	1.0	0.00	0	0.000	0.0	0.00	0.0	1	0.0	0.00	0.00	0	1.0	1	0.00	1.00	1.0	0.00
Kidney	Mean	<1	40.0	0.34	0.34	<0.1	6.1	575.1	0.68	<0.5	<1.5	264.67	1100	0.984	2610.0	166.27	1.0	<1	1430.0	2.04	23.75	42200	<5.0	<1	1.53	<0.15	<0.5	37.33
RNWH	SD	NA																										
n=5	Min.	<1	40.0	0.34	0.34	<0.1	6.1	575.1	0.68	<0.5	<1.5	264.67	1100	0.984	2610.0	166.27	1.0	<1	1430.0	2.04	23.75	42200	<5.0	<1	1.53	<0.15	<0.5	37.33
	Max.	<1	40.0	0.34	0.34	<0.1	6.1	575.1	0.68	<0.5	<1.5	264.67	1100	0.984	2610.0	166.27	1.0	<1	1430.0	2.04	23.75	42200	<5.0	<1	1.53	<0.15	<0.5	37.33
Jericho	n<D.L.	1	1.0	0.00	0.00	1.0	0.0	0.0	1.00	1.0	1.0	0.00	0	0.000	0.0	0.00	0.0	1	0.0	1.00	0.00	0	1.0	1	0.00	1.00	1.0	0.00
Liver	Mean	<1	<5.0	0.10	0.05	<0.1	2.4	213.6	<0.05	<0.5	<1.5	6.63	174	0.260	18000.0	1060.00	6.1	<1	2180.0	<0.25	0.20	59400	<5.0	<1	0.56	<0.15	<0.5	81.07
RNWH	SD	NA																										
n=5	Min.	<1	<5.0	0.10	0.05	<0.1	2.4	213.6	<0.05	<0.5	<1.5	6.63	174	0.260	18000.0	1060.00	6.1	<1	2180.0	<0.25	0.20	59400	<5.0	<1	0.56	<0.15	<0.5	81.07
	Max.	<1	<5.0	0.10	0.05	<0.1	2.4	213.6	<0.05	<0.5	<1.5	6.63	174	0.260	18000.0	1060.00	6.1	<1	2180.0	<0.25	0.20	59400	<5.0	<1	0.56	<0.15	<0.5	81.07
Jericho	n<D.L.	1	1.0	0.00	0.00	1.0	0.0	0.0	1.00	1.0	1.0	0.00	0	0.000	0.0	0.00	1.0	1	0.0	1.00	0.00	0	1.0	1	0.00	1.00	1.0	0.00
Muscle	Mean	<1	<5.0	0.07	0.06	<0.1	1.2	488.2	<0.05	<0.5	<1.5	1.43	16	0.195	21600.0	1420.00	0.1	<1	728.7	<0.25	0.09	36600	<5.0	<1	0.87	<0.15	<0.5	13.98
RNWH	SD	NA																										
n=5	Min.	<1	<5.0	0.07	0.06	<0.1	1.2	488.2	<0.05	<0.5	<1.5	1.43	16	0.195	21600.0	1420.00	<0.1	<1	728.7	<0.25	0.09	36600	<5.0	<1	0.87	<0.15	<0.5	13.98
	Max.	<1	<5.0	0.07	0.06	<0.1	1.2	488.2	<0.05	<0.5	<1.5	1.43	16	0.195	21600.0	1420.00	0.1	<1	728.7	<0.25	0.09	36600	<5.0	<1	0.87	<0.15	<0.5	13.98
Control	n<D.L.	20	3.0	1.00	0.00	20.0	0.0	0.0	0.00	20.0	20.0	0.00	0	0.000	0.0	0.00	0.0	20	0.0	0.00	0.00	0	20.0	20	0.00	5.00	19.0	0.00
Kidney	Mean	<1	26.7	1.04	0.81	<0.1	7.1	1982.5	10.88	<0.5	<1.5	12.73	1456	3.270	20309.5	811.75	3.4	<1	11827.5	1.78	0.37	63565	<5.0	<1	4.11	1.17	0.3	173.56
