
DORIS NORTH PROJECT AQUATIC STUDIES 2004



**DORIS NORTH PROJECT
AQUATIC STUDIES
2004**

- FINAL REPORT -

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Cover Photo: Boulder garden and upper fish fence on Roberts Outflow, 2004.

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EXECUTIVE SUMMARY

Miramar Hope Bay Limited (MHBL) proposes to construct and operate a new underground gold mine (“Doris North Project”) in the West Kitikmeot Region of Nunavut. The project is located 685 km northeast of Yellowknife and 160 km southwest of Cambridge Bay. The mine is on Inuit-owned land, approximately 5 km south of the Arctic Ocean.

The objective of the 2004 aquatic studies program was to address data gaps from the Final Environmental Impact Statement (EIS). The issues addressed in the 2004 field program included the use of the Roberts Lake system by Arctic char; fish use of near-shore areas in Tail and Roberts lakes; water quality in selected lakes and streams in the study area; seasonal monitoring of discharge in Doris, Roberts and Little Roberts outflows; and lake level monitoring in Doris, Tail, and Roberts lakes.

Hydrology

Lake water level and stream discharge monitoring in 2004 showed that the bulk of runoff was due to snowmelt. Doris, Tail and Roberts Lake water surface elevations and Doris, Tail, Roberts and Little Roberts outflow discharges were monitored from May to September. Streams began to flow in the first half of June and peak stream discharges were observed between 28 June and 4 July. No significant secondary peaks caused by summer or autumn rainfall were observed. Measured water yields were approximately 42 mm for the Tail Lake watershed, 62 mm for the Doris and Roberts Lake watersheds, and 64 mm for the Little Roberts Lake watershed.

Snow course surveys were undertaken in May 2004 to measure the snowpack available to contribute to spring runoff. Twenty-two survey plots on seven terrain types were measured and the mean snow water equivalent depth was 55 mm.

Rainfall measurements at the Doris North meteorological station indicated that only 7.4 mm of rain fell in 2004 through 9 September. This does not include trace rainfall events that may not have been recorded.

Temperature, relative humidity and solar radiation data recorded at the Doris North meteorological station were used to estimate lake evaporation for the Doris and Tail Lake watersheds. The estimated values for 2004 were 267 mm for Doris Lake and 260 mm for Tail Lake.

The annual water balance for the Doris and Tail Lake watersheds indicates that 2004 was an extremely dry year. Snow accumulation and rainfall were far below

normal, as was water yield. The water balance indicates that it is likely that groundwater was released from storage in 2004.

Physical Limnology and Water Quality

The lakes sampled in 2004 were generally isothermic and uniformly mixed during the open-water season. Roberts Lake was the only lake that exhibited any thermal stratification. In all sampling locations and throughout the open-water season, dissolved oxygen concentrations met the CCME guideline for the protection of aquatic life. However, in all waterbodies during the July sampling event, dissolved oxygen concentrations were below the guideline for supporting early life stages of fish at water depths greater than 1.0 to 2.0 m.

Under-ice sampling was conducted in Doris Lake, Tail Lake, and Roberts Lake during June. The profiles in Tail Lake and Doris Lake showed winter stratification patterns and dissolved oxygen concentrations fell below the guidelines for early life stages of fish (at about 4.5 m water depth) and the protection of aquatic life (at about 6.0 m water depth).

At various times during the open-water season, total aluminum concentrations exceeded CCME guidelines in Roberts Lake, Tail Lake, and Little Roberts Lake. Because the dissolved samples were not above guideline, the high total aluminum concentrations were most likely due to the presence of suspended sediment in the sample. In Little Roberts Lake, the total iron concentration was above CCME guideline in August and pH was below CCME guideline in September. The elevated iron result was likely caused by wind-induced increases in suspended sediment in the sample. The cause of the acidic pH result is unknown.

During under-ice sampling in June, there were elevated concentrations of total and dissolved lead in Doris Lake (top) and Tail Lake (top), and elevated concentrations of dissolved lead in Roberts Lake (mid-column). In addition, the cadmium concentration in Doris Lake (top) was above guideline during the June sampling. All of these results are suspect because of possible contamination from sampling equipment and should be interpreted with caution.

In all of the streams and throughout the sampling season, dissolved oxygen concentrations met the CCME guideline and were therefore suitable for the protection of aquatic life. On occasion, however, the dissolved oxygen guideline for early life stages of fish was not met. Also, at various times during the open-water season, aluminum concentrations exceeded the CCME guideline in Roberts Outflow and Little Roberts Outflow. This was most likely due to the presence of suspended sediment in the samples.

Fish Communities

In total, 570 fish representing 10 species were captured in the Doris North Project area during fisheries surveys conducted in 2004. Fish sampling was conducted in two lakes, 10 streams, and in the marine environment of Roberts Bay. The most common fish species captured was Arctic char (47.2%), followed by lake trout (37.5%) and ninespine stickleback (6.8%).

Lake Communities

Small fish sampling was conducted in Roberts and Tail lakes to assess near-shore habitat use. Ninespine stickleback were directly captured in Tail Lake for the first time while least cisco, juvenile arctic char, and juvenile lake trout were captured in Roberts Lake. Catch-per-unit effort for all of these species was very low, despite using sampling methods that target small fish.

To enable comparisons following fish passage enhancement in the Roberts Outflow boulder garden, data on large fish population structure were collected from Roberts Lake. Lake trout, lake whitefish, and broad whitefish were captured with gill nets and angling gear. Lake trout and lake whitefish dominated the catch, and catch-per-unit effort for both of these species was considerably higher than for any of the small fish species.

Stream Communities

Fish sampling was conducted in 10 streams; these included Roberts, Little Roberts, and Pelvic outflows, and inflows to Roberts Lake (n=7). In total, 466 fish representing of five species were captured. Fish were captured in Little Roberts Outflow, Roberts Outflow and two tributaries to Roberts Lake.

Arctic char was the dominant species in Roberts Outflow and the tributaries to Roberts Lake. Ninespine stickleback was the dominant fish species captured in Little Roberts Outflow. Other species captured in streams included lake trout and cisco. One Arctic flounder was captured in Little Roberts Outflow near Roberts Bay.

Arctic Char in Roberts Lake System

Two fish fences were installed above and below the boulder garden located in Roberts Outflow between 8 August and 8 September. These fish fences were installed to determine the number of Arctic char migrating from the ocean to Roberts Lake. Fish were also captured using backpack electrofishing and beach seining. In total, 403 fish representing four species were caught in Roberts Outflow. Arctic char was the predominant species in the overall catch (59%), followed by lake trout (37%).

The number of Arctic char entering the trap on a daily basis varied greatly. The greatest number of fish that passed through the lower trap in a given day was 18 fish. Of the fish that were captured in Roberts Outflow, recaptures from previous years accounted for 25.4% of the Arctic char catch and 15.9% of the lake trout catch. The open-water period during 2004 was a low flow year, which made migration through the boulder garden difficult for large fish. Approximately 78% of the Arctic char population and 48% of the lake trout population were stranded within the boulder garden section below Roberts Lake, and most likely perished. This represents a considerable loss of fish numbers, biomass, and future reproductive potential of fish from the Roberts Lake system.

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1.0 INTRODUCTION

1.1 GENERAL

Miramar Hope Bay Limited (MHBL) proposes to construct and operate a new underground gold mine (“Doris North Project”) in the West Kitikmeot Region of Nunavut. The project is located 685 km northeast of Yellowknife and 160 km southwest of Cambridge Bay. The mine is on Inuit owned land, approximately 5 km south of the Arctic Ocean. The nearest communities are Umingmaktok, located 65 km to the west and Bathurst Inlet located 110 km to the southwest.

Environmental baseline studies within the Doris North zone were carried out in 1995 (Klohn Crippen 1995), 1996 (Rescan 1997), 1997 (Rescan 1998), 1998 (Rescan 1999), and 2000 (Rescan 2001). All data collected up to 2000 were summarized in a data compilation report (RL&L/Golder 2002). Additional studies were conducted in 2002 and 2003. In 2002, the main focus of the aquatic studies was to investigate fish populations in Roberts Lake and in the near-shore areas of Roberts Bay (RL&L/Golder 2003a). The 2003 field season focused on monitoring of fish use of the Roberts Lake system by Arctic char; assessing fish use of near-shore habitat in Doris, Roberts and Little Roberts lakes and Roberts Bay; bathymetry and water quality in selected lakes; habitat mapping in Roberts Lake; and seasonal monitoring of discharge and water temperature in selected streams (RL&L/Golder 2003b).

In 2004, Miramar Hope Bay Limited retained Golder Associates Ltd. to expand the baseline data collected during the previous studies and to address potential issues related to changes in the design of the Doris North Project. The specific objectives of the 2004 field program included:

- continued monitoring of use of the Roberts Lake system by Arctic char;
- assessing small fish use of near-shore habitat in Tail and Roberts lakes, and Roberts Bay;
- large fish sampling in Roberts Lake;
- sampling of water quality in selected lakes and streams (Roberts, Little Roberts, Doris, and Tail lakes and Little Roberts, Doris, and Tail outflows and Roberts Bay);
- snowcourse surveys in the Doris Lake watershed;
- meteorological monitoring of rainfall and other parameters to support lake evaporation estimates in the Doris Lake watershed; and,
- seasonal monitoring of water surface elevations on Doris, Tail and Roberts lakes and discharge in Doris, Tail, Roberts and Little Roberts outflows.

The field program was conducted between 4 May and 22 September 2004. The results are summarized for each study component in the following sections.

1.2 SAMPLING PROGRAM IN 2004

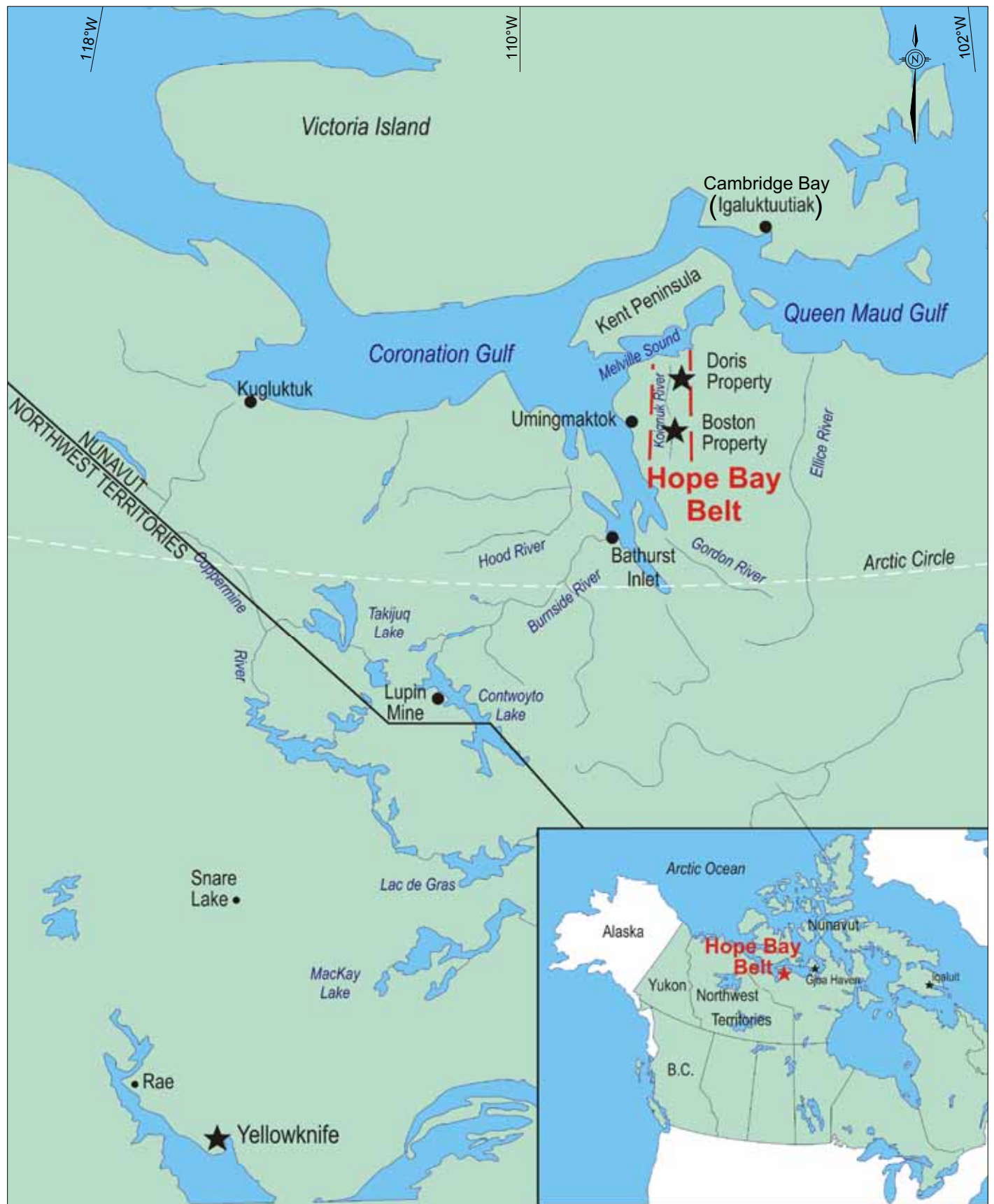
Figure 1.1 provides an overview of the Doris North Project study area. Lakes that were sampled as part of the baseline studies within the project area in 2004 included Roberts, Little Roberts, Doris, and Tail lakes (Figure 1.2). Also sampled were Roberts, Little Roberts, Doris, and Tail outflows, as well as several small tributaries to Roberts Lake. The marine environment of Roberts Bay was sampled near the mouth of Little Roberts Outflow as the main receiving waterbody downstream of the proposed mining development. Data collection sites and sampling methods used in 2004 are summarized in Table 1.1.

Table 1.1 Doris North Project aquatic sampling program, 2004.

Waterbody	Discharge/ Water Level	Water Quality	Fish Populations					
			Fish Fence	Fyke Net	Gill Net	Electro-fish	Minnow Trap	Beach Seine
Doris Lake	√	√						
Tail Lake	√	√		√	√		√	√
Roberts Lake	√	√		√	√	√	√	√
Little Roberts Lake		√						
Doris Outflow	√	√						
Tail Outflow	√	√						
Roberts Outflow	√	√	√			√		√
Roberts Inflows						√	√	
Little Roberts Outflow	√	√				√		
Pelvic Outflow						√		
Roberts Bay		√		√				√

1.3 OVERVIEW OF REPORT

To facilitate subsequent integration of the 2004 data with the previous data collected, the format and organization of the present report follows closely the outline used in the previous reports (RL&L/Golder 2002, 2003a and 2003b). 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: stream discharge, water quality, fish communities and fish habitat. All data and analytical results are provided as appendices at the end of the report.



100 0 100
SCALE KILOMETRES

REFERENCE

BASE MAP PROVIDED BY RESCAN,
FEBRUARY 17, 1998



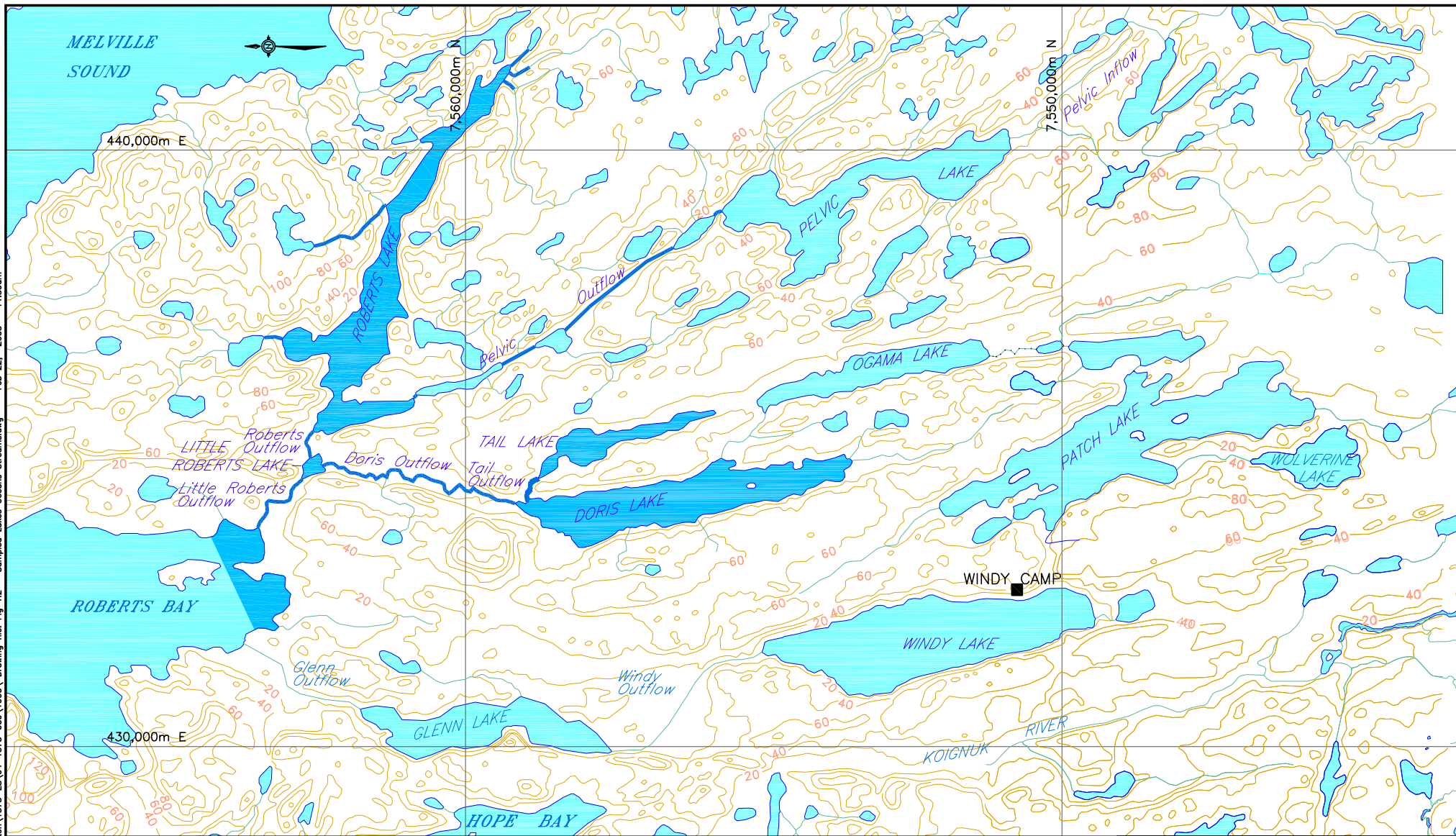
TITLE

HOPE BAY BELT PROJECT LOCATION MAP



PROJECT 03-1370-007.3000			FILE No.	Project Location
DESIGN	JP	12/07/02	SCALE	1:4000000
CADD	PSR	18/11/03	REV.	0
CHECK	AL		FIGURE: 1.1	
REVIEW				

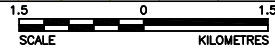
R:\CAD\2004\1370-Edmonton\1373-ES\04-1373-009\1000\ Drawing file: Fig. 1.2 - Sampled Lakes Oceans Streams.dwg Feb 22, 2005 - 11:39am



LEGEND

Sampled Lakes or Ocean

Sampled Stream



NOTE : CONTOUR INTERVAL 20 m

REFERENCE
BASE MAP PROVIDED BY RESCAN,
22 JANUARY 2001

WATERBODIES SAMPLED IN THE DORIS NORTH PROJECT AREA, 2004

PROJECT 04-1373-009.1000				FILE No. Sample Ocn Lk Strm	
DESIGN	AS	25/10/04	SCALE	AS SHOWN	REV. 0
CADD	SG	25/10/04			
CHECK	AS	25/11/04			
REVIEW					

Golder Associates
Edmonton, Alberta

FIGURE: 1.2

2.0 HYDROLOGY

2.1 METHODS

2.1.1 Hydrometry

Hydrographs of Doris Lake and Outflow, Tail Lake and Outflow, Roberts Lake and Outflow and Little Roberts Lake Outflow at the Doris North project were derived using the following methods:

- At each hydrometric station, a KPSI 730-series solid-state pressure transducer and Optimum Instruments DD-320 data logger were installed. Each data logger was programmed to record water pressure measurements on a 15-minute interval. Each station was referenced to an elevation benchmark.
- Transducers at all stations but Tail Lake outflow (H76) were installed under ice conditions in the spring of 2004. Dry (i.e., frozen to the lake bed) holes were drilled through the ice, the transducer was placed on the lakebed or streambed, and the hole was packed with snow. All of the stations installed in this fashion provided reliable data as soon as melting ice allowed a direct connection to the main waterbody.
- During the first and subsequent site visits, the water surface elevations were surveyed from the permanent benchmark, and the pressure transducer readings were recorded.
- During the first and subsequent visits to stations with flowing water, stream discharge measurements were performed according to Terzl et al. (1994). The data loggers at each station were downloaded periodically to ensure that they were operating properly.
- During the last site visit of 2004, the pressure transducer and data logger were removed from the flowing water stations to prevent ice damage over the winter. During the last site visit of 2004, the pressure transducers at Doris Lake (H74) and Tail Lake (H75) were replaced with new transducers. These had 60 m cables that allowed them to be placed in approximately 5 m depth of water, to allow them to record measurements over the winter. Thermistors were also installed at these stations to provide water temperature readings over the course of the year.
- When all data were available, for flowing water stations, the record of water surface elevation versus discharge was used to derive a stage-discharge rating curve for each station. Where 2003 data were available, these were also used to develop the rating curve. This rating curve was then applied to the continuous record of water surface elevations, as

measured by the pressure transducer and recorded by the data logger at each station, to derive a continuous record of discharges.

2.1.2 Snow Course Surveys

Snow course surveys were undertaken on 5 and 6 May 2004, using the following method:

Plot Selection

Plot locations within the Doris Lake watershed were selected on the basis of terrain type. These included:

- Open Lake (flat areas on lakes);
- Exposed Lowland (flat areas at the top of slopes);
- Sheltered Lowland (flat areas at the toe of slopes); and
- North, East, South and West Aspects (slopes facing these directions).

The purpose of this was to determine if significant differences existed between terrain types.

Snow Depth Measurement

At each plot, 30 depth measurements were made at randomly selected locations on a large circle. These depth measurements were taken by inserting a metal metre stick into the snowpack and reading the snowline mark.

Snow Density Measurement

Three density measurements were recorded at each plot, using an Atmospheric Environment Service (AES) snow density sampler. The AES sampler was inserted carefully into the snowpack. The snow depth was read on the tube, when the corer reached the soil surface. The corer was then inserted/twisted more deeply into the ground to ensure that a plug of soil was extracted with the sampler to prevent granular snow from falling out. After extracting the sampler and carefully removing the soil plug, the sampler weight was measured with and without the snow core, to measure the weight of snow and allow a snow water equivalent to be calculated.

2.1.3 Rainfall

The Doris North meteorological station is located near the Doris Lake hydrometric station and has sensors to measure the following parameters:

- Air temperature;

- Relative humidity;
- Vapor pressure;
- Global solar radiation;
- Wind speed and direction; and
- Rainfall.

Rainfall at this station was recorded using a tipping bucket rain gauge and the rainfall record was used to derive total daily and monthly rainfall during the summer months.

2.1.4 Lake Evaporation

The program WREVAP (Morton et al. 1985) was used to estimate the lake evaporation from Doris and Tail lakes. The WREVAP model requires accurate temperature, humidity and solar radiation data from a station with surroundings similar to the area of interest. These data were available from the Doris North meteorological station, described in Section 2.1.3. The program is not recommended for use near “sharp environmental discontinuities, such as a high-latitude coastline... because of advection of heat and water vapour in the lower layers of the atmosphere.” However, the program documentation indicates “that the effects of such advectons can decrease to near zero with [in] 300 m, but this finding may not be generally applicable.” Doris Lake is approximately 4 km from the Roberts Bay coastline at its closest point, so it is assumed that the WREVAP model is applicable. Lake evaporation was calculated using the CRLE (Complementary Relationship Lake Evaporation) model component.

2.2 HYDROMETRY

2.2.1 Doris Lake and Doris Lake Outflow

Factsheets describing the locations of the hydrometric site and equipment installed at Doris Lake (Station H74) and Doris Lake outflow (Station H71) are provided in Appendix A. The appendix also contains stage-discharge data; the derived stage-discharge rating curve based on 2003 and 2004 data; tabulated mean daily discharge and water level data; and manual discharge measurement data and calculation sheets.

The Doris Lake hydrometric station was visited 10 times during the 2004 field program, and a continuous hydrograph was derived for the period 12 June to 10 September. The Doris Lake outflow hydrometric station was visited 12 times during the 2004 field program, and a continuous hydrograph was derived for the period 12 June to 11 September. Details of each site visit are provided in Table 2.1 and the hydrographs from the two stations are presented in Figure 2.1.

Table 2.1 Site visits to Doris Lake and Doris Lake Outflow hydrometric stations, 2004.

Date	Activities	Lake	Water Level (geodetic)	Outflow	Discharge
7 May	Installed transducer at frozen hole at Doris Lake.	✓	n/a		n/a
5 June	Checked transducer at Doris Lake; ice affected.	✓	n/a		n/a
6 June	Checked transducer at Doris Lake; ice affected.	✓	n/a		n/a
7 June	Checked transducer at Doris Lake; ice affected.	✓	n/a		n/a
8 June	Checked transducer at Doris Lake; ice affected. Installed transducer in frozen hole on Doris Lake outflow; observed ice conditions and zero flow.	✓	n/a	✓	0.000 m ³ /s
9 June	Checked transducer at Doris Lake; ice affected. Observed zero flow at Doris Lake outflow.	✓	n/a	✓	0.000 m ³ /s
19 June	Surveyed water level and measured discharge at Doris Lake outflow.			✓	1.258 m ³ /s
23 June	Checked transducer at Doris Lake; ice on lake but free water conditions.	✓	21.786 m		n/a
2 July	Surveyed water level and measured discharge at Doris Lake outflow.			✓	1.383 m ³ /s
3 July	Surveyed water level and measured discharge at Doris Lake outflow.			✓	1.430 m ³ /s
4 July	Surveyed water level and measured discharge at Doris Lake outflow.			✓	1.426 m ³ /s
5 July	Surveyed water level and measured discharge at Doris Lake outflow.			✓	1.321 m ³ /s
6 July	Surveyed water level and measured discharge at Doris Lake outflow.			✓	1.304 m ³ /s
7 July	Surveyed water level (no discharge measurement) at Doris Lake outflow.			✓	n/a
16 July	Surveyed water level and measured discharge at Doris Lake outflow.			✓	1.046 m ³ /s
18 July	Checked transducer at Doris Lake.	✓	21.652 m		n/a
20 July	Checked transducer at Doris Lake.	✓	21.642 m	✓	0.814 m ³ /s
10 September	Replaced transducer at Doris Lake with longer cable in deeper water for overwintering. Installed permanent benchmark in bedrock.	✓	21.394 m		n/a
11 September	Surveyed water level and measured discharge at Doris Lake outflow. Removed transducer for overwintering. Installed permanent benchmark in bedrock.			✓	0.180 m ³ /s

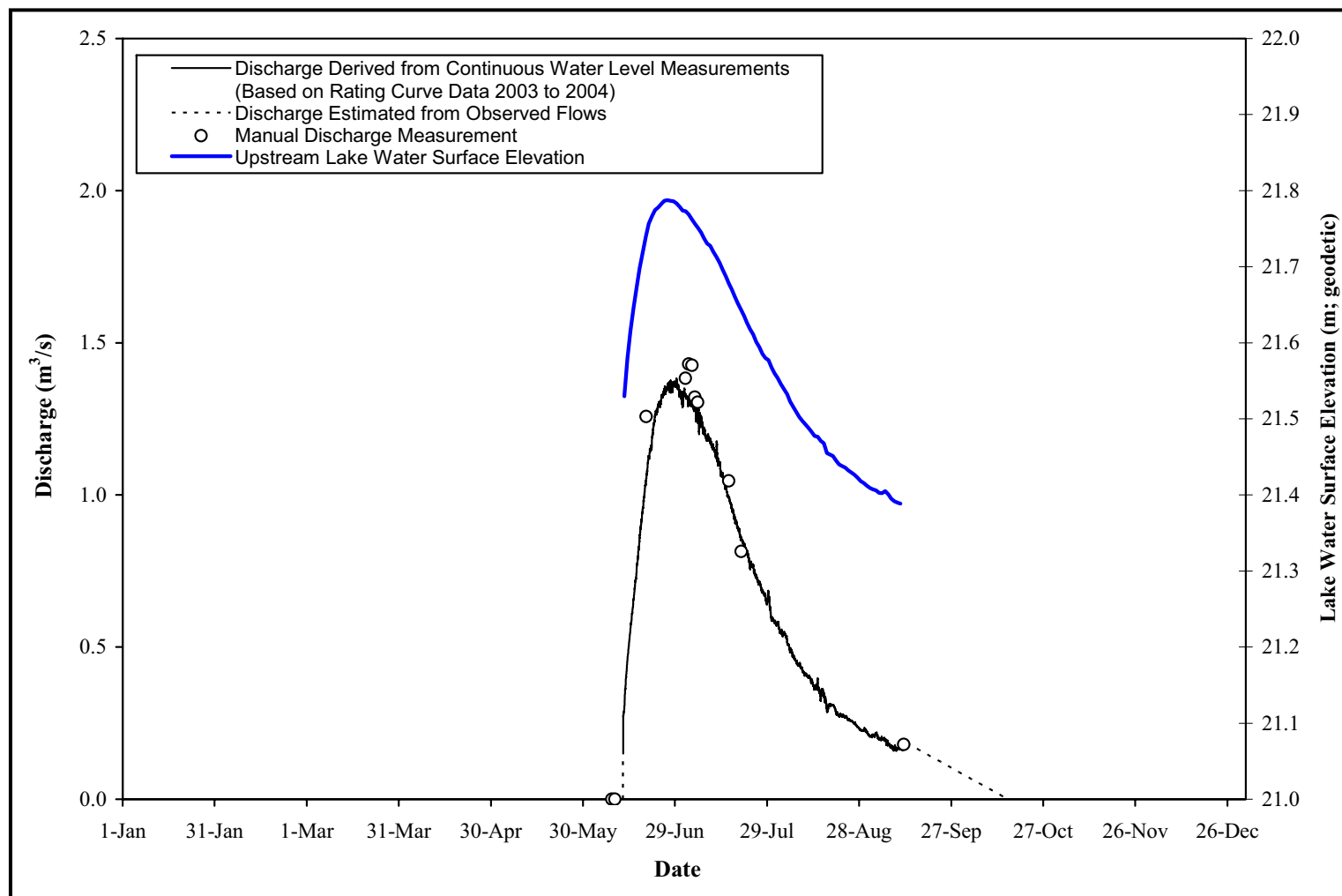


Figure 2.1 Hydrographs for Doris Lake and Doris Lake Outflow, 2004.

2.2.2 Tail Lake and Tail Lake Outflow

Factsheets describing the locations of the hydrometric site and equipment installed at Tail Lake (Station H75) and Tail Lake outflow (Station H76) are provided in Appendix A. The appendix also contains stage-discharge data; the derived stage-discharge rating curve based on 2004 data; tabulated mean daily discharge and water level data; and manual discharge measurement data and calculation sheets.

The Tail Lake hydrometric station was visited 10 times during the 2004 field program, and a continuous hydrograph was derived for the period 15 June to 10 September. The Tail Lake outflow hydrometric station was visited 11 times during the 2004 field program, and a continuous hydrograph was derived for the period 19 June to 11 September. Details of each site visit are provided in Table 2.2 and the hydrographs from the two stations are presented in Figure 2.2.

Table 2.2 Site visits to Tail Lake and Tail Lake Outflow hydrometric stations, 2004.

Date	Activities	Lake	Water Level (geodetic)	Outflow	Discharge
8 May	Installed transducer at frozen hole at Tail Lake.	✓	n/a		n/a
5 June	Checked transducer at Tail Lake; ice affected.	✓	n/a		n/a
6 June	Checked transducer at Tail Lake; ice affected.	✓	n/a		n/a
7 June	Checked transducer at Tail Lake; ice affected.	✓	n/a		n/a
8 June	Checked transducer at Tail Lake; ice affected.	✓	n/a		n/a
9 June	Checked transducer at Tail Lake; ice affected. Discharge measurement at Tail Lake outlet but Tail Lake outflow station still snow-covered.	✓	n/a	✓	0.025 m ³ /s
19 June	Checked transducer at Tail Lake; ice on lake but transducer not affected. Installed transducer in flowing water on Tail Lake outflow; surveyed water level and measured discharge at Tail Lake outflow.	✓	28.279 m	✓	0.057 m ³ /s
2 July	Surveyed water level and measured discharge at Tail Lake outflow.			✓	0.056 m ³ /s
3 July	Surveyed water level and measured discharge at Tail Lake outflow.			✓	0.063 m ³ /s
4 July	Surveyed water level and measured discharge at Tail Lake outflow.			✓	0.067 m ³ /s

Table 2.2 Site visits to Tail Lake and Tail Lake Outflow hydrometric stations, 2004 (continued).

Date	Activities	Lake	Water Level (geodetic)	Outflow	Discharge
5 July	Surveyed water level and measured discharge at Tail Lake outflow.			✓	0.064 m ³ /s
6 July	Surveyed water level and measured discharge at Tail Lake outflow.			✓	0.068 m ³ /s
7 July	Surveyed water level and measured discharge at Tail Lake outflow.			✓	0.061 m ³ /s
16 July	Reinstalled transducer at Tail Lake outflow after animal disturbance. Surveyed water level and measured discharge.			✓	0.027 m ³ /s
18 July	Checked transducer at Tail Lake.	✓	28.253 m		n/a
19 July	Checked transducer at Tail Lake.	✓	28.252 m		n/a
20 July	Surveyed water level at Tail Lake outflow. Discharge measurement deemed unreliable.			✓	n/a
3 September	Mean of six measurements by fisheries crew on Tail Lake outflow.			✓	0.003 m ³ /s
4 September	Mean of three measurements by fisheries crew on Tail Lake outflow.			✓	0.003 m ³ /s
10 September	Replaced transducer at Tail Lake with longer cable in deeper water for overwintering. Installed permanent benchmark in bedrock.	✓	28.141 m		n/a
11 September	Surveyed water level and measured discharge at Tail Lake outflow. Removed transducer for overwintering. Installed permanent benchmark in bedrock.			✓	0.002 m ³ /s

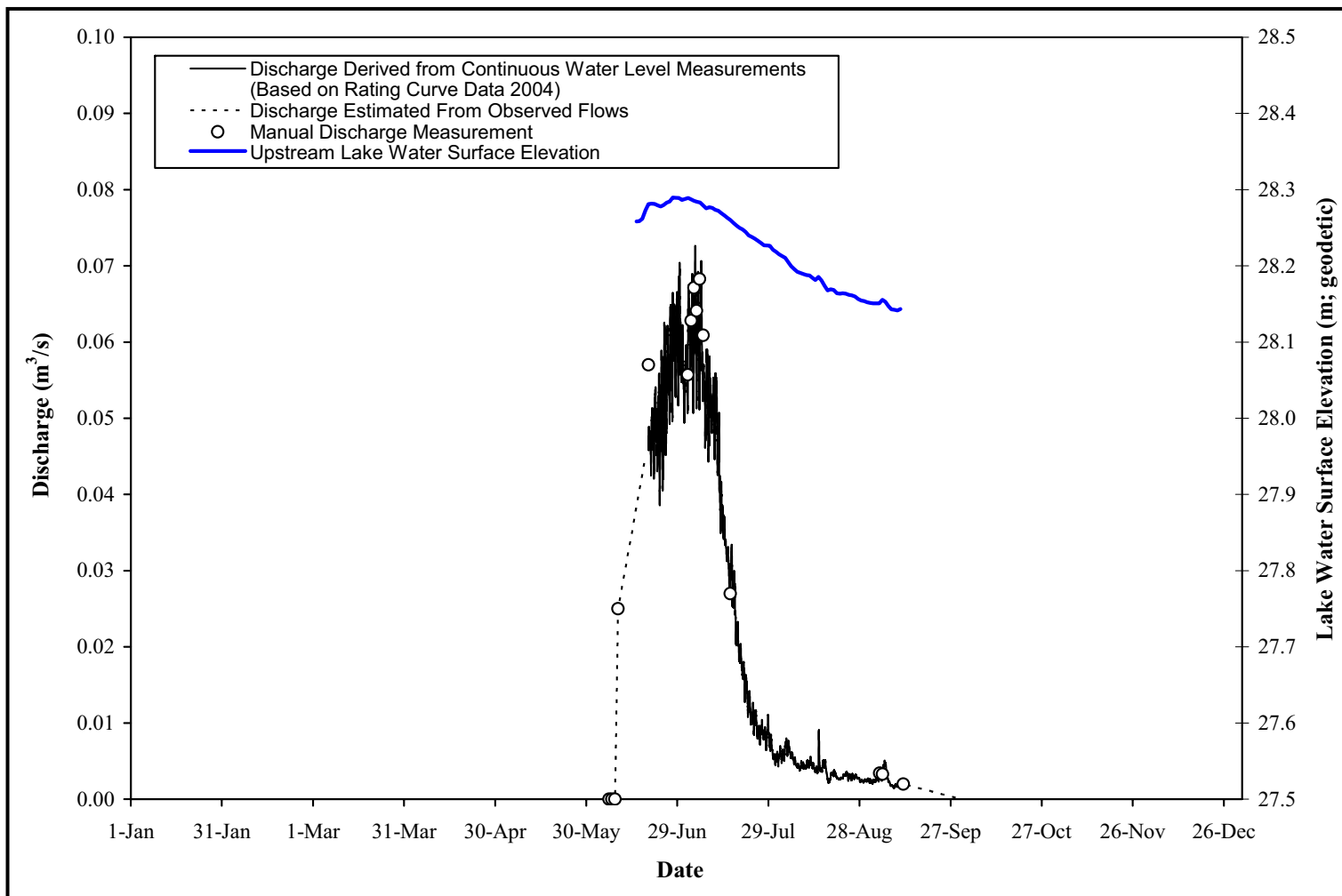


Figure 2.2 Hydrographs for Tail Lake and Tail Lake Outflow, 2004.

2.2.3 Roberts Lake and Roberts Lake Outflow

A factsheet describing the locations of the hydrometric site and equipment installed at Roberts Lake and Roberts Lake outflow (Station H72) is provided in Appendix A. The appendix also contains stage-discharge data; the derived stage-discharge rating curve based on 2003 and 2004 data; tabulated mean daily discharge and water level data; and manual discharge measurement data and calculation sheets.

The Roberts Lake and Roberts Lake outflow hydrometric station was visited 13 times during the 2004 field program and a continuous hydrograph was derived for the period 18 June to 13 September. Details of each site visit are provided in Table 2.3 and the hydrographs from the station are presented in Figure 2.3.

Table 2.3 Site visits to Roberts Lake and Roberts Lake Outflow hydrometric station, 2004.

