Appendix V5-5A

Doris North Project Aquatic Studies 2002

DORIS NORTH PROJECT
AQUATIC STUDIES
2002

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DORIS NORTH PROJECT
AQUATIC STUDIES
2002

- FINAL REPORT -

Prepared for:

Miramar Hope Bay Ltd.
North Vancouver, BC

Prepared by:

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Cover Photo: Southeast view of the drainage between Roberts and Pelvic lakes, showing numerous rock outcrops that are typical in the Doris North Project area, 2 September 2002.

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EXECUTIVE SUMMARY

Introduction

The Hope Bay Belt area is located in the Canadian Arctic to the east of Bathurst Inlet, approximately 60 km east of the community of Umingmaktok, Nunavut. The project area consists of three main gold deposit zones: Doris North, Madrid, and Boston. The Doris North zone is the northern-most area and includes several lake systems that drain into Roberts Bay.

Environmental baseline studies within the Doris North zone were carried out in 1995 (Klohn Crippen 1995), 1996 (Rescan 1997), 1997 (Rescan 1998), 1998 (Rescan 1999a), and 2000 (Rescan 2001). All data collected until 2000 were recently summarized in a data compilation report (RL&L/Golder 2002).

In 2002, Miramar Hope Bay Ltd. retained RL&L/Golder Associates Ltd. to address several data gaps in aquatic baseline studies conducted between 1995 and 2000. The main data gaps were associated with the Roberts Lake drainage, which joins the Doris Lake drainage at Little Roberts Lake prior to emptying into Roberts Bay. The issues addressed in the 2002 field program included the use of the Roberts Lake system by Arctic char, metal concentrations in tissues of Arctic char and lake trout, fish use of near-shore areas in Roberts Bay, sediment quality in Roberts Lake and Roberts Bay, and fish overwintering potential in Little Roberts Lake. Data gaps assessed in other areas of the Doris North Project included determining the population size of lake trout in Tail Lake (proposed tailings pond) and verifying the identity of cisco species in Pelvic Lake (selected as reference lake).

To facilitate integration of the 2002 data with the previous data collected in 1995-2000, the format and organization of the present report follows closely the outline used in the 1995-2000 data compilation report (RL&L/Golder 2002). As such, this report is organized by major disciplines, each of which is then discussed separately for each sampled waterbody. Environmental disciplines are presented as separate sections in the following order: physical environment, sediment quality, fish communities, and fish tissue contaminant analysis.

Physical Environment

Roberts Outflow

Measurements of water temperature, discharge, stage, and stream gradient in Roberts Outflow were conducted concurrently with the fish fence monitoring of Arctic char movements into Roberts Lake. During the period of 16 August to 2 September 2002, stream water temperature fluctuated between 8 and 11 °C and stream discharge decreased by more than half (from 0.173 to 0.075 m^3/s). Reflecting the decrease in flows, the surface elevation dropped by 26 mm.

Evaluation of stream gradient at a boulder garden in the upper sections of Roberts Outflow was prompted by the observation of Arctic char becoming entrapped in the interstitial spaces between and under rocks. Gradients measured along two survey lines were 2.7 and 3.5%. Gradient of this magnitude is not in itself a barrier to fish movement; however, in combination with the large-sized boulders dominating the site, it contributed to passage problems and fish entrapment. Methods of alleviating this problem are discussed as part of Doris North Project No Net Loss Plan in a separate report (RL&L/Golder 2003).

Little Roberts Lake

To determine the overwintering potential of Little Roberts Lake, point depth measurements were collected at 28 locations throughout the lake. The maximum water depth measured was 3.1 m. As ice cover in Doris North Project area lakes can reach 2.5 m in thickness, only small areas of Little Roberts Lake are expected to have under-ice water during late winter. It is suspected that dissolved oxygen concentrations in these shallow under-ice areas would become severely depleted in late winter. As such, Little Roberts Lake is likely not used as overwintering habitat for fish; however, this conclusion should be verified through water quality sampling during late winter.

Sediment Quality

Most metal levels in Roberts Lake sediments and all metal levels in the marine sediments of Roberts Bay were below the Canadian Interim Sediment Quality Guidelines (CISQG). The exceptions in Roberts Lake were chromium and arsenic. Of these, chromium concentrations exceeded the CISQG Threshold Effect Level (TEL) in all replicate samples from both of the Roberts Lake sample sites. Arsenic levels exceeded the TEL in four of five replicate samples from one site in Roberts Lake, but were below the TEL guidelines in all replicate samples from the second site. Nevertheless, these elevated concentrations of chromium and arsenic in sediment were within the range of natural variability for the Slave Structural Province (Puznicki 1996).

Total hydrocarbon concentrations in Roberts Lake and Roberts Bay sediments were below detection limits in all analyzed samples.

Fish Communities

In total, 978 fish representing 10 species were captured in the Doris North Project area during fisheries surveys conducted in 2002. Sampling was conducted in Roberts, Little Roberts, Tail and Pelvic lakes; in Roberts Outflow; and in the marine environments of Roberts Bay. The captured species included (in the order of abundance in the total catch) lake trout (30%), Arctic char (18%), lake whitefish (17%), least cisco (17%), saffron cod (12%), cisco (3%), Greenland cod (2%) and single specimens of banded gunnel, broad whitefish, and fourhorn sculpin.

Arctic Char in Roberts Lake System

The Roberts Lake system (Roberts Lake, Little Roberts Lake and their outflow streams) was determined to be a migratory corridor between marine and freshwater environments for spawning and overwintering Arctic char. A fish fence with a trap to capture upstream migrants was operated in Roberts Outflow between 16 and 30 August. In total, 85 Arctic char were trapped at the fish fence; however, trap efficiency was compromised on three occasions by interference from grizzly bears. Fifty-five Arctic char were also captured by hand from a natural "trap" provided by the boulder garden at the upstream end of Roberts Outflow. In addition, 28 Arctic char were captured in a fyke net installed between the boulder garden and Roberts Lake; however, several of these fish were juveniles that appeared to be using the habitat at the lake/stream interface and were likely not migrating from the marine environment.

In total, 168 Arctic char were captured in Roberts Outflow. Although most of these fish were adults, only four were ready to spawn in late fall 2002. The presence of only a small number of current year spawners was consistent previous studies that indicated that a large proportion of spawning fish do not migrate to sea in the year that they spawn. As such, most of the fish captured in Roberts Outflow were Arctic char returning to Roberts Lake to overwinter after spending the summer feeding in the sea. Considering that the 2002 monitoring period was incomplete and interrupted by grizzly bears, the magnitude of the Arctic char run in Roberts Outflow could exceed 200 or 300 fish.

Roberts Lake Fish Community

Fish sampling of Roberts Lake was conducted mainly to capture lake trout for tissue analysis. Sampling methods included gill netting, angling, and fyke netting. In total, 143 fish comprised of five species were captured. Lake whitefish contributed most (55%) to the total catch, followed by lake trout (28%), cisco (11%), least cisco (4%), and Arctic char (2%). Of the three Arctic char captured, all were juveniles.

Population Estimate for Lake Trout in Tail Lake

The fish community in Tail Lake is considerably different from the other Doris North Project area lakes, because it does not include whitefish and cisco species. This difference in species diversity is likely the result of Tail Lake's isolation from Doris Lake due to the diminutive size of Tail Outflow that connects these lakes.

Only lake trout (*n*=203) were captured during intensive gill netting and angling program in 2002. A previous attempt to determine a population estimate for lake trout in Tail Lake (Rescan 2001) via mark-recapture methods was unsuccessful due to the lack of recaptures. The sampling program in 2002 resulted in recaptures of nine fish originally marked in 2000, as well as four fish marked in 2002. Based on these recapture events, the population size of lake trout in Tail Lake was estimated at 2350 to 2650 fish, depending on the use of different estimating methods and assumptions regarding fish mortality rates over the 2000 to 2002 period.

Pelvic Lake Fish Community

Sampling of Pelvic Lake was conducted to determine whether two "sub-populations" of cisco reported in this lake by Rescan (1999a) were in fact representatives of two different species: cisco (*Coregonus artedi*) and least cisco (*C. sardinella*). Confirmation of the presence of both of these species was determined by using gill nets. In total, 300 fish were captured. Least cisco was the most abundant species in the catch (54%), followed by lake whitefish (31%), lake trout (11%), and cisco (5%). Based on the high ratio of least cisco to cisco in the 2002 catch, most of the cisco species captured in Pelvic Lake by Rescan (1999a) were likely least cisco.

Near-shore Fish Use in Roberts Bay

Roberts Bay is the final receiving waterbody for lakes in the Doris North Project area and the location of a proposed barge off-loading facility. Two sites were sampled with a fyke net to determine the fish species inhabiting the near-shore marine environments. In total, 136 fish comprised of five species were captured. Saffron cod was the predominant species in the overall catch (86%). Greenland cod contributed 12% to the total catch. Also captured were single specimens of Arctic char, fourhorn sculpin, and banded gunnel. In addition to the Arctic char juvenile captured in a fyke net, another small Arctic char was encountered in the stomach of a Greenland cod. Although most previous studies reported that Arctic char juveniles generally spend their first five years in freshwater habitats, the present captures of juvenile fish in the marine environment suggested that Roberts Bay may be used (to an unknown extent) for rearing purposes by Arctic char juveniles.

Fish Tissues

Fish tissue samples (dorsal muscle, liver, and kidney) were collected from 30 lake trout and 30 Arctic char in 2002 to provide baseline data on metal concentrations in fish from the Roberts Lake drainage. Tissue analyses indicated generally low levels of metal accumulation for most constituents; however, elevated concentrations (i.e., exceeding the Canadian Food Inspection Agency's guidelines for human consumption) were recorded for arsenic in both lake trout and Arctic char tissues and for mercury in lake trout tissues only.

Mean arsenic concentration in lake trout muscle tissues from Roberts Lake was much greater (22 to 57 times higher) than the mean levels recorded in the previously sampled Doris North Project area lakes. In contrast to arsenic, mean mercury concentrations in lake trout muscle and liver tissues from Roberts Lake were similar to those from the other Doris North Project area lakes.

In total, 17 lake trout (57%) exhibited arsenic or mercury concentrations that were higher than the federal guideline for human consumption (regardless of tissue type). Conversely, only eight Arctic char (27%) contained arsenic concentrations above the guideline and none exceeded the guidelines for mercury. Arctic char are diadromous and spend much of their adult life feeding in the marine environment. As such, they spend less time in freshwater habitats than lake trout. This likely contributed to the lower metal concentrations in Arctic char compared to lake trout, assuming that the sources of elevated metal concentrations are located in the freshwater environment (i.e., Roberts Lake drainage).

ACKNOWLEDGEMENTS

The authors would like to thank Hugh R. Wilson (Manager, Environmental Affairs, Miramar Mining Corporation / Miramar Hope Bay Ltd.) for offering us the opportunity of working on this project and providing valuable information and guidance during the field program. Dwayne Windsor, Claire Aldrid and Rob McLeod of the Windy Lake camp were extremely helpful in arranging logistical support for the field work. Able and enthusiastic assistance provided by Cody Evalik of Cambridge Bay is also gratefully acknowledged.

The following RL&L/Golder personnel participated in the preparation of the report:

Gary Ash	- Study Director and Senior Reviewer
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Mike Braeuer	- Fish Ageing
Paul St. Rose	- Drafting
Angela Wight	- Word Processing

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1.0 INTRODUCTION

1.1 GENERAL

The Hope Bay Belt area is located in the Canadian Arctic to the east of Bathurst Inlet, approximately 60 km east of the community of Umingmaktok, Nunavut (Figure 1.1). The project area consists of three main gold deposit zones: Doris North, Madrid, and Boston. The Doris North zone is the northern-most area and includes several lake systems that drain into Roberts Bay.

Environmental baseline studies within the Doris North zone were carried out in 1995 (Klohn Crippen 1995), 1996 (Rescan 1997), 1997 (Rescan 1998), 1998 (Rescan 1999a), and 2000 (Rescan 2001). All data collected until 2000 were recently summarized in a data compilation report (RL&L/Golder 2002).

In 2002, Miramar Mining Corporation retained RL&L/Golder Associates Ltd. to address several data gaps in aquatic baseline studies conducted between 1995 and 2000 in the Doris North Project area. The specific objectives of the 2002 field program included:

- investigate the use of the Roberts Lake system by Arctic char;
- collect fish tissue samples from Arctic char and lake trout for metal analyses;
- determine fish use of near-shore areas in Roberts Bay;
- collect sediment samples from Roberts Lake and Roberts Bay;
- conduct a population estimate of lake trout in Tail Lake;
- identify cisco species in Pelvic Lake; and,
- determine maximum depth in Little Roberts Lake.

The field session was conducted between 14 August and 4 September 2002. The results are summarized for each study component in the following sections.

1.2 SAMPLING PROGRAM IN 2002

Figure 1.2 provides an overview of the Doris North Project study area. Lakes that were sampled as part of the baseline studies within the project area in 2002 included Roberts, Pelvic, Tail, and Little Roberts lakes. Also sampled were Roberts Outflow and the marine environment of Roberts Bay as the main receiving waterbody downstream of the proposed mining development. The Pelvic Lake drainage is located outside of the potential zone of impact from the project. As such, it was considered as a control basin and was sampled to provide reference data for future aquatic effects monitoring programs. Data collection sites and sampling methods used in 2002 are summarized in Table 1.1.

TITLE

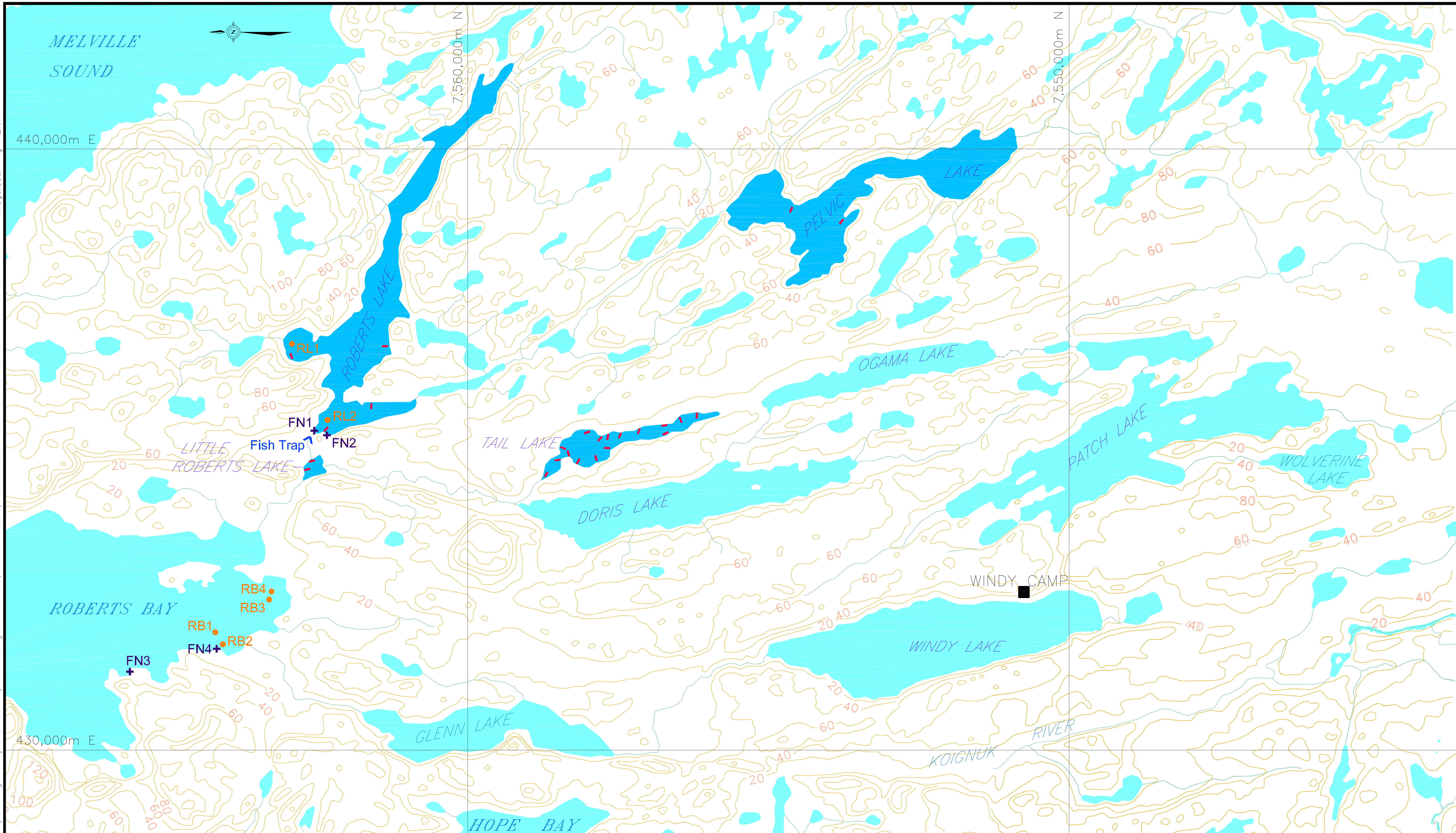
HOPE BAY BELT
PROJECT LOCATION MAP

PROJECT No. 022-7009.1000			FILE No. Project Location Map
DESIGN	JP	12/07/02	SCALE 1:4000000 REV. 1
CADD	PSR	23/01/03	
CHECK	RS	23/01/03	**FIGURE: 1.1**
REVIEW			

Golder Associates
Calgary, Alberta

REFERENCE
BASE MAP PROVIDED BY RESCAN,
17 FEBRUARY 1998

R:\CAD\7000\022-7009\ Drawing file: Project Location Map.dwg Jul 12, 2002 - 2:38pm



LEGEND

- SAMPLED LAKES
- RL1 ● SEDIMENT SAMPLING SITE
- FISH TRAP
- FN1 + FYKE NET
- GILL NET

NOTE : CONTOUR INTERVAL 20 m

REFERENCE
BASE MAP PROVIDED BY RESCAN,
22nd, JANUARY 2001

TITLE

FISH AND SEDIMENT SAMPLING SITES IN THE DORIS NORTH PROJECT AREA, 2002

Golder Associates
Edmonton, Alberta

PROJECT	No. 022-7010.1000		FILE No. FykeNet-FishTraps-02	
DESIGN	RS	05/11/02	SCALE AS SHOWN	REV. 2
CADD	RFM	13/11/02	FIGURE: 1.2	
CHECK	RS	23/01/03		
REVIEW				

Table 1.1 Doris North Project aquatic sampling program, Aug to Sep 2002.

Waterbody	Depth Survey	Discharge	Sediments	Fish Populations				Fish Tissues
				Fish fence	Fyke net	Gill nets	Angling	
Roberts Lake			✓		✓	✓	✓	✓
Roberts Outflow		✓		✓	✓			✓
Little Roberts Lake	✓					✓		
Tail Lake						✓	✓	
Pelvic Lake						✓		
Roberts Bay			✓		✓			

1.3 OVERVIEW OF REPORT

To facilitate subsequent integration of the 2002 data with the previous data collected in 1995-2000, the format and organization of the present report follows closely the outline used in the 1995-2000 data compilation report (RL&L/Golder 2002). As such, this report is organized by major disciplines, with a separate discussion for each sampled waterbody. Environmental disciplines are presented as separate sections in the following order: physical environment, sediment quality, fish communities, and fish tissue contaminant analysis. Habitat conditions and fish capture methods are illustrated in Plates 1 to 16 in the Photographic Plates section that follows the text of the report. All data and analytical results are provided as appendices at the end of the report.

2.0 PHYSICAL ENVIRONMENT

2.1 ROBERTS OUTFLOW

2.1.1 Water Temperature

Water temperature of Roberts Outflow was measured daily with a hand-held thermometer to provide background data for the fish movement study. Readings were taken between 16 and 30 August 2002. Outflow temperature fluctuated little during this period due to the moderating effect of its source, Roberts Lake, located approximately 200 m upstream of the measurement site. Water temperatures ranged from 8 to 11°C, with no clear trend over time; however, measurements recorded earlier in the day were generally lower than those in the afternoon or evening (Appendix C1). The lowest temperature (8°C) was recorded in the morning of 18 August; the highest temperature (11°C) was recorded in the afternoon of 26 August.

2.1.2 Discharge and Stage

Roberts Outflow stream discharge was measured by methods outlined in Buchanan and Sommers (1969). Water velocity and stream depth measurements were made with a Swoffer Model 2100 current meter. Discharge, measured on three occasions, exhibited a steady decrease over the duration of the study (Table 2.1).

Table 2.1 Discharge and stage of Roberts Outflow, 2002.

Date	Discharge (m^3/s)	Stage (mm)
19 August	0.173	510
25 August	0.118	500
2 September	0.075	484

A staff gauge for measuring the relative change in stream surface elevation over time (i.e., stage) was erected near the fish fence in Roberts Outflow on 19 August. Stage measurements (±1 mm) were taken daily, coinciding with sampling at the fish fence, until 30 August (Appendix C1). An additional staff gauge reading was taken during the final discharge measurement on 2 September. The stream stage decreased by 26 mm over the monitoring period.

2.1.3 Boulder Garden Gradient

On 1 September 2002, gradient measurements were conducted along the boulder garden at the upstream end of Roberts Outflow. The intent was to provide background data for enhancing fish passage opportunities, as part of the potential fish habitat compensation plan. Surface water elevations were surveyed at points A, B, and C identified in Plate 15. Using the measured distances between the points, stream gradients along sections A-B and A-C were calculated as 3.51% and 2.67%, respectively (Table 2.2). Gradients of this magnitude are not in themselves a barrier to fish movement; however, in combination with the large-sized boulders dominating the site, they contributed to passage problems and fish entrapment. Methods of alleviating this problem are discussed as part of the Doris North Project No Net Loss Plan in a separate report (RL&L/Golder 2003).

Table 2.2 Gradient surveyed at boulder garden near the upstream end of Roberts Outflow, 2002.

Section[a]	Distance (m)	Difference in Elevation (m)	Gradient (%)
A-B	36.22	1.27	3.51
A-C	55.10	1.47	2.67

[a] refer to Plate 15 for locations of points A, B and C.

2.2 LITTLE ROBERTS LAKE

2.2.1 Depth Survey

A lake depth survey was carried out in Little Roberts Lake on 2 September 2002. The survey was limited to point measurements of depths at various locations within the lake to determine whether Little Roberts Lake is sufficiently deep to provide overwintering habitat for fish. The collection of more detailed bathymetry data is currently scheduled for summer 2003.

Depth measurements were collected with a weighted hand-held sounding line (marked at 0.1 m intervals) used from an inflatable boat. The locations of all measured depths were visually estimated and plotted in the field on a lake outline map. Due to the small surface area of Little Roberts Lake (9.7 ha), the maximum distance between the point measurements was approximately 100 m.

Twenty-eight point measurements of depth were recorded in Little Roberts Lake (Figure 2.1). The lake was shallow, with a mean depth of 2.1 m. The maximum depth of 3.1 m was recorded near the north shore. A similar depth (3.0 m) was recorded along the west shore, near the lake's outlet. As the two deepest areas in the lake were approximately 200 m apart, it is suspected that the lake basin consists of two shallow troughs that are separated by the submerged portion of a high rock ridge that extends north and south of the lake.

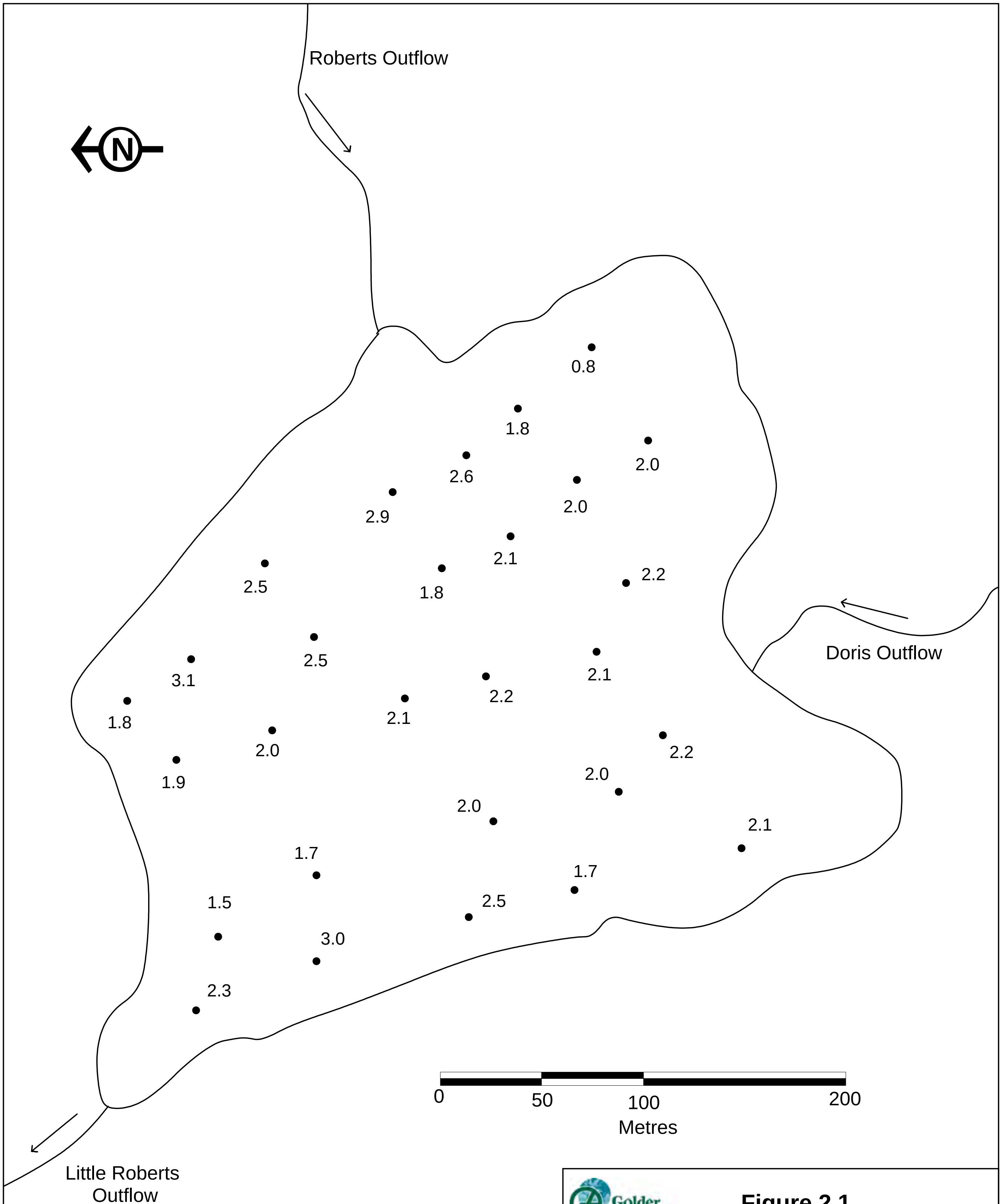


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Figure 2.1

Water Depths in Little Roberts Lake,
2 September 2002.

Map Source: Rescan (2001)

Depths are in metres

Little Roberts Lake bottom consisted of soft sediments (likely silt) at all point measurement sites; coarse substrates (i.e., gravel/cobble/boulder) were not encountered.

Considering that the ice thickness on lakes within the Doris North Project area can reach as much as 2.5 m in late winter (based on data collected through rock core drilling during gold exploration activities; Hugh Wilson, Miramar Hope Bay Ltd., pers. comm.), only small areas of Little Roberts Lake are expected to have under-ice water during late winter. As only 4 of the 28 depth measurements recorded in Little Roberts Lake were greater than 2.5 m, thick ice cover would limit the overwintering habitat to two disjoint shallow basins, with the maximum under-ice water depth of approximately 0.5 or 0.6 m. It is likely that dissolved oxygen concentrations in these shallow areas would become severely depleted in late winter, due to decomposition of organic material and absence of photosynthetic processes (i.e., thick ice and snow cover would block sunlight from reaching under the ice). As such, Little Roberts Lake is likely not suitable as overwintering habitat for fish; however, this conclusion should be verified through water quality sampling during late winter.

3.0 SEDIMENT QUALITY

This section presents information on baseline sediment quality conditions for Roberts Lake and Roberts Bay. Sediment samples were collected in Roberts Lake on 31 August 2002 to determine the potential effects on lake sediments resulting from the operations of a now abandoned silver mine located immediately north of the lake. Sediment samples were collected in Roberts Bay on 1 September 2002 to provide baseline data on sediment quality in the vicinity of two potential locations for a barge off-loading facility.

The sediment sampling locations are shown in Figure 1.2. The UTM coordinates at each site are presented in Appendices B1 to B3.

3.1 METHODS

Bottom sediment samples were collected using an Ekman grab sampler (232 cm^2). Sampling was conducted from an anchored boat, and UTM coordinates were collected with a Garmin 76 GPS. Five sediment grabs were collected at each site for metals analysis and one grab for hydrocarbons analysis. Individual grabs within a site were spaced approximately 1 m apart to avoid collection of disturbed lake bottom. Approximately 200 mL of sediment was removed from the centre of the Ekman sampler with a stainless steel spoon, avoiding sediment in contact with the sampler. The sediment was deposited in sample containers provided by the laboratory and kept at low temperature in a cooler. The samples were shipped to CanTest Laboratories (North Vancouver, BC) within five days of collection.

Sediment quality samples were analysed for total organic carbon, total metals, and hydrocarbons (BTEX, PAH, MAH). Analytical detection limits are presented in Appendices B1 to B4.

3.2 ROBERTS LAKE

Two sediment sampling sites (RL1 and RL2) were established in Roberts Lake (Figure 1.2). Both sites were located within 100 m of two separate inflows that drain the terrain occupied by the abandoned silver mine. Site RL1, situated in a bay along the north shore, was 7.9 m in depth. At the time of sampling (31 August), the discharge in the nearby tributary was low (estimated at 0.3 L/s). Site RL2, situated in the west end of Roberts Lake, was 4.6 m in depth. At the time of sampling, the nearby tributary was dry. The sediments collected at both sites were brown-grey in color and had a smooth, fine texture. The lake temperature was 9°C.

Analytical results for Roberts Lake sediment quality are presented in Appendix B1. To assess whether metal concentrations in sediments were within recommended ranges, the data are compared with the Canadian Interim Sediment Quality Guidelines for the Protection of Aquatic Life (CISQG; CCME 1999) in the following section. The CISQG recommends using two guidelines in assessing sediment quality. The first, referred to as the Threshold Effect Level (TEL), is the concentration below which adverse effects are rare. The second, referred to as the Probable Effect Level (PEL), is the concentration above which adverse effects are likely to occur. This recommended procedure was followed in this report.

Roberts Lake sediments consisted primarily of clay-sized particles overlain by a surface layer of silt. Larger particles (i.e., sand and gravel) contributed less than 3% to the samples collected at both sites (Appendix B1). Total organic carbon (TOC) concentrations ranged from 0.50 to 0.72% dry weight and were lower than the corresponding TOC levels recorded in Doris and Little Roberts lakes (between 0.75 and 2.8% dry weight) during previous sampling in 1996 and 1997 (RL&L/Golder 2002).

The concentrations of most metals were within the TEL guidelines. The only exceptions were chromium and arsenic. The concentrations of total chromium ranged from 44 to 48 µg/g and exceeded the TEL guidelines (37.3 µg/g) in all samples from both sites. Total arsenic concentrations (4.2 to 11.1 µg/g) were above the TEL guidelines (5.9 µg/g) in four of five samples at Site RL2, but did not exceed the guidelines in any of the samples collected at Site RL1. Exceedences of TEL guidelines for chromium and arsenic were also reported during previous sediment sampling in Doris North Project area lakes (RL&L/Golder 2002).

Hydrocarbon concentrations from both sites were below detection limits for all constituents tested (Appendix B4).

3.3 ROBERTS BAY

Baseline marine sediment quality sampling was conducted in Roberts Bay, which is the final receiving waterbody of drainage from the Doris Lake watershed. Two pairs of sediment sampling sites were selected in Roberts Bay near two potential barge off-loading locations (Figure 1.2). Each pair of sites included a deep water and shallow water area.

One pair of sites (RB1 and RB2) was located approximately 500 m north of the mouth of Glen Outflow. The other pair of sites (RB3 and RB4) was at the extreme south end of Roberts Bay.

Sites RB1 and RB2 were 11.5 and 3.4 m in depth, respectively. Sites RB3 and RB4 were 7.9 and 4.6 m in depth, respectively. Sediment collected from all sites was grey in colour and contained numerous bivalves and shell fragments. Water temperature at the time of sampling was 8°C.

Three of four Roberts Bay sediment samples contained mainly clay and silt-sized particles (Appendices B2 and B3). In contrast, the samples collected at site RB4 consisted primarily of sand. Concentrations of TOC were all below the detection limit (<0.5% dry weight). Metal concentrations in all collected samples did not exceed the TEL guidelines for the protection of marine life.

Hydrocarbon concentrations from all four sites were below detection limits for all constituents tested (Appendix B4).

4.0 FISH POPULATIONS

4.1 METHODS

Fish sampling techniques used in the Doris North Project area lakes in 2002 included gill nets, Arctic fyke net, and angling. Lakes sampled during this study included Roberts, Little Roberts, Tail, and Pelvic lakes. Fish sampling in Roberts Outflow was conducted between Roberts Lake and Little Roberts Lake (Figure 1.2), and involved a fish fence trap, Arctic fyke net, seining, hand captures, and observations from a helicopter. Fish sampling techniques used in Roberts Bay were limited to the use of an Arctic fyke net and hand captures.

4.1.1 Life History Data Collection

Fish life history information was collected from all fish captured. Live fish were identified to species, measured (fork length or total length to the nearest mm), and weighed (g). Fish larger than 300 mm in fork length were tagged with a uniquely numbered Floy™ tag to assess their movements through subsequent recaptures. Ageing structures were removed from selected fish. Depending upon the species being examined, ageing structures collected were left pelvic fin and/or scales. Additional data were collected from accidental and euthanized mortalities (i.e., fish collected for tissue samples). These included sex and maturity, reproductive status, gonad weight, stomach contents, collection of otoliths (for ageing), as well as collection of muscle, liver, and/or kidney tissues for metal analysis.

To facilitate data recording and presentation of results, all captured fish were assigned a four-letter code. The common and scientific names of fish species captured in 2002, as well as their coded abbreviations, are presented in Table 4.1.

Table 4.1 Common and scientific names of fish species captured in the Doris North Project area, 2002.

Family	Common name	Scientific name	Code
Salmonidae	Arctic char	*Salvelinus alpinus* (Linnaeus)	ARCH
	Lake trout	*Salvelinus namayacush* (Walbaum)	LKTR
	Lake whitefish	*Coregonus clupeaformis* (Mitchill)	LKWH
	Broad whitefish	*Coregonus nasus* (Pallas)	BRWH
	Cisco	*Coregonus artedi* Lesueur	CISC
	Least cisco	*Coregonus sardinella* Valenciennes	LSCS
Gadidae	Saffron cod	*Eleginus gracilis* (Tilesius)	SFCD
	Greenland cod	*Gadus ogac* Richardson	GRCD
Cottidae	Fourhorn sculpin	*Myoxocephalus quadricornis* (Linnaeus)	FHSC
Pholidae	Banded gunnel	*Pholis fasciata* (Bloch and Schneider)	BNGN

4.1.2 Gill Net

Gill nets were set in Roberts, Little Roberts, Tail, and Pelvic lakes. Set gangs were comprised of either three or four panels. Each panel was 1.5 m deep by 15.2 m long. The nets were of the sinking type with mesh sizes of 3.8 and 8.9 cm. The 3.8 cm mesh nets were used more often than the 8.9 cm mesh nets because they allowed comparison with the data collected in 1997 to 2000, when only 3.8 cm mesh was used in index gill nets (Rescan 1998, 1999a, 2001). Whereas the small mesh nets have a greater potential for catching fish of a wide size range, the larger, 8.9 cm mesh was used in 2002 to target larger-sized fish. Nets were generally checked every one to two hours to reduce capture mortality. Information recorded for individual gangs included the number and mesh size of net panels used, GPS coordinates, water depth and temperature, deployment and removal times, as well as life history data for all captured fish.

4.1.3 Fish Fence

A fish fence and trap was erected in Roberts Outflow to monitor the fall migration of Arctic char returning from the sea to overwinter in Roberts Lake. The fence consisted of two panels (each 3.1 m in length and 1.5 m in height) constructed of a metal frame with removable conduit rods (1.8 cm in diameter). The spacing between the rods was 1.9 cm. The panels were supported by wooden “A” frames and sandbagged into position. Upstream migrant fish were funnelled into a trap box located in mid-stream. The trap consisted of a metal frame (1.8 m long, 1.2 m wide, and 1.5 m high) perforated with holes for holding vertical conduit sections that formed the trap walls. The entrance to the trap consisted of a conduit funnel, similar in construction to the trap walls, allowing the opening width to be adjusted to maximize capture and minimize escape. Photographs of the installed fish fence are provided in Plates 1 to 4.

The fish fence was checked once or twice daily to monitor diurnal movement patterns. Information recorded during each trap check included water temperature, time of day, stream staff gauge, and life history data on captured upstream migrants. All captured fish were released immediately upstream of the fence.

The fish fence was installed on 16 August and removed on 30 August. Although the fish fence was operational during most of this period, sampling was interrupted three times. On 20 August the trap and fence were torn down by a grizzly bear attracted by the fish in the trap. Repeated bear visits on 29 and 30 August prompted the discontinuation of sampling by this method.

4.1.4 Fyke Net

Arctic fyke nets were used to sample fish in Roberts Lake, Roberts Bay, and Roberts Outflow. Each fyke net consisted of a trap 3.7 m long and 0.9 m wide, containing two throats (15 x 25 cm each). The nets were constructed of 1.27 cm dark grey knotless nylon mesh.

Fyke net sets in Roberts Bay and Roberts Lake were placed approximately 30 m off shore. A lead net panel was set perpendicular from shore and bisected the trap entrance. Wing net panels, 15 m in length, were attached to either side of the trap entrance and were stretched out parallel to shore. The combination of the lead panel and directional wings acted to confine and guide fish into the trap. Wings and lead were constructed of 2.54 cm dark grey knotless nylon and were 1.7 m deep. Fyke nets were held in place by metal stakes driven into the sea bed or lake bottom.

A fyke net was used to sample for fish migrating up Roberts Outflow and successfully passing into Roberts Lake through a dense boulder garden. This fyke net was set up with two wings that stretched from the trap to shore. No centre lead was utilized. This arrangement functioned similarly to the fish fence trap, as it blocked off the entire stream channel and funnelled all upstream migrants into the trap.

Fyke nets were checked daily. During each fyke net check, trapped fish were removed from the trap and transferred to plastic tubs filled with water, and the trap was reset immediately. After the collection of life history data, the captured fish were released near the capture site.

4.1.5 Other Capture Methods

Beach seining was only conducted in Roberts Outflow, immediately upstream of the fish fence. Arctic char that migrated past the fence location prior to installation, or during periods when the fence was torn down by a bear, were observed holding in a pool 30 m upstream of the trap. Capture of these fish was attempted using a fyke net wing modified as a beach seine. The net was dragged slowly downstream through the pool, forcing the fish into shallows and trapping them between the net and the fence.

Capture of fish by hand was conducted within a boulder garden habitat located immediately downstream of Roberts Lake. Stranded Arctic char were located (by eye or feeling with a hand) in deep, narrow interstitial pockets among the boulders, where they had become trapped as they attempted to migrate up to Roberts Lake. These fish were generally in an exhausted state and were being preyed upon by scavengers (bears and gulls). To rescue these fish, a daily check of the boulder garden was initiated and continued throughout the study period. After the collection of life history data from captured fish, all surviving fish were released in Roberts Lake upstream of the boulder garden and fyke net location.

4.1.6 Data Analysis

Fish ageing was carried out according to MacKay et al. (1990). All data from individual fish were consolidated into one table (Appendix C16) and submitted to a thorough QA/QC procedure. The data were then used to calculate life history statistics that included:

- length-frequency distributions;
- length-weight relationships;
- mean, standard deviation, and range of length, weight, age and condition factor data;
- age-specific mean length and weight;
- size characteristics for separate sex and maturity categories; and,
- diet analyses.

As an index of relative abundance, catch-per-unit-effort (CPUE) values for gill netting events were presented separately for each mesh size to allow comparison with the CPUE values reported for 1997 to 2000 gill netting programs. As such, gill net CPUE values are reported as number of fish captured per 100 m^2 of each mesh size panel set for 24 hours.

CPUE values for fyke net and fish fence catches are reported as number of fish captured per 24 hours of trap operation, whereas CPUE units for angling are number of fish captured per rod-hour.

4.2 ROBERTS OUTFLOW

The catch rates, length-frequency distributions, size and age statistics, age-specific lengths and weights, diet, and sex/maturity data for fish species sampled in Roberts Outflow are summarized in Appendices C1 to C9; data from individual fish are presented in Appendix C16. A fish fence was the main capture method used in Roberts Outflow. Other methods used included hand captures of fish stranded within the boulder garden immediately downstream of Roberts Lake, a fyke net placed immediately upstream of the boulder garden, beach seining upstream of the fish fence trap, and observations of fish presence conducted from the air.

4.2.1 Species Composition and Relative Abundance

In total, 187 fish representing three species were caught in Roberts Outflow during August 2002 (Table 4.2). Arctic char was the predominant species in the overall catch (89.9%), followed by lake trout (9.6%), and broad whitefish (0.5%).

Table 4.2 Number of fish captured in Roberts Outflow, 2002.

Capture Method	Arctic char			Lake trout			Broad whitefish			All Species Combined		
	Initial	Recap	Total	Initial	Recap	Total	Initial	Recap	Total	Initial	Recap	Total
Fish Fence	85		85	13		13	1		1	99		99
Seine or Dip Net	2	4	6		1	1				2	5	7
Hand Grab	53	21	74							53	20	73
Fyke Net	28	11	39	5	2	7				33	13	46
Total	**168**	**36**	**204**	**18**	**3**	**21**	**1**	**0**	**1**	**187**	**39**	**226**

Different sampling sites located along the length of the outflow resulted in recaptures of some fish as they migrated upstream. Thirty-nine recapture events of Arctic char (*n*=36) and lake trout (*n*=3) were recorded during sampling. Two fish (one Arctic char and one lake trout) were recaptured twice. Approximately half of the recaptures (*n*=21) were fish that were originally caught at the fish fence and then recaptured by hand from interstitial spaces in the boulder garden. Eleven Arctic char and two lake trout were recaptured in the fyke net after moving upstream through the boulder garden; however, these fish were generally small (less than 1.5 kg in weight) with the exception of one Arctic char that was 604 mm in fork length and weighed 2.3 kg.

Fifty-three unmarked Arctic char were captured during boulder garden checks. As these fish had not been initially captured at the fish fence, they were likely upstream of the fence location prior to installation or moved past the fish fence during periods when it was torn down by grizzly bears.

In total, 168 Arctic char were captured in Roberts Outflow. Most of these fish (*n*=160) were larger than 250 mm in fork length; they were likely adults migrating from the marine environment into Roberts Lake. Arctic char smaller than 250 mm in fork length were likely juveniles undergoing localized movements between fresh water habitats (e.g., between Roberts and Little Roberts lakes).

Fish Fence

In total, 99 fish were captured at the fish fence. Most were Arctic char (86%), followed by lake trout (13%) and broad whitefish (1%). All of these fish represented first time captures. The number of Arctic char entering the trap on a daily basis varied greatly. Of the 85 Arctic char captured in total, most (56%) were captured on 20 and 27 August, when 26 and 22 fish were removed from the trap, respectively (Figure 4.1). The trapped Arctic char ranged from 266 to 883 mm in fork length (mean of 611 mm) and from 190 to 8250 g in weight (mean of 3502 g).

Sampling Upstream of Trap

Fish observed holding in habitats upstream of the fish fence were captured by seining and dip net. In total, seven fish (six Arctic char and one lake trout) were captured upstream of the trap; five were captured by seining and two by dip net, as they held along the upstream side of the fence. Most of these fish (n=5) were recaptures that were initially caught and tagged at the fish fence.

Boulder Garden Salvage

Hand captures of Arctic char from the boulder garden immediately downstream of Roberts Lake were initiated on 16 August after several stranded fish were observed there during a helicopter over-flight. A ground inspection led to the capture of 17 Arctic char. Over-flights on subsequent days (17 to 20 August) did not reveal the presence of fish; therefore, a salvage was not attempted.

On the morning of 21 August, several gulls were observed in proximity to the boulder garden. Closer inspection resulted in the capture of seven Arctic char, of which four were recaptures. An afternoon inspection resulted in the capture of six more Arctic char, of which five were recaptures. Daily ground inspections were conducted from this date through to 2 September. Inspections were conducted visually while walking through the boulder garden and reaching “blindly” into deep voids between and under boulders. Most fish were encountered within a relatively small section of the boulder garden (approximately 20% of the total boulder garden area). This “stranding zone” is illustrated in Plates 15 and 16.

In total, 74 Arctic char were captured in the boulder garden. Of these, 21 were marked fish (initially captured at the fish fence) and 53 were unmarked (first time captures). The daily number of Arctic char found stranded in the boulder garden ranged from zero to 28 fish (Figure 4.1). The mean fork length of Arctic char removed from the boulder garden was 689 mm (ranged from 355 to 827 mm).

Fyke Net

On 24 August, a fyke net was installed at the Roberts Lake outlet to document marked fish moving upstream through the boulder garden. The fyke net was operational until 29 August, when it was damaged by a bear and subsequently removed. During the period when it was operational, the fyke net captured 46 fish, 13 of which were recaptures. Arctic char was the most common species

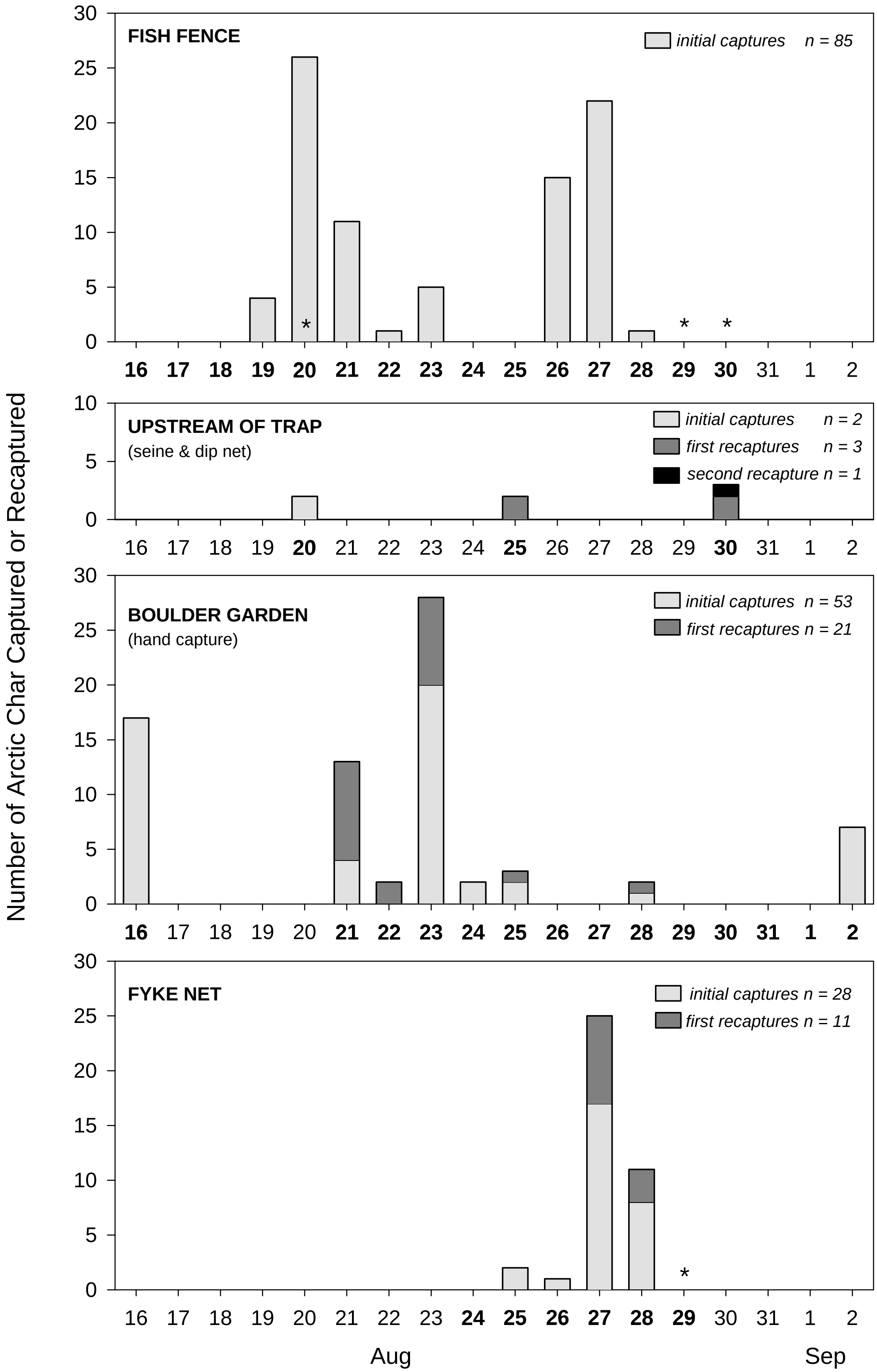


Figure 4.1 Daily catches of Arctic char captured by different sampling methods in Roberts Outflow, 2002. Note: Bolding indicates dates when sampling method was employed. Asterisk (*) denotes days when fish fence or fyke net operations were interrupted by grizzly bear interference.

encountered, contributing 84.8% to the total catch. Lake trout comprised the remainder of the catch (15.2%).

Arctic char captured in the fyke net (*n*=39) ranged from 92 to 604 mm in fork length. The mean fork length (313 mm) was considerably smaller than the mean fork lengths of fish captured in the fish fence trap (611 mm) and in the boulder garden (689 mm), suggesting that only the smaller fish were able to swim upstream through the boulder garden.

4.2.2 Life History Data

4.2.2.1 Arctic Char

Size Distribution

The length distribution of Arctic char captured in Roberts Outflow (*n*=168) was widespread, ranging from 92 to 883 mm in fork length (mean of 585 mm). The majority (62%) of the catch was comprised of fish larger than 600 mm in fork length. The length-distribution pattern exhibited two distinct modes (Figure 4.2). The smaller mode was composed of fish between 200 and 400 mm in fork length (likely juveniles), whereas the larger and wider mode was composed of adult Arctic char in the 580 to 890 mm size range.

Length-Weight Relationship

Due to the migratory nature of Arctic char, life history data from fish captured in Roberts Outflow were combined with data from fish from other parts of the Roberts Lake drainage (i.e., three fish from Roberts Lake, six from Little Roberts Lake and one from Roberts Bay). This treatment increased the sample size and range of size groups, thus allowing for a better description of length-weight relationships, as well as growth, maturity and diet characteristics of the Arctic char population in the Roberts Lake drainage. Size and diet statistics for Arctic char from separate waterbodies are included in Appendices C5, C8, and C9.

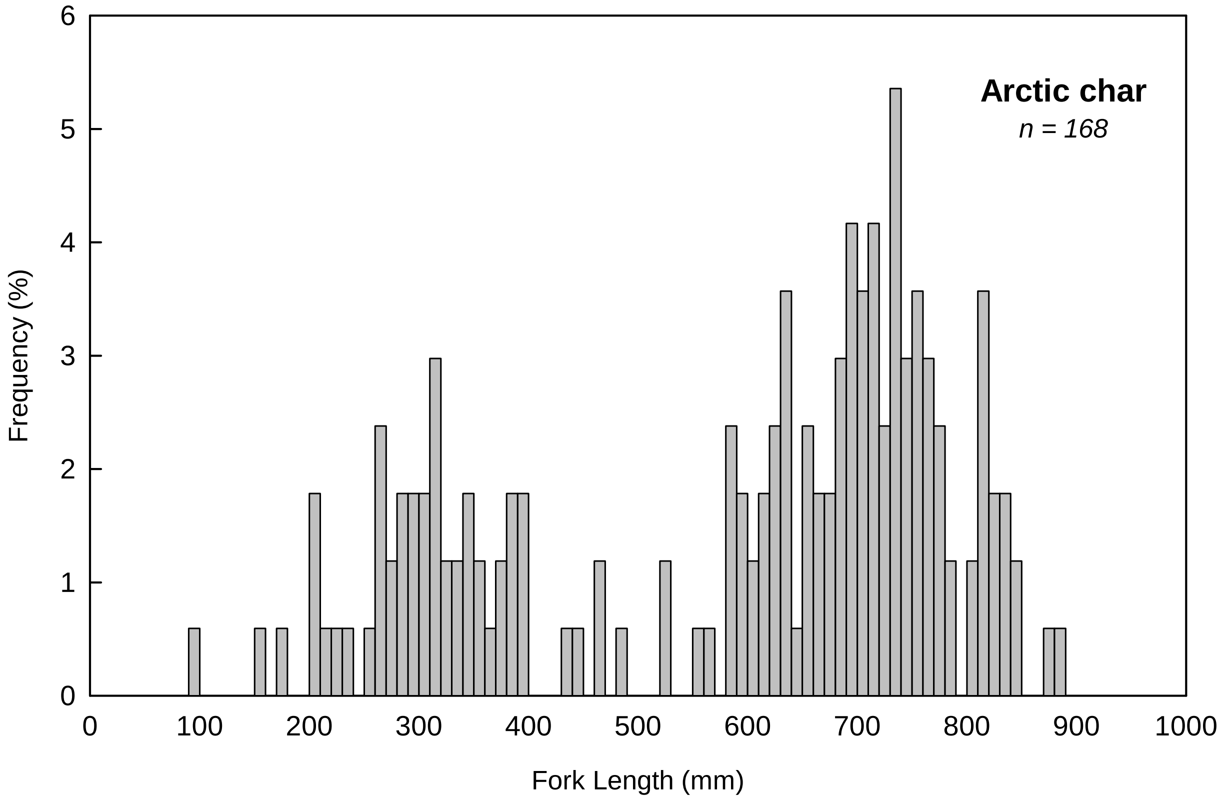
The length-weight relationship for Arctic char from the Doris North Project area is illustrated in Appendix C10. The resulting regression equation was:

log Weight (g) = -5.400 + 3.161 log Fork Length (mm) (*n*=145; r^2=0.994).