LKTR	SD	0	58.6	2.79	1.34	0.0	13.5	4273.6	16.68	0.0	0.0	21.99	1599	4.023	37157.8	1357.59	7.1	0	19743.3	2.32	0.73	105924	0.0	0	8.21	2.79	0.1	305.99
n=5	Min.	<1	<5.0	<0.05	0.21	<0.1	2.0	395.6	3.52	<0.5	<1.5	3.25	527	0.800	8410.0	347.55	1.3	<1	5360.0	0.52	0.05	25800	<5.0	<1	0.79	<0.15	<0.5	75.71
	Max.	<1	272.5	12.82	6.41	<0.1	64.1	19900.0	80.14	<0.5	<1.5	105.79	7930	18.593	178000.0	6570.00	33.7	<1	95500.0	11.22	3.21	513000	<5.0	<1	38.47	12.82	0.6	1470.00
Control	n<D.L.	20	7.0	4.00	8.00	20.0	0.0	0.0	0.00	16.0	20.0	0.00	0	0.000	0.0	0.00	0.0	20	0.0	14.00	5.00	0	20.0	20	0.00	20.00	20.0	0.00
Liver	Mean	<1	7.6	0.13	0.06	<0.1	3.7	461.6	1.61	0.4	<1.5	65.03	2555	1.318	11406.0	625.61	5.7	<1	5731.5	0.27	0.10	43705	<5.0	<1	0.68	<0.15	<0.5	132.46
LKTR	SD	0	4.8	0.08	0.04	0.0	1.1	260.3	0.88	0.2	0.0	43.77	1402	0.848	1891.8	112.44	2.5	0	1006.9	0.33	0.11	5967	0.0	0	0.28	0.00	0.0	23.69
n=5	Min.	<1	<5.0	<0.05	<0.05	<0.1	1.8	227.9	0.27	<0.5	<1.5	0.70	592	0.509	6800.0	407.15	3.1	<1	4320.0	<0.25	<0.05	31900	<5.0	<1	0.35	<0.15	<0.5	89.50
	Max.	<1	18.4	0.32	0.15	<0.1	6.3	1410.0	3.61	1.1	<1.5	175.30	5610	3.029	15270.0	856.76	14.8	<1	7880.0	1.25	0.52	55000	<5.0	<1	1.52	<0.15	<0.5	162.95
Control	n<D.L.	20	20.0	20.00	12.00	20.0	0.0	0.0	20.00	20.0	20.0	0.00	0	0.000	0.0	0.00	1.0	20	0.0	18.00	20.00	0	20.0	20	0.00	20.00	20.0	0.00
Muscle	Mean	<1	<5.0	<0.05	0.06	<0.1	1.7	1069.8	<0.05	<0.5	<1.5	1.07	11	0.891	19745.0	1206.50	0.4	<1	1047.0	0.15	<0.05	35510	<5.0	<1	1.26	<0.15	<0.5	12.97
LKTR	SD	0	0.0	0.00	0.05	0.0	0.6	688.7	0.00	0.0	0.0	0.22	3	0.562	1405.1	46.60	0.2	0	255.6	0.08	0.00	1932	0.0	0	0.85	0.00	0.0	1.14
n=5	Min.	<1	<5.0	<0.05	<0.05	<0.1	1.0	265.1	<0.05	<0.5	<1.5	0.81	6	0.358	16800.0	1140.00	<0.1	<1	570.0	<0.25	<0.05	32000	<5.0	<1	0.16	<0.15	<0.5	11.51
	Max.	<1	<5.0	<0.05	0.18	<0.1	3.4	2700.0	<0.05	<0.5	<1.5	1.70	19	2.125	22800.0	1290.00	1.0	<1	1460.0	0.42	<0.05	41100	<5.0	<1	3.38	<0.15	<0.5	15.86
Control	n<D.L.	18	4.0	2.00	0.00	18.0	0.0	0.0	0.00	6.0	18.0	0.00	0	0.000	0.0	0.00	0.0	18	0.0	0.00	1.00	0	18.0	18	0.00	6.00	15.0	0.00