Date	Activities	Lake	Water Level (geodetic)	Outflow	Discharge
9 May	Installed transducer at frozen hole at Roberts Lake. Zero flow observed at Roberts Lake outflow.	✓	n/a	✓	0.000 m ³ /s
5 June	Checked transducer at Roberts Lake; ice affected. Zero flow observed at Roberts Lake outflow.	✓	n/a	✓	0.000 m ³ /s
6 June	Checked transducer at Roberts Lake; ice affected. Zero flow observed at Roberts Lake outflow.	✓	n/a	✓	0.000 m ³ /s
7 June	Checked transducer at Roberts Lake; ice affected. Zero flow observed at Roberts Lake outflow.	✓	n/a	✓	0.000 m ³ /s
8 June	Checked transducer at Roberts Lake; ice affected. Zero flow observed at Roberts Lake outflow.	✓	n/a	✓	0.000 m ³ /s
9 June	Checked transducer at Roberts Lake; ice affected. Installed a second transducer for redundant measurement. Zero flow observed at Roberts Lake outflow.	✓	n/a	✓	0.000 m ³ /s
3 July	Surveyed water level on Roberts Lake and measured discharge at Roberts Lake outflow.	✓	5.792 m	✓	2.354 m ³ /s
4 July	Surveyed water level on Roberts Lake and measured discharge at Roberts Lake outflow.	✓	5.795 m	✓	1.925 m ³ /s
5 July	Surveyed water level on Roberts Lake and measured discharge at Roberts Lake outflow.	✓	5.789 m	✓	1.700 m ³ /s
7 July	Surveyed water level on Roberts Lake and measured discharge at Roberts Lake outflow.	✓	5.758 m	✓	1.562 m ³ /s
17 July	Surveyed water level on Roberts Lake and measured discharge at Roberts Lake outflow.	✓	5.684 m	✓	0.983 m ³ /s
21 July	Surveyed water level on Roberts Lake and measured discharge at Roberts Lake outflow.	✓	5.636 m	✓	0.752 m ³ /s
13 September	Surveyed water level on Roberts Lake and measured discharge at Roberts Lake outflow. Removed transducer for overwintering and installed benchmark in bedrock.	✓	5.460 m	✓	0.104 m ³ /s

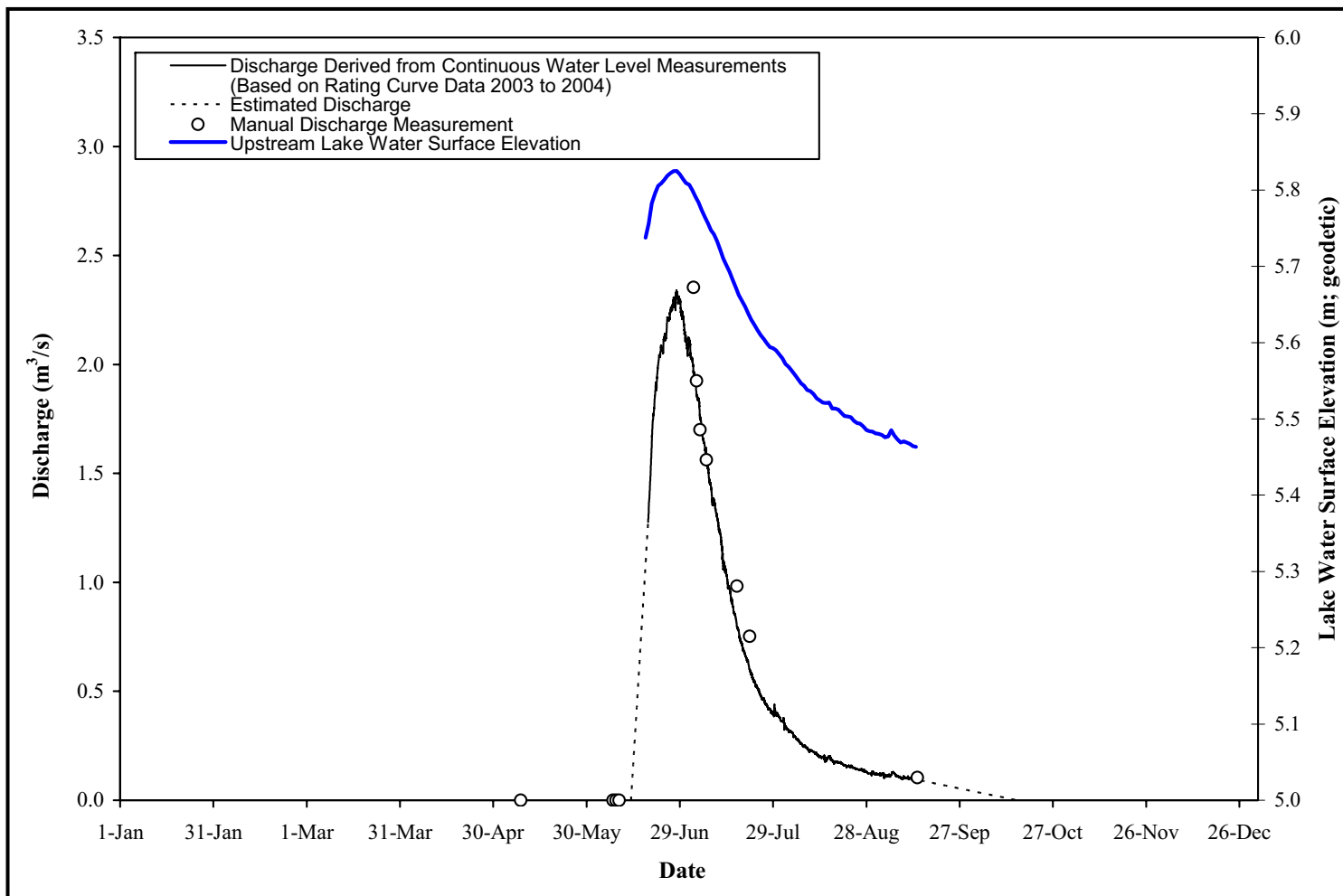


Figure 2.3 Hydrographs for Roberts Lake and Roberts Lake Outflow, 2004.

2.2.4 Little Roberts Creek

A factsheet describing the location of the hydrometric site and equipment installed at Little Roberts Creek is provided in Appendix A. The appendix also contains stage-discharge data; the derived stage-discharge rating curve; tabulated mean daily discharge and water level data; and manual discharge measurement data and calculation sheets.

The Little Roberts Lake Outflow hydrometric station was visited 12 times during the 2004 field program, and a continuous hydrograph was derived for the period 16 June to 7 September. Details of each site visit are provided in Table 2.4 and the hydrograph from the station is presented in Figure 2.4.

Table 2.4 Site visits to Little Roberts Creek hydrometric station, summer 2004.

Date	Activities	Creek	Discharge
6 June	Installed pressure transducer in frozen hole at Little Roberts Creek. Surveyed water level and measured discharge at Little Roberts Creek; ice affected.	✓	0.161 m ³ /s
7 June	Surveyed water level and measured discharge at Little Roberts Creek; ice affected.	✓	0.393 m ³ /s
8 June	Surveyed water level and measured discharge at Little Roberts Creek; ice affected.	✓	0.316 m ³ /s
9 June	Surveyed water level and measured discharge at Little Roberts Creek; ice affected.	✓	0.171 m ³ /s
23 June	Surveyed water level and measured discharge at Little Roberts Creek.	✓	3.239 m ³ /s
3 July	Surveyed water level and measured discharge at Little Roberts Creek.	✓	3.276 m ³ /s
4 July	Surveyed water level and measured discharge at Little Roberts Creek.	✓	3.112 m ³ /s
5 July	Surveyed water level and measured discharge at Little Roberts Creek.	✓	3.100 m ³ /s
7 July	Surveyed water level and measured discharge at Little Roberts Creek.	✓	2.562 m ³ /s
17 July	Surveyed water level and measured discharge at Little Roberts Creek.	✓	2.230 m ³ /s
21 July	Surveyed water level and measured discharge at Little Roberts Creek.	✓	1.598 m ³ /s
7 September	Surveyed water level and measured discharge at Little Roberts Creek. Removed transducer for overwintering.	✓	0.249 m ³ /s

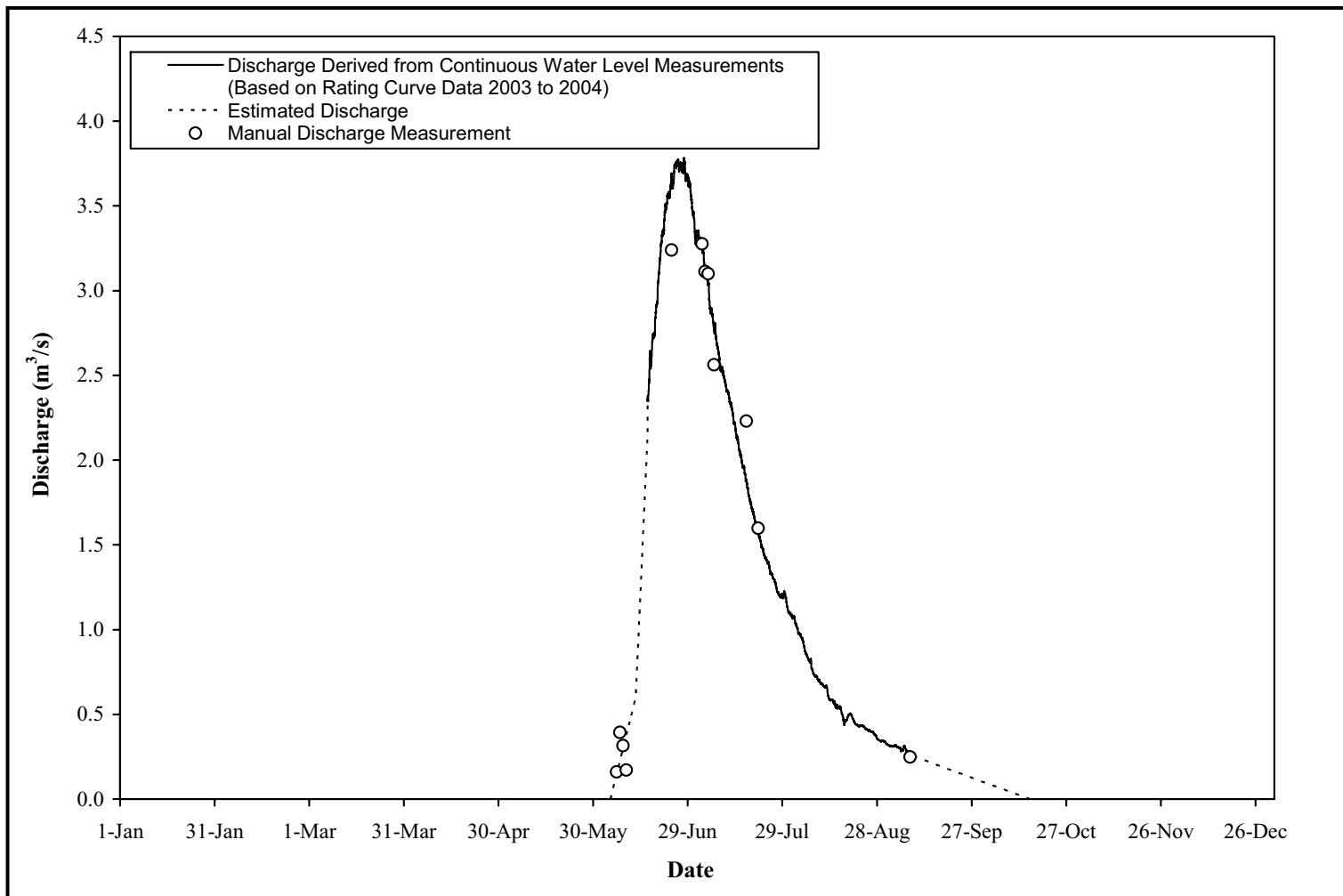


Figure 2.4 Hydrograph for Little Roberts Lake outflow, 2004.

2.2.5 Other Streams

One manual discharge measurement was undertaken to support fisheries work at stream E14, a tributary of Roberts Lake, during the 2004 field program. No continuous water level or discharge measurements were acquired at this site. A manual discharge measurement at Stream E14 was 0.002 m³/s (Table 2.5).

Table 2.5 Manual discharge measurements to support fisheries work at Doris North Project, 2004.

Date	Activities	Discharge
21 August	Roberts Lake Tributary E14 – Discharge Measurement	0.0002 m ³ /s

2.2.6 Discussion

The 2004 hydrometry program had two layers of redundancy built in to ensure that there were no significant data gaps in the event of equipment disturbance or failure. As in 2003, the Little Roberts Creek hydrometric station was installed as a redundant measure, to allow discharges for the Doris Creek or Roberts Creek hydrometric stations to be back-calculated if either of those stations was to malfunction. Scrutiny on the Doris Lake and Tail Lake watersheds during the regulatory review of 2003 and 2004 also prompted the installation of lake water level measurement stations in addition to lake outflow measurement stations. These stations could have provided surrogate data for discharge measurements if required, and also provided direct measurements of lake water surface elevation. The lake water level stations, reinstalled in September 2004 in deep water, will also now provide year-round data.

In 2004, the Doris Lake outflow, Roberts Lake outflow and Little Roberts Lake outflow stations operated continuously with no malfunctions, so the data can be used as a check. Between 20 June and 13 September, the derived mean daily discharge for the Little Roberts Lake outflow varied from -20% to +16% of the sum of the two tributaries, with 90% of the values falling within -8% to +13%. Some of the difference could be due to the attenuation of flow in Little Roberts Lake, but this comparison shows good consistency between stations. The total volume of flow measured over the monitoring period at the Little Roberts Lake outflow was 7.8% greater than that of the two tributaries. The total drainage area at this station is 4.2% greater than the sum of the areas of the two tributary stations, so the data compare well.

Monthly and annual water yields for the four monitored watersheds (Doris Lake, Tail Lake, Roberts Lake and Little Roberts Lake) were calculated based on the measured hydrographs and watershed areas. These water yields are presented in

Table 2.6, where the baseline mean water yield for each watershed is also shown. The data show that 2004 was an extremely dry year.

Table 2.6 Calculated water yields for Doris, Tail, Roberts and Little Roberts lakes.

Watershed	Total Annual Discharge	Watershed Area	Water Yield	
			2004 Annual	Mean Annual ^a
Tail Lake	186,000 m ³	4.4 km ²	42.3 mm	111 mm
Doris Lake	5,750,000 m ³	93.1 km ²	61.8 mm	134 mm
Roberts Lake	5,979,000 m ³	97.8 km ²	61.1 mm	134 mm
Little Roberts Lake	12,646,000 m ³	198.9 km ²	63.6 mm	134 mm

^a Derived based on Ellice River data 1971 to 2000 (Amec 2003).

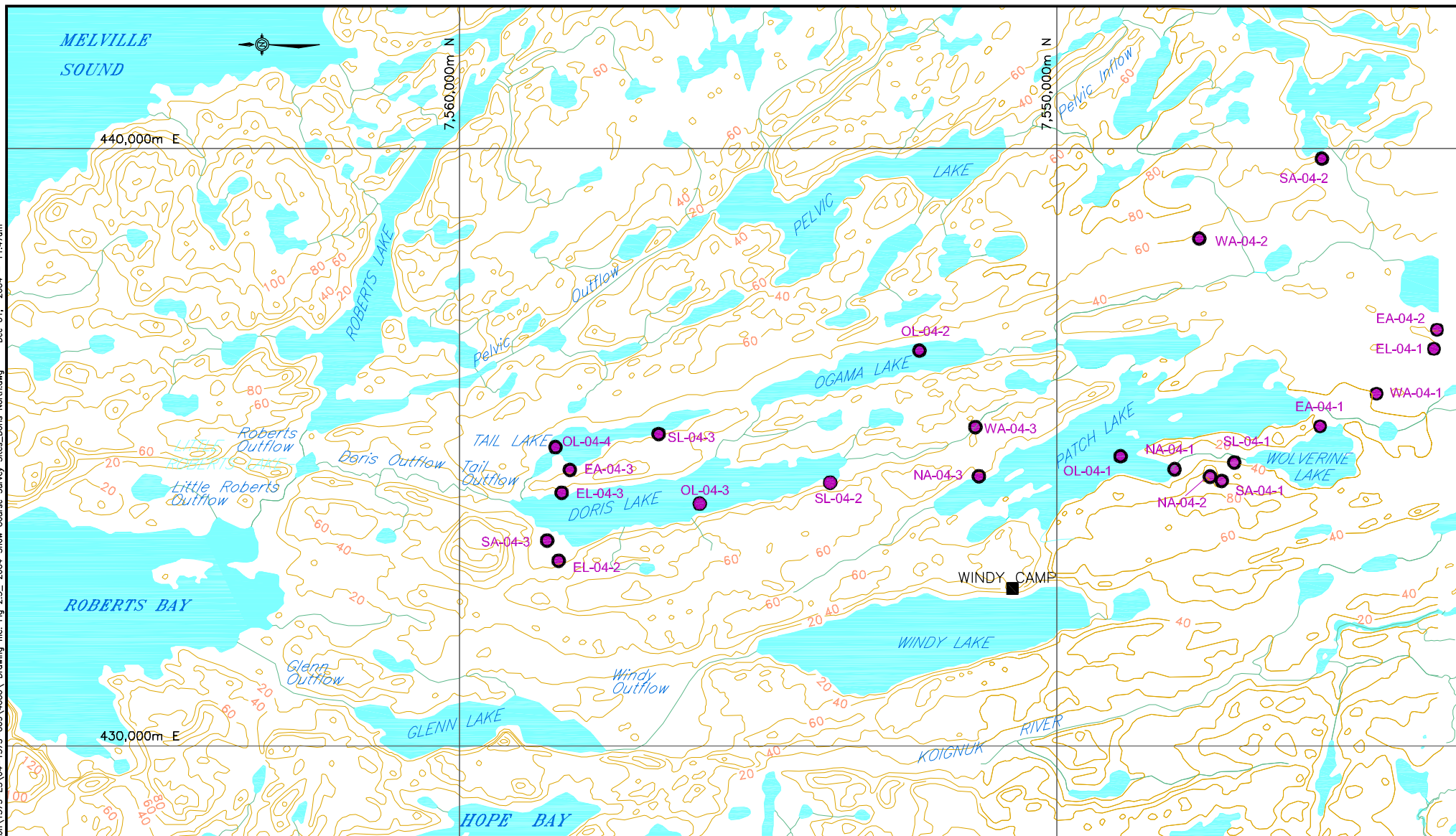
2.3 SNOW COURSE SURVEYS

The water equivalent of a snowpack (the equivalent depth of water if the snowpack is melted) is a product of snow depth and snow density. At each snow course survey plot, snow depths and snow densities were measured as described in Section 2.1.2. Appendix A presents the terrain type and snowpack measurement data collected on 5 and 6 May 2004. The snow course survey sampling locations for the 2004 program are shown on Figure 2.5, and the snow course data are presented in Table 2.7 and Figure 2.6.

Table 2.7 Snow course survey data for Doris Lake watershed, 5 to 6 May 2004.

Terrain Type	Survey Plot Number	Snow Density (g/cm³)	Snow Depth (cm)	Snow Water Equivalent (mm)
Open Lake	OL-04-1	0.160	9.6	15.4
	OL-04-2	0.388	17.2	66.7
	OL-04-3	0.697	2.5	17.2
	OL-04-4	0.360	6.7	24.0
	2004 Mean	0.401	9.0	30.8
Exposed Lowland	EL-04-1	0.226	34.2	77.2
	EL-04-2	0.201	21.4	42.9
	EL-04-3	0.209	8.0	16.8
	2004 Mean	0.212	21.2	45.6
Sheltered Lowland	SL-04-1	0.193	28.5	55.0
	SL-04-2	0.236	48.8	115.3
	SL-04-3	0.194	27.1	52.5
	2004 Mean	0.208	34.8	74.3
North Aspect	NA-04-1	0.183	18.7	34.1
	NA-04-2	0.230	14.5	33.3
	NA-04-3	0.277	14.3	39.6
	2004 Mean	0.230	15.8	35.7
East Aspect	EA-04-1	0.205	30.7	63.0
	EA-04-2	0.214	28.1	60.3
	EA-04-3	0.197	20.1	39.6
	2004 Mean	0.205	26.3	54.3
South Aspect	SA-04-1	0.223	36.4	80.9
	SA-04-2	0.300	36.9	110.5
	SA-04-3	0.227	20.4	46.4
	2004 Mean	0.250	31.2	79.3
West Aspect	WA-04-1	0.239	45.0	107.5
	WA-04-2	0.218	18.4	40.0
	WA-04-3	0.248	28.7	71.4
	2004 Mean	0.235	30.7	73.0

R:\CAD\2004\1370-Edmonton\1373-ES\04-1373-009 4000\ Drawing file: Fig 2.5 - 2004 Snow Course Survey Sites North.dwg Dec 01, 2004 - 11:47am



LEGEND
● Snow Course Survey Site 2004

 **Miramar**
MINING CORPORATION

1.5 0 1.5
SCALE KILOMETRES

NOTE : CONTOUR INTERVAL 20 m

REFERENCE
BASE MAP PROVIDED BY RESCAN,
22 JANUARY 2001

TITLE
**SNOW COURSE SURVEY SITES IN THE
DORIS NORTH PROJECT AREA,
5 - 6 MAY 2004**



PROJECT 04-1373-009.4000			FILE No. 2004 Snow Course	
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CADD	PSR	01/12/04		
CHECK	NS	01/12/04		
REVIEW				

FIGURE: 2.5

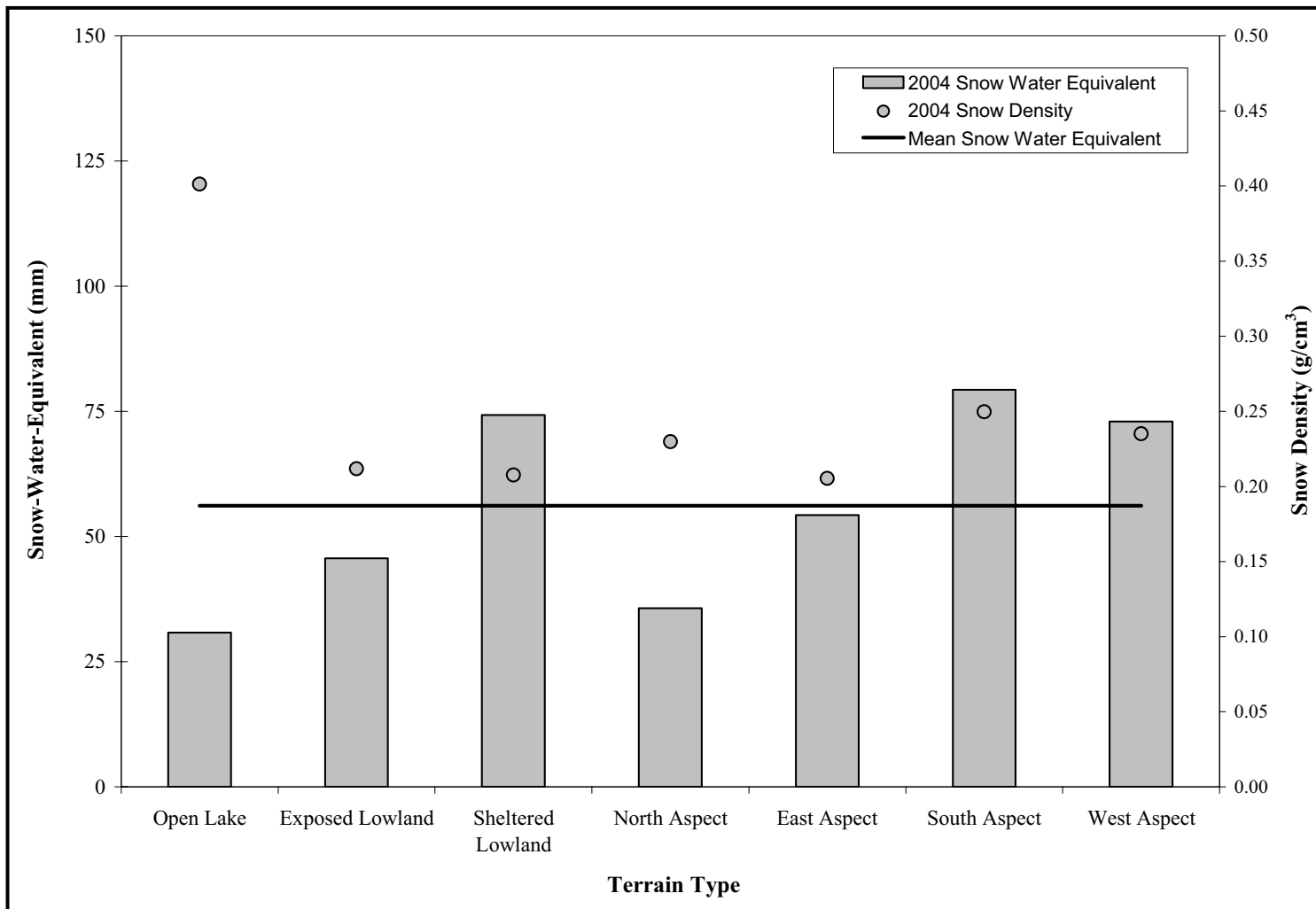


Figure 2.6 Snow course survey data for Doris Lake watershed, 5 to 6 May 2004.

Twenty-two sites over seven terrain types were examined during the snow course survey. Measured snow densities were similar across all but the open lake terrain type, whereas snow depths ranged from a mean of 9.0 cm for open lake terrain to a mean of 34.8 cm for sheltered lowland terrain. Snow water equivalents ranged from 30.8 mm of water for open lake terrain to 79.3 mm for south aspect terrain.

Wind redistributes snowfall over the course of a winter, and in general, exposed terrain such as open lake areas collect less snow than sheltered lowland areas. Similarly, prevailing winds redistribute snow unequally across slopes of differing aspect. These effects may result in significant differences between terrain types in some cases. However, this study involved a limited number of sampling sites in an area with little vegetation and broad ranges of measured values were observed within each terrain type. As such, detailed calculation of the mean snow water equivalent, based on the relative proportion of each terrain type, is not recommended. An unweighted mean snow water equivalent of 55 mm should be used in any water balance calculations.

2.4 RAINFALL

The Doris North meteorological station recorded very little rainfall for the period from 1 June to 9 September, 2004. Monthly rainfall totals are provided in Table 2.8.

Table 2.8 Monthly rainfall measured at Doris North meteorological station, May to September 2004.

Month	Measured Rainfall
May	1.0 mm
June	6.4 mm
July	0.0 mm
August	0.0 mm
September ^a	0.0 mm
Total	7.4 mm

^a To the date of the last station download on 9 September.

The two largest events of 2004 were measured on 19 and 27 June, when 2.0 mm of rainfall were measured (Figure 2.7). Lake and stream hydrographs were checked for signs of significant rainfall events, and the absence of any significant increases in stream discharge or lake water surface elevation over the course of the year indicate that the record is accurate. It is possible that trace rainfall events, and localized rainfall events in parts of the watershed distant from the meteorological station, occurred over the course of the open water months and were not recorded.

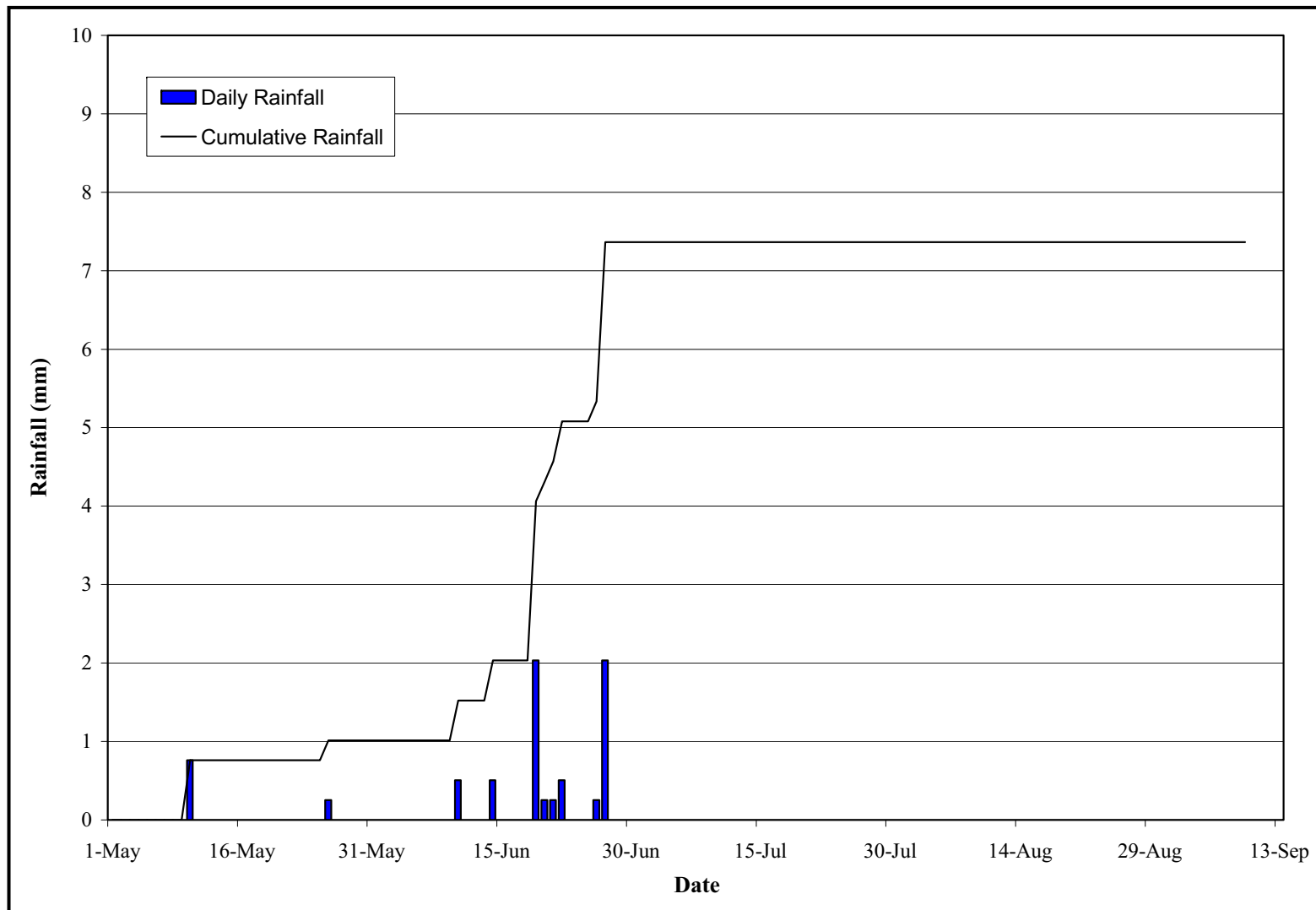


Figure 2.7 Rainfall data from Doris North meteorology station, May to September 2004.

2.5 EVAPORATION

The CRLE component of the WREVAP model (Morton et al. 1985) was used to estimate lake evaporation for the Doris Lake watershed. Evaporation from Doris Lake and Tail Lake were calculated separately, because lake evaporation is affected by the mean lake depth. Calculated values for the period September 2003 to August 2004 are provided in Table 2.9, where normals of lake evaporation are provided for comparison. Detailed calculation results are provided in Appendix A.

Table 2.9 Doris Lake watershed lake evaporation 2003 to 2004.

Month	Lake Evaporation		
	Baseline Report ^a	Doris Lake CRLE ^b	Tail Lake CRLE ^b
September 2003	13 mm	63 mm	37 mm
October 2003	0 mm	41 mm	7 mm
November 2003	0 mm	17 mm	0 mm
December 2003	0 mm	1 mm	0 mm
January 2004	0 mm	0 mm	0 mm
February 2004	0 mm	0 mm	0 mm
March 2004	0 mm	0 mm	0 mm
April 2004	0 mm	-2 mm ^c	0 mm
May 2004	0 mm	-2 mm ^c	5 mm
June 2004	35 mm	13 mm	46 mm
July 2004	95 mm	51 mm	86 mm
August 2004	77 mm	85 mm	79 mm
Annual Total	220 mm	267 mm	260 mm

^a Source: (Amec 2003).

^b Calculated using WREVAP model component CRLE (Morton et al. 1985).

^c Indicates net condensation.

The calculated annual lake evaporation values for Doris and Tail lakes from September 2003 to August 2004 were 267 mm and 260 mm, respectively. These values are slightly larger than the baseline estimate of 220 mm. Based on prior experience in high-latitude regions, it is believed the calculated values may be slightly overestimated.

2.6 DORIS LAKE WATERSHED WATER BALANCE

The 2004 runoff year was very dry, due to below average snow accumulation and extremely low rainfall. The spring snowcourse survey measured an average snowpack of just 55 mm snow water equivalent, compared to an estimated mean annual snowfall of 122 mm (Amec 2003). The Doris North meteorological station measured a total rainfall of just 7.4 mm, compared to an estimated mean annual rainfall of 122 mm (Amec 2003). Tabulated water balances for Doris and Tail Lakes are provided in Table 2.10.

Table 2.10 Water balance for 2004 runoff at Tail and Doris lakes.

Parameter	Doris Lake		Tail Lake	
	Mean Annual ^a	2004 Annual	Mean Annual ^a	2004 Annual
Rainfall (mm)	89	7	89	7
Snow water equivalent (mm)	122	55	122	55
Total annual input (mm)	211	62	211	62
Basin discharge (mm)	134	62	111	42
Lake evaporation (mm) ^b	42	42 ^c	40	40 ^c
Calculated other losses (mm)	35	-42	71	-20

^a Source: Amec (2003).

^b Based on 19% and 18% lake area for the Doris Lake and Tail Lake watersheds, respectively.

^c Baseline values were used in this water balance analysis. Calculated values for 2004 were 51 mm and 47 mm for Doris and Tail Lake watersheds, respectively.

The water balance shown in Table 2.10 indicates that the parameter “other losses” was negative in 2004, implying that additional water was added to the system to offset evapotranspiration. Possible sources of extra water include:

- Open lake snow water equivalents may have been underestimated due to incorporation of snowfall into the lake ice cover. Additionally, there is some uncertainty in the mean value of snow water equivalent that was estimated based on the snowcourse survey;
- Tipping bucket rain gauges do not measure trace rainfall events, the cumulative effect of which could have been in the tens of millimeters over the summer months;
- Overestimated lake evaporation, as noted;
- During dry years, groundwater may be released from storage. In a dry region, where annual inputs and outputs are on the order of 200 mm, the water balance in any given year could be very sensitive to changes in elevation of the water table.

3.0 PHYSICAL LIMNOLOGY AND WATER QUALITY

An extensive water quality program was conducted in the Doris North study area between 5 June and 22 September 2004 to strengthen the project's water management strategy. Lakes were sampled monthly over the course of four months (one sampling event under-ice and three sampling events during the open-water season). Of the streams sampled, the most extensive effort was conducted at Doris Outflow since this stream would be the immediate receiving environment from the tailings impoundment area. Doris Outflow was sampled 11 times throughout the open-water period. Other streams sampled included Tail, Roberts, and Little Roberts outflows.

This section of the report presents information on baseline water quality conditions for selected lakes and streams in the study area (Figure 3.1). Refer to Appendices B1 and B2 for site-specific data.

3.1 METHODS

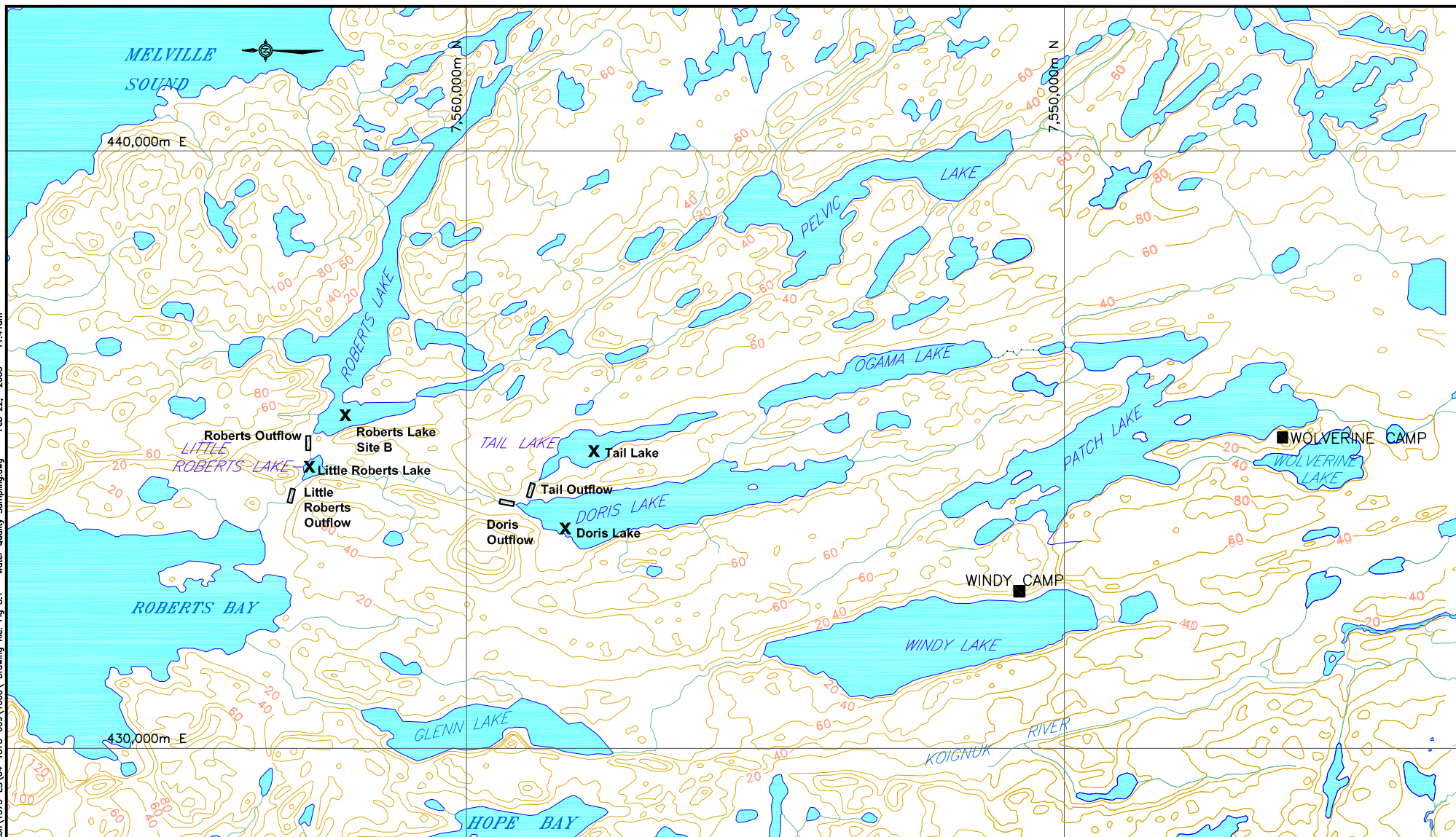
3.1.1 Field Sampling Locations and Procedures

Lakes

Water quality sampling dates and equipment are summarized in Table 3.1. Water quality stations were established in 2004 in the deep basins of Doris Lake, Tail Lake, Little Roberts Lake, and Roberts Lake. A sample station was also established in Roberts Bay for the 2004 sampling program. Sample sites were located using a Global Positioning System (hand-held Garmin GPS 76, accuracy of ± 3 m). For the June under-ice sampling event, holes were augured through the ice and samples collected 1 m below the ice-water interface and 1.0 m above the bottom. Both surface and bottom samples were collected with a geopump and Tygon tubing (with the exception of the Doris Lake bottom sample). During the ice-free period, surface water samples were collected 1.0 m below the surface with a geopump and Tygon tubing, and bottom samples were collected 1.0 m above the bottom with a Kemmerer water sampler. To prevent contamination, equipment was thoroughly rinsed with ambient water before and after sampling. Samples collected for dissolved metals and dissolved organic carbon analyses were filtered in the field with a 45 μ m cartridge filter and geopump.

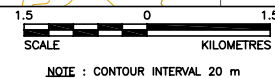
Water samples were analyzed for physical and conventional parameters, major ions, nutrients, and metals. Sample bottles were provided by the laboratory and were labeled with the sample location and date. When required, the appropriate preservative was added in the field and all samples were kept cool until they were delivered to the laboratory.

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LEGEND

- X** Lake Sampling Locations
- Stream Sampling Locations



REFERENCE
BASE MAP PROVIDED BY RESCAN, JANUARY 22, 2001

TITLE

**WATER QUALITY SAMPLING LOCATIONS IN
THE DORIS NORTH PROJECT AREA, 2004**



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CADD	PSR	22/02/05			
CHECK	AS	22/02/05			
REVIEW	AS	22/02/05			

FIGURE: 3.1

Table 3.1 Dates and equipment used for water quality sampling, 2004.