The mean condition factor was 1.10; condition factors for individual fish ranged from 0.74 to 1.47.

Age and Growth

The age-length relationship for Arctic char from the Doris North Project area is illustrated in Figure 4.2. Age-classes between 1 to 5 and 8 to 13 were represented



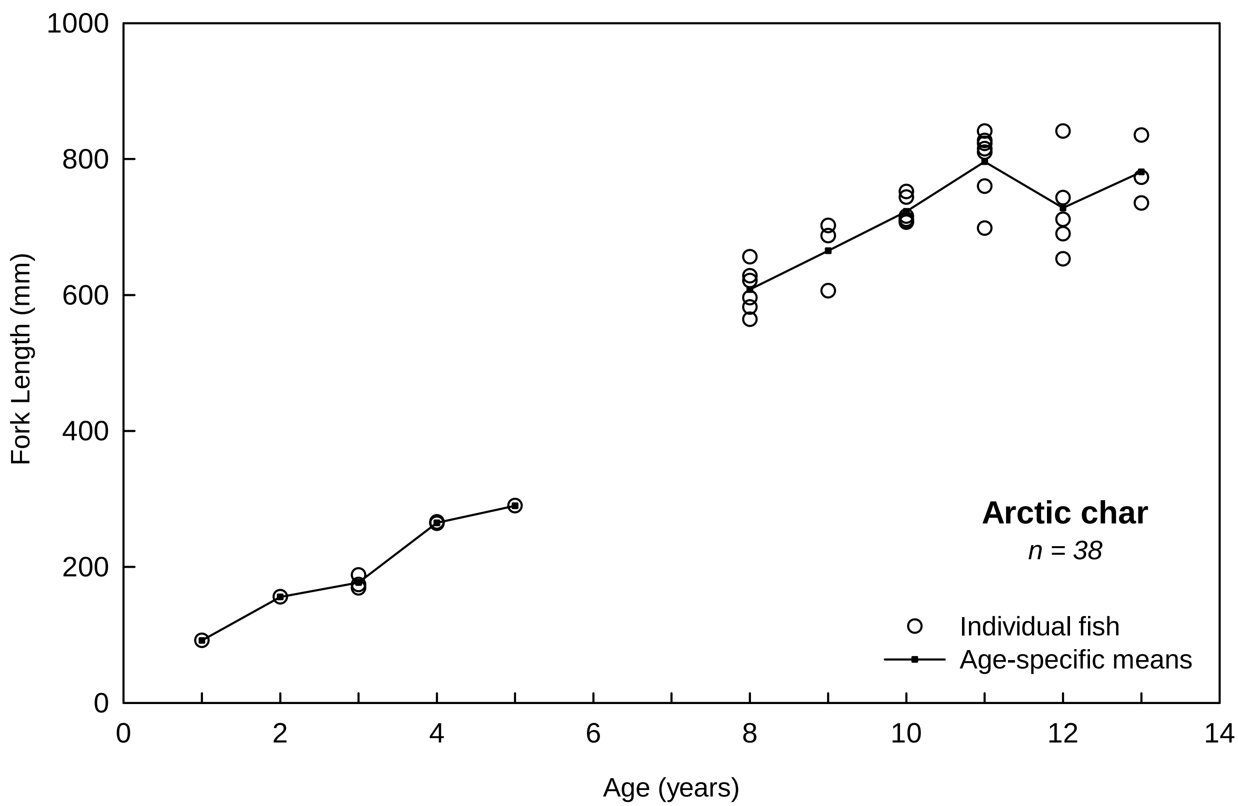


Figure 4.2 Length-frequency distribution of Arctic char captured in Roberts Outflow and age-length relationship for Arctic char captured in the Doris Hinge Project area, 2002.

in the sample of 38 fish. Within the aged sample, the juvenile fish (ages 1 to 5) appeared to grow at a slower rate (annual fork length increment of approximately 50 mm) than the adult fish between ages 8 and 11 (approximately 64 mm increase in fork length per year).

Sex and Maturity

Sex and maturity characteristics were determined for 35 Arctic char from the Doris North Project area (18 females and 17 males; Appendix C8). Although 17 females were mature, only two exhibited signs of ovary development for the 2002 spawning season. Nine females did contain a small number of residual eggs, indicating that these fish spawned the previous year. The mature females ranged from 8 to 13 years in age, whereas one immature female was five years old. This suggested that sexual maturity in females is reached between ages 6 and 8.

Similar to females, only two of 15 mature Arctic char males were showing signs of spawning development for the current season (i.e., bright orange color, presence of kype, and extrusion of milt). The remaining mature males appeared to be multiyear interval spawners. The mature males ranged from 8 to 12 years in age. Based on the above data and the capture of two immature males that were four years old, sexual maturity in males is reached between ages 5 and 8.

Results from other studies of Arctic char populations indicated that a large proportion of spawning fish do not migrate to sea in the year that they spawn (Grainger 1953; Moore 1975a, 1975b; Johnson 1980; Moshenko et al. 1984; RL&L 1998, 1999, 2000). The presence of only a small number of current year spawners (two males and two females) within the fish fence catch in 2002 was consistent with the previous studies.

Diet

Thirty-three stomachs were examined from Arctic char collected from the Doris North Project area. Most (88%) of the stomachs were empty; this was reflected in the low mean fullness index of 3.2%. For the fish with stomach contents, the diet consisted primarily of unidentified fish remains (99% of total food volume) and small amounts of amphipods (Appendix C9).

4.2.2.2 Lake Trout

Size Distribution

Lake trout caught in Roberts Outflow (*n*=18) ranged from 350 to 898 mm in fork length (mean of 501 mm). Most (67%) of the catch was comprised of fish smaller than 500 mm in fork length, with only 17% of the captured lake trout exceeding 600 mm in fork length.

Length-Weight Relationship

The length-weight regression equation for lake trout caught in Roberts Outflow was:

log Weight (g) = -4.484 + 2.817 log Fork Length (mm) (n=14; r^2=0.984).

The mean condition factor was 1.06; condition factors for individual fish ranged from 0.83 to 1.24 (Appendix C5).

4.2.2.3 Broad Whitefish

One broad whitefish was captured in Roberts Outflow. This fish was caught at the fish fence on 22 August. It was 496 mm in fork length, weighed 1900 g, and was 11 years old (Appendix C5). This fish was a mature female with fully developed ovaries for the 2002 spawning season. Examination of the stomach revealed that this fish had not been feeding prior to capture.

4.3 ROBERTS LAKE

The catch rates, length-frequency distributions, size and age statistics, age-specific lengths and weights, diet, and sex/maturity data for fish species sampled in Roberts Lake are summarized in Appendices C1 to C9; data from individual fish are presented in Appendix C16. Fish capture methods used in Roberts Lake included gill nets, fyke nets, and angling.

4.3.1 Species Composition and Relative Abundance

In total, 143 fish representing five species were captured in Roberts Lake (Table 4.3). Lake whitefish was the predominant species in the overall catch (55%), followed by lake trout (28%), cisco (10%), least cisco (4%), and Arctic char (2%). Gill nets accounted for most (87%) of the total catch.

Table 4.3 Number of fish captured in Roberts Lake, 2002.

Capture Method	Arctic char	Lake trout	Lake whitefish	Cisco	Least cisco	Total
Gill Net	1	33	72	14	4	**124**
Fyke Net	2	1	7	1	2	**13**
Angling		6				**6**
Total	**3**	**40**	**79**	**15**	**6**	**143**

4.3.2 Life History Data

4.3.2.1 Arctic Char

The three Arctic char caught in Roberts Lake were all immature. Two fish were three years old (169 and 188 mm in fork length) and were likely rearing in Roberts Lake or nearby stream habitats. The largest fish (290 mm in fork length) was five years old; internal examination revealed that it was an immature female with an empty stomach. Based on the capture of a four year old juvenile Arctic char in Roberts Bay (see Section 4.7), it is likely that this fish spent the early summer in the sea and returned to overwinter in fresh water.

4.3.2.2 Lake Trout

Size Distribution

Lake trout from Roberts Lake (*n*=40) ranged between 195 and 913 mm in fork length (Figure 4.3). The mean fork length was 572 mm (Appendix C5). The majority (65%) of the catch was comprised of fish larger than 500 mm in fork length. Overall, lake trout lengths were evenly distributed throughout the size range, with no distinct modes for particular size-classes.

Length-Weight Relationship

The length-weight relationship for lake trout caught in Roberts Lake is illustrated in Appendix C11. The resulting regression equation was:

log Weight (g) = -5.085 + 3.044 log Fork Length (mm) (n=39; r^2=0.989).

The mean condition factor was 1.10; condition factors for individual fish ranged from 0.78 to 1.64 (Appendix C5).

Age and Growth

The age-length relationship for lake trout from Roberts Lake is illustrated in Figure 4.3. Age-classes between 14 and 44 were represented in the sample of 30 fish; the mean age was 28 years. In contrast to lake trout from Tail Lake, which did not grow larger than 650 mm in fork length (see Section 4.5), lake trout in Roberts Lake appeared to grow throughout their life span, with an average annual growth increment of approximately 18 mm in fork length.

Sexual Maturity

Sex and maturity characteristics were determined for 32 lake trout (20 females and 12 males). Nineteen females were mature; however, only seven (37%) exhibited signs of readiness for the upcoming spawning season (i.e., contained developed eggs), suggesting that the majority of mature females were multiyear

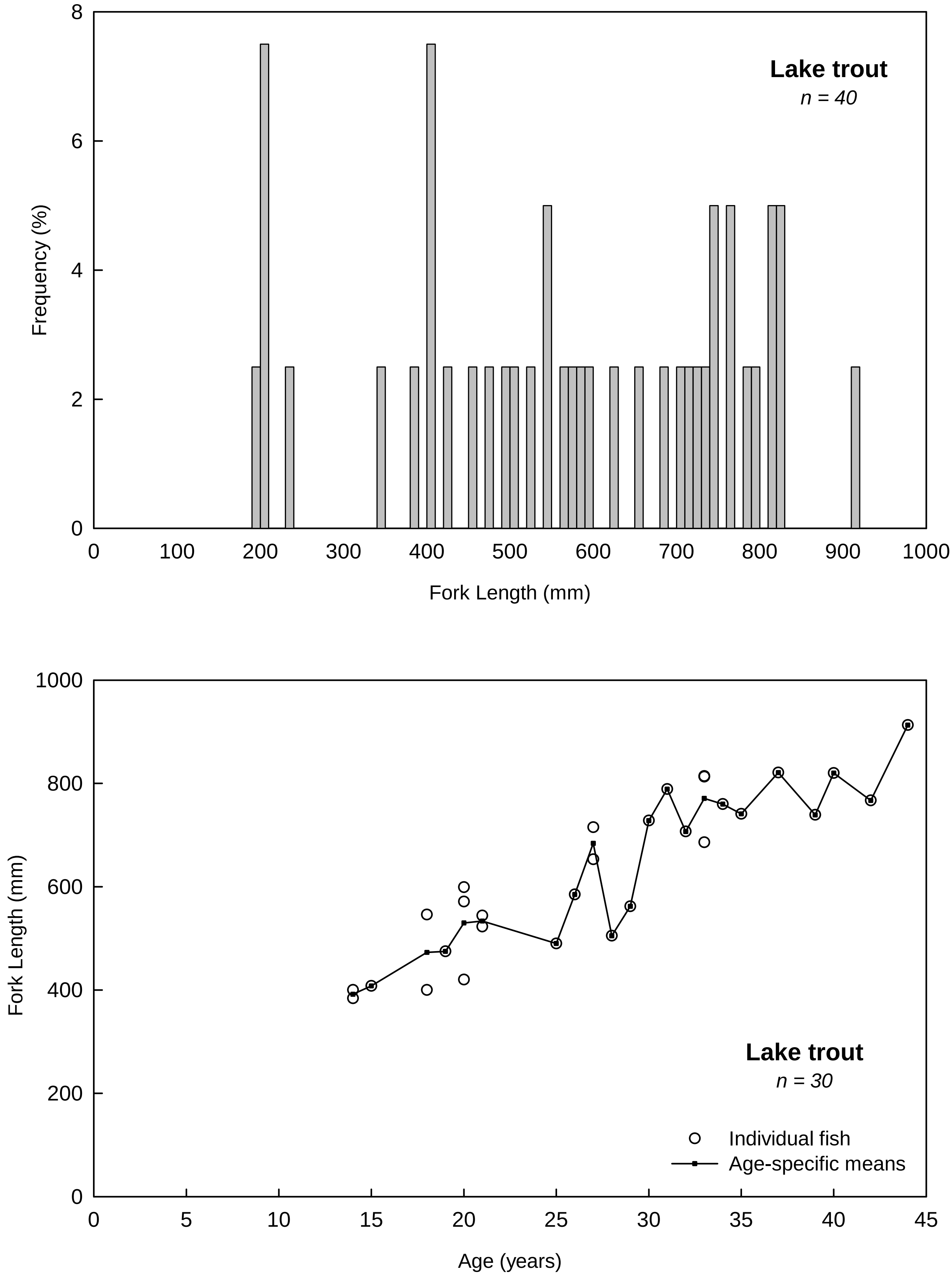


Figure 4.3 Length-frequency distribution and age-length relationship for lake trout captured in Roberts Lake, 2002.

interval spawners. The smallest mature female was 384 mm in fork length and 14 years in age.

Within the sample of 10 mature males, most (70%) were sexually developed for the current spawning season (i.e., testes full of milt). The smallest mature male was 400 mm in fork length and 18 years in age; the largest immature male was 408 in fork length and 15 years old. This suggested that lake trout males mature between 15 and 18 years of age at the approximate size of 400 mm in fork length.

Diet

Of 32 lake trout stomachs examined, most (66%) were empty, resulting in a low overall mean fullness index of 10.2% (Appendix C9). Invertebrates, including the isopod *Saduria entemon*, chironomids, and amphipods, contributed almost half (47%) to the total food volume identified in the stomachs. Unidentified fish remains accounted for 35% of the food volume, whereas the remainder was contributed by a terrestrial vole, as well as plant and inorganic matter (stones).

Abnormalities

One lake trout captured had a large, fleshy growth of tissue on its upper jaw (Plate 10). This tissue was preserved and submitted to a laboratory for histological examination, which resulted in the diagnosis of a benign dermal fibroma of unknown origin.

4.3.2.3 Lake Whitefish

Size Distribution

Lake whitefish captured in Roberts Lake (n=79) ranged from 154 to 530 mm in fork length (mean of 381 mm). Most (90%) of the catch was composed of fish larger than 300 mm in fork length, with 47% of the catch exceeding 400 mm in fork length, but only 1% of the catch exceeding 500 mm in fork length (Figure 4.4). Three distinct size-class modes were apparent in the catch. The smallest mode (4% of the catch) was centred around 150-169 mm in fork length, whereas the larger two modes were focused around 330 to 379 mm and 420 to 469 mm (29 and 32% of the catch, respectively).

Length-Weight Relationship

The length-weight regression equation for lake whitefish from Roberts Lake (Appendix C12) was:

log Weight (g) = -5.553 + 3.261 log Fork Length (mm) (n=78; r^2=0.989).

The mean condition factor was 1.31; condition factors for individual fish ranged from 0.93 to 1.83 (Appendix C5).

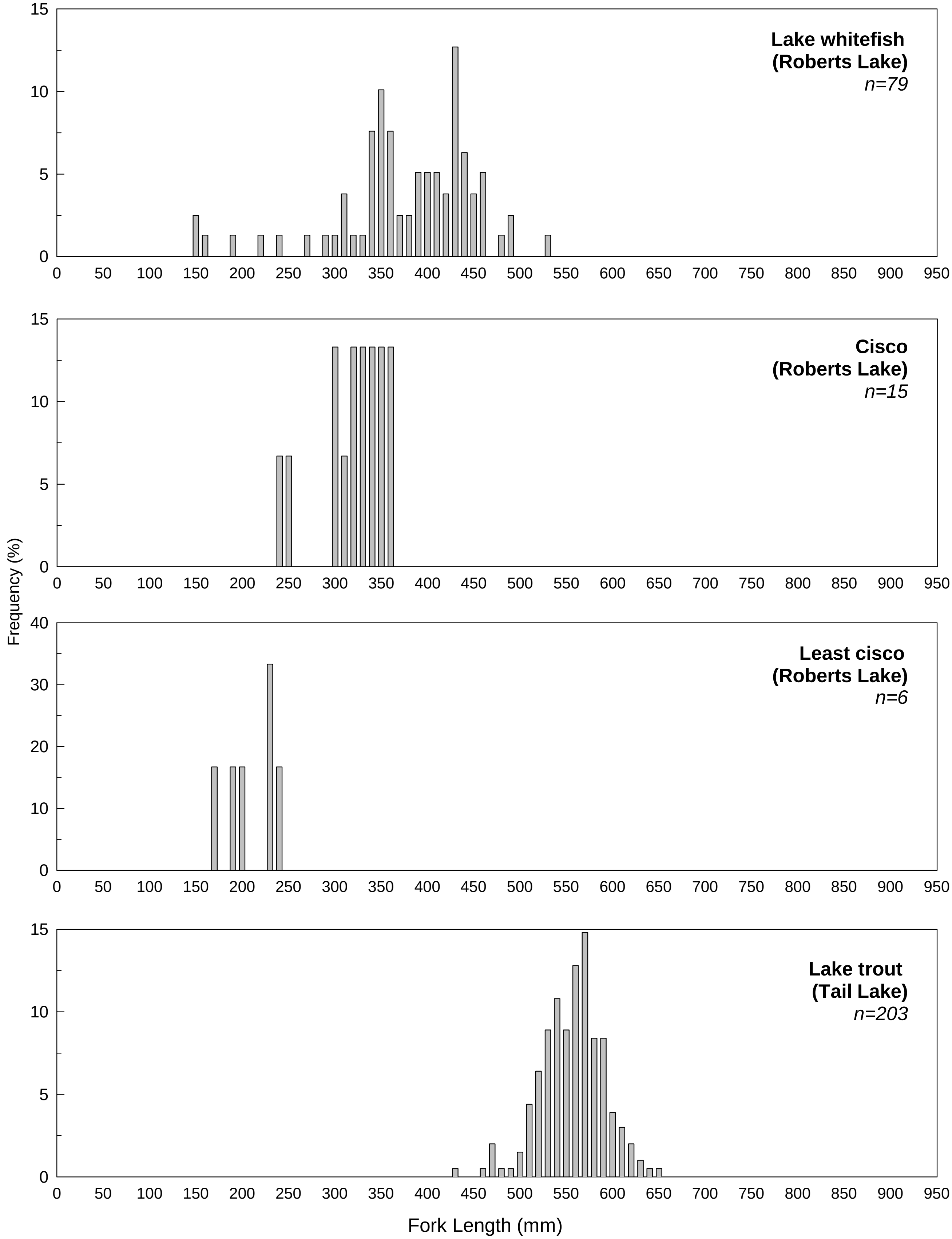


Figure 4.4 Length-frequency distribution of lake whitefish, cisco, and least cisco captured in Roberts Lake and lake trout captured in Tail Lake, 2002.

Sexual Maturity

In total, 56 lake whitefish from Roberts Lake (27 females and 29 males) were sampled for sex and maturity characteristics. The sampled females were generally larger than the males (mean fork lengths of 410 and 363 mm, respectively) and had a higher mean condition factor (1.38 and 1.30, respectively). Although 26 females were sexually mature, only six (23%) exhibited signs of development for the upcoming spawning season (i.e., contained mature eggs), indicating that most fish were multiyear interval spawners. Mean ovary weight of the pre-spawning females was 69 g (range of 37 to 120 g); this was much higher than the mean ovary weight of non-spawning mature females (16 g). The smallest mature female was 315 mm in fork length, whereas the only immature female in the catch was considerably larger (362 mm); this suggested that not all fish attain sexual maturity at similar size.

Within the sample of males, 24 were sexually mature and five were immature (Appendix C8). Only five (21%) of the mature males were sexually developed for the current spawning season (i.e., testes full of milt). These pre-spawning males were considerably larger than the non-spawning mature males (mean fork lengths of 435 and 375 mm, respectively). The smallest mature male was 319 mm in fork length, whereas the largest immature male was 365 mm in fork length, suggesting that fish attain sexual maturity at different sizes.

Diet

Of 56 lake whitefish stomachs examined, most (86%) contained food items. Mean overall stomach fullness was 42.3% (Appendix C9). Invertebrates accounted for almost the entire total volume (>99.9%) of food items, with the remainder being plant matter. The isopod *Saduria entemon* and chironomids (blood worms) were the greatest contributors to the total food volume encountered in the stomachs (51 and 37%, respectively).

4.3.2.4 Cisco

Size Distribution

Cisco captured in Roberts Lake (n=15) ranged from 245 to 368 mm in fork length (mean of 326 mm; Appendix C5). Most (87%) were larger than 300 mm in fork length (Figure 4.4).

Length-Weight Relationship

The length-weight regression equation for cisco from Roberts Lake was:

log Weight (g) = -5.072 + 3.056 log Fork Length (mm) (n=15; r^2=0.974).

The mean condition factor was 1.17; condition factors for individual fish ranged from 1.06 to 1.31 (Appendix C5).

Sexual Maturity

In total, 14 cisco (12 females and two males) were sampled for sex and maturity characteristics. All sampled fish were sexually mature. One-half of the mature females exhibited signs of development for the upcoming spawning season (i.e., contained mature eggs). These pre-spawning females were larger than the non-spawning females (mean fork lengths of 346 and 317 mm, respectively). Gonad weight of pre-spawning females ranged from 16 to 56 g (mean of 36 g). Both mature males were in pre-spawning condition (i.e., testes full of milt).

Diet

Food items were encountered in all 14 cisco stomachs examined. Mean overall stomach fullness was 67%. Zooplankton accounted for most (88%) of the total volume of food items, with the remainder comprised of chironomids (blood worms).

4.3.2.5 Least Cisco

Size Distribution

Least cisco captured in Roberts Lake (n=6) ranged from 170 to 249 mm in fork length (mean of 215 mm; Appendix C5; Figure 4.4).

Length-Weight Relationship

The length-weight regression equation for least cisco from Roberts Lake was:

log Weight (g) = -4.795 + 2.910 log Fork Length (mm) (n=6; r^2=0.975).

The mean condition factor was 0.99; condition factors for individual fish ranged from 0.93 to 1.09 (Appendix C5).

Sexual Maturity

In total, five least cisco (three females and two males) were sampled for sex and maturity characteristics. Of the sampled females, only the largest fish (fork length of 230 mm) was mature; this fish was fully developed to spawn in the current season. The remaining two females were immature (170 and 206 mm in fork length). One of the males (249 mm in fork length) was mature and in pre-spawning condition. The second male was immature (198 mm in fork length).

Diet

Of four least cisco stomachs examined, all contained food. The mean overall stomach fullness index of was 53% (Appendix C9). Zooplankton accounted for most (95%) of the total volume, with the remainder comprised of chironomids (blood worms).

4.4 LITTLE ROBERTS LAKE

A limited gill netting program was conducted in Little Roberts Lake to supplement information on Arctic char utilization of the Roberts Lake drainage system. The catch rates, length-frequency distributions, size and age statistics, age-specific lengths and weights, diet, and sex/maturity data for fish species sampled in Little Roberts Lake are summarized in Appendices C3 to C9; data from individual fish are presented in Appendix C16.

4.4.1 Species Composition and Relative Abundance

In total, nine fish, representing three species, were captured in Little Roberts Lake. Arctic char (*n*=6) was the predominant species that contributed 67% to the total catch. Also captured were three lake trout and one least cisco.

4.4.2 Life History Data

4.4.2.1 Arctic Char

Arctic char captured in Little Roberts Lake (*n*=6) ranged from 552 to 835 mm in fork length (mean of 698 mm). The majority (67%) of the catch was composed of fish larger than 700 mm in fork length. None of the captured fish exhibited external signs of spawning in the current year.

4.4.2.2 Lake Trout

Two lake trout captured in Little Roberts Lake were 352 and 441 mm in fork length. They were marked with Floy tags and released into the lake.

4.4.2.3 Least Cisco

One least cisco captured in Little Roberts Lake was 191 mm in fork length. It was a mature male in pre-spawning condition. Its stomach was 90% full and contained amphipods and hymenopterans (ants).

4.5 TAIL LAKE

A gill netting and angling program was conducted in Tail Lake to determine the population size of lake trout through mark-recapture procedures. The catch rates, length-frequency distributions, size statistics, diet, and sex/maturity data for fish species sampled in Tail Lake are summarized in Appendices C3 to C9; data from individual fish are presented in Appendix C16.

4.5.1 Species Composition and Relative Abundance

Lake trout was the only fish species captured in Tail Lake during sampling (Appendix C16). Unlike other lakes in the Doris North Project area, Tail Lake does not support lake whitefish and cisco populations (RL&L/Golder 2002).

Prior to the present study, lake trout were marked with Floy tags during August 2000 survey in an attempt to derive a population estimate through subsequent recaptures (Rescan 2001). Although 128 lake trout were marked during the three-day survey, no recaptures were recorded.

In total, 207 lake trout captures were recorded in Tail Lake during a gill netting and angling program carried out during 21-26 August 2002 (Table 4.4). These included 194 captures of unmarked fish as well as 13 recaptures of previously marked fish (nine marked in August 2000 and four marked during the present study).

Table 4.4 Numbers of marked and unmarked lake trout captured in Tail Lake, 2002.

Capture Method	Unmarked	Recapture from 2000[a]	Recapture from 2002[b]	Total
Gill Net (3.8 cm mesh)	19	1		**20**
Gill Net (8.9 cm mesh)	73	2	3	**78**
Angling	102	6	1	**109**
Total	194	9	4	**207**

[a] fish originally marked in August 2000 by Rescan (2001)
[b] fish marked and recaptured during the present study

In total, 98 lake trout were captured in gill nets set at 16 locations throughout the lake. The mean catch-per-unit-effort (CPUE) for 3.8 cm mesh gill nets was approximately 16% of the CPUE for 8.9 cm mesh size nets (18.5 and 114.4 fish/100 m^2/24 h, respectively; Appendix C3). The mean CPUE value reported by Rescan (2001) for August 2000 gill net catches with 3.8 cm mesh in Tail Lake (85.6 fish/100 m^2/24 h) was considerably higher than the corresponding value from the present study, suggesting that lake trout population size in Tail Lake may have decreased over the last two years.

In total, 109 lake trout captures were recorded during angling in Tail Lake. The total angling effort was 26.1 rod-h, resulting in the mean CPUE value of 4.2 fish/rod-h.

4.5.2 Life History Data

4.5.2.1 Lake Trout

Size Distribution

The sample of lake trout from Tail Lake (*n*=203) ranged between 436 and 650 mm in fork length, with a mean of 551 mm (Figure 4.4; Appendices C5 and C6). The mean weight was 1676 g (maximum of 2500 g). Most (73%) of the fish were within a narrow 530 to 600 mm size-class. Fish smaller than 500 mm contributed less than 4% to the total catch. The lack of fish smaller than 430 mm in fork length in the catch suggested limited recruitment (i.e., these size-classes should be fully vulnerable to 3.8 cm mesh size gill nets). Considering the absence of forage fish (i.e., whitefish and cisco species) in Tail Lake, it is likely that the small size-classes are consumed by the larger lake trout. This scarcity of small fish was also reported during previous studies of Tail Lake, when fish smaller than 430 mm in fork length contributed only 2.5% to the total catch (RL&L/Golder 2002).

Length-Weight Relationship

The length-weight regression equation for lake trout captured in Tail Lake (Appendix C13) was:

log Weight (g) = -2.116 + 1.941 log Fork Length (mm) (n=203; r^2=0.375).

The relatively low correlation coefficient (r^2=0.375) suggested high variability in length-weight relationship among individual fish; it was also greatly influenced by the narrow size range of the captured fish. The mean condition factor was 0.95; condition factors for individual fish ranged from 0.59 to 1.31 (Appendix C5).

Sexual Maturity

Of the 27 lake trout sampled for sex and maturity, nine were females and 18 were males. All examined fish were mature. Whereas only two females exhibited signs of development for the current spawning season (i.e., fully developed ovaries), all mature males were ready to spawn in fall 2002. The smallest mature female and male were 532 and 519 mm in fork length, respectively.

Diet

Lake trout diet in Tail Lake was comprised of a variety of aquatic invertebrates. Within 12 stomachs examined, only three were empty, and the mean fullness index was high (60%). Tadpole shrimp (order Notostraca) was the main food item in the diet and contributed 92% to the total food volume (Appendix C9). Zooplankton, amphipods, and coleopteran (beetles) were also encountered in the stomachs.

4.5.3 Lake Trout Population Estimate

Estimations of the population size of lake trout within Tail Lake were accomplished via mark and recapture methods. Mark and recapture methods involve capturing fish from the population, marking them, and releasing them to mix with the unmarked population. Resampling is then conducted to determine the proportion of marked individuals within the total catch. Population size estimates of lake trout inhabiting Tail Lake were generated using two mathematical approaches: the Petersen method and the Schnabel method (Krebs 1989).

The Petersen method is the simpler method of the two, because it is based on a single marking episode and a single recapturing episode. The formula for calculating population size using the Petersen method is as follows:

$$N = (M + 1)(C + 1)/(R + 1) – 1$$

where N = estimate of population size
M = number of individuals marked in first sample
C = total number of individuals captured in second sample
R = number of individuals in second sample that are marked

Previous attempts at generating a population estimate for Tail Lake were conducted during 17-19 August 2000, when 128 lake trout were marked and released, but none were recaptured during those three days. Sampling during the present study (21 to 26 August 2002) resulted in the capture of 203 individual lake trout, nine of which were recaptures of fish marked in 2000, and 194 were unmarked.

Application of these numbers (M = 128, C = 203, and R = 9) to the Petersen Population Estimate yields an population size estimate of 2631 fish, with a 95% confidence interval from 1461 to 4758 fish. If mortality of marked fish is considered, then the pool of marked fish within Tail Lake would have diminished over time. Assuming a 10% mortality of tagged fish between the tagging session in 2000 and the recapture session in 2002, application of the Petersen Population Estimate yields an estimate of 2365 fish, with a 95% confidence interval from 1313 to 4275 fish (Table 4.5). Age data for lake trout from Tail Lake indicate a very slow growing population; therefore, the assumption of 10% mortality rate over two years is likely an overestimate.

Table 4.5 Lake trout population estimates for Tail Lake, 2002.

Lake Trout	Petersen[a]		Schnabel[b]	
	Population Estimate	95% Confidence Interval	Population Estimate	95% Confidence Interval
No Mortality	2631	1461 - 4758	2632	1725 - 5511
10% Mortality	2365	1313 - 4275	2454	1608 - 5139

[a] based on fish marked in 2000 and recaptured in 2002

[b] based on fish marked in 2000 and 2002 and recaptured in 2002

The Schnabel method, which is based on multiple mark and recapture episodes, is a more complex method than the Petersen method. The main difference between the two methods is that the Schnabel method includes new fish that are being marked during each capture episode.

If the Schnabel Population Estimate is applied, then recaptures of fish tagged and recaptured during the present study (n=4) can be incorporated with the recaptures of nine fish tagged during 2000 and recaptured in 2002. If no tagged fish mortalities are assumed to have occurred between 2000 and 2002, the Schnabel Population Estimate is 2632 fish, with a 95% confidence interval from 1725 to 5511 fish. When 10% mortality is assumed, the population estimate is 2454 fish, with a 95% confidence interval from 1608 to 5139. Due to the low number of recaptured fish, the resulting 95% confidence intervals are quite large for either method.

Lake trout population size estimated by both methods and both assumptions (i.e., no mortality and 10% mortality) produced similar results of approximately 2350 to 2650 fish inhabiting Tail Lake; however, due to large 95% confidence intervals, the population size could be as low as 1300 fish or as great as 5500 fish.

4.6 PELVIC LAKE

Gill nets were set in Pelvic Lake on 28 August 2002 to determine whether the two "subpopulations" of cisco reported in this lake by Rescan (1999a) were in fact representatives of two different species: cisco (*Coregonus artedi*) and least cisco (*Coregonus sardinella*).

The catch rates, length-frequency distributions, size statistics, diet, and sex/maturity data for fish species sampled in Pelvic Lake are summarized in Appendices C3 to C9; data from individual fish are presented in Appendix C16.

4.6.1 Species Composition and Relative Abundance

In total, 300 fish, representing four species, were captured in Pelvic Lake (Table 4.5). Least cisco was the predominant species in the overall catch (54%), followed by lake whitefish (31%), lake trout (11%), and cisco (5%). One lake trout (sample #549) was a recapture of a fish originally tagged in 1998 (Appendix C16).

Table 4.5 Numbers of fish captured by gill nets in Pelvic Lake, 2002.

Mesh Size (cm)	Effort (m^2 / 24 h)	Lake trout	Lake whitefish	Cisco	Least cisco	Total
3.8	183	21	53	12	161	**247**
8.9	58	12	39	2		**53**
Total	241	33	92	14	161	**300**

Due to the large numbers of small-sized fish (particularly least cisco) in the gill net catch, the mean CPUE value for 3.8 cm mesh size was higher than the CPUE for 8.9 cm mesh size (135 and 91 fish/100 m^2/24 h, respectively). The mean catch rate during sampling with 3.8 cm mesh gill nets in 1998 (400 fish/100m^2/24 h; Rescan 1999a data summarized in RL&L/Golder 2002) was approximately three times higher than the corresponding catch rate during the present study.

4.6.2 Life History Data

4.6.2.1 Lake Trout

Size Distribution

The measured lake trout captured in Pelvic Lake (*n*=32) ranged from 431 mm to 850 mm in fork length (mean of 596 mm; Appendix C5). The length-distribution pattern exhibited one distinct mode composed of fish in the 430 to 469 mm size-range, which represented 31% of the total catch. (Figure 4.5)

Age and Growth

Lake trout captured in Pelvic Lake in 2002 were not aged; however, the recapture of one fish originally tagged in August 1998 showed a growth of only 13 mm in fork length over the four-year period. This fish was 22 years of age and 476 mm in fork length in August 1998.

Sexual Maturity

Of the 33 lake trout captured, only two exhibited external signs of sexual maturity. Both were males (489 and 820 mm in fork length) that released milt during examination.

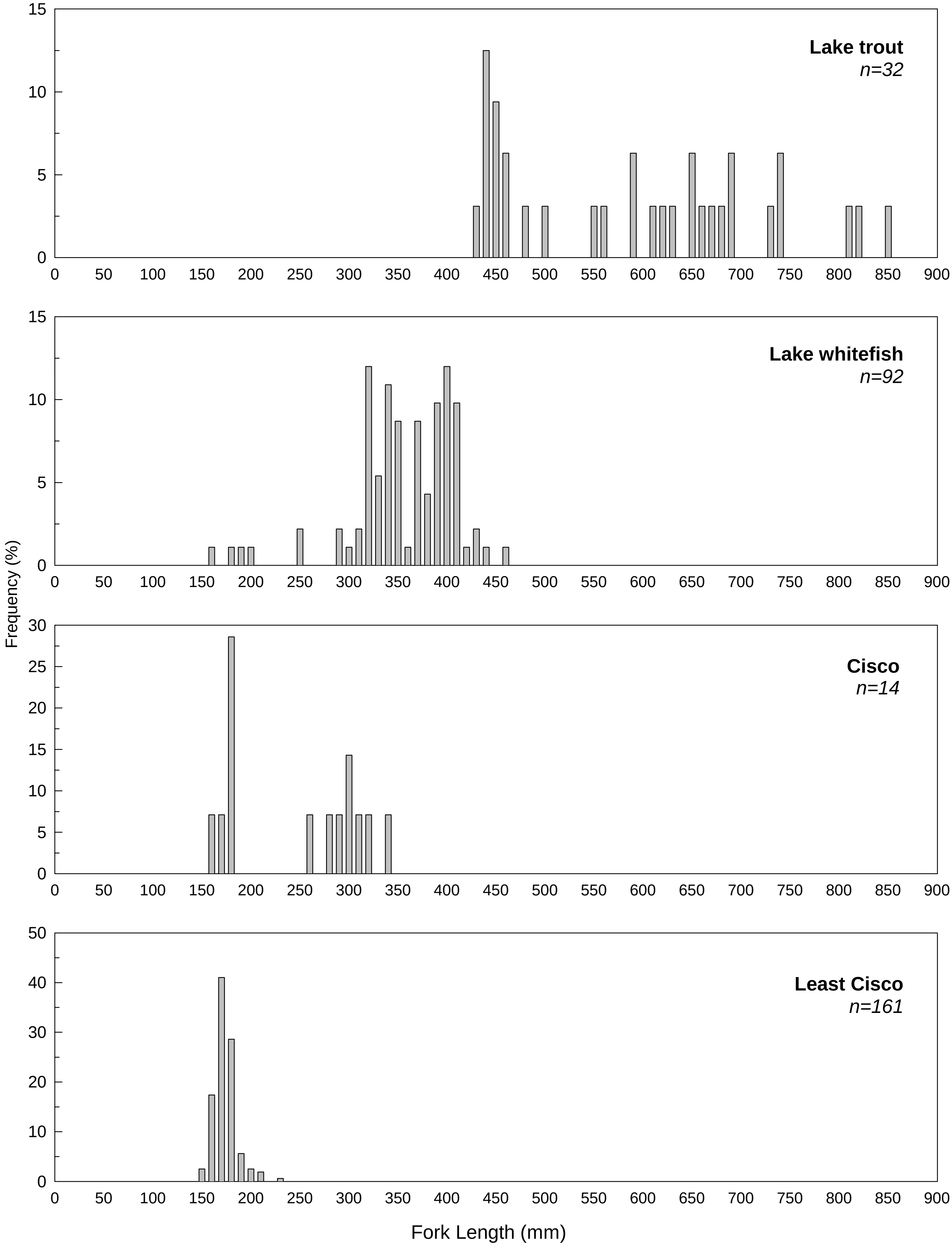


Figure 4.5 Length-frequency distribution of lake trout, lake whitefish, cisco, and least cisco captured in Pelvic Lake, 2002.

4.6.2.2 Lake Whitefish

Size Distribution

Lake whitefish captured in Pelvic Lake (*n*=92) ranged from 164 mm to 466 mm in fork length, with a mean of 360 mm (Appendix C5). Most (83%) fish were within the 320 to 419 mm size range (Figure 4.5). Juvenile lake whitefish smaller than 260 mm in fork length were also captured; they contributed 7% to the total catch.

Sexual Maturity

Four lake whitefish (three males and one female) were examined for sexual maturity characteristics. All were immature. The largest immature male was 342 mm in fork length, whereas the female was 412 mm in fork length (Appendix C8).

4.6.2.3 Cisco

Size Distribution

Cisco captured in Pelvic Lake (*n*=14) ranged from 164 mm to 344 mm in fork length, with a mean of 251 mm (Appendix C5). The length-distribution pattern exhibited two distinct modes (Figure 4.5). One mode was composed of fish in the 160 to 189 mm size range (43% of the catch), whereas the second mode was composed of fish in the 250 to 349 mm size range (57% of the catch).

Sexual Maturity

Six cisco (four females and two males) were examined for sexual maturity characteristics. Two fish (one female and one male) were mature and ready to spawn in fall 2002. Whereas the mature female and male were 300 and 304 mm, respectively, in fork length, the largest immature fish was 294 mm in fork length, suggesting that maturity is attained at a size of approximately 300 mm (Appendix C8).

4.6.2.4 Least Cisco

Size Distribution

Least cisco captured in Pelvic Lake (*n*=161) ranged from 154 mm to 232 mm in fork length, with a mean of 178 mm (Appendix C5). Most (70%) of the fish were within a narrow size range of 170 to 189 mm in fork length (Figure 4.5)

Sexual Maturity

Forty-three least cisco from Pelvic Lake (22 females and 19 males) were examined for sexual maturity characteristics. Within the sample of females, 19 fish were mature and three were immature. All mature females exhibited signs of readiness for the 2002 spawning season. The smallest mature female was 174 mm in fork length, whereas the largest immature female was 178 mm in fork length. All sampled males were mature and ranged from 163 to 232 mm in fork length (Appendix C8). These data suggested that sexual maturity in least cisco was attained at a size of approximately 160 to 180 mm in fork length.

The difference in size-at-maturity between cisco and least cisco was the main reason why Rescan (1999a) suggested the existence of two subpopulations of cisco in Pelvic Lake. The two species are similar in appearance; however, they can be distinguished by the position of the pelvic fin relative to the snout and caudal peduncle (Scott and Crossman 1973).

4.7 ROBERTS BAY

Fish use of near-shore habitats in Roberts Bay was assessed by sampling with a fyke net installed at two locations in the vicinity of one of the proposed barge off-loading sites on the west side of the bay (Figure 1.2).

The catch rates, length-frequency distributions, size statistics, diet, and sex/maturity data for fish species sampled in Roberts Bay are summarized in Appendices C2 to C9; data from individual fish are presented in Appendix C16.

4.7.1 Species Composition and Relative Abundance

In total, 136 fish comprised of five species were captured in Roberts Bay between 27 August and 3 September 2002 (Table 4.6). Saffron cod was the predominant species in the overall catch (86%). Greenland cod contributed 12% to the total catch. Also captured were single specimens of Arctic char, fourhorn sculpin, and banded gunnel.

Table 4.6 Numbers of fish captured at two fyke net locations in Roberts Bay, 2002.

Capture Location	Arctic char	Saffron cod	Greenland cod	Fourhorn sculpin	Banded gunnel	Total
FN3		45	12	1[a]	1	**59**
FN4	1	72	4			**77**
Total	1	117	16	1	1	**136**

[a] captured by hand from tidal pools on shore

4.7.2 Life History Data

4.7.2.1 Arctic Char

The only Arctic char captured in a fyke net in Roberts Bay was 264 mm in fork length and weighted 189 g (Appendix C5). It was four years old and an immature male. There were no food items in its stomach.

In addition to the Arctic char captured in a fyke net, another small Arctic char (215 mm in fork length) was encountered in the stomach of a Greenland cod.

4.7.2.2 Saffron Cod

Size Distribution

Saffron cod captured in Roberts Bay (*n*=117) ranged from 100 mm to 435 mm in fork length, with a mean of 259 mm (Appendix C5). The length-distribution pattern exhibited several modes within this range (Figure 4.6). The largest mode (38% of the total catch) was composed of fish between 250 and 299 mm in fork length.

Length-Weight Relationship

The length-weight regression equation for saffron cod captured in Roberts Bay (Appendix C14) was:

log Weight (g) = -5.570 + 3.167 log Fork Length (mm) (n=108; r^2=0.995).

The mean condition factor was 0.68; condition factors for individual fish ranged from 0.51 to 0.84 (Appendix C5).

4.7.2.3 Greenland Cod

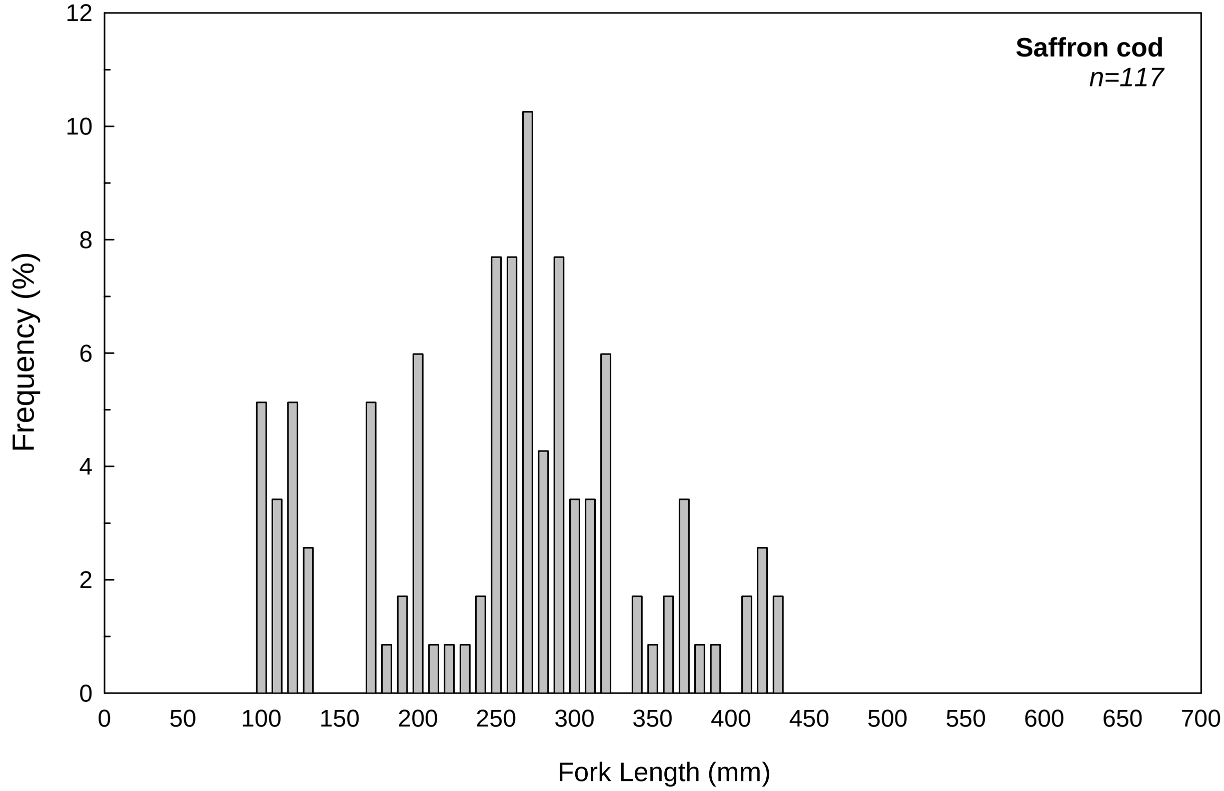
Size Distribution

Greenland cod captured in Roberts Bay (*n*=16) ranged from 95 mm to 652 mm in fork length, with a mean of 265 mm (Appendix C5). The length-distribution pattern exhibited two modes (Figure 4.6). One mode (56% of the catch) was composed of immature fish from 90 to 159 mm in fork length. The second mode (25% of the catch) was composed of larger fish between 440 and 469 mm in fork length.

Length-Weight Relationship

The length-weight regression equation for Greenland cod (Appendix C15) was:

log Weight (g) = -5.835 + 3.350 log Fork Length (mm) (n=16; r^2=0.997).



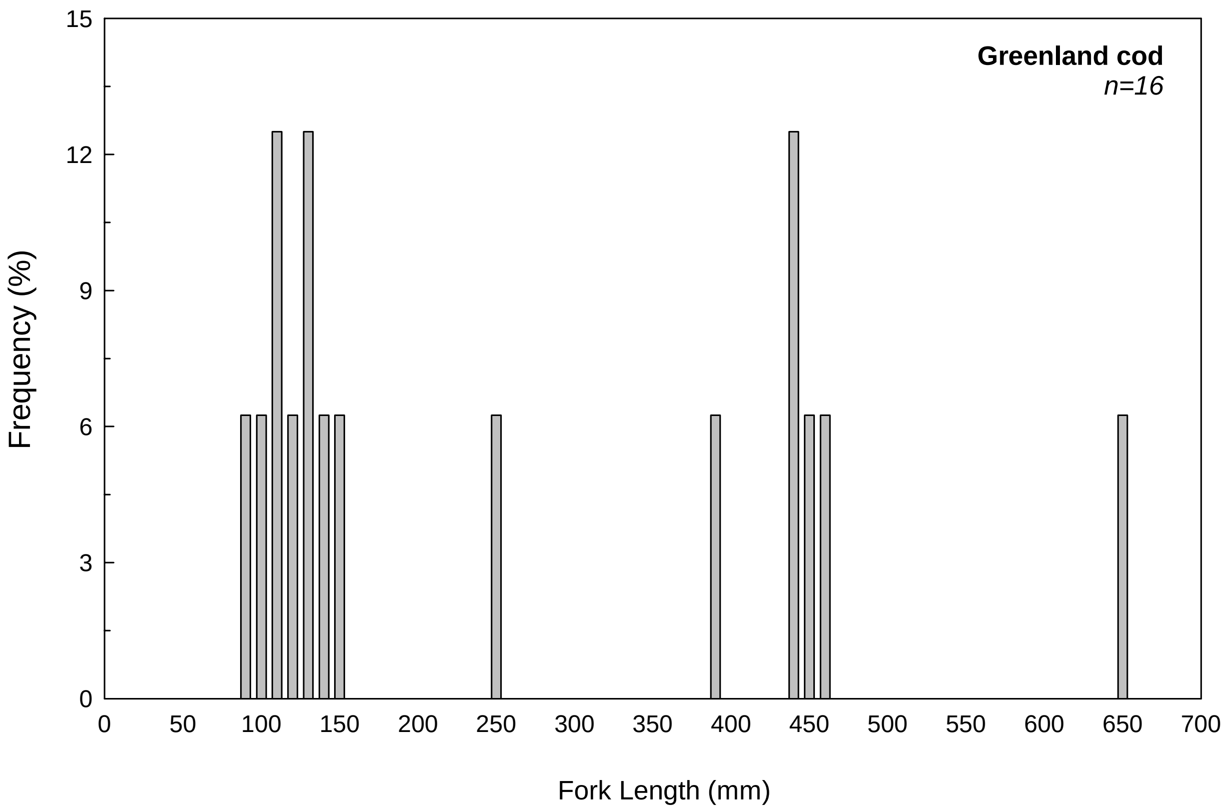


Figure 4.6 Length-frequency distribution of saffron cod and Greenland cod captured in Roberts Bay, 2002.

The mean condition factor was 0.98; condition factors for individual fish ranged from 0.58 to 1.49 (Appendix C5).

Sexual Maturity

Three Greenland cod were examined for sexual maturity. Two were mature males (445 and 463 mm in fork length) and one was a mature female (652 mm in fork length).

4.7.2.4 Fourhorn Sculpin

A single fourhorn sculpin was captured in Roberts Bay. This fish was 115 mm in total length and weighed 13 g.

4.7.2.5 Banded Gunnel

A single specimen of banded gunnel was captured in Roberts Bay (Plate 11). It was 245 mm in total length and weighed 38 g, resulting in a low condition factor of 0.26. Banded gunnel inhabit inshore or intertidal regions, however little is known about their life history or ecology. The captured specimen was close to the maximum size record (267 mm total length) reported for this species in Canadian waters (Leim and Scott 1966).

4.8 SUMMARY

In total, 978 fish representing ten species were captured in the Doris North Project area during fisheries surveys conducted in August and September 2002 (Table 4.7). Sampling was conducted in Roberts, Little Roberts, Tail and Pelvic lakes; in Roberts Ouflow; and in the marine environments of Roberts Bay. The captured species included (in the order of abundance in the total catch) lake trout (30.3%), Arctic char (18.2%), lake whitefish (17.5%), least cisco (17.2%), saffron cod (12%), cisco (3%), Greenland cod (1.6%) and single specimens of banded gunnel, broad whitefish, and fourhorn sculpin.

The Roberts Lake system (Roberts Lake, Little Roberts Lake and their outflow streams) was determined to be a migratory corridor between marine and freshwater environments for spawning and overwintering Arctic char. A fish fence with a trap to capture upstream migrants was operated in Roberts Outflow between 16 and 30 August. In total, 85 Arctic char were trapped at the fish fence; however, trap efficiency was compromised on three occasions by interference from grizzly bears. Fifty-five Arctic char were also captured by hand from a natural “trap” provided by the boulder garden at the upstream end of Roberts Outflow. In addition, 28 Arctic char were captured in a fyke net installed between the boulder garden and Roberts Lake; however, several of these fish were juveniles that appeared to be using the habitat at the lake/stream interface and were likely not migrating from the marine environment.