Kidney	Mean	<1	23.2	0.28	2.92	<0.1	4.0	390.0	7.59	2.0	<1.5	8.97	946	1.686	15212.8	522.02	3.1	<1	9796.1	3.39	0.40	39561	<5.0	<1	1.06	0.81	0.3	72.30
RNWH	SD	0	16.5	0.16	2.37	0.0	1.3	135.8	4.45	1.6	0.0	6.59	391	0.834	6756.0	104.56	1.0	0	17481.8	1.60	0.67	7923	0.0	0	0.35	0.59	0.2	18.08
n=5	Min.	<1	<5.0	<0.05	0.11	<0.1	1.9	184.3	0.88	<0.5	<1.5	5.29	460	0.399	8780.0	373.20	1.6	<1	3950.0	0.33	<0.05	29700	<5.0	<1	0.40	<0.15	<0.5	50.60
	Max.	<1	54.2	0.55	10.21	<0.1	6.0	730.5	15.75	6.2	<1.5	34.20	2290	3.729	33900.0	780.00	5.1	<1	79500.0	7.28	2.87	65500	<5.0	<1	1.92	1.72	1.2	124.66
Control	n<D.L.	20	8.0	5.00	5.00	20.0	0.0	0.0	0.00	19.0	20.0	0.00	0	0.000	0.0	0.00	0.0	20	0.0	5.00	6.00	0	20.0	20	0.00	19.00	20.0	0.00
Liver	Mean	<1	6.9	0.10	0.16	<0.1	2.3	254.9	1.05	0.4	<1.5	9.74	748	0.555	12385.5	632.22	6.8	<1	3950.0	0.48	0.30	42435	<5.0	<1	0.58	0.11	<0.5	84.45
RNWH	SD	0	4.8	0.06	0.22	0.0	1.2	82.5	1.17	0.6	0.0	8.34	353	0.371	3768.7	122.96	2.1	0	1187.8	0.81	0.89	6270	0.0	0	0.30	0.15	0.0	19.65
n=5	Min.	<1	<5.0	<0.05	<0.05	<0.1	0.8	142.4	0.16	<0.5	<1.5	5.99	288	0.290	5410.0	450.00	2.7	<1	1310.0	<0.25	<0.05	32400	<5.0	<1	0.09	<0.15	<0.5	18.60
	Max.	<1	18.2	0.22	1.05	<0.1	5.5	490.0	5.68	3.1	<1.5	44.48	1687	2.044	22900.0	916.44	11.6	<1	6270.0	3.87	4.06	56500	<5.0	<1	1.27	0.76	<0.5	122.30
Control	n<D.L.	20	20.0	17.00	2.00	20.0	0.0	0.0	20.00	20.0	20.0	0.00	0	0.000	0.0	0.00	1.0	20	0.0	20.00	18.00	0	20.0	20	0.00	20.00	20.0	0.00
Muscle	Mean	<1	<5.0	0.04	0.24	<0.1	1.5	1420.8	<0.05	<0.5	<1.5	1.20	14	0.286	19200.0	1220.72	1.3	<1	1120.7	<0.25	0.03	37150	<5.0	<1	2.69	<0.15	<0.5	13.85
RNWH	SD	0	0.0	0.04	0.16	0.0	0.5	803.0	0.00	0.0	0.0	0.37	4	0.117	2079.5	115.26	0.8	0	211.6	0.00	0.03	3976	0.0	0	1.68	0.00	0.0	0.99
n=5	Min.	<1	<5.0	<0.05	<0.05	<0.1	0.5	428.7	<0.05	<0.5	<1.5	0.71	10	0.134	12600.0	860.00	<0.1	<1	680.0	<0.25	<0.05	25900	<5.0	<1	0.55	<0.15	<0.5	12.18
	Max.	<1	<5.0	0.18	0.61	<0.1	2.4	2930.0	<0.05	<0.5	<1.5	2.36	23	0.565	21700.0	1420.00	3.3	<1	1430.0	<0.25	0.16	42200	<5.0	<1	5.67	<0.15	<0.5	15.82

Note: n < D.L. = number of samples below detection limit; SD = standard deviation; LKTR = lake trout; RNWH = round whitefish.