Waterbody	Date 2004	Sample Site	Sampling Equipment	
			Kemmerer	Tygon Tubing
Doris Lake	5 June	Top		X
	5 June	Bottom		X
	19 July	Top		X
	19 July	Bottom	X	
	16 Aug	Top		X
	16 Aug	Bottom	X	
	10 Sept	Doris Lake Top		X
	10 Sept	Doris Lake Bottom	X	
Tail Lake	5 June	Top		X
	5 June	Bottom		X
	19 July	Top		X
	19 July	Bottom	X	
	18 Aug	Top		X
	18 Aug	Bottom	X	
	11 Sept	Top		X
	11 Sept	Bottom	X	
Roberts Lake	6 June	Mid column		X
	17 July	Top		X
	17 July	Bottom	X	
	13 Aug	Top	X	
	13 Aug	Bottom	X	
	13 Sept	Top		X
	13 Sept	Bottom	X	
Little Roberts Lake	19 July	Mid column		X
	16 Aug	Mid column		X
	19 Aug	Mid column		X
	13 Sept	Mid column		X
Roberts Bay	19 July	Mid column		X
	14 Aug	Mid column		X
	16 Aug	Mid column		X

Field measurements, including pH, conductivity, temperature, and dissolved oxygen (DO) were measured at each sample site, when possible. Dissolved oxygen and temperature were measured using a field-calibrated Oxyguard™ Handy Mark II dissolved oxygen and temperature meter. This meter was accurate to ± 0.1 mg/L for dissolved oxygen and to $\pm 0.1^\circ\text{C}$ for water temperature. Dissolved oxygen and temperature profile data were taken at 0.5 or 1 m intervals along a vertical transect from surface to near bottom. The deepest measurement for each profile was 0.5 m above the lake bottom to avoid contamination of the probe by fine sediments. Conductivity and pH were measured at the surface only with an Oakton TDS Testr 3 and an Oakton pH Testr 2.

Water transparency was measured with a standard Secchi disk (20 cm diameter). The depth at which a Secchi disk disappears from sight is a standard index of transparency. The euphotic zone (lower limit=approximate depth to which 1% of incident light penetrates) coincides with approximately twice the Secchi depth.

Streams

Surface (approximately 0.1 m below the surface) water grab samples were collected from the outflow streams of Doris Lake, Tail Lake, Roberts Lake and Little Roberts Lake. Samples collected for dissolved metals and dissolved organic carbon analyses were filtered in the field with a 45 μm cartridge filter and geopump. Similar to lake water samples (see above), all stream water samples were analyzed for physical and conventional parameters, nutrients, major ions, and metals. All sample bottles were provided by the laboratory, labeled with sample location and date, preserved in the field, and kept cool until they reached the laboratory.

Field measurements, including pH, conductivity, temperature and dissolved oxygen were measured at each sample site, when possible. Dissolved oxygen and temperature were measured using a field-calibrated meter Oxyguard™ Handy Mark II dissolved oxygen and temperature meter. Conductivity and pH were measured with an Oakton Waterproof TDS Testr 3 and an Oakton pH Testr 2.

3.1.2 Laboratory Analytical Procedures

Analyses for physical and chemical parameters including nutrients (phosphorus, nitrogen, carbon), major ions (cations and anions), and physical properties (TSS, TDS) were carried out by EnviroTest Laboratories (ETL) in Edmonton, Alberta; as well, a subset of samples were analyzed for ultra low level total metals. The subset included samples collected from Doris Outflow (24 June), Tail Outflow (19 June, 2 July and 16 July) and Tail Lake (5 June). During the remainder of the sampling events, ultra low level metal samples (total and dissolved), including mercury, were submitted to the Alberta Research Council (ARC), Vegreville, Alberta. The Alberta Research Council laboratory analyzed the majority of total

metal samples because EnviroTest Laboratories could not achieve ultra low level detection limits with the amount of plankton that was present in the samples. Detection limits for each laboratory are provided in Table 3.2.

Table 3.2 List of detection limits for water quality parameters analyzed for the Doris North Project, 2004.

Parameter	Unit	Detection Limit		Parameter	Unit	Detection Limit	
		ETL	ARC			ETL	
<i>Metals (Total and Dissolved)</i>				<i>Nutrients</i>			
Aluminum (Al)*	µg/L	0.3	0.5	Phosphorus, Total	mg/L	0.001	
Antimony (Sb)	µg/L	0.03	0.0005	Ammonia-N	mg/L	0.005	
Arsenic (As)*	µg/L	0.03	0.002	Color, True	T.C.U.	3	
Barium (Ba)	µg/L	0.05	0.004	Dissolved Organic Carbon	mg/L	1	
Beryllium (Be)	µg/L	0.2	0.003	Fluoride (F)	mg/L	0.05	
Boron (B)	µg/L	1	0.05	Sulphide	mg/L	0.003	
Cadmium (Cd) *	µg/L	0.05	0.002	Total Kjeldahl Nitrogen	mg/L	0.05	
Calcium (Ca)	mg/L	0.02	0.004	Total Organic Carbon	mg/L	1	
Chromium (Cr)	µg/L	0.06	0.03	Total Suspended Solids	mg/L	3	
Cobalt (Co)	µg/L	0.1	0.001	<i>Routine Water Analysis</i>			
Copper (Cu) *	µg/L	0.6	0.05				
Iron (Fe)*	µg/L	5	2		Chloride (Cl)	mg/L	1
Lead (Pb) *	µg/L	0.05	0.001		Nitrate+Nitrite-N	mg/L	0.006
Magnesium (Mg)	mg/L	0.004	0.0001		Nitrate-N	mg/L	0.006
Manganese (Mn)	µg/L	0.1	0.003		Nitrite-N	mg/L	0.002
Mercury (Hg)*	µg/L		0.0006		Sulphate (SO ₄)	mg/L	0.05
Molybdenum (Mo)*	µg/L	0.06	0.001	<i>pH, Conductivity and Total Alkalinity</i>			
Nickel (Ni)*	µg/L	0.06	0.005				
Potassium (K)	µg/L	20	2		pH*	pH	0.1
Selenium (Se)*	µg/L	0.1	0.1		Conductivity (EC)	µS/cm	0.2
Silver (Ag)*	µg/L	0.1	0.0005		Bicarbonate (HCO ₃)	mg/L	5
Sodium (Na)	µg/L	5	2		Carbonate (CO ₃)	mg/L	5
Strontium (Sr)	µg/L	0.1	0.004		Hydroxide (OH)	mg/L	5
Uranium (U)	µg/L	0.05	0.0001		Alkalinity, Total (as CaCO ₃)	mg/L	5
Vanadium (V)	µg/L	0.05	0.005		Total Dissolved Solids	mg/L	10
Zinc (Zn)*	µg/L	0.8	0.1				
Bismuth (Bi)	mg/L		0.00003				
Thallium (Tl)*	mg/L		0.00003				
Tin (Sn)	mg/L		0.0001				
Cyanide, Total	mg/L		0.002				
Radium 226	Bq/L	0.005					

* Indicates parameters for which there are CCME (Canadian Council of Ministers of the Environment) guidelines for the protection of aquatic life

Quality assurance/quality control for the water sampling program was ensured through the use of field blanks, equipment blanks, and replicate samples (Table 3.3). Field blanks were prepared by filling sample containers in the field with deionized water provided by the laboratory. Replicate samples were collected by filling multiple containers at a single site. Equipment blanks were conducted on the Tygon tubing (n=1) and the Kemmerer water sampler (n=4). In both cases, deionized water was run through the equipment (including filters, if appropriate) before being collected in sample containers for analysis. All blank samples were preserved as required and given a unique name. Ultra low level mercury were analyzed for two of the four Kemmerer equipment blanks, both of which showed detectable concentrations of mercury. To account for this, the mean mercury concentration of Kemmerer blanks was subtracted from mercury concentrations reported for water collected with the Kemmerer (Table 3.3). Total mercury was not detected in the Tygon tubing blank.

Table 3.3 Summary of the QAQC samples collected in the Doris North Project Area, 2004.

Waterbody	QAQC Sample Type	No. of Samples	Date	Location in Water Column	Total Metals Analyzed	Total Ultra Low Level Mercury Results (µg/L)
	Kemmerer Blank	1	7-Jun-04	-	yes	-
		1	20-Jul-04	-	yes	-
		1	18-Aug-04	-	yes	0.0109
		1	11-Sep-04	-	yes	0.0116
	Tygon Tubing Blank	1	11-Sep-04	-	yes	<0.0006
	Bottle Blank	1	20-Jun-04	-	yes	-
	Blank DI Water	1	21-Jul-04	-	yes	-
		1	19-Aug-04	-	yes	<0.0006
		1	11-Sep-04	-	yes	<0.0006
Doris Outflow	Replicate	2	22-Jul-04	Surface	yes	<0.0006
		2	15-Aug-04	Surface	yes	<0.0006
		3	12-Sep-04	Surface	yes	all 3 samples were <0.0006
		3	22-Sep-04	Surface	yes	-
Doris Lake	Replicate	4	16-Aug-04	Top	yes	2 samples were <0.0006
		2	16-Aug-04	Bottom	yes	0.0419
		2	10-Sep-04	Top	yes	<0.0006 and 0.0007

3.2 LAKE WATER QUALITY

Secchi depth, dissolved oxygen, and temperature data are summarized in Appendix B1. Analytical results of the water quality data for the 2004 sampling program are presented in Appendix B2.

3.2.1 Doris Lake

Dissolved oxygen (DO) concentrations were similar throughout the water column during all four sampling sessions (Figure 3.2). This indicates that the water column was well mixed. Bottom DO concentrations recorded on 5 June and 10 September 2004 were noticeably lower than in the rest of the water column. These low concentrations likely occurred because the probe touched the bottom of the lake and was contaminated by fine sediments. With the exception of the bottom DO concentration obtained on 5 June 2004, all values were well above the minimum Canadian Water Quality Guideline (CWQG; CCME 2003) for the protection of aquatic life (6.5 mg/L). During the June and July sampling sessions, however, some dissolved oxygen concentrations were below the CWQG guideline of 9.5 mg/L for early life stages of fish. In June, this occurred directly under the ice (assuming the bottom concentration is a result of contamination) and in July, all dissolved oxygen concentrations taken at a depth of 2.0 m or greater were less than 9.5 mg/L. This depletion of oxygen with increasing depth was most likely a result of decomposition of organic material in the water column.

During the 2004 open water season, Doris Lake was generally isothermic. In August and September, the water at the surface was slightly cooler than in the rest of the water column (Figure 3.2). This reflected a recent, rapid decline in air temperature. Under ice cover, water temperature was slightly warmer at the bottom of the water column than at the top; this was a result of warmer, denser water (closer to 4°C) sinking to the bottom (Wetzel 1983).

Canadian Council of Ministers of the Environment (CCME) guidelines for the protection of aquatic life have been developed for only a subset of parameters analyzed during the 2004 water sampling program (Table 3.4). Both total and dissolved cadmium and lead concentrations exceeded CCME guidelines in Doris Lake (top) samples collected during the June under-ice sampling event (Table 3.4). These results are suspect because cadmium and lead concentrations were below guideline in the bottom samples. Also, under-ice sampling requires the use of a fuel-powered auger and it is more difficult to prevent contamination when using this equipment.

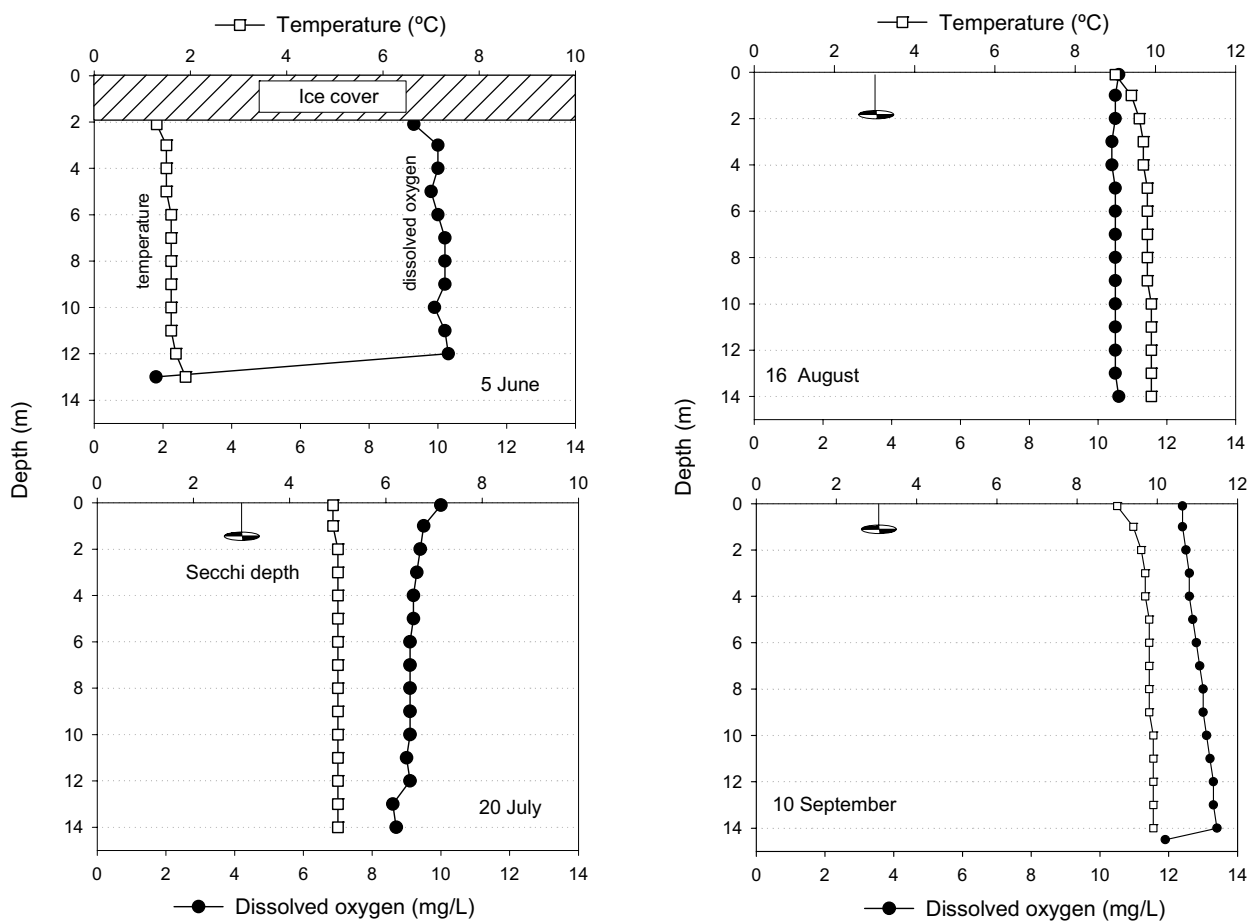


Figure 3.2 Temperature and dissolved oxygen profiles and Secchi depth for Doris Lake, 2004.

Table 3.4 Summary of water samples that exceeded CCME guidelines.

Waterbody	Strata	Date Guideline Exceeded	Aluminum CCME = 100 µg/L	Cadmium CCME = 0.038 µg/L	Lead CCME = 2 µg/L	Iron CCME = 300 µg/L	pH CCME = 6.5-9.0
Doris Lake	Top	5 June 04 (under ice)		0.0658 (T) ^a 0.0662 (D) ^b	6.69 (T) 2.79(D)		
Roberts Lake	Mid-column Top	6 June 04			2.70 (D)		
		17 Jul 04	128 (T)				
		13 Sept 04	127 (T)				
	Bottom	17 Jul 04	137 (T)				
		13 Sept 04	110 (T)				
Roberts Outflow		20 Jun 04	147 (T)				
		17 Jul 04	153 (T)				
		19 Aug 04	315 (T)				
		12 Sept 04	108 (T)				
		22 Sept 04	141 (T)				
Little Roberts Lake		16 Aug 04	582 (T)			462 (T)	6.2
		19 Aug 04	321 (T)				
		13 Sept 04	134 (T)				
Little Roberts Outflow		20 Jun 04	243 (T)				
		16 Jul 04	114 (T)				
		19 Aug 04	191 (T)				
		12 Sept 04	140 (T)				
		22 Sept 04	151 (T)				
Tail Lake	Top	5 June 04			23.6 (T)		
		18 Aug 04	147 (T)		14.8(D)		
	Bottom	18 Aug 04	141 (T)				

^a total concentration

^b dissolved concentration

3.2.2 Roberts Lake

During the under-ice sampling event, Roberts Lake was near isothermic conditions at approximately 4°C but showed decreasing dissolved oxygen concentrations with increasing depth (Figure 3.3). As discussed above, this was most likely a result of increased decomposition of organic matter with increasing depth. Dissolved oxygen concentrations fell below the minimum guideline for the protection of aquatic life (6.5 mg/L, CWQG; CCME 2003) at depths greater than 5.0 m and below the minimum guideline for early life stages of fish (9.5mg/L, CWQG; CCME 2003) at depths greater than 4.25 m. Many species can survive dissolved oxygen concentrations that are lower than 6.5 mg/L, but others require concentrations that are at or above the guideline.

Roberts Lake showed weak thermal stratification in July but was isothermic during August and September sampling events (Figure 3.3). Dissolved oxygen concentrations were above the minimum guideline for the protection of aquatic life throughout the open-water season (6.5 mg/L, CWQG; CCME 2003) and were uniform throughout the water column. They fell below the minimum guideline for early life stages of fish (9.5mg/L, CWQG; CCME 2003) in July at depths greater than 2.0 m (Figure 3.3). The low dissolved oxygen concentration measured at the bottom of Roberts Lake in September was likely a result of probe contamination by fine sediments.

The concentration of dissolved lead was above the CCME guideline during the June under-ice sampling (Table 3.4). Tail Lake and Doris Lake also had elevated dissolved lead concentrations during this sampling event (see above), but in both of these lakes total lead concentrations were also elevated above guideline. Similar to Doris and Tail lakes, this result is suspect.

Total aluminum concentrations were above the CCME guideline in Roberts Lake samples (top and bottom) that were collected in July and September (Table 3.4). During the 2003 sampling season, elevated aluminum concentrations were detected in a tributary to Roberts Lake that drains through an abandoned silver mine (RL&L/Golder 2003b). Because they are within the same watershed, it is possible that contamination from the mine may explain elevated aluminum concentrations in Roberts Lake, Roberts Outflow, Little Roberts Lake, and Little Roberts Outflow. However, elevated total aluminum concentrations were also found in Tail Lake, which is not connected to either Roberts Lake or Roberts Outflow. The other possibility is that samples collected for total metal analysis contained appreciable amounts of sediment and this caused the elevated aluminum concentrations. This is a likely explanation, because all dissolved aluminum concentrations were below the CCME guideline.

3.2.3 Tail Lake

Tail Lake was well-mixed and isothermic during the open-water season and showed winter stratification during the June under-ice sampling event. In June, Tail Lake was covered with 2 m of ice and water temperature increased with depth while dissolved oxygen concentrations decreased with depth (Figure 3.4). Temperature often increases with depth in ice-covered lakes because water is most dense at 4°C, yet the water directly underlying ice cover is close to 0°C (Figure 3.4). This results in warmer, denser water sinking below cooler, less dense water (Wetzel 1983). Dissolved oxygen concentrations decrease with depth during winter stratification because photosynthetic activity is limited to the surface waters (directly below ice cover) and because respiration and decomposition increase with depth. During the June sampling event, dissolved oxygen concentrations fell below the guideline for protection of aquatic life (6.5 mg/L, CWQG; CCME 2003).

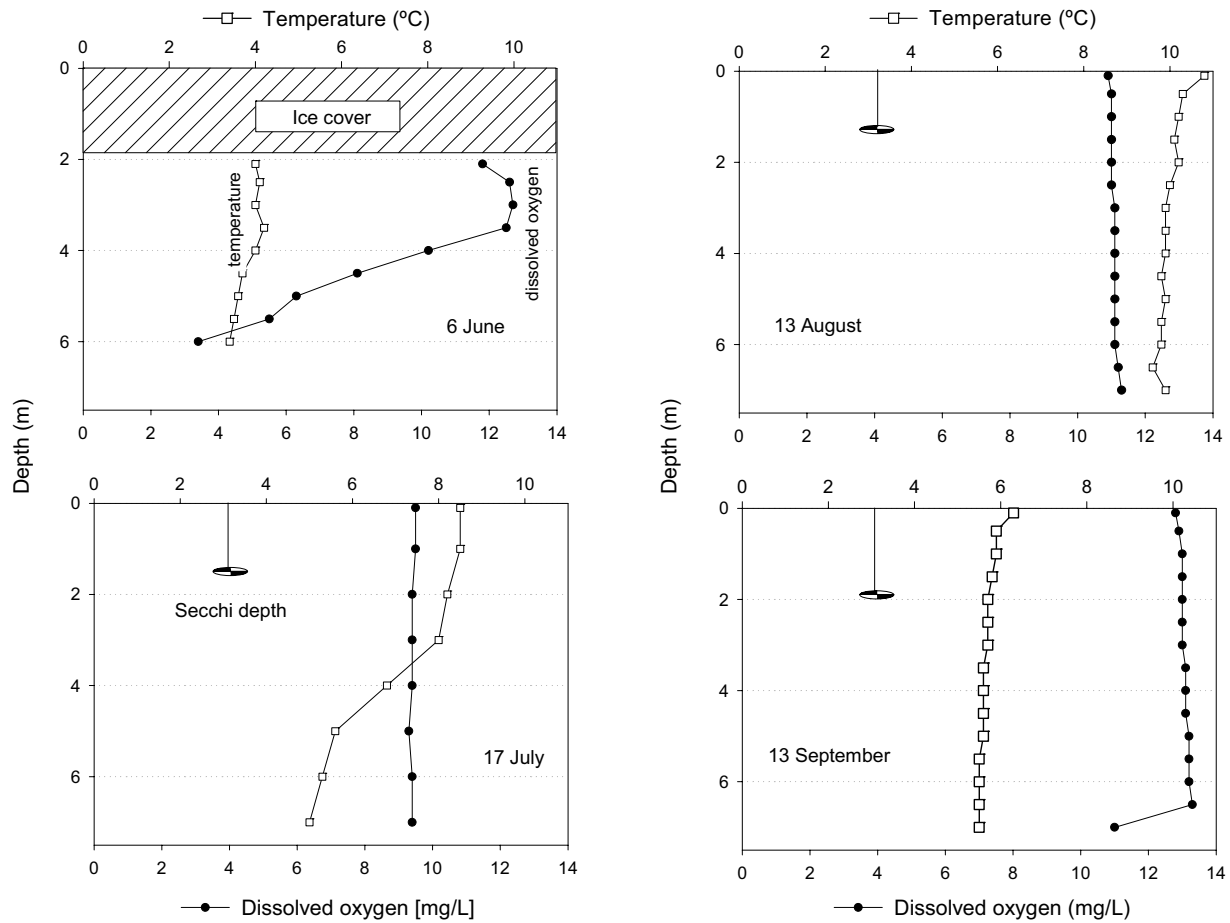


Figure 3.3 Temperature and dissolved oxygen profiles and Secchi depth for Roberts Lake, 2004.

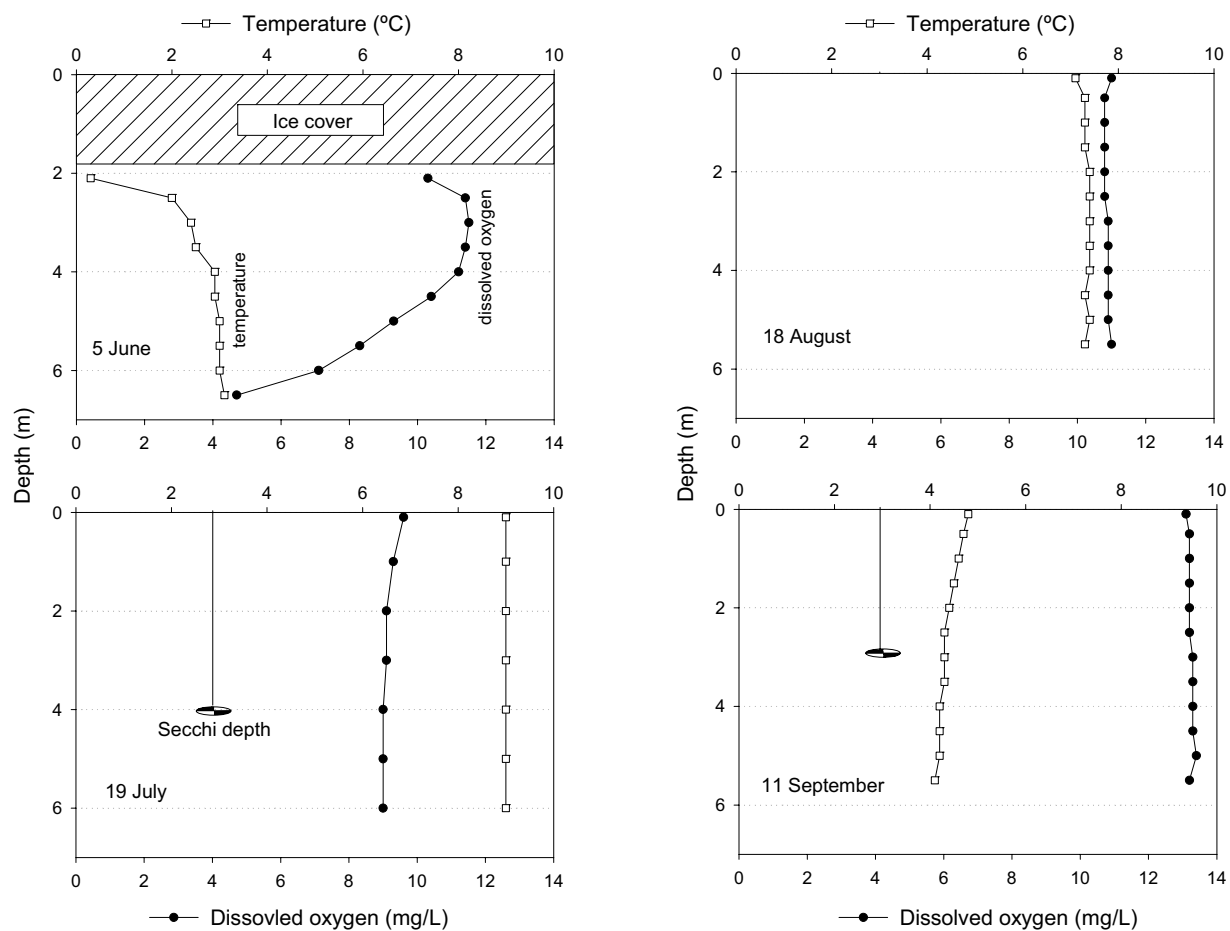


Figure 3.4 Temperature and dissolved oxygen profiles and Secchi depth for Tail Lake, 2004.

In July, dissolved oxygen concentrations decreased slightly with depth and fell below 9.5 mg/L (CWQG for early life stages of fish) at depths greater than 1.0 m. They never fell below the guideline for the protection of aquatic life, however (6.5 mg/L). Dissolved oxygen concentrations were above both guidelines (protection of aquatic life and early life stages of fish) during the August and September sampling.

During the June under-ice sampling event, total and dissolved lead concentrations exceeded the water quality guideline for the protection of aquatic life (Table 3.4; CCME 2003). Similar to Doris Lake, these results are suspect because lead concentrations were below guideline in the bottom samples and because this sampling event required the use of a fuel-powered auger.

In both top and bottom samples collected in August, total aluminum concentrations were above CCME guidelines. As discussed above, this most likely occurred because the sample collected for total metal analysis contained suspended material.

3.2.4 Little Roberts Lake

Little Roberts Lake was frozen to the bottom during the June sampling event. July, August, and September profiles show that both temperature and dissolved oxygen were generally uniform throughout the water column (Figure 3.5). Dissolved oxygen concentrations never fell below the guideline for the protection of aquatic life (6.5 mg/L, CWQG; CCME 2003) and fell below the guideline for early life stages of fish (9.5 mg/Lm CWQG; CCME 2003) only once, at depths greater than 2.5 m in July (Figure 3.5).

As discussed above, total aluminum concentrations in Little Roberts Lake were above CCME guidelines (Table 3.4) in August and September and were most likely caused by suspended material in the total metal analysis samples.

The total iron concentration was above CCME guideline during the 16 August sampling, and pH was below the CCME guideline (i.e., too acidic) during the September sampling (Table 3.4). Coincident with the drop in pH, bicarbonate and alkalinity concentrations in September were low relative to other sampling events and nitrate concentrations were high (Appendix B2). The August sampling was coincident with high winds, and because Little Roberts Lake is shallow, increased wave action can easily suspend bottom sediments into the watercolumn. This was evidenced by a higher total suspended solids concentration and a lower secchi depth in August than in any other month (Appendix B2; Figure 3.5). The elevated total iron concentration is, therefore, most likely due to increased sediment in the sample. In agreement with this, dissolved iron concentrations were below CCME guideline.

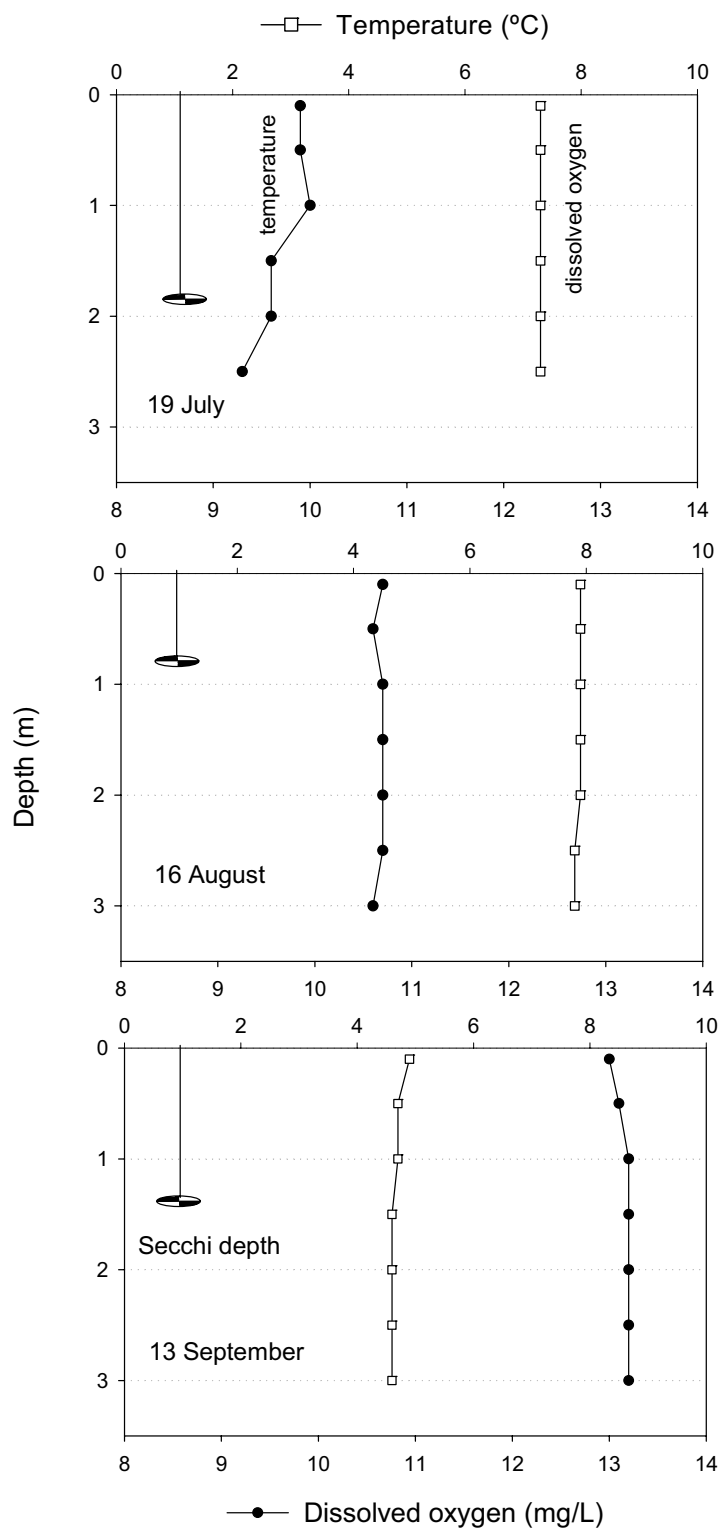


Figure 3.5 Temperature and dissolved oxygen profiles and Secchi depth for Little Roberts Lake, 2004.

The changes in pH, alkalinity, bicarbonate, and nitrate in September could be caused by a number of processes. These include an algal die-off, redox reactions initiated by sediment suspension, and sampling or analytical error. Further sampling would be required to determine if these results represent a consistent seasonal trend or if this was a one-time event.

3.3 STREAM WATER QUALITY

Water chemistry, temperature, and dissolved oxygen data for streams sampled in the 2004 field season are presented in Appendix B1.

3.3.1 Doris Outflow

Stream temperature in Doris Outflow ranged from 2.5 to 9°C and dissolved oxygen concentrations ranged from 9.2 to 10.2 mg/L (Table 3.5). Dissolved oxygen concentrations met the CCME guideline of 6.5 mg/L for the protection of aquatic life (CWQG; CCME 2003) throughout the sampling season. In July, however, dissolved oxygen concentrations were slightly below the 9.5 mg/L guideline for the protection of early life stages of fish.

Where CCME guidelines can be applied, the water chemistry parameters analyzed during the 2004 field season were below guideline.

3.3.2 Roberts Bay

Similar to Little Roberts Lake, Roberts Bay was frozen to the bottom in June. July, August, and September profiles show that both temperature and dissolved oxygen were generally uniform throughout the water column (Figure 3.6). There was a slight decrease in temperature with increasing depth in the July profile, but not enough to cause stratification. Dissolved oxygen concentrations were above the CCME guideline of 8.0 mg/L (marine and estuarine systems) throughout the sampling season (CWQG; CCME 2003).

There are very few CCME guidelines for metal concentrations in marine systems. Where they can be applied, concentrations in Roberts Bay were within the guidelines.

3.3.3 Summary

Roberts Bay, Little Roberts Lake, Roberts Lake, Tail Lake, and Doris Lake were generally isothermic and uniformly mixed during the open-water season; Roberts Lake was the only waterbody that exhibited any thermal stratification. In all sampling locations and throughout the open-water season, dissolved oxygen concentrations met the CCME guideline for the protection of aquatic life. During

the July sampling event, however, dissolved oxygen concentrations were below the guideline for protecting early life stages of fish at depths greater than approximately 1.0 to 2.0 m. This was true for all waterbodies.

Table 3.5 Stream temperature and dissolved oxygen.

	Date	Dissolved oxygen (mg/L)	Temp (°C)
Doris Outflow	19-Jun-04	10.2	3.0
	24-Jun-04	9.6	4.1
	2-Jul-04	10.1	3.7
	7-Jul-04	9.8	5.3
	16-Jul-04	9.2	8.0
	22-Jul-04	9.4	6.9
	22-Jul-04	10.1	3.7
	15-Aug-04	-	9.0
	12-Sep-04	-	5.0
	22-Sep-04	-	2.5
Tail Lake Outflow	19-Jun-04	9.3	4.8
	2-Jul-04	9.4	4.2
	16-Jul-04	7.9	8.7
	22-Jul-04	9.4	4.7
	15-Aug-04	-	9.0
	12-Sep-04	-	5.0
	22-Sep-04	-	0.0
Little Roberts Outflow	20-Jun-04	9.8	2.6
	16-Jul-04	9.3	8.9
	12-Sep-04	-	5.0
	22-Sep-04	-	0.5
Roberts Outflow	17-Jul-04	8.9	8.6
	12-Sep-04	-	6.5
	22-Sep-04	-	2.0

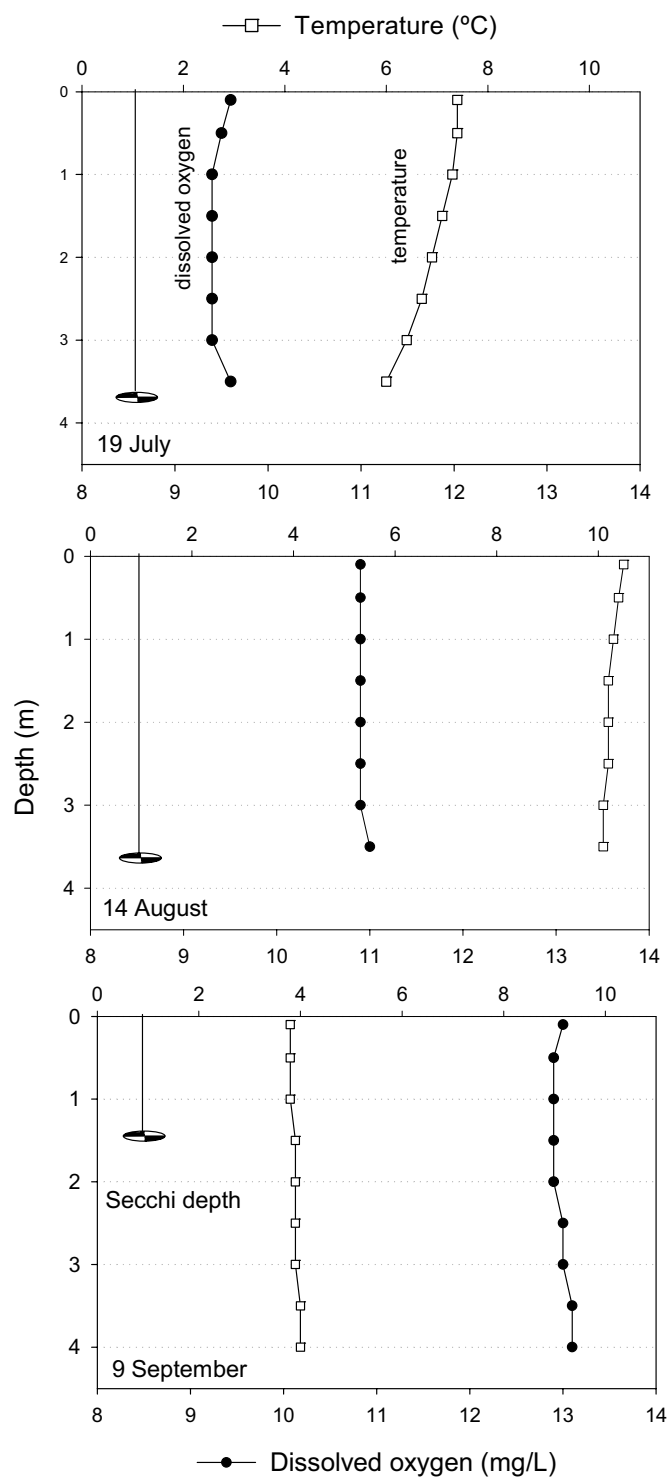


Figure 3.6 Temperature and dissolved oxygen profiles and Secchi depth for Roberts Bay, 2004.

Under-ice sampling was possible in Doris Lake, Tail Lake, and Roberts Lake. The profiles in Tail Lake and Doris Lake showed winter stratification patterns and dissolved oxygen concentrations fell below the guideline for early life stages of fish below approximately 4.5 m depth and below the guideline for the protection of aquatic life below approximately 6.0 m depth in both lakes.

At various times during the open-water season, total aluminum concentrations exceeded CCME guidelines in Roberts Lake (top and bottom), Tail Lake, and Little Roberts Lake. Because the dissolved samples were not above guideline, this was most likely due to the presence of suspended sediment in the sample. In Little Roberts Lake, iron concentrations did not meet CCME guidelines in August and pH did not meet CCME guidelines in September. The iron result was likely caused by wind-induced increases in suspended sediment. The cause of the pH result is unknown.

During under-ice sampling in June, there were elevated concentrations of total and dissolved lead in Doris Lake (top) and Tail Lake (top) and elevated concentrations of dissolved lead in Roberts Lake (mid-column). In addition, the cadmium concentration in Doris Lake (top) was above guideline during June.

3.3.4 Roberts Outflow

Water temperature in Roberts Outflow ranged from 2.0 to 8.6°C (Table 3.5). Only one dissolved oxygen measurement was taken; in July, the dissolved oxygen was 8.9 mg/L (Table 3.5). This is above the CCME guideline for the protection of aquatic life (6.5 mg/L) but below the guideline for the protection of early life stages of fish (9.5 mg/L).

In Roberts Lake, total aluminum concentrations were above CCME guideline in July and September (see section 3.2). In Roberts Outflow, total aluminum concentrations were above CCME guideline in samples collected in July, August, and September. Dissolved aluminum concentrations were always below guideline, however. For this and other reasons discussed above (see section 3.2), elevated aluminum concentrations observed in Roberts Outflow were most likely due to suspended sediment in the sample.