Table 4.7 Summary of fish captures in Doris North Project area, 2002.

Species	Roberts Outflow	Roberts Lake	Little Roberts Lake	Tail Lake	Pelvic Lake	Roberts Bay	Total
Arctic char	168	3	6			1	**178**
Lake trout	18	40	2	203	33		**296**
Lake whitefish		79			92		**171**
Broad whitefish	1						**1**
Cisco		15			14		**29**
Least cisco		6	1		161		**168**
Saffron cod						117	**117**
Greenland cod						16	**16**
Fourhorn sculpin						1	**1**
Banded gunnel						1	**1**
Total	187	143	9	203	300	136	**978**

The Roberts Lake system (Roberts Lake, Little Roberts Lake and their outflow streams) was determined to be a migratory corridor between marine and freshwater environments for spawning and overwintering Arctic char. A fish fence with a trap to capture upstream migrants was operated in Roberts Outflow between 16 and 30 August. In total, 85 Arctic char were trapped in the fish fence trap; however, trap efficiency was compromised on three occasions by interference from grizzly bears. Fifty-five Arctic char were also captured by hand from a natural "trap" provided by the boulder garden at the upstream end of Roberts Outflow. In addition, 28 Arctic char were captured in a fyke net installed between the boulder garden and Roberts Lake; however, several of these fish were juveniles that appeared to be using the habitat at the lake/stream interface and were likely not migrating from the marine environment.

In total, 168 Arctic char were captured in Roberts Outflow. Although most of these fish were adults, only four were ready to spawn in late fall 2002. The presence of only a small number of current year spawners was consistent with previous studies that indicated that a large proportion of spawning fish do not migrate to sea in the year that they spawn. As such, most of the fish captured in Roberts Outflow were Arctic char returning to Roberts Lake to overwinter after spending the summer feeding in the sea. Considering that the 2002 monitoring period was incomplete and interrupted by grizzly bears, the magnitude of the Arctic char run in Roberts Outflow could exceed 200 or 300 fish.

Fish sampling of Roberts Lake was conducted mainly to capture lake trout for tissue analysis. Sampling methods included gill netting, angling, and fyke netting In total, 143 fish comprised of five species were captured. Lake whitefish contributed most (55%) to the total catch, followed by lake trout (28%), cisco (11%), least cisco (4%), and Arctic char (2%). Of the three Arctic char captured, all were juveniles.

The fish community in Tail Lake is considerably different from the other Doris North area lakes, because it does not include whitefish and cisco species. This difference in species diversity is likely the result of Tail Lake's isolation from Doris Lake due to the diminutive size of Tail Outflow that connects these lakes.

Only lake trout (n=203) were captured in Tail Lake during intensive gill netting and angling program in 2002. A previous attempt to determine a population estimate for lake trout in Tail Lake (Rescan 2001) via mark-recapture methods was unsuccessful due to the lack of recaptures. The sampling program in 2002 resulted in recaptures of nine fish originally marked in 2000, as well as four fish marked in 2002. Based on these recapture events, the population size of lake trout in Tail Lake was estimated at 2350 to 2650 fish, depending on the use of different estimating methods and assumptions regarding fish mortality rates over the 2000 to 2002 period.

Sampling of Pelvic Lake was conducted to determine whether two "subpopulations" of cisco reported in this lake by Rescan (1999a) were in fact representatives of two different species: cisco (*Coregonus artedi*) and least cisco (*Coregonus sardinella*). Confirmation of the presence of both of these species was determined by using gill nets. In total, 300 fish were captured. Least cisco was the most abundant species in the catch (54%), followed by lake whitefish (31%), lake trout (11%), and cisco (5%). Based on the high ratio of least cisco to cisco in the 2002 catch, most of the cisco reported in Pelvic Lake by Rescan (1999a) were likely least cisco.

Roberts Bay is the final receiving waterbody for lakes in the Doris North Project area and the location of a proposed barge off-loading facility. Two sites were sampled with a fyke net to determine the fish species inhabiting the near-shore marine environments. In total, 136 fish comprised of five species were captured. Saffron cod was the predominant species in the overall catch (86%). Greenland cod contributed 12% to the total catch. Also captured were single specimens of Arctic char, fourhorn sculpin, and banded gunnel. In addition to the Arctic char juvenile captured in a fyke net, another small Arctic char was encountered in the stomach of a Greenland cod. Although most previous studies reported that Arctic char juveniles generally spend their first five years in freshwater habitats, the present captures of juvenile fish in the marine environment suggested that Roberts Bay may be used (to an unknown extent) for rearing purposes by Arctic char juveniles.

4.9 FISH TISSUES

To provide baseline data on metal concentrations in fish tissues, dorsal muscle, liver, and kidney samples were collected from Arctic char in Roberts Outflow and from lake trout in Roberts Lake. In total, 180 tissue samples were collected and analyzed (30 samples of each tissue type per species).

Because most of the analyzed metal constituents are not potential contaminants associated with the Doris North Project, they were not included in the following description, but are presented in Appendices D2 and D3. Metal constituents that were deemed to be suitable indicators included aluminum, arsenic, cadmium, copper, lead, mercury, nickel, selenium, and zinc. These metals were included because they are of potential concern in gold mining developments and from a human consumption perspective. The following sections briefly outline the significance of these constituents to aquatic environments and human health.

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 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).

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. Demersal (bottom dwelling) fish species are more likely to accumulate arsenic than pelagic (open water) species (Demayo et al. 1979). Arsenic concentrates mainly in the liver and is a cumulative toxin (Falk et al. 1973). Background concentrations of arsenic in most aquatic organisms generally are less than 1 µg/g wet weight (Eisler 1988) or less than 5 µg/g dry weight (assuming 80% moisture content). The Canadian Food Inspection Agency’s guidelines indicate that arsenic levels in fish tissues should not exceed 3.5 µg/g wet weight (http://www.inspection.gc.ca/english/anima/fispoi/guide/chme.shtml).

Cadmium

Cadmium is a relatively rare element, and is most often associated with copper, lead, and zinc. In sufficient concentrations, cadmium is toxic to plants and animals (Health Canada 1992). The rate of cadmium uptake in aquatic organisms is generally faster in hard waters, although cadmium toxicity decreases in hard water (Reeder et al. 1979). Cadmium does not bioaccumulate in the food web (Reeder et al. 1979). Cadmium concentrations exceeding 3 µg/L in water lead to high mortality of aquatic organisms, reduced growth, and inhibited reproduction

(Eisler 1985a). The main sources of cadmium pollution are industrial and municipal wastes. Other anthropogenic sources of cadmium include smelter dusts and fumes and fossil fuel incineration products (Health Canada 1992).

Copper

In contrast to the non-essential trace metals (e.g., arsenic, cadmium, mercury, lead), copper is an essential element with important biochemical functions; however, excessive amounts of copper are toxic to freshwater fish (Forstner 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 liver, muscle, and brain tissues (Demayo and Taylor 1981).

Lead

Lead is the most common of the heavy metals and is toxic to all forms of life. Lead does not appear to bioaccumulate. In aquatic ecosystems, lead concentrations are generally higher in benthic organisms and lower in organisms at higher trophic levels. Lead tends to deposit in bone (hard tissue) as a cumulative toxin (Falk et al. 1973). It is more toxic in soft water than in hard water (Demayo et al. 1980). Solid and liquid wastes account for a large percentage of the lead discharged into the Canadian environment, usually into landfills, but lead has been dispersed more widely in the general environment though atmospheric emissions (Health Canada 1992). The Canadian Food Inspection Agency’s guidelines indicate that lead levels in fish tissues should not exceed 0.5 µg/g wet weight (http://www.inspection.gc.ca/english/anima/fispoi/guide/chme.shtml).

Mercury

Mercury is a toxic element, which in fish tissue is most commonly present in the form of methyl mercury. Under anaerobic conditions in sediments, inorganic mercury can be processed by microorganisms into organic mercury compounds (most commonly in the form of methyl mercury). Methyl mercury can readily associate with suspended and organic matter and be taken up by aquatic organisms. It has a high affinity for lipids and is distributed to the fatty tissues of living organisms (Health Canada 1992). As such, methyl mercury bioaccumulates in the food chain, and tissues of the top predators may contain mercury levels that are unacceptable for human consumption (Health Canada 1992).

The average proportion of methyl mercury to total mercury increases from 10% in the water column to 15% in phytoplankton, 30% in zooplankton, and 90% or more in fish (Huckabee et al. 1979; Morel et al. 1998). High levels of mercury are common in reservoirs, as flooded terrestrial vegetation, which is rich in organic material, decomposes and stimulates the production of methyl mercury. Environmental conditions can influence the rate of methylation; these environmental conditions include water temperature, pH, dissolved oxygen, and sediment chemistry (Rudd and Turner 1983).

Mercury may enter the water column from three principal sources: 1) by direct deposition from the atmosphere, 2) in runoff from the drainage basin, or 3) by solubilization or suspension from the benthic sediments. Erosion of mercury-bearing rocks is the ultimate geological source of mercury, and also contributes to mercury loads in rivers.

Long-term daily ingestion of mercury has been found to cause the onset of neurological symptoms (Health Canada 1992). The Canadian Food Inspection Agency's guidelines (http://www.inspection.gc.ca/english/anima/fispoi/guide/chme.shtml) indicate that mercury levels in fish tissues should not exceed 0.5 µg/g wet weight, which is comparable to about 2.5 µg/g dry weight (assuming 80% moisture content).

Nickel

The toxicity of nickel increases with decreasing water hardness and increasing acidity (CCREM 1996). Nickel toxicity also increases when it is present with copper, likely as a result of synergism (Taylor et al. 1979). 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. Bowen (1966) considered 1 µg/g (dry weight) of nickel in fish tissue to be in the range of natural background levels.

Nickel concentrations tend to be highest in the vicinity of nickel smelters, sewage outfalls, coal ash disposal basins, and heavily populated areas (Eisler 1998). In fish, signs of nickel poisoning include rapid opercular and mouth movements, and surfacing. Loss of equilibrium and convulsions occur prior to death (Khangarot and Ray 1990).

Selenium

Selenium is an essential nutrient in low concentrations (Eisler 1985b); however, it is also a toxicant for humans and animals at concentrations slightly higher than those required (Chen 2000). Selenium is a naturally occurring trace element found commonly in rocks and soil, particularly in deposits of coal and other fossil fuels (Lemly and Smith 1987). Selenium is usually present in water as selenate or selenite; however, the elemental form may be carried in suspension (Health Canada 1992). Anthropogenic sources of selenium include irrigation waters from seleniferous soils, municipal and industrial wastewaters, fuel (coal and oil) combustion, mining, smelting, and refining (Nagpal and Howell 2001; Health Canada 1992).

Selenium has been found to bioaccumulate within the food chain (Nagpal and Howell 2001; Lemly and Smith 1987). In aquatic environments, organisms accumulate selenium from both water and food. The bioaccumulation of selenium through the diet, however, is usually greater than the direct uptake from water (Nagpal and Howell 2001; Lemly and Smith 1987). Most selenium (90%) that enters an aquatic ecosystem is taken up by organisms or bound to particulate matter, which results in its deposition and accumulation in the top layer of sediments and detritus.

Toxic effects of selenium include mortality of juvenile and adult fish and reproductive effects (Lemly and Smith 1987). Selenite tends to be more toxic at early life history stages (i.e., eggs and juveniles) and these effects are more pronounced when water temperature is elevated. Selenium concentrations greater than 0.005 mg/L in water can be bioconcentrated in food chains and cause toxicity and reproductive failure in fish (Lemly and Smith 1987). Juvenile and adult fish usually require higher concentrations of selenium in water before mortality occurs. Signs of selenium toxicity include losses of equilibrium, lethargy, muscle spasms, liver degeneration, reduction in erythrocytes and blood haemoglobin, and an increase in white blood cells (Eisler 1985b).

Lemly and Smith (1987) provided selenium levels of concern for fish and wildlife. They suggested that concentrations in water should not exceed 2 to 5 µg/L to protect fish and waterfowl. For food ingested by fish, they suggested that concentrations of 5 µg/g (dry weight) could cause toxic effects. Reproductive failure was found to occur in fish when concentrations exceeded 12 µg/g (dry weight) in whole body residue, 16 µg/g in visceral residue, and 8 µg/g in skeletal muscle residue.

Zinc

Zinc primarily affects gill epithelial tissues. In excessive amounts, it can cause outright mortality or induce stress that leads to death (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 (CCME 1999).

4.9.1 Methods

Fish Tissue Collection

Tissue samples were collected by angling and gill netting in Roberts Lake (lake trout) and by a fish fence trap and hand captures in Roberts Outflow (Arctic char). The fish were captured between 16 and 31 August 2002 and included Arctic char that were migrating from the sea into the Roberts Lake system.

All fish selected for tissue analyses were identified to species, measured for fork length (mm), weighed (g), examined for sex, maturity, and reproductive status, and dissected for ageing structures (otoliths) and tissues. The samples were collected following the procedures outlined in the British Columbia Field Sampling Manual (MELP 1996). A minimum of 20 g of muscle tissue was collected from each fish, as well as the complete kidney and liver (without the bile gland). Samples were individually stored in labelled, plastic Whirl-Pac bags and frozen until analysis. All samples were submitted to the laboratory within three weeks of their collection.

Laboratory

Fish tissue analyses were conducted by CanTest Ltd. (Burnaby, BC). All samples were digested using a nitric acid-hydrogen peroxide digestion procedure based on EPA Method 200.3. Analyses for most metals were performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS) based on EPA Method 200.8; the only exception was mercury, which was analyzed by Cold Vapour Atomic Flourescence Spectrophotometry (EPA Method 245.6). The detection limits and methods used for metal analyses are listed in Table 4.8. Some of the constituents had varying detection limits because of different dilution factors needed for samples that had a low volume of tissue (e.g., kidney samples). All results were reported as micrograms per gram on a dry weight basis.

Data Analyses

To allow statistical analyses of all sample data, metal constituent values that were below analytical detection limits were replaced with values that equaled one half the detection limit (Helsel and Hirsch 1992). These values were then used to calculate mean concentrations, standard deviation, and the range of individual sample concentrations (i.e., minimum and maximum values). The numbers of samples with values below the detection limit were also provided in the summary statistics tables.

Dry weight values for mercury, arsenic, and lead were converted to wet weight (using the reported moisture content of each sample) to allow comparison with the Canadian Food Inspection Agency’s guidelines, which are based on wet weight.

Table 4.8 Detection limits (μg/g dry weight) and methods used to analyze fish tissues for metals concentrations, Doris North Project area, 2002.

Metal	Detection Limits		Method
	Minimum	Maximum	
Aluminum	0.5	1	ICP/MS
Antimony	0.1	0.5	ICP/MS
Arsenic	0.1	0.3	ICP/MS
Barium	0.1	0.5	ICP/MS
Beryllium	0.02	0.1	ICP/MS
Boron	2	2	ICP/MS
Cadmium	0.02	0.02	ICP/MS
Calcium	1	1	ICP/MS
Chromium	0.1	0.5	ICP/MS
Cobalt	0.1	0.3	ICP/MS
Copper	0.1	0.1	ICP/MS
Iron	5	5	ICP/MS
Lead	0.1	0.5	ICP/MS
Magnesium	0.5	0.5	ICP/MS
Manganese	0.1	0.1	ICP/MS
Mercury	0.01	0.01	CVAFS
Molybdenum	0.1	0.5	ICP/MS
Nickel	0.1	0.3	ICP/MS
Phosphorus	0.5	0.5	ICP/MS
Potassium	1	1	ICP/MS
Selenium	0.2	0.2	ICP/MS
Silicon	10	30	ICP/MS
Silver	0.01	0.05	ICP/MS
Sodium	1	1	ICP/MS
Strontium	0.05	0.05	ICP/MS
Tellurium	0.1	0.5	ICP/MS
Thallium	0.02	0.06	ICP/MS
Tin	0.1	0.5	ICP/MS
Titanium	0.3	0.6	ICP/MS
Uranium	0.04	0.2	ICP/MS
Vanadium	0.5	2.5	ICP/MS
Zinc	0.5	0.5	ICP/MS
Zirconium	3	15	ICP/MS

ICP/MS = Inductively Coupled Plasma Mass Spectrometry
CVAFS = Cold Vapor Atomic Flourescence Spectrophotometry

As concentration of mercury in fish tissues tends to increase with increasing fish size and age (Bodaly et al. 1984), mercury concentrations were described in relation to fork length and age of fish. Mercury concentrations were presented on the dependent axis (Y) and the fork length and age of the fish on the independent axis (X). Because growth of fish (irrespective of age, weight, or length) is curvilinear, it would be inappropriate to apply linear regression techniques against non-linear data without first transforming the data. As such, length, age, and mercury data were transformed into logarithmic values prior to calculating the regression equations and the associated r^2 values.

4.9.2 Lake Trout in Roberts Lake

Lake trout captured for tissue analyses in Roberts Lake ranged from 384 to 913 mm in fork length and from 14 to 44 years in age (Table 4.9).

Table 4.9 Fork length, weight, and age of lake trout sampled for metal concentrations in Roberts Lake, 2002.

Species	*n*	Fork Length (mm)			Weight (g)			Age (years)		
		Mean	SD[a]	Range	Mean	SD	Range	Mean	SD	Range
Lake trout	*30*	629	154	384-913	3151	2129	717-10000	27.5	8.6	14-44

[a]standard deviation

Mean metal concentrations (including standard deviation, range, and number of samples below analytical detection limits) are provided for each species and tissue type in Appendix D1. The concentrations of 33 metal elements in individual tissue samples are presented in Appendix D2. The average concentrations of some of the potentially toxic trace metals (i.e., aluminum, arsenic, cadmium, copper, lead, mercury, nickel, selenium, and zinc) are summarized in Table 4.10.

Aluminum

Two thirds of lake trout muscle tissue samples contained aluminum levels above the detection limit. The mean concentration was 0.72 µg/g dry weight, with the maximum recorded level of 2.30 µg/g dry weight.

Mean aluminum concentrations in liver and kidney samples were considerably higher (14.0 and 30.4 µg/g dry weight, respectively) than in muscle tissues, with all samples exhibiting concentrations above the detection limit. The highest aluminum levels were 85.8 and 100 µg/g dry weight in liver and kidney samples, respectively. Mean aluminum levels reported in lake trout livers from other lakes sampled in 1997 and 1998 in the Doris North Project area (Rescan 1999b summarized in RL&L/Golder 2002) were higher than in Roberts Lake (ranged from 16.9 µg/g dry weight in Doris Lake to 72.5 µg/g dry weight in Windy Lake). Because the detection limits used in the previous studies were approximately 50 times higher than in 2002, aluminum levels in lake trout muscle tissues from Roberts Lake could not be compared to other previously studied lakes (i.e., all previous results were below the detection limit).

Table 4.10 Metal concentrations in lake trout tissues from Roberts Lake, 2002.

Tissue	Parameter	Metal Concentrations (µg/g dry weight)								
		Al	As	Cd	Cu	Pb	Hg	Ni	Se	Zn
Muscle	*n < D.L.*[a]	*10*	*0*	*30*	*0*	*30*	*0*	*30*	*0*	*0*
n=30	Mean	0.72	10.5	0.01	1.1	0.05	0.98	0.05	0.96	15.5
	SD[b]	0.47	19.8	0.00	0.2	0.00	0.68	0.00	0.40	1.8
	Minimum	0.25	0.2	0.01	0.8	0.05	0.13	0.05	0.50	12.3
	Maximum	2.30	81.0	0.01	1.6	0.05	2.41	0.05	2.10	19.5
Liver	*n < D.L*	*0*	*1*	*0*	*0*	*30*	*0*	*29*	*0*	*0*
n=30	Mean	14.0	1.5	0.18	49.4	0.05	1.66	0.06	6.18	116.8
	SD	19.8	1.6	0.20	31.0	0.01	1.39	0.03	4.08	26.2
	Minimum	1.7	0.1	0.02	4.3	0.05	0.06	0.05	2.30	74.5
	Maximum	85.8	6.6	0.97	106.0	0.10	4.97	0.20	17.20	170.0
Kidney	*n < D.L.*[a]	*0*	*8*	*0*	*0*	*30*	*0*	*18*	*0*	*0*
n=30	Mean	30.4	0.7	1.38	6.6	0.09	3.08	0.24	7.03	111.6
	SD	20.3	0.8	1.23	1.5	0.05	2.27	0.30	3.13	18.1
	Minimum	9.1	0.1	0.15	4.9	0.05	0.40	0.05	1.90	83.8
	Maximum	100.0	2.9	5.64	10.8	0.25	9.45	1.50	14.00	164.0

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

Arsenic

Arsenic levels in lake trout from Roberts Lake ranged from 0.05 to 81.0 µg/g. Mean concentrations were much higher in muscle (10.5 µg/g dry weight) than in liver and kidney tissues (1.5 and 0.7 µg/g dry weight, respectively). The percentages of samples below the detection limit were 0% for muscle, 3% for liver, and 27% for kidney samples.

Mean arsenic level in lake trout muscle tissues from Roberts Lake was considerably higher than those from the other sampled lakes within the Doris North Project area. Mean arsenic concentrations recorded in 1997 and 1998 ranged from 0.15 µg/g dry weight in Pelvic Lake to 0.39 µg/g dry weight in Patch Lake (RL&L/Golder 2002). The reasons for the elevated arsenic levels in Roberts Lake are not known; however, it is suspected that they may be related to the previous operations of the abandoned silver mine near the north shore of Roberts Lake.

The Canadian Food Inspection Agency's guidelines indicate that arsenic levels in fish tissues should not exceed 3.5 µg/g wet weight. Although the mean concentration of arsenic in lake trout muscle tissues from Roberts Lake (2.4 µg/g wet weight) was below this guideline, six of thirty (20%) sampled fish contained arsenic levels in excess of the guideline levels (Appendix D4). The arsenic levels in these six fish ranged from approximately two to five times higher than the recommended guideline (ranged from 6.5 to 18.3 µg/g wet weight).

Cadmium

All lake trout muscle tissue samples contained cadmium levels below the detection limit. Cadmium concentrations in liver and kidney samples were considerably higher, with all samples exhibiting concentrations above the detection limit. Mean cadmium level was 0.18 µg/g dry weight in liver samples and 1.38 µg/g dry weight in the kidney samples. The maximum cadmium levels recorded were 0.97 and 5.64 µg/g dry weight in liver and kidney samples, respectively. These levels were similar to those reported in lake trout tissues from other lakes in the Doris North Project area (RL&L/Golder 2002).

Copper

All lake trout tissue samples contained copper levels above the detection limit of 0.1 µg/g dry weight. Mean concentration of copper in lake trout liver samples (49.4 µg/g dry weight) was approximately 45 times higher than in the muscle samples (1.1 µg/g dry weight) and seven times higher than in the kidney samples (6.6 µg/g dry weight). The maximum copper concentrations in individual samples were 106, 10.8, and 1.1 µg/g dry weight in liver, kidney, and muscle samples, respectively. These levels were lower or similar to those reported in lake trout tissues from other lakes in the Doris North Project area (RL&L/Golder 2002).

Lead

All tissue samples collected from lake trout in Roberts Lake had lead concentrations below the detection limits, which ranged from 0.1 to 0.5 µg/g dry weight. Converted to wet weight, these detection limits corresponded to approximately 0.02 to 0.1 µg/g wet weight; this was at least five times lower than the Canadian Food Inspection Agency's guideline of 0.5 µg/g wet weight. All lake trout lead levels reported from other lakes in the Doris North Project area were also below the detection limits (RL&L/Golder 2002).

Mercury

Mercury levels in lake trout muscle tissues ranged from 0.13 to 2.41 µg/g dry weight; the mean concentration was 0.98 µg/g dry weight. The maximum mercury level recorded corresponded to 0.55 µg/g wet weight and was the only lake trout muscle sample that exceeded the federal guidelines for human consumption (0.5 µg/g wet weight; Appendix D4).

Mercury levels in lake trout liver tissues were higher than in muscle tissues, and ranged from 0.06 to 4.97 µg/g dry weight; the mean concentration was 1.66 µg/g dry weight. Eight of 30 liver samples (27%) exceeded the federal guidelines for human consumption (0.5 µg/g wet weight).

The highest mercury levels were recorded in lake trout kidney tissues. They ranged from 0.05 to 9.45 µg/g dry weight, with the mean concentration of 3.08 µg/g dry weight. Almost half of the kidney samples (47%) exceeded the federal guidelines for human consumption (0.5 µg/g wet weight).

Because mercury is known to bioaccumulate in fish, mercury concentrations in muscle, liver, and kidney tissues were regressed against age and fork length to determine the strength of these relationships and to allow comparisons with future monitoring studies (Figure 4.7). The correlation coefficients (r^2; the closer to 1, the better the relationship) ranged between 0.317 (muscle concentration versus age) and 0.568 (kidney concentration versus fork length), indicating a poor relationship between the variables.

In comparison to other lakes in the Doris North Project area, mean mercury level in lake trout muscle tissues from Roberts Lake (0.98 µg/g dry weight) was lower than those reported previously from Patch, Pelvic, and Doris lakes (1.91, 1.48, and 1.45 µg/g dry weight), but higher than in Windy Lake (0.18 µg/g dry weight).

Nickel

All lake trout muscle tissue samples contained nickel levels below the detection limit. Nickel concentrations in liver and kidney samples were slightly higher, with 3% of liver and 40% of kidney samples exhibiting concentrations above the detection limit. Mean nickel concentrations were 0.06 µg/g dry weight in liver samples and 0.24 µg/g dry weight in the kidney samples. The maximum nickel levels recorded were 0.2 and 1.5 µg/g dry weight in liver and kidney samples, respectively. These levels were similar to those reported in lake trout tissues from Tail Lake in 1995 (Klohn Crippen 1995). The high detection limits used during 1997 and 1998 studies of fish tissues in the Doris North Project area (approximately 5 µg/g dry weight) resulted in all nickel levels below detection (Rescan 1999b summarized in RL&L/Golder 2002).

Selenium

Selenium levels in lake trout muscle tissues ranged from 0.5 to 2.1 µg/g dry weight; the mean concentration was 0.96 µg/g dry weight. In lake trout liver tissues, selenium concentrations were approximately six times higher than in muscle tissues, and they ranged from 2.3 to 17.2 µg/g dry weight (mean of 6.18 µg/g dry weight). Mean selenium levels in the kidneys were slightly higher

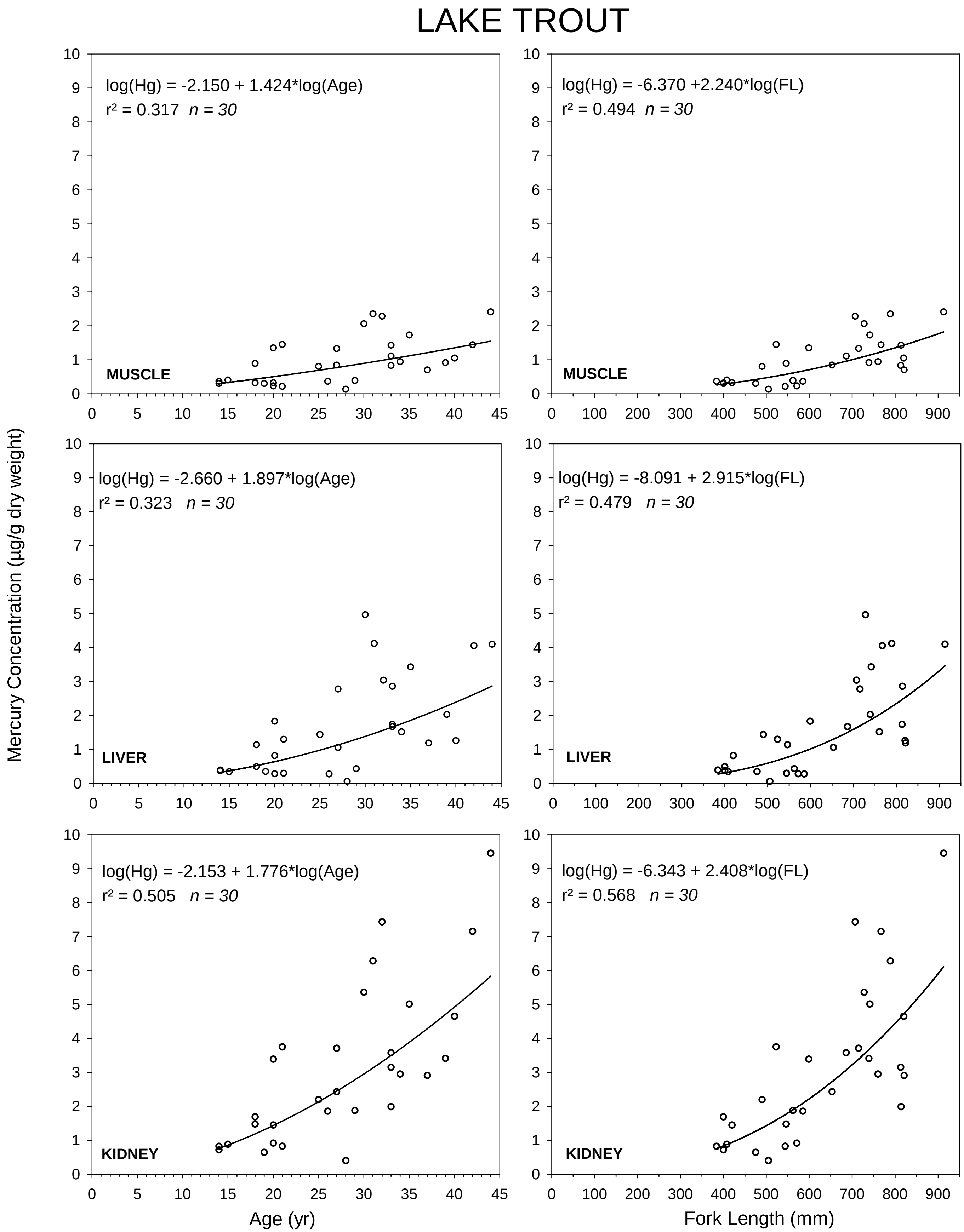


Figure 4.7 Mercury concentrations in lake trout muscle, liver, and kidney tissues from Roberts Lake plotted versus fish age and fork length, 2002.

(7.03 µg/g dry weight) with individual fish ranging between 1.9 and 14.0 µg/g dry weight. The selenium levels recorded in Roberts Lake in 2002 were lower or similar to those reported in lake trout tissues from other lakes in the Doris North Project area (RL&L/Golder 2002).

Zinc

Zinc levels in lake trout muscle tissues ranged from 12.3 to 19.5 µg/g dry weight; the mean concentration was 15.5 µg/g dry weight. In lake trout liver tissues, mean zinc concentrations (116.8 µg/g dry weight) were approximately eight times higher than in muscle tissues. Mean zinc levels in the kidneys (111.6 µg/g dry weight) were similar to the liver concentrations. The maximum zinc levels recorded in lake trout livers and kidneys were 170 and 164 µg/g dry weight, respectively. These levels were similar to those reported in lake trout tissues from other lakes in the Doris North Project area (RL&L/Golder 2002).

4.9.3 Arctic Char in Roberts Outflow

Arctic char captured for tissue analyses in Roberts Outflow ranged from 564 to 841 mm in fork length and from 8 to 13 years in age (Table 4.11).

Table 4.11 Fork length, weight, and age of Arctic char sampled for metal concentrations in Roberts Outflow, 2002.

Species	*n*	Fork Length (mm)			Weight (g)			Age (years)		
		Mean	SD[a]	Range	Mean	SD	Range	Mean	SD	Range
Arctic char	*30*	718	154	564-841	4444	1619	2391-7200	10.4	1.6	8-13

[a]standard deviation

Mean metal concentrations (including standard deviation, range, and number of samples below analytical detection limits) are provided for each species and tissue type in Appendix D1. The concentrations of 33 metal elements in individual tissue samples are presented in Appendix D2. The average concentrations of some of the potentially toxic trace metals (i.e., aluminum, arsenic, cadmium, copper, lead, mercury, nickel, selenium, and zinc) are summarized in Table 4.12.

Aluminum

Approximately one third (*n*=11) of Arctic char muscle tissue samples contained aluminum levels above the detection limit of 0.5 µg/g dry weight. The mean concentration was 0.53 µg/g dry weight, with the maximum recorded level of 2.0 µg/g dry weight.

Table 4.12 Metal concentrations in Arctic char tissues from Roberts Outflow, 2002.

Tissue	Parameter	Metal Concentrations (µg/g dry weight)								
		Al	As	Cd	Cu	Pb	Hg	Ni	Se	Zn
Muscle	*n < D.L.*[a]	*19*	*0*	*30*	*0*	*30*	*0*	*30*	*0*	*0*
n=30	Mean	0.53	8.6	0.01	1.6	0.05	0.081	0.05	1.8	14.1
	SD[b]	0.50	3.6	0.00	0.3	0.00	0.023	0.00	0.2	1.5
	Minimum	0.25	3.8	0.01	1.2	0.05	0.042	0.05	1.3	10.9
	Maximum	2.00	17.7	0.01	2.4	0.05	0.133	0.05	2.1	16.5
Liver	*n < D.L*	*28*	*0*	*0*	*0*	*30*	*0*	*29*	*0*	*0*
n=30	Mean	0.32	6.2	0.22	29.1	0.05	0.099	0.06	7.2	68.5
	SD	0.26	1.7	0.16	18.4	0.01	0.052	0.05	2.0	17.3
	Minimum	0.25	2.5	0.06	5.0	0.05	0.039	0.05	3.6	40.8
	Maximum	1.40	9.9	0.81	73.3	0.10	0.228	0.3	11.6	97.1
Kidney	*n < D.L.*[a]	*9*	*0*	*0*	*0*	*30*	*0*	*10*	*0*	*0*
n=30	Mean	1.31	3.1	1.26	8.9	0.09	0.329	0.22	6.4	127.8
	SD	1.32	0.8	0.59	2.0	0.05	0.101	0.18	1.7	26.2
	Minimum	0.25	1.7	0.38	6.1	0.05	0.194	0.05	3.8	97.1
	Maximum	5.40	5.1	2.75	14.2	0.25	0.610	0.7	10.6	214.0

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

Mean aluminum concentration in liver samples (0.32 µg/g dry weight) was lower than in muscle samples, whereas mean concentration in the kidneys were the highest among the three tissue types (1.31 µg/g dry weight). Twenty-eight liver samples and nine kidney samples were below detection limits. The highest aluminum levels were 5.40 and 1.40 µg/g dry weight in kidney and liver samples, respectively.

Arsenic

Arsenic levels in Arctic char tissues from Roberts Outflow ranged from 1.7 to 17.7 µg/g. Mean concentrations in muscle (8.6 µg/g dry weight) were higher than in liver and kidney tissues (6.2 and 3.1 µg/g dry weight, respectively). All of the samples were above the detection limit.

Mean arsenic level in Arctic char muscle tissues from Roberts Outflow was similar to mean arsenic level in lake trout muscle tissue from Roberts Lake (8.6 and 10.5 µg/g dry weight, respectively). However, mean arsenic concentrations in either species from this drainage were much higher than mean concentrations recorded in lake trout muscle tissues from other Doris North Project area lakes in 1997 and 1998 (0.15 to 0.39 µg/g dry weight). Similar to the elevated arsenic levels observed in lake trout from Roberts Lake, the elevated arsenic levels in Arctic char from Roberts Outflow may be related to the previous operations of the abandoned silver mine near the north shore of Roberts Lake.

The Canadian Food Inspection Agency’s guidelines indicate that arsenic levels in fish tissues should not exceed 3.5 µg/g wet weight. The mean concentration of arsenic in Arctic char muscle tissues from Roberts Outflow (3.6 µg/g wet weight) was above this guideline. Four of 30 (13%) sampled fish contained arsenic levels in excess of the guideline levels (Appendix D4). The arsenic levels in these four fish (ranged from 3.8 to 5.2 µg/g wet weight) were approximately 1.1 to 1.5 times higher than the recommended guideline.

Cadmium

All Arctic char muscle tissue samples contained cadmium levels below the detection limit. Cadmium concentrations in liver and kidney samples were considerably higher, with all samples exhibiting concentrations above the detection limit. Mean cadmium level was 0.22 µg/g dry weight in liver samples and 1.26 µg/g dry weight in the kidneys. The maximum cadmium levels recorded were 0.81 and 2.75 µg/g dry weight in liver and kidney samples, respectively. These levels were similar to those reported in lake trout tissues from Roberts Lake during this study.

Copper

All Arctic char tissue samples contained copper levels above the detection limit of 0.1 µg/g dry weight. Mean concentration of copper in Arctic char liver samples (29.1 µg/g dry weight) was approximately 18 times higher than in the muscle samples (1.6 µg/g dry weight) and three times higher than in the kidney samples (8.9 µg/g dry weight). The maximum copper concentrations in individual samples were 73.3, 14.2, and 2.4 µg/g dry weight in liver, kidney, and muscle samples, respectively.

Lead

All tissue samples collected from Arctic char in Roberts Outflow had lead concentrations below the detection limits, which ranged from 0.1 to 0.5 µg/g dry weight. Converted to wet weight, these detection limits corresponded to approximately 0.02 to 0.1 µg/g wet weight; this was at least five times lower than the federal guideline of 0.5 µg/g wet weight.

Mercury

Mercury levels in Arctic char muscle tissues ranged from 0.042 to 0.133 µg/g dry weight; the mean concentration was 0.081 µg/g dry weight. The maximum mercury level recorded corresponded to 0.036 µg/g wet weight, which was far below the federal guideline for human consumption (0.5 µg/g wet weight; Appendix D4).

Mercury levels in Arctic char liver tissues were higher than in muscle tissues and ranged from 0.039 to 0.228 µg/g dry weight; the mean concentration was 0.099 µg/g dry weight.

The highest mercury levels were recorded in Arctic char kidney tissues. They ranged from 0.194 to 0.610 µg/g dry weight, with the mean concentration of 0.329 µg/g dry weight.

Because mercury is known to bioaccumulate in fish, mercury concentrations in muscle, liver, and kidney tissues were regressed against age and fork length to determine the strength of these relationships and to allow comparisons with future monitoring studies (Figure 4.8). The correlation coefficients ranged between 0.125 (muscle versus age) and 0.357 (kidney versus fork length), indicating that concentrations of mercury in Arctic char tissues were mostly independent of the age and size of individual fish.

Nickel

All Arctic char muscle tissue samples contained nickel levels below the detection limit (0.1 µg/g dry weight). Nickel concentrations in liver and kidney samples were slightly higher, with 3% of liver and 67% of kidney samples exhibiting concentrations above the detection limit. Mean nickel level was 0.06 µg/g dry weight in liver samples and 0.22 µg/g dry weight in the kidneys. The maximum nickel levels recorded were 0.3 and 0.7 µg/g dry weight in liver and kidney samples, respectively.

Selenium

Selenium levels in Arctic char muscle tissues ranged from 1.3 to 2.1 µg/g dry weight; the mean concentration was 1.8 µg/g dry weight. In Arctic char liver tissues, selenium concentrations were approximately four times higher than in muscle tissues and ranged from 3.6 to 11.6 µg/g dry weight (mean of 7.2 µg/g dry weight). Mean selenium levels in the kidneys were slightly lower (6.4 µg/g dry weight), with individual fish ranging between 3.8 and 10.6 µg/g dry weight.

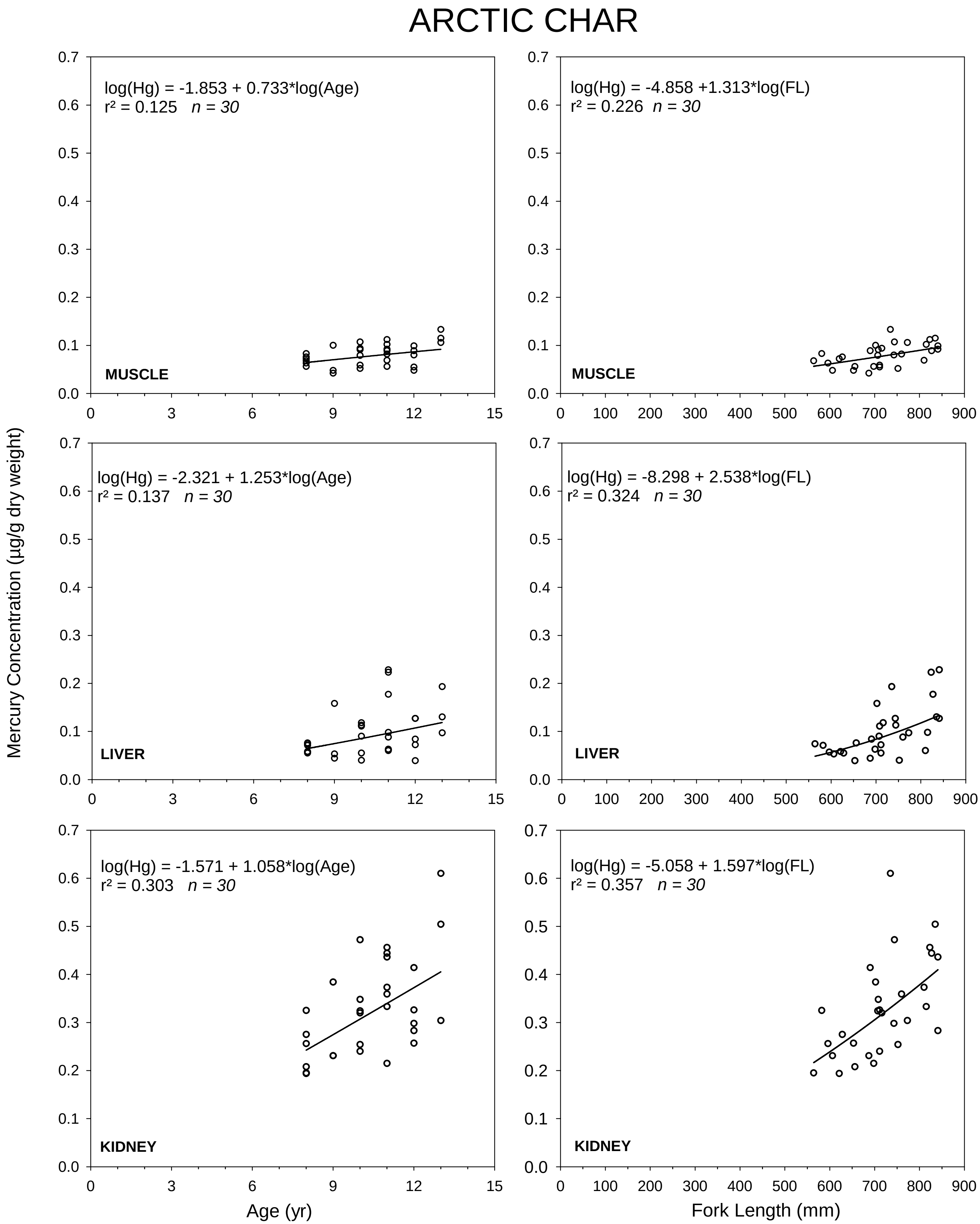


Figure 4.8 Mercury concentrations in Arctic char muscle, liver, and kidney tissues from Roberts Outflow plotted versus fish age and fork length, 2002.

Zinc

Zinc levels in Arctic char muscle tissues ranged from 10.9 to 16.5 µg/g dry weight; the mean concentration was 14.1 µg/g dry weight. In Arctic char liver tissues, mean zinc concentrations (68.5 µg/g dry weight) were approximately five times higher than in muscle tissues. Mean zinc levels in the kidneys (127.8 µg/g dry weight) were approximately two times higher than the liver concentrations. The maximum zinc levels recorded in Arctic char livers and kidneys were 97.1 and 214 µg/g dry weight, respectively.

4.9.4 Summary

Fish tissue samples (dorsal muscle, liver, and kidney) were collected from lake trout and Arctic char in 2002 to provide baseline data on metal concentrations in fish from the Roberts Lake drainage, and to complement tissue samples collected previously from other Doris North Project area lakes (Doris, Tail, Ogama, Pelvic, Patch, and Windy). Previous samples were collected over several years between 1995 and 1998; however, the majority of the samples were collected in 1997 and 1998 and consisted of muscle and liver tissues from lake trout and lake whitefish.

Analyses of fish tissues from Roberts Lake drainage indicated generally low levels of metal accumulation; however, elevated concentrations (i.e., exceeding the Canadian Food Inspection Agency's guidelines for human consumption) were recorded for arsenic in both lake trout and Arctic char tissues and for mercury in lake trout tissues only.

Mean arsenic concentrations in lake trout muscle and liver tissues from Roberts Lake were much greater than those observed in lake trout tissues from the previously sampled Doris North Project area lakes. Mean arsenic concentration from Roberts Lake muscle tissue (8.6 µg/g dry weight) was 22 to 57 times higher than the mean levels recorded in other Doris North Project area lakes. Mean arsenic concentration in lake trout liver tissues (6.2 µg/g dry weight) was also greater in Roberts Lake than in other Doris North Project area lakes, ranging from 3 to 34 times higher.

In contrast to arsenic, mean mercury concentrations in lake trout muscle and liver tissues from Roberts Lake were similar to those from the other Doris North Project area lakes. Muscle concentrations averaged 0.98 µg/g dry weight from Roberts Lake, whereas mean muscle concentrations in other Doris North Project area lakes ranged between 0.18 and 1.48 µg/g dry weight. Similarly, mean mercury concentration in lake trout livers was 1.66 µg/g dry weight in Roberts Lake and ranged between 0.27 and 2.44 µg/g dry weight in the other Doris North Project area lakes.

Twenty percent (6 of 30) of lake trout muscle tissue samples from Roberts Lake and 13.3% (4 of 30) of Arctic char muscle tissues from Roberts Outflow exceeded the Canadian Food Inspection Agency’s consumption guideline of 3.5 µg/g wet weight (roughly equivalent to 17.5 µg/g dry weight) for arsenic (Table 4.13). None of the tissue samples collected in 2002 contained lead levels above the federal guideline of 0.5 µg/g wet weight. Although almost half (46.7%) of lake trout kidney tissues exceeded the federal consumption guideline for mercury (0.5 µg/g wet weight), only 1 of 30 lake trout muscle samples (3%) and none of Arctic char tissues exhibited mercury levels above the federal guideline.

Table 4.13 Percent of fish tissue samples exceeding Canadian Food Inspection Agency’s guidelines for human consumption, 2002.

Species	Arsenic CFIA[a] = 3.5 µg/g			Lead CFIA[a] = 0.5 µg/g			Mercury CFIA[a] = 0.5 µg/g		
	Muscle	Liver	Kidney	Muscle	Liver	Kidney	Muscle	Liver	Kidney
Lake trout (*n*=30)	20.0						3.3	26.7	46.7
Arctic char (*n*=30)	13.3	16.7							

[a]Canadian Food Inspection Agency's guidelines

In total, 17 lake trout (57%) exhibited arsenic or mercury concentrations that were higher than the federal guideline for human consumption (regardless of tissue type). Conversely, only eight Arctic char (27%) contained arsenic concentrations above the guideline. Arctic char are diadromous and spend much of their adult life feeding in the marine environment. As such, they spend less time in freshwater habitats than lake trout. This likely contributed to the lower metal concentrations in Arctic char compared to lake trout, assuming that the sources of elevated metal concentrations are located in the freshwater environment (i.e., Roberts Lake drainage).

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6.0 CLOSURE

This report was prepared by Golder Associates Ltd. (Golder) for the account of Miramar Hope Bay Ltd. The material in it reflects Golder's best judgment in light of information available to it at the time of preparation. Any use which a third party makes of this report or any reliance on or decisions to be made based on it, are the responsibility of such third party. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decision made or action based on this report.

We trust the information contained in this report is sufficient for your present needs. Should you have any questions regarding the project, please do not hesitate to contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

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PHOTOGRAPHIC PLATES

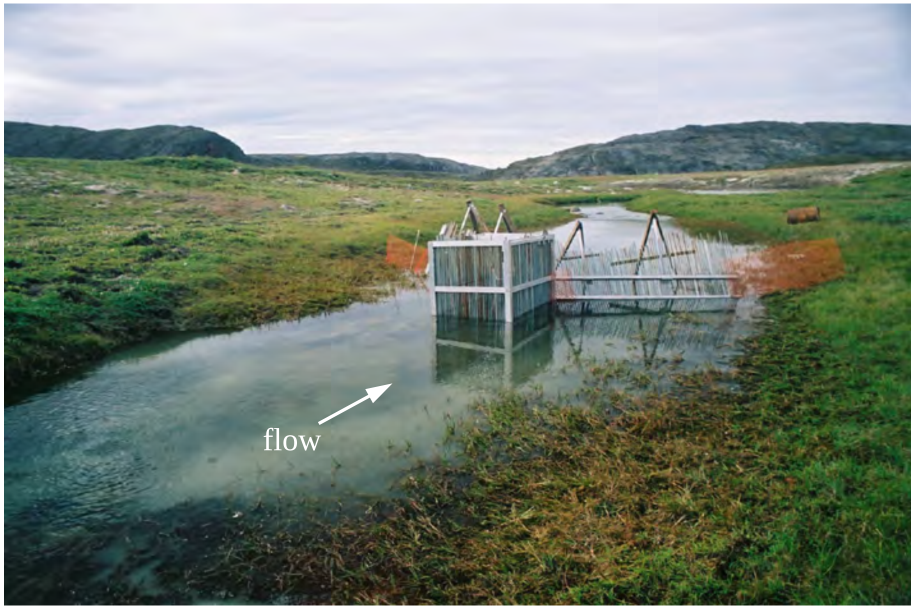


Plate 1 **Roberts Outflow,** *16 August 2002*. Fish fence and trap where migrating Arctic char were captured.

Plate 2 Aerial view of fish trap in **Roberts Outflow**. A deep pool upstream of trap held several Arctic char that migrated before trap installation.

Plate 3 Aerial view of fyke net (FN1) set at upstream end of **Roberts Outflow**. Note boulder garden and fish fence downstream.

Plate 4 **Roberts Outflow,** *30 August 2002*. Trap after third destruction by grizzly bear in search of an easy meal.

Plate 5 **Roberts Bay,** *27 August 2002*. Fyke net FN3 set in small sheltered bay.

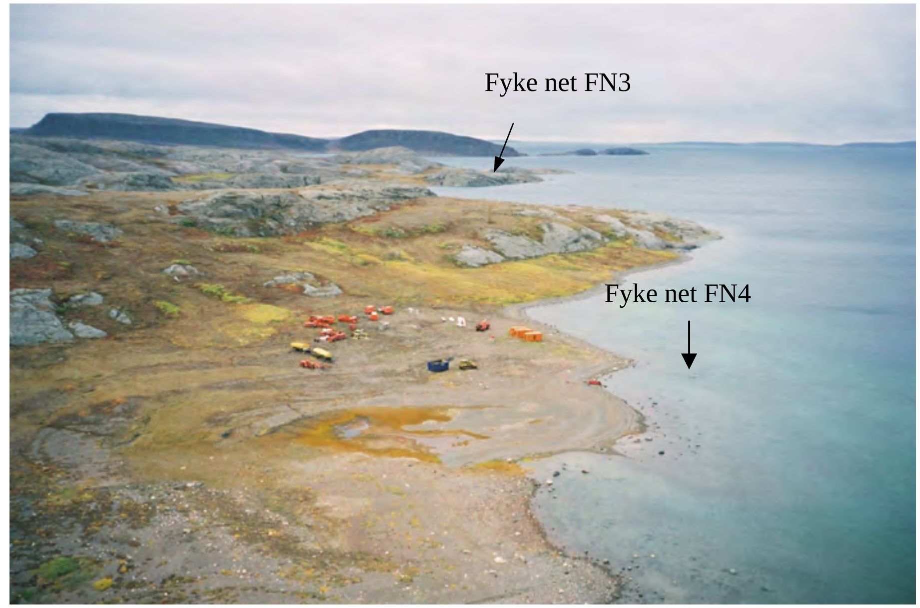


Plate 6 Aerial view of fyke net FN4 set in **Roberts Bay** near one of the potential barge off-loading locations. Note relative location of fyke net FN3.

Plate 7 **Roberts Bay**, *29 August 2002*. Location of the second potential barge off-loading site at the south end of Roberts Bay.

Plate 8 **Windy Lake Camp,** *17 August 2002*. Fish tissue sampling station set up on shore of Windy Lake.

Plate 9 **Roberts Outflow,** *27 August 2002*. Large male Arctic char (sample #457) in spawning colors captured at fence and released upstream.

Plate 10 **Roberts Lake,** *18 August 2002*. Lake trout (sample #24) with dermal fibroma on jaw. This fish was kept for tissue sampling.

Plate 11 **Roberts Bay**, *29 August 2002*. Banded gunnel (245 mm total length) captured in fyke net FN3. Only one specimen of this species was captured during this study.