3.3.5 Tail Outflow

Water temperature in Tail Outflow ranged from 0 to 9°C and dissolved oxygen concentrations ranged from 7.9 to 9.4 mg/L (Table 3.5). Dissolved oxygen concentrations consistently met the CCME guideline of 6.5 mg/L for the protection of aquatic life but were always below the CCME guideline of 9.5 mg/L for the protection of early life stages of fish (Table 3.4). All water chemistry parameters were within CCME guidelines.

3.3.6 Little Roberts Outflow

Water temperature in Little Roberts Outflow ranged from 0.5 to 8.9°C, and dissolved oxygen concentrations ranged from 9.3 to 9.8 mg/L (Table 3.5). Both of the dissolved oxygen concentrations are above the CCME guideline for the protection of aquatic life (6.5 mg/L), but the dissolved oxygen concentration in July is slightly below the guideline for the protection of early life stages of fish (9.5 mg/L).

Similar to Roberts Outflow, total aluminum concentrations were above the CCME guideline in June, July, August, and September sampling events. The elevated total aluminum concentrations are, therefore, likely due to suspended sediment collected with the total metal analysis sample.

3.3.7 Summary

In all of the streams and throughout the sampling season, dissolved oxygen concentrations met the CCME guideline for the protection of aquatic life. On occasion, however, they did not meet the guideline for early life stages of fish. At various times, aluminum concentrations were above the CCME guideline in Roberts Outflow and Little Roberts Outflow. This was most likely due to the presence of suspended sediment in the samples.

4.0 FISH POPULATIONS

4.1 METHODS

Fish sampling was conducted in selected lakes and streams within the Doris North Project area based on data gaps identified during the Nunavut Impact Review Board (NIRB) hearings in July 2004 and identified in the submission of the “No Net Loss” Plan (NNLP) to Department of Fisheries and Oceans (DFO) in May 2004. The specific objectives of the 2004 fisheries field program related to the fish population section included:

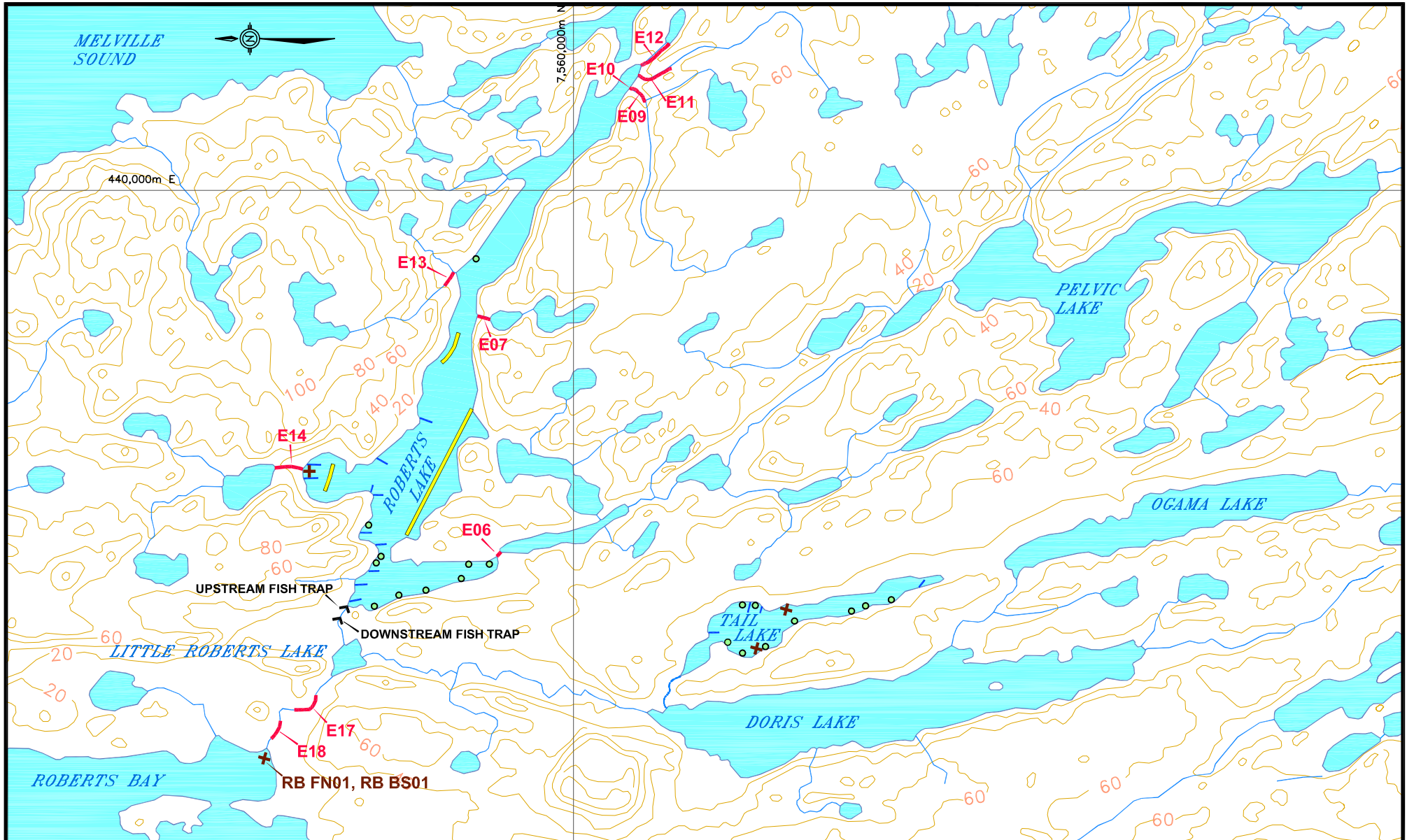
- continued monitoring of use of the Roberts Lake system by Arctic char;
- assessing small fish use of near-shore habitat in Roberts Lake and Tail Lake and Roberts Bay;
- assessing small fish use of Roberts outflow and Little Roberts outflow; and,
- assessing large fish use of offshore habitat in Roberts Lake







Figure 4.1 provides the fish sampling locations and methods used during the 2004 program. Figures 4.2 and 4.3 detail fish sampling methods and locations in Tail Lake and Roberts Lake, respectively. Large fish sampling in Roberts Outflow was conducted between Roberts Lake and Little Roberts Lake and was accomplished with two fish fences with traps. One of the fish fences was upstream of the boulder garden and one of the fish fences was downstream of the boulder garden. Backpack electrofishing was used to sample small fish in Roberts Lake, Roberts Outflow, and Little Roberts Outflow. Small fish sampling in Roberts Lake and Tail Lake was accomplished with beach seines, Gee minnow traps, small-mesh gill nets, and a modified Arctic fyke net. Beach seining and a modified Arctic fyke net were also used in Roberts Bay.

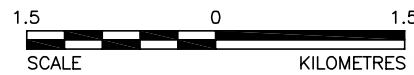
4.1.1 Life History Data Collection

Fish life history information was collected from all fish captured. Live fish were identified to species, measured (fork length to the nearest mm), and weighed (g). Fish larger than 300 mm in fork length were tagged with a uniquely numbered Hall Print™ tag to assess their movements through subsequent recaptures. Additional life history data were collected from fish that had succumbed during sampling; data collected were sex and maturity, reproductive status, and stomach contents.

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 2004, as well as their coded abbreviations, are presented in Table 4.1.

**LEGEND**

-  FISH TRAP
-  FYKE NET (FN)
-  GILL NET (GN)
-  BACKPACK ELECTROFISHING
-  MINNOW TRAP (GT), BEACH SEINE (BS)
-  ANGLING (AN)



NOTE : CONTOUR INTERVAL 20 m

**REFERENCE**

BASE MAP PROVIDED BY RESCAN, JANUARY 22, 2001.

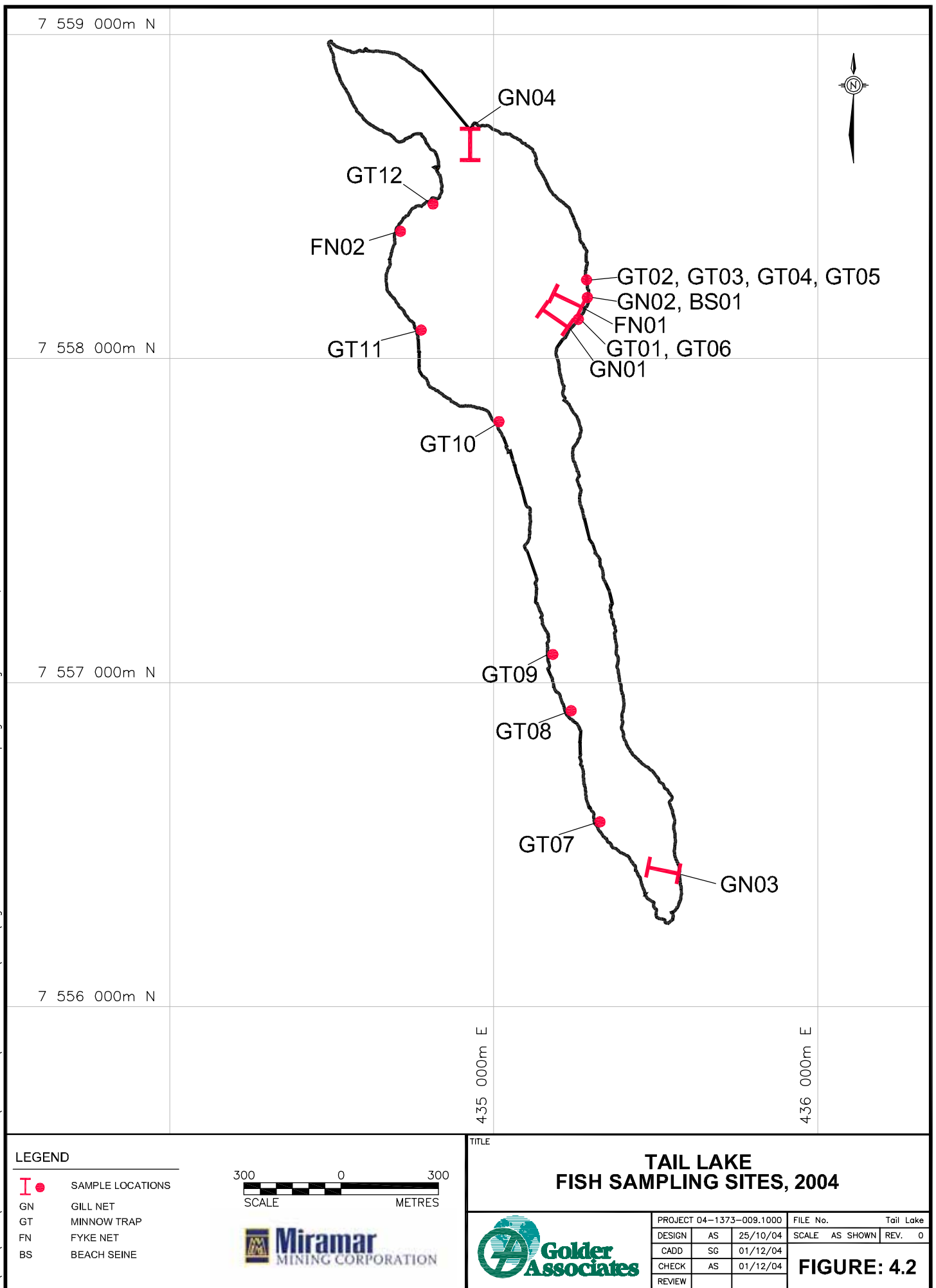
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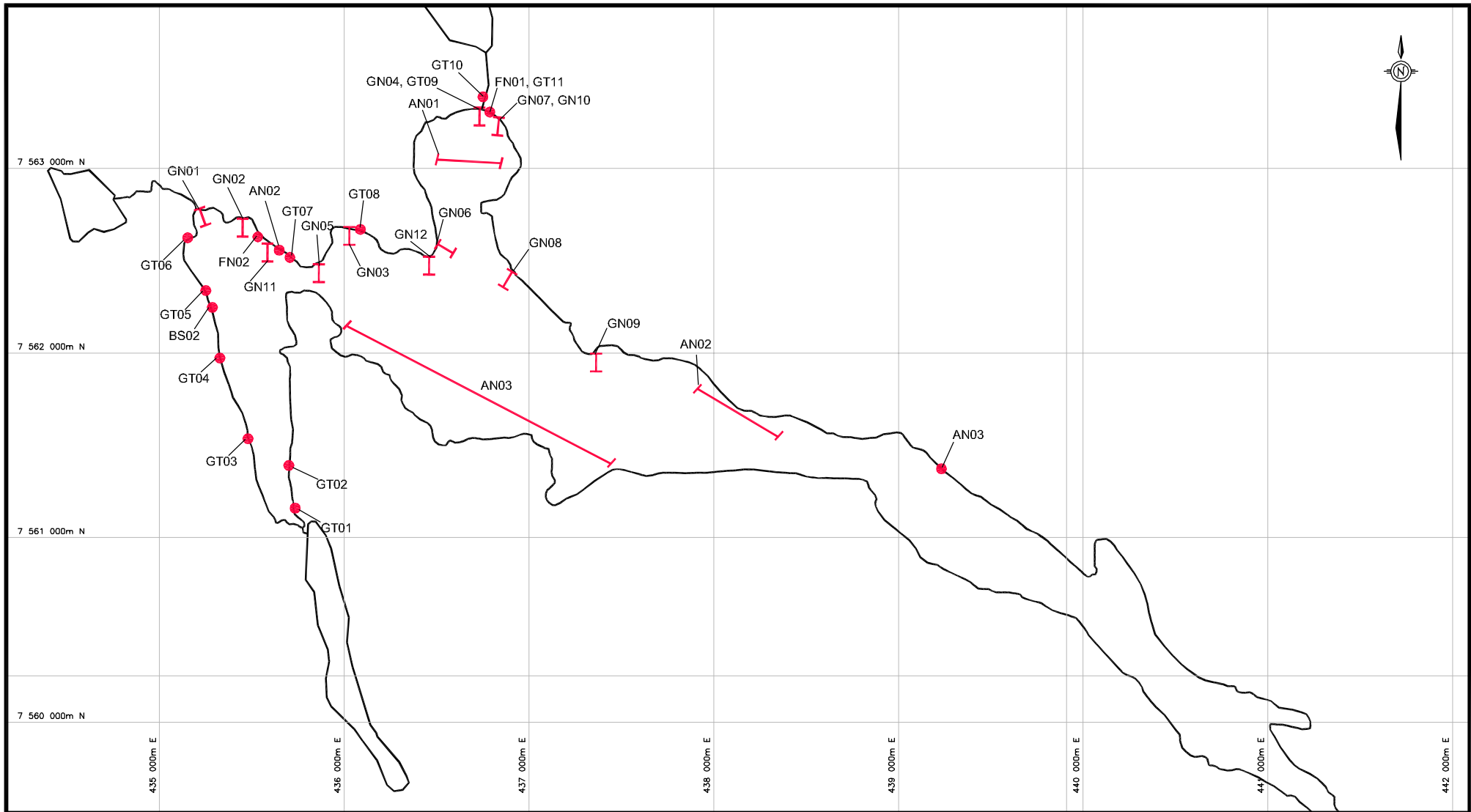
FISH SAMPLING SITES IN THE DORIS NORTH PROJECT AREA, 2004



PROJECT 04-1373-009.1000			FILE No. Fish_SampSites-2004		
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CADD	PSR	22/02/05	FIGURE : 4.1		
CHECK	AS	22/02/05			
REVIEW	AS	22/02/05			

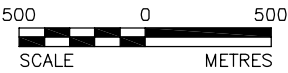
R:\CAD\2004\1370-Edmonton\1373-ES\04-1373-009\1000\Fig 4.2 - Tail Lake Fish Sampling Site.dwg Dec 01, 2004 - 10:58am





LEGEND

-  SAMPLE LOCATIONS
- GN GILL NET
- GT MINNOW TRAP
- FN FYKE NET
- BS BEACH SEINE
- AN ANGLING



TITLE					
ROBERTS LAKE FISH SAMPLING SITES, 2004					
PROJECT 04-1373-009.1000			FILE No. Roberts Lake		
DESIGN	AS	25/10/04	SCALE	AS SHOWN	REV. 0
CADD	SG	01/12/04	FIGURE: 4.3		
CHECK	AS	01/12/04			
REVIEW					



Table 4.1 Common and scientific names of fish species captured in the Doris North Project Area, 2004.

Family	Common name	Scientific name	Code
Salmonidae	Arctic char	<i>Salvelinus alpinus</i> (Linnaeus)	ARCH
	Lake trout	<i>Salvelinus namayacush</i> (Walbaum)	LKTR
	Lake whitefish	<i>Coregonus clupeaformis</i> (Mitchill)	LKWH
	Broad whitefish	<i>Coregonus nasus</i> (Pallas)	BRWH
	Cisco	<i>Coregonus artedii</i> Lesueur	CISC
	Least cisco	<i>Coregonus sardinella</i> Valenciennes	LSCS
Osmeridae	Rainbow Smelt	<i>Osmerus mordax</i> (Mitchill)	RNSM
Gasterosteidae	Ninespine stickleback	<i>Pungitius pungitius</i> (Linnaeus)	NNST
Pleuronectidae	Arctic flounder	<i>Liopsetta glacialis</i> (Pallas)	ARFL
Gadidae	Saffron cod	<i>Eleginus gracilis</i> (Tilesius)	SFCD

4.1.2 Gill Net

Gill nets were set for large and small fish in Roberts Lake and for small fish in Tail Lake. All nets were of the sinking type and comprised of single panels; each panel was 1.5 m deep by 15.2 m long. Small fish were targeted with 1.9 cm stretched mesh while large fish were targeted with 11.43 cm and 12.7 cm stretched mesh. Nets were generally checked every one to two hours to reduce capture mortality. When overnight sets were necessary, small mesh was used to minimize large fish mortality. Information recorded for net sets included the number and mesh size of net panels used, GPS coordinates (± 3 m), water depth (m) and temperature ($^{\circ}\text{C}$), deployment and removal times, and life history data for all captured fish.

4.1.3 Fish Fence

Two fish fences with traps were erected in Roberts Outflow to monitor the fall migration of Arctic char from the ocean to over-wintering habitat in Roberts Lake. The fences were erected such that there was one fence downstream (Plate 2) and one fence upstream of the boulder garden in Roberts Outflow. During periods of moderate to low flow, this boulder garden has been shown to be an impediment to Arctic char migration between the ocean and Roberts Lake (RL&L/Golder 2002). The lower fence and trap were installed on 8 August and removed on 9 September 2004, while the upper fence and trap were installed on 7 August and removed on 9 September 2004. Fence construction for the two sites was very similar and consisted of either two (in the lower trap) or four (in the upper trap) metal panels (each 3.1 m in length and 1.5 m in height) and a trap. The panels consisted of metal frames 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. Fish migrating upstream were funnelled into the trap box located near the right downstream bank (lower fence) or mid-stream (upper fence).

The traps 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.

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

Immediately after the traps were checked, visual inspections of the boulder garden were performed. Tag numbers of fish that were either stranded or holding were recorded and the fish was left in place.

4.1.4 Fyke Net

A modified Arctic fyke net was used to sample small fish in Tail Lake (Plate 3), Roberts Lake, and Roberts Bay. This net consisted of a single trap net, two 7.6 m wings, and a 7.6 m lead to shore. The trap was 0.9 m long and 0.9 m wide, contained two throats (7.5×7.5 cm each), and was constructed of 1.0 cm dark grey knotless nylon mesh. Wings and lead were also constructed of 1.0 cm dark grey knotless nylon mesh, and were 0.9 m deep.

Fyke net sets were placed approximately 30 m off shore. A lead net panel was set perpendicular from shore and bisected the trap entrance. Wing net panels were attached to either side of the trap entrance and were stretched out parallel to shore. The combination of the lead panel and wings acted to confine and guide fish into the trap. Fyke net sets were held in place by anchors placed on the trap, lead, and wings.

Fyke nets were checked daily. Information recorded during each net check included water temperature, date and time of day, and life history data on captured fish.

4.1.5 Backpack Electrofishing

A Smith-Root Type XII backpack electrofisher was used to collect small fish in Roberts Outflow, Little Roberts Outflow, and tributaries to Roberts Lake. The operator waded upstream and sampled in the vicinity of suspected fish holding areas (e.g., under boulders, undercut banks, etc.) while the netter collected stunned fish and placed them in a holding bucket. Recorded information at each site included UTM coordinates, date and time of sampling, distance sampled, sampling effort (seconds), and electrofisher settings. Captured fish were allowed

to recover, processed for life history information, and released into the area of capture.

4.1.6 Beach Seine

Beach seining for small fish was conducted in Roberts Lake, Tail Lake, and Roberts Bay in areas of suitable substrate (i.e., fine or small substrate). The beach seine was 6.0 m long with a mesh size of 5 mm and was equipped with a collection bag. The length of each haul was recorded to determine catch-per-unit effort. Similar to the other sampling methods, life history information was recorded and location, date, time, water temperature, and substrate type were also recorded.

4.1.7 Minnow Trap

GeeTM minnow traps were used to sample small fish in Tail Lake and Roberts Lake. The traps (40 cm long, 23 cm diameter in the middle, 19 cm diameter at each end) were two-piece wire enclosures with inverted funnel openings. They were baited with cat food or oysters and were set in near-shore habitats. Date, time, sampling location, depth, water temperature and substrate type were recorded for all minnow trap sets, and life history information was recorded for all captured fish.

4.1.8 Angling

Angling was conducted by either casting from shore or trolling behind a boat. Barbless lures were used and fish were processed for life history information before being released. Other recorded data included date, time, location, hours fished, number of rods used, and distance sampled.

4.1.9 Data Analysis

All life history data from individual fish were consolidated into one table (Appendix C1) 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, and condition factor data; and,
- size characteristics for separate sex and maturity categories;

As an index of relative abundance, catch-per-unit effort (CPUE) values were calculated for each sampling method. Gill net CPUE values are reported as number of fish captured per 100 m² of each mesh size panel set for the equivalent

of 24 hours (fish/100 m²/24 h). CPUE values for fyke net, minnow trap, and fish fence catches are reported as number of fish captured per 24 hours of trap operation. CPUE values for angling are reported as number of fish captured per hour of angling with one rod. Backpack electrofishing CPUE values are reported as number of fish per 100 seconds, and beach seining CPUE units are reported as number of fish per 100 m².

4.2 LAKE COMMUNITIES

4.2.1 Tail Lake

The catch and size statistics for fish sampled in Tail Lake are summarized in Appendices C2 to C6 and Appendix C8; data from individual fish are presented in Appendix C1. Fish capture methods used in Tail Lake targeted small fish and included fyke nets, gill nets, minnow traps, and beach seines.

4.2.1.1 Species Composition and Relative Abundance

In total, 26 fish representing two species were captured in Tail Lake (Table 4.2). Lake trout was the predominant species in the overall catch (54%), followed by ninespine stickleback (46%). Gill nets were the most successful capture method for lake trout and minnow traps were the most successful capture method for ninespine stickleback (Table 4.3). This was the first time that ninespine stickleback were directly captured in Tail Lake; previously, they were only encountered in the stomachs of captured lake trout.

Table 4.2 Number of fish captured in Tail Lake, 2004.

Capture Method	Lake trout	Ninespine stickleback	Total
Fyke net	0	4	4
Gill net	14	0	14
Minnow trap	0	8	8
Beach seine	0	0	0
Total	14 (54%)	12 (46%)	26 (100%)

Table 4.3 Catch-per-unit effort (CPUE^a) of fish captured in Tail Lake, 2004.

Capture Method	Effort ^a	Lake trout		Ninespine stickleback		Total	
		n	CPUE	n	CPUE	n	CPUE
Fyke net	44.6 h	0	0	4	2.15	4	2.15
Gill net	89.1 h	14	10.14	0	0	14	10.14
Minnow trap	272.7 h	0	0	8	0.70	8	0.70
Beach seine	450 m ²	0	0	0	0	0	0
Total		14		12		26	

^a CPUE units: gill net = fish/100 m²/24 h; fyke net and minnow trap = fish/24 h; beach seine = fish/100 m².

4.2.1.2 Life History Data

Lake Trout

Although the sampling effort targeted small fish, all lake trout captured in Tail Lake were adults. Fork lengths ranged from 509 to 710 mm, with a mean of 574 mm (Appendix C8). Similar to sampling conducted in previous years (RL&L/Golder 2002), the majority of captured lake trout were 550-589 mm. The lack of representation from small size-classes indicates low recruitment in Tail Lake, particularly because the sampling gear should have targeted smaller size-classes.

The mean condition factor for lake trout in Tail Lake was 0.96, with a range of 0.77 to 1.29 (Appendix C8). This is less than the mean condition factor for lake trout in Roberts Lake, Roberts Outflow, or Little Roberts Outflow (Appendix C8) and is similar to the mean condition factor reported in the 2002 (0.94; RL&L/Golder 2002).

Ninespine stickleback

The 12 ninespine stickleback that were captured in Tail Lake ranged from 32 to 65 mm, with a mean of 44 mm (Appendix C8).

4.2.2 ROBERTS LAKE

The catch and size statistics for fish sampled in Roberts Lake are summarized in Appendices C2 to C6 and Appendix C8; data from individual fish are presented in Appendix C1. Fish capture methods used in Roberts Lake included fyke nets, gill nets, backpack electrofishing, minnow traps, beach seines, and angling. Both large and small fish were targeted.

4.2.2.1 Species Composition and Relative Abundance

Seventy-five fish representing five species were captured in Roberts Lake (Table 4.4). Lake trout was the predominant species in the overall catch (61%), followed by lake whitefish (28%), Arctic char (8%), least cisco (1.5%), and broad whitefish (1.5%). Gill nets were the most successful capture method for large fish. The small fish catch was very low despite considerable effort (Table 4.5).

Table 4.4 Number of fish captured in Roberts Lake, 2004.

Capture Method	Arctic char	Lake trout	Lake whitefish	Broad whitefish	Least cisco	Total
Fyke net	3	1	1	0	0	5
Gill net	1	22	20	1	1	45
Backpack electrofishing	2	1	0	0	0	3
Minnow trap	0	0	0	0	0	0
Beach seine	0	0	0	0	0	0
Angling	0	22	0	0	0	22
Total	6 (8%)	46 (61%)	21 (28%)	1 (1.5%)	1 (1.5%)	75 (100%)

Table 4.5 Catch-per-unit effort (CPUE^a) of fish captured in Roberts Lake, 2004.

Capture Method	Effort ^a	Arctic char	Lake trout	Lake whitefish	Total
Fyke net	68.8 h	1.05	0.35	0.35	1.75
Gill net	166.5 h	0.27	5.92	5.38	11.58
Backpack electrofishing	381 s	0.52	0.26	0	0.79
Minnow trap	247.1 h	0	0	0	0
Beach seine	480 m ²	0	0	0	0
Angling	13.6 h	0	1.62	0	1.62

^a CPUE units: gill net = fish/100 m²/24h; fyke net and minnow trap = fish/24 h; electrofishing = fish/100s; beach seine = fish/100 m².

4.2.2.2 Life History Data

Arctic Char

All of the Arctic char captured in Roberts Lake were immature and likely rearing in Roberts Lake or nearby stream habitats. Fork lengths ranged from 73 to 167 mm, with a mean length of 110 mm (Appendix C8).

Lake Trout

Size Distribution

Of the 46 lake trout captured in Roberts Lake, four were juveniles and 42 were adults. Fork lengths ranged from 70 to 903 mm, with a mean length of 612 mm (Appendix C8). Most (63%) captured fish were between 600 and 900 mm. All other size-classes were equally represented (Figure 4.4).

Length-Weight Relationship

The length-weight relationship for lake trout captured in Roberts Lake (Figure 4.5) was:

$$\text{Log Weight (g)} = -5.005 + 2.999 \log \text{Fork Length (mm)} \quad (n=39, r^2=0.99)$$

$$\text{Or } W = 9.886 \times 10^{-6} * L^{2.999}$$

The mean condition factor for lake trout in Roberts Lake was 0.99, which was higher than the mean condition factor for lake trout in Tail Lake but lower than the mean condition factor for lake trout in either Roberts Outflow or Little Roberts Outflow (Appendix C8). This may indicate that lake trout residing solely in Roberts Lake experience poorer food availability and/or quality than those that migrate within the watershed.

Lake whitefish

Size Distribution

Despite a considerable effort to capture small fish, all lake whitefish captured in Roberts Lake were adults. The mean fork length was 438 mm and the range was 337 to 545 mm (Appendix C8). Forty percent of captured fish were between 450 and 480 mm (Figure 4.6).

Length-Weight Relationship

The length-weight relationship for lake whitefish captured in Roberts Lake (Figure 4.7) was:

$$\text{Log Weight (g)} = -5.533 + 3.253 \log \text{Fork Length (mm)} \quad (n=18, r^2=0.98)$$

$$\text{Or } W = 2.931 \times 10^{-6} * L^{3.253}$$

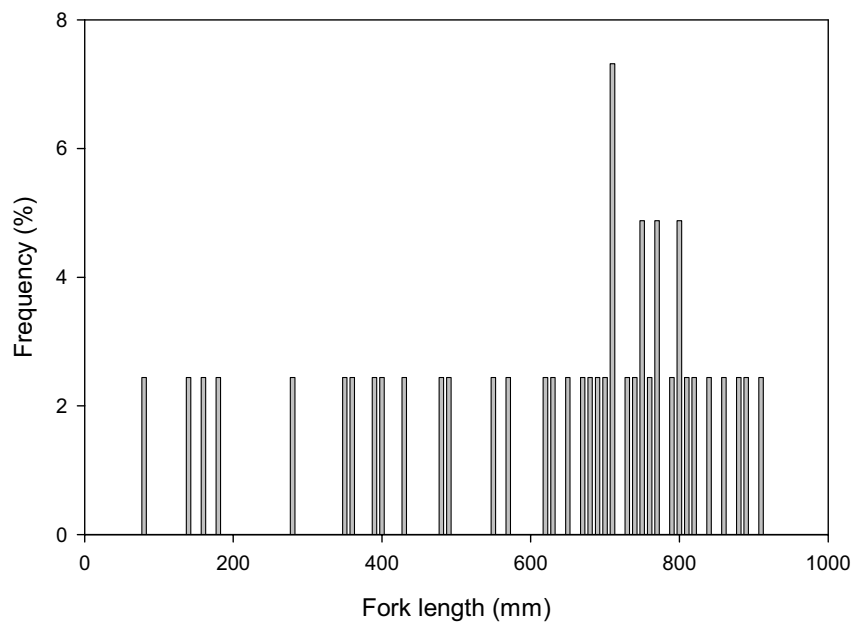


Figure 4.4 Length-frequency distribution of lake trout in Roberts Lake.

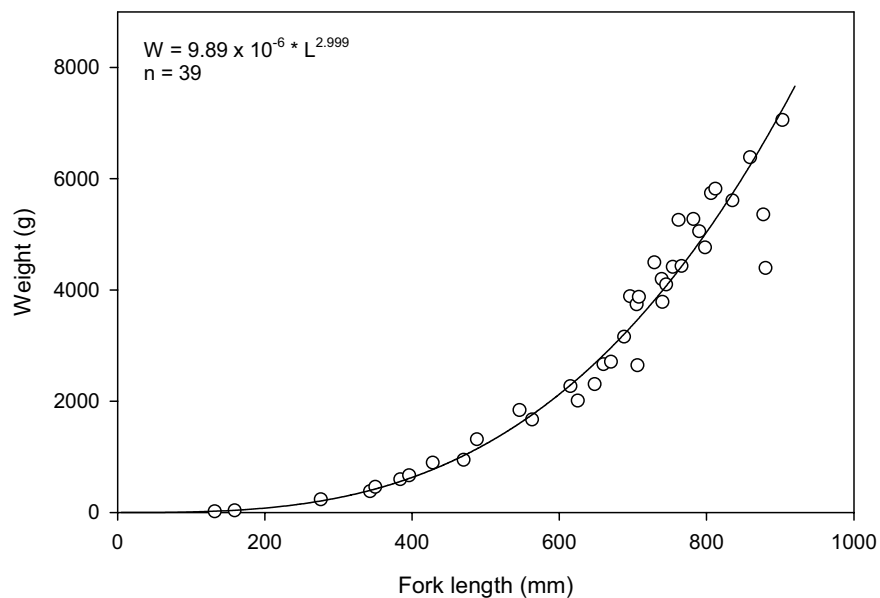


Figure 4.5 Length-weight relationship for lake trout captured in Roberts Lake, 2004.

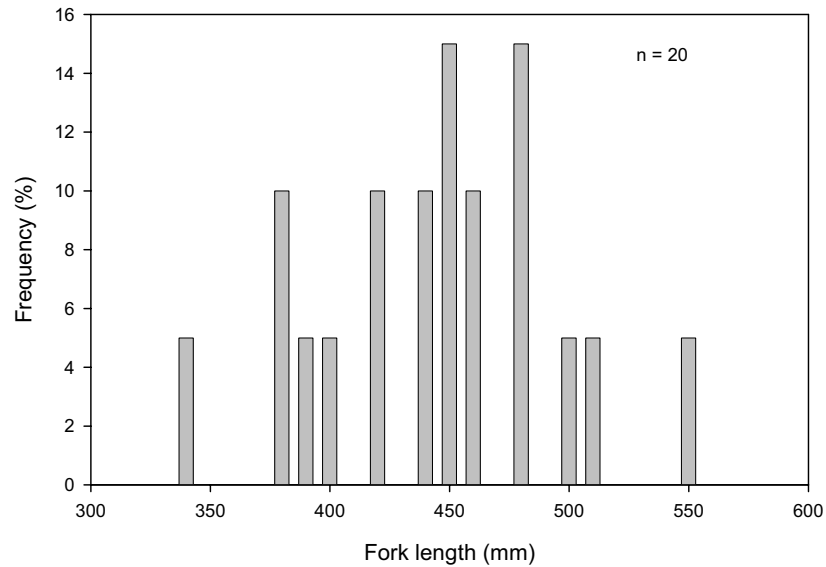


Figure 4.6 Length-frequency distribution of lake whitefish in Roberts Lake, 2004.

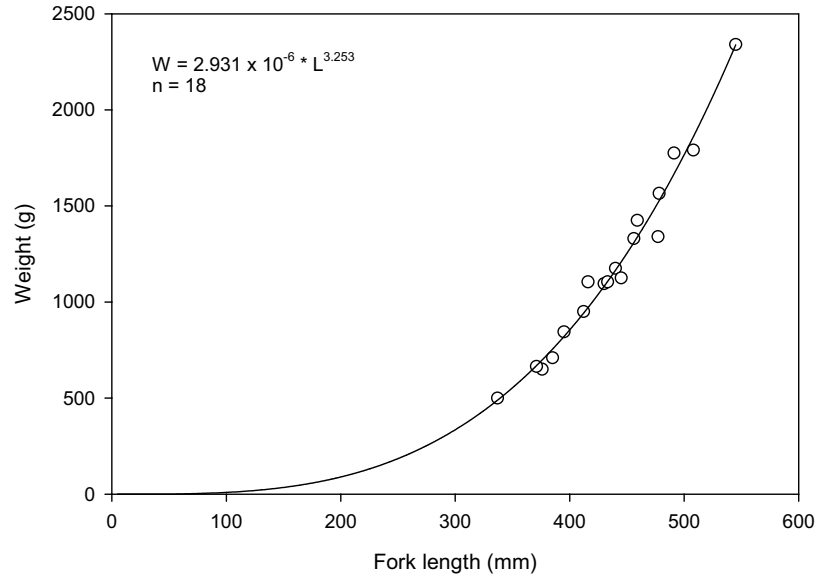


Figure 4.7 Length-weight relationship for lake whitefish captured in Roberts Lake, 2004.

Condition factors for lake whitefish in Roberts Lake ranged from 1.22 to 1.53, with a mean of 1.37. This is slightly higher than mean condition factors reported for lake whitefish in Doris, Ogama, Patch, Little Roberts, and Pelvic Lakes in 2002 (RL&L/Golder 2002); mean condition factors in these lakes varied from 1.22 to 1.32. This may be due to better food availability or quality in Roberts Lake, or it may be a result of the relatively small sample size captured in Roberts Lake (18 fish).

Broad whitefish and Least cisco

One broad whitefish and one least cisco were captured in Roberts Lake (Table 4.4). The broad whitefish was an adult and had a fork length of 149 mm and a condition factor of 1.25. The least cisco had a fork length of 149 mm and a condition factor of 0.91 (Appendix C8).

4.3 STREAM COMMUNITIES

This section of the report focuses primarily on fish use within Roberts Outflow, as this is the primary component of the “No Net Loss Plan” (RL&L/Golder 2004) for the project.

The catch rates and size statistics for fish species sampled in streams are summarized in Appendices C2 to C8; data from individual fish are presented in Appendix C1. Fish in most of the streams sampled were captured with a backpack electrofisher, with the exception of Roberts Outflow. Fish sampling in Roberts Outflow included fish fences, backpack electrofishing, beach seining, and dip netting.

4.3.1 Roberts Outflow

4.3.1.1 Species Composition and Relative Abundance

In total, 403 fish representing four species were encountered in Roberts Outflow during August and September 2004 (Table 4.6). Arctic char was the predominant species in the overall catch (58.6%), followed by lake trout (36.5%).

Table 4.6 Number of fish encountered^a in Roberts Outflow, 2004.

Species	Fish Fence		Electrofishing		Beach Seine		Dip Net		Total	
	no.	%	no.	%	no.	%	no.	%	no.	%
Arctic char	185	67.8	47	38.5	2	33.3	2	100.0	236	58.6
Lake trout	87	31.9	56	45.9	4	66.7			147	36.5
Char spp.			18	14.8					18	4.5
Cisco	1	0.4							1	0.2
Ninespine stickleback			1	0.8					1	0.2
Total	273	100.0	122	100.0	6	100.0	2	100.0	403	100.0

^a excluding recaptures in the upper fish fence.

Fish Fence

To monitor the number of fish migrating through the boulder garden located in Roberts Outflow, a fish fence was installed at the downstream end (termed the “lower trap”) and at the upstream end (termed the “upper trap”) of the boulder garden section. This is the third year that this monitoring program has been conducted (i.e., 2002 to 2004). It should also be noted that Rescan floy tagged fish during their field program in 2000.

In total, 273 fish were captured at the boulder garden in Roberts Outflow (not including fish that were captured more than once this year). Most fish were Arctic char (67.8%), followed by lake trout (31.9%; Table 4.6). During the 30 days that the fish fence was employed, there were four days (13.3% of the time) when Arctic char were not encountered in the lower trap and 20 days (67% of the time) when Arctic char were not encountered in the upper trap. Similarly, there were 13 days (43%) when lake trout were not captured in the lower trap and 21 days (70%) when they were not captured in the upper trap (Table 4.7).

Table 4.7 Summary of the dates when Arctic char and Lake trout were not captured at the fish fences.

Arctic Char		Lake Trout	
Lower Trap	Upper Trap	Lower Trap	Upper Trap
8-Aug	8-Aug	15-Aug	15-20 Aug
22-Aug	9-Aug	17-Aug	22-Aug
5-Sep	13-Aug	22-Aug	25-Aug
6-Sep	15-Aug	26 - 30 Aug	27-31 Aug
	18-Aug	1-Sep	1-8 Sep
	21 - 23 Aug	3-6 Sep	
	26 - 30 Aug		
	1-5 Sep		
	7-8 Sep		
n=4	n=20	n=13	n=21

The number of Arctic char entering the lower trap on a daily basis varied greatly (Figure 4.8). The maximum number of Arctic char that passed through the lower trap in a day was 18 fish on 12 August and the mean number was six fish per day. In the upper trap, most Arctic char (90%) were captured between 10 and 23 August (Figure 4.8).

The size distribution of Arctic char passing through the lower fish fence varied over time (Figure 4.9). From the beginning to mid-August, larger size-classes (>650 mm in fork length) dominated. During mid to late August, all size-classes appeared to be equally represented. From late August to early September, smaller size classes (<400 mm in fork length) dominated.

In contrast to Arctic char, most lake trout (90%) passed through the lower trap in mid-August (8 to 21 August; Figure 4.10). The maximum number of lake trout recorded daily in the lower trap was 15 fish on 11 August. The mean number of lake trout encountered within the 30 day sampling period (4.5 fish per day) was slightly lower than for Arctic char.

The number of initial encounters of fish that passed through the lower trap during 2004 included 185 Arctic char, 88 lake trout, and 1 cisco. Of those, the number of recaptures encountered from previous years (i.e., 2000, 2002, and 2003) accounted for 25.4% of the Arctic char catch (n=47 of 185) and 15.9% of the lake trout catch (n=14 of 88) (Table 4.8).

Table 4.8 Number of fish captured and recaptured in Roberts Outflow, 2004.

Species	Initial Captures in 2004	No. of Fish Recaptured in Upper Trap during 2004	Number of Recaptures from Previous Years		
			2003	2002	2000
Arctic char	185	40	32	14	1
Lake trout	88	46	8	4	2
Cisco	1				
Total	274	86	40	18	3

The open-water season of 2004 was relatively dry, and flows through the boulder garden section were low. This made migration through the boulder garden difficult or impossible for large fish. Of the 185 Arctic char captured in the lower trap, 40 fish were recaptured in the upper trap. The total number of Arctic char that were stranded within the boulder garden section and likely perished during 2004 was 145 (78.4%). Comparison of hydrology data collected during 2004 in Roberts Outflow and the number of Arctic char that were able to migrate through

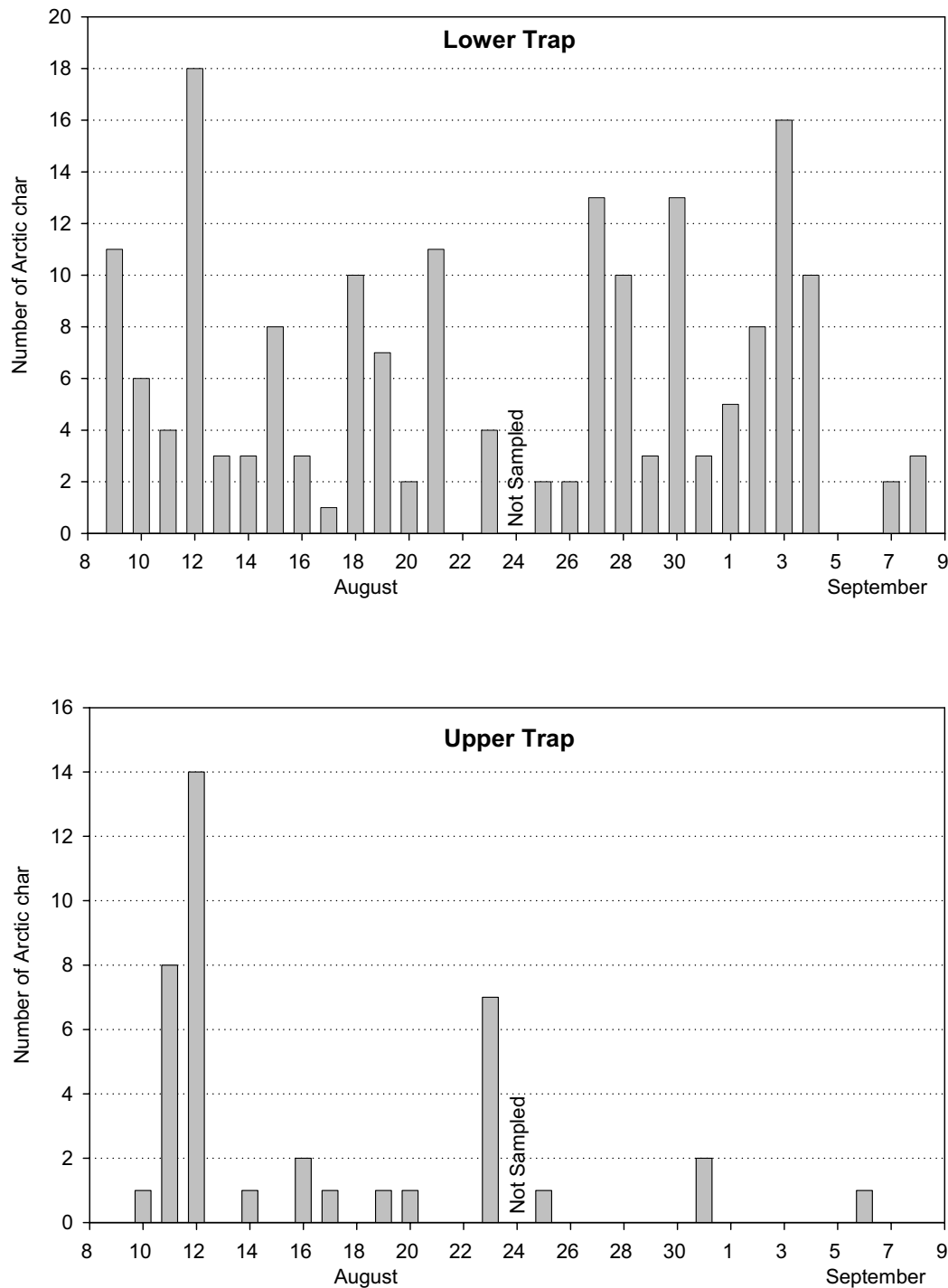


Figure 4.8 Daily catches of Arctic char in the fish fences in Roberts Outflow, 2004.

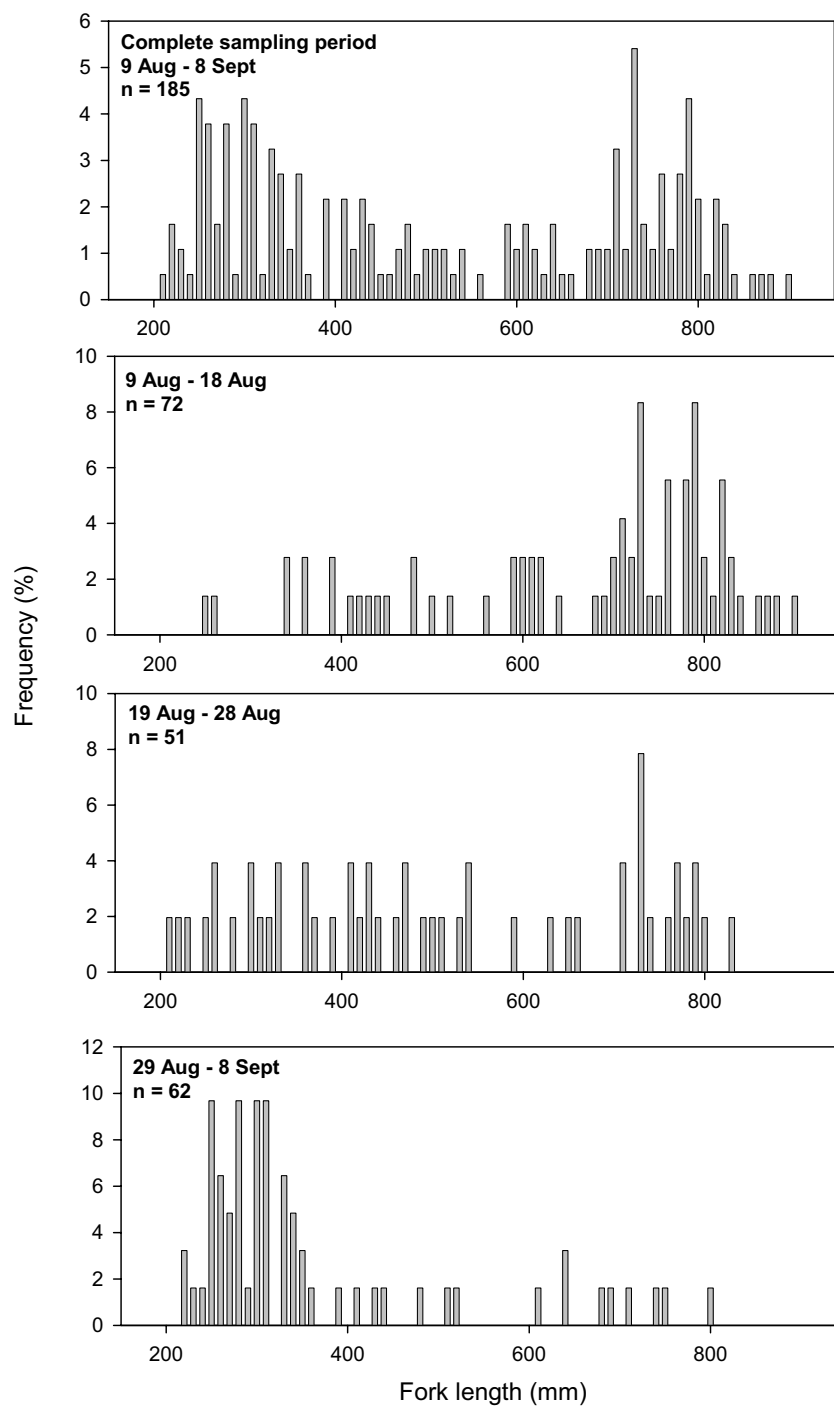


Figure 4.9 Temporal changes in length-frequency distribution of Arctic char captured at the fish fence in Roberts Outflow, 2004.

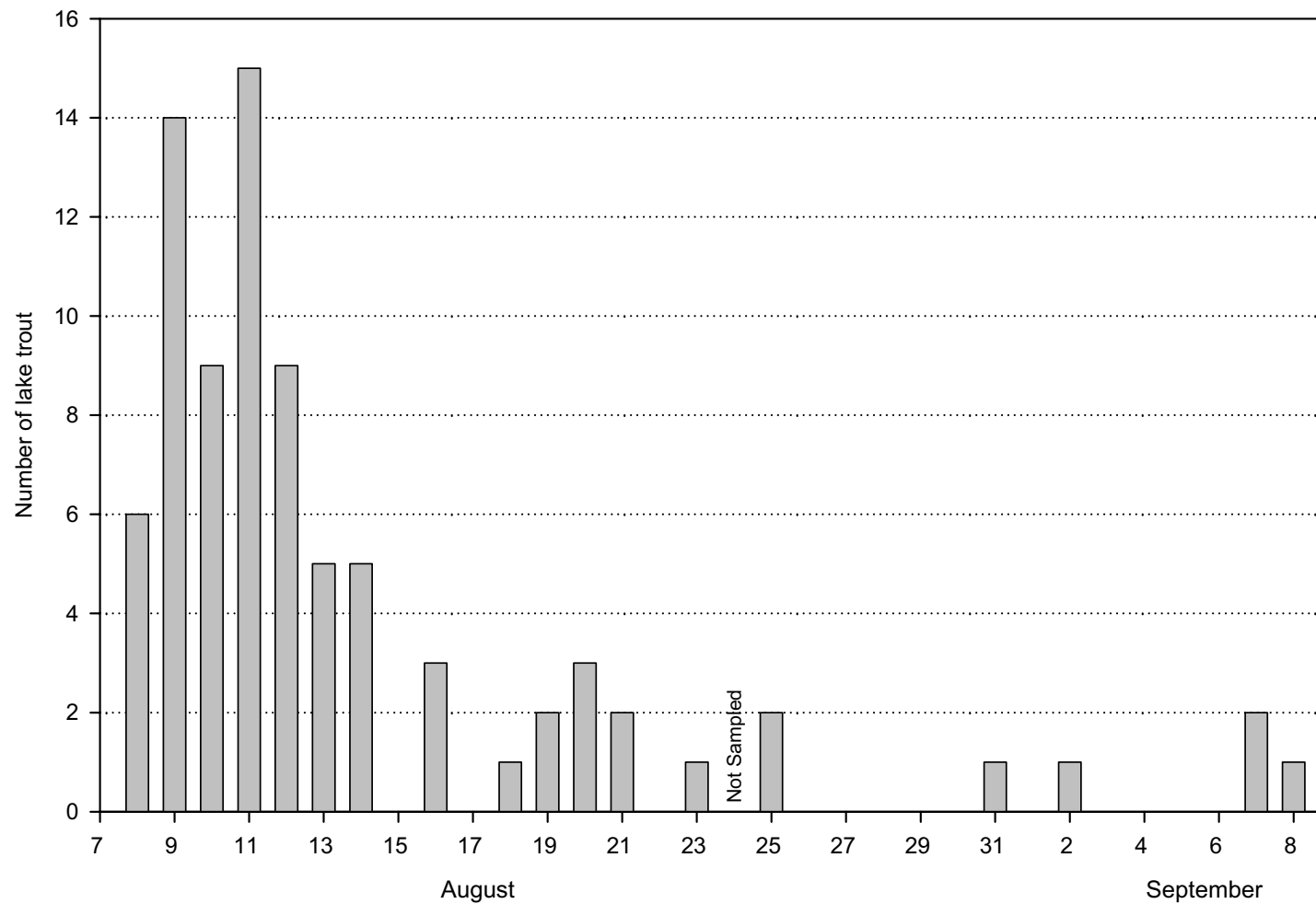


Figure 4.10 Daily catches of lake trout in the lower fish fence in Roberts Outflow, 2004.

the boulder garden suggests that migration of larger fish is difficult when discharges drop below $0.145 \text{ m}^3/\text{s}$ (Table 4.9). Three of the 40 fish captured in the upper trap were able to navigate through the boulder garden during discharges $<0.145 \text{ m}^3/\text{s}$. These fish had fork lengths of 259, 512, and 520 mm.

The number of lake trout stranded in the boulder garden was lower than for Arctic char. Of the 88 tagged lake trout, 46 passed through the upper trap, which suggests that 47.7% of the lake trout population was stranded within the boulder garden section, and likely perished. Representative photos of stranded fish are provided in Plates 8, 10, and 11.

Most Arctic char (90%) were captured in the upper trap between 8 and 23 August. Following that, only four Arctic char passed through the upper fish fence, one on 25 August, two on 31 August and one on 6 September. Similarly, most lake trout (89%) were captured in the upper fish fence between 8 and 14 August. The last lake trout was recorded in the upper fish fence on 26 August.

Backpack Electrofishing

Backpack electrofishing was conducted within the boulder garden on eight separate occasions to assess the rearing use of fish in this area (Table 4.10). Overall, 122 fish were captured or observed. Lake trout represented 45.9% of the catch, followed by Arctic char (38.5%).

Fish encountered in the boulder garden during backpack electrofishing were comprised entirely of juveniles. Arctic char ($n=47$) ranged from 45 to 189 mm in fork length, with a mean of 95 mm. Lake trout ($n=55$) ranged from 48 to 185 mm in fork length, with a mean of 97 mm.

Table 4.9 Summary of the number of Arctic char captured in the upper fish fence in Roberts Outflow and mean daily discharge, 2004.

Date	Mean Daily Discharge ^{a, b} (m ³ /s)	No. of Fish	Fork Length (mm)	
			Mean	Range
August	8	0		
	9	0		
	10	1	758	-
	11	8	722	583 - 787
	12	14	638	383 - 821
	13	0		
	14	1	733	-
	15	0		
	16	2	634	408 - 860
	17	1	726	-
	18	0		
	19	1	475	-
	20	1	753	-
	21	0		
	22	0		
	23	7	501	400 - 627
	24	0		
	25	1	500	-
	26	0		
	27	0		
	28	0		
	29	0		
	30	0		
	31	2	390	259 - 520
September	1	0		
	2	0		
	3	0		
	4	0		
	5	0		
	6	1	512	-
	7	0		
	8	0		

^a since the fish likely moved into the trap during the evening or early morning and the traps were checked daily in the morning, the discharge values used in the table correspond to the previous days discharge.

^b red indicates days of no fish passage; green indicates days of full fish passage; yellow indicates days where fish passage is uncertain.

Table 4.10 Number and catch-per-unit-effort of fish encountered by backpack electrofishing in the boulder garden of Roberts Outflow, 2004.

Date	Effort (s)	Arctic char		Lake trout		Ninespine stickleback		Char Spp. ^b	
		<i>n</i>	CPUE ^a	<i>n</i>	CPUE	<i>n</i>	CPUE	<i>n</i>	CPUE
17-Aug	269	5	1.86	8	2.97			9	3.35
21-Aug	513	13	2.53	10	1.95				
25-Aug	661	5	0.76	18	2.72			9	1.36
31-Aug	410	5	1.22	9	2.20				
3-Sep	455	10	2.20	5	1.10				
4-Sep	225	5	2.22	2	0.89				
6-Sep	390	4	1.03	3	0.77	1	0.26		
8-Sep	150		0.00	1	0.67				
Total	3073	47	1.53	56	1.82	1	0.03	18	0.59

^a CPUE = catch-per-unit effort = number of fish / 100 s.

^b these are observed fish that could not be differentiated between Arctic char or lake trout.

4.3.1.2 Life History Data

Arctic Char

Size Distribution

The length distribution of individual Arctic char captured in Roberts Outflow (n=234; all methods combined) was widespread, ranging from 45 to 892 mm in fork length (mean of 433 mm). Most of these fish (73% of the catch) were larger than 250 mm in fork length; these were primarily maturing fish or 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 freshwater habitats (e.g., between Roberts and Little Roberts lakes).

Of the fish captured in Roberts Outflow, primarily at the boulder garden, the length-distribution pattern exhibited three categories of sizes (Figure 4.11). The smallest mode was comprised of fish between 45 and 200 mm in fork length (n=47); the second size grouping was comprised of fish between 200 and 600 mm (n=108); and the third size grouping was comprised of fish >600 mm (n=79).

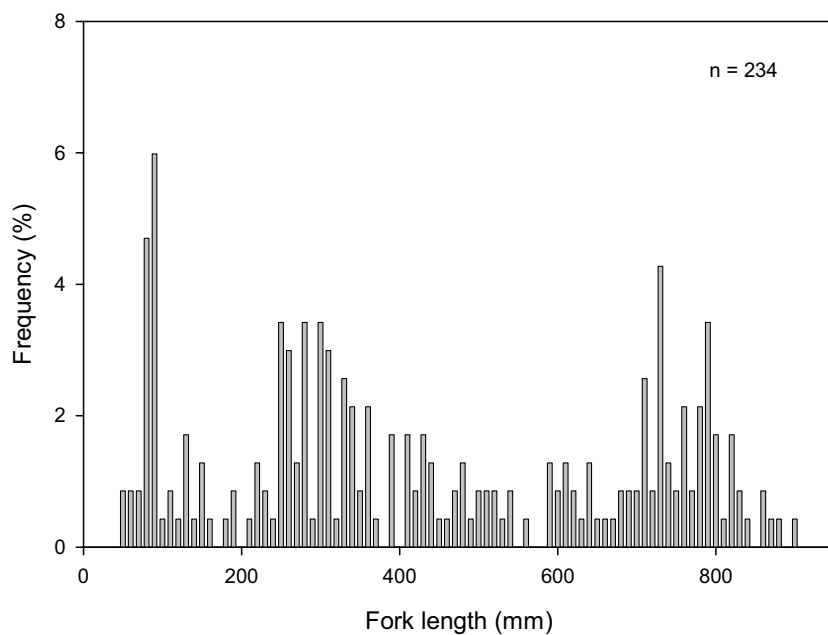


Figure 4.11 Length-frequency distribution of Arctic char captured by various methods in Roberts Outflow, 2004.

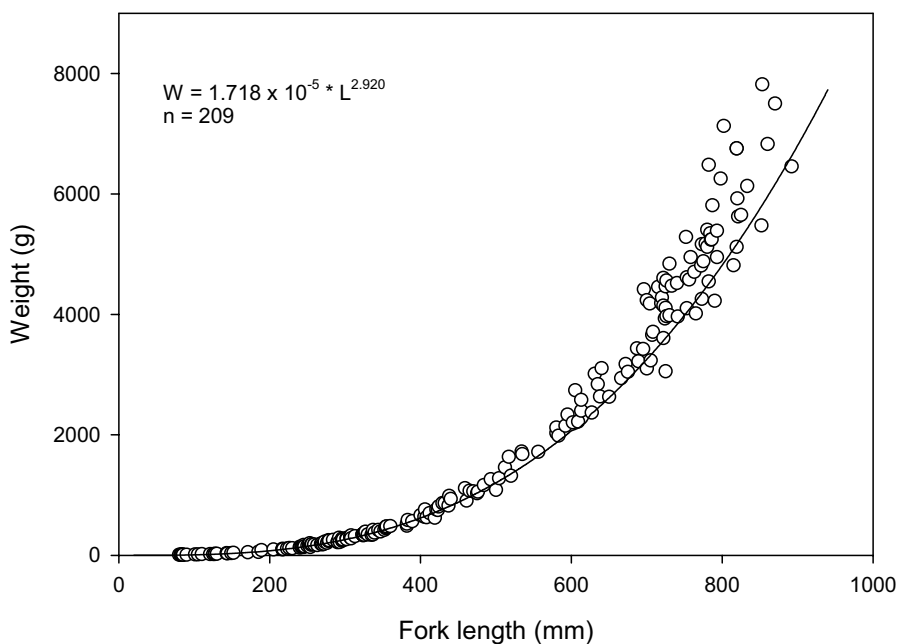


Figure 4.12 Length-weight relationship for Arctic char captured in Roberts Outflow, 2004.

Length-Weight Relationship

The length-weight regression equation for Arctic char captured in Roberts Outflow (Figure 4.12) was:

$$\log \text{ Weight (g)} = -4.765 + 2.920 \log \text{ Fork Length (mm)} \quad (n=209; r^2=0.995)$$

$$\text{or} \quad W = 1.718 \times 10^{-5} * L^{2.920}$$

The mean condition factor was 1.08; condition factors for individual fish ranged from 0.8 to 1.95.

Sex and Maturity

Sex (based on external characteristics) was determined for 95 Arctic char. Of those, 73 were females and 22 were males (Appendix C1). During the Doris North aquatic studies, maturity has only been determined for fish that had succumbed during sampling; during the 2004 field season, there were no fish that succumbed at the fish fences.

Diet

Since none of the Arctic char that passed through the fish fence succumbed during sampling, no diet information was available.

Lake Trout

Size Distribution

Lake trout caught in Roberts Outflow (n=144) ranged from 48 to 772 mm in fork length (mean of 334 mm). Two main size groupings were evident for lake trout in Roberts Outflow. Approximately 40% of the population was between 40 and 200 mm and approximately 60% of the population was between 380 to 630 mm in fork length (Figure 4.13).

Length-Weight Relationship

The length-weight regression equation for lake trout caught in Roberts Outflow (Figure 4.14) was:

$$\log \text{ Weight (g)} = -4.734 + 2.922 \log \text{ Fork Length (mm)} \quad (n=111; r^2=0.993)$$

$$\text{or} \quad W = 1.845 \times 10^{-5} * L^{2.922}$$

The mean condition factor was 1.17; condition factors for individual fish ranged from 0.80 to 1.81 (Appendix C8).

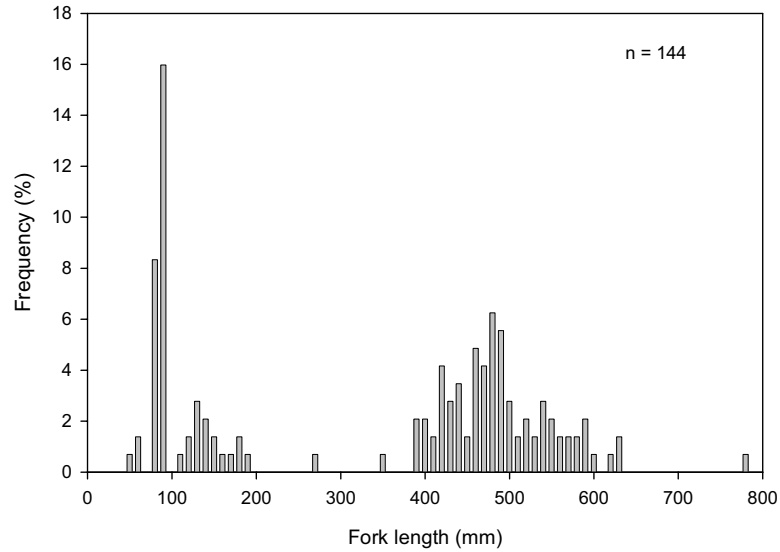


Figure 4.13 Length-frequency distribution of lake trout captured by various methods in Roberts Outflow, 2004.

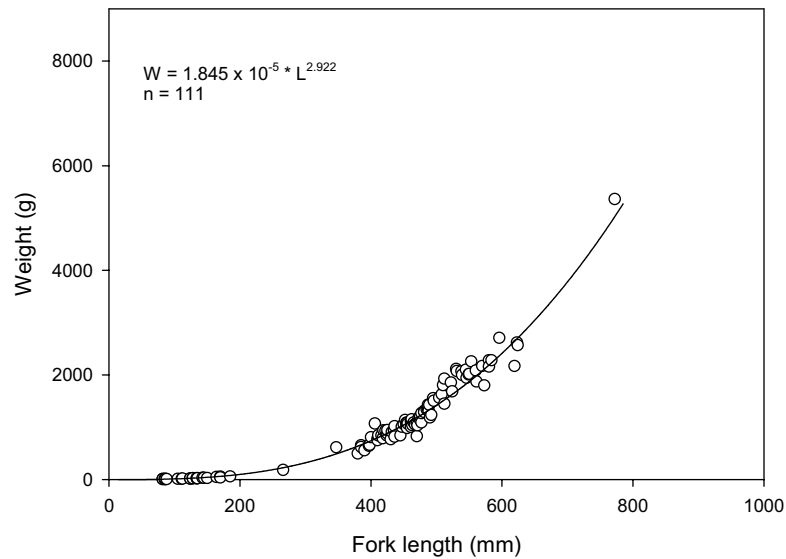


Figure 4.14 Length-weight relationship for lake trout captured in Roberts Outflow, 2004.

Cisco

One cisco was captured in Roberts Outflow. This fish had a fork length of 331 mm and a weight of 415 g. The condition factor for this fish was 1.14 (Appendix C8).

Ninespine Stickleback

One ninespine stickleback was captured in Roberts Outflow. This fish had a fork length of 66 mm (Appendix C8).

4.3.2 Roberts Lake Tributaries

4.3.2.1 Species Composition and Relative Abundance

Seven tributaries flowing into Roberts Lake were sampled. Of these, four of the streams had very little or no flowing water present. Fish were captured in two streams (Table 4.11). In total, 21 fish representing three species were captured. Arctic char was the dominant species (n=15); lake trout (n=1) and ninespine stickleback (n=3) were also captured. The overall catch-per-unit effort (CPUE) for backpack electrofishing CPUE was 2.90 fish/100 s.

Table 4.11 Catch, species composition, and catch-per-unit effort (CPUE^a) data for fish captured by backpack electrofishing in Roberts Lake tributaries, 2004.

Location	Effort (s)	Arctic char		Lake trout		Ninespine Stickleback		Char spp.		Total	
		n	CPUE	n	CPUE	n	CPUE	n	CPUE	n	CPUE
Tributary E07	0										
Tributary E08	0										
Tributary E09a	219	2	0.91	1	0.46			1	0.46	4	1.83
Tributary E11	105										
Tributary E12	0										
Tributary E13	0										
Tributary E14	399	13	3.26			3	0.75	1	0.25	17	4.26
Total for Sites Combined	723	15	2.07	1	0.14	3	0.41	2	0.28	21	2.90

^a CPUE units = fish /100 s.

4.3.2.2 Life History Data

Arctic Char

The Arctic char (n=15) captured in the tributaries of Roberts Lake were young-of-the-year (YOY) fish that were rearing in these streams. Fork lengths ranged from 38 to 68 mm, with a mean length of 56 mm (Appendix C8).

Lake Trout

One juvenile lake trout was captured in a tributary to Roberts Lake (Appendix C1).

Ninespine Stickleback

Ninespine stickleback (n=3) in Roberts Lake tributaries ranged from 47 to 60 mm in fork length, with a mean of 54 mm (Appendix C8).

4.3.3 Little Roberts Outflow

4.3.3.1 Species Composition and Relative Abundance

Backpack electrofishing was conducted for 2616 seconds over a 440 m length of stream. Overall, 42 fish representing four species were captured in Little Roberts Outflow (Table 4.12). Ninespine stickleback was the dominant fish species captured (54.8%), followed by Arctic char (28.6%) and lake trout (14.3%). In addition, one Arctic flounder, which is a marine fish species, was captured in the stream. This fish was captured in the lower end of Little Roberts Outflow near the marine environment. The overall backpack electrofishing CPUE was 1.61 fish/100 s (Appendix C4).

Table 4.12 Catch, species composition, and catch-per-unit effort (CPUE^a) data for fish captured by backpack electrofishing in Little Roberts Outflow, 2004.

Site	Effort (s)	Arctic char		Lake trout		Ninespine stickleback		Arctic flounder		Total	
		n	CPUE	n	CPUE	n	CPUE	n	CPUE	n	CPUE
E18	558	7	1.25			4	0.72			11	-
E18	1039			2	0.19	2	0.19	1	0.10	5	-
E17	1019	5	0.49	4	0.39	17	1.67			26	-
Total	2616	12	0.46	6	0.23	23	0.88	1	0.04	42	1.61

^a CPUE units = fish /100 s.

4.3.3.2 Life History Data

Arctic Char

The Arctic char (n=12) captured in Little Roberts Outflow were YOY and juvenile fish that were likely rearing in these streams. Fork lengths ranged from 76 to 160 mm, with a mean length of 111 mm (Appendix C8).

Lake Trout

Six lake trout were captured in Little Roberts Outflow. Five of these six fish were YOY, with fork lengths <150 mm. The largest fish captured had a fork length of 347 mm. Overall, the mean length of lake trout encountered in Little Roberts Outflow was 138 mm (Appendix C8). Mean weight for five of the fish was 132 g and the mean condition factor was 1.19.

Ninespine Stickleback

Ninespine stickleback (n=23) in Little Roberts Outflow ranged from 40 to 70 mm in fork length, with a mean of 51 mm (Appendix C8).

Arctic Flounder

One Arctic flounder was captured in Little Roberts Outflow. This fish had a fork length of 239 mm and a weight of 210 g. The condition factor for this fish was 1.54 (Appendix C8).

4.3.4 Pelvic Outflow

Fish sampling in Pelvic Outflow was conducted by backpack electrofishing on 26 August. Total electrofishing effort was 487 seconds. During that sampling time, no fish were captured.

4.4 ROBERTS BAY

Fish use of near-shore habitats in Roberts Bay was assessed using fyke nets and beach seines. Fish sampling was conducted near the mouth of Little Roberts Outflow (Figure 4.1).

The catch rates, length-frequency distributions, size statistics, and diet data for fish species sampled in Roberts Bay are summarized in Appendices C2 to C6 and Appendix C8; data from individual fish are presented in Appendix C1.

4.4.1 Species Composition and Relative Abundance

Fish sampling in Roberts Bay was conducted by fyke netting and beach seining on 20 and 21 August. In total, two saffron cod and one rainbow smelt were captured (Table 4.13).

Table 4.13 Number of fish captured in Roberts Bay, 2004.

Species	Fyke Net		Beach Seine		Total Captured
	no. of fish	CPUE (Effort = 22.3 h)	no.	CPUE (Effort = 1380 m ²)	
Rainbow Smelt	0	-	1	0.07 fish / 100 m ²	1
Saffron cod	2	2.16 fish/24 h	0	-	2

4.4.2 Life History Data

Of the two saffron cod captured in Roberts Bay, the fork lengths were 238 and 250 mm, with a mean of 244 mm. The mean weight of these fish was 70 g and mean condition factor was 0.49 (Appendix C8).

The rainbow smelt captured in the beach seine was 88 mm in fork length.

4.5 SUMMARY

In total, 570 fish representing 10 species were encountered in the Doris North Project area during fisheries surveys conducted in 2004 (Table 4.14). Fish sampling was conducted in two lakes, 10 streams, and in the marine environment of Roberts Bay. The most common fish species captured was Arctic char (47.2%), followed by lake trout (37.5%) and ninespine stickleback (6.8%).

Lake Communities

Small fish sampling was conducted in Roberts and Tail lakes to assess near-shore habitat use. Small fish sampling methods included gill netting, fyke netting, beach seining, minnow trapping, and backpack electrofishing. Ninespine stickleback were captured directly in Tail Lake for the first time while least cisco, juvenile arctic char, and juvenile lake trout were captured in Roberts Lake. Catch-per-unit effort for all of these species was very low. Despite using sampling methods that target small fish, incidental catches of large fish were greater than for the targeted small fish.

Table 4.14 Summary of fish encountered in Doris North Project area, 2004.

Species	Roberts Outflow	Roberts Lake tribs	Little Roberts Outflow	Pelvic Outflow	Tail Lake	Roberts Lake	Roberts Bay	Total
Arctic char	236	15	12			6		269
Lake trout	147	1	6		14	46		214
Char spp.	18	2						20
Lake whitefish						21		21
Broad whitefish						1		1
Least Cisco						1		1
Cisco	1							1
Ninespine stickleback	1	3	23		12			39
Arctic flounder			1					1
Rainbow smelt							1	1
Saffron cod							2	2
Total	403	21	42	0	26	75	3	570

To enable comparisons following fish passage enhancement in the Roberts Outflow boulder garden, data on large fish population structure were collected from Roberts Lake. Lake trout, lake whitefish, and broad whitefish were captured with gill nets and angling gear. Lake trout and lake whitefish dominated the catch, and catch-per-unit effort for both of these species was considerably higher than for any of the small fish species.

Stream Communities

Fish sampling was conducted in 10 streams; these included Roberts, Little Roberts, and Pelvic outflows, and inflows to Roberts Lake (n=7). In total, 466 fish representing of five species were captured. Fish were captured in Little Roberts Outflow, Roberts Outflow and two tributaries to Roberts Lake.

Arctic char was the dominant species in Roberts Outflow and the tributaries to Roberts Lake. Ninespine stickleback was the dominant fish species captured in Little Roberts Outflow. Other species captured in streams included lake trout and cisco. One Arctic flounder was captured in Little Roberts Outflow near Roberts Bay.

Arctic Char in Roberts Lake System

Two fish fences were installed above and below the boulder garden located in Roberts Outflow between 8 August and 8 September. These fish fences were installed to determine the number of Arctic char migrating from the ocean to

Roberts Lake. Fish were also captured using backpack electrofishing and beach seining. In total, 403 fish representing four species were caught in Roberts Outflow. Arctic char was the predominant species in the overall catch (59%), followed by lake trout (37%).

The number of Arctic char entering the trap on a daily basis varied greatly. The greatest number of fish that passed through the lower trap in a given day was 18 fish. Of the fish that were captured in Roberts Outflow, recaptures from previous years accounted for 25.4% of the Arctic char catch and 15.9% of the lake trout catch. The open-water period during 2004 was a low flow year, which made migration through the boulder garden difficult for large fish. Approximately 78% of the Arctic char population and 48% of the lake trout population were stranded within the boulder garden section below Roberts Lake, and most likely perished. This represents a considerable loss of fish numbers, biomass, and future reproductive potential of fish from the Roberts Lake system.

5.0 FISH HABITAT

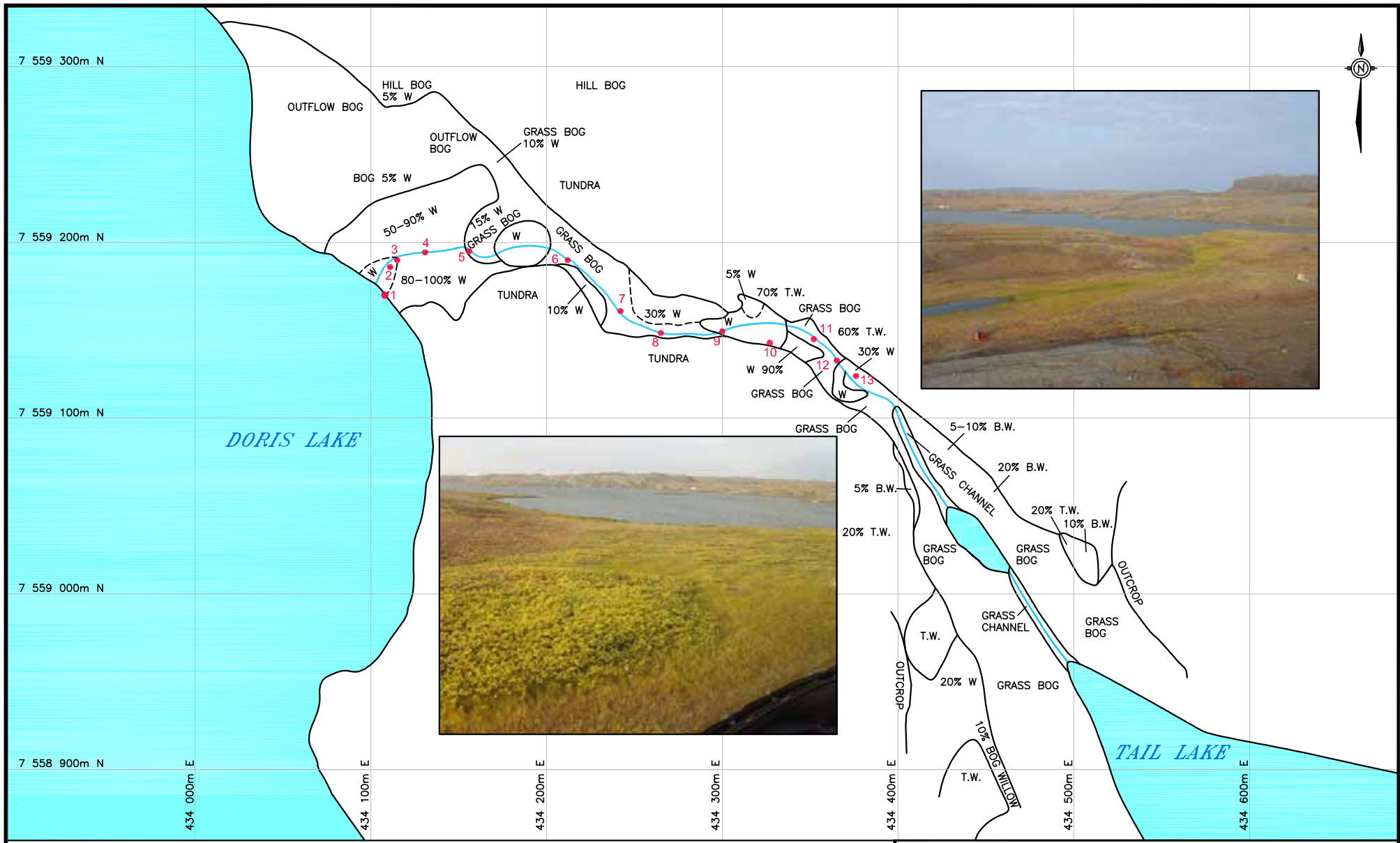
5.1 TAIL OUTFLOW

During the Nunavut Impact Review Board (NIRB) hearings in July 2004, concerns were raised regarding the post-impoundment loss of fish and wildlife habitat in Tail Outflow. Consequently, detailed mapping of instream and bank habitat was conducted on Tail Outflow in August and September 2004. Terrestrial and aquatic habitat characteristics were assessed through field surveys. Substrate composition and stream channel characteristics (i.e., channel width, water depth, velocity, and discharge) were determined at 20 to 50 m intervals along the outflow (Table 5.1). Bank habitat (defined as all habitat affected by the drainage of the stream) from Tail Lake to Doris Lake was classified into four categories: bog, grass channel, grass bog, and willow (Figure 5.1). Willow coverage (percent cover) was recorded in all habitat types.

Table 5.1 Channel characteristics of Tail Outflow.