Plate 12 **Roberts Bay,** *29 August 2002*. Greenland cod (upper) and saffron cod captured in fyke net FN3.

Plate 13 **Roberts Outflow,** *16 August 2002*. Rescue of migrating Arctic char trapped between boulders immediately downstream of Roberts Lake.

Plate 14 **Roberts Outflow,** *16 August 2002*. Low level aerial view of Arctic char trapped in boulder garden stranding zone.

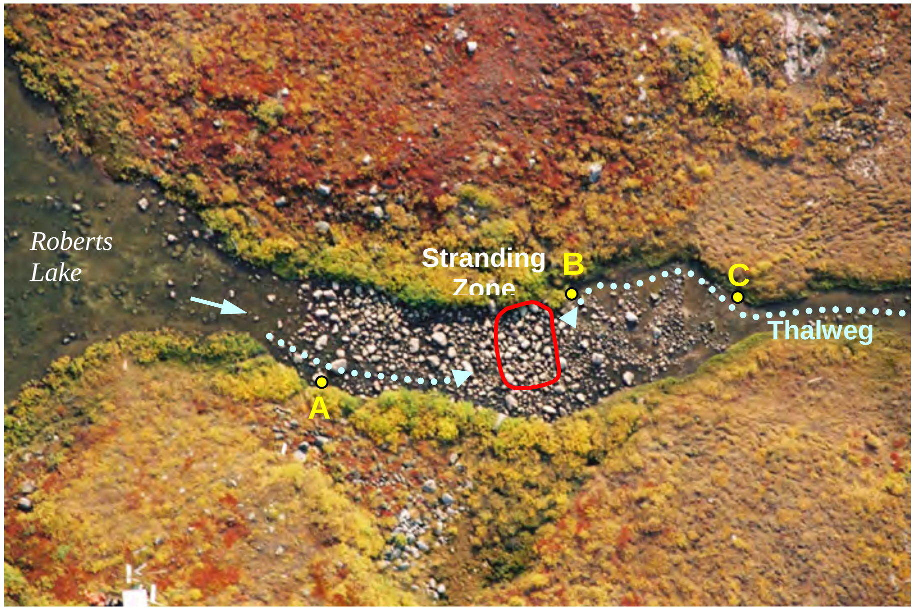


Plate 15 **Roberts Outflow**, *2 September 2002*. Aerial view of boulder garden. Outflow thalweg crosses channel through stranding zone of boulder garden. Gradients were surveyed between points A-B and A-C.

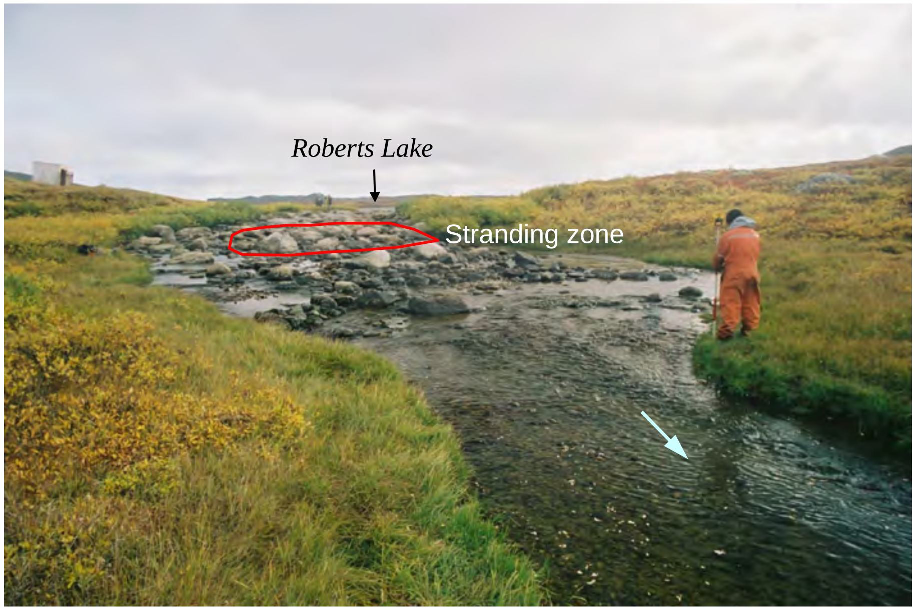


Plate 16 **Roberts Outflow,** *1 September 2002*. Survey measurements of the boulder garden area to determine stream gradient.

APPENDIX A

PHYSICAL ENVIRONMENT DATA

Appendix A1. Depth, velocity, and discharge measurements in Roberts Outflow, 2002.

19 August 2002				25 August 2002				2 September 2002			
Water Temp = 8.5°C Staff Gauge = 510 mm				Water Temp = 10°C Staff Gauge = 497 mm				Water Temp= 9.5°C Staff Gauge = 484 mm			
Point	**Distance (m)**	**Depth (m)**	**Velocity (m/s)**	**Point**	**Distance (m)**	**Depth (m)**	**Velocity (m/s)**	**Point**	**Distance (m)**	**Depth (m)**	**Velocity (m/s)**
1	0.00	0.00	0.00	1	0.00	0.00	0.00	1	0.00	0.00	0.00
2	0.20	0.19	0.15	2	0.30	0.17	0.21	2	0.10	0.17	0.03
3	0.50	0.19	0.28	3	0.60	0.16	0.18	3	0.40	0.15	0.15
4	0.80	0.20	0.22	4	0.90	0.17	0.12	4	0.70	0.16	0.06
5	1.10	0.19	0.17	5	1.20	0.13	0.20	5	1.00	0.14	0.06
6	1.40	0.16	0.21	6	1.50	0.12	0.19	6	1.30	0.14	0.17
7	1.70	0.14	0.27	7	1.80	0.11	0.17	7	1.60	0.11	0.15
8	2.00	0.14	0.21	8	2.10	0.10	0.20	8	1.90	0.10	0.13
9	2.30	0.13	0.21	9	2.40	0.10	0.20	9	2.20	0.08	0.15
10	2.60	0.12	0.23	10	2.70	0.10	0.22	10	2.50	0.09	0.17
11	2.90	0.11	0.31	11	3.00	0.10	0.22	11	2.80	0.09	0.19
12	3.20	0.11	0.29	12	3.30	0.11	0.25	12	3.10	0.10	0.17
13	3.50	0.14	0.26	13	3.60	0.11	0.27	13	3.40	0.10	0.20
14	3.80	0.15	0.30	14	3.90	0.11	0.23	14	3.70	0.09	0.21
15	4.10	0.12	0.26	15	4.20	0.10	0.23	15	4.00	0.10	0.22
16	4.40	0.10	0.28	16	4.50	0.09	0.23	16	4.30	0.08	0.17
17	4.70	0.11	0.27	17	4.80	0.09	0.23	17	4.60	0.07	0.18
18	5.00	0.13	0.25	18	5.10	0.11	0.15	18	4.90	0.09	0.07
19	5.10	0.14	0.19	19	5.20	0.00	0.00	19	5.00	0.00	0.00
20	5.20	0.00	0.00								
Discharge = 0.173 m^3				**Discharge = 0.118 m^3**				**Discharge = 0.075 m^3**			

APPENDIX B

SEDIMENT DATA

Appendix B1. Sediment quality data from Roberts Lake (Sites RL1 and RL2), 31 August 2002.

Parameter	Unit[a]	Det. Limit	CISQG(F)[b] TEL	PEL	**Site RL1** (13W 436733 7562902) - **7.9 m depth** Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Mean[c]	SE[c]	**Site RL2** (13W 435540 7562366) - **4.6 m depth** Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Mean[c]	SE[c]
Total Organic Carbon	%	0.5			0.58	0.54	0.50	0.51	0.51	**0.53**	*0.01*	0.72	0.67	0.64	0.72	0.61	**0.67**	*0.02*
pH	unit	-			6.0	5.9	5.8	5.6	5.8	**5.82**	*0.07*	5.0	5.4	5.4	5.3	5.4	**5.30**	*0.08*
Total Metals																		
Aluminum (Al)	ug/g	10			21000	19400	18500	19200	19800	**19580**	*413*	19900	20100	19700	20300	19600	**19920**	*128*
Antimony (Sb)	ug/g	10			< 10	< 10	< 10	< 10	< 10	**< 10**	-	< 10	< 10	< 10	< 10	< 10	**< 10**	-
Arsenic (As)	ug/g	0.1	5.9	17	4.8	4.8	4.6	5.5	4.2	**4.8**	*0.2*	10.4	6.4	11.1	5.8	6.3	**8.0**	*1.1*
Barium (Ba)	ug/g	1			124	121	114	117	118	**118.8**	*1.7*	134	134	132	130	127	**131.4**	*1.3*
Beryllium (Be)	ug/g	1			< 1	< 1	< 1	< 1	< 1	**< 1**	-	< 1	< 1	< 1	< 1	< 1	**< 1**	
Boron (B)	ug/g	1			60	64	63	69	65	**64.2**	*1.5*	84	70	87	74	73	**77.6**	*3.3*
Cadmium (Cd)	ug/g	0.2	0.6	3.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**< 0.2**	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**< 0.2**	-
Calcium (Ca)	ug/g	1			4090	3920	3800	3860	3830	**3900**	*51*	3720	3840	3910	3910	3740	**3824**	*41*
Chromium (Cr)	ug/g	2	37.3	90	48	46	44	44	46	**45.6**	*0.7*	45	47	44	46	46	**45.6**	*0.5*
Cobalt (Co)	ug/g	1			5	5	5	6	5	**5.2**	*0.2*	4	4	4	4	4	**4.0**	*0.0*
Copper (Cu)	ug/g	1	35.7	197	23	22	20	21	22	**21.6**	*0.5*	19	21	18	20	19	**19.4**	*0.5*
Iron (Fe)	ug/g	2			36900	34500	31500	36600	35200	**34940**	*967*	36300	39600	38300	41100	40600	**39180**	*865*
Lead (Pb)	ug/g	2	35	91.3	8	6	5	6	5	**6.0**	*0.5*	6	6	5	5	5	**5.4**	*0.2*
Magnesium (Mg)	ug/g	0.1			7370	6970	6840	6980	7180	**7068**	*93*	7390	7320	7280	7430	7260	**7336**	*32*
Manganese (Mn)	ug/g	1			967	1180	1120	1270	1040	**1115**	*53*	941	586	1350	531	521	**786**	*161*
Mercury (Hg)	ug/g	0.01	0.17	0.486	0.04	0.03	0.03	0.03	0.03	**0.032**	*0.002*	0.03	0.02	0.04	0.03	0.02	**0.028**	*0.004*
Molybdenum (Mo)	ug/g	4			< 4	< 4	< 4	< 4	< 4	**< 4**	-	< 4	< 4	< 4	< 4	< 4	**< 4**	-
Nickel (Ni)	ug/g	2			< 2	28	27	29	28	**22.6**	*0.4*	33	33	34	33	33	**33.2**	*0.2*
Phosphorus (PO_4)	ug/g	20			2340	2210	2100	2390	2130	**2234**	*57*	3780	2870	3790	3030	3140	**3322**	*194*
Potassium (K)	ug/g	10			6310	5240	5010	5480	5620	**5532**	*221*	5770	5550	5660	5890	5550	**5684**	*66*
Selenium (Se)	ug/g	0.2			0.4	0.4	0.4	0.4	0.3	**0.4**	*0.0*	0.3	0.3	0.3	0.3	0.3	**0.3**	*0.0*
Silver (Ag)	ug/g	0.1			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-
Sodium (Na)	ug/g	5			1050	942	877	879	907	**931**	*32*	857	902	884	875	827	**869**	*13*
Strontium (Sr)	ug/g	1			31	31	29	29	29	**29.8**	*0.5*	30	30	31	29	28	**29.6**	*0.5*
Thallium (Tl)	ug/g	0.1			0.2	0.2	0.2	0.2	0.2	**0.2**	*0.0*	0.2	0.2	0.2	0.2	0.2	**0.2**	*0.0*
Tin (Sn)	ug/g	5			< 5	< 5	< 5	< 5	< 5	**< 5**	-	< 5	< 5	< 5	< 5	< 5	**< 5**	-
Titanium (Ti)	ug/g	1			819	802	780	795	816	**802**	*7*	821	894	798	874	889	**855**	*19*
Vanadium (V)	ug/g	1			57	53	52	52	54	**53.6**	*0.9*	55	57	54	57	56	**55.8**	*0.6*
Zinc (Zn)	ug/g	1	123	315	72	67	63	68	69	**67.8**	*1.5*	70	68	69	71	68	**69.2**	*0.6*
Zirconium (Zr)	ug/g	1			3	2	3	2	3	**2.6**	*0.2*	2	3	2	6	7	**4.0**	*1.0*
Particle Size																		
Gravel (>2000 µm)	%	0.1			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-
Sand (53 - 2000 µm)	%	0.1			2.3	2.6	2.5	2.6	2.4	**2.5**	*0.1*	1.3	1.3	1.6	0.9	0.9	**1.2**	*0.1*
Silt (2 - 53 µm)	%	0.1			38.2	39.4	40.2	42.2	40.2	**40.0**	*0.7*	37.5	37.6	42.7	37.9	37.7	**38.7**	*1.0*
Clay (<2 µm)	%	0.1			59.5	58.0	57.3	55.2	57.4	**57.5**	*0.7*	61.2	61.1	55.7	61.2	61.4	**60.1**	*1.1*

[a] Units are expressed as dry weights, except for particle size distribution which is based on wet weigh

[b] CISQG(F) = Canadian Interim Sediment Quality Guidelines for the Protection of Aquatic Life (Freshwater); TEL = Threshold Effect Level; PEL = Probable Effect Leve

[c] Means were calculated by assigning half of detection limit for "less than" values that occurred together with values above detection limit; SE = standard erro

shaded values exceed TEL

Appendix B2. Sediment quality data from Roberts Bay (Sites RB1 and RB2), 1 September 2002.

Parameter	Unit[a]	Det. Limit	CISQG(M)[b] TEL	CISQG(M)[b] PEL	**Site RB1** (13W 431833 7564240) **- 11.5 m depth** Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	**Mean[c]**	*SE[c]*	**Site RB2** (13W 431776 7564177) **- 3.4 m depth** Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	**Mean[c]**	*SE[c]*
Total Organic Carbon	%	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**< 0.5**	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**< 0.5**	-
pH	unit	-			7.2	7.3	7.2	7.5	7.2	**7.28**	*0.06*	7.3	7.2	7.3	7.5	7.2	**7.30**	*0.05*
Metals																		
Aluminum (Al)	ug/g	10			13900	13000	12900	13500	14100	**13480**	*237*	11400	12100	11100	10600	12500	**11540**	*341*
Antimony (Sb)	ug/g	10			< 10	< 10	< 10	< 10	< 10	**< 10**	-	< 10	< 10	< 10	< 10	< 10	**< 10**	-
Arsenic (As)	ug/g	0.1	7.24	41.6	4.4	3.4	3.1	3.0	3.0	**3.4**	*0.3*	6.6	6.7	6.4	6.1	4.7	**6.1**	*0.4*
Barium (Ba)	ug/g	1			79	72	73	76	80	**76.0**	*1.6*	64	68	60	59	67	**63.6**	*1.8*
Beryllium (Be)	ug/g	1			< 1	< 1	< 1	< 1	< 1	**< 1**	-	< 1	< 1	< 1	< 1	< 1	**< 1**	-
Boron (B)	ug/g	1			56	55	53	54	55	**54.6**	*0.5*	50	52	50	43	52	**49.4**	*1.7*
Cadmium (Cd)	ug/g	0.2	0.7	4.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**< 0.2**	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**< 0.2**	-
Calcium (Ca)	ug/g	1			5030	4170	4290	4190	4630	**4462**	*164*	3440	3310	3400	3790	3350	**3458**	*86*
Chromium (Cr)	ug/g	2	52.3	160	36	34	34	36	37	**35.4**	*0.6*	32	32	29	29	33	**31.0**	*0.8*
Cobalt (Co)	ug/g	1			2	2	2	2	3	**2.2**	*0.2*	2	2	2	2	3	**2.2**	*0.2*
Copper (Cu)	ug/g	1	18.7	108	15	14	14	14	15	**14.4**	*0.2*	11	11	10	10	11	**10.6**	*0.2*
Iron (Fe)	ug/g	2			23700	22600	22100	22600	23200	**22840**	*277*	20300	21600	20300	19600	21300	**20620**	*365*
Lead (Pb)	ug/g	2	30.2	112	4	4	4	4	5	**4.2**	*0.2*	4	4	3	3	4	**3.6**	*0.2*
Magnesium (Mg)	ug/g	0.1			11800	11000	11300	11200	11700	**11400**	*152*	9540	9790	9110	8710	10100	**9450**	*246*
Manganese (Mn)	ug/g	1			189	182	180	186	194	**186**	*2*	166	165	159	150	174	**163**	*4*
Mercury (Hg)	ug/g	0.01	0.13	0.7	0.01	0.01	0.01	0.01	0.01	**0.01**	*0.000*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**< 0.01**	-
Molybdenum (Mo)	ug/g	4			< 4	< 4	< 4	< 4	< 4	**< 4**	-	< 4	< 4	< 4	< 4	< 4	**< 4**	-
Nickel (Ni)	ug/g	2			20	19	19	20	20	**19.6**	*0.2*	17	18	17	17	18	**17.4**	*0.2*
Phosphorus (PO_4)	ug/g	20			2260	2150	1970	2080	2000	**2092**	*52*	1420	1450	1410	1450	1490	**1444**	*14*
Potassium (K)	ug/g	10			5220	4780	4680	4830	5030	**4908**	*97*	3990	4300	3720	3710	4470	**4038**	*153*
Selenium (Se)	ug/g	0.2			0.2	0.3	0.3	0.3	0.3	**0.28**	*0.02*	0.3	0.3	0.3	0.3	0.2	**0.28**	*0.02*
Silver (Ag)	ug/g	0.1			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-
Sodium (Na)	ug/g	5			6650	6020	5430	5600	5990	**5938**	*211*	4820	4280	4060	4330	4630	**4424**	*134*
Strontium (Sr)	ug/g	1			41	28	26	30	35	**32.0**	*2.7*	24	21	20	23	22	**22.0**	*0.7*
Thallium (Tl)	ug/g	0.1			0.1	0.1	0.1	0.1	0.1	**0.10**	*0.00*	0.1	0.1	< 0.1	< 0.1	0.1	**0.080**	*0.012*
Tin (Sn)	ug/g	5			< 5	< 5	< 5	< 5	< 5	**< 5**	-	< 5	< 5	< 5	< 5	< 5	**< 5**	-
Titanium (Ti)	ug/g	1			708	698	696	712	729	**709**	*6*	612	665	591	597	691	**631**	*20*
Vanadium (V)	ug/g	1			44	42	42	43	45	**43.2**	*0.6*	40	41	40	38	42	**40.2**	*0.7*
Zinc (Zn)	ug/g	1	124	271	45	42	41	43	45	**43.2**	*0.8*	38	39	36	35	41	**37.8**	*1.1*
Zirconium (Zr)	ug/g	1			7	6	7	7	7	**6.8**	*0.2*	7	7	6	6	7	**6.6**	*0.2*
Particle Size																		
Gravel (>2000 µm)	%	0.1			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-	3.5	< 0.1	< 0.1	< 0.1	< 0.1	**0.7**	*0.7*
Sand (53 - 2000 µm)	%	0.1			12.0	10.7	10.1	7.5	10.3	**10.1**	*0.7*	32.8	24.6	27.5	27.1	18.5	**26.1**	*2.3*
Silt (2 - 53 µm)	%	0.1			48.3	50.5	51.6	51.8	50.7	**50.6**	*0.6*	35.1	44.1	44.6	44.2	44.4	**42.5**	*1.8*
Clay (<2 µm)	%	0.1			39.7	38.8	38.3	40.7	39.0	**39.3**	*0.4*	28.6	31.3	27.9	28.7	37.1	**30.7**	*1.7*

[a] Units are expressed as dry weights, except for particle size distribution which is based on wet weigh

[b] CISQG(M) = Canadian Interim Sediment Quality Guidelines for the Protection of Aquatic Life (Marine); TEL = Threshold Effect Level; PEL = Probable Effect Leve

shaded values exceed TEL

[c] Means were calculated by assigning half of detection limit for "less than" values that occurred together with values above detection limit; SE = standard erro

Appendix B3. Sediment quality data from Roberts Bay (Sites RB3 and RB4), 1 September 2002.

Parameter	*Unit* [a]	Det.	CISQG(M)[b]		**Site RB3** (13W 432406 7563337) **- 7.2 m depth**							**Site RB4** (13W 432637 7563262) **- 3.9 m depth**						
		Limit	**TEL**	**PEL**	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	**Mean**[c]	*SE*[c]	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	**Mean**[c]	*SE*[c]
Total Organic Carbon	*%*	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**< 0.5**	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**< 0.5**	
pH	*unit*	-			7.5	7.5	7.6	7.4	7.2	**7.44**	*0.07*	7.6	7.8	7.8	7.5	7.2	**7.58**	*0.11*
Metals																		
Aluminum (Al)	*ug/g*	10			12000	11000	12600	9980	10000	**11116**	*526*	6420	6560	7070	5850	5940	**6368**	*222*
Antimony (Sb)	*ug/g*	10			< 10	< 10	< 10	< 10	< 10	**< 10**	-	< 10	< 10	< 10	< 10	< 10	**< 10**	-
Arsenic (As)	*ug/g*	0.1	7.24	41.6	2.8	2.6	2.8	2.4	2.6	**2.6**	*0.1*	1.8	1.9	1.9	1.8	2.1	**1.9**	*0.1*
Barium (Ba)	*ug/g*	1			65	62	68	53	55	**60.6**	*2.9*	33	35	39	32	31	**34.0**	*1.4*
Beryllium (Be)	*ug/g*	1			< 1	< 1	< 1	< 1	< 1	**< 1**	-	< 1	< 1	< 1	< 1	< 1	**< 1**	-
Boron (B)	*ug/g*	1			52	46	53	40	40	**46.2**	*2.8*	28	30	31	28	28	**29.0**	*0.6*
Cadmium (Cd)	*ug/g*	0.2	0.7	4.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**< 0.2**	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**< 0.2**	-
Calcium (Ca)	*ug/g*	1			5670	8080	5350	3340	5560.0	**5600**	*753*	3130	4290	5710	3380	2530	**3808**	*553*
Chromium (Cr)	*ug/g*	2	52.3	160	32	29	32	26	26	**29.0**	*1.3*	18	19	20	17	17	**18.2**	*0.6*
Cobalt (Co)	*ug/g*	1			2	2	2	1	2	**1.8**	*0.2*	2	2	2	2	2	**2.0**	*0.0*
Copper (Cu)	*ug/g*	1	18.7	108	14	15	14	12	13	**13.6**	*0.5*	8	9	9	8	8	**8.4**	*0.2*
Iron (Fe)	*ug/g*	2			20400	18800	21500	17400	17700	**19160**	*787*	10200	11100	12100	10100	10300	**10760**	*379*
Lead (Pb)	*ug/g*	2	30.2	112	4	4	4	3	3	**3.6**	*0.2*	3	3	3	2	2	**2.6**	*0.2*
Magnesium (Mg)	*ug/g*	0.1			10100	9540	10400	8290	8630	**9392**	*408*	5720	5840	6210	5180	5320	**5654**	*185*
Manganese (Mn)	*ug/g*	1			162	144	162	132	134	**147**	*7*	97	105	109	97	101	**102**	*2*
Mercury (Hg)	*ug/g*	0.01	0.13	0.7	0.01	0.01	0.01	0.01	< 0.01	**0.009**	*0.001*	< 0.01	< 0.01	0.01	< 0.01	< 0.01	**0.006**	*0.001*
Molybdenum (Mo)	*ug/g*	4			< 4	< 4	< 4	< 4	< 4	**< 4**	-	< 4	< 4	< 4	< 4	< 4	**< 4**	-
Nickel (Ni)	*ug/g*	2			18	17	18	14	14	**16.2**	*0.9*	11	12	13	11	11	**11.6**	*0.4*
Phosphorus (PO_4)	*ug/g*	20			1870	2270	1730	1540	1600	**1802**	*130*	1350	1410	1340	1350	1360	**1362**	*12*
Potassium (K)	*ug/g*	10			4300	4170	4750	3660	3750	**4126**	*197*	2030	2030	2200	1730	1730	**1944**	*93*
Selenium (Se)	*ug/g*	0.2			0.2	0.3	0.3	0.2	0.2	**0.24**	*0.0*	< 0.2	< 0.2	0.2	< 0.2	< 0.2	**0.12**	*0.0*
Silver (Ag)	*ug/g*	0.1			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-
Sodium (Na)	*ug/g*	5			5720	6860	5090	4310	5630	**5522**	*418*	3540	3480	3520	3330	3830	**3540**	*81*
Strontium (Sr)	*ug/g*	1			38	28	33	21	35	**31.0**	*3.0*	17	25	23	18	15	**19.6**	*1.9*
Thallium (Tl)	*ug/g*	0.1			0.1	0.1	0.1	< 0.1	< 0.1	**0.08**	*0.0*	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-
Tin (Sn)	*ug/g*	5			< 5	< 5	< 5	< 5	< 5	**< 5**	-	< 5	< 5	< 5	< 5	< 5	**< 5**	-
Titanium (Ti)	*ug/g*	1			630	587	664	560	533	**595**	*24*	359	396	417	362	380	**383**	*11*
Vanadium (V)	*ug/g*	1			40	37	41	34	33	**37.0**	*1.6*	25	26	28	24	24	**25.4**	*0.7*
Zinc (Zn)	*ug/g*	1	124	271	39	35	41	31	31	**35.4**	*2.0*	20	22	23	19	19	**20.6**	*0.8*
Zirconium (Zr)	*ug/g*	1			6	6	7	6	4	**5.8**	*0.5*	3	3	4	3	3	**3.2**	*0.2*
Particle Size																		
Gravel (>2000 µm)	*%*	0.1			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**< 0.1**	-	< 0.1	< 0.1	2.5	< 0.1	< 0.1	**0.54**	*0.49*
Sand (53 - 2000 µm)	*%*	0.1			15.3	24.8	9.5	26.1	19.7	**19.1**	*3.1*	52.7	52.5	51.3	49.7	55.2	**52.3**	*0.9*
Silt (2 - 53 µm)	*%*	0.1			47.9	45.1	52.8	43.0	48.3	**47.4**	*1.7*	27.9	28.1	26.4	28.3	26.7	**27.5**	*0.4*
Clay (<2 µm)	*%*	0.1			36.8	30.1	37.7	30.9	32.0	**33.5**	*1.6*	19.4	19.4	19.8	22.0	18.1	**19.7**	*0.6*

[a] Units are expressed as dry weights, except for particle size distribution which is based on wet weigh

[b] CISQG(M) = Canadian Interim Sediment Quality Guidelines for the Protection of Aquatic Life (Marine); TEL = Threshold Effect Level; PEL = Probable Effect Leve

[c] Means were calculated by assigning half of detection limit for "less than" values that occurred together with values above detection limit; SE = standard erro

shaded values exceed TEL

Appendix B4. Hydrocarbon concentrations in sediment from Roberts Lake and Roberts Bay, 2002.

Parameter	Unit	Roberts Lake (30 Aug 2002)		Roberts Bay (1 Sep 2002)			
		Site RL1 *(7.9 m depth)*	Site RL2 *(4.6 m depth)*	Site RB1 *(11.5 m depth)*	Site RB2 *(3.4 m depth)*	Site RB3 *(7.2 m depth)*	Site RB4 *(3.9 m depth)*
Monocyclic Volatile Hydrocarbons							
Benzene	µg/g	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Toluene	µg/g	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	µg/g	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Xylenes	µg/g	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Styrene	µg/g	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons							
Naphthalene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	ug/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acenaphthene	ug/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Fluorene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	ug/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Benzo(g,h,i)perylene	ug/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Surrogate Recovery							
Naphthalene-d8	%	86	82	55	83	74	73
Acenaphthene-d10	%	86	91	69	84	77	85
Phenanthrene-d10	%	82	86	77	88	78	84
Chrysene-d12	%	75	82	76	83	76	80
Perylene-d12	%	86	92	85	98	88	90
Monocyclic Aromatic Hydrocarbons							
Volatile Hydrocarbons VHs6-10	ug/g	< 100	< 100	< 100	< 100	< 100	< 100
Volatile Petroleum Hydrocarbons	ug/g	< 100	< 100	< 100	< 100	< 100	< 100
Moisture	*%*	*52.8*	*56.9*	*38.6*	*30.3*	*33.6*	*32.7*

NOTE: Results expressed as micrograms per gram, on a dry weight basis; surrogate recoveries and moisture expressed as percent.

APPENDIX C

FISH CAPTURE AND LIFE HISTORY DATA

Appendix C1. Fish catch and catch-per-unit-effort (CPUE) at the upstream fish fence trap installed in Roberts Outflow, 2002.

Trap Check		H_2O Temp.	Staff Gauge	Sampling Duration	Number Captured and CPUE (fish / 24 h)								Comments
					Arctic char		Lake trout		Broad whitefish		All Species		
Date	Time	(°C)	(mm)	(h)	*n*	CPUE	*n*	CPUE	*n*	CPUE	*n*	CPUE	
16-Aug	15:20	10	-										trap installation complete
17-Aug	8:45	9	-	17.4							*0*	0.0	
17-Aug	19:30	9	-	10.7							*0*	0.0	
18-Aug	8:40	8	-	13.2							*0*	0.0	
19-Aug	9:45	8.5	510	25.1							*0*	0.0	
19-Aug	16:00	-	-	6.2	*4*	15.4	*2*	7.7			*6*	23.0	
20-Aug	8:30	8.5	510	16.5 [a]							*0*	-	trap damaged by bear
20-Aug	20:15	8.5	510	11.8	*26*	53.1	*1*	2.0			*27*	55.1	
21-Aug	9:15	9.5	513	13.0	*10*	18.5	*2*	3.7			*12*	22.2	
21-Aug	16:00	10.5	510	6.8	*1*	3.6					*1*	3.6	
22-Aug	16:00	-	-	24.0	*1*	1.0	*6*	6.0	*1*	1.0	*8*	8.0	
23-Aug	16:45	10	510	24.8	*5*	4.8					*5*	4.8	
24-Aug	8:00	8.5	505	15.3							*0*	0.0	
24-Aug	16:15	10	500	8.3							*0*	0.0	
25-Aug	8:30	8.5	500	16.2							*0*	0.0	
25-Aug	14:00	10	497	5.5							*0*	0.0	
26-Aug	16:30	11	500	26.5	*15*	13.6	*2*	1.8			*17*	15.4	
27-Aug	16:30	10	499	24.0	*13*	13.0					*13*	13.0	
27-Aug	20:00	-	498	3.5	*9*	61.7					*9*	61.7	
28-Aug	9:45	10	498	13.7	*1*	1.7					*1*	1.7	
29-Aug	8:45	9.5	-	23.0 [a]							*0*	-	trap damaged by bear
30-Aug	9:45	10.5	485	25.0 [a]							*0*	-	trap damaged by bear
Total				**265.9**	***85***	**7.7**	***13***	**1.2**	***1***	**0.1**	***99***	**8.9**	

[a] not included in total sampling duration

Appendix C2. Location, effort, catch, and CPUE data for fyke net sets in the Doris North Project area, 2002

Water-body	Set No.	UTM Location (Zone 13W)		Set Date	Set Time	Water Temp (°C)	Sali-nity (‰)	Set Period (h)	Number Captured / *CPUE (fish/24 h)*																				
									Arctic char			Lake trout			Lake whitefish		Cisco		Least cisco		Saffron cod		Greenland cod		Banded gunnel		All Species		
		Easting	Northing						*n*	*(r)*	CPUE	*n*	*(r)*	CPUE	*n*	CPUE	*n*	CPUE	*n*	CPUE	*n*	CPUE	*n*	CPUE	*n*	CPUE	*n*	*(r)*	CPUE
Roberts	FN1	435275	7562570	24-Aug	10:30	-	-	6.5																					
Outflow				24-Aug	17:05	-	-	15.9																					
				25-Aug	9:05	-	-	5.4	*2*		8.9																*2*		8.9
				25-Aug	14:35	-	-	26.8	*1*		0.9	*2*		1.8													*3*		2.7
				26-Aug	17:30	-	-	26.0	*25*	*(8)*	23.1	*2*		1.8													*27*	*(8)*	24.9
				27-Aug	19:35	10.0	-	14.7	*11*	*(3)*	18.0	*3*	*(2)*	4.9													*14*	*(5)*	22.9
				28-Aug	10:20	-	-	24.2																					
	Total							**119.5**	***39***	***(11)***		***7***	***(2)***														***46***	***(13)***	
	Mean CPUE										**7.8**			**1.4**															**9.2**
	Standard Deviation										**9.7**			**1.8**															**11.0**
Roberts	FN2	435225	7562350	25-Aug	17:30	-	-	24.1				*1*		1.0	*1*	1.0			*1*	1.0							*3*		3.0
Lake				26-Aug	17:40	-	-	19.7	*2*		2.4				*6*	7.3	*1*	1.2									*9*		11.0
	Total							**43.8**	***2***			***1***			***7***		***1***		***1***								***12***		
	Mean CPUE										**1.1**			**0.5**		**3.8**		**0.5**		**0.5**									**6.6**
	Standard Deviation										**1.7**			**0.7**		**4.5**		**0.9**		**0.7**									**5.7**
Roberts	FN3	431274	7565614	27-Aug	16:00	-	-	17.2																					
Bay				28-Aug	9:15	8.0	25.9	26.2													*6*	5.5	*4*	3.7	*1*	0.9	*11*		10.1
				29-Aug	11:30	8.0	25.9	22.5													*14*	14.9	*3*	3.2			*17*		18.1
				30-Aug	10:05	8.0	23.4	29.9													*25*	20.1	*5*	4.0			*30*		24.1
	Total							**95.8**													***45***		***12***		***1***		***58***		
	Mean CPUE																					**11.3**		**3.0**		**0.3**			**14.5**
	Standard Deviation																					**9.0**		**1.8**		**0.5**			**10.4**
Roberts	FN4	431680	7564256	31-Aug	17:30	9.0	26.0	21.0													*21*	24.0	*2*	2.3			*23*		26.3
Bay				1-Sep	14:35	9.0	23.5	25.4													*26*	24.6	*1*	0.9			*27*		25.5
				2-Sep	16:05	7.5	23.4	16.4	*1*		1.5										*25*	36.5	*1*	1.5			*27*		39.5
	Total							**62.8**	***1***												***72***		***4***				***77***		
	Mean CPUE							**321.8**			**0.4**											**27.5**		**1.5**					**29.4**
	Standard Deviation										**0.8**											**7.1**		**0.7**					**7.9**

NOTES:

n = number of captured fish (includes recaptures)
(r) = number of recaptured fish (previously tagged)
CPUE = catch per unit effort (fish/24 h); includes recaptures fish

Appendix C3. Location, effort, catch, and CPUE data for gill net sets in Doris North lakes, 2002.

Lake	Set No.	UTM Location Zone 13W Easting	Northing	Water Depth (m)	Water Temp. (°C)	Set Date	Set Time	Set Period (h)	Effort[a] (net units) 3.8 cm mesh	8.9 cm mesh	Arctic char 3.8 cm n	CPUE	Arctic char 8.9 cm n	CPUE	Lake trout 3.8 cm n	CPUE	Lake trout 8.9 cm n	CPUE	Lake whitefish 3.8 cm n	CPUE	Lake whitefish 8.9 cm n	CPUE	Cisco 3.8 cm n	CPUE	Cisco 8.9 cm n	CPUE	Least cisco 3.8 cm n	CPUE	Least cisco 8.9 cm n	CPUE	All Species 3.8 cm n	CPUE	All Species 8.9 cm n	CPUE
											Number of Fish Captured / CPUE (fish/100 m²/ 24 h)																							
Roberts	GN1 A	435326	7562331	2.0 - 5.0	9.0	17-Aug	11:30	1.6	0.036	0.018							*1*	55.4															*1*	55.4
	B					17-Aug	13:35	19.4	0.443	0.221					*3*	6.8	*2*	9.0	*16*	36.1	*7*	31.6					*1*	2.3			*20*	45.2	*9*	40.7
	GN2 A	436586	7562987	2.0 - 5.0	9.0	17-Aug	12:30	24.0	0.547	0.274					*8*	14.6	*4*	14.6	*4*	7.3	*6*	21.9	*8*	14.6	*4*	14.6	*1*	1.8			*21*	38.4	*14*	51.2
	GN3 A	435705	7561641	2.0	8.0	18-Aug	9:45	25.6	0.583	0.292	*1*	1.7			*1*	1.7	*3*	10.3	*13*	22.3	*10*	34.3					*2*	3.4			*17*	29.1	*13*	44.6
	GN4 A	436694	7561371	3.0 - 4.5	8.0	18-Aug	13:20	24.7	0.562	0.281					*9*	16.0	*2*	7.1	*4*	7.1	*12*	42.7	*2*	3.6							*15*	26.7	*14*	49.8
	Total							**95.3**	**2.172**	**1.086**	***1***				***21***		***12***		***37***		***35***		***10***		***4***		***4***				***73***		***51***	
	Mean CPUE											0.5				9.7		11.1		17.0		32.2		4.6		3.7		1.8				33.6		47.0
	Standard Deviation											0.8				7.3		20.4		14.5		16.4		6.3		6.5		1.5				17.2		5.8
Little Roberts	GN1 A	434821	7562610	1.0	9.0	2-Sep	8:55	2.6	0.118	-	*5*	42.4																			*5*	42.4		
	GN2 A	434709	7562694	1.5 - 2.5	9.0	2-Sep	11:35	2.3	0.103	-	*1*	9.7			*2*	19.5											*1*	9.7			*4*	39.0		
	Total							**4.8**	**0.220**		***6***				***2***												***1***				***9***			
	Mean CPUE											27.2				9.1												4.5				40.8		
	Standard Deviation											23.1				13.8												6.9				2.4		
Tail	GN1 A	434829	7558507	1.5 - 3.5	9.5	21-Aug	12:20	1.0	0.023	0.011							*1*	87.7															*1*	87.7
	B						13:20	1.2	0.027	0.013							*1*	75.2															*1*	75.2
	C						14:30	0.5	0.011	0.006																								
	GN2 A	434641	7558660	2.0 - 3.0	9.5	21-Aug	12:35	0.9	0.021	0.010																								
	B						13:30	1.2	0.027	0.013							*1*	75.2															*1*	75.2
	C						14:40	0.4	0.010	0.005																								
	GN3 A	435014	7558415	1.5 - 3.5	9.5	22-Aug	8:45	1.2	0.027	0.013					*1*	37.6	*2*	150.4													*1*	37.6	*2*	150.4
	B						9:55	1.7	0.038	0.019							*2*	105.3															*2*	105.3
	GN4 A	434937	7558304	3.0 - 4.5	9.5	22-Aug	8:55	1.3	0.030	0.015							*1*	65.8															*1*	65.8
	B						10:15	1.5	0.034	0.017							*4*	233.9															*4*	233.9
	GN5 A	434800	7558115	1.0 - 3.0	9.5	22-Aug	11:55	2.5	0.057	0.029							*3*	105.3															*3*	105.3
	B						14:25	0.7	0.015	0.008					*1*	65.8															*1*	65.8		
	GN6 A	434843	7557886	1.0 - 4.0	9.5	22-Aug	12:30	2.3	0.051	0.026							*1*	39.0															*1*	39.0
	B						14:45	0.2	0.006	0.003					*1*	175.4															*1*	175.4		
	GN7 A	435239	7557953	2.0 - 3.0	9.5	23-Aug	8:45	2.1	0.048	0.024																								
	B					23-Aug	10:50	0.7	0.015	0.008																								
	GN8 A	435037	7557659	1.5 - 3.0	9.5	23-Aug	9:00	2.0	0.046	0.023					*1*	21.9	*2*	87.7													*1*	21.9	*2*	87.7
	GN9 A	435201	7557719	1.5 - 3.0	9.5	23-Aug	11:20	2.4	0.055	0.028					*2*	36.3	*3*	108.9													*2*	36.3	*3*	108.9
	B					23-Aug	13:45	1.8	0.040	0.020					*4*	100.3	*9*	451.1													*4*	100.3	*9*	451.1
	GN10 A	435385	7556799	1.5 - 2.0	9.5	23-Aug	11:40	1.8	0.040	0.020																								
	GN11 A	435274	7556728	1.5 - 2.5	9.5	23-Aug	13:35	2.1	0.048	0.024																								
	GN12 A	435482	7556471	1.5 - 2.5	9.5	24-Aug	11:55	2.7	0.061	0.030					*1*	16.4	*3*	98.7													*1*	16.4	*3*	98.7
	GN13 A	435542	7556270	1.0 - 2.0	9.5	24-Aug	12:05	2.8	0.063	0.031							*1*	31.9															*1*	31.9
	B						14:50	0.3	0.008	0.004																								
	GN14 A	435195	7557876	1.5 - 2.5	9.5	26-Aug	8:50	2.3	0.051	0.051					*5*	97.5	*7*	136.5													*5*	97.5	*7*	136.5
	B						11:05	2.6	0.059	0.059							*8*	135.8															*8*	135.8
	C						13:40	1.7	0.038	0.038							*9*	236.8															*9*	236.8
	D						15:20	0.3	0.008	0.008							*5*	657.9															*5*	657.9
	GN15 A	435185	7557627	2.0 - 4.5	9.5	26-Aug	9:45	1.7	0.038	0.038							*9*	236.8															*9*	236.8
	GN16 A	435260	7557426	1.5 - 4.0	9.5	26-Aug	12:00	1.9	0.044	0.044					*3*	68.6	*1*	22.9													*3*	68.6	*1*	22.9
	B						13:55	2.0	0.046	0.046					*1*	21.9	*5*	109.6													*1*	21.9	*5*	109.6
	Total							**47.4**	**1.081**	**0.682**					***20***		***78***														***20***		***78***	
	Mean CPUE															18.5		114.4														18.5		114.4
	Standard Deviation															40.8		142.8														40.8		142.8
Pelvic	GN1 A	439184	7554799	2.0 - 4.0	10.5	28-Aug	14:30	0.8	0.019	0.019					*1*	52.6			*2*	105.3	*1*	52.6	*1*	52.6	*1*	52.6					*4*	210.5	*2*	105.3
	B					28-Aug	15:20	24.7	0.562	0.562					*6*	10.7	*12*	21.3	*22*	39.1	*38*	67.6	*5*	8.9	*1*	1.8	*64*	113.8			*97*	172.5	*51*	90.7
	GN2 A	438821	7553755	1.5 - 3.5	10.5	28-Aug	13:35	27.4	1.250	-					*14*	11.2			*29*	23.2			*6*	4.8			*97*	77.6			*146*	116.8		
	Total							**52.9**	**1.832**	**0.581**					***21***		***12***		***53***		***39***		***12***		***2***		***161***				***247***		***53***	**195.9**
	Mean CPUE															11.5		20.6		28.9		67.1		6.6		3.4		87.9				134.9		91.2
	Standard Deviation															24.1		15.1		43.5		10.6		26.5		36.0		58.1				47.1		10.3

[a] one net unit equals 100 m² of gill net set for 24 hours; each gill net panel was 27.36 m² in area

Appendix C4. Angling catch and CPUE in the Doris North Project area, 2002.

Waterbody	Angling Event	Water Temp (°C)	Date	Start Time	End Time	Sampling Period (h)	No. of Rods	Effort (rod-h)	Lake Trout Catch and CPUE (fish/rod-h)	
									n	***CPUE***
Roberts Lake	AN1	9.5	20-Aug	13:15	15:00	1.8	1	1.8	*5*	*2.9*
	AN2	9.5	31-Aug	11:00	12:30	1.5	3	4.5	*1*	*0.2*
	Total					**3.3**		**6.3**	***6***	
	Mean CPUE									0.96
	Standard Deviation									1.86
Tail Lake	AN1	9.5	21-Aug	13:45	14:05	0.3	1	0.3	*1*	*3.0*
	AN2	9.5	22-Aug	9:10	9:40	0.5	2	1.0	*5*	*5.0*
	AN3	9.5	22-Aug	10:25	11:25	1.0	2	2.0	*10*	*5.0*
	AN4	9.5	22-Aug	12:30	14:00	1.5	2	3.0	*12*	*4.0*
	AN5	9.5	23-Aug	9:10	10:40	1.5	2	3.0	*14*	*4.7*
	AN6	9.5	23-Aug	12:25	13:10	0.8	2	1.5	*7*	*4.7*
	AN7	9.5	23-Aug	14:00	15:30	1.5	2	3.0	*15*	*5.0*
	AN8	9.5	24-Aug	12:30	14:30	2.0	2	4.0	*15*	*3.8*
	AN9	9.5	26-Aug	10:00	11:00	1.0	3	3.0	*14*	*4.7*
	AN10	9.5	26-Aug	13:00	13:30	0.5	3	1.5	*2*	*1.3*
	AN11	9.5	26-Aug	14:00	15:15	1.3	3	3.7	*14*	*3.7*
	Total					**11.8**		**26.1**	***109***	
	Mean CPUE									4.2
	Standard Deviation									1.1

NOTE: CPUE = catch per unit effort (fish / rod-h)

Appendix C5. Size statistics for fish captured in Doris North Project area, 2002.

Waterbody	Species	Fork Length (mm)					Weight (g)					Condition Factor				
		n	**Mean**	SD	Min	Max	*n*	**Mean**	SD	Min	Max	*n*	**Mean**	SD	Min	Max
Roberts Outflow	Arctic char	*168*	**584**	200	92	883	*135*	**3130**	2201	51	8250	*135*	**1.10**	0.14	0.74	1.47
	Lake trout	*18*	**501**	131	350	898	*14*	**1686**	1633	715	6750	*14*	**1.06**	0.12	0.83	1.24
	Broad whitefish	*1*	**496**	-	-	-	*1*	**1900**	-	-	-	*1*	**1.56**	-	-	-
Roberts Lake	Arctic char	*3*	**216**	65	169	290	*3*	**112**	106	46	234	*3*	**0.92**	0.07	0.84	0.96
	Lake trout	*40*	**572**	202	195	913	*39*	**2823**	2246	66	10000	*39*	**1.10**	0.15	0.78	1.64
	Lake whitefish	*79*	**381**	75	154	530	*78*	**819**	427	36	2229	*78*	**1.31**	0.14	0.93	1.83
	Cisco	*15*	**326**	37	245	368	*15*	**420**	130	163	593	*15*	**1.17**	0.07	1.06	1.31
	Least cisco	*6*	**215**	30	170	249	*6*	**103**	39	50	149	*6*	**0.99**	0.06	0.93	1.09
Little Roberts Lake	Arctic char	*6*	**698**	104	552	835	*6*	**4417**	1574	2400	6500	*6*	**1.26**	0.11	1.12	1.43
	Lake trout	*2*	**397**	63	352	441	*2*	**684**	284	483	884	*2*	**1.07**	0.05	1.03	1.11
	Least cisco	*1*	**191**	-	-	-	*1*	**62**	-	-	-	*1*	**0.89**	-	-	-
Tail Lake	Lake trout	*203*	**561**	34	436	650	*203*	**1676**	311	650	2500	*203*	**0.95**	0.15	0.59	1.32
Pelvic Lake	Lake trout	*32*	**596**	128	431	850										
	Lake whitefish	*92*	**360**	55	164	466	*3*	**976**	304	629	1195	*3*	**1.20**	0.06	1.16	1.28
	Cisco	*14*	**251**	67	164	344	*2*	**412**	64	366	457	*2*	**1.12**	0.00	1.12	1.12
	Least cisco	*161*	**178**	12	154	232										
Roberts Bay	Arctic char	*1*	**264**	-	-	-	*1*	**189**	-	-	-	*1*	**1.03**	-	-	-
	Saffron cod	*117*	**259**	86	100	435	*108*	**176**	148	6	695	*108*	**0.68**	0.06	0.51	0.84
	Greenland cod	*16*	**265**	180	95	652	*16*	**604**	1061	5	4131	*16*	**0.98**	0.26	0.58	1.49
	Fourhorn sculpin	*1*	**115**	-	-	-	*1*	**13**	-	-	-	*1*	**0.85**	-	-	-
	Banded gunnel	*1*	**245**	-	-	-	*1*	**38**	-	-	-	*1*	**0.26**	-	-	-

NOTE: all sampling methods combined; SD = standard deviation

Appendix C6. Length-frequency (%) distribution of fish sampled in the Doris North Project area, 2002.

Fork Length Interval (mm)	Waterbody / Species																			
	Roberts Outflow			Roberts Lake					Little Roberts L.			Tail L.	Pelvic Lake				Roberts Bay			
	ARCH	LKTR	BRWH	ARCH	LKTR	LKWH	CISC	LSCS	ARCH	LKTR	LSCS	LKTR	LKTR	LKWH	CISC	LSCS	ARCH	SFCD	GRCD	BNGN
90 - 99	0.6																		6.3	
100 - 109																		5.1	6.3	
110 - 119																		3.4	12.5	
120 - 129																		5.1	6.3	
130 - 139																		2.6	12.5	
140 - 149																			6.3	
150 - 159	0.6					2.5										2.5			6.3	
160 - 169				33.3		1.3								1.1	7.1	17.4				
170 - 179	0.6							16.7							7.1	41.0		5.1		
180 - 189				33.3										1.1	28.6	28.6		0.9		
190 - 199					2.5	1.3		16.7			100.0			1.1		5.6		1.7		
200 - 209	1.8				7.5			16.7						1.1		2.5		6.0		
210 - 219	0.6															1.9		0.9		
220 - 229	0.6					1.3												0.9		
230 - 239	0.6				2.5			33.3								0.6		0.9		
240 - 249						1.3	6.7	16.7										1.7		100.0
250 - 259	0.6						6.7							2.2				7.7	6.3	
260 - 269	2.4														7.1		100.0	7.7		
270 - 279	1.2					1.3												10.3		
280 - 289	1.8														7.1			4.3		
290 - 299	1.8			33.3		1.3								2.2	7.1			7.7		
300 - 309	1.8					1.3	13.3							1.1	14.3			3.4		
310 - 319	3.0					3.8	6.7							2.2	7.1			3.4		
320 - 329	1.2					1.3	13.3							12.0	7.1			6.0		
330 - 339	1.2					1.3	13.3							5.4						
340 - 349	1.8				2.5	7.6	13.3							10.9	7.1			1.7		
350 - 359	1.2	5.6				10.1	13.3			50.0				8.7				0.9		
360 - 369	0.6					7.6	13.3							1.1				1.7		
370 - 379	1.2					2.5								8.7				3.4		
380 - 389	1.8	5.6			2.5	2.5								4.3				0.9		
390 - 399	1.8					5.1								9.8				0.9	6.3	
400 - 409					7.5	5.1								12.0						
410 - 419		5.6				5.1								9.8				1.7		
420 - 429		11.1			2.5	3.8								1.1				2.6		
430 - 439	0.6	5.6				12.7						0.5	3.1	2.2				1.7		
440 - 449	0.6	5.6				6.3				50.0			12.5	1.1					12.5	
450 - 459		11.1			2.5	3.8							9.4						6.3	
460 - 469	1.2	5.6				5.1						0.5	6.3	1.1					6.3	
470 - 479					2.5							2.0								
480 - 489	0.6					1.3						0.5	3.1							
490 - 499		11.1	100.0		2.5	2.5						0.5								
500 - 509		16.7			2.5							1.5	3.1							
510 - 519												4.4								
520 - 529	1.2				2.5							6.4								
530 - 539						1.3						8.9								
540 - 549					5.0							10.8								
550 - 559	0.6								16.7			8.9	3.1							
560 - 569	0.6				2.5							12.8	3.1							
570 - 579					2.5							14.8								
580 - 589	2.4				2.5							8.4								
590 - 599	1.8				2.5							8.4	6.3							
600 - 609	1.2								16.7			3.9								
610 - 619	1.8											3.0	3.1							
620 - 629	2.4				2.5							2.0	3.1							
630 - 639	3.6											1.0	3.1							
640 - 649	0.6	5.6										0.5								
650 - 659	2.4				2.5							0.5	6.3						6.3	
660 - 669	1.8												3.1							
670 - 679	1.8												3.1							
680 - 689	3.0				2.5								3.1							
690 - 699	4.2												6.3							
700 - 709	3.6				2.5															
710 - 719	4.2	5.6			2.5															
720 - 729	2.4				2.5															
730 - 739	5.4				2.5				50.0				3.1							
740 - 749	3.0				5.0								6.3							
750 - 759	3.6																			
760 - 769	3.0				5.0															
770 - 779	2.4																			
780 - 789	1.2				2.5															
790 - 799					2.5															
800 - 809	1.2																			
810 - 819	3.6				5.0								3.1							
820 - 829	1.8				5.0								3.1							
830 - 839	1.8								16.7											
840 - 849	1.2																			
850 - 859													3.1							
870 - 879	0.6																			
880 - 889	0.6																			
890 - 899		5.6																		
910 - 919					2.5															
Sample Size	***168***	***18***	***1***	***3***	***40***	***79***	***15***	***6***	***6***	***2***	***1***	***203***	***32***	***92***	***14***	***161***	***1***	***117***	***16***	***1***

Appendix C7. Age-specific length and weight statistics for fish captured in Doris North Project area, 2002.

Age (yr)	Roberts Outflow[a]										Roberts Lake									
	Arctic char										Lake trout									
	Fork Length (mm)					Weight (g)					Fork Length (mm)					Weight (g)				
	n	**Mean**	SD	Min	Max	*n*	**Mean**	SD	Min	Max	*n*	**Mean**	SD	Min	Max	*n*	**Mean**	SD	Min	Max
1	*1*	**92**	-	-	-															
2	*1*	**156**	-	-	-															
3	*3*	**177**	10	169	188	*3*	**51**	5	46	56										
4	*2*	**265**	1	264	266	*2*	**190**	1	189	190										
5	*1*	**290**	-	-	-	*1*	**234**	-	-	-										
6																				
7																				
8	*6*	**608**	34	564	656	*6*	**2862**	393	2391	3378										
9	*3*	**665**	52	606	702	*3*	**3468**	954	2405	4250										
10	*6*	**723**	20	707	752	*6*	**4343**	502	3830	5000										
11	*7*	**796**	50	698	841	*7*	**5820**	1162	4077	7100										
12	*5*	**728**	71	653	841	*5*	**4741**	1530	3402	7200										
13	*3*	**781**	50	735	835	*3*	**5083**	1602	3300	6400										
14											*2*	**392**	11	384	400	*2*	**750**	0	750	750
15											*1*	**408**	-	-	-	*1*	**758**	-	-	-
16																				
17																				
18											*2*	**473**	103	400	546	*2*	**1234**	730	717	1750
19											*1*	**475**	-	-	-	*1*	**1250**	-	-	-
20											*3*	**530**	96	420	599	*3*	**1791**	871	818	2496
21											*2*	**534**	15	523	544	*2*	**2171**	252	1993	2349
22																				
23																				
24																				
25											*1*	**490**	-	-	-	*1*	**1235**	-	-	-
26											*1*	**585**	-	-	-	*1*	**2250**	-	-	-
27											*2*	**684**	44	653	715	*2*	**3025**	349	2778	3272
28											*1*	**505**	-	-	-	*1*	**1450**	-	-	-
29											*1*	**562**	-	-	-	*1*	**1850**	-	-	-
30											*1*	**728**	-	-	-	*1*	**3459**	-	-	-
31											*1*	**789**	-	-	-	*1*	**5209**	-	-	-
32											*1*	**707**	-	-	-	*1*	**3600**	-	-	-
33											*3*	**771**	74	686	814	*3*	**4417**	926	3611	5429
34											*1*	**760**	-	-	-	*1*	**5050**	-	-	-
35											*1*	**741**	-	-	-	*1*	**3738**	-	-	-
36																				
37											*1*	**821**	-	-	-	*1*	**5838**	-	-	-
38																				
39											*1*	**739**	-	-	-	*1*	**4450**	-	-	-
40											*1*	**820**	-	-	-	*1*	**6250**	-	-	-
42											*1*	**767**	-	-	-	*1*	**5157**	-	-	-
44											*1*	**913**	-	-	-	*1*	**10000**	-	-	-
Total	*38*	**609**	228	92	841	*36*	**3725**	2087	46	7200	*30*	**629**	154	384	913	*30*	**3151**	2129	717	10000

[a] includes three fish from Roberts Lake and one fish from Roberts Bay

NOTE: all capture methods combined; SD = standard deviation

Appendix C8. Sex-specific size and age characteristics for immature and mature fish captured in Doris North Project area, 2002.

Sex	Maturity	Parameter		Roberts Outflow		Roberts Lake					Tail L.	Pelvic Lake				Roberts Bay	
				ARCH	BRWH	ARCH	LKTR	LKWH	CISC	LSCS	LKTR	LKTR	LKWH	CISC	LSCS	ARCH	GRCD
Female	Immature	Fork Length	*n*			1	1	1		2			1	3	3		
		(mm)	Minimum			290	232	362		170			412	179	170		
			Maximum			290	232	362		206			412	294	178		
		Age	*n*			1											
		(yr)	Minimum			5											
			Maximum			5											
		Condition Factor	*n*			1	1	1		2							
			Mean			0.96	0.97	1.25		0.98							
	Mature	Fork Length	*n*	17	1		19	26	12	1	9			1	19		1
		(mm)	Minimum	564	496		384	315	257	230	532			300	174		652
			Maximum	835	496		913	530	368	230	650			300	216		652
		Age	*n*	17			19										
		(yr)	Minimum	8			14										
			Maximum	13			44										
		Condition Factor	*n*	17	1		19	26	12	1	9						1
			Mean	1.17	1.56		1.08	1.39	1.18	1.09	0.84						1.49
	Combined	Fork Length	*n*	17	1	1	20	27	12	3	9		1	4	22		1
		(mm)	Minimum	564	496	290	232	315	257	170	532		412	179	170		652
			Maximum	835	496	290	913	530	368	230	650		412	300	216		652
		Age	*n*	17		1	19										
		(yr)	Minimum	8		5	14										
			Maximum	13		5	44										
		Condition Factor	*n*	17	1	1	20	27	12	3	9						1
			Mean	1.17	1.56	0.96	1.08	1.38	1.18	1.02	0.84						1.49
Male	Immature	Fork Length	*n*	1			2	5		1			3	1		1	
		(mm)	Minimum	266			209	166		198			191	187		264	
			Maximum	266			408	365		198			342	187		264	
		Age	*n*	1			1									1	
		(yr)	Minimum	4			15									4	
			Maximum	4			15									4	
		Condition Factor	*n*	1			2	5		1						1	
			Mean	1.01			1.09	1.20		1.00						1.03	
	Mature	Fork Length	*n*	15			10	24	2	1	18	2		1	21		2
		(mm)	Minimum	596			400	295	323	249	519	489		304	163		445
			Maximum	877			767	465	338	249	582	820		304	232		463
		Age	*n*	13			10										
		(yr)	Minimum	8			18										
			Maximum	12			42										
		Condition Factor	*n*	15			10	24	2	1	18						2
			Mean	1.17			1.15	1.32	1.19	0.97	1.01						1.26
	Combined	Fork Length	*n*	16			12	29	2	2	18	2	3	2	21	1	2
		(mm)	Minimum	266			209	166	323	198	519	489	191	187	163	264	445
			Maximum	877			767	465	338	249	582	820	342	304	232	264	463
		Age	*n*	14			11									1	
		(yr)	Minimum	4			15									4	
			Maximum	12			42									4	
		Condition Factor	*n*	16			12	29	2	2	18					1	2
			Mean	1.16			1.14	1.30	1.19	0.98	1.01					1.03	1.26

Appendix C9. Frequency of occurrence and percent composition of food items encountered in fish stomachs in the Doris North Project Area, 2002.

Food Item	Roberts Lake										Roberts Outflow				L. Roberts L.		Tail Lake		Roberts Bay			
	Arctic char		**Lake trout**		**Lake whitefish**		**Cisco**		**Least cisco**		**Arctic char**		**Broad whitefish**		**Least cisco**		**Lake trout**		**Arctic char**		**Greenland cod**	
	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*	%occ	*%con*
Invertebrates																						
Pelecypoda (clams)					10.7	*1.0*																
Isopoda *(Saduria entemon)*			6.3	*21.5*	35.7	*51.2*															33.3	*0.7*
Notostraca (tadpole shrimp)																	66.7	*91.9*				
Trichoptera (caddis fly larvae)					7.1	*6.5*																
Chironomidae (blood worms)			6.3	*10.2*	44.6	*37.0*	*14.3*	*11.8*	25.0	*4.8*												
Amphipoda			6.3	*15.7*							3.2	*0.9*			100.0	*55.6*	16.7	*1.0*				
Zooplankton					3.6	*4.2*	*85.7*	*88.2*	75.0	*95.2*							8.3	*6.9*				
Hymenoptera (ants)															100.0	*44.4*						
Coleoptera (beetles)																	8.3	*0.3*				
Fish																						
Arctic char																					33.3	*3.3*
Saffron cod																					100.0	*96.0*
Unidentified fish remains			12.5	*35.4*							9.7	*99.1*										
Vole			3.1	*15.1*																		
Plant matter			3.1	*1.5*	1.8	*0.04*																
Inorganic matter (stones)			3.1	*0.6*																		
Number of Stomachs Examined	1		32		56		14		4		31		1		1		12		1		3	
Number of Empty Stomachs	1		21		8		0		0		27		1		0		3		1		0	
Total Fullness	0		325		2367		935		210		106		0		90		724		0		300	
Mean Fullness (%)	**0.0**		**10.2**		**42.3**		**66.8**		**52.5**		**3.4**		**0.0**		**90.0**		**60.3**		**0.0**		**100.0**	
Empty Stomachs (%)	100.0		65.6		14.3		0.0		0.0		87.1		100.0		0.0		25.0		100.0		0.0	

NOTES:

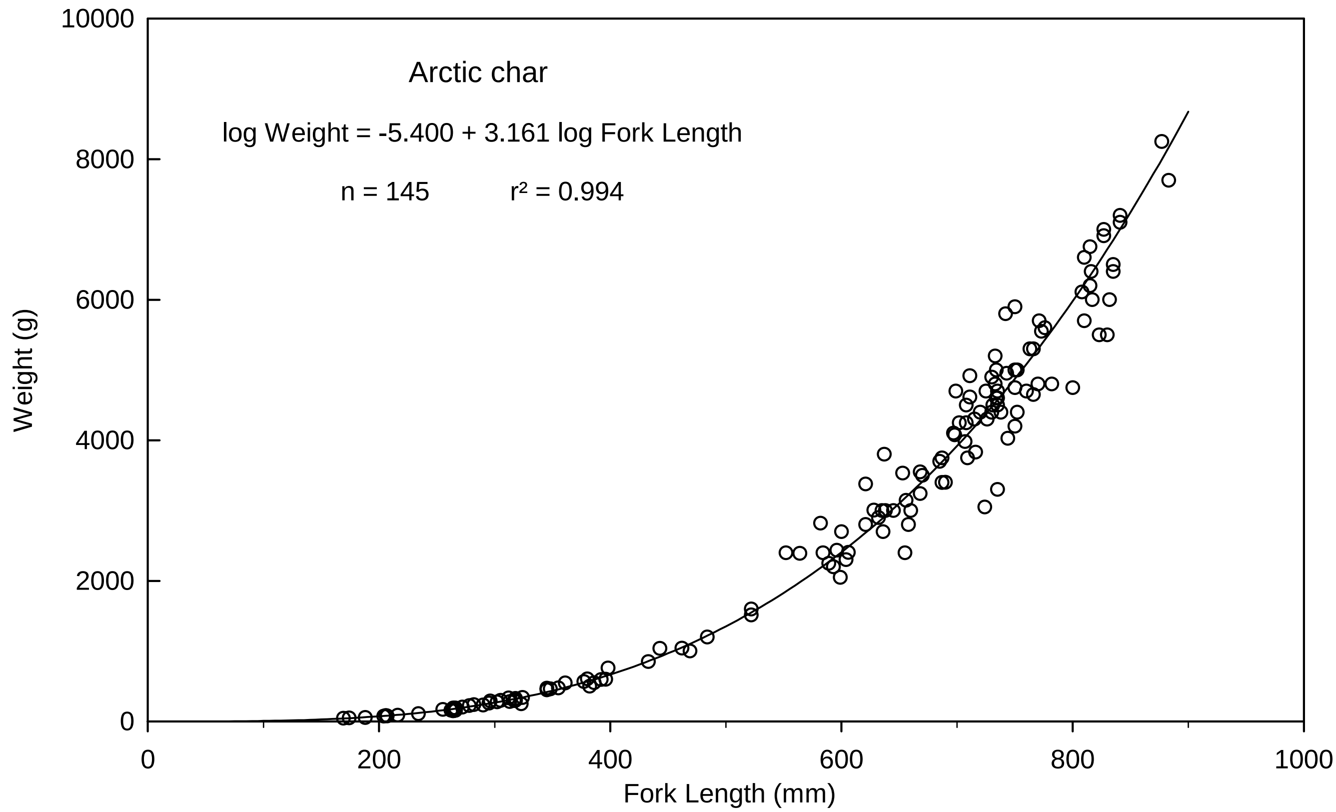
% occ = frequency of occurrence of each food item in the total number of stomachs examined

% con = percent contribution of each food item (by volume) to the total amount of food found in all stomachs

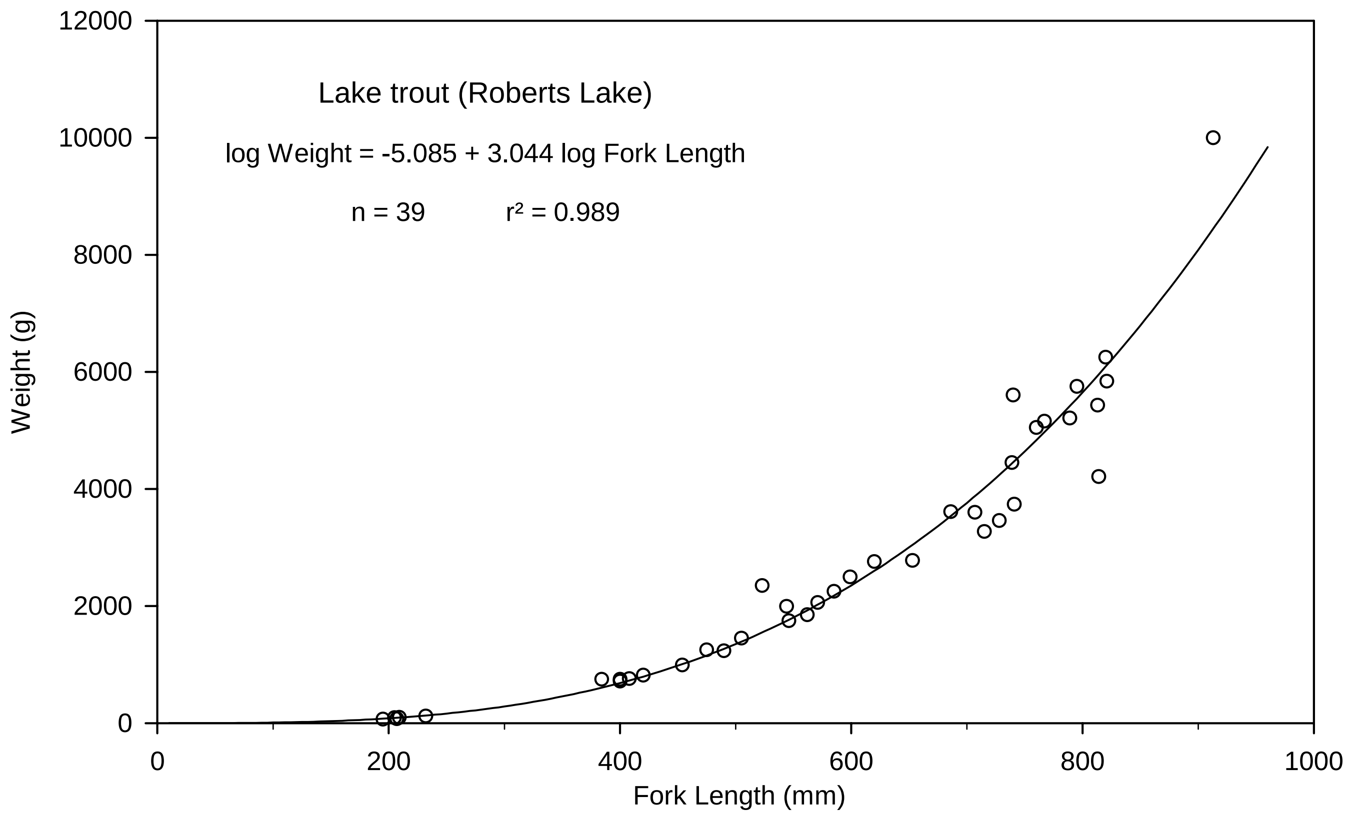
Fullness was assessed on a scale of 0 (empty stomach) to 100 (stomach completely filled with food)

Total Fullness = the sum of all fullness values from all fish examined

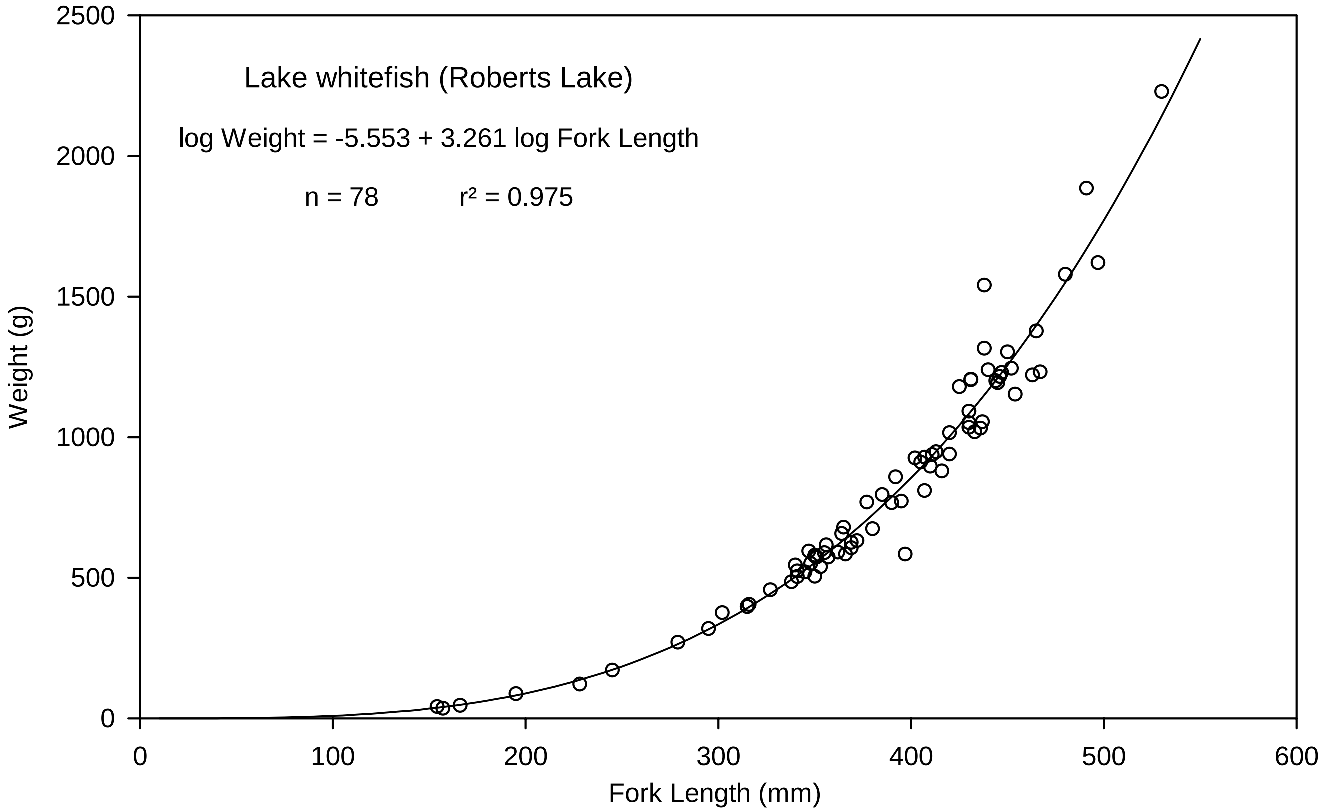
Mean Fullness = Total Fullness / Number of Stomachs Examined



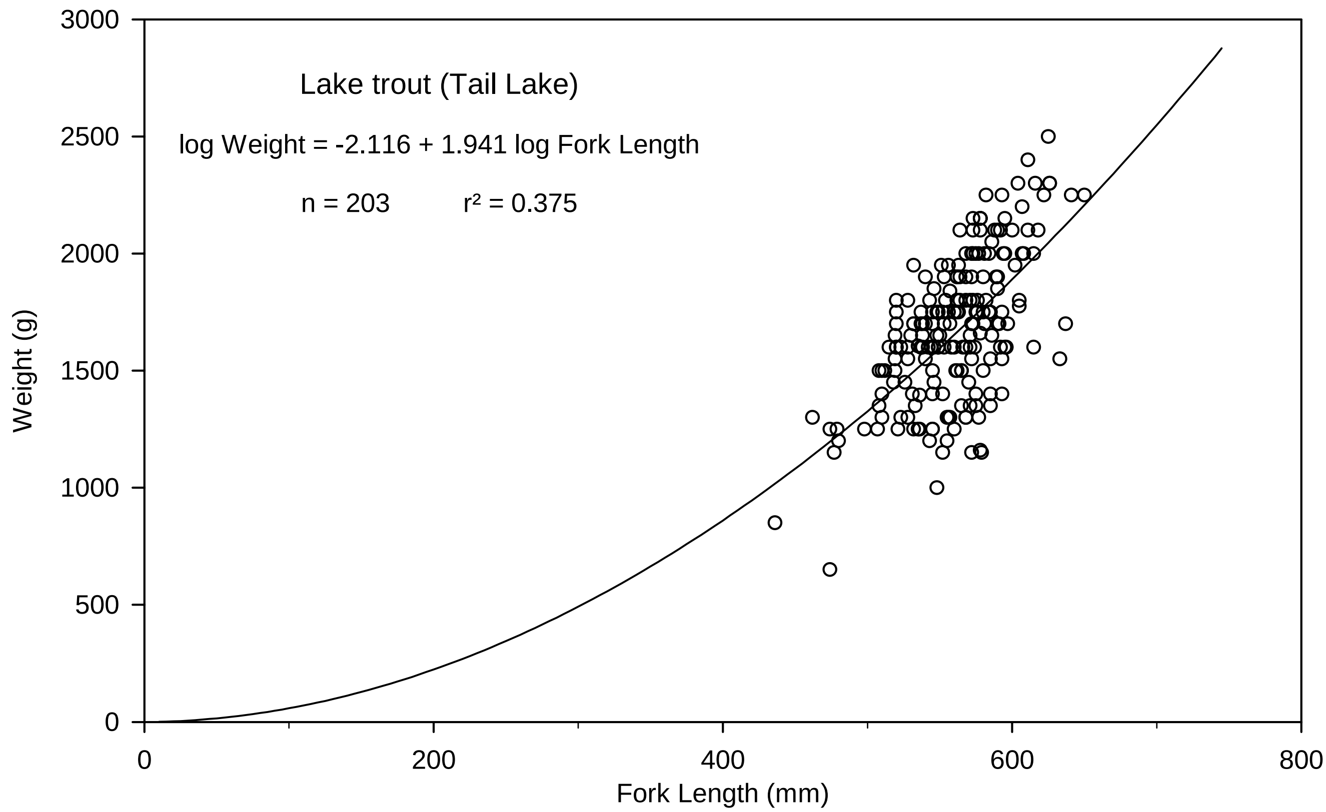
Appendix C10. Length-weight relationship for Arctic char captured in the Doris Hinge Project area, 2002.



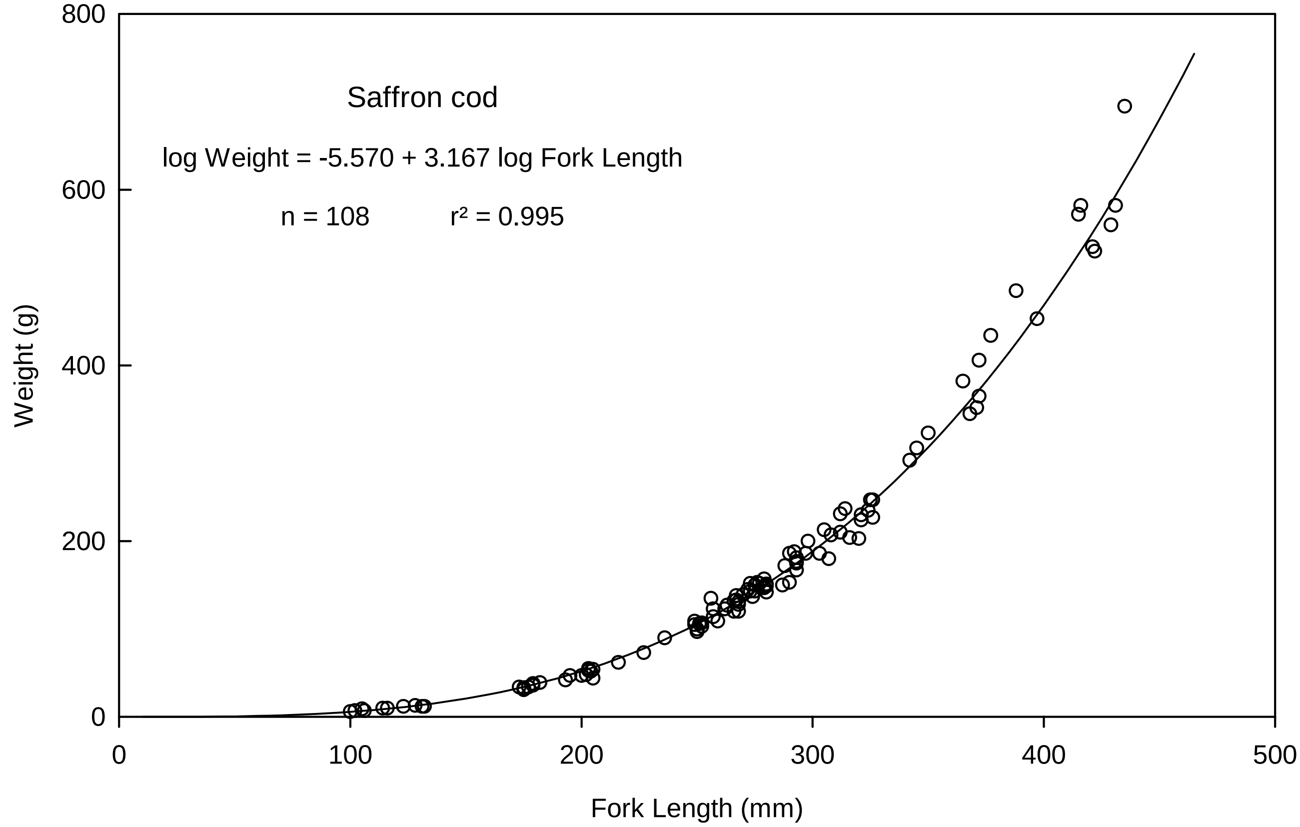
Appendix C11. Length-weight relationship for lake trout captured in Roberts Lake, 2002.



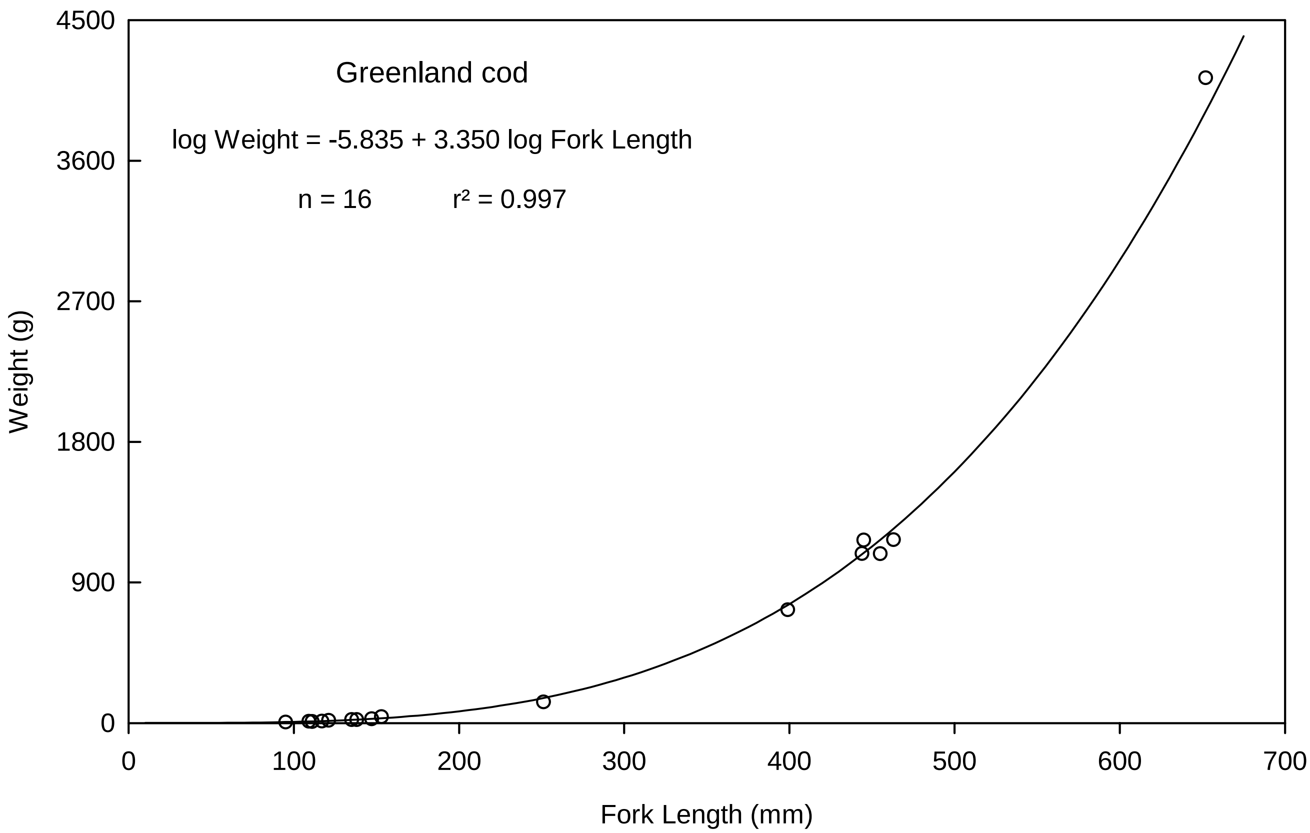
Appendix C12. Length-weight relationship for lake whitefish captured in Roberts Lake, 2002.



Appendix C13. Length-weight relationship for lake trout captured in Tail Lake, 2002.



Appendix C14. Length-weight relationship for saffron cod captured in Roberts Bay, 2002.



Appendix C15. Length-weight relationship for Greenland cod captured in Roberts Bay, 2002.

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mortality	Stomach % Full	Stomach Contents	Comments
Rob Out	BG	16-Aug	HC		1	ARCH	564	2391	1.33	F	2	1			O,F,S	8				Tis	Mort	0		
Rob Out	BG	16-Aug	HC		2	ARCH	815	6753	1.25	M	2	1			O,F,S	11				Tis	Mort	1	Amph	kype; photo 1-17
Rob Out	BG	16-Aug	HC		3	ARCH	716	3830	1.04	F	2	1			O,F,S	10				Tis	Mort	0		residual eggs
Rob Out	BG	16-Aug	HC		4	ARCH	744	4028	0.98	F	2	1			O,F,S	10				Tis	Mort	0		residual eggs; photo 1-18
Rob Out	BG	16-Aug	HC		5	ARCH	628	3006	1.21	M	2	1		4	O,F,S	8				Tis	Mort	0		
Rob Out	BG	16-Aug	HC		6	ARCH	707	3980	1.13	F	2	1			O,F,S	10				Tis	Mort	0		
Rob Out	BG	16-Aug	HC		7	ARCH	827	6910	1.22	M	2	1		9	O,F,S	11				Tis	Mort	0		slight kype
Rob Out	BG	16-Aug	HC		8	ARCH	596	2435	1.15	M	2	1		3	O,F,S	8				Tis	Mort	20	unid fish	
Rob Out	BG	16-Aug	HC		9	ARCH	743	4953	1.21	F	2	1	45		O,F,S	12				Tis	Mort	0		residual eggs
Rob Out	BG	16-Aug	HC		10	ARCH	711	4616	1.28	F	2	1	33		O,F,S	12				Tis	Mort	0		residual eggs
Rob Out	BG	16-Aug	HC		11	ARCH	690	3402	1.04	F	2	1	20		O,F,S	12				Tis	Mort	0		residual eggs
Rob Out	BG	16-Aug	HC		12	ARCH	582	2820	1.43	F	2	1	7		O,F,S	8				Tis	Mort	10	unid fish	
Rob Out	BG	16-Aug	HC		13	ARCH	653	3533	1.27	F	2	1	23		O,F,S	12				Tis	Mort	75	unid fish	
Rob Out	BG	16-Aug	HC		14	ARCH	711	4919	1.37	M	2	1		7	O,F,S	10				Tis	Mort	0		
Rob Out	BG	16-Aug	HC		15	ARCH	656	3144	1.11	M	2	1		5	O,F,S	8				Tis	Mort	0		
Rob Out	BG	16-Aug	HC		16	ARCH	621	3378	1.41	F	2	1			O,F,S	8				Tis	Mort	0		
Rob Out	BG	16-Aug	HC		17	ARCH	698	4077	1.20	M	2	1			O,F,S	11				Tis	Mort	0		
Rob Lk	GN1A	17-Aug	GN	8.9	18	LKTR	814	4211	0.78	F	2	1	40		O,F,S	33				Tis	Mort	0		skinny
Rob Lk	GN2	17-Aug	GN	3.8	19	CISC	310	316	1.06	F	2	1			S						Mort	75	Zoop	
Rob Lk	GN1B	17-Aug	GN	8.9	20	LKWH	411	938	1.35	M	2	2	16		O,F,S						Mort	25	Chir	
Rob Lk	GN1B	17-Aug	GN	3.8	21	LKWH	407	810	1.20	F	2	1	13		O,F,S						Mort	25	24 Chir, 1 veg	
Rob Lk	GN1B	17-Aug	GN	8.9	22	LKWH	365	680	1.40	M	1	1		2	O,F,S						Mort	25	23 Chir, 2 Pele	
Rob Lk	GN1B	17-Aug	GN	3.8	23	LKWH	362	591	1.25	F	1	1	2		O,F,S						Mort	50	Chir	
Rob Lk	GN1B	18-Aug	GN	3.8	24	LKTR	741	3738	0.92	M	2	1		10	O,F,S	35				Tis	Mort	50	Isop	skinny; tumor; photo 1-22;23
Rob Lk	GN1B	18-Aug	GN	3.8	25	LKTR	813	5429	1.01	F	2	1	80		O,F,S	33				Tis	Mort	0		skinny; residual eggs
Rob Lk	GN1B	18-Aug	GN	3.8	26	LKTR	232	121	0.97	F	1	1			O,F,S						Mort	50	Amph	
Rob Lk	GN1B	18-Aug	GN	3.8	27	LKWH	452	1245	1.35	F	2	1	15		O,S						Mort	100	90 Isop, 10 Tric	ulcer abdomen; red eggs; photo 1-24
Rob Lk	GN1B	18-Aug	GN	3.8	28	LKWH	491	1886	1.59	F	2	2	120		O,S						Mort	75	Isop	
Rob Lk	GN1B	18-Aug	GN	3.8	29	LKWH	431	1204	1.50	F	2	2	55		O,S						Mort	50	Isop	
Rob Lk	GN1B	18-Aug	GN	3.8	30	LKWH	433	1019	1.26	M	2	1		7	O,S						Mort	10	Zoop	
Rob Lk	GN1B	18-Aug	GN	3.8	31	LKWH	402	926	1.43	M	2	1		4	O,S						Mort	75	50 Isop, 25 Tric	
Rob Lk	GN1B	18-Aug	GN	3.8	32	LKWH	407	929	1.38	F	2	1	7		O,S						Mort	10	Isop	
Rob Lk	GN1B	18-Aug	GN	3.8	33	LKWH	430	1092	1.37	M	2	2	24	15	O,S						Mort	2	Pele	tubercles
Rob Lk	GN1B	18-Aug	GN	3.8	34	LKWH	413	948	1.35	F	2	1	8		O,S						Mort	50	48 Isop, 2 Pele	
Rob Lk	GN1B	18-Aug	GN	3.8	35	LKWH	351	573	1.33	F	2	1	2		O,S						Mort	100	90 Zoop, 8 Chir, 2 Pele	eggs red
Rob Lk	GN1B	18-Aug	GN	3.8	36	LKWH	348	551	1.31	M	2	1		3	O,S						Mort	0		
Rob Lk	GN1B	18-Aug	GN	3.8	37	LKWH	302	376	1.37	M	2	1		4	O,S						Mort	0		
Rob Lk	GN1B	18-Aug	GN	3.8	38	LSCS	198	78	1.00	M	1	1		2	O,S						Mort	50	Zoop	
Rob Lk	GN1B	18-Aug	GN	3.8	39	LKWH	166	46	1.01	M	1	1		<1	O,S						Mort	5	Chir	
Rob Lk	GN1B	18-Aug	GN	3.8	40	LKWH	157	36	0.93						S									
Rob Lk	GN1B	18-Aug	GN	3.8	41	LKWH	154	42	1.15						S									
Rob Lk	GN1B	18-Aug	GN	8.9	42	LKTR	490	1235	1.05	M	2	2	30		O,F,S	25				Tis	Mort	0		
Rob Lk	GN1B	18-Aug	GN	8.9	43	LKTR	408	758	1.12	M	1	1		4	O,F,S	15				Tis	Mort	90	unid fish	
Rob Lk	GN1B	18-Aug	GN	8.9	44	LKWH	480	1579	1.43	F	2	2	80		O,S						Mort	100	Isop	
Rob Lk	GN1B	18-Aug	GN	8.9	45	LKWH	410	897	1.30	M	2	1		8	O,S						Mort	25	Chir	testes red
Rob Lk	GN1B	18-Aug	GN	8.9	46	LKWH	340	545	1.39	M	2	1		4	O,S						Mort	75	Chir	testes red
Rob Lk	GN1B	18-Aug	GN	8.9	47	LKWH	355	589	1.32	M	2	1		4	O,S						Mort	25	Chir	testes red
Rob Lk	GN1B	18-Aug	GN	8.9	48	LKWH	345	521	1.27	M	2	1		3	O,S						Mort	75	Chir	testes red
Rob Lk	GN2	18-Aug	GN	3.8	49	LKTR	821	5838	1.05	F	2	2	130		O,F,S	37				Tis	Mort	0		
Rob Lk	GN2	18-Aug	GN	3.8	50	LKTR	767	5157	1.14	M	2	2	138	35	O,F,S	42				Tis	Mort	0		
Rob Lk	GN2	18-Aug	GN	3.8	51	LKTR	728	3459	0.90	F	2	1	32		O,F,S	30				Tis	Mort	0		
Rob Lk	GN2	18-Aug	GN	3.8	52	LKTR	715	3272	0.90	F	2	1	36		O,F,S	27				Tis	Mort	0		skinny
Rob Lk	GN2	18-Aug	GN	3.8	53	LKTR	544	1993	1.24	F	2	1	36		O,F,S	21				Tis	Mort	0		deformed dorsal fin (only 4 rays)
Rob Lk	GN2	18-Aug	GN	3.8	54	LKTR	571	2059	1.11	F	2	2	156		O,F,S	20				Tis	Mort	0		
Rob Lk	GN2	18-Aug	GN	3.8	55	LKTR	523	2349	1.64	M	2	2	58	25	O,F,S	21				Tis	Mort	0		

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mortality	Stomach % Full	Stomach Contents	Comments
Rob Lk	GN2	18-Aug	GN	3.8	56	LKTR	599	2496	1.16	F	2	2	238		O,F,S	20				Tis	Mort	0		
Rob Lk	GN2	18-Aug	GN	3.8	57	LKWH	316	405	1.28	M	2	1		2	O,S						Mort	80	Chir	
Rob Lk	GN2	18-Aug	GN	3.8	58	LKWH	315	398	1.27	F	2	1	2		O,S						Mort	20	Tric	eggs red
Rob Lk	GN2	18-Aug	GN	3.8	59	LKWH	245	172	1.17	M	1	1		5	O,S						Mort	75	Chir	
Rob Lk	GN2	18-Aug	GN	3.8	60	LKWH	195	88	1.19	M	1	1		1	O,S						Mort	25	Chir	
Rob Lk	GN2	18-Aug	GN	3.8	61	CISC	356	593	1.31	F	2	2	56		O,S						Mort	10	Chir	
Rob Lk	GN2	18-Aug	GN	3.8	62	CISC	347	491	1.18	F	2	1	4		O,S						Mort	50	Zoop	
Rob Lk	GN2	18-Aug	GN	3.8	63	CISC	323	423	1.26	M	2	2		12	O,S						Mort	100	Zoop	
Rob Lk	GN2	18-Aug	GN	3.8	64	CISC	304	348	1.24	F	2	2	16		O,S						Mort	100	Zoop	
Rob Lk	GN2	18-Aug	GN	3.8	65	CISC	328	395	1.12	F	2	1	5		O,S						Mort	50	Zoop	
Rob Lk	GN2	18-Aug	GN	3.8	66	CISC	358	514	1.12	F	2	1	7		O,S						Mort	50	Zoop	
Rob Lk	GN2	18-Aug	GN	3.8	67	CISC	257	202	1.19	F	2	1	5		O,S						Mort	50	Zoop	
Rob Lk	GN2	18-Aug	GN	3.8	68	LSCS	230	133	1.09	F	2	2	6		O,S						Mort	50	Zoop	
Rob Lk	GN2	18-Aug	GN	8.9	69	LKTR	653	2778	1.00	F	2	1	29		O,F,S	27				Tis	Mort	5	veg	
Rob Lk	GN2	18-Aug	GN	8.9	70	LKTR	789	5209	1.06	F	2	2	517		O,F,S	31				Tis	Mort	0		
Rob Lk	GN2	18-Aug	GN	8.9	71	LKTR	686	3611	1.12	M	2	2	93	32	O,F,S	33				Tis	Mort	10	unid fish	
Rob Lk	GN2	18-Aug	GN	8.9	72	LKTR	420	818	1.10	M	2	1		3	O,F,S	20				Tis	Mort	0		
Rob Lk	GN2	18-Aug	GN	8.9	73	LKWH	438	1541	1.83	F	2	1	28		O,S						Mort	50	Isop	fat
Rob Lk	GN2	18-Aug	GN	8.9	74	LKWH	438	1316	1.57	F	2	1	18		O,S						Mort	50	Isop	eggs red
Rob Lk	GN2	18-Aug	GN	8.9	75	LKWH	405	911	1.37	M	2	1		4	O,S						Mort	50	Isop	
Rob Lk	GN2	18-Aug	GN	8.9	76	LKWH	380	674	1.23	M	2	1		3	O,S						Mort	10	Chir	
Rob Lk	GN2	18-Aug	GN	8.9	77	LKWH	372	632	1.23															
Rob Lk	GN2	18-Aug	GN	8.9	78	LKWH	366	584	1.19															
Rob Lk	GN2	18-Aug	GN	8.9	79	CISC	368	591	1.19	F	2	2	34		O,S						Mort	75	Zoop	
Rob Lk	GN2	18-Aug	GN	8.9	80	CISC	348	496	1.18	F	2	2	36		O,S						Mort	100	Zoop	
Rob Lk	GN2	18-Aug	GN	8.9	81	CISC	368	549	1.10	F	2	2	39		O,S						Mort	25	Zoop	
Rob Lk	GN2	18-Aug	GN	8.9	82	CISC	330	452	1.26	F	2	2	32		O,S						Mort	100	Zoop	
Rob Lk	GN3	19-Aug	GN	3.8	83	LKTR	620	2759	1.16								Wh	2302						
Rob Lk	GN3	19-Aug	GN	3.8	84	LKWH	465	1378	1.37	M	2	2	13	20							Mort	0		
Rob Lk	GN3	19-Aug	GN	3.8	85	LKWH	425	1180	1.54	F	2	2	37								Mort	20	Isop	
Rob Lk	GN3	19-Aug	GN	3.8	86	LKWH	392	859	1.43	F	2	1									Mort	10	Chir	
Rob Lk	GN3	19-Aug	GN	3.8	87	LKWH	431	1206	1.51	M	2	1									Mort	50	Isop	
Rob Lk	GN3	19-Aug	GN	3.8	88	LKWH	450	1303	1.43	F	2	2	53								Mort	90	Isop	
Rob Lk	GN3	19-Aug	GN	3.8	89	LKWH	437	1055	1.26	F	2	1									Mort	100	Isop	
Rob Lk	GN3	19-Aug	GN	3.8	90	LKWH	397	584	0.93	M	2	1									Mort	10	Chir	
Rob Lk	GN3	19-Aug	GN	3.8	91	LKWH	377	769	1.44	F	2	1									Mort	30	Chir	
Rob Lk	GN3	19-Aug	GN	3.8	92	LKWH	420	940	1.27								Wh	2304						
Rob Lk	GN3	19-Aug	GN	3.8	93	LKWH	447	1230	1.38	M	2	2	11	19							Mort	20	Chir	
Rob Lk	GN3	19-Aug	GN	3.8	94	LKWH	350	505	1.18	F	2	1		7							Mort	25	Chir	
Rob Lk	GN3	19-Aug	GN	3.8	95	LKWH	369	607	1.21	M	2	1		4							Mort	75	70 Chir, 5 Pele	
Rob Lk	GN3	19-Aug	GN	3.8	96	LKWH	295	319	1.24	M	2	1		4							Mort	50	Chir	
Rob Lk	GN3	19-Aug	GN	3.8	97	LSCS	249	149	0.97	M	2	2		12	O,S						Mort	100	Zoop	
Rob Lk	GN3	19-Aug	GN	3.8	98	LSCS	170	50	1.02	F	1	1			O,S						Mort	10	Chir	
Rob Lk	GN3	19-Aug	GN	3.8	99	ARCH	290	234	0.96	F	1	1		4	O,S	5					Mort	0		
Rob Lk	GN3	19-Aug	GN	8.9	100	LKWH	454	1153	1.23	M	2	1		8							Mort	50	Isop	
Rob Lk	GN3	19-Aug	GN	8.9	101	LKWH	356	617	1.37	M	2	1		3							Mort	50	Isop	testes red
Rob Lk	GN3	19-Aug	GN	8.9	102	LKWH	497	1621	1.32	F	2	1	30		O,S						Mort	0		
Rob Lk	GN3	19-Aug	GN	8.9	103	LKWH	350	580	1.35	F	2	1									Mort	0		
Rob Lk	GN3	19-Aug	GN	8.9	104	LKWH	350	577	1.35	F	2	1									Mort	50	40 Chir, 10 Pele	ovaries red
Rob Lk	GN3	19-Aug	GN	8.9	105	LKWH	347	595	1.42	M	2	1		4							Mort	100	Isop	
Rob Lk	GN3	19-Aug	GN	8.9	106	LKWH	430	1035	1.30	M	2	1		6							Mort	50	Chir	
Rob Lk	GN3	19-Aug	GN	8.9	107	LKWH	430	1051	1.32	F	2	1									Mort	75	50 Isop, 25 Chir	ovaries red
Rob Lk	GN3	19-Aug	GN	8.9	108	LKWH	353	539	1.23	F	2	1									Mort	20	Chir	ovaries red
Rob Lk	GN3	19-Aug	GN	8.9	109	LKWH	364	657	1.36	F	2	1									Mort	0		
Rob Lk	GN3	19-Aug	GN	8.9	110	LKTR	707	3600	1.02	F	2	2	413		O,F,S	32				Tis	Mort	0		large developed eggs

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad		Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tiss ues	Mort- ality	Stomach		Comments
													(g)	(mm)								% Full	Contents	
Rob Lk	GN3	19-Aug	GN	8.9	111	LKTR	546	1750	1.08	F	2	1			O,F,S	18				Tis	Mort	20	Isop	
Rob Lk	GN3	19-Aug	GN	8.9	112	LKTR	562	1850	1.04	F	2	1	32		O,F,S	29				Tis	Mort	0		tiny undeveloped eggs
Rob Lk	GN4	19-Aug	GN	3.8	113	LKTR	795	5750	1.14								Wh	2305						
Rob Lk	GN4	19-Aug	GN	3.8	114	LKTR	740	5602	1.38								Wh	2306						
Rob Lk	GN4	19-Aug	GN	3.8	115	LKTR	454	992	1.06								Wh	2307						
Rob Lk	GN4	19-Aug	GN	3.8	116	LKWH	444	1201	1.37	F	2	2	66								Mort	50	Isop	
Rob Lk	GN4	19-Aug	GN	3.8	117	LKWH	420	1016	1.37	M	2	2		22							Mort	0		
Rob Lk	GN4	19-Aug	GN	3.8	118	LKWH	338	486	1.26	F	2	1									Mort	100	Tric	ovaries red
Rob Lk	GN4	19-Aug	GN	3.8	119	LKWH	279	271	1.25	M	1	1		2							Mort	0		
Rob Lk	GN4	19-Aug	GN	3.8	120	CISC	303	329	1.18	F	2	1			O,S						Mort	100	Chir	
Rob Lk	GN4	19-Aug	GN	3.8	121	CISC	338	435	1.13	M	2	2		12	O,S						Mort	50	Zoop	
Rob Lk	GN4	19-Aug	GN	3.8	122	LKTR	209	98	1.07	M	1	1									Mort	0		
Rob Lk	GN4	19-Aug	GN	3.8	123	LKTR	205	95	1.10															
Rob Lk	GN4	19-Aug	GN	3.8	124	LKTR	195	66	0.89															
Rob Lk	GN4	19-Aug	GN	3.8	125	LKTR	207	74	0.83															
Rob Lk	GN4	19-Aug	GN	3.8	126	LKTR	913	10000	1.31	F	2	2	1273		O,F,S	44				Tis	Mort	10	unid fish	large developed eggs
Rob Lk	GN4	19-Aug	GN	3.8	127	LKTR	760	5050	1.15	F	2	1	67		O,F,S	34				Tis	Mort	0		undeveloped eggs
Rob Lk	GN4	19-Aug	GN	8.9	128	LKWH	530	2229	1.50	F	2	1	34								Mort	80	Isop	fat
Rob Lk	GN4	19-Aug	GN	8.9	129	LKWH	446	1216	1.37												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	130	LKWH	440	1240	1.46												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	131	LKWH	369	626	1.25												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	132	LKWH	445	1194	1.35												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	133	LKWH	390	767	1.29												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	134	LKWH	385	796	1.39												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	135	LKWH	357	573	1.26												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	136	LKWH	341	504	1.27												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	137	LKWH	327	457	1.31												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	138	LKWH	341	524	1.32												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	139	LKWH	315	398	1.27												Mort			
Rob Lk	GN4	19-Aug	GN	8.9	140	LKTR	475	1250	1.17	M	2	2		23	O,F,S	19				Tis	Mort	50	49 vole, 1 Amph	stomach contents preserved
Rob Lk	GN4	19-Aug	GN	8.9	141	LKTR	400	750	1.17	F	2	1		8	O,F,S	14				Tis	Mort	0		
Rob Out	1600	19-Aug	TU		142	ARCH	724	3050	0.80								Wh	2308						
Rob Out	1600	19-Aug	TU		143	ARCH	655	2400	0.85								Wh	2309						
Rob Out	1600	19-Aug	TU		144	ARCH	668	3550	1.19								Wh	2310						
Rob Out	1600	19-Aug	TU		145	LKTR	439										Wh	2311						
Rob Out	1600	19-Aug	TU		146	ARCH	599	2050	0.95								Wh	2312						
Rob Out	1600	19-Aug	TU		147	LKTR	640										Wh	2313						
Rob Out	u/s TU	20-Aug	HC		148	ARCH	800	4750	0.93								Wh	2314						
Rob Out	u/s TU	20-Aug	HC		149	ARCH	830	5500	0.96								Wh	2315						
Rob Lk	AN1	20-Aug	AN		150	LKTR	820	6250	1.13	F	2	2	855		O,F,S	40				Tis	Mort	0		large developed eggs
Rob Lk	AN1	20-Aug	AN		151	LKTR	739	4450	1.10	M	2	2		35	O,F,S	39				Tis	Mort	5	unid fish	
Rob Lk	AN1	20-Aug	AN		152	LKTR	585	2250	1.12	F	2	1	69		O,F,S	26				Tis	Mort	0		
Rob Lk	AN1	20-Aug	AN		153	LKTR	505	1450	1.13	M	2	1		5	O,F,S	28				Tis	Mort	0		
Rob Lk	AN1	20-Aug	AN		154	LKTR	384	750	1.32	F	2	1	10		O,F,S	14				Tis	Mort	25	Chir	tiny undeveloped eggs
Rob Out	2015	20-Aug	TU		155	ARCH	635	3000	1.17								Wh	2316						
Rob Out	2015	20-Aug	TU		156	ARCH	709	3750	1.05								Wh	2317						
Rob Out	2015	20-Aug	TU		157	ARCH	621	2800	1.17								Wh	2318						
Rob Out	2015	20-Aug	TU		158	ARCH	685	3700	1.15								Wh	2319						
Rob Out	2015	20-Aug	TU		159	ARCH	735	4500	1.13								Wh	2320						
Rob Out	2015	20-Aug	TU		160	ARCH	658	2800	0.98								Wh	2321						
Rob Out	2015	20-Aug	TU		161	ARCH	660	3000	1.04								Wh	2322						
Rob Out	2015	20-Aug	TU		162	ARCH	593	2200	1.06								Wh	2323						
Rob Out	2015	20-Aug	TU		163	ARCH	469	1000	0.97								Wh	2324						
Rob Out	2015	20-Aug	TU		164	ARCH	484	1200	1.06								Wh	2325						
Rob Out	2015	20-Aug	TU		165	ARCH	335										Wh	2326						