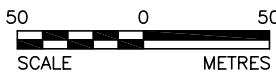
Habitat Transect	UTM 13W		Width (m)	Max Depth (m)	Velocity at max depth (m/s)	Substrate
	Eastings	Northing				
1	434111	7559186	0.20	0.07	0.18	Willow, grass, roots, fines
2	434108	7559170	0.37	0.06	0.24	Willow, grass, roots, fines
3	434115	7559190	0.30	0.20	0.12	Grass, roots, fines
4	434131	7559196	0.63	0.76	0.01	Silt and sand
5	434156	7559195	0.30	0.16	0.03	Grass, roots, some fines
6	434212	7559190	0.30	0.20	0.12	Grass, roots, filamentous algae
7	434242	7559161	0.40	0.28	0.08	Grass, roots, fines
8	434300	7559144	0.77	0.20	0.05	Grass, roots, filamentous algae, fines
9	434322	7559147	0.35	0.08	0.23	Grass, willow, roots, fines
10	434327	7559143	0.22	0.09	0.04	Grass, willow, roots, fines
11	434352	7559145	0.27	0.14	0.11	Grass, roots, fines
12	434363	7559130	0.70	0.08	0.09	Grass, roots, fines
13	434376	7559124	0.40	0.09	0.00	Grass, willow, roots, fines

The four habitat types are illustrated photographically in Plates 13 to 16. Habitat classified as bog consisted of water-saturated tundra that was dominated by short grasses (< 10 cm) and low-lying shrubs. These habitats were found predominately at the downstream end of the outflow (Figure 5.1). At the northwest end of the outflow, bog habitat was further subdivided into outflow bog and hill bog. Bog or outflow bog habitat was found within the drainage area



LEGEND

W	WILLOW
B.W.	BOG WILLOW
T.W.	TUNDRA WILLOW
2•	HABITAT TRANSECT



TITLE

**TAIL OUTFLOW
HABITAT MAP**

PROJECT 04-1373-009.1000			FILE No.		Tail Outflow	
DESIGN	AS	25/10/04	SCALE	AS SHOWN	REV.	0
CADD	PSR	25/02/05				
CHECK	AS	25/02/05				
REVIEW						

FIGURE: 5.1

Golder Associates
Edmonton, Alberta

of the outflow while hill bog habitat was slightly upslope; hill bogs were the result of dispersed drainage over a steep slope rather than drainage through the outflow.

Similar to bog habitats described above, areas classified as grass bog were water-saturated tundra. They were, however, dominated by long grasses (> 10 cm) and shrubs were either absent or represented less than 5% cover. Grass bog habitat dominated the middle section of the outflow (Figure 5.1).

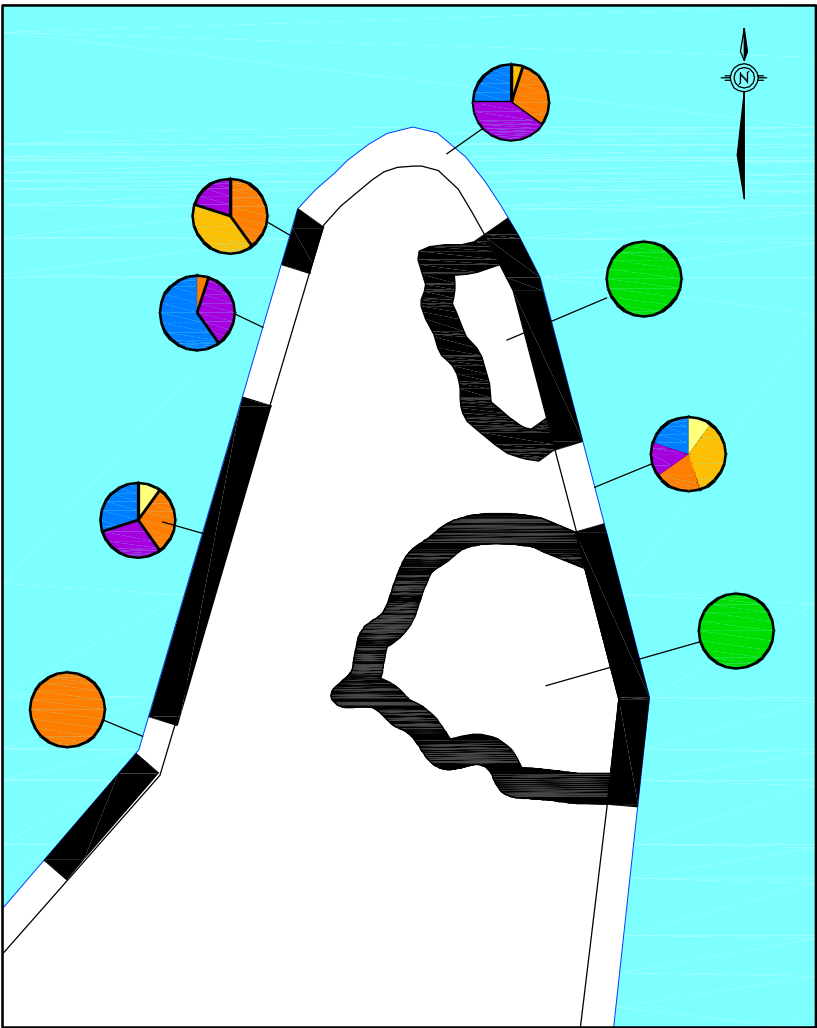
Grass channel habitat was found toward the upstream end of the outflow and was defined by the presence of a wide, dispersed channel with long grasses (> 40 cm) that grew throughout the channel. Stream channel width in grass channel areas varied from 5 to 10 m.

Willows were present throughout the outflow drainage. In Figure 5.1, areas that were dominated by tall (> 1 m), dense willow stands are mapped as a distinct habitat type. Shorter, less dense willow stands dispersed through other habitat types are mapped as percent cover. In some areas, willows were subdivided into tundra willows and bog willows. Areas with tundra willow were upslope of bog willow areas and were not directly affected by the outflow drainage (Figure 5.1).

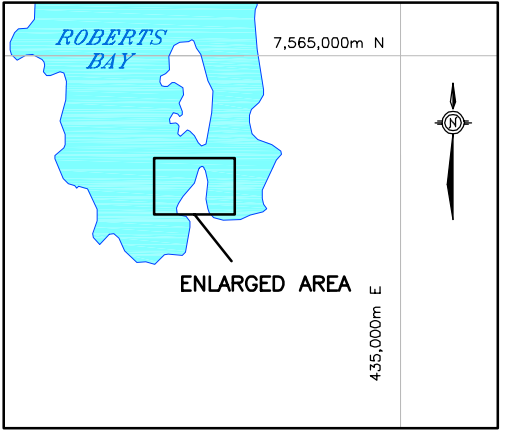
5.2 ROBERTS BAY

During the Nunavut Impact Review Board hearings in July 2004, the Department of Fisheries and Oceans inquired whether the tip of the peninsula in Roberts Bay had been considered as an alternative site for the proposed jetty. It was pointed out at the hearings that this area is too shallow for a suitable barge landing site. Since the shoreline of this area had not been previously mapped, this exercise was conducted during the 2004 field season. Substrate composition was assessed and recorded as percent composition along the shoreline of the peninsula (Figure 5.2). Substrate types were classified into six categories: silt, sand, gravel, cobble, boulder, and bedrock.

All substrate types were represented on the peninsula. Bedrock was the most dominant substrate on the eastern shore of the peninsula while sand, cobble, and boulder were dominant on the western shore (Figure 5.2). With the exception of moderately sloping bedrock outcrops, shoreline relief was low (Figure 5.2). Vegetation was generally restricted to the centre of the peninsula and consisted of grasses, mosses, and lichens (Figure 5.2).



40 0 40
SCALE METRES



LEGEND

- SUBSTRATE TYPE
- SILT
 - SAND
 - GRAVEL
 - COBBLE
 - BOULDER
 - BEDROCK



TITLE					
ROBERTS BAY HABITAT MAP					
PROJECT 04-1373-009.1000			FILE No. Roberts Bay Habitat		
DESIGN	AS	25/10/04	SCALE	AS SHOWN	REV. 0
CADD	PSR	01/12/04	FIGURE: 5.2		
CHECK	AS	01/12/04			
REVIEW					



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7.0 CLOSURE

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. *15 August 2004.* Water sampling on Tail Lake outflow. Doris Lake and Doris mesa in background.



Plate 2. *7 August 2004.* Lower fish fence, electric fence, and work area on Roberts Lake outflow.



Plate 3. *8 August 2004.* Fyke net set in Tail Lake.



Plate 4. *19 August 2004.* Arctic char captured at lower fish fence.



Plate 5. 18 August 2004. Young of the year Arctic char.



Plate 6. 28 August 2004. Arctic flounder caught in Little Roberts Outflow.



Plate 7. 12 September 2004. Looking upstream, view of boulder garden on Roberts Lake outflow. Roberts Lake in background.



Plate 8. 15 August 2004. Looking upstream, lake trout stranded in boulder garden between upper and lower fish fences.



Plate 9. *13 September 2004.* Aerial view of boulder garden. Proposed channel is marked with yellow flagging tape.



Plate 10. *22 September 2004.* Arctic char stranded in area of proposed channel.



Plate 11. *13 August 2004.* Arctic char stranded in boulder garden.



Plate 12. *2 September 2004.* Aerial view of Tail Outflow.



Plate 13. *2 September, 2004.* Tail Outflow habitat mapping. Grass bog habitat with willow habitat in background.



Plate 14. *2 September, 2004.* Tail Outflow habitat mapping. Grass channel habitat with Tail Lake in background.



Plate 15. *2 September, 2004.* Tail Outflow habitat mapping. Bog habitat with 5% willow cover. Willow habitat in background.



Plate 16. *2 September, 2004.* Tail Outflow habitat mapping; willow habitat.

APPENDIX A

HYDROLOGY DATA

This appendix contains hydrology data referenced in the body of the report. A table of contents for the appendix follows:

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DORIS CREEK HYDROMETRIC STATION

H71 FACTSHEET

LOCATION AND DETAILS

Located on the right downstream bank of Doris Creek, approximately 50 m downstream of the lake outlet.

Operational: 2003 (30 June - 9 September)

Benchmark: Top of embedded boulder; 22.593 m (geodetic)

Coordinates: UTM: 434108 m E, 7559274 m N (NAD27)

Datalogger: Optimum Instruments #0948

2004 (8 June - 11 September)

Drainage Area: 93.1 km²

Lat/Long: 68°08'30" N, 106°35'14" W

Transducer: KPSI #0402786 (5 psi; 15 m)



Aerial view of Doris Creek looking north along outlet channel.



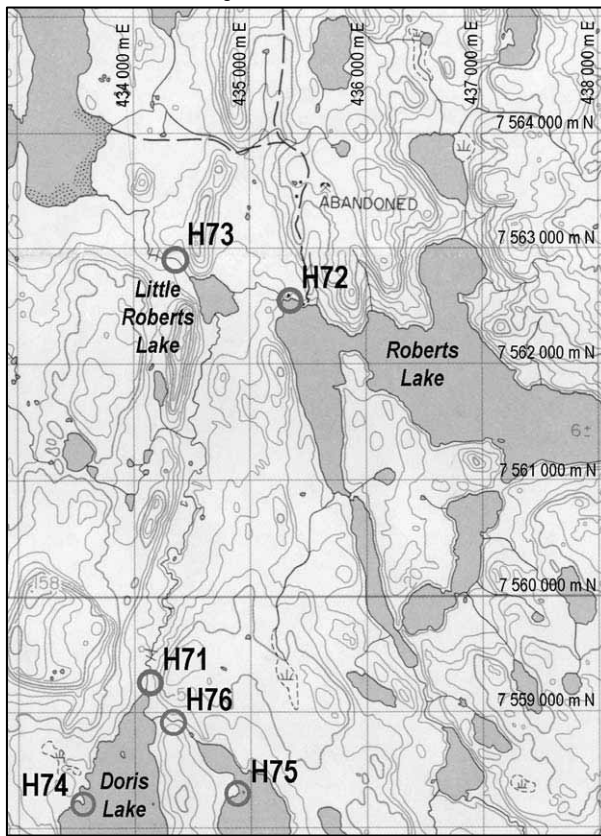
Doris Creek looking south from Station H71 to lake outlet.



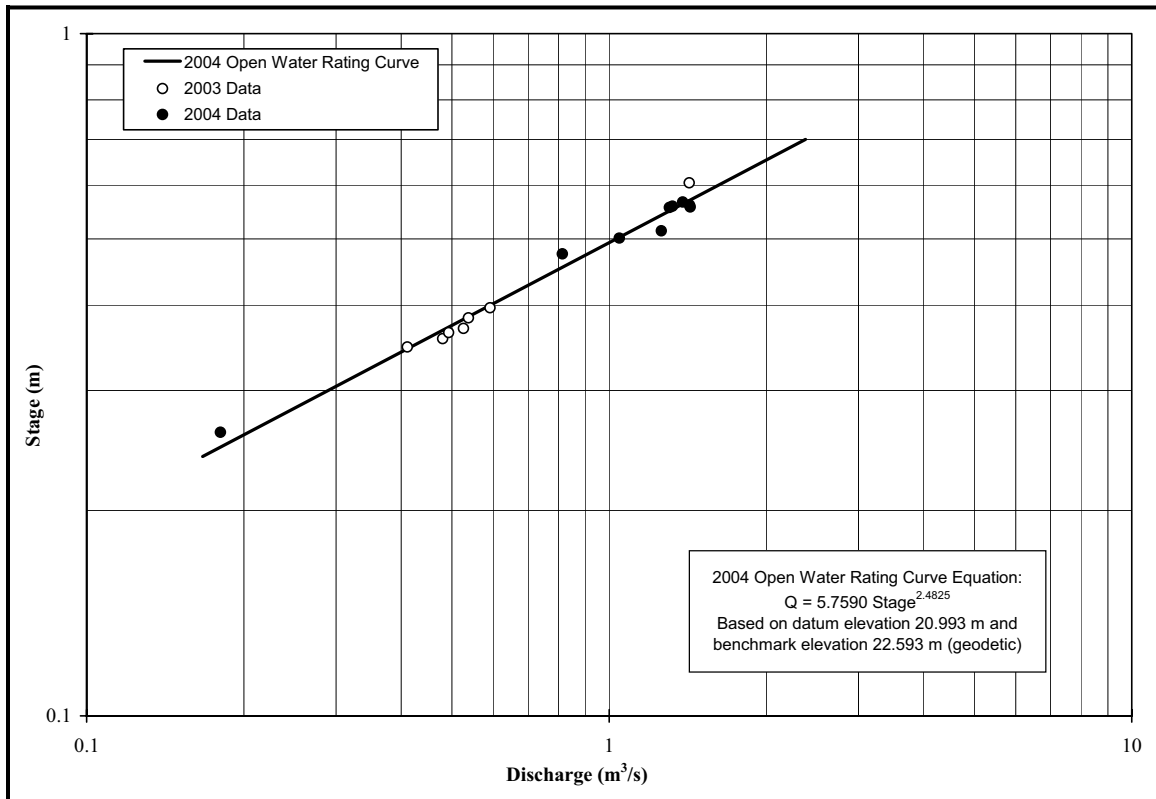
Station H71 from RDB looking northwest.



Station H71 from RDB looking southeast.



NTS Mapping of Area.



Doris Creek Station H71 - Stage-Discharge Rating Curve (2004)

Doris Creek Station H71 – Stage-Discharge Data (2003-2004)

Date & Time	Transducer Reading	Transducer Elevation	Average Transducer Elevation	Staff Gauge Reading	Stage Datum	20.993	(geodetic)
					Water Surface Elevation	Stage	Measured Discharge
6/30/2003 16:24	0.6414	20.953		0.615	21.594	0.604	1.423
8/6/2003 19:09	0.3941	20.962		0.377	21.356	0.357	0.480
8/8/2003 17:24	0.3843	20.953		0.358	21.337	0.347	0.411
8/18/2003 16:54	0.4015	20.962		0.384	21.363	0.364	0.493
8/20/2003 15:54	0.4070				21.363	0.370	0.526
8/28/2003 15:54	0.4201	20.939		0.380	21.359	0.383	0.538
9/5/2003 9:24	0.4336	20.960		0.415	21.394	0.397	0.592
9/9/2003 8:24	0.4474	20.964	20.956	0.432	21.411	0.410	n/a
6/8/2004 0:00	n/a	-			21.443	-	-
6/9/2004 10:38	0.3768	21.024			21.401	-	-
6/19/2004 15:43	0.5512	20.980			21.531	0.514	1.258
7/2/2004 9:40	0.6034	20.950			21.553	0.566	1.383
7/3/2004 12:00	0.5943	20.960			21.554	0.557	1.430
7/4/2004 13:05	0.5976	20.948			21.546	0.561	1.426
7/5/2004 0:00	0.5959	20.945			21.541	0.559	1.321
7/6/2004 9:25	0.5931	20.971			21.564	0.556	1.304
7/7/2004 15:19	0.5870	20.930			21.517	0.550	-
7/16/2004 12:16	0.5385	20.942			21.48	0.501	1.046
7/20/2004 14:07	0.5125	20.929			21.442	0.475	0.814
9/11/2004 12:55	0.2975	20.925	20.944		21.223	0.260	0.180

H71 - DORIS CREEK - 2004

MEAN DAILY DISCHARGE (m³/s)

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	1.316	0.572	0.208	0.078 E	-	-
2	-	-	-	-	-	-	1.327	0.550	0.212	0.073 E	-	-
3	-	-	-	-	-	-	1.307	0.543	0.200	0.067 E	-	-
4	-	-	-	-	-	-	1.297	0.522	0.198	0.061 E	-	-
5	-	-	-	-	-	-	1.282	0.494	0.192	0.056 E	-	-
6	-	-	-	-	-	-	1.262	0.471	0.183	0.050 E	-	-
7	-	-	-	-	-	-	1.246	0.453	0.172	0.045 E	-	-
8	-	-	-	-	-	0.000 E	1.208	0.440	0.168	0.039 E	-	-
9	-	-	-	-	-	0.000 E	1.187	0.425	0.165	0.034 E	-	-
10	-	-	-	-	-	0.000 E	1.175	0.411	0.168	0.028 E	-	-
11	-	-	-	-	-	0.000 E	1.153	0.402	0.168 P	0.022 E	-	-
12	-	-	-	-	-	0.300	1.136	0.387	0.184 E	0.017 E	-	-
13	-	-	-	-	-	0.455	1.096	0.369	0.179 E	0.011 E	-	-
14	-	-	-	-	-	0.560	1.063	0.370	0.173 E	0.006 E	-	-
15	-	-	-	-	-	0.656	1.028	0.347	0.168 E	0.000 E	-	-
16	-	-	-	-	-	0.753	0.990	0.342	0.162 E	-	-	-
17	-	-	-	-	-	0.860	0.958	0.303	0.157 E	-	-	-
18	-	-	-	-	-	0.953	0.923	0.309	0.151 E	-	-	-
19	-	-	-	-	-	1.043	0.892	0.308	0.145 E	-	-	-
20	-	-	-	-	-	1.124	0.859	0.288	0.140 E	-	-	-
21	-	-	-	-	-	1.181	0.837	0.277	0.134 E	-	-	-
22	-	-	-	-	-	1.255	0.807	0.275	0.129 E	-	-	-
23	-	-	-	-	-	1.290	0.775	0.271	0.123 E	-	-	-
24	-	-	-	-	-	1.312	0.759	0.263	0.117 E	-	-	-
25	-	-	-	-	-	1.339	0.731	0.257	0.112 E	-	-	-
26	-	-	-	-	-	1.352	0.709	0.249	0.106 E	-	-	-
27	-	-	-	-	-	1.355	0.684	0.238	0.101 E	-	-	-
28	-	-	-	-	-	1.363	0.661	0.228	0.095 E	-	-	-
29	-	-	-	-	-	1.361	0.655	0.228	0.089 E	-	-	-
30	-	-	-	-	-	1.339	0.599	0.220	0.084 E	-	-	-
31	-	-	-	-	-	-	0.582	0.208	-	-	-	-
MIN	-	-	-	-	-	0.000	0.582	0.208	0.084	0.000	-	-
MEAN	-	-	-	-	-	0.662	0.984	0.356	0.153	0.039	-	-
MAX	-	-	-	-	-	1.363	1.327	0.572	0.212	0.078	-	-

MEAN DAILY WATER SURFACE ELEVATION (m) BASED ON BENCHMARK ELEVATION 22.593 m

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	21.545	21.388	21.256	-	-	-
2	-	-	-	-	-	-	21.547	21.381	21.258	-	-	-
3	-	-	-	-	-	-	21.543	21.379	21.251	-	-	-
4	-	-	-	-	-	-	21.542	21.373	21.250	-	-	-
5	-	-	-	-	-	-	21.539	21.365	21.247	-	-	-
6	-	-	-	-	-	-	21.535	21.358	21.242	-	-	-
7	-	-	-	-	-	-	21.533	21.352	21.236	-	-	-
8	-	-	-	-	-	21.353 P	21.526	21.348	21.234	-	-	-
9	-	-	-	-	-	21.317	21.522	21.343	21.232	-	-	-
10	-	-	-	-	-	21.286	21.520	21.338	21.234	-	-	-
11	-	-	-	-	-	21.277	21.516	21.335	21.233 P	-	-	-
12	-	-	-	-	-	21.303	21.513	21.330	-	-	-	-
13	-	-	-	-	-	21.353	21.506	21.324	-	-	-	-
14	-	-	-	-	-	21.384	21.499	21.324	-	-	-	-
15	-	-	-	-	-	21.410	21.492	21.316	-	-	-	-
16	-	-	-	-	-	21.434	21.485	21.314	-	-	-	-
17	-	-	-	-	-	21.458	21.478	21.298	-	-	-	-
18	-	-	-	-	-	21.478	21.471	21.301	-	-	-	-
19	-	-	-	-	-	21.495	21.465	21.300	-	-	-	-
20	-	-	-	-	-	21.511	21.458	21.292	-	-	-	-
21	-	-	-	-	-	21.521	21.453	21.288	-	-	-	-
22	-	-	-	-	-	21.534	21.446	21.287	-	-	-	-
23	-	-	-	-	-	21.540	21.439	21.285	-	-	-	-
24	-	-	-	-	-	21.544	21.435	21.281	-	-	-	-
25	-	-	-	-	-	21.549	21.428	21.279	-	-	-	-
26	-	-	-	-	-	21.551	21.423	21.275	-	-	-	-
27	-	-	-	-	-	21.551	21.417	21.270	-	-	-	-
28	-	-	-	-	-	21.553	21.411	21.265	-	-	-	-
29	-	-	-	-	-	21.552	21.410	21.265	-	-	-	-
30	-	-	-	-	-	21.549	21.395	21.261	-	-	-	-
31	-	-	-	-	-	-	21.390	21.256	-	-	-	-
MIN	-	-	-	-	-	21.277	21.390	21.256	-	-	-	-
MEAN	-	-	-	-	-	21.457	21.480	21.315	-	-	-	-
MAX	-	-	-	-	-	21.553	21.547	21.388	-	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

E - ESTIMATED

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 19 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1545 hrs.
MEASUREMENT END TIME: 1715 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	1.33						0.14	0.00
1	1.60		0.17			0.13	0.29	0.01
2	1.90		0.31			0.48	0.30	0.04
3	2.20		0.35			0.90	0.30	0.09
4	2.50		0.33			0.92	0.30	0.09
5	2.80		0.33			0.97	0.30	0.10
6	3.10		0.33			1.00	0.30	0.10
7	3.40		0.33			1.06	0.30	0.10
8	3.70		0.31			1.12	0.30	0.10
9	4.00		0.31			0.90	0.30	0.08
10	4.30		0.32			0.94	0.30	0.09
11	4.60		0.30			0.86	0.30	0.08
12	4.90		0.33			0.91	0.30	0.09
13	5.20		0.32			1.00	0.30	0.10
14	5.50		0.29			1.02	0.30	0.09
15	5.80		0.25			0.65	0.30	0.05
16	6.10		0.18			0.26	0.30	0.01
17	6.40		0.15			0.23	0.30	0.01
18	6.70		0.16			0.18	0.30	0.01
19	7.00		0.12			0.13	0.30	0.00
20	7.30		0.13			0.07	0.30	0.00
21	7.60		0.13			0.06	0.30	0.00
22	7.90		0.05			0.00	0.30	0.00
23	8.20		0.04			0.00	0.28	0.00
Left Bank	8.46						-4.10	0.00

1.258

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 2 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 0940 hrs.
MEASUREMENT END TIME: 1100 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.70						0.90	0.00
1	1.80		0.25			-0.02	0.15	0.00
2	2.00		0.20			-0.02	0.35	0.00
3	2.50		0.23			0.06	0.50	0.01
4	3.00		0.36			0.18	0.50	0.03
5	3.50		0.40			0.36	0.50	0.07
6	4.00		0.40			0.44	0.50	0.09
7	4.50		0.52			0.48	0.50	0.12
8	5.00		0.62			0.53	0.50	0.16
9	5.50		0.66			0.50	0.50	0.17
10	6.00		0.61			0.57	0.50	0.17
11	6.50		0.51			0.61	0.50	0.16
12	7.00		0.49			0.64	0.50	0.16
13	7.50		0.45			0.45	0.50	0.10
14	8.00		0.46			0.34	0.50	0.08
15	8.50		0.31			0.16	0.50	0.02
16	9.00		0.20			0.15	0.50	0.02
17	9.50		0.14			0.06	0.50	0.00
18	10.00		0.14			0.05	0.50	0.00
19	10.50		0.18			0.09	0.50	0.01
20	11.00		0.17			0.09	0.50	0.01
21	11.50		0.20			0.02	0.50	0.00
22	12.00		0.14			0.03	0.30	0.00
Right Bank	12.10						-6.00	0.00

1.383

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 3 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1200 hrs.
MEASUREMENT END TIME: 1240 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.70		0.01			0.00	1.00	0.00
1	2.00		0.27			0.00	0.40	0.00
2	2.50		0.32			0.01	0.50	0.00
3	3.00		0.35			0.08	0.50	0.01
4	3.50		0.39			0.27	0.50	0.05
5	4.00		0.42			0.44	0.50	0.09
6	4.50		0.49			0.52	0.50	0.13
7	5.00		0.61			0.54	0.50	0.16
8	5.50		0.65			0.54	0.50	0.18
9	6.00		0.65			0.55	0.50	0.18
10	6.50		0.59			0.60	0.50	0.18
11	7.00		0.50			0.63	0.50	0.16
12	7.50		0.45			0.54	0.50	0.12
13	8.00		0.47			0.36	0.50	0.08
14	8.50		0.44			0.19	0.50	0.04
15	9.00		0.20			0.14	0.50	0.01
16	9.50		0.15			0.05	0.50	0.00
17	10.00		0.12			0.05	0.50	0.00
18	10.50		0.16			0.08	0.50	0.01
19	11.00		0.16			0.04	0.50	0.00
20	11.50		0.18			0.07	0.50	0.01
21	12.00		0.18			0.02	1.10	0.00
Right Bank	13.70		0.00				-6.00	0.00

1.430

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 4 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1310 hrs.
MEASUREMENT END TIME: 1400 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.80		0.01			-0.01	1.00	0.00
1	2.00		0.32			0.01	0.35	0.00
2	2.50		0.38			0.06	0.50	0.01
3	3.00		0.36			0.24	0.50	0.04
4	3.50		0.40			0.38	0.50	0.08
5	4.00		0.42			0.47	0.50	0.10
6	4.50		0.53			0.52	0.50	0.14
7	5.00		0.61			0.57	0.50	0.17
8	5.50		0.67			0.56	0.50	0.19
9	6.00		0.65			0.56	0.50	0.18
10	6.50		0.52			0.65	0.50	0.17
11	7.00		0.47			0.60	0.50	0.14
12	7.50		0.45			0.45	0.50	0.10
13	8.00		0.46			0.25	0.50	0.06
14	8.50		0.30			0.13	0.50	0.02
15	9.00		0.18			0.08	0.50	0.01
16	9.50		0.12			0.02	0.50	0.00
17	10.00		0.13			0.03	0.50	0.00
18	10.50		0.18			0.04	0.50	0.00
19	11.00		0.19			0.06	0.50	0.01
20	11.50		0.17			0.04	0.50	0.00
21	12.00		0.14			0.03	0.50	0.00
22	12.50		0.08			0.02	0.70	0.00
Right Bank	13.40						-6.25	0.00

1.426

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 5 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.70		0.15			0.01	1.00	0.00
1	2.00		0.30			0.01	0.40	0.00
2	2.50		0.37			0.04	0.50	0.01
3	3.00		0.37			0.21	0.50	0.04
4	3.50		0.40			0.37	0.50	0.07
5	4.00		0.43			0.43	0.50	0.09
6	4.50		0.60			0.48	0.50	0.14
7	5.00		0.62			0.51	0.50	0.16
8	5.50		0.61			0.54	0.50	0.16
9	6.00		0.57			0.57	0.50	0.16
10	6.50		0.52			0.62	0.50	0.16
11	7.00		0.50			0.54	0.50	0.14
12	7.50		0.46			0.40	0.50	0.09
13	8.00		0.43			0.22	0.50	0.05
14	8.50		0.24			0.10	0.50	0.01
15	9.00		0.18			0.06	0.50	0.01
16	9.50		0.14			0.03	0.50	0.00
17	10.00		0.15			0.04	0.50	0.00
18	10.50		0.18			0.05	0.50	0.00
19	11.00		0.21			0.02	0.50	0.00
20	11.50		0.18			0.11	0.50	0.01
21	12.00		0.10			0.02	0.50	0.00
22	12.50		0.12			0.03	0.30	0.00
Right Bank	12.60		0.00			0.00	-6.25	0.00

1.321

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 6 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 0930 hrs.
MEASUREMENT END TIME: 1020 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.90		0.15			0.01	1.00	0.00
1	2.00		0.27			-0.03	0.30	0.00
2	2.50		0.35			0.02	0.50	0.00
3	3.00		0.34			0.12	0.50	0.02
4	3.50		0.39			0.29	0.50	0.06
5	4.00		0.40			0.42	0.50	0.08
6	4.50		0.48			0.49	0.50	0.12
7	5.00		0.60			0.52	0.50	0.16
8	5.50		0.63			0.53	0.50	0.17
9	6.00		0.54			0.55	0.50	0.15
10	6.50		0.50			0.63	0.50	0.16
11	7.00		0.46			0.68	0.50	0.16
12	7.50		0.43			0.43	0.50	0.09
13	8.00		0.44			0.30	0.50	0.07
14	8.50		0.50			0.21	0.50	0.05
15	9.00		0.18			0.09	0.50	0.01
16	9.50		0.15			0.04	0.50	0.00
17	10.00		0.15			0.05	0.50	0.00
18	10.50		0.20			0.05	0.50	0.01
19	11.00		0.20			0.02	0.50	0.00
20	11.50		0.18			0.03	0.50	0.00
21	12.00		0.16			0.02	0.50	0.00
22	12.50		0.12			0.01	0.30	0.00
Right Bank	12.60		0.00			0.00	-6.25	0.00

1.304

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 16 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1230 hrs.
MEASUREMENT END TIME: 1310 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	0.54						0.18	0.00
1	0.90		0.23			0.03	0.33	0.00
2	1.20		0.27			0.66	0.30	0.05
3	1.50		0.31			1.02	0.30	0.09
4	1.80		0.32			1.11	0.30	0.11
5	2.10		0.24			1.15	0.30	0.08
6	2.40		0.23			1.05	0.30	0.07
7	2.70		0.25			1.11	0.30	0.08
8	3.00		0.23			1.07	0.30	0.07
9	3.30		0.26			1.04	0.30	0.08
10	3.60		0.28			1.01	0.30	0.08
11	3.90		0.26			0.89	0.30	0.07
12	4.20		0.26			0.94	0.30	0.07
13	4.50		0.20			1.04	0.30	0.06
14	4.80		0.21			0.98	0.30	0.06
15	5.10		0.21			0.60	0.30	0.04
16	5.40		0.10			0.09	0.30	0.00
17	5.70		0.07			0.04	0.30	0.00
18	6.00		0.09			0.04	0.30	0.00
19	6.30		0.11			0.02	0.30	0.00
20	6.60		0.09			0.03	0.33	0.00
Left Bank	6.96		0.00				-3.30	0.00

1.046

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 20 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1415 hrs.
MEASUREMENT END TIME: 1450 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	0.90						0.18	0.00
1	1.25		0.05			0.00	0.30	0.00
2	1.50		0.05			0.00	0.25	0.00
3	1.75		0.05			0.00	0.25	0.00
4	2.00		0.06			0.00	0.25	0.00
5	2.25		0.07			0.05	0.25	0.00
6	2.50		0.14			0.08	0.25	0.00
7	2.75		0.33			0.70	0.25	0.06
8	3.00		0.34			0.85	0.25	0.07
9	3.25		0.39			0.75	0.25	0.07
10	3.50		0.36			0.78	0.25	0.07
11	3.75		0.28			0.96	0.25	0.07
12	4.00		0.33			0.74	0.25	0.06
13	4.25		0.32			0.73	0.25	0.06
14	4.50		0.34			0.69	0.25	0.06
15	4.75		0.32			0.79	0.25	0.06
16	5.00		0.30			0.60	0.25	0.05
17	5.25		0.26			0.71	0.25	0.05
18	5.50		0.26			0.62	0.25	0.04
19	5.75		0.26			0.67	0.25	0.04
20	6.00		0.27			0.33	0.25	0.02
21	6.25		0.22			0.36	0.25	0.02
22	6.50		0.21			0.24	0.23	0.01
Left Bank	6.70		0.00			0.00	-3.25	0.00

0.814

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Doris Creek
LOCATION: Outlet of Doris Lake
COORDINATES: 434108 m E, 7559274 m N (NAD27)

MEASUREMENT DATE: 20 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: NS
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1310 hrs.
MEASUREMENT END TIME: 1400 hrs.

STATION	DISTANCE FROM BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Bank	4.67		0.00			0.00	0.09	0.00
1	4.50		0.02			0.00	0.14	0.00
2	4.40		0.10			0.07	0.13	0.00
3	4.25		0.14			0.06	0.15	0.00
4	4.10		0.20			0.16	0.15	0.00
5	3.95		0.24			0.15	0.15	0.01
6	3.80		0.27			0.17	0.15	0.01
7	3.65		0.30			0.17	0.15	0.01
8	3.50		0.33			0.15	0.15	0.01
9	3.35		0.33			0.13	0.15	0.01
10	3.20		0.35			0.20	0.15	0.01
11	3.05		0.38			0.23	0.15	0.01
12	2.90		0.37			0.24	0.15	0.01
13	2.75		0.40			0.22	0.15	0.01
14	2.60		0.44			0.23	0.15	0.02
15	2.45		0.46			0.23	0.15	0.02
16	2.30		0.47			0.19	0.15	0.01
17	2.15		0.45			0.18	0.15	0.01
18	2.00		0.40			0.16	0.15	0.01
19	1.85		0.34			0.13	0.15	0.01
20	1.70		0.29			0.08	0.15	0.00
21	1.55		0.24			0.04	0.15	0.00
22	1.40		0.23			0.04	0.15	0.00
23	1.25		0.20			0.02	0.20	0.00
23	1.00		0.20			0.03	0.38	0.00
24	0.50		0.20			0.02	0.50	0.00
24	0.00		0.20			0.02	0.50	0.00
25	-0.50		0.28			0.02	0.50	0.00
25	-1.00		0.14			0.01	0.45	0.00
Bank	-1.40		0.00			0.00	0.50	0.00

0.180

ROBERTS LAKE OUTLET HYDROMETRIC STATION

H72 FACTSHEET

LOCATION AND DETAILS

Located on the right downstream bank of Roberts Lake, approximately 20 m upstream of the lake outlet.

Operational: 2003 (30 June – 9 September)
 Benchmark: Rock bolt in bedrock; 6.958 m (geodetic)
 Coordinates: UTM: 435310 m E, 7562560 m N (NAD27)
 Datalogger: Optimum Instruments #0638

2004 (9 May – 13 September)
 Drainage Area: 97.8 km²
 Lat/Long: 68°10'10" N, 106°33'32" W
 Transducer: KPSI #0202697 (5 psi, 20 m)^a
 KPSI #0202942 (3 psi, 8 m)^a



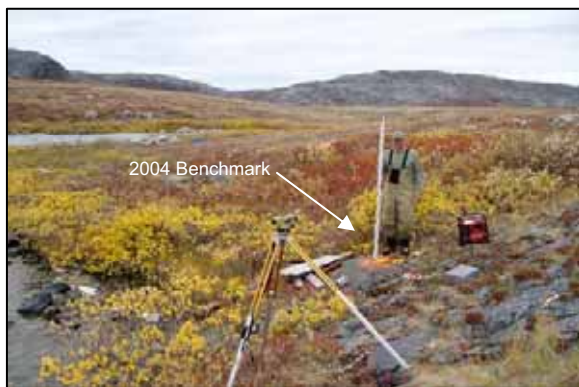
Aerial view of Roberts Lake Outlet looking northeast.



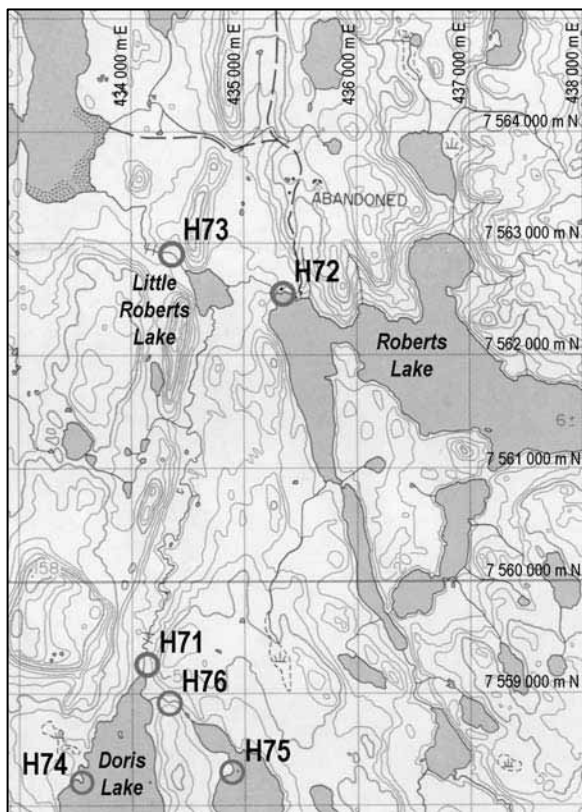
Station H72 from lake looking northwest.



Station H72 from bank looking southeast.

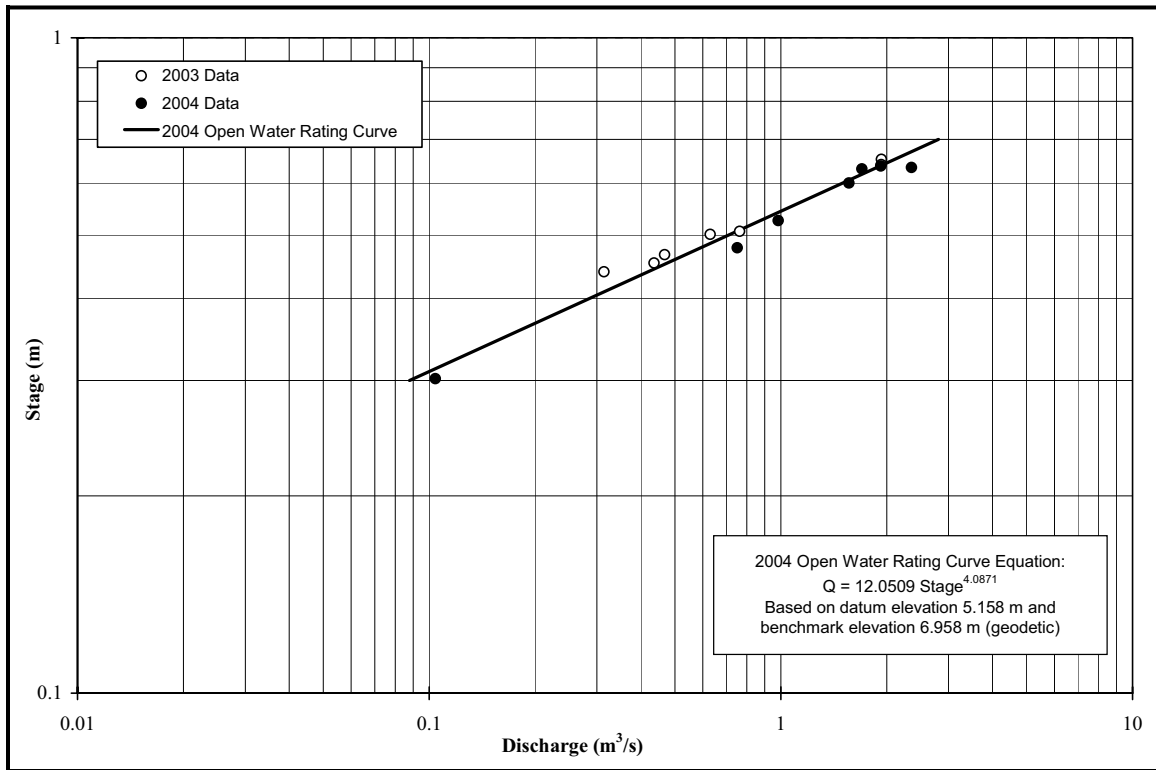


Station H72 from bank looking west at new benchmark.