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mortality	Stomach % Full	Stomach Contents	Comments
Rob Out	2015	20-Aug	TU		166	ARCH	733	4800	1.22								Wh	2327						
Rob Out	2015	20-Aug	TU		167	ARCH	750	4200	1.00								Wh	2328						
Rob Out	2015	20-Aug	TU		168	ARCH	738	4400	1.09								Wh	2329						
Rob Out	2015	20-Aug	TU		169	ARCH	770	4800	1.05								Wh	2330						
Rob Out	2015	20-Aug	TU		170	ARCH	687	3400	1.05								Wh	2331						
Rob Out	2015	20-Aug	TU		171	ARCH	584	2400	1.20								Wh	2332						
Rob Out	2015	20-Aug	TU		172	ARCH	731	4500	1.15								Wh	2333						
Rob Out	2015	20-Aug	TU		173	ARCH	522	1600	1.12								Wh	2334						
Rob Out	2015	20-Aug	TU		174	ARCH	281										Wh	2335						parr marks
Rob Out	2015	20-Aug	TU		175	LKTR	455	1000	1.06								Wh	2336						
Rob Out	2015	20-Aug	TU		176	ARCH	841	7200	1.21	M	2	1		7	O,F,S	12				Tis	Mort	0		
Rob Out	2015	20-Aug	TU		177	ARCH	773	5550	1.20	F	2	1	50		O,F,S	13				Tis	Mort	0		residual eggs
Rob Out	2015	20-Aug	TU		178	ARCH	810	5700	1.07	M	2	1		9	O,F,S	11				Tis	Mort	0		
Rob Out	2015	20-Aug	TU		179	ARCH	687	3750	1.16	M	2	1		6	O,F,S	9				Tis	Mort	0		
Rob Out	2015	20-Aug	TU		180	ARCH	835	6400	1.10	F	2	1	64		O,F,S	13				Tis	Mort	0		residual eggs
Rob Out	2015	20-Aug	TU		181	ARCH	760	4700	1.07	F	2	1	25		O,F,S	11				Tis	Mort	0		residual eggs
Rob Out	0915	21-Aug	TU		182	ARCH	816	6400	1.18								Wh	2337						
Rob Out	0915	21-Aug	TU		183	ARCH	750	4750	1.13								Wh	2338						
Rob Out	0915	21-Aug	TU		184	ARCH	699	4700	1.38								Wh	2339						
Rob Out	0915	21-Aug	TU		185	ARCH	750	5000	1.19								Wh	2340						
Rob Out	0915	21-Aug	TU		186	ARCH	708	4250	1.20								Wh	2341						
Rob Out	0915	21-Aug	TU		187	ARCH	637	3800	1.47								Wh	2342						
Rob Out	0915	21-Aug	TU		188	ARCH	776	5600	1.20								Wh	2343						
Rob Out	0915	21-Aug	TU		189	ARCH	636	2700	1.05								Wh	2344						
Rob Out	0915	21-Aug	TU		190	ARCH	697	4100	1.21								Wh	2345						
Rob Out	0915	21-Aug	TU		191	ARCH	632	2900	1.15								Wh	2346						
Rob Out	0915	21-Aug	TU		192	LKTR	898	6750	0.93								Wh	2347						
Rob Out	0915	21-Aug	TU		193	LKTR	503	1250	0.98								Wh	2348						
Rob Out	BG	21-Aug	HC		194	ARCH	827	7000	1.24								Wh	2349						released in Roberts Lake
Rob Out	BG	21-Aug	HC		195	ARCH	735	4600	1.16								Wh	2350						released in Roberts Lake
Rob Out	BG	21-Aug	HC		196	ARCH	725	4700	1.23								Wh	2101						released in Roberts Lake
Rob Out	BG	21-Aug	HC		196.1	ARCH	709										Wh	2317	02-1					released in Roberts Lake
Rob Out	BG	21-Aug	HC		196.2	ARCH	621										Wh	2318	02-1					released in Roberts Lake
Rob Out	BG	21-Aug	HC		196.3	ARCH	800										Wh	2314	02-1					released in Roberts Lake
Rob Out	BG	21-Aug	HC		196.4	ARCH	687										Wh	2331	02-1					released in Roberts Lake
Tail Lk	GN1A	21-Aug	GN	8.9	197	LKTR	615	2000	0.86								Wh	2102						
Tail Lk	AN1	21-Aug	AN		198	LKTR	605	1800	0.81								Wh	2103						
Tail Lk	GN1B	21-Aug	GN	8.9	199	LKTR	548	1000	0.61								Wh	2104						
Tail Lk	GN2B	21-Aug	GN	8.9	201	LKTR	579	1150	0.59								Wh	2105						
Rob Out	1600	21-Aug	TU		200	ARCH	735	3300	0.83	F	2	2	480		O,F,S	13				Tis	Mort	0		large dev'd eggs & residual eggs
Rob Out	BG	21-Aug	HC		202	ARCH	720	4400	1.18								Wh	2106						released in Roberts Lake
Rob Out	BG	21-Aug	HC		202.1	ARCH	731										Wh	2333	02-1					released in Roberts Lake
Rob Out	BG	21-Aug	HC		202.2	ARCH	658										Wh	2321	02-1					released in Roberts Lake
Rob Out	BG	21-Aug	HC		202.3	ARCH	632										Wh	2346	02-1					released in Roberts Lake
Rob Out	BG	21-Aug	HC		202.4	ARCH	635										Wh	2316	02-1					released in Roberts Lake
Rob Out	BG	21-Aug	HC		202.5	ARCH	660										Wh	2322	02-1					released in Roberts Lake
Tail Lk	AN2	22-Aug	AN		203	LKTR	565	1500	0.83								Yel	735	2000					skinny
Tail Lk	AN2	22-Aug	AN		204	LKTR	581	2000	1.02								Wh	2107						
Tail Lk	AN2	22-Aug	AN		205	LKTR	607	2200	0.98								Wh	2108						
Tail Lk	AN2	22-Aug	AN		206	LKTR	543	1800	1.12								Wh	2109						
Tail Lk	AN2	22-Aug	AN		207	LKTR	512	1500	1.12								Wh	2110						
Tail Lk	GN3A	22-Aug	GN	8.9	208	LKTR	571	1350	0.73								Wh	2111						
Tail Lk	GN3A	22-Aug	GN	8.9	209	LKTR	532	1250	0.83								Wh	2112						
Tail Lk	GN3A	22-Aug	GN	3.8	210	LKTR	545	1250	0.77								Wh	2113						
Tail Lk	GN4A	22-Aug	GN	8.9	211	LKTR	597	1700	0.80								Wh	2114						

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Tail Lk	AN3	22-Aug	AN		212	LKTR	622	2250	0.93								Wh	2115						
Tail Lk	AN3	22-Aug	AN		213	LKTR	510	1400	1.06								Wh	2116						
Tail Lk	AN3	22-Aug	AN		214	LKTR	555	1300	0.76								Wh	2117						
Tail Lk	AN3	22-Aug	AN		215	LKTR	555	1200	0.70								Wh	2118						
Tail Lk	AN3	22-Aug	AN		216	LKTR	556	1300	0.76								Wh	2119						
Tail Lk	AN3	22-Aug	AN		217	LKTR	568	1300	0.71								Wh	2120						
Tail Lk	AN3	22-Aug	AN		218	LKTR	480	1200	1.09								Wh	2121						
Tail Lk	AN3	22-Aug	AN		219	LKTR	554	1800	1.06								Wh	2122						
Tail Lk	AN3	22-Aug	AN		220	LKTR	562	1750	0.99								Wh	2123						
Tail Lk	AN3	22-Aug	AN		221	LKTR	564	2100	1.17								Wh	2124						
Tail Lk	GN3B	22-Aug	GN	8.9	222	LKTR	576	1750	0.92								Wh	2125						
Tail Lk	GN3B	22-Aug	GN	8.9	223	LKTR	625	2500	1.02								Wh	2126						
Tail Lk	GN4B	22-Aug	GN	8.9	224	LKTR	560	1250	0.71								Wh	2127						
Tail Lk	GN4B	22-Aug	GN	8.9	225	LKTR	557	1300	0.75								Wh	2128						
Tail Lk	GN4B	22-Aug	GN	8.9	226	LKTR	581	1700	0.87								Wh	2129						
Tail Lk	GN4B	22-Aug	GN	8.9	227	LKTR	546	1850	1.14	F	2	2			O,F,S						Mort	100	Noto	
Tail Lk	AN4	22-Aug	AN		228	LKTR	563	1950	1.09								Wh	2130						
Tail Lk	AN4	22-Aug	AN		229	LKTR	595	2000	0.95								Wh	2131						
Tail Lk	AN4	22-Aug	AN		230	LKTR	526	1450	1.00								Wh	2132						
Tail Lk	AN4	22-Aug	AN		231	LKTR	573	2100	1.12								Wh	2133						
Tail Lk	AN4	22-Aug	AN		232	LKTR	546	1600	0.98								Wh	2134						
Tail Lk	AN4	22-Aug	AN		233	LKTR	568	2000	1.09								Wh	2135						
Tail Lk	AN4	22-Aug	AN		234	LKTR	580	1900	0.97								Wh	2136						
Tail Lk	AN4	22-Aug	AN		235	LKTR	545	1500	0.93								Yel	958	2000					tagged in 2000
Tail Lk	AN4	22-Aug	AN		236	LKTR	584	2000	1.00								Wh	2137						
Tail Lk	AN4	22-Aug	AN		237	LKTR	562	1900	1.07								Wh	2138						
Tail Lk	AN4	22-Aug	AN		238	LKTR	521	1250	0.88								Wh	2139						
Tail Lk	AN4	22-Aug	AN		239	LKTR	543	1200	0.75								Wh	2140						
Tail Lk	GN5A	22-Aug	GN	8.9	240	LKTR	545	1250	0.77								Wh	2141						
Tail Lk	GN5A	22-Aug	GN	8.9	241	LKTR	591	1700	0.82								Wh	2142						
Tail Lk	GN5A	22-Aug	GN	8.9	242	LKTR	523	1300	0.91	F	2	1			O,F,S						Mort	100	Noto	
Tail Lk	GN6A	22-Aug	GN	8.9	243	LKTR	560	1750	1.00								Wh	2143						
Tail Lk	GN6B	22-Aug	GN	3.8	244	LKTR	573	1800	0.96								Wh	2144						
Tail Lk	GN5B	22-Aug	GN	3.8	245	LKTR	553	1600	0.95								Wh	2145						
Rob Out	1600	22-Aug	TU		246	LKTR	713	3700	1.02								Wh	2146						
Rob Out	1600	22-Aug	TU		247	LKTR	495	1200	0.99								Wh	2147						
Rob Out	1600	22-Aug	TU		248	LKTR	493	1000	0.83								Wh	2148						
Rob Out	1600	22-Aug	TU		249	LKTR	460	1000	1.03								Wh	2149						
Rob Out	1600	22-Aug	TU		250	LKTR	509	1500	1.14								Wh	2150						
Rob Out	1600	22-Aug	TU		251	LKTR	459	1200	1.24								Wh	2151						
Rob Out	1600	22-Aug	TU		252	BRWH	496	1900	1.56	F	2	2			O,F,S	11					Mort	0		
Rob Out	1600	22-Aug	TU		253	ARCH	318	300	0.93								Wh	2152						
Rob Out	BG	22-Aug	HC		253.1	ARCH	697										Wh	2345	02-1					released in Roberts Lake
Rob Out	BG	22-Aug	HC		253.2	ARCH	593										Wh	2323	02-1					released in Roberts Lake
Tail Lk	AN5	23-Aug	AN		254	LKTR	548	1750	1.06								Yel	962	2000					tagged in 2000
Tail Lk	AN5	23-Aug	AN		255	LKTR	552	1750	1.04								Wh	2153						
Tail Lk	AN5	23-Aug	AN		256	LKTR	551	1950	1.17								Wh	2154						
Tail Lk	AN5	23-Aug	AN		257	LKTR	578	2100	1.09								Wh	2155						
Tail Lk	AN5	23-Aug	AN		258	LKTR	564	1900	1.06								Wh	2156						
Tail Lk	AN5	23-Aug	AN		259	LKTR	530	1650	1.11								Wh	2157						
Tail Lk	AN5	23-Aug	AN		260	LKTR	498	1250	1.01								Wh	2158						
Tail Lk	AN5	23-Aug	AN		261	LKTR	436	850	1.03								Wh	2159						
Tail Lk	AN5	23-Aug	AN		262	LKTR	590	2100	1.02								Wh	2160						
Tail Lk	AN5	23-Aug	AN		263	LKTR	528	1300	0.88								Wh	2161						skinny
Tail Lk	AN5	23-Aug	AN		264	LKTR	556	1750	1.02								Wh	2162						

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Tail Lk	AN5	23-Aug	AN		265	LKTR	553	1900	1.12								Wh	2163						
Tail Lk	AN5	23-Aug	AN		266	LKTR	616	2300	0.98								Wh	2164						
Tail Lk	AN5	23-Aug	AN		267	LKTR	546	1450	0.89								Yel	778	2000					skinny; tagged in 2000
Tail Lk	GN8	23-Aug	GN	8.9	268	LKTR	544	1600	0.99								Wh	2165						
Tail Lk	GN8	23-Aug	GN	8.9	269	LKTR	474	650	0.61								Wh	2166						skinny
Tail Lk	GN8	23-Aug	GN	3.8	270	LKTR	580	1500	0.77								Wh	2167						
Tail Lk	AN6	23-Aug	AN		271	LKTR	519	1650	1.18								Wh	2168						
Tail Lk	AN6	23-Aug	AN		272	LKTR	532	1700	1.13								Wh	2169						
Tail Lk	AN6	23-Aug	AN		273	LKTR	479	1250	1.14								Wh	2170						
Tail Lk	AN6	23-Aug	AN		274	LKTR	520	1600	1.14								Wh	2171						
Tail Lk	AN6	23-Aug	AN		275	LKTR	626	2300	0.94								Wh	2172						
Tail Lk	AN6	23-Aug	AN		276	LKTR	571	1800	0.97								Wh	2173						skinny
Tail Lk	AN6	23-Aug	AN		277	LKTR	510	1500	1.13								Yel	758	2000					tagged in 2000
Tail Lk	GN9A	23-Aug	GN	8.9	278	LKTR	571	1600	0.86								Yel	747	2000					tagged in 2000
Tail Lk	GN9A	23-Aug	GN	3.8	279	LKTR	577	1300	0.68								Wh	2174						
Tail Lk	GN9A	23-Aug	GN	8.9	280	LKTR	528	1800	1.22								Wh	2175						
Tail Lk	GN9A	23-Aug	GN	3.8	281	LKTR	553	1700	1.01								Wh	2176						
Tail Lk	GN9A	23-Aug	GN	8.9	282	LKTR	568	1900	1.04	M	2	3					Wh	2177						
Tail Lk	AN7	23-Aug	AN		283	LKTR	560	1600	0.91	M	2	3					Wh	2178						
Tail Lk	AN7	23-Aug	AN		284	LKTR	562	1900	1.07								Wh	2179						
Tail Lk	AN7	23-Aug	AN		285	LKTR	600	2100	0.97								Wh	2180						
Tail Lk	AN7	23-Aug	AN		286	LKTR	578	2150	1.11								Wh	2181						
Tail Lk	AN7	23-Aug	AN		287	LKTR	515	1600	1.17								Wh	2182						
Tail Lk	AN7	23-Aug	AN		288	LKTR	566	1600	0.88								Wh	2183						
Tail Lk	AN7	23-Aug	AN		289	LKTR	532	1700	1.13								Wh	2184						
Tail Lk	AN7	23-Aug	AN		290	LKTR	560	1750	1.00								Wh	2185						
Tail Lk	AN7	23-Aug	AN		291	LKTR	578	2150	1.11								Wh	2186						
Tail Lk	AN7	23-Aug	AN		292	LKTR	528	1600	1.09								Wh	2187						
Tail Lk	AN7	23-Aug	AN		293	LKTR	508	1500	1.14								Wh	2188						
Tail Lk	AN7	23-Aug	AN		294	LKTR	540	1700	1.08								Wh	2189						
Tail Lk	AN7	23-Aug	AN		295	LKTR	520	1700	1.21								Wh	2190						
Tail Lk	AN7	23-Aug	AN		296	LKTR	520	1800	1.28								Wh	2191						
Tail Lk	AN7	23-Aug	AN		297	LKTR	590	1850	0.90	F	2	2			O,F,S						Mort	100	Noto	
Tail Lk	GN9B	23-Aug	GN	3.8	298	LKTR	572	1150	0.61								Wh	2192						very skinny
Tail Lk	GN9B	23-Aug	GN	3.8	299	LKTR	615	1600	0.69								Wh	2193						skinny
Tail Lk	GN9B	23-Aug	GN	3.8	300	LKTR	596	1600	0.76								Wh	2194						
Tail Lk	GN9B	23-Aug	GN	8.9	301	LKTR	604	2300	1.04								Wh	2195						
Tail Lk	GN9B	23-Aug	GN	8.9	302	LKTR	582	2250	1.14								Wh	2196						
Tail Lk	GN9B	23-Aug	GN	8.9	303	LKTR	532	1950	1.30								Wh	2197						
Tail Lk	GN9B	23-Aug	GN	8.9	304	LKTR	537	1750	1.13								Wh	2198						
Tail Lk	GN9B	23-Aug	GN	3.8	305	LKTR	576	1800	0.94								Wh	2199						
Tail Lk	GN9B	23-Aug	GN	8.9	306	LKTR	568	1600	0.87								Wh	2200						
Tail Lk	GN9B	23-Aug	GN	8.9	307	LKTR	550	1650	0.99								Wh	2501						
Tail Lk	GN9B	23-Aug	GN	8.9	308	LKTR	585	1750	0.87								Wh	2502						
Tail Lk	GN9B	23-Aug	GN	8.9	309	LKTR	538	1700	1.09								Wh	2503						
Tail Lk	GN9B	23-Aug	GN	8.9	310	LKTR	552	1150	0.68	M	2	2			O,F,S						Mort	0		
Rob Out	1645	23-Aug	TU		311	ARCH	323	250	0.74								Wh	2504						
Rob Out	1645	23-Aug	TU		312	ARCH	841	7100	1.19	M	2	1		7	O,F,S	11				Tis	Mort	0		
Rob Out	1645	23-Aug	TU		313	ARCH	823	5500	0.99	M	2	1			O,F,S	11				Tis	Mort	0		
Rob Out	1645	23-Aug	TU		314	ARCH	752	5000	1.18	M	2	1			O,F,S	10				Tis	Mort	0		
Rob Out	1645	23-Aug	TU		315	ARCH	702	4250	1.23	F	2	2	425		O,F,S	9				Tis	Mort	0		
Rob Out	BG	23-Aug	HC		316	ARCH	708	4300	1.21	F	2	1			O,F,S	10	Wh	2341	02-1	Tis	Mort	0		
Rob Out	BG	23-Aug	HC		316.01	ARCH	685										Wh	2319	02-1					released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.02	ARCH	735										Wh	2320	02-1					released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.03	ARCH	816										Wh	2337	02-1					released in Roberts Lake

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Rob Out	BG	23-Aug	HC		316.04	ARCH	637										Wh	2342	02-1					released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.05	ARCH	636										Wh	2344	02-1					released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.06	ARCH	750										Wh	2328	02-1					released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.07	ARCH	655										Wh	2309	02-1					released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.08	ARCH	613										Wh	2505						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.09	ARCH	670										Wh	2506						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.1	ARCH	615										Wh	2507						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.11	ARCH	685										Wh	2508						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.12	ARCH	632										Wh	2509						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.13	ARCH	690										Wh	2510						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.14	ARCH	760										Wh	2511						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.15	ARCH	781										Wh	2512						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.16	ARCH	703										Wh	2513						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.17	ARCH	715										Wh	2514						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.18	ARCH	745										Wh	2515						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.19	ARCH	691										Wh	2516						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.2	ARCH	683										Wh	2517						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.21	ARCH	710										Wh	2518						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.22	ARCH	690										Wh	2519						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.23	ARCH	558										Wh	2520						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.24	ARCH	588										Wh	2521						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.25	ARCH	676										Wh	2522						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.26	ARCH	622										Wh	2523						released in Roberts Lake
Rob Out	BG	23-Aug	HC		316.27	ARCH	718										Wh	2524						released in Roberts Lake
Rob Out	BG	24-Aug	HC		316.28	ARCH	742										Wh	2525						released in Roberts Lake
Rob Out	BG	24-Aug	HC		316.29	ARCH	615										Wh	2526						released in Roberts Lake
Tail Lk	AN8	24-Aug	AN		317	LKTR	540	1900	1.21								Wh	2527						
Tail Lk	AN8	24-Aug	AN		318	LKTR	542	1600	1.00								Wh	2528						
Tail Lk	AN8	24-Aug	AN		319	LKTR	607	2000	0.89								Wh	2529						
Tail Lk	AN8	24-Aug	AN		320	LKTR	564	1800	1.00								Wh	2530						
Tail Lk	AN8	24-Aug	AN		321	LKTR	535	1250	0.82								Wh	2531						
Tail Lk	AN8	24-Aug	AN		322	LKTR	536	1250	0.81								Wh	2532						
Tail Lk	AN8	24-Aug	AN		323	LKTR	474	1250	1.17								Wh	2533						
Tail Lk	AN8	24-Aug	AN		324	LKTR	545	1750	1.08								Wh	2534						
Tail Lk	AN8	24-Aug	AN		325	LKTR	545	1400	0.86								Wh	2535						skinny
Tail Lk	AN8	24-Aug	AN		326	LKTR	549	1750	1.06								Wh	2536						
Tail Lk	AN8	24-Aug	AN		327	LKTR	577	2000	1.04								Wh	2537						
Tail Lk	AN8	24-Aug	AN		328	LKTR	575	1750	0.92								Wh	2538						
Tail Lk	AN8	24-Aug	AN		329	LKTR	556	1950	1.13								Wh	2539						
Tail Lk	AN8	24-Aug	AN		330	LKTR	562	1500	0.85								Wh	2540						
Tail Lk	AN8	24-Aug	AN		331	LKTR	537	1600	1.03	M	2	3					Wh	2541						
Tail Lk	GN12	24-Aug	GN	8.9	332	LKTR	650	2250	0.82	F	2	1			O,F,S						Mort	0		skinny
Tail Lk	GN12	24-Aug	GN	8.9	333	LKTR	572	1900	1.02								Wh	2542						
Tail Lk	GN13	24-Aug	GN	8.9	334	LKTR	537	1700	1.10	M	2	3			O,F,S						Mort	50	zoop	
Tail Lk	GN12	24-Aug	GN	8.9	335	LKTR	508	1350	1.03								Wh	2543						
Tail Lk	GN12	24-Aug	GN	3.8	336	LKTR	608	2000	0.89								Wh	2544						lump on left side; photo 2-19
Rob Out	d/s BG	25-Aug	HC		336.1	ARCH	750										Wh	2338	02-1					released d/s of BG
Rob Out	BG	25-Aug	HC		337	ARCH	645	3000	1.12								Wh	2545						released in Roberts Lake
Rob Out	FN1	25-Aug	FN		338	ARCH	220								S									released in Roberts Lake
Rob Out	FN1	25-Aug	FN		339	ARCH	156								S	2								released in Roberts Lake
Rob Out	u/s TU	25-Aug	BS		339.1	ARCH	776										Wh	2343	02-1					
Rob Out	u/s TU	25-Aug	BS		339.2	LKTR	502	1202	0.95								Wh	2147	02-1					
Rob Out	u/s TU	25-Aug	BS		339.3	ARCH	770										Wh	2330	02-1					
Rob Out	BG	25-Aug	HC		340	ARCH	606	2405	1.08	F	2	1			O,F,S	9				Tis	Mort	0		
Tail Lk	AN9	26-Aug	AN		341	LKTR	562	1800	1.01								Wh	2546						

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Tail Lk	AN9	26-Aug	AN		342	LKTR	611	2400	1.05								Wh	2547						
Tail Lk	AN9	26-Aug	AN		343	LKTR	538	1650	1.06								Wh	2548						
Tail Lk	AN9	26-Aug	AN		344	LKTR	563	1750	0.98								Wh	2549						
Tail Lk	AN9	26-Aug	AN		345	LKTR	641	2250	0.85								Wh	2550						skinny
Tail Lk	AN9	26-Aug	AN		346	LKTR	592	2100	1.01								Wh	2551						
Tail Lk	AN9	26-Aug	AN		347	LKTR	593	1550	0.74								Wh	2552						skinny
Tail Lk	AN9	26-Aug	AN		348	LKTR	510	1300	0.98								Wh	2553						
Tail Lk	AN9	26-Aug	AN		349	LKTR	633	1550	0.61								Wh	2554						very skinny
Tail Lk	AN9	26-Aug	AN		350	LKTR	575	1400	0.74								Wh	2555						skinny
Tail Lk	AN9	26-Aug	AN		351	LKTR	575	1350	0.71								Wh	2556						skinny
Tail Lk	AN9	26-Aug	AN		352	LKTR	540	1550	0.98								Wh	2557						
Tail Lk	AN9	26-Aug	AN		353	LKTR	618	2100	0.89								Wh	2558						
Tail Lk	AN9	26-Aug	AN		354	LKTR	562	1800	1.01								Wh	2559						
Tail Lk	GN14A	26-Aug	GN	8.9	355	LKTR	595	2150	1.02								Wh	2560						
Tail Lk	GN14A	26-Aug	GN	8.9	356	LKTR	520	1600	1.14	M	2	3					Wh	2561						
Tail Lk	GN14A	26-Aug	GN	8.9	357	LKTR	586	1650	0.82								Wh	2562						
Tail Lk	GN14A	26-Aug	GN	8.9	358	LKTR	519	1500	1.07	M	2	3					Wh	2563						
Tail Lk	GN14A	26-Aug	GN	8.9	359	LKTR	518	1450	1.04								Wh	2564						
Tail Lk	GN14A	26-Aug	GN	8.9	360	LKTR	535	1605	1.05	M	2	2			O,F,S						Mort	0		
Tail Lk	GN14A	26-Aug	GN	8.9	361	LKTR	578	1660	0.86	F	2	1			O,F,S						Mort	10	5 Noto, 5 Amph	skinny
Tail Lk	GN14A	26-Aug	GN	3.8	362	LKTR	557	1700	0.98								Wh	2565						
Tail Lk	GN14A	26-Aug	GN	3.8	363	LKTR	561	1500	0.85								Wh	2566						
Tail Lk	GN14A	26-Aug	GN	3.8	364	LKTR	572	1700	0.91								Wh	2567						
Tail Lk	GN14A	26-Aug	GN	3.8	365	LKTR	549	1600	0.97								Wh	2568						
Tail Lk	GN14A	26-Aug	GN	3.8	366	LKTR	565	1500	0.83								Wh	2569						
Tail Lk	GN15	26-Aug	GN	8.9	367	LKTR	595	1600	0.76								Yel	990	2000					tagged in 2000
Tail Lk	GN15	26-Aug	GN	8.9	368	LKTR	523	1600	1.12								Wh	2570						
Tail Lk	GN15	26-Aug	GN	8.9	369	LKTR	574	1600	0.85								Wh	2571						
Tail Lk	GN15	26-Aug	GN	8.9	370	LKTR	545	1700	1.05								Wh	2572						
Tail Lk	GN15	26-Aug	GN	8.9	371	LKTR	571	1650	0.89								Wh	2573						
Tail Lk	GN15	26-Aug	GN	8.9	372	LKTR	593	1400	0.67	F	2	1					Wh	2574						residual eggs expelled
Tail Lk	GN15	26-Aug	GN	8.9	373	LKTR	590	1900	0.93								Wh	2575						
Tail Lk	GN15	26-Aug	GN	8.9	374	LKTR	552	1400	0.83								Wh	2576						
Tail Lk	GN15	26-Aug	GN	8.9	375	LKTR	605	1775	0.80	F	2	1			O,F,S						Mort	100	Noto	
Tail Lk	AN10	26-Aug	AN		376	LKTR	477	1150	1.06								Yel	963	2000					tagged in 2000
Tail Lk	AN10	26-Aug	AN		377	LKTR	578	1160	0.60	F	2	1			O,F,S						Mort	90	Noto	very skinny
Tail Lk	GN14B	26-Aug	GN	8.9	378	LKTR	573	2000	1.06	M	2	3					Wh	2578						
Tail Lk	GN14B	26-Aug	GN	8.9	379	LKTR	580	1750	0.90								Wh	2579						
Tail Lk	GN14B	26-Aug	GN	8.9	380	LKTR	537	1600	1.03	M	2	3					Wh	2580						
Tail Lk	GN14B	26-Aug	GN	8.9	381	LKTR	575	2000	1.05								Wh	2581						
Tail Lk	GN14B	26-Aug	GN	8.9	382	LKTR	528	1550	1.05								Wh	2582						
Tail Lk	GN14B	26-Aug	GN	8.9	383	LKTR	558	1600	0.92	M	2	3					Wh	2583						blood expelled with milt
Tail Lk	GN14B	26-Aug	GN	8.9	384	LKTR	557	1840	1.06	M	2	3			O,F,S						Mort	90	Noto	milt
Tail Lk	GN14B	26-Aug	GN	8.9	385	LKTR	536	1395	0.91	F	2	1			O,F,S						Mort	84	80 Noto, 2 Amph, 2 Cole	
Tail Lk	GN16A	26-Aug	GN	8.9	386	LKTR	593	2250	1.08								Wh	2584						
Tail Lk	GN16A	26-Aug	GN	3.8	387	LKTR	592	1600	0.77								Wh	2585						skinny
Tail Lk	GN16A	26-Aug	GN	3.8	388	LKTR	585	1550	0.77								Wh	2586						
Tail Lk	GN16A	26-Aug	GN	3.8	389	LKTR	585	1350	0.67								Wh	2587						skinny; photo
Tail Lk	AN11	26-Aug	AN		390	LKTR	626	2300	0.94								Wh	2588						
Tail Lk	AN11	26-Aug	AN		391	LKTR	590	1700	0.83								Wh	2589						
Tail Lk	AN11	26-Aug	AN		392	LKTR	611	2100	0.92								Wh	2590						
Tail Lk	AN11	26-Aug	AN		393	LKTR	531	1400	0.94								Wh	2591						
Tail Lk	AN11	26-Aug	AN		394	LKTR	565	1350	0.75								Wh	2592						
Tail Lk	AN11	26-Aug	AN		395	LKTR	585	1400	0.70								Wh	2593						skinny
Tail Lk	AN11	26-Aug	AN		396	LKTR	538	1600	1.03								Wh	2594						

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site /	Date	Samp	Mesh	Sample	Species	FL	Weight	Cond.	Sex	Mat.	Rep.	Gonad		Age	Age	Tag	Tag #	Re-	Tiss	Mort-	Stomach		Comments
	Time		Meth.	(cm)	#		(mm)	(g)	Fact.			Stat.	(g)	(mm)	Struc.	(yr)	Color		capt.	ues	ality	% Full	Contents	
Tail Lk	AN11	26-Aug	AN		397	LKTR	533	1350	0.89								Wh	2595						
Tail Lk	AN11	26-Aug	AN		398	LKTR	586	2050	1.02								Wh	2596						
Tail Lk	AN11	26-Aug	AN		399	LKTR	602	1950	0.89								Wh	2597						
Tail Lk	AN11	26-Aug	AN		400	LKTR	462	1300	1.32								Wh	2598						
Tail Lk	AN11	26-Aug	AN		401	LKTR	568	1800	0.98								Wh	2599						
Tail Lk	AN11	26-Aug	AN		402	LKTR	560	1800	1.02								Wh	2127	02-1					
Tail Lk	AN11	26-Aug	AN		403	LKTR	584	1750	0.88								Wh	2600						
Tail Lk	GN14C	26-Aug	GN	8.9	404	LKTR	549	1600	0.97	M	2	3					Wh	2201						milt
Tail Lk	GN14C	26-Aug	GN	8.9	405	LKTR	519	1550	1.11	M	2	3					Wh	2202						milt
Tail Lk	GN14C	26-Aug	GN	8.9	406	LKTR	539	1800	1.15	M	2	3					Wh	2572	02-1					milt
Tail Lk	GN14C	26-Aug	GN	8.9	407	LKTR	589	1900	0.93								Wh	2203						
Tail Lk	GN14C	26-Aug	GN	8.9	408	LKTR	520	1750	1.24	M	2	3					Wh	2204						milt
Tail Lk	GN14C	26-Aug	GN	8.9	409	LKTR	588	2100	1.03								Wh	2205						
Tail Lk	GN14C	26-Aug	GN	8.9	410	LKTR	550	1900	1.14	M	2	3					Wh	2117	02-1					milt
Tail Lk	GN14C	26-Aug	GN	8.9	411	LKTR	573	2150	1.14								Wh	2206						
Tail Lk	GN14C	26-Aug	GN	8.9	412	LKTR	572	2000	1.07								Wh	2207						
Tail Lk	GN14D	26-Aug	GN	8.9	413	LKTR	594	2000	0.95								Wh	2208						
Tail Lk	GN14D	26-Aug	GN	8.9	414	LKTR	582	1800	0.91	M	2	3					Wh	2209						milt
Tail Lk	GN14D	26-Aug	GN	8.9	415	LKTR	572	1550	0.83								Wh	2210						skinny
Tail Lk	GN14D	26-Aug	GN	8.9	416	LKTR	593	1750	0.84								Wh	2211						
Tail Lk	GN14D	26-Aug	GN	8.9	417	LKTR	573	1700	0.90	M	2	3					Wh	2212						milt
Tail Lk	GN16B	26-Aug	GN	3.8	418	LKTR	568	1300	0.71								Yel	947	2000					tagged in 2000
Tail Lk	GN16B	26-Aug	GN	8.9	419	LKTR	570	1450	0.78								Wh	2213						
Tail Lk	GN16B	26-Aug	GN	8.9	420	LKTR	548	1650	1.00	M	2	3					Wh	2214						milt
Tail Lk	GN16B	26-Aug	GN	8.9	421	LKTR	626	2300	0.94								Wh	2172	02-1					
Tail Lk	GN16B	26-Aug	GN	8.9	422	LKTR	507	1250	0.96								Wh	2215						
Tail Lk	GN16B	26-Aug	GN	8.9	423	LKTR	637	1700	0.66								Wh	2216						skinny
Rob Out	1630	26-Aug	TU		424	ARCH	766	5300	1.18								Wh	2217						kype
Rob Out	1630	26-Aug	TU		425	ARCH	345	450	1.10								Wh	2218						
Rob Out	1630	26-Aug	TU		426	ARCH	604	2300	1.04								Wh	2219						
Rob Out	1630	26-Aug	TU		427	ARCH	281																	
Rob Out	1630	26-Aug	TU		428	ARCH	396	600	0.97						S		Wh	2220						
Rob Out	1630	26-Aug	TU		429	LKTR	509	1600	1.21								Wh	2221						
Rob Out	1630	26-Aug	TU		430	LKTR	447	1000	1.12								Wh	2222						
Rob Out	1630	26-Aug	TU		431	ARCH	433	850	1.05						S		Wh	2223						
Rob Out	1630	26-Aug	TU		432	ARCH	356								S		Wh	2224						
Rob Out	1630	26-Aug	TU		433	ARCH	386	550	0.96						S		Wh	2225						
Rob Out	1630	26-Aug	TU		434	ARCH	382	500	0.90						S		Wh	2226						
Rob Out	1630	26-Aug	TU		435	ARCH	377	568	1.06						S		Wh	2227						
Rob Out	1630	26-Aug	TU		436	ARCH	282	240	1.07						S		Wh	2228						
Rob Out	1630	26-Aug	TU		437	ARCH	376								S		Wh	2229						
Rob Out	1630	26-Aug	TU		438	ARCH	297								S									
Rob Out	1630	26-Aug	TU		439	ARCH	335								S		Wh	2230						
Rob Out	1630	26-Aug	TU		440	ARCH	301								S		Wh	2231						
Rob Out	FN1	26-Aug	FN		441	LKTR	382										Wh	2232						
Rob Out	FN1	26-Aug	FN		442	LKTR	350										Wh	2233						
Rob Out	FN1	26-Aug	FN		443	ARCH	92								S	1								photo 2-22
Rob Lk	FN2	26-Aug	FN		444	LSCS	206	82	0.94	F	1	1			O,S						Mort			
Rob Lk	FN2	26-Aug	FN		445	LKWH	467										Wh	2234						
Rob Lk	FN2	26-Aug	FN		446	LKTR	348										Wh	2235						
Rob Lk	FN2	27-Aug	FN		447	LKWH	467	1232	1.21															
Rob Lk	FN2	27-Aug	FN		448	LKWH	436	1032	1.25															
Rob Lk	FN2	27-Aug	FN		449	LKWH	463	1221	1.23															
Rob Lk	FN2	27-Aug	FN		450	LKWH	395	773	1.25															
Rob Lk	FN2	27-Aug	FN		451	LKWH	416	880	1.22															

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Rob Lk	FN2	27-Aug	FN		452	CISC	245	163	1.11						S									
Rob Lk	FN2	27-Aug	FN		453	LSCS	239	127	0.93						S									
Rob Lk	FN2	27-Aug	FN		454	LKWH	228	122	1.03						S									
Rob Lk	FN2	27-Aug	FN		455	ARCH	169	46	0.95						S	3								
Rob Lk	FN2	27-Aug	FN		456	ARCH	188	56	0.84						S	3								
Rob Out	1630	27-Aug	TU		457	ARCH	877	8250	1.22	M	2	3					Wh	2236						bright orange; milt; kype; photos
Rob Out	1630	27-Aug	TU		458	ARCH	883	7700	1.12								Wh	2237						
Rob Out	1630	27-Aug	TU		459	ARCH	763	5300	1.19								Wh	2238						blind right eye; damaged dorsal
Rob Out	1630	27-Aug	TU		460	ARCH	734	4600	1.16								Wh	2239						3 rusty spots on left side
Rob Out	1630	27-Aug	TU		461	ARCH	810	6600	1.24								Wh	2240						
Rob Out	1630	27-Aug	TU		462	ARCH	766	4650	1.03								Wh	2241						
Rob Out	1630	27-Aug	TU		463	ARCH	589	2250	1.10								Wh	2242						
Rob Out	1630	27-Aug	TU		464	ARCH	317	296	0.93								Wh	2243						
Rob Out	1630	27-Aug	TU		465	ARCH	708	4500	1.27								Wh	2244						
Rob Out	1630	27-Aug	TU		466	ARCH	782	4800	1.00								Wh	2245						
Rob Out	1630	27-Aug	TU		467	ARCH	355	476	1.06								Wh	2246						
Rob Out	1630	27-Aug	TU		468	ARCH	305	300	1.06								Wh	2247						
Rob Out	1630	27-Aug	TU		469	ARCH	832	6000	1.04	M	2	3					Wh	2248						orange; kype; milt
Rob Out	FN1	27-Aug	FN		470	ARCH	392	597	0.99								Wh	2249						
Rob Out	FN1	27-Aug	FN		471	ARCH	324	339	1.00								Wh	2250						
Rob Out	FN1	27-Aug	FN		472	ARCH	356										Wh	2224	02-1					
Rob Out	FN1	27-Aug	FN		473	ARCH	345										Wh	2218	02-1					
Rob Out	FN1	27-Aug	FN		474	ARCH	348	462	1.10								Wh	2251						
Rob Out	FN1	27-Aug	FN		475	ARCH	433										Wh	2223	02-1					
Rob Out	FN1	27-Aug	FN		476	ARCH	604										Wh	2219	02-1					
Rob Out	FN1	27-Aug	FN		477	ARCH	396										Wh	2220	02-1					
Rob Out	FN1	27-Aug	FN		478	ARCH	301										Wh	2231	02-1					
Rob Out	FN1	27-Aug	FN		479	ARCH	382										Wh	2226	02-1					
Rob Out	FN1	27-Aug	FN		480	ARCH	282										Wh	2228	02-1					
Rob Out	FN1	27-Aug	FN		481	LKTR	423	907	1.20								Wh	2252						
Rob Out	FN1	27-Aug	FN		482	ARCH	443	1040	1.20								Wh	2253						
Rob Out	FN1	27-Aug	FN		483	ARCH	262	161	0.90															
Rob Out	FN1	27-Aug	FN		484	ARCH	278	226	1.05															
Rob Out	FN1	27-Aug	FN		485	ARCH	266	158	0.84															gash right side & ventral
Rob Out	FN1	27-Aug	FN		486	ARCH	312	335	1.10								Wh	2254						
Rob Out	FN1	27-Aug	FN		487	ARCH	296	291	1.12															
Rob Out	FN1	27-Aug	FN		488	ARCH	361	549	1.17								Wh	2255						
Rob Out	FN1	27-Aug	FN		489	ARCH	264	151	0.82															skinny
Rob Out	FN1	27-Aug	FN		490	LKTR	410	784	1.14								Wh	2256						
Rob Out	FN1	27-Aug	FN		491	ARCH	345	475	1.16								Wh	2257						
Rob Out	FN1	27-Aug	FN		492	ARCH	295	262	1.02															
Rob Out	FN1	27-Aug	FN		493	ARCH	302	277	1.01								Wh	2258						
Rob Out	FN1	27-Aug	FN		494	ARCH	313	282	0.92								Wh	2259						
Rob Out	FN1	27-Aug	FN		495	ARCH	318	326	1.01								Wh	2260						
Rob Out	FN1	27-Aug	FN		496	ARCH	234	110	0.86															
Rob Out	2000	27-Aug	TU		497	ARCH	771	5700	1.24								Wh	2261						
Rob Out	2000	27-Aug	TU		498	ARCH	726	4300	1.12								Wh	2262						
Rob Out	2000	27-Aug	TU		499	ARCH	752	4400	1.03								Wh	2263						
Rob Out	2000	27-Aug	TU		500	ARCH	638	3000	1.16								Wh	2264						
Rob Out	2000	27-Aug	TU		501	ARCH	750	5900	1.40								Wh	2265						fat
Rob Out	2000	27-Aug	TU		502	ARCH	670	3500	1.16								Wh	2266						
Rob Out	2000	27-Aug	TU		503	ARCH	462	1042	1.06								Wh	2267						
Rob Out	2000	27-Aug	TU		504	ARCH	522	1515	1.07								Wh	2268						
Rob Out	2000	27-Aug	TU		505	ARCH	398	762	1.21								Wh	2269						
Rob Bay	FN3	27-Aug	HC		505.1	FRSC	115	13	0.85															preserved

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Rob Out	1000	28-Aug	TU		506	ARCH	266	190	1.01	M	1	1			O,F,S	4					Mort	0		lodged between conduit
Rob Out	BG	28-Aug	HC		507	ARCH	668	3240	1.09								Wh	2270						released in Roberts Lake
Rob Out	u/s BG	28-Aug	HC		508	ARCH	355										Wh	2246	02-1					released u/s of BG
Rob Out	FN1	28-Aug	FN		509	ARCH	528										Wh	2268	02-1					
Rob Out	FN1	28-Aug	FN		510	LKTR	450										Wh	2222	02-1					
Rob Out	FN1	28-Aug	FN		511	LKTR	502										Wh	2147	02-2					
Rob Out	FN1	28-Aug	FN		512	ARCH	462										Wh	2267	02-1					
Rob Out	FN1	28-Aug	FN		513	ARCH	377										Wh	2227	02-1					
Rob Out	FN1	28-Aug	FN		514	ARCH	206	82	0.94						S									
Rob Out	FN1	28-Aug	FN		515	ARCH	207	79	0.89						S									
Rob Out	FN1	28-Aug	FN		516	ARCH	204	75	0.88															
Rob Out	FN1	28-Aug	FN		517	ARCH	174	51	0.97						S	3								
Rob Out	FN1	28-Aug	FN		518	ARCH	216	89	0.88															
Rob Out	FN1	28-Aug	FN		519	ARCH	255	170	1.03						S									
Rob Out	FN1	28-Aug	FN		520	ARCH	380	604	1.10						S		Wh	2271						
Rob Out	FN1	28-Aug	FN		521	LKTR	428	715	0.91								Wh	2272						
Rob Out	FN1	28-Aug	FN		522	ARCH	272	203	1.01						S									
Pelvic Lk	GN1A	28-Aug	GN	3.8	523	LKWH	442	1104	1.28															
Pelvic Lk	GN1A	28-Aug	GN	3.8	524	LKWH	466	1195	1.18															
Pelvic Lk	GN1A	28-Aug	GN	8.9	525	LKWH	379	629	1.16															
Pelvic Lk	GN1A	28-Aug	GN	3.8	526	CISC	320	366	1.12															
Pelvic Lk	GN1A	28-Aug	GN	8.9	527	CISC	344	457	1.12															
Pelvic Lk	GN1A	28-Aug	GN	3.8	528	LKTR																		escaped (~400 mm)
Rob Bay	FN3	29-Aug	FN		529	GRCD	251	135	0.85															preserved
Rob Bay	FN3	29-Aug	FN		530	GRCD	445	1171	1.33	M	2	2	40		O						Mort	100	98 SFCD; 2 Isop	921g w/o stom; photo - gonad
Rob Bay	FN3	29-Aug	FN		531	GRCD	399	724	1.14															
Rob Bay	FN3	29-Aug	FN		532	BNGN	245	38	0.26															preserved
Rob Bay	FN3	29-Aug	FN		533	SFCD	250	100	0.64															preserved
Rob Bay	FN3	29-Aug	FN		534	SFCD	305	213	0.75															
Rob Bay	FN3	29-Aug	FN		535	SFCD	236	90	0.68															
Rob Bay	FN3	29-Aug	FN		536	SFCD	280	151	0.69															
Rob Bay	FN3	29-Aug	FN		537	SFCD	205	44	0.51															preserved
Rob Bay	FN3	29-Aug	FN		538	SFCD	270	139	0.71															
Rob Bay	FN3	29-Aug	FN		539	GRCD	652	4131	1.49	F	2	2	130		O,F						Mort	100	90 SFCD, 10 ARCH	3307g w/o stom; ARCH 215mm; photo
Pelvic Lk	GN1B	29-Aug	GN	3.8	540	LKTR	813																	
Pelvic Lk	GN1B	29-Aug	GN	3.8	541	LKTR	820			M	2	3												photo
Pelvic Lk	GN1B	29-Aug	GN	3.8	542	LKTR	740																	
Pelvic Lk	GN1B	29-Aug	GN	8.9	543	LKTR	440																	
Pelvic Lk	GN1B	29-Aug	GN	8.9	544	LKTR	622																	
Pelvic Lk	GN1B	29-Aug	GN	8.9	545	LKTR	690																	photo
Pelvic Lk	GN1B	29-Aug	GN	8.9	546	LKTR	448																	
Pelvic Lk	GN1B	29-Aug	GN	8.9	547	LKTR	850																	
Pelvic Lk	GN1B	29-Aug	GN	8.9	548	LKTR	459																	
Pelvic Lk	GN1B	29-Aug	GN	8.9	549	LKTR	489			M	2	3					Yel	317	1998					tagged 17Aug98 (476 mm; 1150 g)
Pelvic Lk	GN1B	29-Aug	GN	8.9	550	LKTR	742																	
Pelvic Lk	GN1B	29-Aug	GN	8.9	551	LKTR	444																	
Pelvic Lk	GN1B	29-Aug	GN	3.8	552	LKTR	560																	
Pelvic Lk	GN1B	29-Aug	GN	3.8	553	LKTR	556																	
Pelvic Lk	GN1B	29-Aug	GN	3.8	554	CISC	187			M	1	1									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	555	CISC	269			F	1	1									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	556	CISC	294			F	1	1									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	557	CISC	300			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	558	CISC	179			F	1	1									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	559	LSCS	206														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	560	LSCS	168														Mort			

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tiss ues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Pelvic Lk	GN1B	29-Aug	GN	3.8	561	LSCS	188														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	562	LSCS	173														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	563	LSCS	178														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	564	LSCS	175														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	565	LSCS	169														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	566	LSCS	176														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	567	LSCS	186														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	568	LSCS	157														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	569	LSCS	177														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	570	LSCS	178														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	571	LSCS	180														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	572	LSCS	164														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	573	LSCS	189														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	574	LSCS	178														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	575	LSCS	163														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	576	LSCS	179														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	577	LSCS	176														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	578	LSCS	183														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	579	LSCS	169														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	580	LSCS	183														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	581	LSCS	169														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	582	LSCS	172														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	583	LSCS	208														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	584	LSCS	182														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	585	LSCS	197														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	586	LSCS	174														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	587	LSCS	172														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	588	LSCS	184			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	589	LSCS	174			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	590	LSCS	173														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	591	LSCS	174														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	592	LSCS	176														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	593	LSCS	176														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	594	LSCS	179														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	595	LSCS	188														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	596	LSCS	183			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	597	LSCS	195			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	598	LSCS	232			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	599	LSCS	172														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	600	LSCS	186			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	601	LSCS	180			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	602	LSCS	175			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	603	LSCS	191			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	604	LSCS	181			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	605	LSCS	186			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	606	LSCS	180			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	607	LSCS	176			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	608	LSCS	190			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	609	LSCS	172			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	610	LSCS	174			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	611	LSCS	174			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	612	LSCS	180			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	613	LSCS	183			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	614	LSCS	187			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	615	LSCS	186			F	2	2									Mort			

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mortality	Stomach % Full	Stomach Contents	Comments
Pelvic Lk	GN1B	29-Aug	GN	3.8	616	LSCS	188			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	617	LSCS	194			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	618	LSCS	194			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	619	LSCS	179			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	620	LSCS	172			M	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	621	LSCS	183			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	622	LSCS	177			F	2	2									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	623	LKWH	342			M	1	1									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	624	LKWH	412			F	1	1									Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	625	LKWH	393														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	626	LKWH	324														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	627	LKWH	327														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	628	LKWH	376														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	629	LKWH	402														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	630	LKWH	251														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	631	LKWH	383														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	632	LKWH	344														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	633	LKWH	291														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	634	LKWH	414														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	635	LKWH	413														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	636	LKWH	355														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	637	LKWH	351														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	638	LKWH	420														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	639	LKWH	399														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	640	LKWH	319														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	641	LKWH	381														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	642	LKWH	374														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	643	LKWH	350														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	644	LKWH	417														Mort			
Pelvic Lk	GN1B	29-Aug	GN	3.8	645	LKTR	451														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	646	LKTR	695														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	647	LKTR	466														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	648	LKTR	454														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	649	LKWH	346														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	650	LKWH	391														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	651	LKWH	333														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	652	LKWH	413														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	653	LKWH	355														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	654	LKWH	325														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	655	LKWH	419														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	656	LKWH	326														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	657	LKWH	398														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	658	LKWH	353														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	659	LKWH	345														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	660	LKWH	351														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	661	LKWH	400														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	662	LKWH	392														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	663	LKWH	392														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	664	LKWH	437														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	665	LKWH	380														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	666	LKWH	324														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	667	LKWH	355														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	668	LKWH	370														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	669	LKWH	401														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	670	LKWH	344														Mort			

Appendix C16.   Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Pelvic Lk	GN1B	29-Aug	GN	8.9	671	LKWH	404														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	672	LKWH	411														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	673	LKWH	401														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	674	LKWH	379														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	675	LKWH	403														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	676	LKWH	338														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	677	LKWH	382														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	678	LKWH	407														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	679	LKWH	403														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	680	LKWH	347														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	681	LKWH	330														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	682	LKWH	394														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	683	LKWH	406														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	684	LKWH	324														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	685	LKWH	329														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	686	LKWH	328														Mort			
Pelvic Lk	GN1B	29-Aug	GN	8.9	687	CISC	304			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	688	LKTR	688																	
Pelvic Lk	GN2	29-Aug	GN	3.8	689	LKTR	650																	
Pelvic Lk	GN2	29-Aug	GN	3.8	690	LKTR	592																	
Pelvic Lk	GN2	29-Aug	GN	3.8	691	LKTR	431																	
Pelvic Lk	GN2	29-Aug	GN	3.8	692	LKTR	635																	
Pelvic Lk	GN2	29-Aug	GN	3.8	693	LKTR	444																	
Pelvic Lk	GN2	29-Aug	GN	3.8	694	LKTR	656																	
Pelvic Lk	GN2	29-Aug	GN	3.8	695	LKTR	462																	
Pelvic Lk	GN2	29-Aug	GN	3.8	696	LKTR	501																	
Pelvic Lk	GN2	29-Aug	GN	3.8	697	LKTR	662																	
Pelvic Lk	GN2	29-Aug	GN	3.8	698	LKTR	676																	
Pelvic Lk	GN2	29-Aug	GN	3.8	699	LKTR	738																	
Pelvic Lk	GN2	29-Aug	GN	3.8	700	LKTR	614																	
Pelvic Lk	GN2	29-Aug	GN	3.8	701	LKTR	591																	
Pelvic Lk	GN2	29-Aug	GN	3.8	702	LKWH	395																	
Pelvic Lk	GN2	29-Aug	GN	3.8	703	LKWH	416																	
Pelvic Lk	GN2	29-Aug	GN	3.8	704	LKWH	376																	
Pelvic Lk	GN2	29-Aug	GN	3.8	705	LKWH	393																	
Pelvic Lk	GN2	29-Aug	GN	3.8	706	LKWH	358																	
Pelvic Lk	GN2	29-Aug	GN	3.8	707	LKWH	325																	
Pelvic Lk	GN2	29-Aug	GN	3.8	708	LKWH	340																	
Pelvic Lk	GN2	29-Aug	GN	3.8	709	LKWH	292																	
Pelvic Lk	GN2	29-Aug	GN	3.8	710	LKWH	338																	
Pelvic Lk	GN2	29-Aug	GN	3.8	711	LKWH	418																	
Pelvic Lk	GN2	29-Aug	GN	3.8	712	LKWH	370																	
Pelvic Lk	GN2	29-Aug	GN	3.8	713	LKWH	360																	
Pelvic Lk	GN2	29-Aug	GN	3.8	714	LKWH	376																	
Pelvic Lk	GN2	29-Aug	GN	3.8	715	LKWH	401																	
Pelvic Lk	GN2	29-Aug	GN	3.8	716	LKWH	304																	
Pelvic Lk	GN2	29-Aug	GN	3.8	717	LKWH	403																	
Pelvic Lk	GN2	29-Aug	GN	3.8	718	LKWH	332																	
Pelvic Lk	GN2	29-Aug	GN	3.8	719	LKWH	316																	
Pelvic Lk	GN2	29-Aug	GN	3.8	720	LKWH	341																	
Pelvic Lk	GN2	29-Aug	GN	3.8	721	LKWH	340																	
Pelvic Lk	GN2	29-Aug	GN	3.8	722	LKWH	344																	
Pelvic Lk	GN2	29-Aug	GN	3.8	723	LKWH	164																	
Pelvic Lk	GN2	29-Aug	GN	3.8	724	LKWH	327																	
Pelvic Lk	GN2	29-Aug	GN	3.8	725	LKWH	322																	

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Pelvic Lk	GN2	29-Aug	GN	3.8	726	LKWH	258																	
Pelvic Lk	GN2	29-Aug	GN	3.8	727	LKWH	432																	
Pelvic Lk	GN2	29-Aug	GN	3.8	728	LSCS	189			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	729	LSCS	178														Mort			preserved
Pelvic Lk	GN2	29-Aug	GN	3.8	730	LSCS	170			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	731	LSCS	173			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	732	LSCS	191			F	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	733	LSCS	165			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	734	LSCS	172			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	735	LSCS	163			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	736	LSCS	178			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	737	LSCS	170			F	1	1									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	738	LSCS	173			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	739	LSCS	216			F	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	740	LSCS	178			F	1	1									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	741	LSCS	166			M	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	742	LSCS	170			F	1	1									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	743	LSCS	177			F	2	2									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	744	LSCS	185														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	745	LSCS	217														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	746	LSCS	184														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	747	LSCS	179														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	748	LSCS	174														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	749	LSCS	163														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	750	LSCS	170														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	751	LSCS	160														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	752	LSCS	181														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	753	LSCS	179														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	754	LSCS	175														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	755	LSCS	172														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	756	LSCS	175														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	757	LSCS	178														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	758	LSCS	168														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	759	LSCS	169														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	760	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	761	LSCS	179														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	762	LSCS	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	763	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	764	LSCS	183														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	765	LSCS	164														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	766	LSCS	177														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	767	LSCS	188														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	768	LSCS	184														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	769	LSCS	160														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	770	LSCS	163														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	771	LSCS	177														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	772	LSCS	154														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	773	LSCS	168														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	774	LSCS	164														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	775	LSCS	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	776	LSCS	154														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	777	LSCS	178														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	778	LSCS	158														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	779	LSCS	183														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	780	LSCS	173														Mort			

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Pelvic Lk	GN2	29-Aug	GN	3.8	781	LSCS	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	782	LSCS	175														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	783	LSCS	184														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	784	LSCS	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	785	LSCS	172														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	786	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	787	LSCS	178														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	788	LSCS	191														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	789	LSCS	173														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	790	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	791	LSCS	162														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	792	LSCS	176														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	793	LSCS	200														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	794	LSCS	174														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	795	LSCS	178														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	796	LSCS	179														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	797	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	798	LSCS	174														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	799	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	800	LSCS	219														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	801	LSCS	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	802	LSCS	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	803	LSCS	169														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	804	LSCS	169														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	805	LSCS	164														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	806	LSCS	185														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	807	LSCS	185														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	808	LSCS	201														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	809	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	810	LSCS	170														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	811	LSCS	167														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	812	LSCS	195														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	813	LSCS	169														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	814	LSCS	165														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	815	LSCS	163														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	816	LSCS	179														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	817	LSCS	172														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	818	LSCS	172														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	819	LSCS	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	820	LSCS	174														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	821	LSCS	178														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	822	LSCS	166														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	823	LSCS	169														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	824	LSCS	178														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	825	CISC	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	826	CISC	182														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	827	CISC	317														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	828	CISC	164														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	829	CISC	286														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	830	CISC	180														Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	831	LKWH	191			M	1	1									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	832	LKWH	200			M	1	1									Mort			
Pelvic Lk	GN2	29-Aug	GN	3.8	833	LKWH	188														Mort			
Rob Bay	FN3	30-Aug	FN		834	SFCD	429	560	0.71															
Rob Bay	FN3	30-Aug	FN		835	SFCD	431	582	0.73															

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Rob Bay	FN3	30-Aug	FN		836	SFCD	314	237	0.77															
Rob Bay	FN3	30-Aug	FN		837	SFCD	371	352	0.69															
Rob Bay	FN3	30-Aug	FN		838	SFCD	365	382	0.79															
Rob Bay	FN3	30-Aug	FN		839	SFCD	345	306	0.75															
Rob Bay	FN3	30-Aug	FN		840	SFCD	312	210	0.69															
Rob Bay	FN3	30-Aug	FN		841	SFCD	368	345	0.69															
Rob Bay	FN3	30-Aug	FN		842	SFCD	312	231	0.76															
Rob Bay	FN3	30-Aug	FN		843	SFCD	297	186	0.71															
Rob Bay	FN3	30-Aug	FN		844	SFCD	202	48	0.58															
Rob Bay	FN3	30-Aug	FN		845	SFCD	123	12	0.64															
Rob Bay	FN3	30-Aug	FN		846	SFCD	128	13	0.62															
Rob Bay	FN3	30-Aug	FN		847	GRCD	121	16	0.90															
Rob Bay	FN3	30-Aug	FN		848	SFCD	116	10	0.64															
Rob Bay	FN3	30-Aug	FN		849	GRCD	135	22	0.89															
Rob Bay	FN3	30-Aug	FN		850	GRCD	117	12	0.75															
Rob Out	u/s TU	30-Aug	BS		851	ARCH	776										Wh	2343	02-2					
Rob Out	u/s TU	30-Aug	BS		852	ARCH	750										Wh	2340	02-1					
Rob Bay	FN3	31-Aug	FN		853	SFCD	421	535	0.72															
Rob Bay	FN3	31-Aug	FN		854	SFCD	435	695	0.84															
Rob Bay	FN3	31-Aug	FN		855	SFCD	388	485	0.83															
Rob Bay	FN3	31-Aug	FN		856	SFCD	342	292	0.73															
Rob Bay	FN3	31-Aug	FN		857	SFCD	321	230	0.70															
Rob Bay	FN3	31-Aug	FN		858	SFCD	326	227	0.66															
Rob Bay	FN3	31-Aug	FN		859	SFCD	325	247	0.72															
Rob Bay	FN3	31-Aug	FN		860	SFCD	293	181	0.72															
Rob Bay	FN3	31-Aug	FN		861	SFCD	303	186	0.67															
Rob Bay	FN3	31-Aug	FN		862	SFCD	266	120	0.64															
Rob Bay	FN3	31-Aug	FN		863	SFCD	292	188	0.76															
Rob Bay	FN3	31-Aug	FN		864	SFCD	288	172	0.72															
Rob Bay	FN3	31-Aug	FN		865	SFCD	256	135	0.80															
Rob Bay	FN3	31-Aug	FN		866	SFCD	193	42	0.58															
Rob Bay	FN3	31-Aug	FN		867	GRCD	109	10	0.77															
Rob Bay	FN3	31-Aug	FN		868	GRCD	153	40	1.12															
Rob Bay	FN3	31-Aug	FN		869	GRCD	147	27	0.85															
Rob Bay	FN3	31-Aug	FN		870	GRCD	111	9	0.66															
Rob Bay	FN3	31-Aug	FN		871	SFCD	175	31	0.58															
Rob Bay	FN3	31-Aug	FN		872	SFCD	131	12	0.53															
Rob Bay	FN3	31-Aug	FN		873	GRCD	138	22	0.84															
Rob Bay	FN3	31-Aug	FN		874	SFCD	128																	
Rob Bay	FN3	31-Aug	FN		875	SFCD	121																	
Rob Bay	FN3	31-Aug	FN		876	SFCD	108																	
Rob Bay	FN3	31-Aug	FN		877	SFCD	122																	
Rob Bay	FN3	31-Aug	FN		878	SFCD	112																	
Rob Bay	FN3	31-Aug	FN		879	SFCD	119																	
Rob Bay	FN3	31-Aug	FN		880	SFCD	126																	
Rob Bay	FN3	31-Aug	FN		881	SFCD	134																	
Rob Bay	FN3	31-Aug	FN		882	SFCD	108																	
Rob Lk	AN2	31-Aug	AN		883	LKTR	400	717	1.12	M	2	2	16	14	O,F,S	18				Tis	Mort	10	8 Chir, 2 stone	
Rob Bay	FN4	1-Sep	FN		884	GRCD	444	1085	1.24															
Rob Bay	FN4	1-Sep	FN		885	GRCD	455	1083	1.15															
Rob Bay	FN4	1-Sep	FN		886	SFCD	415	572	0.80															
Rob Bay	FN4	1-Sep	FN		887	SFCD	298	200	0.76															
Rob Bay	FN4	1-Sep	FN		889	SFCD	274	137	0.67															
Rob Bay	FN4	1-Sep	FN		890	SFCD	422	530	0.71															
Rob Bay	FN4	1-Sep	FN		891	SFCD	273	143	0.70															

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mort-ality	Stomach % Full	Stomach Contents	Comments
Rob Bay	FN4	1-Sep	FN		892	SFCD	280	149	0.68															
Rob Bay	FN4	1-Sep	FN		893	SFCD	249	105	0.68															
Rob Bay	FN4	1-Sep	FN		894	SFCD	272	145	0.72															
Rob Bay	FN4	1-Sep	FN		895	SFCD	377	434	0.81															
Rob Bay	FN4	1-Sep	FN		896	SFCD	262	123	0.68															
Rob Bay	FN4	1-Sep	FN		897	SFCD	350	323	0.75															
Rob Bay	FN4	1-Sep	FN		898	SFCD	273	152	0.75															
Rob Bay	FN4	1-Sep	FN		899	SFCD	268	131	0.68															
Rob Bay	FN4	1-Sep	FN		900	SFCD	227	73	0.62															
Rob Bay	FN4	1-Sep	FN		901	SFCD	205	54	0.63															
Rob Bay	FN4	1-Sep	FN		902	SFCD	182	39	0.65															
Rob Bay	FN4	1-Sep	FN		903	SFCD	179	38	0.66															
Rob Bay	FN4	1-Sep	FN		904	SFCD	105	9	0.78															
Rob Bay	FN4	1-Sep	FN		905	SFCD	114	10	0.67															
Rob Bay	FN4	1-Sep	FN		906	SFCD	321	224	0.68															
Rob Bay	FN4	1-Sep	FN		907	SFCD	177	34	0.61															inside SFCD #906
L Rob Lk	GN1	2-Sep	GN	3.8	908	ARCH	600	2700	1.25								Wh	2273						
L Rob Lk	GN1	2-Sep	GN	3.8	909	ARCH	735	4700	1.18								Wh	2274						
L Rob Lk	GN1	2-Sep	GN	3.8	910	ARCH	733	5200	1.32								Wh	2275						
L Rob Lk	GN1	2-Sep	GN	3.8	911	ARCH	734	5000	1.26								Wh	2276						
L Rob Lk	GN1	2-Sep	GN	3.8	912	ARCH	552	2400	1.43								Wh	2277						
Rob Out	BG	2-Sep	HC		913	ARCH	808	6110	1.16								Wh	2278						released in Roberts Lake
Rob Out	BG	2-Sep	HC		914	ARCH	730	4400	1.13								Wh	2279						released in Roberts Lake
Rob Out	BG	2-Sep	HC		915	ARCH	817	6000	1.10								Wh	2280						released in Roberts Lake
Rob Out	BG	2-Sep	HC		916	ARCH	730	4900	1.26								Wh	2281						released in Roberts Lake
Rob Out	BG	2-Sep	HC		917	ARCH	742	5800	1.42								Wh	2282						released in Roberts Lake
Rob Out	BG	2-Sep	HC		918	ARCH	815	6200	1.15								Wh	2283						released in Roberts Lake
Rob Out	BG	2-Sep	HC		919	ARCH	715	4300	1.18								Wh	2284						released in Roberts Lake
L Rob Lk	GN2	2-Sep	GN	3.8	920	ARCH	835	6500	1.12								Wh	2285						
L Rob Lk	GN2	2-Sep	GN	3.8	921	LKTR	441	884	1.03								Wh	2286						
L Rob Lk	GN2	2-Sep	GN	3.8	922	LKTR	352	483	1.11								Wh	2287						
L Rob Lk	GN2	2-Sep	GN	3.8	923	LSCS	191	62	0.89	M	2	2		8	O,F,S						Mort	90	50 Amph; 40 Hyme	
Rob Bay	FN4	2-Sep	FN		924	SFCD	416	582	0.81															
Rob Bay	FN4	2-Sep	FN		925	SFCD	326	247	0.71															
Rob Bay	FN4	2-Sep	FN		926	SFCD	397	453	0.72															
Rob Bay	FN4	2-Sep	FN		927	SFCD	372	406	0.79															
Rob Bay	FN4	2-Sep	FN		928	SFCD	324	235	0.69															
Rob Bay	FN4	2-Sep	FN		929	SFCD	259	109	0.63															
Rob Bay	FN4	2-Sep	FN		930	SFCD	252	107	0.67															
Rob Bay	FN4	2-Sep	FN		931	SFCD	275	150	0.72															
Rob Bay	FN4	2-Sep	FN		932	SFCD	275	143	0.69															
Rob Bay	FN4	2-Sep	FN		933	SFCD	279	148	0.68															
Rob Bay	FN4	2-Sep	FN		934	SFCD	293	167	0.66															
Rob Bay	FN4	2-Sep	FN		935	SFCD	251	106	0.67															
Rob Bay	FN4	2-Sep	FN		936	SFCD	293	175	0.70															
Rob Bay	FN4	2-Sep	FN		937	SFCD	279	157	0.72															
Rob Bay	FN4	2-Sep	FN		938	SFCD	320	203	0.62															
Rob Bay	FN4	2-Sep	FN		939	SFCD	308	207	0.71															
Rob Bay	FN4	2-Sep	FN		940	SFCD	268	128	0.66															
Rob Bay	FN4	2-Sep	FN		941	SFCD	175	33	0.62															
Rob Bay	FN4	2-Sep	FN		942	SFCD	277	152	0.72															
Rob Bay	FN4	2-Sep	FN		943	SFCD	179	36	0.63															
Rob Bay	FN4	2-Sep	FN		944	SFCD	106	7	0.59															
Rob Bay	FN4	2-Sep	FN		945	SFCD	316	204	0.65															
Rob Bay	FN4	2-Sep	FN		946	SFCD	203	55	0.66															

Appendix C16. Data for individual fish captured in the Doris North Project area, 2002.

Waterbody	Site / Time	Date	Samp Meth.	Mesh (cm)	Sample #	Species	FL (mm)	Weight (g)	Cond. Fact.	Sex	Mat.	Rep. Stat.	Gonad (g)	Gonad (mm)	Age Struc.	Age (yr)	Tag Color	Tag #	Re-capt.	Tissues	Mortality	Stomach % Full	Stomach Contents	Comments
Rob Bay	FN4	2-Sep	FN		947	SFCD	100	6	0.60															
Rob Bay	FN4	2-Sep	FN		948	SFCD	173	34	0.66															
Rob Bay	FN4	2-Sep	FN		949	SFCD	102	7	0.66															
Rob Bay	FN4	2-Sep	FN		950	GRCD	95	5	0.58															
Rob Bay	FN4	3-Sep	FN		951	SFCD	287	150	0.63															
Rob Bay	FN4	3-Sep	FN		952	SFCD	257	114	0.67															
Rob Bay	FN4	3-Sep	FN		953	SFCD	276	153	0.73															
Rob Bay	FN4	3-Sep	FN		954	SFCD	293	177	0.70															
Rob Bay	FN4	3-Sep	FN		955	SFCD	372	365	0.71															
Rob Bay	FN4	3-Sep	FN		956	SFCD	307	180	0.62															
Rob Bay	FN4	3-Sep	FN		957	SFCD	290	153	0.63															
Rob Bay	FN4	3-Sep	FN		958	SFCD	279	147	0.68															
Rob Bay	FN4	3-Sep	FN		959	SFCD	266	132	0.70															
Rob Bay	FN4	3-Sep	FN		960	SFCD	267	138	0.73															
Rob Bay	FN4	3-Sep	FN		961	SFCD	280	142	0.65															
Rob Bay	FN4	3-Sep	FN		962	SFCD	268	120	0.62															
Rob Bay	FN4	3-Sep	FN		963	SFCD	290	186	0.76															
Rob Bay	FN4	3-Sep	FN		964	SFCD	267	133	0.70															
Rob Bay	FN4	3-Sep	FN		965	SFCD	249	109	0.71															
Rob Bay	FN4	3-Sep	FN		966	SFCD	257	123	0.72															
Rob Bay	FN4	3-Sep	FN		967	SFCD	200	47	0.59															
Rob Bay	FN4	3-Sep	FN		968	SFCD	263	127	0.70															
Rob Bay	FN4	3-Sep	FN		969	SFCD	250	97	0.62															
Rob Bay	FN4	3-Sep	FN		970	SFCD	216	62	0.62															
Rob Bay	FN4	3-Sep	FN		971	SFCD	252	103	0.64															
Rob Bay	FN4	3-Sep	FN		972	SFCD	204	52	0.61															
Rob Bay	FN4	3-Sep	FN		974	SFCD	203	53	0.63															
Rob Bay	FN4	3-Sep	FN		975	SFCD	195	47	0.63															
Rob Bay	FN4	3-Sep	FN		976	SFCD	132	12	0.52															
Rob Bay	FN4	3-Sep	FN		977	GRCD	463	1173	1.18	M	2	2									Mort	100	SFCD	
Rob Bay	FN4	3-Sep	FN		978	ARCH	264	189	1.03	M	1	1			O,S	4					Mort	0		

CODES:

Sampling Method:
- AN — Angling
- BG — Boulder Garden
- BS — Beach Seine
- FN — Fyke Net
- GN — Gill Net
- HC — Hand Capture
- TU — Trap/Fence

Species:
- ARCH — Arctic char
- BNGN — Banded gunnel
- BRWH — Broad whitefish
- CISC — Cisco
- FRSC — Fourhorn sculpin
- GRCD — Greenland cod
- LKTR — Lake trout
- LKWH — Lake whitefish
- LSCS — Least cisco
- SFCD — Saffron cod

FL: Fork length (in mm)

Sex:
- F — Female
- M — Male

Maturity:
- 1 — Immature
- 2 — Mature

Reproductive Status:
- 1 — Undeveloped
- 2 — Gravid
- 3 — Ripe

Age Structures:
- O — Otolith
- F — Fin ray
- S — Scale

Condition Factor = Weight [in g] X 10^5/ (FL [in mm])^3

Tag Colour:
- Wh — White
- Yel — Yellow

Recapture:
- 1998 or 2000 — originally marked in Aug of that year
- 02-1 — 1st recapture of fish marked in Aug 2002
- 02-2 — 2nd recapture of fish marked in Aug 2002

Tissues: Tis — Fish sampled for tissues

Mortality: Mort — Fish that died during sampling

Stomach Content:
- Amph — Amphipoda
- Chir — Chironomidae (blood worms)
- Cole — Coleoptera (beetles)
- Hyme — Hymenoptera (ants)
- Isop — Isopoda *(Saduria entemon)*
- Noto — Notostraca (tadpole shrimp)
- Pele — Pelecypoda (clams)
- Tric — Trichoptera (caddisfly larvae)
- Zoo — Zooplankton
- Veg — Vegetation

APPENDIX D

FISH TISSUES DATA

Appendix D1. Metal concentrations (µg/g dry weight) in fish tissues from the Doris North Project area, August 2002.

Parameter		Arctic Char *(Roberts Outflow)*			Lake Trout *(Roberts Lake)*		
		Kidney *n = 30*	**Liver** *n = 30*	**Muscle** *n = 30*	**Kidney** *n = 30*	**Liver** *n = 30*	**Muscle** *n = 30*
Aluminum	*n<DL* [a]	*9*	*28*	*19*	*0*	*0*	*10*
	Mean	**1.31**	**0.32**	**0.53**	**30.42**	**13.99**	**0.72**
	SD[b]	1.32	0.26	0.50	20.29	19.77	0.47
	Minimum	0.25	0.25	0.25	9.10	1.70	0.25
	Maximum	5.40	1.40	2.00	100.00	85.80	2.30
Antimony	*n<DL*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	**0.06**	**0.05**	**0.05**	**0.09**	**0.05**	**0.05**
	SD	0.02	0.00	0.00	0.05	0.01	0.00
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	0.10	0.05	0.05	0.25	0.10	0.05
Arsenic	*n<DL*	*0*	*0*	*0*	*8*	*1*	*0*
	Mean	**3.09**	**6.19**	**8.59**	**0.74**	**1.48**	**10.49**
	SD	0.75	1.75	3.59	0.83	1.64	19.77
	Minimum	1.7	2.5	3.8	0.1	0.1	0.2
	Maximum	5.1	9.9	17.7	2.9	6.6	81.0
Barium	*n<DL*	*29*	*30*	*30*	*20*	*30*	*29*
	Mean	**0.06**	**0.05**	**0.05**	**0.16**	**0.05**	**0.06**
	SD	0.03	0.00	0.00	0.11	0.01	0.03
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	0.20	0.05	0.05	0.60	0.10	0.20
Beryllium	*n<DL*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	**0.01**	**0.01**	**0.01**	**0.02**	**0.01**	**0.01**
	SD	0.00	0.00	0.00	0.01	0.00	0.00
	Minimum	0.01	0.01	0.01	0.01	0.01	0.01
	Maximum	0.02	0.01	0.01	0.05	0.02	0.01
Boron	*n<DL*	*0*	*26*	*30*	*0*	*30*	*30*
	Mean	**107.0**	**1.30**	**1.00**	**145.8**	**1.03**	**1.00**
	SD	233.8	0.79	0.00	334.7	0.18	0.00
	Minimum	16	1	1	12	1	1
	Maximum	992	4	1	1240	2	1
Cadmium	*n<DL*	*0*	*0*	*30*	*0*	*0*	*30*
	Mean	**1.26**	**0.22**	**0.01**	**1.38**	**0.18**	**0.01**
	SD	0.59	0.16	0.00	1.23	0.20	0.00
	Minimum	0.38	0.06	0.01	0.15	0.02	0.01
	Maximum	2.75	0.81	0.01	5.64	0.97	0.01
Calcium	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**350**	**90**	**798**	**605**	**316**	**1336**
	SD	89	38	551	128	96	1221
	Minimum	241	44	213	362	104	442
	Maximum	739	191	2590	944	474	7230
Chromium	*n<DL*	*30*	*15*	*6*	*29*	*8*	*5*
	Mean	**0.06**	**0.13**	**0.55**	**0.11**	**0.29**	**0.81**
	SD	0.02	0.12	0.89	0.10	0.22	0.84
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	0.10	0.50	4.70	0.60	1.00	2.70
Cobalt	*n<DL*	*3*	*3*	*30*	*4*	*3*	*30*
	Mean	**0.67**	**0.17**	**0.05**	**0.36**	**0.38**	**0.05**
	SD	0.41	0.10	0.00	0.18	0.30	0.00
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	1.70	0.50	0.05	1.00	1.50	0.05
Copper	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**8.9**	**29.1**	**1.6**	**6.6**	**49.4**	**1.1**
	SD	2.0	18.4	0.3	1.5	31.0	0.2
	Minimum	6.1	5.0	1.2	4.9	4.3	0.8
	Maximum	14.2	73.3	2.4	10.8	106.0	1.6
Iron	*n<DL*	*0*	*0*	*1*	*0*	*0*	*5*
	Mean	**760**	**428**	**17**	**758**	**566**	**13**
	SD	482	282	9	282	436	8
	Minimum	298	161	3	401	64	3
	Maximum	2230	1260	54	1610	1820	29

Appendix D1. Metal concentrations (µg/g dry weight) in fish tissues from the Doris North Project area, August 2002.

Parameter		Arctic Char *(Roberts Outflow)*			Lake Trout *(Roberts Lake)*		
		Kidney *n = 30*	**Liver** *n = 30*	**Muscle** *n = 30*	**Kidney** *n = 30*	**Liver** *n = 30*	**Muscle** *n = 30*
Lead	*n<DL*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	**0.06**	**0.05**	**0.05**	**0.09**	**0.05**	**0.05**
	SD	0.02	0.00	0.00	0.05	0.01	0.00
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	0.10	0.05	0.05	0.25	0.10	0.05
Magnesium	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**589**	**345**	**784**	**571**	**639**	**922**
	SD	44	131	74	54	188	126
	Minimum	474	167	677	491	227	708
	Maximum	675	736	911	746	1100	1400
Manganese	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**1.97**	**2.32**	**0.24**	**2.06**	**4.77**	**0.74**
	SD	0.37	1.25	0.06	0.58	2.10	0.21
	Minimum	1.3	1.3	0.2	1.4	1.7	0.5
	Maximum	2.7	7.0	0.4	4.4	11.2	1.4
Mercury	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**0.329**	**0.099**	**0.081**	**3.079**	**1.656**	**0.976**
	SD	0.101	0.052	0.023	2.273	1.393	0.682
	Minimum	0.194	0.039	0.042	0.404	0.062	0.133
	Maximum	0.610	0.228	0.133	9.450	4.970	2.410
Molybdenum	*n<DL*	*23*	*0*	*30*	*26*	*1*	*30*
	Mean	**0.08**	**0.39**	**0.05**	**0.11**	**0.38**	**0.05**
	SD	0.05	0.08	0.00	0.05	0.18	0.00
	Minimum	0.05	0.20	0.05	0.05	0.05	0.05
	Maximum	0.20	0.50	0.05	0.25	0.90	0.05
Nickel	*n<DL*	*10*	*29*	*30*	*18*	*29*	*30*
	Mean	**0.22**	**0.06**	**0.05**	**0.24**	**0.06**	**0.05**
	SD	0.18	0.05	0.00	0.30	0.03	0.00
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	0.70	0.30	0.05	1.50	0.20	0.05
Phosphorus	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**12597**	**9282**	**10550**	**12263**	**18185**	**11683**
	SD	865	3508	1040	905	4888	1889
	Minimum	10800	4770	8980	10600	6340	8870
	Maximum	14300	20900	12800	15100	28100	19000
Potassium	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**12112**	**6039**	**13390**	**11909**	**12146**	**16907**
	SD	1220	2804	1300	1311	3188	1992
	Minimum	9870	3700	11200	9170	5410	12000
	Maximum	14300	16300	15800	14600	18700	21200
Selenium	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**6.44**	**7.15**	**1.76**	**7.03**	**6.18**	**0.96**
	SD	1.67	2.03	0.18	3.13	4.08	0.40
	Minimum	3.8	3.6	1.3	1.9	2.3	0.5
	Maximum	10.6	11.6	2.1	14.0	17.2	2.1
Silicon	*n<DL*	*21*	*0*	*0*	*17*	*0*	*0*
	Mean	**10.0**	**123.7**	**102.8**	**23.5**	**156.1**	**80.2**
	SD	7.5	49.8	27.2	34.5	58.1	25.9
	Minimum	5	41	55	2	47	19
	Maximum	29	209	158	177	294	127
Silver	*n<DL*	*10*	*0*	*30*	*27*	*3*	*30*
	Mean	**0.05**	**0.71**	**0.01**	**0.02**	**0.45**	**0.01**
	SD	0.05	0.42	0.00	0.02	0.36	0.00
	Minimum	0.01	0.09	0.01	0.01	0.01	0.01
	Maximum	0.16	1.94	0.01	0.07	1.49	0.01
Sodium	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**5631**	**1356**	**658**	**8414**	**6044**	**1055**
	SD	758	423	149	1276	2205	287
	Minimum	3950	676	408	5480	1810	631
	Maximum	6800	2620	995	10300	9940	2190

Appendix D1. Metal concentrations (µg/g dry weight) in fish tissues from the Doris North Project area, August 2002.

Parameter		Arctic Char *(Roberts Outflow)*			Lake Trout *(Roberts Lake)*		
		Kidney	**Liver**	**Muscle**	**Kidney**	**Liver**	**Muscle**
		n = 30	*n = 30*	*n = 30*	*n = 30*	*n = 30*	*n = 30*
Strontium	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**1.46**	**0.21**	**1.76**	**2.31**	**0.67**	**2.14**
	SD	0.49	0.08	1.50	1.05	0.24	2.04
	Minimum	0.89	0.10	0.27	1.27	0.32	0.33
	Maximum	2.74	0.42	6.80	5.30	1.13	10.90
Tellurium	*n<DL*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	**0.06**	**0.05**	**0.05**	**0.09**	**0.05**	**0.05**
	SD	0.02	0.00	0.00	0.05	0.01	0.00
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	0.10	0.05	0.05	0.25	0.10	0.05
Thallium	*n<DL*	*30*	*30*	*30*	*23*	*13*	*30*
	Mean	**0.01**	**0.01**	**0.01**	**0.05**	**0.13**	**0.01**
	SD	0.00	0.00	0.00	0.06	0.14	0.00
	Minimum	0.01	0.01	0.01	0.01	0.01	0.01
	Maximum	0.02	0.01	0.01	0.28	0.51	0.01
Tin	*n<DL*	*28*	*30*	*30*	*27*	*29*	*30*
	Mean	**0.67**	**0.05**	**0.05**	**1.00**	**0.19**	**0.05**
	SD	2.91	0.00	0.00	3.42	0.74	0.00
	Minimum	0.05	0.05	0.05	0.05	0.05	0.05
	Maximum	15.90	0.05	0.05	15.30	4.10	0.05
Titanium	*n<DL*	*4*	*0*	*0*	*0*	*0*	*0*
	Mean	**0.43**	**4.96**	**7.33**	**2.61**	**9.96**	**7.93**
	SD	0.12	2.17	0.75	1.45	2.32	0.84
	Minimum	0.15	2.90	6.20	1.00	4.30	6.30
	Maximum	0.70	13.30	8.80	7.80	13.90	10.20
Uranium	*n<DL*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	**0.02**	**0.02**	**0.02**	**0.04**	**0.02**	**0.02**
	SD	0.01	0.00	0.00	0.02	0.00	0.00
	Minimum	0.02	0.02	0.02	0.02	0.02	0.02
	Maximum	0.04	0.02	0.02	0.10	0.04	0.02
Vanadium	*n<DL*	*30*	*30*	*30*	*30*	*27*	*30*
	Mean	**0.28**	**0.25**	**0.25**	**0.48**	**0.30**	**0.25**
	SD	0.08	0.00	0.00	0.27	0.14	0.00
	Minimum	0.25	0.25	0.25	0.25	0.25	0.25
	Maximum	0.50	0.25	0.25	1.50	0.80	0.25
Zinc	*n<DL*	*0*	*0*	*0*	*0*	*0*	*0*
	Mean	**127.8**	**68.5**	**14.1**	**111.6**	**116.8**	**15.5**
	SD	26.2	17.3	1.5	18.1	26.2	1.8
	Minimum	97.1	40.8	10.9	83.8	74.5	12.3
	Maximum	214.0	97.1	16.5	164.0	170.0	19.5
Zirconium	*n<DL*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	**1.65**	**1.50**	**1.50**	**2.57**	**1.55**	**1.50**
	SD	0.46	0.00	0.00	1.22	0.27	0.00
	Minimum	1.50	1.50	1.50	0.55	1.50	1.50
	Maximum	3.00	1.50	1.50	4.50	3.00	1.50
Moisture (%)	*n*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	**78.7**	**56.6**	**70.3**	**81.6**	**76.4**	**78.1**
	SD	1.1	6.3	2.0	1.6	4.3	1.9
	Minimum	76.1	46.5	65.6	78.6	62.6	73.7
	Maximum	81.1	72.2	74.3	84.4	81.8	82.0

[a] number of samples below detection limit

[b] standard deviation

Appendix D2. Metal concentrations (µg/g dry weight) in muscle (M), liver (L), and kidney (K) tissues of lake trout from Roberts Lake, August 2002.

Fish #	Tissue	Fork Length (mm)	Weight (g)	Age (yr)	*Moisture (%)*	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO_4	Potassium K	Selenium Se	Silicon SiO_2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
18	M	814	4211	33	*77.6*	<0.5	<0.1	34.3	<0.1	<0.02	<2	<0.02	1570	0.4	<0.1	1.1	10	<0.1	893	0.6	1.430	<0.1	<0.1	12000	17200	1.1	101	<0.01	1050	1.99	<0.1	<0.02	<0.1	8.3	<0.04	<0.5	17.5	<3
24	M	741	3738	35	*82.0*	1.2	<0.1	1.2	<0.1	<0.02	<2	<0.02	1540	2.5	<0.1	1.0	23	<0.1	1020	0.9	1.730	<0.1	<0.1	12900	19400	0.7	100	<0.01	1270	2.19	<0.1	<0.02	<0.1	9.0	<0.04	<0.5	19.5	<3
25	M	813	5429	33	*73.7*	0.7	<0.1	24.6	<0.1	<0.02	<2	<0.02	640	1.8	<0.1	0.8	10	<0.1	746	0.5	0.832	<0.1	<0.1	8870	12000	1.2	82	<0.01	631	1.17	<0.1	<0.02	<0.1	6.4	<0.04	<0.5	14.7	<3
42	M	490	1235	25	*77.8*	1.2	<0.1	0.4	<0.1	<0.02	<2	<0.02	531	0.7	<0.1	1.1	11	<0.1	917	1.0	0.804	<0.1	<0.1	9920	15500	0.6	73	<0.01	793	0.61	<0.1	<0.02	<0.1	7.2	<0.04	<0.5	18.2	<3
43	M	408	758	15	*79.0*	2.3	<0.1	0.3	<0.1	<0.02	<2	<0.02	1530	2.2	<0.1	1.3	26	<0.1	1400	0.8	0.404	<0.1	<0.1	19000	19900	0.7	68	<0.01	1360	2.48	<0.1	<0.02	<0.1	8.5	<0.04	<0.5	17.2	<3
49	M	821	5838	37	*77.7*	0.5	<0.1	48.1	<0.1	<0.02	<2	<0.02	1470	0.6	<0.1	1.0	10	<0.1	974	0.7	0.701	<0.1	<0.1	12300	17300	0.9	124	<0.01	1000	2.61	<0.1	<0.02	<0.1	8.5	<0.04	<0.5	15.6	<3
50	M	767	5157	42	*80.6*	0.7	<0.1	3.1	<0.1	<0.02	<2	<0.02	442	0.2	<0.1	1.4	14	<0.1	883	0.7	1.440	<0.1	<0.1	11400	18600	0.8	72	<0.01	1170	0.33	<0.1	<0.02	<0.1	8.0	<0.04	<0.5	17.6	<3
51	M	728	3459	30	*80.5*	0.6	<0.1	0.8	<0.1	<0.02	<2	<0.02	587	0.6	<0.1	0.9	<5	<0.1	848	0.8	2.060	<0.1	<0.1	10600	17000	0.9	47	<0.01	907	0.71	<0.1	<0.02	<0.1	7.3	<0.04	<0.5	14.3	<3
52	M	715	3272	27	*79.9*	<0.5	<0.1	0.4	<0.1	<0.02	<2	<0.02	547	2.3	<0.1	0.9	29	<0.1	973	0.8	1.330	<0.1	<0.1	11700	19100	0.8	120	<0.01	958	0.43	<0.1	<0.02	<0.1	8.4	<0.04	<0.5	14.9	<3
53	M	544	1993	21	*77.6*	1.1	<0.1	3.5	<0.1	<0.02	<2	<0.02	978	1.4	<0.1	1.1	25	<0.1	887	0.8	0.219	<0.1	<0.1	10900	15900	1.6	95	<0.01	703	1.85	<0.1	<0.02	<0.1	7.8	<0.04	<0.5	14.7	<3
54	M	571	2059	20	*78.0*	<0.5	<0.1	6.3	<0.1	<0.02	<2	<0.02	1550	0.3	<0.1	1.0	10	<0.1	958	0.7	0.229	<0.1	<0.1	12100	17200	1.3	108	<0.01	952	2.97	<0.1	<0.02	<0.1	8.5	<0.04	<0.5	12.3	<3
55	M	523	2349	21	*78.5*	1.0	<0.1	0.3	<0.1	<0.02	<2	<0.02	1190	0.3	<0.1	1.0	15	<0.1	950	1.1	1.450	<0.1	<0.1	11700	18200	0.8	90	<0.01	1050	1.51	<0.1	<0.02	<0.1	7.9	<0.04	<0.5	13.7	<3
56	M	599	2496	20	*79.7*	<0.5	<0.1	0.2	<0.1	<0.02	<2	<0.02	1130	2	<0.1	0.8	14	<0.1	841	0.9	1.350	<0.1	<0.1	10200	15600	0.8	54	<0.01	1050	1.74	<0.1	<0.02	<0.1	7.0	<0.04	<0.5	13.1	<3
69	M	653	2778	27	*76.9*	<0.5	<0.1	30.3	<0.1	<0.02	<2	<0.02	1980	2.7	<0.1	0.8	23	<0.1	861	0.7	0.845	<0.1	<0.1	11800	16500	1.4	57	<0.01	910	3.97	<0.1	<0.02	<0.1	8.2	<0.04	<0.5	16.4	<3
70	M	789	5209	31	*81.2*	1.1	<0.1	2.2	<0.1	<0.02	<2	<0.02	1290	0.9	<0.1	1.0	18	<0.1	1010	1.1	2.350	<0.1	<0.1	12600	21200	1.0	127	<0.01	1280	1.61	<0.1	<0.02	<0.1	8.6	<0.04	<0.5	14.5	<3
71	M	686	3611	33	*79.6*	1.1	<0.1	0.6	<0.1	<0.02	<2	<0.02	2080	<0.1	<0.1	1.2	9	<0.1	939	0.8	1.110	<0.1	<0.1	11600	18300	0.6	68	<0.01	873	3.34	<0.1	<0.02	<0.1	8.4	<0.04	<0.5	14.8	<3
72	M	420	818	20	*78.4*	1.1	<0.1	0.4	<0.1	<0.02	<2	<0.02	1580	<0.1	<0.1	1.3	21	<0.1	940	0.6	0.325	<0.1	<0.1	11000	13900	0.7	74	<0.01	2190	2.25	<0.1	<0.02	<0.1	7.6	<0.04	<0.5	15.7	<3
110	M	707	3600	32	*80.0*	0.5	<0.1	0.3	<0.1	<0.02	<2	<0.02	1020	0.9	<0.1	1.1	10	<0.1	829	0.9	2.280	<0.1	<0.1	10000	16800	0.8	19	<0.01	1280	1.19	<0.1	<0.02	<0.1	7.0	<0.04	<0.5	14.5	<3
111	M	546	1750	18	*77.4*	0.8	<0.1	0.3	<0.1	<0.02	<2	<0.02	900	1.7	<0.1	1.3	24	<0.1	1020	0.8	0.894	<0.1	<0.1	12900	20500	0.8	104	<0.01	955	1.01	<0.1	<0.02	<0.1	9.0	<0.04	<0.5	15.4	<3
112	M	562	1850	29	*76.0*	0.7	<0.1	2.7	<0.1	<0.02	<2	<0.02	2170	0.4	<0.1	0.8	10	<0.1	803	0.6	0.389	<0.1	<0.1	11900	16600	1.7	69	<0.01	1030	5.18	<0.1	<0.02	<0.1	8.2	<0.04	<0.5	16.3	<3
126	M	913	10000	44	*77.0*	<0.5	<0.1	1.3	<0.1	<0.02	<2	<0.02	721	<0.1	<0.1	0.9	<5	<0.1	773	0.5	2.410	<0.1	<0.1	9130	15100	0.6	96	<0.01	1080	0.73	<0.1	<0.02	<0.1	6.6	<0.04	<0.5	13.1	<3
127	M	760	5050	34	*77.4*	0.5	<0.1	81.0	<0.1	<0.02	<2	<0.02	530	0.2	<0.1	0.8	<5	<0.1	882	0.6	0.947	<0.1	<0.1	10900	15500	1.3	76	<0.01	1030	0.82	<0.1	<0.02	<0.1	7.3	<0.04	<0.5	13.4	<3
140	M	475	1250	19	*77.2*	0.9	<0.1	0.9	<0.1	<0.02	<2	<0.02	802	<0.1	<0.1	1.3	14	<0.1	920	0.6	0.301	<0.1	<0.1	11300	16500	0.5	73	<0.01	1210	1.06	<0.1	<0.02	<0.1	8.0	<0.04	<0.5	16.0	<3
141	M	400	750	14	*79.3*	1.1	<0.1	0.7	<0.1	<0.02	<2	<0.02	633	0.5	<0.1	1.6	10	<0.1	964	0.5	0.301	<0.1	<0.1	12500	17200	0.7	71	<0.01	651	0.77	<0.1	<0.02	<0.1	8.5	<0.04	<0.5	19.2	<3
150	M	820	6250	40	*77.7*	<0.5	<0.1	53.6	<0.1	<0.02	<2	<0.02	801	0.4	<0.1	1.0	<5	<0.1	708	0.6	1.050	<0.1	<0.1	9260	14500	0.9	27	<0.01	967	1.56	<0.1	<0.02	<0.1	6.3	<0.04	<0.5	13.9	<3
151	M	739	4450	39	*77.2*	<0.5	<0.1	1.4	<0.1	<0.02	<2	<0.02	1490	0.6	<0.1	1.2	14	<0.1	958	0.7	0.917	<0.1	<0.1	11600	18100	0.7	87	<0.01	1070	2.19	<0.1	<0.02	<0.1	8.1	<0.04	<0.5	15.3	<3
152	M	585	2250	26	*76.5*	<0.5	<0.1	6.8	<0.1	<0.02	<2	<0.02	688	<0.1	<0.1	0.8	<5	<0.1	781	0.5	0.366	<0.1	<0.1	11400	16900	1.7	77	<0.01	934	1.48	<0.1	<0.02	<0.1	7.5	<0.04	<0.5	14.3	<3
153	M	505	1450	28	*74.7*	<0.5	<0.1	8.1	<0.1	<0.02	<2	<0.02	1670	0.2	<0.1	1.2	6	<0.1	893	0.5	0.133	<0.1	<0.1	11800	15800	2.1	67	<0.01	823	4.48	<0.1	<0.02	<0.1	8.1	<0.04	<0.5	16.1	<3
154	M	384	750	14	*77.5*	0.6	<0.1	0.3	<0.1	<0.02	<2	<0.02	784	0.1	<0.1	1.2	13	<0.1	1040	0.6	0.364	<0.1	<0.1	11900	16000	0.6	69	<0.01	1100	1.03	<0.1	<0.02	<0.1	7.6	<0.04	<0.5	16.4	<3
883	M	400	717	18	*76.1*	1.3	<0.1	0.3	0.2	<0.02	<2	<0.02	7230	0.2	<0.1	1.4	11	<0.1	1050	1.4	0.317	<0.1	<0.1	15300	14900	0.6	112	<0.01	1380	10.90	<0.1	<0.02	<0.1	10.2	<0.04	<0.5	17.8	<3

Appendix D2. Metal concentrations (µg/g dry weight) in muscle (M), liver (L), and kidney (K) tissues of lake trout from Roberts Lake, August 2002.

Fish #	Tissue	Fork Length (mm)	Weight (g)	Age (yr)	*Moisture (%)*	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO_4	Potassium K	Selenium Se	Silicon SiO_2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
18	L	814	4211	33	*80.1*	7.0	<0.1	3.6	<0.1	<0.02	<2	0.07	362	0.3	0.7	75.3	528	<0.1	668	3.6	2.860	0.2	<0.1	18600	13300	7.4	168	0.99	8580	1.04	<0.1	<0.02	<0.1	8.9	<0.04	<0.5	116	<3
24	L	741	3738	35	*81.8*	31.0	<0.1	0.6	<0.1	<0.02	<2	0.16	422	0.3	1.5	65.3	1320	<0.1	819	5.8	3.430	0.4	<0.1	22100	12400	4.6	214	0.51	9940	0.85	<0.1	<0.02	<0.1	10.4	<0.04	0.8	123	<3
25	L	813	5429	33	*81.7*	3.9	<0.1	2.5	<0.1	<0.02	<2	0.30	324	0.3	0.3	56.0	645	<0.1	566	3.0	1.740	0.4	<0.1	17000	10600	14.5	180	0.61	9480	0.86	<0.1	<0.02	4.1	8.2	<0.04	<0.5	137	<3
42	L	490	1235	25	*79.0*	16.9	<0.1	0.2	<0.1	<0.02	<2	0.07	474	0.6	0.3	43.3	502	<0.1	715	3.7	1.440	0.4	<0.1	20100	12500	3.5	294	0.37	9880	1.02	<0.1	<0.02	<0.1	9.7	<0.04	<0.5	120	<3
43	L	408	758	15	*76.6*	7.0	<0.1	0.9	<0.1	<0.02	<2	0.03	396	0.4	<0.1	21.4	268	<0.1	691	3.8	0.347	0.3	0.2	20100	12300	3.7	214	0.17	6540	0.81	<0.1	0.14	<0.1	10.0	<0.04	<0.5	88.4	<3
49	L	821	5838	37	*74.9*	4.3	<0.1	2.6	<0.1	<0.02	<2	0.26	225	0.4	0.5	42.1	247	<0.1	612	3.4	1.190	0.3	<0.1	18800	12500	4.5	165	0.53	5970	0.55	<0.1	<0.02	<0.1	9.4	<0.04	<0.5	118	<3
50	L	767	5157	42	*76.3*	8.0	<0.1	0.9	<0.1	<0.02	<2	0.25	247	0.2	0.7	93.1	217	<0.1	525	3.5	4.060	0.6	<0.1	16100	9970	6.9	172	1.06	6260	0.60	<0.1	0.10	<0.1	7.8	<0.04	<0.5	135	<3
51	L	728	3459	30	*80.6*	6.0	<0.1	0.4	<0.1	<0.02	<2	0.09	366	0.4	0.6	65.7	1430	<0.1	819	5.8	4.970	0.4	<0.1	24000	15100	5.0	214	0.34	9260	0.81	<0.1	0.12	<0.1	12.0	<0.04	<0.5	145	<3
52	L	715	3272	27	*78.4*	3.7	<0.1	0.5	<0.1	<0.02	<2	0.09	316	0.5	0.9	54.0	808	<0.1	650	3.8	2.780	0.4	<0.1	19600	12200	4.7	141	0.37	7330	0.63	<0.1	<0.02	<0.1	9.3	<0.04	<0.5	139	<3
53	L	544	1993	21	*77.8*	4.9	<0.1	2.2	<0.1	<0.02	<2	0.20	344	0.4	0.2	77.2	420	<0.1	588	3.1	0.299	0.5	<0.1	17700	12100	17.2	164	0.84	6210	0.99	<0.1	<0.02	<0.1	8.7	<0.04	<0.5	154	<3
54	L	571	2059	20	*77.4*	6.7	<0.1	1.4	<0.1	<0.02	<2	0.12	427	0.4	0.1	40.9	193	<0.1	866	4.7	0.287	0.2	<0.1	23900	13600	7.0	210	0.61	5210	1.13	<0.1	<0.02	<0.1	11.3	<0.04	<0.5	122	<3
55	L	523	2349	21	*66.4*	3.3	<0.1	0.1	<0.1	<0.02	<2	0.05	189	1	0.3	34.2	664	<0.1	364	2.7	1.300	0.2	<0.1	11600	6500	2.4	204	0.26	4890	0.32	<0.1	<0.02	<0.1	5.6	<0.04	<0.5	74.5	<3
56	L	599	2496	20	*76.4*	2.9	<0.1	<0.1	<0.1	<0.02	<2	0.02	440	0.6	0.2	4.5	334	<0.1	846	5.2	1.830	0.2	<0.1	23300	16500	2.3	197	<0.01	5510	0.64	<0.1	0.24	<0.1	11.3	<0.04	<0.5	78.5	<3
69	L	653	2778	27	*80.5*	9.0	<0.1	3.6	<0.1	<0.02	<2	0.21	341	0.4	0.4	60.6	327	<0.1	603	2.5	1.060	0.3	<0.1	18300	12200	9.0	195	0.38	9490	0.96	<0.1	0.12	<0.1	9.0	<0.04	<0.5	131	<3
70	L	789	5209	31	*77.8*	4.5	<0.1	0.4	<0.1	<0.02	<2	0.03	443	0.3	0.4	4.8	247	<0.1	941	6.7	4.120	0.2	<0.1	25300	15200	3.8	189	<0.01	6100	0.63	<0.1	0.14	<0.1	12.7	<0.04	<0.5	81.1	<3
71	L	686	3611	33	*72.6*	4.3	<0.1	0.5	<0.1	<0.02	<2	0.05	272	0.1	0.3	49.1	368	<0.1	477	2.9	1.670	0.3	<0.1	13800	8010	2.6	161	0.61	5090	0.53	<0.1	<0.02	<0.1	7.0	<0.04	<0.5	93.9	<3
72	L	420	818	20	*80.2*	85.8	<0.1	0.9	<0.1	<0.02	<2	0.09	386	0.2	0.2	106	825	<0.1	829	6.5	0.819	0.5	<0.1	25500	13600	6.5	224	0.38	6410	0.67	<0.1	0.32	<0.1	13.3	<0.04	<0.5	148	<3
110	L	707	3600	32	*80.8*	4.1	<0.1	0.2	<0.1	<0.02	<2	0.04	401	0.2	0.3	4.3	417	<0.1	1100	4.7	3.040	<0.1	<0.1	28100	18700	2.8	178	0.01	7530	0.50	<0.1	0.22	<0.1	13.1	<0.04	<0.5	81.8	<3
111	L	546	1750	18	*77.4*	3.2	<0.1	0.5	<0.1	<0.02	<2	0.07	325	0.3	0.4	45.8	961	<0.1	577	4.8	1.140	0.5	<0.1	13800	10000	3.7	97	0.36	6900	0.97	<0.1	0.10	<0.1	8.9	<0.04	<0.5	137	<3
112	L	562	1850	29	*76.6*	9.0	<0.1	2.5	<0.1	<0.02	<2	0.73	237	<0.1	0.2	44.6	378	<0.1	453	2.8	0.434	0.5	<0.1	13700	9640	15.9	65	0.33	5500	0.73	<0.1	<0.02	<0.1	8.7	<0.04	<0.5	139	<3
126	L	913	10000	44	*78.6*	3.0	<0.1	0.2	<0.1	<0.02	<2	0.06	330	<0.1	<0.1	6.4	64	<0.1	783	6.8	4.100	0.2	<0.1	20700	16800	2.9	106	<0.01	4770	0.47	<0.1	0.39	<0.1	13.3	<0.04	<0.5	94.7	<3
127	L	760	5050	34	*73.7*	5.0	<0.1	5.9	<0.1	<0.02	<2	0.28	333	<0.1	0.3	37.8	261	<0.1	482	3.4	1.520	0.4	<0.1	13000	8500	6.4	174	0.52	5920	0.84	<0.1	<0.02	<0.1	8.7	<0.04	<0.5	104	<3
140	L	475	1250	19	*76.0*	45.0	<0.1	0.3	<0.1	<0.02	<2	0.10	294	<0.1	0.3	20.7	461	<0.1	475	5.3	0.352	0.5	<0.1	12800	10400	3.0	47	0.09	5540	0.54	<0.1	0.11	<0.1	9.4	<0.04	<0.5	97.0	<3
141	L	400	750	14	*73.0*	27.0	<0.1	0.6	<0.1	<0.02	<2	0.16	440	<0.1	0.3	29.0	821	<0.1	636	6.7	0.375	0.5	<0.1	16700	11500	4.2	105	0.09	4470	0.71	<0.1	0.21	<0.1	11.3	<0.04	<0.5	118	<3
150	L	820	6250	40	*77.2*	1.8	<0.1	6.6	<0.1	<0.02	<2	0.14	225	0.1	0.1	4.8	198	<0.1	805	7.5	1.260	0.2	<0.1	20500	18400	4.8	101	0.02	2530	0.32	<0.1	0.32	<0.1	13.9	<0.04	<0.5	87.0	<3
151	L	739	4450	39	*76.2*	1.9	<0.1	0.5	<0.1	<0.02	<2	0.08	176	<0.1	0.5	95.6	357	<0.1	504	6.0	2.030	0.5	<0.1	14600	11000	3.6	96	0.97	3890	0.32	<0.1	0.18	<0.1	9.7	<0.04	<0.5	132	<3
152	L	585	2250	26	*70.0*	12.1	<0.1	2.0	<0.1	<0.02	<2	0.97	182	0.5	0.6	94.1	291	<0.1	389	2.9	0.279	0.4	<0.1	11800	8450	13.0	94	1.49	2670	0.49	<0.1	0.02	<0.1	8.3	<0.04	0.6	123	<3
153	L	505	1450	28	*62.6*	1.7	<0.1	1.8	<0.1	<0.02	<2	0.18	104	0.2	0.1	30.0	201	<0.1	227	1.7	0.062	0.2	<0.1	6340	5410	10.1	82	0.63	1810	0.37	<0.1	<0.02	<0.1	4.3	<0.04	<0.5	76.4	<3
154	L	384	750	14	*76.7*	34.0	<0.2	1.0	<0.2	<0.04	<4	0.19	257	<0.2	<0.2	106	1820	<0.2	587	8.6	0.394	0.8	<0.2	18600	13100	4.1	165	0.47	4700	0.59	<0.2	0.38	<0.2	12.4	<0.08	<1	170	<6
883	L	400	717	18	*74.3*	62.7	<0.1	1.0	<0.1	<0.02	<2	0.28	198	<0.1	0.6	68.1	1420	<0.1	587	11.2	0.494	0.9	<0.1	19100	13900	5.4	68	0.36	2940	0.35	<0.1	0.51	<0.1	12.3	<0.04	0.6	140	<3

Appendix D2. Metal concentrations (µg/g dry weight) in muscle (M), liver (L), and kidney (K) tissues of lake trout from Roberts Lake, August 2002.