NTS Mapping of Area.

(a) This station had two transducers installed as a redundant measure, under ice conditions in the spring of 2004. Both transducers provided good quality data throughout the open water season.



Roberts Lake and Creek Station H72 - Stage-Discharge Rating Curve (2004)

Roberts Lake and Creek Station H72 – Stage-Discharge Data (2003-2004)

Date & Time	Transducer Reading	Transducer Elevation	Average Transducer Elevation	Staff Gauge Reading	Stage Datum	Stage	Measured Discharge
					Water Surface Elevation		
6/30/2003 11:30	0.6500	5.157		0.596	5.807	0.652	1.932
7/1/2003 13:30	0.6380	5.159		0.586	5.797	0.640	1.929
8/6/2003 15:00	0.4509	5.165		0.405	5.616	0.453	0.436
8/9/2003 13:30	0.4373	5.154		0.380	5.591	0.440	0.314
8/14/2003 13:45	0.4643	5.155		0.408	5.619	0.467	0.467
8/19/2003 11:30	0.5043	5.157		0.450	5.661	0.507	0.764
8/28/2003 13:00	0.4991	5.162		0.450	5.661	0.501	0.630
9/9/2003 9:30	0.4716	5.174	5.160	0.435	5.646	0.474	n/a
5/9/2004 16:00	n/a	n/a			-	-	-
6/5/2004 0:00	n/a	n/a			-	-	-
6/6/2004 0:00	n/a	n/a			-	-	-
6/7/2004 0:00	n/a	n/a			-	-	-
6/8/2004 0:00	n/a	n/a			-	-	-
6/9/2004 13:00	n/a	n/a			5.632	0.474	-
7/3/2004 9:40	0.6884	5.104			5.792	0.634	2.354
7/4/2004 10:05	0.6789	5.116			5.795	0.637	1.925
7/5/2004 12:00	0.6688	5.120			5.789	0.631	1.700
7/7/2004 13:30	0.6495	5.108			5.758	0.600	1.562
7/17/2004 9:21	0.5607	5.123			5.684	0.526	0.983
7/21/2004 10:21	0.5264	5.110			5.636	0.478	0.752
9/13/2004 9:38	0.3544	5.106	5.112		5.460	0.302	0.104

H72 – ROBERTS LAKE AND CREEK - 2004
MEAN DAILY DISCHARGE (m³/s)

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	2.087	0.353	0.118	0.041 E	-	-
2	-	-	-	-	-	-	2.059	0.328	0.116	0.038 E	-	-
3	-	-	-	-	-	-	1.971	0.316	0.112	0.035 E	-	-
4	-	-	-	-	-	-	1.867	0.301	0.113	0.032 E	-	-
5	-	-	-	-	-	-	1.776	0.284	0.125	0.029 E	-	-
6	-	-	-	-	-	-	1.666	0.268	0.115	0.026 E	-	-
7	-	-	-	-	-	-	1.573	0.253	0.108	0.023 E	-	-
8	-	-	-	-	-	-	1.478	0.245	0.102	0.021 E	-	-
9	-	-	-	-	-	-	1.389	0.231	0.104	0.018 E	-	-
10	-	-	-	-	-	-	1.336	0.227	0.102	0.015 E	-	-
11	-	-	-	-	-	-	1.258	0.218	0.100	0.012 E	-	-
12	-	-	-	-	-	0.000 E	1.160	0.205	0.096	0.009 E	-	-
13	-	-	-	-	-	0.079 E	1.065	0.199	0.095 P	0.006 E	-	-
14	-	-	-	-	-	0.274 E	0.995	0.193	0.091 E	0.003 E	-	-
15	-	-	-	-	-	0.507 E	0.932	0.192	0.088 E	0.000 E	-	-
16	-	-	-	-	-	0.739 E	0.862	0.193	0.085 E	-	-	-
17	-	-	-	-	-	0.971 E	0.798	0.177	0.082 E	-	-	-
18	-	-	-	-	-	1.204 P	0.737	0.176	0.079 E	-	-	-
19	-	-	-	-	-	1.478	0.689	0.173	0.076 E	-	-	-
20	-	-	-	-	-	1.762	0.649	0.165	0.073 E	-	-	-
21	-	-	-	-	-	1.921	0.601	0.157	0.070 E	-	-	-
22	-	-	-	-	-	2.040	0.560	0.156	0.067 E	-	-	-
23	-	-	-	-	-	2.082	0.529	0.154	0.065 E	-	-	-
24	-	-	-	-	-	2.143	0.498	0.146	0.062 E	-	-	-
25	-	-	-	-	-	2.215	0.469	0.141	0.059 E	-	-	-
26	-	-	-	-	-	2.266	0.448	0.139	0.056 E	-	-	-
27	-	-	-	-	-	2.299	0.424	0.134	0.053 E	-	-	-
28	-	-	-	-	-	2.302	0.405	0.125	0.050 E	-	-	-
29	-	-	-	-	-	2.245	0.401	0.123	0.047 E	-	-	-
30	-	-	-	-	-	2.162	0.390	0.123	0.044 E	-	-	-
31	-	-	-	-	-	-	0.369	0.119	-	-	-	-
MIN	-	-	-	-	-	0.000	0.369	0.119	0.044	-	-	-
MEAN	-	-	-	-	-	1.510	1.014	0.200	0.085	-	-	-
MAX	-	-	-	-	-	2.302	2.087	0.353	0.125	-	-	-

MEAN DAILY WATER SURFACE ELEVATION (m) BASED ON BENCHMARK ELEVATION 6.958 m

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	5.809	5.579	5.480	-	-	-
2	-	-	-	-	-	-	5.807	5.572	5.479	-	-	-
3	-	-	-	-	-	-	5.800	5.568	5.476	-	-	-
4	-	-	-	-	-	-	5.792	5.563	5.477	-	-	-
5	-	-	-	-	-	-	5.784	5.558	5.485	-	-	-
6	-	-	-	-	-	-	5.774	5.552	5.478	-	-	-
7	-	-	-	-	-	-	5.766	5.547	5.473	-	-	-
8	-	-	-	-	-	-	5.756	5.543	5.469	-	-	-
9	-	-	-	-	-	-	5.747	5.538	5.471	-	-	-
10	-	-	-	-	-	-	5.742	5.536	5.469	-	-	-
11	-	-	-	-	-	-	5.733	5.533	5.467	-	-	-
12	-	-	-	-	-	-	5.722	5.527	5.464	-	-	-
13	-	-	-	-	-	-	5.710	5.524	5.464 P	-	-	-
14	-	-	-	-	-	-	5.701	5.521	-	-	-	-
15	-	-	-	-	-	-	5.692	5.521	-	-	-	-
16	-	-	-	-	-	-	5.682	5.521	-	-	-	-
17	-	-	-	-	-	-	5.673	5.514	-	-	-	-
18	-	-	-	-	-	5.738 P	5.663	5.514	-	-	-	-
19	-	-	-	-	-	5.756	5.655	5.512	-	-	-	-
20	-	-	-	-	-	5.783	5.647	5.508	-	-	-	-
21	-	-	-	-	-	5.796	5.638	5.504	-	-	-	-
22	-	-	-	-	-	5.805	5.630	5.503	-	-	-	-
23	-	-	-	-	-	5.809	5.623	5.502	-	-	-	-
24	-	-	-	-	-	5.813	5.617	5.498	-	-	-	-
25	-	-	-	-	-	5.819	5.610	5.495	-	-	-	-
26	-	-	-	-	-	5.822	5.605	5.494	-	-	-	-
27	-	-	-	-	-	5.825	5.599	5.491	-	-	-	-
28	-	-	-	-	-	5.825	5.594	5.485	-	-	-	-
29	-	-	-	-	-	5.821	5.593	5.484	-	-	-	-
30	-	-	-	-	-	5.815	5.590	5.483	-	-	-	-
31	-	-	-	-	-	-	5.584	5.481	-	-	-	-
MIN	-	-	-	-	-	5.738	5.584	5.481	5.464	-	-	-
MEAN	-	-	-	-	-	5.802	5.688	5.522	5.473	-	-	-
MAX	-	-	-	-	-	5.825	5.809	5.579	5.485	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

E - ESTIMATED

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Roberts Creek
LOCATION: Outlet of Roberts Lake
COORDINATES: 435310 m E, 7562560 m N (NAD27)

MEASUREMENT DATE: 3 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.20		0.00			0.00	0.75	0.00
1	1.50		0.06			0.00	0.40	0.00
2	2.00		0.12			0.11	0.50	0.01
3	2.50		0.16			0.17	0.50	0.01
4	3.00		0.21			0.24	0.50	0.03
5	3.50		0.30			0.28	0.50	0.04
6	4.00		0.42			0.30	0.50	0.06
7	4.50		0.58			0.38	0.50	0.11
8	5.00		0.73			0.41	0.50	0.15
9	5.50		0.72			0.25	0.50	0.09
10	6.00		0.84	0.23	0.42	0.33	0.50	0.14
11	6.50		0.86	0.29	0.47	0.38	0.50	0.16
12	7.00		0.80	0.41	0.43	0.42	0.50	0.17
13	7.50		0.82	0.38	0.39	0.39	0.50	0.16
14	8.00		0.80	0.31	0.34	0.33	0.50	0.13
15	8.50		0.76	0.30	0.38	0.34	0.50	0.13
16	9.00		0.66			0.66	0.50	0.22
17	9.50		0.60			0.60	0.50	0.18
18	10.00		0.58			0.58	0.50	0.17
19	10.50		0.47			0.47	0.50	0.11
20	11.00		0.40			0.40	0.50	0.08
21	11.50		0.36			0.36	0.50	0.06
22	12.00		0.33			0.33	0.50	0.05
23	12.50		0.30			0.30	0.50	0.05
24	13.00		0.22			0.22	0.50	0.02
25	13.50		0.18			0.18	0.50	0.02
26	14.00		0.12			0.12	0.55	0.01
Right Bank	14.60		0.00			0.00	-7.00	0.00

2.354

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Roberts Creek
LOCATION: Outlet of Roberts Lake
COORDINATES: 435310 m E, 7562560 m N (NAD27)

MEASUREMENT DATE: 4 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1005 hrs.
MEASUREMENT END TIME:

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.20		0.01			0.00	0.80	0.00
1	1.60		0.03			0.00	0.40	0.00
2	2.00		0.09			0.05	0.45	0.00
3	2.50		0.13			0.17	0.50	0.01
4	3.00		0.16			0.21	0.50	0.02
5	3.50		0.28			0.27	0.50	0.04
6	4.00		0.38			0.36	0.50	0.07
7	4.50		0.59			0.36	0.50	0.11
8	5.00		0.72			0.36	0.50	0.13
9	5.50		0.68			0.25	0.50	0.09
10	6.00		0.74			0.39	0.50	0.14
11	6.50		0.78	0.38	0.39	0.39	0.50	0.15
12	7.00		0.78	0.38	0.73	0.56	0.50	0.22
13	7.50		0.74			0.46	0.50	0.17
14	8.00		0.78	0.38	0.42	0.40	0.50	0.16
15	8.50		0.76	0.29	0.44	0.37	0.50	0.14
16	9.00		0.77	0.29	0.38	0.34	0.50	0.13
17	9.50		0.65			0.22	0.50	0.07
18	10.00		0.50			0.23	0.50	0.06
19	10.50		0.41			0.27	0.50	0.06
20	11.00		0.36			0.23	0.50	0.04
21	11.50		0.32			0.19	0.50	0.03
22	12.00		0.30			0.21	0.50	0.03
23	12.50		0.26			0.26	0.50	0.03
24	13.00		0.21			0.21	0.50	0.02
25	13.50		0.16			0.16	0.50	0.01
26	14.00		0.12			0.12	0.55	0.01
Right Bank	14.60		0.01			0.01	-7.00	0.00

1.925

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Roberts Creek
LOCATION: Outlet of Roberts Lake
COORDINATES: 435310 m E, 7562560 m N (NAD27)

MEASUREMENT DATE: 5 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.50		0.06			0.02	0.25	0.00
1	2.00		0.08			0.07	0.50	0.00
2	2.50		0.12			0.18	0.50	0.01
3	3.00		0.23			0.25	0.50	0.03
4	3.50		0.34			0.34	0.50	0.06
5	4.00		0.59			0.28	0.50	0.08
6	4.50		0.72			0.37	0.50	0.13
7	5.00		0.73			0.25	0.50	0.09
8	5.50		0.77	0.39	0.33	0.36	0.50	0.14
9	6.00		0.83	0.34	0.35	0.35	0.50	0.14
10	6.50		0.80	0.34	0.38	0.36	0.50	0.14
11	7.00		0.81	0.33	0.38	0.36	0.50	0.14
12	7.50		0.80	0.33	0.40	0.37	0.50	0.15
13	8.00		0.73			0.37	0.50	0.14
14	8.50		0.66			0.33	0.50	0.11
15	9.00		0.70			0.21	0.50	0.07
16	9.50		0.55			0.26	0.50	0.07
17	10.00		0.50			0.22	0.50	0.06
18	10.50		0.41			0.20	0.50	0.04
19	11.00		0.36			0.12	0.50	0.02
20	11.50		0.32			0.19	0.50	0.03
21	12.00		0.31			0.16	0.50	0.02
22	12.50		0.26			0.07	0.50	0.01
23	13.00		0.21			0.03	0.50	0.00
24	13.50		0.14			0.03	0.50	0.00
25	14.00		0.07			0.02	0.45	0.00
Right Bank	14.40		0.00			0.00	-7.00	0.00

1.700

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Roberts Creek
LOCATION: Outlet of Roberts Lake
COORDINATES: 435310 m E, 7562560 m N (NAD27)

MEASUREMENT DATE: 7 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1330 hrs.
MEASUREMENT END TIME:

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	2.30		0.02			0.01	0.10	0.00
1	2.50		0.00			0.00	0.35	0.00
2	3.00		0.06			0.09	0.50	0.00
3	3.50		0.12			0.15	0.50	0.01
4	4.00		0.21			0.26	0.50	0.03
5	4.50		0.65			0.14	0.50	0.05
6	5.00		0.52			0.37	0.50	0.10
7	5.50		0.60			0.24	0.50	0.07
8	6.00		0.70			0.26	0.50	0.09
9	6.50		0.74			0.38	0.50	0.14
10	7.00		0.77	0.76	0.32	0.54	0.50	0.21
11	7.50		0.77	0.35	0.43	0.39	0.50	0.15
12	8.00		0.76	0.31	0.04	0.18	0.50	0.07
13	8.50		0.74			0.35	0.50	0.13
14	9.00		0.74			0.37	0.50	0.14
15	9.50		0.69			0.35	0.50	0.12
16	10.00		0.64			0.21	0.50	0.07
17	10.50		0.53			0.22	0.50	0.06
18	11.00		0.41			0.21	0.50	0.04
19	11.50		0.38			0.17	0.50	0.03
20	12.00		0.36			0.10	0.50	0.02
21	12.50		0.28			0.15	0.50	0.02
22	13.00		0.25			0.13	0.50	0.02
23	13.50		0.18			0.08	0.50	0.01
24	14.00		0.12			0.04	0.50	0.00
25	14.50		0.04			0.00	0.45	0.00
Right Bank	14.90		0.00			0.00	-7.25	0.00

1.562

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Roberts Creek
LOCATION: Outlet of Roberts Lake
COORDINATES: 435310 m E, 7562560 m N (NAD27)

MEASUREMENT DATE: 17 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC/KH
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 0930 hrs.
MEASUREMENT END TIME: 1020 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	2.10		0.00				0.10	0.00
1	2.30		0.34			0.72	0.20	0.05
2	2.50		0.37			0.68	0.20	0.05
3	2.70		0.35			0.69	0.20	0.05
4	2.90		0.36			0.68	0.20	0.05
5	3.10		0.37			0.62	0.20	0.05
6	3.30		0.32			0.69	0.20	0.04
7	3.50		0.35			0.82	0.20	0.06
8	3.70		0.38			0.84	0.20	0.06
9	3.90		0.36			0.92	0.20	0.07
10	4.10		0.36			0.92	0.20	0.07
11	4.30		0.37			0.88	0.20	0.07
12	4.50		0.40			0.90	0.20	0.07
13	4.70		0.40			0.80	0.20	0.06
14	4.90		0.43			0.81	0.20	0.07
15	5.10		0.40			0.77	0.20	0.06
16	5.30		0.38			0.69	0.20	0.05
17	5.50		0.36			0.63	0.20	0.05
18	5.70		0.18			0.07	0.20	0.00
19	5.90		0.10			0.23	0.20	0.00
20	6.10		0.10			0.14	0.20	0.00
21	6.30		0.10			0.05	0.20	0.00
22	6.50		0.08			0.08	0.29	0.00
Left Bank	6.87		0.00				-3.25	0.00

0.983

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Roberts Creek
LOCATION: Outlet of Roberts Lake
COORDINATES: 435310 m E, 7562560 m N (NAD27)

MEASUREMENT DATE: 21 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC/
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1040 hrs.
MEASUREMENT END TIME: 1115 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	2.75		0.00				0.13	0.00
1	3.00		0.28			0.56	0.23	0.04
2	3.20		0.30			0.56	0.20	0.03
3	3.40		0.29			0.58	0.20	0.03
4	3.60		0.32			0.54	0.20	0.03
5	3.80		0.30			0.58	0.20	0.03
6	4.00		0.32			0.71	0.20	0.05
7	4.20		0.31			0.82	0.20	0.05
8	4.40		0.31			0.84	0.20	0.05
9	4.60		0.30			0.85	0.20	0.05
10	4.80		0.33			0.82	0.20	0.05
11	5.00		0.36			0.79	0.20	0.06
12	5.20		0.34			0.80	0.20	0.05
13	5.40		0.36			0.76	0.20	0.05
14	5.60		0.37			0.65	0.20	0.05
15	5.80		0.34			0.59	0.20	0.04
16	6.00		0.32			0.60	0.20	0.04
17	6.20		0.30			0.57	0.20	0.03
18	6.40		0.08			0.01	0.20	0.00
19	6.60		0.05			0.00	0.20	0.00
20	6.80		0.05			0.00	0.35	0.00
Left Bank	7.30		0.00				-3.40	0.00

0.752

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Roberts Creek
LOCATION: Outlet of Roberts Lake
COORDINATES: 435310 m E, 7562560 m N (NAD27)

MEASUREMENT DATE: 13 September 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: RS/NS
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 0910 hrs.
MEASUREMENT END TIME: 0940 hrs.

STATION	DISTANCE FROM LEFT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.35		0.00			0.00	0.01	0.00
1	1.36		0.10			0.02	0.08	0.00
2	1.50		0.11			0.11	0.17	0.00
3	1.70		0.12			0.15	0.20	0.00
4	1.90		0.13			0.10	0.20	0.00
5	2.10		0.12			0.16	0.20	0.00
6	2.30		0.11			0.16	0.20	0.00
7	2.50		0.12			0.18	0.20	0.00
8	2.70		0.12			0.18	0.20	0.00
9	2.90		0.12			0.22	0.20	0.01
10	3.10		0.11			0.19	0.20	0.00
11	3.30		0.10			0.19	0.20	0.00
12	3.50		0.10			0.18	0.20	0.00
13	3.70		0.11			0.17	0.20	0.00
14	3.90		0.12			0.17	0.20	0.00
15	4.10		0.10			0.18	0.20	0.00
16	4.30		0.11			0.17	0.20	0.00
17	4.50		0.11			0.19	0.20	0.00
18	4.70		0.11			0.19	0.20	0.00
19	4.90		0.10			0.18	0.20	0.00
20	5.10		0.10			0.17	0.20	0.00
21	5.30		0.11			0.16	0.20	0.00
22	5.50		0.12			0.17	0.20	0.00
23	5.70		0.13			0.18	0.20	0.00
24	5.90		0.15			0.19	0.20	0.01
25	6.10		0.15			0.21	0.20	0.01
26	6.30		0.16			0.19	0.20	0.01
27	6.50		0.16			0.06	0.18	0.00
28	6.65		0.16			0.01	0.19	0.00
Right Bank	6.88		0.00			0.00	-3.33	0.00

0.104

LITTLE ROBERTS CREEK HYDROMETRIC STATION

H73 FACTSHEET

LOCATION AND PURPOSE

Located on the right downstream bank of Little Roberts Creek, approximately 200 m downstream of the lake outlet.

Operational: 2003 (30 June – 9 September)
 Benchmark: Top of embedded boulder; 100.000 m (local)
 Coordinates: UTM: 434320 m E, 7562920 m N (NAD27)
 Datalogger: Optimum Instruments #0634

2004 (6 June – 7 September)
 Drainage Area: 198.9 km²
 Lat/Long: 68°10'20" N, 106°34'59" W
 Transducer: KPSI #0402788 (5 psi, 15 m)



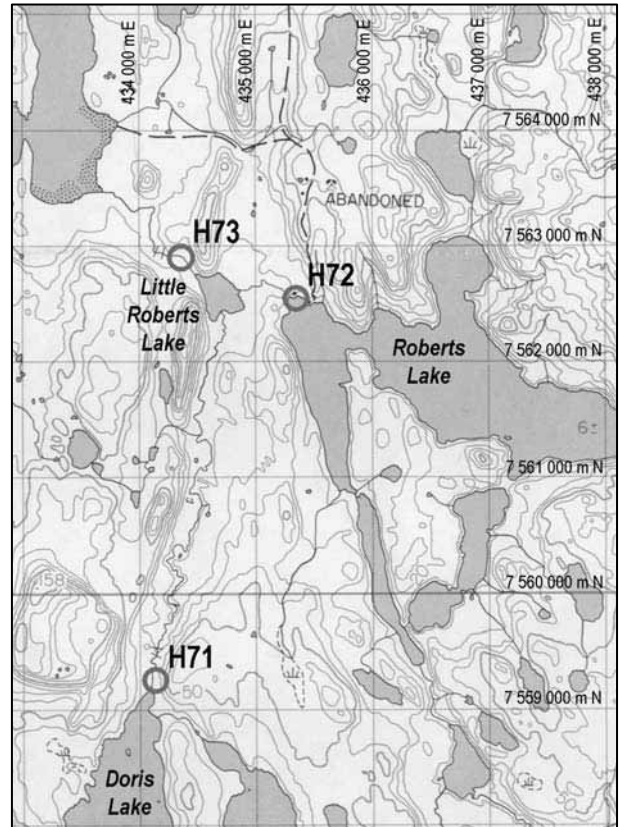
Panoramic view of H73 from LDB looking west.



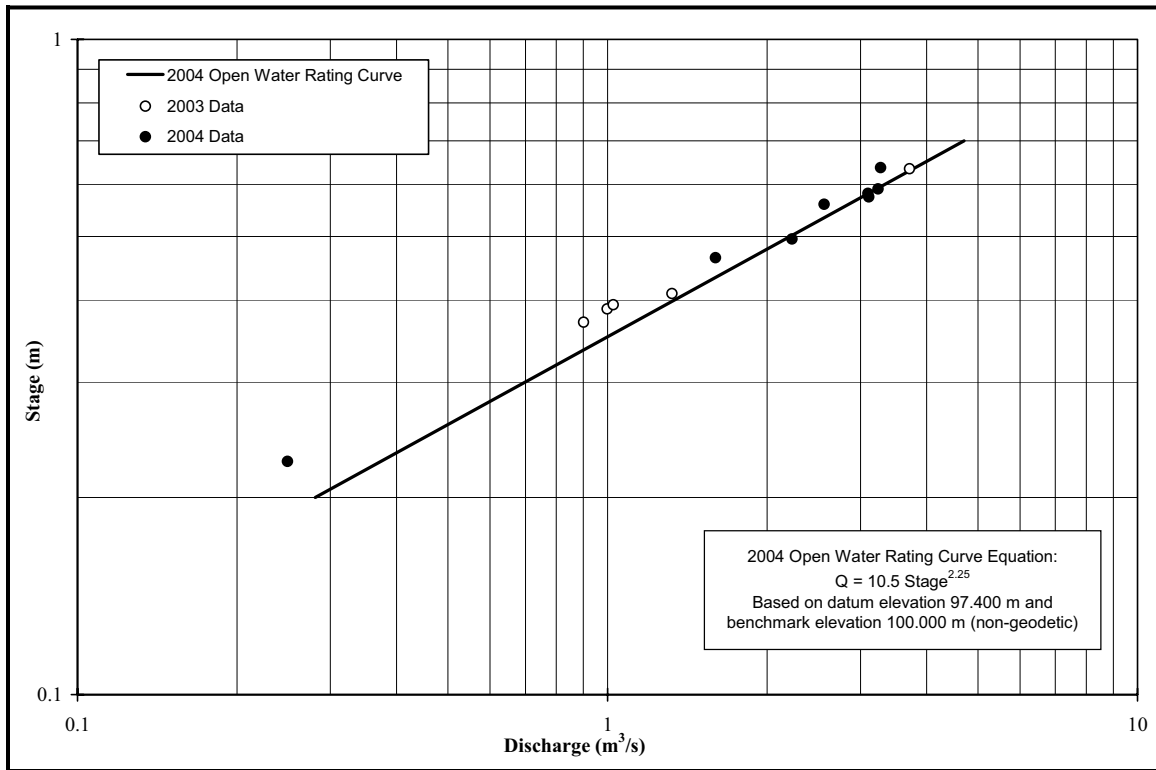
Station H73 from RDB looking downstream.



Station H73 from bank looking east.



NTS Mapping of Area.



Little Roberts Creek Station H73 - Stage-Discharge Rating Curve (2004)

Little Roberts Creek Station H73 – Stage-Discharge Data (2003-2004)

Date & Time	Transducer Reading	Transducer Elevation	Average Transducer Elevation	Staff Gauge Reading	Water Surface Elevation	Stage	Measured Discharge
					Stage Datum 97.400 (assumed)		
6/30/03 14:33	0.6581	97.558		0.585	98.216	0.8194	3.906
7/1/03 11:48	0.6464	97.563		0.578	98.209	0.8078	3.714
8/5/03 20:33	0.3818	97.559		0.310	97.941	0.5431	0.901
8/15/03 20:03	0.3995	97.561		0.330	97.961	0.5609	0.999
8/28/03 15:03	0.4053				97.631	0.5667	1.025
9/5/03 11:18	0.4209	97.562		0.352	97.983	0.5822	1.323
9/9/03 9:03	0.4263	97.565	97.561	0.359	97.991	0.5876	n/a
6/6/2004 12:00	n/a	n/a			97.889	ice effects	0.161
6/7/2004 12:00	n/a	n/a			97.959	ice effects	0.412
6/8/2004 12:00	n/a	n/a			97.837	ice effects	0.274
6/9/2004 13:54	n/a	n/a			97.791	ice effects	0.164
6/23/2004 20:24	0.5262	97.465			97.991	0.591	3.239
7/3/2004 12:00	0.5047	97.532			98.037	0.637	3.276
7/4/2004 11:15	0.4916	97.483			97.975	0.575	3.112
7/5/2004 12:00	0.4751	97.485			97.982	0.582	3.100
7/7/2004 9:01	0.4571	97.439			97.960	0.560	2.562
7/16/2004 14:55	0.3827	97.513			97.896	0.496	2.230
7/21/2004 8:36	0.3411	97.523			97.864	0.464	1.598
9/7/2004 12:20	0.1511	97.476	97.490		97.627	0.227	0.249

H73 – LITTLE ROBERTS CREEK - 2004
MEAN DAILY DISCHARGE (m³/s)

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	3.329	1.072	0.313	0.096 E	-	-
2	-	-	-	-	-	-	3.317	1.021	0.314	0.089 E	-	-
3	-	-	-	-	-	-	3.255	0.973	0.308	0.082 E	-	-
4	-	-	-	-	-	0.000 E	3.139	0.930	0.297	0.075 E	-	-
5	-	-	-	-	-	0.075 E	3.025	0.860	0.302	0.068 E	-	-
6	-	-	-	-	-	0.161 A	2.872	0.819	0.278	0.062 E	-	-
7	-	-	-	-	-	0.393 A	2.778	0.767	0.260 P	0.055 E	-	-
8	-	-	-	-	-	0.316 A	2.663	0.728	0.253 E	0.048 E	-	-
9	-	-	-	-	-	0.171 A	2.547	0.703	0.246 E	0.041 E	-	-
10	-	-	-	-	-	0.450 E	2.491	0.678	0.239 E	0.034 E	-	-
11	-	-	-	-	-	0.525 E	2.413	0.664	0.232 E	0.027 E	-	-
12	-	-	-	-	-	0.641 E	2.340	0.619	0.226 E	0.021 E	-	-
13	-	-	-	-	-	1.010 E	2.249	0.586	0.219 E	0.014 E	-	-
14	-	-	-	-	-	1.422 E	2.148	0.563	0.212 E	0.007 E	-	-
15	-	-	-	-	-	1.835 E	2.053	0.542	0.205 E	0.000 E	-	-
16	-	-	-	-	-	2.435 P	1.968	0.528	0.198 E	-	-	-
17	-	-	-	-	-	2.632	1.882	0.467	0.191 E	-	-	-
18	-	-	-	-	-	2.782	1.783	0.475	0.185 E	-	-	-
19	-	-	-	-	-	3.004	1.707	0.500	0.178 E	-	-	-
20	-	-	-	-	-	3.250	1.633	0.468	0.171 E	-	-	-
21	-	-	-	-	-	3.403	1.561	0.440	0.164 E	-	-	-
22	-	-	-	-	-	3.535	1.491	0.432	0.157 E	-	-	-
23	-	-	-	-	-	3.602	1.431	0.432	0.150 E	-	-	-
24	-	-	-	-	-	3.666	1.391	0.416	0.144 E	-	-	-
25	-	-	-	-	-	3.748	1.329	0.404	0.137 E	-	-	-
26	-	-	-	-	-	3.732	1.287	0.396	0.130 E	-	-	-
27	-	-	-	-	-	3.728	1.225	0.375	0.123 E	-	-	-
28	-	-	-	-	-	3.684	1.201	0.351	0.116 E	-	-	-
29	-	-	-	-	-	3.623	1.206	0.343	0.109 E	-	-	-
30	-	-	-	-	-	3.489	1.143	0.337	0.103 E	-	-	-
31	-	-	-	-	-	-	1.093	0.320	-	-	-	-
MIN	-	-	-	-	-	0.000	1.093	0.320	0.103	-	-	-
MEAN	-	-	-	-	-	2.123	2.063	0.587	0.205	-	-	-
MAX	-	-	-	-	-	3.748	3.329	1.072	0.314	-	-	-

MEAN DAILY WATER SURFACE ELEVATION (m) BASED ON BENCHMARK ELEVATION 100.482 m (ASSUMED)

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	98.000	97.763	97.610	-	-	-
2	-	-	-	-	-	-	97.999	97.755	97.610	-	-	-
3	-	-	-	-	-	-	97.994	97.747	97.608	-	-	-
4	-	-	-	-	-	-	97.985	97.741	97.605	-	-	-
5	-	-	-	-	-	-	97.975	97.729	97.607	-	-	-
6	-	-	-	-	-	97.901 P	97.962	97.722	97.599	-	-	-
7	-	-	-	-	-	97.899	97.954	97.713	97.593 P	-	-	-
8	-	-	-	-	-	97.789	97.943	97.705	-	-	-	-
9	-	-	-	-	-	97.742	97.933	97.701	-	-	-	-
10	-	-	-	-	-	97.729	97.928	97.696	-	-	-	-
11	-	-	-	-	-	97.711	97.920	97.693	-	-	-	-
12	-	-	-	-	-	97.690	97.913	97.684	-	-	-	-
13	-	-	-	-	-	97.824	97.904	97.677	-	-	-	-
14	-	-	-	-	-	97.809	97.894	97.673	-	-	-	-
15	-	-	-	-	-	97.790	97.884	97.668	-	-	-	-
16	-	-	-	-	-	97.913	97.875	97.665	-	-	-	-
17	-	-	-	-	-	97.941	97.866	97.651	-	-	-	-
18	-	-	-	-	-	97.954	97.855	97.653	-	-	-	-
19	-	-	-	-	-	97.973	97.846	97.658	-	-	-	-
20	-	-	-	-	-	97.994	97.837	97.651	-	-	-	-
21	-	-	-	-	-	98.006	97.829	97.644	-	-	-	-
22	-	-	-	-	-	98.016	97.820	97.642	-	-	-	-
23	-	-	-	-	-	98.022	97.812	97.642	-	-	-	-
24	-	-	-	-	-	98.026	97.807	97.638	-	-	-	-
25	-	-	-	-	-	98.033	97.799	97.635	-	-	-	-
26	-	-	-	-	-	98.031	97.793	97.633	-	-	-	-
27	-	-	-	-	-	98.031	97.785	97.628	-	-	-	-
28	-	-	-	-	-	98.028	97.781	97.621	-	-	-	-
29	-	-	-	-	-	98.023	97.782	97.618	-	-	-	-
30	-	-	-	-	-	98.013	97.773	97.617	-	-	-	-
31	-	-	-	-	-	-	97.766	97.612	-	-	-	-
MIN	-	-	-	-	-	97.690	97.766	97.612	97.593	-	-	-
MEAN	-	-	-	-	-	97.916	97.878	97.673	97.605	-	-	-
MAX	-	-	-	-	-	98.033	98.000	97.763	97.610	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

E - ESTIMATED

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 6 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	1.10		0.00			0.00	0.55	0.00
1	1.10		0.33			0.15	0.10	0.00
2	1.30		0.36			0.17	0.20	0.01
3	1.50		0.36			0.39	0.20	0.03
4	1.70		0.44			0.46	0.20	0.04
5	1.90		0.32			0.47	0.20	0.03
6	2.10		0.40			0.29	0.20	0.02
7	2.30		0.40			0.15	0.20	0.01
8	2.50		0.25			0.11	0.20	0.01
9	2.70		0.28			0.05	0.20	0.00
10	2.90		0.16			0.02	0.20	0.00
11	3.10		0.27			0.01	0.15	0.00
12	3.20		0.26			0.02	0.05	0.00
Left Bank	3.20		0.00			0.00	1.60	0.00

0.161

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 7 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	1.10		0.00			0.00	0.60	0.00
1	1.20		0.40			0.29	0.15	0.02
2	1.40		0.40			0.27	0.20	0.02
3	1.60		0.41			0.44	0.20	0.04
4	1.80		0.51			0.39	0.20	0.04
5	2.00		0.54			0.41	0.20	0.04
6	2.20		0.54			0.40	0.20	0.04
7	2.40		0.52			0.40	0.20	0.04
8	2.60		0.48			0.10	0.20	0.01
9	2.80		0.38			0.64	0.30	0.07
10	3.20		0.42			0.28	0.30	0.04
11	3.40		0.42			0.02	0.20	0.00
12	3.60		0.26			0.49	0.20	0.03
13	3.80		0.18			0.18	0.70	0.02
Left Bank	5.00		0.00			0.00	1.90	0.00

0.412

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 8 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	1.10		0.00			0.00	0.55	0.00
1	1.10		0.30			0.09	0.10	0.00
2	1.30		0.28			0.47	0.20	0.03
3	1.50		0.41			0.34	0.20	0.03
4	1.70		0.42			0.22	0.20	0.02
5	1.90		0.32			0.41	0.20	0.03
6	2.10		0.40			0.17	0.20	0.01
7	2.30		0.40			0.10	0.20	0.01
8	2.50		0.36			0.07	0.20	0.01
9	2.70		0.28			0.39	0.20	0.02
10	2.90		0.30			0.63	0.20	0.04
11	3.10		0.38			0.61	0.20	0.05
12	3.30		0.37			0.23	0.20	0.02
13	3.50		0.34			0.10	0.20	0.01
14	3.70		0.22			0.74	0.10	0.02
Left Bank	3.70		0.00			0.00	1.85	0.00

0.274

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 9 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1400 hrs.
MEASUREMENT END TIME: 1420 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	1.10		0.00			0.00	0.55	0.00
1	1.10		0.20			0.12	0.10	0.00
2	1.30		0.23			0.50	0.20	0.02
3	1.50		0.23			0.54	0.25	0.03
4	1.80		0.28			0.38	0.25	0.03
5	2.00		0.32			0.01	0.35	0.00
6	2.50		0.28			0.01	0.40	0.00
7	2.80		0.28			0.57	0.30	0.05
8	3.10		0.30			0.13	0.30	0.01
9	3.40		0.32			0.03	0.30	0.00
10	3.70		0.20			0.55	0.15	0.02
Left Bank	3.70		0.00			0.00	1.85	0.00

0.164

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 23 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 0845 hrs.
MEASUREMENT END TIME: 1000 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Right Bank	0.65		0.00				0.18	0.00
1	1.00		0.03			0.00	0.68	0.00
2	2.00		0.03			0.00	1.00	0.00
3	3.00		0.08			0.02	1.00	0.00
4	4.00		0.12			0.01	1.00	0.00
5	5.00		0.20			0.04	1.00	0.01
6	6.00		0.22			0.14	1.00	0.03
7	7.00		0.73	0.22	0.09	0.16	1.00	0.11
8	8.00		0.88	0.39	0.37	0.38	1.00	0.33
9	9.00		0.88	0.36	0.28	0.32	1.00	0.28
10	10.00		0.92	0.33	0.32	0.33	1.00	0.30
11	11.00		0.84	0.29	0.22	0.26	1.00	0.21
12	12.00		0.85	0.32	0.28	0.30	1.00	0.26
13	13.00		0.86	0.31	0.33	0.32	1.00	0.28
14	14.00		0.82	0.31	0.29	0.30	1.00	0.25
15	15.00		0.90	0.29	0.25	0.27	1.00	0.24
16	16.00		0.88	0.29	0.03	0.16	1.00	0.14
17	17.00		0.87	0.30	0.21	0.26	1.00	0.22
18	18.00		0.85	0.26	0.10	0.18	1.00	0.15
19	19.00		0.80	0.22	0.11	0.17	1.00	0.13
20	20.00		0.72			0.12	1.00	0.09
21	21.00		0.33			0.03	1.00	0.01
22	22.00		0.33			0.07	1.00	0.02
23	23.00		0.34			0.05	1.00	0.02
24	24.00		0.36			0.13	1.00	0.05
25	25.00		0.39			0.11	1.00	0.04
26	26.00		0.30			0.09	1.00	0.03
27	27.00		0.24			0.08	1.00	0.02
28	28.00		0.28			0.01	1.00	0.00
29	29.00		0.22			0.04	1.00	0.01
30	30.00		0.17			0.02	1.00	0.00
31	31.00		0.10			0.01	1.00	0.00
32	32.00		0.05			0.00	0.75	0.00
Left Bank	32.50		0.00			0.00	16.00	0.00

3.239

PROJECT NAME: Miramar/Doris North/Doris Creek

PROJECT NO.: 04-1373-009.4000

DISCHARGE DATA

STREAM NAME: Little Roberts Creek

LOCATION: Outlet of Little Roberts Lake

COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 3 July 2004

METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL

COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded

MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	14.60		0.00			0.00	7.00	0.00
1	14.00		0.42			0.17	0.55	0.04
2	13.50		0.62			0.35	0.50	0.11
3	13.00		0.72			0.44	0.50	0.16
4	12.50		0.90	0.54	0.67	0.61	0.50	0.27
5	12.00		0.90	0.58	0.65	0.62	0.50	0.28
6	11.50		0.96	0.52	0.64	0.58	0.50	0.28
7	11.00		0.96	0.53	0.62	0.58	0.50	0.28
8	10.50		0.96	0.50	0.63	0.57	0.50	0.27
9	10.00		0.86	0.51	0.62	0.57	0.50	0.24
10	9.50		0.90	0.36	0.52	0.44	0.50	0.20
11	9.00		0.88	0.31	0.57	0.44	0.50	0.19
12	8.50		0.81	0.36	0.54	0.45	0.50	0.18
13	8.00		0.74			0.41	0.50	0.15
14	7.50		0.64			0.44	0.50	0.14
15	7.00		0.71			0.42	0.50	0.15
16	6.50		0.56			0.27	0.50	0.08
17	6.00		0.41			0.30	0.50	0.06
18	5.50		0.37			0.34	0.50	0.06
19	5.00		0.30			0.35	0.50	0.05
20	4.50		0.32			0.25	0.50	0.04
21	4.00		0.39			0.20	0.50	0.04
22	3.50		0.46			0.01	0.50	0.00
23	3.00		0.10			0.05	0.50	0.00
24	2.50		0.14			0.01	0.50	0.00
25	2.00		0.06			0.00	0.40	0.00
Right Bank	1.70		0.00			0.00	1.00	0.00

3.276

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 4 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	14.80		0.00			0.00	7.20	0.00
1	14.80		0.90			0.02	0.40	0.01
2	14.40		0.26			0.28	0.40	0.03
3	14.00		0.45			0.33	0.45	0.07
4	13.50		0.69			0.44	0.50	0.15
5	13.00		0.74			0.51	0.50	0.19
6	12.50		0.89	0.57	0.67	0.62	0.50	0.28
7	12.00		0.90	0.47	0.67	0.57	0.50	0.26
8	11.50		0.84	0.42	0.54	0.48	0.50	0.20
9	11.00		0.95	0.61	0.68	0.65	0.50	0.31
10	10.50		0.84	0.45	0.58	0.52	0.50	0.22
11	10.00		0.87	0.48	0.56	0.52	0.50	0.23
12	9.50		0.86	0.33	0.55	0.44	0.50	0.19
13	9.00		0.83	0.35	0.48	0.42	0.50	0.17
14	8.50		0.81	0.37	0.50	0.44	0.50	0.18
15	8.00		0.72			0.42	0.50	0.15
16	7.50		0.68			0.41	0.50	0.14
17	7.00		0.70			0.40	0.50	0.14
18	6.50		0.59			0.14	0.50	0.04
19	6.00		0.50			0.29	0.50	0.07
20	5.50		0.53			0.08	0.50	0.02
21	5.00		0.56			0.10	0.50	0.03
22	4.50		0.60			0.16	0.50	0.05
23	4.00		0.54			0.01	0.50	0.00
24	3.50		0.56			0.01	0.50	0.00
25	3.00		0.17			0.01	0.50	0.00
26	2.50		0.08			0.01	0.50	0.00
Right Bank	2.00		0.04			0.00	2.00	0.00

3.112

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 5 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	15.30		0.06			0.02	7.50	0.01
1	15.00		0.25			0.20	0.40	0.02
2	14.50		0.55			0.20	0.50	0.06
3	14.00		0.63			0.40	0.50	0.13
4	13.50		0.72			0.43	0.50	0.15
5	13.00		0.84	0.43	0.70	0.57	0.50	0.24
6	12.50		0.92	0.46	0.67	0.57	0.50	0.26
7	12.00		0.92	0.39	0.60	0.50	0.50	0.23
8	11.50		0.88	0.57	0.71	0.64	0.50	0.28
9	11.00		0.87	0.47	0.63	0.55	0.50	0.24
10	10.50		0.84	0.35	0.52	0.44	0.50	0.18
11	10.00		0.82	0.39	0.60	0.50	0.50	0.20
12	9.50		0.85	0.40	0.15	0.28	0.50	0.12
13	9.00		0.83	0.21	0.50	0.36	0.50	0.15
14	8.50		0.74			0.42	0.50	0.16
15	8.00		0.70			0.36	0.50	0.13
16	7.50		0.62			0.44	0.50	0.14
17	7.00		0.61			0.35	0.50	0.11
18	6.50		0.48			0.23	0.50	0.06
19	6.00		0.35			0.29	0.50	0.05
20	5.50		0.50			0.38	0.50	0.10
21	5.00		0.29			0.25	0.50	0.04
22	4.50		0.29			0.18	0.50	0.03
23	4.00		0.32			0.19	0.50	0.03
24	3.50		0.27			0.09	0.50	0.01
25	3.00		0.13			0.06	0.50	0.00
26	2.50		0.11			0.10	0.50	0.01
27	2.00		0.04			0.01	0.40	0.00
Right Bank	1.70		0.00			0.00	1.00	0.00

3.100

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 7 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY:
SL

MEASUREMENT START TIME: 0905 hrs.