Fish #	Tissue	Fork Length (mm)	Weight (g)	Age (yr)	*Moisture (%)*	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO_4	Potassium K	Selenium Se	Silicon SiO_2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
18	K	814	4211	33	*80.6*	9.1	<0.1	2.9	<0.1	<0.02	29	0.15	362	<0.1	0.1	5.3	401	<0.1	619	1.6	1.990	<0.1	<0.1	13100	14600	7.0	<10	<0.01	6360	1.27	<0.1	<0.02	<0.1	1.1	<0.04	<0.5	88.3	<3
24	K	741	3738	35	*83.3*	100	<0.2	0.5	0.6	<0.04	21	1.68	944	<0.2	0.5	7.1	1180	<0.2	746	2.6	5.010	<0.2	0.5	12500	12000	9.8	72	<0.02	9280	4.74	<0.2	<0.04	0.6	7.8	<0.08	<1	104	<6
25	K	813	5429	33	*84.4*	20.8	<0.2	1.3	<0.2	<0.04	25	2.49	637	<0.2	0.4	6.3	939	<0.2	551	2.0	3.150	<0.2	<0.2	11500	11500	11.0	<20	<0.02	10300	2.59	<0.2	<0.04	15.3	2.1	<0.08	<1	108	<6
42	K	490	1235	25	*83.2*	28.7	<0.3	<0.3	<0.3	<0.06	32	0.50	608	<0.3	0.4	6.3	753	<0.3	573	2.1	2.200	<0.3	<0.3	12800	14200	4.1	<30	<0.03	9210	1.86	<0.3	<0.06	<0.3	2.9	<0.12	<1.5	123	<9
43	K	408	758	15	*80.3*	33.5	<0.3	0.4	<0.3	<0.06	117	0.47	520	<0.3	0.4	7.0	521	<0.3	614	1.8	0.884	<0.3	<0.3	13300	12800	1.9	<30	<0.03	5480	1.44	<0.3	<0.06	<0.3	3.5	<0.12	<1.5	114	<9
49	K	821	5838	37	*79.4*	17.9	<0.1	1.4	0.2	<0.02	55	3.09	602	<0.1	0.3	8.3	534	<0.1	559	2.0	2.910	<0.1	0.1	11700	11200	7.3	<10	0.05	8280	2.78	<0.1	0.11	11.6	1.8	<0.04	<0.5	122	<3
50	K	767	5157	42	*80.9*	35.9	<0.1	0.5	0.2	<0.02	25	1.81	670	<0.1	0.3	5.9	800	<0.1	535	1.8	7.150	0.2	0.5	10600	11200	13.1	12	<0.01	8520	2.82	<0.1	0.11	<0.1	3.0	<0.04	<0.5	124	<3
51	K	728	3459	30	*83.5*	20.7	<0.2	<0.2	<0.2	<0.04	29	0.69	604	<0.2	0.3	5.5	767	<0.2	599	1.9	5.360	<0.2	<0.2	12900	12500	7.0	<20	<0.02	9240	1.81	<0.2	<0.04	<0.2	2.0	<0.08	<1	123	<6
52	K	715	3272	27	*82.9*	20.4	<0.2	0.3	<0.2	<0.04	27	0.74	615	<0.2	0.4	6.1	878	<0.2	577	1.7	3.710	<0.2	<0.2	12000	13000	7.6	<20	<0.02	9280	1.96	<0.2	<0.04	<0.2	2.0	<0.08	<1	119	<6
53	K	544	1993	21	*82.2*	20.2	<0.3	0.5	<0.3	<0.06	54	1.21	608	<0.3	<0.3	7.7	1000	<0.3	515	1.7	0.828	<0.3	<0.3	12100	13400	8.7	<30	<0.03	8730	2.01	<0.3	<0.06	<0.3	1.9	<0.12	<1.5	115	<9
54	K	571	2059	20	*82.8*	53.0	<0.2	0.6	<0.2	<0.04	20	1.32	729	<0.2	0.4	7.2	734	<0.2	602	2.3	0.917	<0.2	<0.2	13400	12200	7.4	<20	<0.02	9100	2.36	<0.2	<0.04	<0.2	3.6	<0.08	<1	116	<6
55	K	523	2349	21	*81.9*	44.6	<0.2	<0.2	0.3	<0.04	21	1.30	551	<0.2	0.7	6.7	624	<0.2	637	2.9	3.750	<0.2	<0.2	13000	11400	6.8	<20	<0.02	9750	1.67	<0.2	0.11	<0.2	4.0	<0.08	<1	124	<6
56	K	599	2496	20	*81.8*	24.7	<0.2	<0.2	<0.2	<0.04	21	0.69	825	<0.2	0.3	5.1	576	<0.2	537	1.9	3.390	<0.2	<0.2	12700	12200	5.6	<20	<0.02	9400	2.04	<0.2	<0.04	<0.2	2.3	<0.08	<1	95.9	<6
69	K	653	2778	27	*81.4*	38.0	<0.1	2.8	0.2	<0.02	22	2.18	590	<0.1	0.3	8.4	418	<0.1	586	2.3	2.430	<0.1	0.3	12700	10700	9.8	26	<0.01	9330	2.35	<0.1	<0.02	<0.1	3.2	<0.04	<0.5	123	<3
70	K	789	5209	31	*79.7*	11.2	<0.1	0.3	<0.1	<0.02	34	0.57	689	<0.1	0.3	5.8	527	<0.1	543	1.7	6.280	<0.1	0.2	11700	11600	5.7	<10	<0.01	7450	2.18	<0.1	<0.02	<0.1	1.1	<0.04	<0.5	100	<3
71	K	686	3611	33	*80.4*	39.9	<0.1	0.3	0.3	<0.02	1010	0.73	567	<0.1	0.5	5.0	775	<0.1	550	1.6	3.580	<0.1	<0.1	11500	11400	6.4	32	<0.01	7570	2.24	<0.1	<0.02	<0.1	3.1	<0.04	<0.5	107	<3
72	K	420	818	20	*82.0*	35.1	<0.3	0.5	<0.3	<0.06	88	0.92	586	<0.3	<0.3	9.5	927	<0.3	561	2.4	1.450	<0.3	<0.3	12300	9900	2.9	<30	<0.03	6500	1.50	<0.3	0.12	<0.3	3.0	<0.12	<1.5	164	<9
110	K	707	3600	32	*83.8*	17.4	<0.1	0.2	<0.1	<0.02	34	0.88	738	<0.1	0.3	5.1	946	<0.1	562	1.6	7.430	<0.1	<0.1	12000	12700	6.8	15	<0.01	10100	2.09	<0.1	<0.02	<0.1	1.7	<0.04	<0.5	86.9	<3
111	K	546	1750	18	*81.6*	12.7	<0.2	<0.2	<0.2	<0.04	33	0.31	464	<0.2	0.5	5.6	423	<0.2	551	1.8	1.480	<0.2	<0.2	12400	11900	3.8	<20	<0.02	9270	1.55	<0.2	<0.04	<0.2	1.5	<0.08	<1	109	<6
112	K	562	1850	29	*83.1*	44.2	<0.1	1.0	0.2	<0.02	28	4.52	737	<0.1	0.3	7.0	1310	<0.1	572	2.2	1.880	0.2	0.2	12400	12000	14.0	57	<0.01	9870	5.30	<0.1	<0.02	<0.1	3.2	<0.04	<0.5	139	<3
126	K	913	10000	44	*81.0*	15.2	<0.1	0.2	<0.1	<0.02	19	0.93	696	<0.1	<0.1	6.1	430	<0.1	507	1.9	9.450	<0.1	0.2	11700	10000	5.7	30	<0.01	9630	1.92	<0.1	<0.02	<0.1	1.4	<0.04	<0.5	83.8	<3
127	K	760	5050	34	*82.9*	11.2	<0.1	2.2	<0.1	<0.02	22	1.96	594	<0.1	0.4	5.0	946	<0.1	491	1.4	2.950	<0.1	0.2	11300	11300	8.2	28	<0.01	8080	2.91	<0.1	<0.02	<0.1	1.2	<0.04	<0.5	101	<3
140	K	475	1250	19	*83.9*	14.1	<0.2	<0.2	<0.2	<0.04	22	0.45	503	<0.2	0.4	4.9	743	<0.2	581	1.5	0.647	<0.2	<0.2	12100	14100	3.1	15	<0.02	8420	1.36	<0.2	<0.04	<0.2	1.3	<0.08	<1	84.9	<6
141	K	400	750	14	*80.7*	15.9	<0.3	<0.3	<0.3	<0.06	28	0.51	536	<0.3	<0.3	7.8	741	<0.3	570	2.0	0.718	<0.3	<0.3	12900	12000	2.6	<30	<0.03	6410	1.44	<0.3	<0.06	<0.3	1.7	<0.12	<1.5	143	<9
150	K	820	6250	40	*80.2*	34.6	<0.1	2.5	0.2	<0.02	12	1.63	607	<0.1	0.2	6.4	593	<0.1	511	1.8	4.650	0.2	0.4	11100	10500	10.5	42	0.07	7630	2.86	<0.1	<0.02	<0.1	2.9	<0.04	<0.5	85.5	<3
151	K	739	4450	39	*78.8*	22.7	<0.1	0.3	0.2	<0.02	69	0.67	406	<0.1	0.3	5.5	538	<0.1	577	1.9	3.410	0.1	0.3	12000	11500	6.3	39	<0.01	6910	1.55	<0.1	0.13	<0.1	2.1	<0.04	<0.5	105	<3
152	K	585	2250	26	*79.9*	56.2	<0.1	0.9	0.3	<0.02	37	5.64	675	0.6	0.3	10.8	1610	<0.1	530	2.6	1.860	<0.1	0.9	11100	10100	12.7	55	0.07	8040	5.13	<0.1	<0.02	<0.1	3.1	<0.04	<0.5	107	<3
153	K	505	1450	28	*80.8*	12.5	<0.2	1.0	<0.2	<0.04	1240	0.84	371	<0.2	0.5	5.8	428	<0.2	584	1.7	0.404	<0.2	<0.2	12900	12900	5.0	<20	<0.02	7040	1.58	<0.2	<0.04	<0.2	1.0	<0.08	<1	112	<6
154	K	384	750	14	*78.6*	27.6	<0.3	<0.3	<0.3	<0.06	1130	0.77	429	<0.3	0.5	6.4	739	<0.3	501	2.7	0.824	<0.3	<0.3	11100	9170	3.7	<30	<0.03	7560	1.42	<0.3	0.13	<0.3	2.8	<0.12	<1.5	103	<9
883	K	400	717	18	*83.2*	74.6	<0.5	0.7	<0.5	<0.1	69	1.70	683	<0.5	1.0	9.7	940	<0.5	686	4.4	1.690	<0.5	1.5	15100	13300	6.5	177	<0.05	9680	2.68	<0.5	0.28	<0.5	5.9	<0.2	<2.5	117	<15

Appendix D3. Metal concentrations (µg/g dry weight) in muscle (M), liver (L), and kidney (K) tissues of Arctic char from Roberts Outflow, August 2002.

Fish #	Tissue	Fork Length (mm)	Weight (g)	Age (yr)	*Moisture (%)*	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO_4	Potassium K	Selenium Se	Silicon SiO_2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
1	M	564	2391	8	*70.5*	<0.5	<0.1	6.2	<0.1	<0.02	<2	<0.02	1180	0.2	<0.1	1.4	12	<0.1	817	0.2	0.068	<0.1	<0.1	11000	13800	2.1	94	<0.01	517	3.24	<0.1	<0.02	<0.1	7.5	<0.04	<0.5	13.1	<3
2	M	815	6753	11	*72.3*	<0.5	<0.1	10.0	<0.1	<0.02	<2	<0.02	220	4.7	<0.1	1.7	54	<0.1	732	0.3	0.102	<0.1	<0.1	10100	13800	1.8	91	<0.01	570	0.27	<0.1	<0.02	<0.1	6.7	<0.04	<0.5	13.6	<3
3	M	716	3830	10	*70.2*	<0.5	<0.1	9.7	<0.1	<0.02	<2	<0.02	1270	0.6	<0.1	1.3	15	<0.1	828	0.2	0.094	<0.1	<0.1	11700	14500	1.8	148	<0.01	585	2.66	<0.1	<0.02	<0.1	8.1	<0.04	<0.5	15.3	<3
4	M	744	4028	10	*71.7*	<0.5	<0.1	3.8	<0.1	<0.02	<2	<0.02	522	1.5	<0.1	1.6	23	<0.1	892	0.4	0.107	<0.1	<0.1	11600	15100	1.9	115	<0.01	692	0.92	<0.1	<0.02	<0.1	8.3	<0.04	<0.5	16.5	<3
5	M	628	3006	8	*72.1*	<0.5	<0.1	11.0	<0.1	<0.02	<2	<0.02	1620	0.5	<0.1	1.4	15	<0.1	911	0.2	0.076	<0.1	<0.1	12000	15200	2.0	128	<0.01	608	4.34	<0.1	<0.02	<0.1	8.7	<0.04	<0.5	15.3	<3
6	M	707	3980	10	*74.3*	<0.5	<0.1	10.7	<0.1	<0.02	<2	<0.02	516	1.9	<0.1	1.6	26	<0.1	846	0.3	0.079	<0.1	<0.1	10400	14700	1.8	63	<0.01	479	1.07	<0.1	<0.02	<0.1	7.5	<0.04	<0.5	15.6	<3
7	M	827	6910	11	*69.0*	<0.5	<0.1	16.9	<0.1	<0.02	<2	<0.02	224	0.2	<0.1	1.7	13	<0.1	709	0.2	0.089	<0.1	<0.1	8980	12400	1.6	76	<0.01	486	0.32	<0.1	<0.02	<0.1	6.4	<0.04	<0.5	12.2	<3
8	M	596	2435	8	*68.3*	<0.5	<0.1	5.7	<0.1	<0.02	<2	<0.02	213	0.8	<0.1	1.6	13	<0.1	724	0.2	0.063	<0.1	<0.1	9400	11800	1.9	95	<0.01	514	0.29	<0.1	<0.02	<0.1	6.6	<0.04	<0.5	13.5	<3
9	M	743	4953	12	*69.1*	0.5	<0.1	6.4	<0.1	<0.02	<2	<0.02	561	0.4	<0.1	1.5	17	<0.1	760	0.2	0.080	<0.1	<0.1	9970	12500	1.8	94	<0.01	727	0.99	<0.1	<0.02	<0.1	6.9	<0.04	<0.5	13.1	<3
10	M	711	4616	12	*67.0*	0.7	<0.1	7.3	<0.1	<0.02	<2	<0.02	649	0.4	<0.1	1.5	17	<0.1	712	0.2	0.055	<0.1	<0.1	9370	12200	1.6	83	<0.01	408	1.35	<0.1	<0.02	<0.1	6.7	<0.04	<0.5	12.4	<3
11	M	690	3402	12	*72.0*	0.7	<0.1	6.7	<0.1	<0.02	<2	<0.02	793	0.6	<0.1	1.3	23	<0.1	850	0.3	0.089	<0.1	<0.1	11500	15300	1.9	115	<0.01	524	1.62	<0.1	<0.02	<0.1	8.4	<0.04	<0.5	15.9	<3
12	M	582	2820	8	*73.0*	1.6	<0.1	4.7	<0.1	<0.02	<2	<0.02	632	0.2	<0.1	1.4	19	<0.1	883	0.3	0.083	<0.1	<0.1	11000	14500	1.9	111	<0.01	523	1.39	<0.1	<0.02	<0.1	7.7	<0.04	<0.5	13.8	<3
13	M	653	3533	12	*68.9*	<0.5	<0.1	4.6	<0.1	<0.02	<2	<0.02	2590	0.3	<0.1	1.3	9	<0.1	677	0.2	0.048	<0.1	<0.1	10200	11200	1.6	100	<0.01	563	6.80	<0.1	<0.02	<0.1	7.1	<0.04	<0.5	13.2	<3
14	M	711	4919	10	*68.5*	<0.5	<0.1	9.0	<0.1	<0.02	<2	<0.02	468	0.2	<0.1	1.2	7	<0.1	735	0.2	0.059	<0.1	<0.1	9010	12300	1.6	135	<0.01	511	0.76	<0.1	<0.02	<0.1	6.5	<0.04	<0.5	12.0	<3
15	M	656	3144	8	*70.7*	<0.5	<0.1	6.0	<0.1	<0.02	<2	<0.02	273	0.5	<0.1	1.7	12	<0.1	706	0.2	0.056	<0.1	<0.1	9580	12700	1.8	78	<0.01	568	0.44	<0.1	<0.02	<0.1	6.9	<0.04	<0.5	15.4	<3
16	M	621	3378	8	*70.1*	1.7	<0.1	10.7	<0.1	<0.02	<2	<0.02	492	0.5	<0.1	2.0	16	<0.1	811	0.3	0.072	<0.1	<0.1	11200	14500	1.8	121	<0.01	715	0.74	<0.1	<0.02	<0.1	8.2	<0.04	<0.5	15.6	<3
17	M	698	4077	11	*69.8*	<0.5	<0.1	3.9	<0.1	<0.02	<2	<0.02	427	0.5	<0.1	1.6	10	<0.1	688	0.2	0.056	<0.1	<0.1	9130	12100	1.9	55	<0.01	544	0.81	<0.1	<0.02	<0.1	6.5	<0.04	<0.5	13.5	<3
176	M	841	7200	12	*69.0*	1.5	<0.1	8.5	<0.1	<0.02	<2	<0.02	1190	0.2	<0.1	1.8	23	<0.1	836	0.2	0.099	<0.1	<0.1	11200	13200	1.6	102	<0.01	771	2.56	<0.1	<0.02	<0.1	7.5	<0.04	<0.5	13.5	<3
177	M	773	5550	13	*67.8*	0.8	<0.1	6.6	<0.1	<0.02	<2	<0.02	233	0.3	<0.1	1.8	21	<0.1	781	0.2	0.106	<0.1	<0.1	10400	12400	1.7	103	<0.01	731	0.32	<0.1	<0.02	<0.1	7.1	<0.04	<0.5	15.7	<3
178	M	810	5700	11	*70.1*	0.6	<0.1	12.7	<0.1	<0.02	<2	<0.02	636	<0.1	<0.1	1.9	24	<0.1	777	0.3	0.069	<0.1	<0.1	11100	13600	1.7	116	<0.01	830	1.46	<0.1	<0.02	<0.1	7.5	<0.04	<0.5	15.0	<3
179	M	687	3750	9	*65.6*	<0.5	<0.1	5.4	<0.1	<0.02	<2	<0.02	288	<0.1	<0.1	2.0	14	<0.1	714	0.2	0.042	<0.1	<0.1	9760	11800	1.5	144	<0.01	629	0.48	<0.1	<0.02	<0.1	6.8	<0.04	<0.5	12.6	<3
180	M	835	6400	13	*72.6*	<0.5	<0.1	12.2	<0.1	<0.02	<2	<0.02	1100	<0.1	<0.1	1.4	14	<0.1	911	0.3	0.115	<0.1	<0.1	12800	15400	2.0	158	<0.01	810	2.42	<0.1	<0.02	<0.1	8.8	<0.04	<0.5	16.5	<3
181	M	760	4700	11	*69.0*	2.0	<0.1	6.8	<0.1	<0.02	<2	<0.02	1480	<0.1	<0.1	1.3	15	<0.1	800	0.3	0.082	<0.1	<0.1	11400	13600	1.7	125	<0.01	768	3.20	<0.1	<0.02	<0.1	7.6	<0.04	<0.5	14.4	<3
200	M	735	3300	13	*72.9*	0.6	<0.1	6.5	<0.1	<0.02	<2	<0.02	1060	0.2	<0.1	1.9	17	<0.1	869	0.3	0.133	<0.1	<0.1	11200	14200	1.6	98	<0.01	995	2.29	<0.1	<0.02	<0.1	7.7	<0.04	<0.5	12.2	<3
312	M	841	7100	11	*70.0*	<0.5	<0.1	14.6	<0.1	<0.02	<2	<0.02	220	0.2	<0.1	1.8	15	<0.1	684	0.2	0.092	<0.1	<0.1	9330	12100	1.5	102	<0.01	824	0.31	<0.1	<0.02	<0.1	6.4	<0.04	<0.5	11.9	<3
313	M	823	5500	11	*73.3*	<0.5	<0.1	17.7	<0.1	<0.02	<2	<0.02	1340	0.1	<0.1	1.4	11	<0.1	889	0.2	0.112	<0.1	<0.1	12200	15800	2.1	101	<0.01	956	3.10	<0.1	<0.02	<0.1	8.5	<0.04	<0.5	14.5	<3
314	M	752	5000	10	*70.1*	0.5	<0.1	9.6	<0.1	<0.02	<2	<0.02	1020	0.7	<0.1	2.4	20	<0.1	720	0.3	0.052	<0.1	<0.1	10200	12400	1.7	139	<0.01	797	2.26	<0.1	<0.02	<0.1	7.0	<0.04	<0.5	15.4	<3
315	M	702	4250	9	*68.5*	<0.5	<0.1	7.0	<0.1	<0.02	<2	<0.02	1390	<0.1	<0.1	1.6	7	<0.1	717	0.2	0.100	<0.1	<0.1	9500	11900	1.3	64	<0.01	831	3.71	<0.1	<0.02	<0.1	6.2	<0.04	<0.5	10.9	<3
316	M	708	4300	10	*70.9*	<0.5	<0.1	6.7	<0.1	<0.02	<2	<0.02	1000	0.4	<0.1	1.7	11	<0.1	732	0.3	0.091	<0.1	<0.1	9960	12800	1.7	59	<0.01	653	2.04	<0.1	<0.02	<0.1	6.8	<0.04	<0.5	15.6	<3
340	M	606	2405	9	*72.2*	<0.5	<0.1	10.2	<0.1	<0.02	<2	<0.02	339	<0.1	<0.1	1.9	<5	<0.1	811	0.2	0.048	<0.1	<0.1	11300	13900	1.9	72	<0.01	605	0.58	<0.1	<0.02	<0.1	7.3	<0.04	<0.5	15.0	<3

Appendix D3. Metal concentrations (µg/g dry weight) in muscle (M), liver (L), and kidney (K) tissues of Arctic char from Roberts Outflow, August 2002.

Fish #	Tissue	Fork Length (mm)	Weight (g)	Age (yr)	*Moisture (%)*	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO_4	Potassium K	Selenium Se	Silicon SiO_2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
1	L	564	2391	8	*53.7*	<0.5	<0.1	4.5	<0.1	<0.02	3	0.14	77	0.2	0.2	25.7	254	<0.1	351	1.5	0.074	0.3	<0.1	9190	5400	5.5	129	0.52	1240	0.19	<0.1	<0.02	<0.1	4.4	<0.04	<0.5	54.6	<3
2	L	815	6753	11	*58.0*	<0.5	<0.1	6.8	<0.1	<0.02	3	0.20	76	0.5	0.1	63.1	365	<0.1	441	2.3	0.098	0.4	<0.1	11900	7050	9.5	149	1.35	1360	0.19	<0.1	<0.02	<0.1	5.3	<0.04	<0.5	78.3	<3
3	L	716	3830	10	*55.1*	<0.5	<0.1	9.9	<0.1	<0.02	4	0.13	67	0.1	0.1	14.7	254	<0.1	412	1.8	0.118	0.4	<0.1	11400	6210	8.9	182	0.33	1310	0.13	<0.1	<0.02	<0.1	5.1	<0.04	<0.5	60.1	<3
4	L	744	4028	10	*51.2*	<0.5	<0.1	5.4	<0.1	<0.02	3	0.08	74	0.2	0.1	13.4	284	<0.1	331	1.4	0.113	0.3	<0.1	8480	5110	7.3	163	0.23	1340	0.14	<0.1	<0.02	<0.1	3.9	<0.04	<0.5	48.0	<3
5	L	628	3006	8	*51.6*	<0.5	<0.1	5.4	<0.1	<0.02	<2	0.11	44	0.2	<0.1	13.8	161	<0.1	238	1.4	0.055	0.3	<0.1	6350	3800	5.8	114	0.25	885	0.11	<0.1	<0.02	<0.1	2.9	<0.04	<0.5	49.1	<3
6	L	707	3980	10	*61.6*	<0.5	<0.1	7.4	<0.1	<0.02	<2	0.19	87	0.1	0.2	31.9	610	<0.1	413	2.3	0.090	0.4	<0.1	11300	5790	8.9	150	0.56	1820	0.23	<0.1	<0.02	<0.1	5.1	<0.04	<0.5	80.5	<3
7	L	827	6910	11	*55.4*	<0.5	<0.1	9.8	<0.1	<0.02	<2	0.16	102	0.1	0.3	73.3	282	<0.1	366	1.8	0.177	0.4	<0.1	9930	5250	7.8	203	1.94	1250	0.27	<0.1	<0.02	<0.1	4.8	<0.04	<0.5	87.7	<3
8	L	596	2435	8	*58.8*	<0.5	<0.1	5.2	<0.1	<0.02	<2	0.07	71	0.4	0.2	54.1	312	<0.1	365	2.4	0.057	0.4	<0.1	10100	6070	9.1	123	0.86	1740	0.20	<0.1	<0.02	<0.1	4.7	<0.04	<0.5	85.7	<3
9	L	743	4953	12	*61.3*	<0.5	<0.1	6.0	<0.1	<0.02	<2	0.26	117	0.2	<0.1	10.5	269	<0.1	414	2.4	0.127	0.3	<0.1	11500	6860	8.0	189	0.21	2620	0.29	<0.1	<0.02	<0.1	5.5	<0.04	<0.5	63.3	<3
10	L	711	4616	12	*56.4*	<0.5	<0.1	7.5	<0.1	<0.02	<2	0.14	119	0.1	0.1	9.0	343	<0.1	384	2.0	0.072	0.4	<0.1	10400	5520	9.0	203	0.30	1110	0.26	<0.1	<0.02	<0.1	5.0	<0.04	<0.5	55.6	<3
11	L	690	3402	12	*57.9*	<0.5	<0.1	7.0	<0.1	<0.02	<2	0.25	79	0.3	0.2	38.2	572	<0.1	412	2.5	0.084	0.5	<0.1	10500	6080	10.7	156	0.76	1140	0.17	<0.1	<0.02	<0.1	5.0	<0.04	<0.5	83.8	<3
12	L	582	2820	8	*54.6*	<0.5	<0.1	8.2	<0.1	<0.02	<2	0.07	79	0.2	0.1	13.2	213	<0.1	271	1.3	0.071	0.3	<0.1	8200	4380	6.3	209	0.42	1290	0.22	<0.1	<0.02	<0.1	3.6	<0.04	<0.5	42.6	<3
13	L	653	3533	12	*49.4*	<0.5	<0.1	6.1	<0.1	<0.02	<2	0.19	59	<0.1	0.1	21.4	282	<0.1	231	2.4	0.039	0.5	<0.1	6060	4250	7.1	79	0.68	859	0.14	<0.1	<0.02	<0.1	3.9	<0.04	<0.5	54.4	<3
14	L	711	4919	10	*49.5*	<0.5	<0.1	5.7	<0.1	<0.02	<2	0.06	70	<0.1	0.1	14.8	244	<0.1	272	1.4	0.055	0.3	<0.1	7840	4290	5.2	151	0.47	1140	0.14	<0.1	<0.02	<0.1	3.4	<0.04	<0.5	40.8	<3
15	L	656	3144	8	*46.6*	1.1	<0.1	9.7	<0.1	<0.02	<2	0.17	106	0.2	0.2	64.2	378	<0.1	405	2.3	0.076	0.4	0.3	11400	5940	9.0	163	1.07	1640	0.26	<0.1	<0.02	<0.1	4.7	<0.04	<0.5	95.8	<3
16	L	621	3378	8	*52.3*	<0.5	<0.1	7.0	<0.1	<0.02	<2	0.08	70	0.1	0.1	22.5	163	<0.1	322	1.6	0.058	0.4	<0.1	8420	4730	6.2	125	0.49	1170	0.15	<0.1	<0.02	<0.1	3.8	<0.04	<0.5	59.5	<3
17	L	698	4077	11	*51.8*	1.4	<0.1	4.8	<0.1	<0.02	<2	0.11	75	0.3	0.2	12.1	243	<0.1	323	1.7	0.063	0.2	<0.1	8710	4560	5.5	196	0.36	1260	0.15	<0.1	<0.02	<0.1	4.1	<0.04	<0.5	47.1	<3
176	L	841	7200	12	*58.5*	<0.5	<0.1	5.2	<0.1	<0.02	<2	0.28	76	<0.1	0.3	22.0	443	<0.1	255	2.2	0.127	0.4	<0.1	7220	5190	5.9	79	0.63	1580	0.20	<0.1	<0.02	<0.1	4.7	<0.04	<0.5	66.4	<3
177	L	773	5550	13	*59.8*	<0.5	<0.1	6.5	<0.1	<0.02	<2	0.26	173	<0.1	0.2	27.3	834	<0.1	293	2.3	0.097	0.5	<0.1	8060	5770	8.3	95	0.97	1650	0.36	<0.1	<0.02	<0.1	4.9	<0.04	<0.5	76.9	<3
178	L	810	5700	11	*53.6*	<0.5	<0.1	2.5	<0.1	<0.02	<2	0.11	47	<0.1	0.1	41.4	401	<0.1	187	1.7	0.060	0.3	<0.1	5030	3700	6.0	70	0.99	1030	0.12	<0.1	<0.02	<0.1	3.1	<0.04	<0.5	56.8	<3
179	L	687	3750	9	*52.5*	<0.5	<0.1	4.1	<0.1	<0.02	<2	0.10	55	<0.1	0.1	46.1	213	<0.1	167	1.6	0.044	0.4	<0.1	4770	3880	5.2	56	1.07	1010	0.14	<0.1	<0.02	<0.1	3.1	<0.04	<0.5	52.7	<3
180	L	835	6400	13	*64.9*	<0.5	<0.1	6.7	<0.1	<0.02	<2	0.47	110	<0.1	0.1	18.9	1050	<0.1	334	2.8	0.130	0.5	<0.1	8750	6560	11.6	80	0.48	2210	0.38	<0.1	<0.02	<0.1	5.6	<0.04	<0.5	83.3	<3
181	L	760	4700	11	*60.5*	<0.5	<0.1	5.1	<0.1	<0.02	<2	0.24	80	<0.1	0.1	17.4	552	<0.1	246	1.8	0.088	0.4	<0.1	6590	5190	6.4	120	0.42	1830	0.19	<0.1	<0.02	<0.1	4.1	<0.04	<0.5	63.7	<3
200	L	735	3300	13	*72.0*	<0.5	<0.1	4.9	<0.1	<0.02	<2	0.41	191	<0.1	0.2	5.0	1260	<0.1	721	6.1	0.193	0.4	<0.1	18200	14700	4.0	75	0.09	1540	0.42	<0.1	<0.02	<0.1	11.0	<0.04	<0.5	80.3	<3
312	L	841	7100	11	*58.4*	<0.5	<0.1	5.3	<0.1	<0.02	<2	0.34	74	<0.1	0.3	48.6	409	<0.1	299	2.4	0.228	0.5	<0.1	7690	6140	6.7	74	1.34	1220	0.16	<0.1	<0.02	<0.1	4.9	<0.04	<0.5	89.6	<3
313	L	823	5500	11	*63.9*	<0.5	<0.1	6.7	<0.1	<0.02	<2	0.42	102	<0.1	0.5	33.6	1080	<0.1	462	3.4	0.223	0.5	<0.1	11300	8700	10.3	104	1.13	1570	0.19	<0.1	<0.02	<0.1	7.0	<0.04	<0.5	92.1	<3
314	L	752	5000	10	*46.5*	<0.5	<0.1	3.7	<0.1	<0.02	<2	0.12	48	<0.1	<0.1	21.1	195	<0.1	196	1.8	0.040	0.3	<0.1	5350	4120	3.6	75	0.71	765	0.10	<0.1	<0.02	<0.1	3.3	<0.04	<0.5	53.8	<3
315	L	702	4250	9	*72.2*	<0.5	<0.1	5.8	<0.1	<0.02	<2	0.81	189	<0.1	0.3	12.2	291	<0.1	736	7.0	0.158	0.4	<0.1	20900	16300	4.8	75	0.83	1520	0.29	<0.1	<0.02	<0.1	13.3	<0.04	<0.5	97.1	<3
316	L	708	4300	10	*58.0*	<0.5	<0.1	5.1	<0.1	<0.02	<2	0.36	67	<0.1	0.2	38.5	506	<0.1	270	1.9	0.111	0.4	<0.1	6720	5090	7.0	41	0.72	910	0.15	<0.1	<0.02	<0.1	4.4	<0.04	<0.5	90.7	<3
340	L	606	2405	9	*52.3*	<0.5	<0.1	7.7	<0.1	<0.02	<2	0.15	120	<0.1	0.2	45.1	364	<0.1	241	2.1	0.053	0.4	<0.1	6200	4540	5.0	82	1.11	676	0.28	<0.1	<0.02	<0.1	4.1	<0.04	<0.5	65.2	<3

Appendix D3. Metal concentrations (µg/g dry weight) in muscle (M), liver (L), and kidney (K) tissues of Arctic char from Roberts Outflow, August 2002.

Fish #	Tissue	Fork Length (mm)	Weight (g)	Age (yr)	*Moisture (%)*	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO_4	Potassium K	Selenium Se	Silicon SiO_2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
1	K	564	2391	8	*79.0*	<1	<0.2	3.3	<0.2	<0.04	493	1.40	249	<0.2	1.5	13.1	369	<0.2	571	2.0	0.195	<0.2	0.4	11800	12000	4.3	<20	0.10	5310	1.03	<0.2	<0.04	<0.2	<0.6	<0.08	<1	121	<6
2	K	815	6753	11	*78.4*	1.2	<0.1	3.0	<0.1	<0.02	35	0.70	317	<0.1	0.5	6.5	1100	<0.1	588	1.6	0.333	<0.1	0.2	12700	12600	8.0	<10	0.01	5040	1.39	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	214	<3
3	K	716	3830	10	*79.2*	4.1	<0.1	2.9	<0.1	<0.02	30	0.68	340	<0.1	0.4	8.8	501	<0.1	559	1.9	0.320	<0.1	0.1	11700	11100	6.7	<10	0.03	5830	1.38	<0.1	<0.02	<0.1	0.6	<0.04	<0.5	109	<3
4	K	744	4028	10	*79.3*	<0.5	<0.1	1.7	<0.1	<0.02	38	0.99	295	<0.1	0.7	10.0	583	<0.1	621	2.7	0.472	0.2	<0.1	13200	13100	6.8	<10	0.06	5340	1.00	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	111	<3
5	K	628	3006	8	*78.6*	<0.5	<0.1	2.8	<0.1	<0.02	30	1.13	241	<0.1	0.8	9.8	421	<0.1	588	1.9	0.275	0.1	0.7	12800	12200	4.7	<10	0.07	4970	0.89	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	122	<3
6	K	707	3980	10	*77.7*	0.8	<0.1	3.5	<0.1	<0.02	25	1.04	286	<0.1	0.4	6.6	990	<0.1	554	1.6	0.324	<0.1	0.2	11400	10600	6.7	<10	0.03	3950	1.17	<0.1	<0.02	2.6	0.5	<0.04	<0.5	172	<3
7	K	827	6910	11	*78.7*	1.0	<0.1	5.1	<0.1	<0.02	26	1.27	336	<0.1	0.8	8.3	595	<0.1	618	1.7	0.444	0.1	0.2	13100	12300	6.3	<10	0.03	4900	1.61	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	122	<3
8	K	596	2435	8	*79.8*	<0.5	<0.1	2.2	0.2	<0.02	25	0.38	739	<0.1	0.8	10.2	313	<0.1	624	2.5	0.256	0.1	0.1	13100	11900	4.6	<10	0.03	5390	2.66	<0.1	<0.02	<0.1	0.3	<0.04	<0.5	106	<3
9	K	743	4953	12	*81.1*	0.8	<0.1	3.5	<0.1	<0.02	992	1.15	410	<0.1	<0.1	7.6	621	<0.1	649	1.5	0.298	<0.1	0.2	13700	13700	6.9	<10	0.04	6770	1.52	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	114	<3
10	K	711	4616	12	*78.3*	1.4	<0.1	3.4	<0.1	<0.02	17	1.08	290	<0.1	0.3	8.6	711	<0.1	598	1.7	0.326	<0.1	0.2	12200	11700	6.1	<10	0.12	4450	1.23	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	168	<3
11	K	690	3402	12	*77.1*	1.3	<0.2	3.3	<0.2	<0.04	66	2.15	337	<0.2	1.7	10.2	1320	<0.2	572	2.2	0.414	<0.2	<0.2	11500	10900	9.1	<20	0.06	4820	1.65	<0.2	<0.04	15.9	<0.6	<0.08	<1	116	<6
12	K	582	2820	8	*78.3*	0.6	<0.1	2.4	<0.1	<0.02	45	0.77	293	<0.1	0.5	10.6	771	<0.1	551	1.8	0.325	<0.1	0.3	12000	10800	4.3	<10	0.09	4380	0.90	<0.1	<0.02	<0.1	<0.3	<0.04	<0.5	120	<3
13	K	653	3533	12	*78.9*	0.8	<0.1	2.7	<0.1	<0.02	50	0.80	334	<0.1	0.5	9.2	298	<0.1	671	1.9	0.257	<0.1	<0.1	14300	12800	5.2	<10	0.10	5790	1.12	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	144	<3
14	K	711	4919	10	*77.9*	1.4	<0.1	3.0	<0.1	<0.02	38	0.67	300	<0.1	0.2	8.2	348	<0.1	594	1.9	0.240	<0.1	<0.1	12600	11800	4.1	<10	0.04	5460	0.91	<0.1	<0.02	<0.1	0.5	<0.04	<0.5	113	<3
15	K	656	3144	8	*78.2*	<0.5	<0.1	2.5	<0.1	<0.02	36	0.94	327	<0.1	0.6	10.3	546	<0.1	565	1.8	0.208	<0.1	<0.1	12100	11200	5.5	<10	0.06	6040	1.26	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	129	<3
16	K	621	3378	8	*78.8*	<0.5	<0.1	3.9	<0.1	<0.02	22	1.03	358	<0.1	0.8	12.1	349	<0.1	569	2.4	0.194	<0.1	<0.1	12600	11200	6.0	<10	0.12	6750	1.08	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	161	<3
17	K	698	4077	11	*79.9*	2.8	<0.1	2.0	<0.1	<0.02	40	1.06	375	<0.1	0.6	8.4	472	<0.1	598	1.8	0.215	<0.1	<0.1	12700	11400	5.8	<10	<0.01	6800	1.25	<0.1	<0.02	<0.1	0.6	<0.04	<0.5	115	<3
176	K	841	7200	12	*76.1*	0.7	<0.1	2.7	<0.1	<0.02	23	1.55	272	<0.1	1.1	6.1	612	<0.1	474	1.3	0.283	<0.1	0.4	10800	10600	6.2	<10	<0.01	5690	1.14	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	97.1	<3
177	K	773	5550	13	*77.2*	1.1	<0.1	2.8	<0.1	<0.02	20	1.10	329	<0.1	0.9	6.5	1430	<0.1	532	1.7	0.304	<0.1	0.5	11600	11400	7.8	19	<0.01	5920	1.43	<0.1	<0.02	<0.1	0.7	<0.04	<0.5	108	<3
178	K	810	5700	11	*77.8*	1.2	<0.1	2.8	<0.1	<0.02	18	1.22	336	<0.1	1.3	8.7	641	<0.1	558	2.2	0.373	<0.1	0.2	12300	11300	7.7	18	<0.01	6310	1.69	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	105	<3
179	K	687	3750	9	*76.8*	1.3	<0.1	2.3	<0.1	<0.02	26	1.13	351	<0.1	0.4	10.1	447	<0.1	500	2.5	0.231	<0.1	<0.1	11200	9870	3.8	14	<0.01	6200	1.26	<0.1	<0.02	<0.1	0.5	<0.04	<0.5	100	<3
180	K	835	6400	13	*78.0*	5.4	<0.1	4.2	<0.1	<0.02	29	1.48	355	<0.1	0.5	8.8	1800	<0.1	591	2.6	0.504	<0.1	0.3	12000	10700	8.5	27	<0.01	6490	2.28	<0.1	<0.02	<0.1	0.5	<0.04	<0.5	108	<3
181	K	760	4700	11	*78.0*	<0.5	<0.1	2.3	<0.1	<0.02	22	0.98	357	<0.1	0.6	6.2	1160	<0.1	613	1.7	0.359	<0.1	<0.1	13100	13400	8.0	29	<0.01	5740	1.42	<0.1	<0.02	<0.1	0.3	<0.04	<0.5	115	<3
200	K	735	3300	13	*79.8*	0.9	<0.1	4.2	<0.1	<0.02	16	2.12	444	<0.1	<0.1	6.3	2230	<0.1	675	1.6	0.610	0.2	0.4	13800	14200	7.7	<10	0.11	5440	2.74	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	137	<3
312	K	841	7100	11	*79.3*	1.0	<0.1	3.6	<0.1	<0.02	49	2.75	272	<0.1	1.3	8.3	532	<0.1	609	2.0	0.436	<0.1	0.7	13200	14300	5.9	10	<0.01	5110	1.19	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	143	<3
313	K	823	5500	11	*80.5*	4.7	<0.1	4.0	<0.1	<0.02	42	1.24	388	<0.1	0.5	7.7	796	<0.1	641	2.0	0.456	<0.1	0.2	13900	13800	10.6	26	<0.01	6460	2.25	<0.1	<0.02	<0.1	0.7	<0.04	<0.5	150	<3
314	K	752	5000	10	*80.1*	2.0	<0.1	2.8	<0.1	<0.02	53	0.86	347	<0.1	0.3	9.1	486	<0.1	585	2.6	0.254	0.2	0.1	12900	13500	6.7	17	0.10	6330	1.40	<0.1	<0.02	<0.1	0.5	<0.04	<0.5	129	<3
315	K	702	4250	9	*79.5*	<1	<0.2	2.7	<0.2	<0.04	54	2.61	416	<0.2	<0.2	6.9	312	<0.2	603	1.5	0.384	<0.2	<0.2	13500	13600	4.0	<20	0.08	6340	1.45	<0.2	<0.04	<0.2	<0.6	<0.08	<1	116	<6
316	K	708	4300	10	*80.2*	2.0	<0.1	3.0	<0.1	<0.02	817	2.46	409	<0.1	0.9	9.5	1530	<0.1	613	2.2	0.348	<0.1	0.3	13300	13400	8.6	19	<0.01	6090	1.69	<0.1	<0.02	<0.1	0.5	<0.04	<0.5	110	<3
340	K	606	2405	9	*78.5*	<0.5	<0.1	4.0	<0.1	<0.02	34	0.99	397	<0.1	1.0	14.2	510	<0.1	589	2.3	0.231	0.2	0.3	12800	12000	6.5	<10	0.16	4830	1.94	<0.1	<0.02	<0.1	0.4	<0.04	<0.5	160	<3

Appendix D4. Concentrations of arsenic, lead and mercury (µg/g **wet weight**) in lake trout tissues from Roberts Lake and Arctic char tissues from Roberts Outflow, August 2002.

Species	Fish #	Fork Length (mm)	Weight (g)	Age (yr)	Arsenic CFIA[a] = 3.5 µg/g			Lead CFIA[a] = 0.5 µg/g			Mercury CFIA[a] = 0.5 µg/g		
					Muscle	Liver	Kidney	Muscle	Liver	Kidney	Muscle	Liver	Kidney
Lake trout	18	814	4211	33	7.68	0.72	0.56	0.011	0.010	0.010	0.320	0.569	0.386
	24	741	3738	35	0.22	0.11	0.08	0.009	0.009	0.017	0.311	0.624	0.837
	25	813	5429	33	6.47	0.46	0.20	0.013	0.009	0.016	0.219	0.318	0.491
	42	490	1235	25	0.09	0.04	0.03	0.011	0.011	0.025	0.178	0.302	0.370
	43	408	758	15	0.06	0.21	0.08	0.011	0.012	0.030	0.085	0.081	0.174
	49	821	5838	37	10.73	0.65	0.29	0.011	0.013	0.010	0.156	0.299	0.599
	50	767	5157	42	0.60	0.21	0.10	0.010	0.012	0.010	0.279	0.962	1.366
	51	728	3459	30	0.16	0.08	0.02	0.010	0.010	0.017	0.402	0.964	0.884
	52	715	3272	27	0.08	0.11	0.05	0.010	0.011	0.017	0.267	0.600	0.634
	53	544	1993	21	0.78	0.49	0.09	0.011	0.011	0.027	0.049	0.066	0.147
	54	571	2059	20	1.39	0.32	0.10	0.011	0.011	0.017	0.050	0.065	0.158
	55	523	2349	21	0.06	0.03	0.02	0.011	0.017	0.018	0.312	0.437	0.679
	56	599	2496	20	0.04	0.01	0.02	0.010	0.012	0.018	0.274	0.432	0.617
	69	653	2778	27	7.00	0.70	0.52	0.012	0.010	0.009	0.195	0.207	0.452
	70	789	5209	31	0.41	0.09	0.06	0.009	0.011	0.010	0.442	0.915	1.275
	71	686	3611	33	0.12	0.14	0.06	0.010	0.014	0.010	0.226	0.458	0.702
	72	420	818	20	0.09	0.18	0.09	0.011	0.010	0.027	0.070	0.162	0.261
	110	707	3600	32	0.06	0.04	0.03	0.010	0.010	0.008	0.456	0.584	1.204
	111	546	1750	18	0.07	0.11	0.02	0.011	0.011	0.018	0.202	0.258	0.272
	112	562	1850	29	0.65	0.59	0.17	0.012	0.012	0.008	0.093	0.102	0.318
	126	913	10000	44	0.30	0.04	0.04	0.012	0.011	0.010	0.554	0.877	1.796
	127	760	5050	34	18.31	1.55	0.38	0.011	0.013	0.009	0.214	0.400	0.504
	140	475	1250	19	0.21	0.07	0.02	0.011	0.012	0.016	0.069	0.084	0.104
	141	400	750	14	0.14	0.16	0.03	0.010	0.014	0.029	0.062	0.101	0.139
	150	820	6250	40	11.95	1.50	0.50	0.011	0.011	0.010	0.234	0.287	0.921
	151	739	4450	39	0.32	0.12	0.06	0.011	0.012	0.011	0.209	0.483	0.723
	152	585	2250	26	1.60	0.60	0.18	0.012	0.015	0.010	0.086	0.084	0.374
	153	505	1450	28	2.05	0.67	0.19	0.013	0.019	0.019	0.034	0.023	0.078
	154	384	750	14	0.07	0.23	0.03	0.011	0.023	0.032	0.082	0.092	0.176
	883	400	717	18	0.07	0.26	0.12	0.012	0.013	0.042	0.076	0.127	0.284
Arctic char	1	564	2391	8	1.83	2.08	0.69	0.015	0.023	0.021	0.020	0.034	0.041
	2	815	6753	11	2.77	2.86	0.65	0.014	0.021	0.011	0.028	0.041	0.072
	3	716	3830	10	2.89	4.45	0.60	0.015	0.022	0.010	0.028	0.053	0.067
	4	744	4028	10	1.08	2.64	0.35	0.014	0.024	0.010	0.030	0.055	0.098
	5	628	3006	8	3.07	2.61	0.60	0.014	0.024	0.011	0.021	0.027	0.059
	6	707	3980	10	2.75	2.84	0.78	0.013	0.019	0.011	0.020	0.035	0.072
	7	827	6910	11	5.24	4.37	1.09	0.016	0.022	0.011	0.028	0.079	0.095
	8	596	2435	8	1.81	2.14	0.44	0.016	0.021	0.010	0.020	0.023	0.052
	9	743	4953	12	1.98	2.32	0.66	0.015	0.019	0.009	0.025	0.049	0.056
	10	711	4616	12	2.41	3.27	0.74	0.017	0.022	0.011	0.018	0.031	0.071
	11	690	3402	12	1.88	2.95	0.76	0.014	0.021	0.023	0.025	0.035	0.095
	12	582	2820	8	1.27	3.72	0.52	0.014	0.023	0.011	0.022	0.032	0.071
	13	653	3533	12	1.43	3.09	0.57	0.016	0.025	0.011	0.015	0.020	0.054
	14	711	4919	10	2.84	2.88	0.66	0.016	0.025	0.011	0.019	0.028	0.053
	15	656	3144	8	1.76	5.18	0.55	0.015	0.027	0.011	0.016	0.041	0.045
	16	621	3378	8	3.20	3.34	0.83	0.015	0.024	0.011	0.022	0.028	0.041
	17	698	4077	11	1.18	2.31	0.40	0.015	0.024	0.010	0.017	0.030	0.043
	176	841	7200	12	2.64	2.16	0.65	0.016	0.021	0.012	0.031	0.053	0.068
	177	773	5550	13	2.13	2.61	0.64	0.016	0.020	0.011	0.034	0.039	0.069
	178	810	5700	11	3.80	1.16	0.62	0.015	0.023	0.011	0.021	0.028	0.083
	179	687	3750	9	1.86	1.95	0.53	0.017	0.024	0.012	0.014	0.021	0.054
	180	835	6400	13	3.34	2.35	0.92	0.014	0.018	0.011	0.032	0.046	0.111
	181	760	4700	11	2.11	2.01	0.51	0.016	0.020	0.011	0.025	0.035	0.079
	200	735	3300	13	1.76	1.37	0.85	0.014	0.014	0.010	0.036	0.054	0.123
	312	841	7100	11	4.38	2.20	0.75	0.015	0.021	0.010	0.028	0.095	0.090
	313	823	5500	11	4.73	2.42	0.78	0.013	0.018	0.010	0.030	0.081	0.089
	314	752	5000	10	2.87	1.98	0.56	0.015	0.027	0.010	0.016	0.021	0.051
	315	702	4250	9	2.21	1.61	0.55	0.016	0.014	0.021	0.032	0.044	0.079
	316	708	4300	10	1.95	2.14	0.59	0.015	0.021	0.010	0.026	0.047	0.069
	340	606	2405	9	2.84	3.67	0.86	0.014	0.024	0.011	0.013	0.025	0.050

[a] Canadian Food Inspection Agency's guidelines

shaded values exceed CFIA's guidelines