COMPUTATIONS BY: BT/NS

MEASUREMENT END TIME: 1000 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	14.80		0.06			0.05	0.15	0.00
1	14.50		0.02			0.09	0.40	0.00
2	14.00		0.37			0.34	0.50	0.06
3	13.50		0.63			0.04	0.50	0.01
4	13.00		0.74			0.43	0.50	0.16
5	12.50		0.88	0.40	0.67	0.54	0.50	0.24
6	12.00		0.91	0.46	0.55	0.51	0.50	0.23
7	11.50		0.94	0.42	0.61	0.52	0.50	0.24
8	11.00		0.93	0.42	0.56	0.49	0.50	0.23
9	10.50		0.93	0.35	0.60	0.48	0.50	0.22
10	10.00		0.92	0.38	0.58	0.48	0.50	0.22
11	9.50		0.86	0.37	0.50	0.44	0.50	0.19
12	9.00		0.08	0.25	0.51	0.38	0.50	0.02
13	8.50		0.76	0.26	0.45	0.36	0.50	0.13
14	8.00		0.72			0.44	0.50	0.16
15	7.50		0.68			0.35	0.50	0.12
16	7.00		0.64			0.36	0.50	0.12
17	6.50		0.64			0.27	0.50	0.09
18	6.00		0.60			0.08	0.50	0.02
19	5.50		0.49			0.26	0.50	0.06
20	5.00		0.53			0.03	0.50	0.01
21	4.50		0.54			0.01	0.50	0.00
22	4.00		0.53			0.11	0.50	0.03
23	3.50		0.55			0.01	0.50	0.00
24	3.00		0.38			0.01	0.50	0.00
25	2.50		0.14			0.01	0.50	0.00
26	2.00		0.07			0.00	0.30	0.00
Right Bank	1.90		0.00			0.00	1.00	0.00

2.562

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 17 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1500 hrs.
MEASUREMENT END TIME: 1550 hrs.

STATION	DISTANCE FROM LEFT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	1.25		0.00			0.00	0.13	0.00
1	1.50		0.20			0.18	0.38	0.01
2	2.00		0.23			0.78	0.50	0.09
3	2.50		0.30			0.82	0.50	0.12
4	3.00		0.37			0.55	0.50	0.10
5	3.50		0.46			0.77	0.50	0.18
6	4.00		0.52			0.64	0.50	0.17
7	4.50		0.53			0.40	0.50	0.11
8	5.00		0.57			0.58	0.50	0.17
9	5.50		0.43			0.36	0.50	0.08
10	6.00		0.50			0.65	0.50	0.16
11	6.50		0.59			0.01	0.50	0.00
12	7.00		0.48			0.07	0.50	0.02
13	7.50		0.40			0.51	0.50	0.10
14	8.00		0.38			0.61	0.50	0.12
15	8.50		0.41			0.69	0.50	0.14
16	9.00		0.36			0.49	0.50	0.09
17	9.50		0.40			0.50	0.50	0.10
18	10.00		0.52			0.46	0.50	0.12
19	10.50		0.53			0.37	0.50	0.10
20	11.00		0.54			0.50	0.50	0.14
21	11.50		0.62			0.41	0.50	0.13
22	12.00		0.10			0.00	0.38	0.00
Right Bank	12.25		0.00			0.00	6.00	0.00

2.230

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake
COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT DATE: 21 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC/RE
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 0845 hrs.
MEASUREMENT END TIME: 0930 hrs.

STATION	DISTANCE FROM LEFT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	8.15		0.00			0.00	0.18	0.00
1	8.50		0.16			0.13	0.43	0.01
2	9.00		0.38			0.36	0.50	0.07
3	9.50		0.33			0.30	0.50	0.05
4	10.00		0.32			0.53	0.50	0.08
5	10.50		0.35			0.55	0.50	0.10
6	11.00		0.40			0.14	0.50	0.03
7	11.50		0.43			0.57	0.50	0.12
8	12.00		0.40			0.58	0.50	0.12
9	12.50		0.34			0.40	0.50	0.07
10	13.00		0.37			0.52	0.50	0.10
11	13.50		0.38			0.48	0.50	0.09
12	14.00		0.44			0.06	0.50	0.01
13	14.50		0.46			0.15	0.50	0.03
14	15.00		0.55			0.17	0.50	0.05
15	15.50		0.56			0.10	0.50	0.03
16	16.00		0.32			0.26	0.50	0.04
17	16.50		0.55			0.29	0.50	0.08
18	17.00		0.48			0.34	0.50	0.08
19	17.50		0.44			0.31	0.50	0.07
20	18.00		0.40			0.45	0.50	0.09
21	18.50		0.47			0.42	0.50	0.10
22	19.00		0.48			0.34	0.50	0.08
23	19.50		0.44			0.41	0.50	0.09
24	20.00		0.18			0.17	0.48	0.01
Right Bank	20.45		0.00			0.00	10.00	0.00

1.598

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Little Roberts Creek
LOCATION: Outlet of Little Roberts Lake

MEASUREMENT DATE: 7 September 2004
METER NUMBER: Marsh-McBirney

COORDINATES: 434320 m E, 7562920 m N (NAD27)

MEASUREMENT BY: RS/HS
COMPUTATIONS BY:
NS

MEASUREMENT START TIME: 1145 hrs.
MEASUREMENT END TIME: 1254 hrs.

STATION	DISTANCE FROM LEFT D/S BANK	ICE THICKNESS	DEPTH	VELOCITY			WIDTH	DISCHARGE
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
	(m)	(m)	(m)				(m)	(m ³ /sec)
Left Bank	13.20		0.00			0.00	0.05	0.00
1	13.10		0.14			0.05	0.20	0.00
2	12.80		0.19			0.09	0.23	0.00
3	12.65		0.22			0.15	0.20	0.01
4	12.40		0.07			0.10	0.35	0.00
5	11.95		0.07			0.03	0.30	0.00
6	11.80		0.30			0.10	0.23	0.01
7	11.50		0.24			0.22	0.40	0.02
8	11.00		0.26			0.21	0.50	0.03
9	10.50		0.28			0.19	0.50	0.03
10	10.00		0.30			0.18	0.50	0.03
11	9.50		0.31			0.16	0.48	0.02
12	9.05		0.27			0.12	0.25	0.01
13	9.00		0.11			0.16	0.38	0.01
14	8.30		0.15			0.08	0.58	0.01
15	7.85		0.13			0.06	0.35	0.00
16	7.60		0.12			0.08	0.25	0.00
17	7.35		0.32			0.05	0.30	0.00
18	7.00		0.26			0.02	0.43	0.00
19	6.50		0.20			0.03	0.50	0.00
20	6.00		0.16			0.06	0.38	0.00
21	5.75		0.18			0.02	0.25	0.00
22	5.50		0.18			0.04	0.38	0.00
23	5.00		0.20			0.05	0.50	0.01
24	4.50		0.08			0.18	0.50	0.01
25	4.00		0.14			0.12	0.50	0.01
26	3.50		0.21			0.13	0.50	0.01
27	3.00		0.16			0.14	0.38	0.01
28	2.75		0.18			0.16	0.25	0.01
29	2.50		0.22			0.15	0.18	0.01
30	2.40		0.22			0.11	0.10	0.00
Right Bank	2.30		0.00			0.00	1.20	0.00

0.249

DORIS LAKE HYDROMETRIC STATION

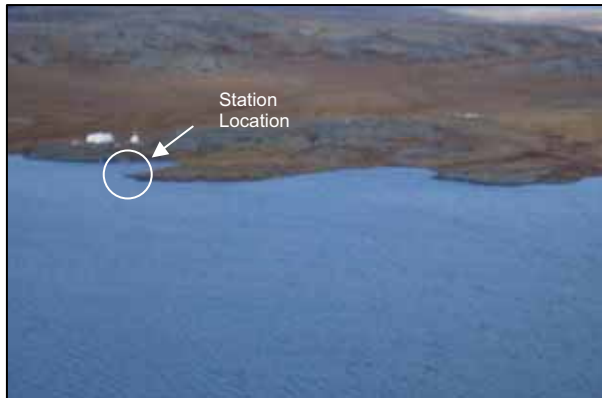
H74 FACTSHEET

LOCATION AND DETAILS

Located on bedrock outcrop on west shore of Doris Lake.

Operational: 2004 (7 May – 10 September)^a
 Benchmark: Rock bolt ; 23.546 m (geodetic)
 Coordinates: UTM: 434491 m E, 7558256 m N (NAD27)
 Datalogger: Optimum Instruments #0628
 Thermistor: 5 k Ω

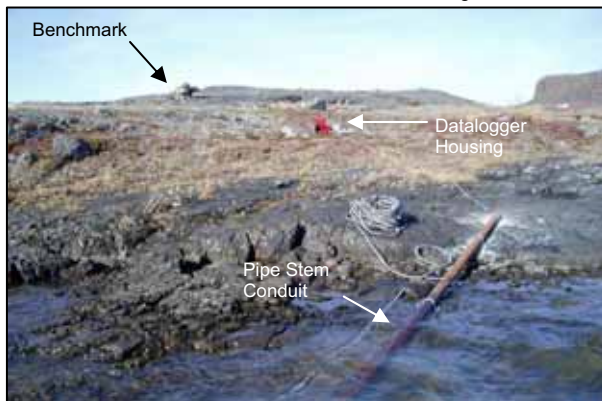
2004 (10 September – Ongoing)^a
 Drainage Area: 93.1 km²
 Lat/Long: 68°07'56" N, 106°34'34" W
 Transducer: KPSI #0202699 (8 psi, 20 m)
 KPSI #0405797 (10 psi, 60 m)



Aerial view of Doris Lake Station H74 looking west.



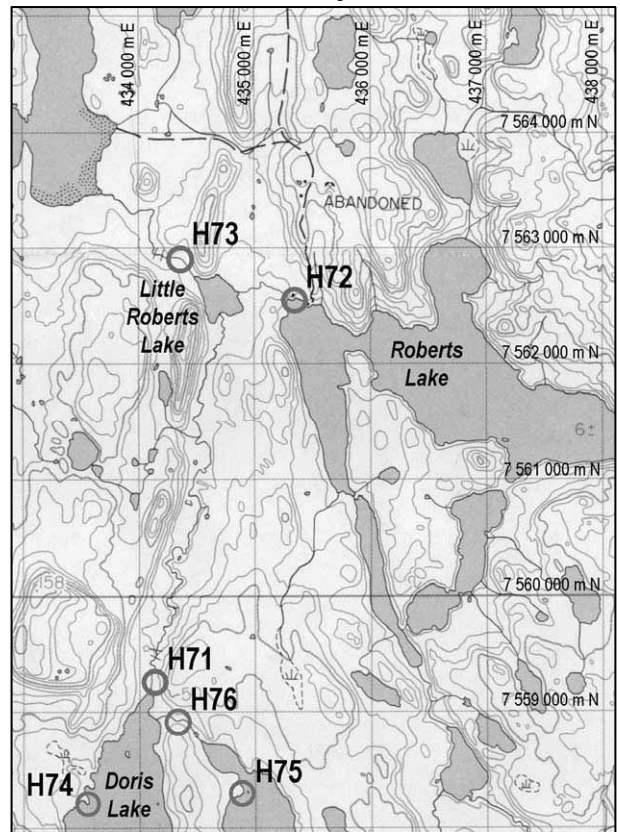
Station H74 looking southwest.



Station H74 from lake looking northwest.



Station H74 benchmark.



NTS Mapping of Area.

(a) This station was installed as a temporary station in the spring of 2004. On 10 September 2004, the temporary pressure transducer was replaced with one that allowed placement into water deep enough for overwintering. A thermistor was also installed to monitor lake bottom temperatures.

Doris Lake Station H74 – Survey Data (2004)

Date & Time	Transducer Reading	Transducer Elevation	Average Transducer Elevation	Staff Gauge Reading	Stage Datum Water Surface Elevation	Stage
5/7/2004 17:00	-0.0191					
6/5/2004 0:00	-					
6/6/2004 0:00	0.7910	20.642			21.433 *	21.433 *
6/7/2004 0:00	0.7893	20.689			21.478 *	21.478 *
6/8/2004 0:00	0.7989					
6/9/2004 13:21	0.8386	20.654	20.662		21.493 *	21.493 *
6/13/2004 10:47	Transducer Shift					
6/15/2004 0:00	Transducer Shift					
6/23/2004 13:01	1.2285	20.557			21.786	21.786
7/18/2004 12:03	1.1131	20.539			21.652	21.652
7/20/2004 13:31	1.0971	20.545			21.642	21.642
9/10/2004 10:18	0.8482	20.546	20.547		21.394	21.394

* Elevations likely local; water surface elevation near shore not equal to that in the lake

H74 – DORIS LAKE - 2004 MEAN DAILY WATER SURFACE ELEVATION (m) BASED ON BENCHMARK ELEVATION 23.546 m

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	21.774	21.554	21.407	-	-	-
2	-	-	-	-	-	-	21.773	21.546	21.406	-	-	-
3	-	-	-	-	-	-	21.769	21.539	21.403	-	-	-
4	-	-	-	-	-	-	21.762	21.533	21.402	-	-	-
5	-	-	-	-	-	-	21.756	21.523	21.405	-	-	-
6	-	-	-	-	-	-	21.751	21.516	21.401	-	-	-
7	-	-	-	-	-	-	21.745	21.509	21.395	-	-	-
8	-	-	-	-	-	-	21.737	21.503	21.392	-	-	-
9	-	-	-	-	-	-	21.730	21.497	21.390	-	-	-
10	-	-	-	-	-	-	21.727	21.493	21.389 P	-	-	-
11	-	-	-	-	-	-	21.720	21.488	-	-	-	-
12	-	-	-	-	-	21.530	21.713	21.483	-	-	-	-
13	-	-	-	-	-	21.579	21.705	21.477	-	-	-	-
14	-	-	-	-	-	21.615	21.696	21.476	-	-	-	-
15	-	-	-	-	-	21.645	21.688	21.471	-	-	-	-
16	-	-	-	-	-	21.672	21.678	21.468	-	-	-	-
17	-	-	-	-	-	21.698	21.670	21.455	-	-	-	-
18	-	-	-	-	-	21.718	21.661	21.453	-	-	-	-
19	-	-	-	-	-	21.739	21.652	21.451	-	-	-	-
20	-	-	-	-	-	21.757	21.644	21.445	-	-	-	-
21	-	-	-	-	-	21.767	21.635	21.440	-	-	-	-
22	-	-	-	-	-	21.774	21.626	21.438	-	-	-	-
23	-	-	-	-	-	21.778	21.618	21.436	-	-	-	-
24	-	-	-	-	-	21.783	21.611	21.432	-	-	-	-
25	-	-	-	-	-	21.787	21.601	21.429	-	-	-	-
26	-	-	-	-	-	21.787	21.594	21.426	-	-	-	-
27	-	-	-	-	-	21.787	21.585	21.423	-	-	-	-
28	-	-	-	-	-	21.786	21.580	21.418	-	-	-	-
29	-	-	-	-	-	21.783	21.577	21.416	-	-	-	-
30	-	-	-	-	-	21.779	21.567	21.412	-	-	-	-
31	-	-	-	-	-	-	21.560	21.409	-	-	-	-
MIN	-	-	-	-	-	21.530	21.560	21.409	21.389	-	-	-
MEAN	-	-	-	-	-	21.724	21.674	21.470	21.399	-	-	-
MAX	-	-	-	-	-	21.787	21.774	21.554	21.407	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

E - ESTIMATED

TAIL LAKE HYDROMETRIC STATION

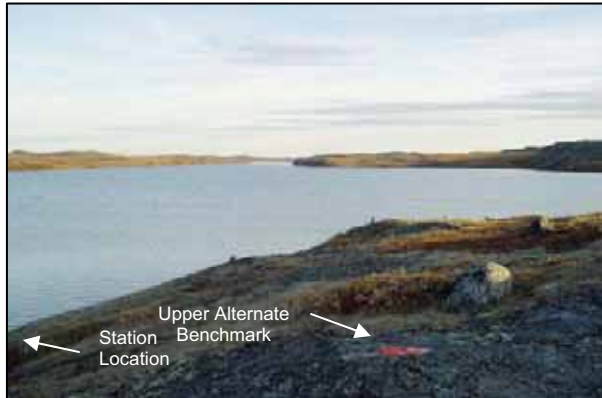
H75 FACTSHEET

LOCATION AND PURPOSE

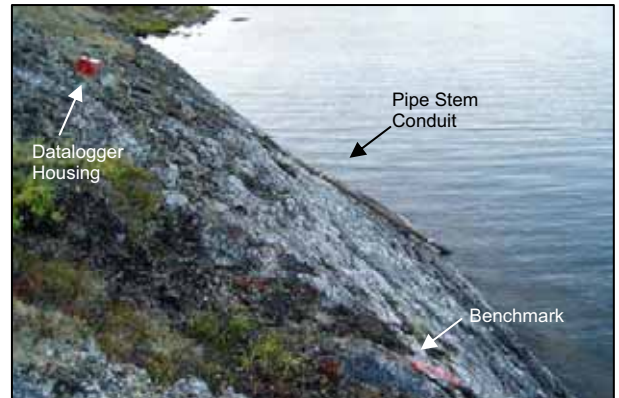
Located on bedrock outcrop on northwest shore of Tail Lake.

Operational: 2004 (8 May – 10 September)^a
 Benchmark: Rock bolt ; 29.339 m (geodetic)
 Coordinates: UTM: 434896 m E, 7558296 m N (NAD27)
 Datalogger: Optimum Instruments #0639
 Thermistor: 5 k Ω

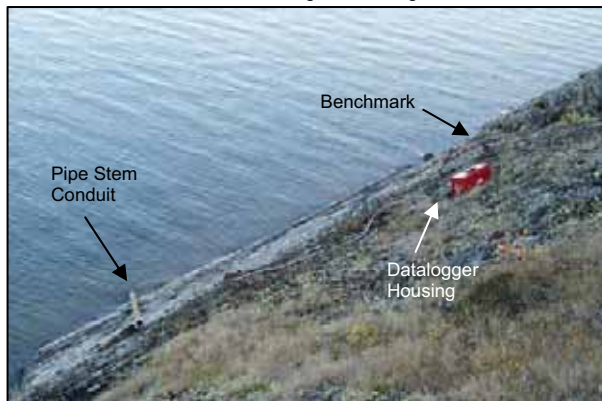
2004 (10 September – Ongoing)^a
 Drainage Area: 4.4 km²
 Lat/Long: 68°07'58" N, 106°33'59" W
 Transducer: KPSI #0202698 (8 psi, 20 m)
 KPSI #0405798 (10 psi, 60 m)



Station H75 area looking south along Tail Lake.



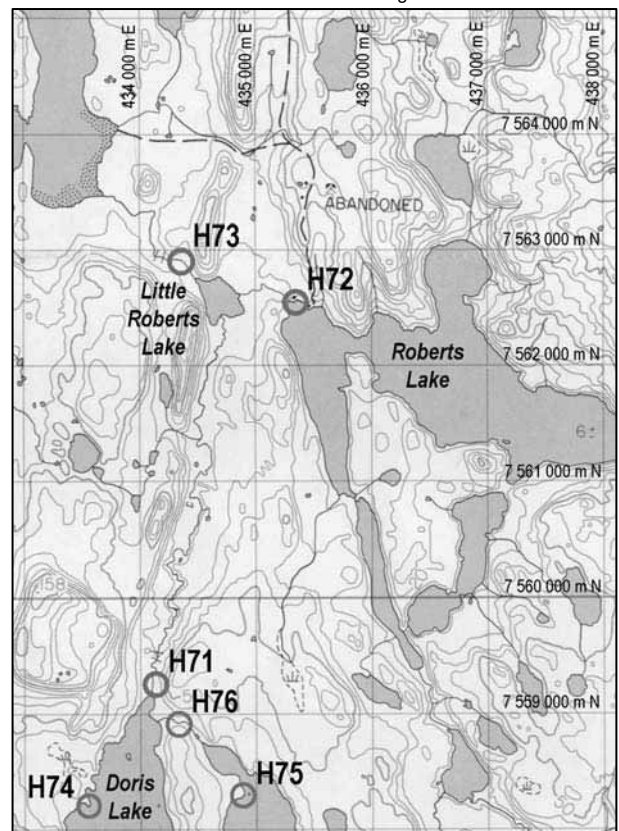
Tail Lake Station H75 looking north.



Tail Lake Station H75 looking east towards water.



Tail Lake Station H75 looking southeast towards water.



NTS Mapping of Area.

(a) This station was installed as a temporary station in the spring of 2004. On 10 September 2004, the temporary pressure transducer was replaced with one that allowed placement into water deep enough for overwintering. A thermistor was also installed to monitor lake bottom temperatures.

Little Roberts Creek Station H75 – Survey Data (2004)

Date & Time	Transducer Reading	Transducer Elevation	Average Transducer Elevation	Staff Gauge Reading	Stage Datum Water Surface Elevation	Stage
5/8/2004 15:13	-					
6/5/2004 0:00	-	-			n/a	n/a
6/6/2004 0:00	0.5200	-			n/a	n/a
6/7/2004 0:00	-	-			n/a	n/a
6/8/2004 0:00	0.4580	-			n/a	n/a
6/9/2004 14:57	0.6500	-			n/a	n/a
6/19/2004 14:12	0.8896	27.390	27.390 *		28.279	n/a
6/22/2004 21:53	transducer shifted					
7/18/2004 11:09	0.9533				28.253	28.253
7/19/2004 16:24	0.9518				28.252	28.252
9/10/2004 17:08	0.8412	27.300			28.141	28.141
9/11/2004 9:00	-	n/a	27.300		28.141	28.141

* Based on observed transducer shift on 22 Jun 04

H75 – TAIL LAKE - 2004

MEAN DAILY WATER SURFACE ELEVATION (m) BASED ON BENCHMARK ELEVATION 29.339 m

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	28.288	28.215	28.151	-	-	-
2	-	-	-	-	-	-	28.289	28.213	28.151	-	-	-
3	-	-	-	-	-	-	28.288	28.211	28.151	-	-	-
4	-	-	-	-	-	-	28.285	28.205	28.155	-	-	-
5	-	-	-	-	-	-	28.284	28.199	28.153	-	-	-
6	-	-	-	-	-	-	28.283	28.196	28.147	-	-	-
7	-	-	-	-	-	-	28.279	28.192	28.143	-	-	-
8	-	-	-	-	-	-	28.276	28.191	28.142	-	-	-
9	-	-	-	-	-	-	28.277	28.189	28.142	-	-	-
10	-	-	-	-	-	-	28.276	28.188	28.143 P	-	-	-
11	-	-	-	-	-	-	28.274	28.187	-	-	-	-
12	-	-	-	-	-	-	28.272	28.184	-	-	-	-
13	-	-	-	-	-	-	28.269	28.181	-	-	-	-
14	-	-	-	-	-	-	28.266	28.186	-	-	-	-
15	-	-	-	-	-	28.258	28.263	28.181	-	-	-	-
16	-	-	-	-	-	28.259	28.260	28.174	-	-	-	-
17	-	-	-	-	-	28.262	28.256	28.168	-	-	-	-
18	-	-	-	-	-	28.273	28.253	28.169	-	-	-	-
19	-	-	-	-	-	28.281	28.250	28.168	-	-	-	-
20	-	-	-	-	-	28.282	28.248	28.164	-	-	-	-
21	-	-	-	-	-	28.281	28.244	28.163	-	-	-	-
22	-	-	-	-	-	28.280	28.240	28.164	-	-	-	-
23	-	-	-	-	-	28.278	28.238	28.163	-	-	-	-
24	-	-	-	-	-	28.280	28.236	28.162	-	-	-	-
25	-	-	-	-	-	28.283	28.233	28.161	-	-	-	-
26	-	-	-	-	-	28.284	28.230	28.160	-	-	-	-
27	-	-	-	-	-	28.290	28.227	28.157	-	-	-	-
28	-	-	-	-	-	28.289	28.227	28.155	-	-	-	-
29	-	-	-	-	-	28.289	28.226	28.154	-	-	-	-
30	-	-	-	-	-	28.287	28.221	28.152	-	-	-	-
31	-	-	-	-	-	-	28.218	28.151	-	-	-	-
MIN	-	-	-	-	-	28.258	28.218	28.151	28.142	-	-	-
MEAN	-	-	-	-	-	28.278	28.257	28.178	28.148	-	-	-
MAX	-	-	-	-	-	28.290	28.289	28.215	28.155	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

E - ESTIMATED

TAIL CREEK HYDROMETRIC STATION

H76 FACTSHEET

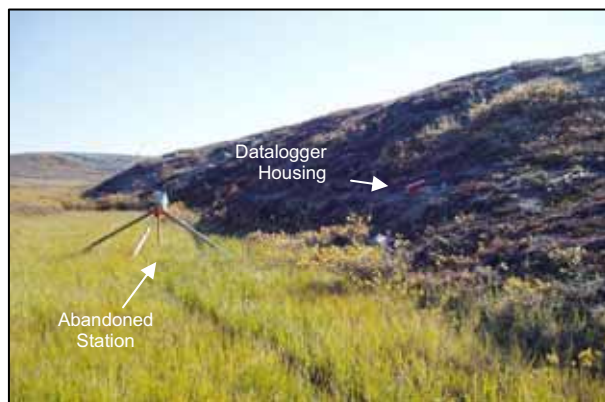
LOCATION AND PURPOSE

Located on the left downstream bank of Tail Creek, approximately 200 m upstream of Doris Lake.

Operational:	2004 (20 June – 11 September)	Drainage Area:	4.4 km ²
Benchmark:	Top of embedded boulder; 26.301 m (geodetic)	Lat/Long:	68°08'19" N, 106°34'55" W
Coordinates:	UTM: 434270 m E, 7558965 m N (NAD27)	Transducer:	KPSI #0402787 (5 psi, 15 m)
Datalogger:	Optimum Instruments #0949		



Aerial view of Tail Creek looking upstream from Doris to Tail Lake.



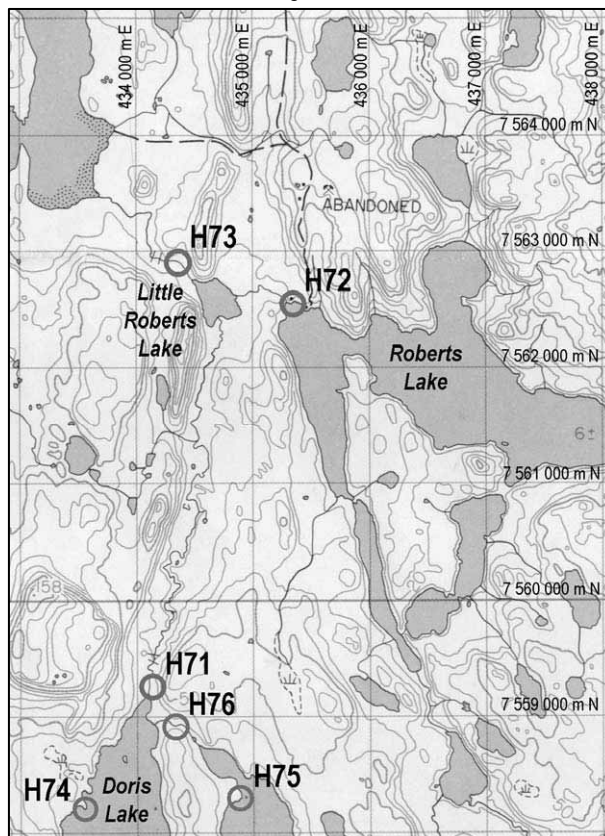
Tail Creek looking east at Station H76.



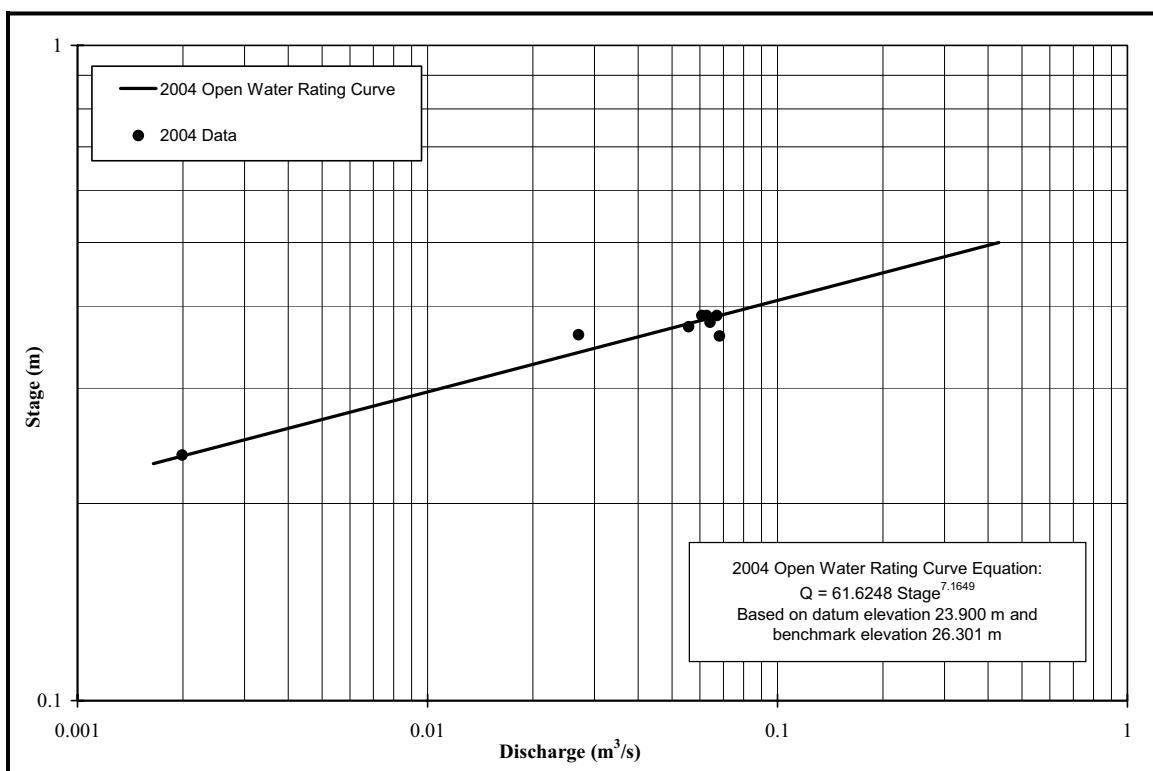
Station H76 looking west (downstream) during high water.



Station H76 looking east (upstream) during high water.



NTS Mapping of Area.



Tail Creek Station H76 – Stage-Discharge Rating Curve (2004)

Tail Creek Station H76 – Stage-Discharge Data (2004)

Date & Time	Transducer Reading	Transducer Elevation	Average Transducer Elevation	Staff Gauge Reading	Stage Datum Water Surface Elevation	Stage	Measured Discharge
6/9/2004 10:00					97.400 (geodetic)		0.025
6/19/2004 10:30	0.1608	24.119			24.280	0.380	0.057
7/2/2004 11:05	0.1729	24.099			24.272	0.372	0.056
7/3/2004 12:48	0.1796	24.107			24.287	0.387	0.063
7/4/2004 12:30	0.1784	24.109			24.287	0.387	0.067
7/5/2004 8:38	0.1725	24.105			24.278	0.378	0.064
7/6/2004 8:40	0.1717	24.088			24.260	0.360	0.068
7/7/2004 12:48	0.1796	24.107	24.103		24.287	0.387	0.061
			Transducer Replaced				
7/16/2004 11:15	0.1394	24.122			24.262	0.361	0.027
7/20/2004 11:54	0.1151	24.120			24.235	0.335	
9/11/2004 10:58	0.0328	24.104	24.104		24.137	0.237	0.002

H76 – TAIL CREEK - 2004
MEAN DAILY DISCHARGE (m³/s)

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	0.055	0.006	0.002	-	-	-
2	-	-	-	-	-	-	0.060	0.006	0.003	-	-	-
3	-	-	-	-	-	-	0.061	0.007	0.003	-	-	-
4	-	-	-	-	-	-	0.062	0.007	0.003	-	-	-
5	-	-	-	-	-	-	0.061	0.006	0.004	-	-	-
6	-	-	-	-	-	0.000 A	0.061	0.005	0.002	-	-	-
7	-	-	-	-	-	0.000 A	0.056	0.004	0.002	-	-	-
8	-	-	-	-	-	0.000 A	0.054	0.004	0.002	-	-	-
9	-	-	-	-	-	0.025 A	0.051	0.004	0.002	-	-	-
10	-	-	-	-	-	0.027 E	0.052	0.004	0.002	-	-	-
11	-	-	-	-	-	0.029 E	0.051	0.005	0.002 P	-	-	-
12	-	-	-	-	-	0.032 E	0.046	0.005	0.002 E	-	-	-
13	-	-	-	-	-	0.034 E	0.038	0.004	0.002 E	-	-	-
14	-	-	-	-	-	0.036 E	0.035	0.005	0.002 E	-	-	-
15	-	-	-	-	-	0.038 E	0.032	0.004	0.002 E	-	-	-
16	-	-	-	-	-	0.040 E	0.030	0.005	0.001 E	-	-	-
17	-	-	-	-	-	0.043 E	0.028	0.003	0.001 E	-	-	-
18	-	-	-	-	-	0.047 E	0.022	0.003	0.001 E	-	-	-
19	-	-	-	-	-	0.047 P	0.019	0.003	0.001 E	-	-	-
20	-	-	-	-	-	0.047	0.017	0.003	0.001 E	-	-	-
21	-	-	-	-	-	0.048	0.015	0.003	0.001 E	-	-	-
22	-	-	-	-	-	0.049	0.013	0.003	0.001 E	-	-	-
23	-	-	-	-	-	0.050	0.011	0.003	0.001 E	-	-	-
24	-	-	-	-	-	0.053	0.011	0.003	0.001 E	-	-	-
25	-	-	-	-	-	0.054	0.009	0.003	0.001 E	-	-	-
26	-	-	-	-	-	0.057	0.009	0.003	0.000 E	-	-	-
27	-	-	-	-	-	0.058	0.009	0.003	0.000 E	-	-	-
28	-	-	-	-	-	0.059	0.008	0.002	0.000 E	-	-	-
29	-	-	-	-	-	0.062	0.008	0.002	0.000 E	-	-	-
30	-	-	-	-	-	0.058	0.006	0.002	0.000 E	-	-	-
31	-	-	-	-	-	-	0.005	0.002	-	-	-	-
MIN	-	-	-	-	-	0.000	0.005	0.002	0.000	-	-	-
MEAN	-	-	-	-	-	0.040	0.032	0.004	0.001	-	-	-
MAX	-	-	-	-	-	0.062	0.062	0.007	0.004	-	-	-

MEAN DAILY WATER SURFACE ELEVATION (m) BASED ON BENCHMARK ELEVATION 26.301 m

DATE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	-	-	-	-	-	-	24.275	24.172	24.141	-	-	-
2	-	-	-	-	-	-	24.280	24.174	24.145	-	-	-
3	-	-	-	-	-	-	24.281	24.178	24.147	-	-	-
4	-	-	-	-	-	-	24.281	24.180	24.151	-	-	-
5	-	-	-	-	-	-	24.280	24.175	24.163	-	-	-
6	-	-	-	-	-	-	24.281	24.169	24.144	-	-	-
7	-	-	-	-	-	-	24.276	24.164	24.133	-	-	-
8	-	-	-	-	-	-	24.274	24.162	24.131	-	-	-
9	-	-	-	-	-	-	24.271	24.163	24.133	-	-	-
10	-	-	-	-	-	-	24.272	24.164	24.136	-	-	-
11	-	-	-	-	-	-	24.271	24.166	24.132 P	-	-	-
12	-	-	-	-	-	-	24.265	24.165	-	-	-	-
13	-	-	-	-	-	-	24.257	24.159	-	-	-	-
14	-	-	-	-	-	-	24.253	24.167	-	-	-	-
15	-	-	-	-	-	-	24.248	24.160	-	-	-	-
16	-	-	-	-	-	-	24.244	24.166	-	-	-	-
17	-	-	-	-	-	-	24.240	24.147	-	-	-	-
18	-	-	-	-	-	-	24.231	24.149	-	-	-	-
19	-	-	-	-	-	24.267 P	24.224	24.154	-	-	-	-
20	-	-	-	-	-	24.267	24.219	24.149	-	-	-	-
21	-	-	-	-	-	24.268	24.213	24.146	-	-	-	-
22	-	-	-	-	-	24.269	24.206	24.149	-	-	-	-
23	-	-	-	-	-	24.269	24.199	24.153	-	-	-	-
24	-	-	-	-	-	24.272	24.198	24.150	-	-	-	-
25	-	-	-	-	-	24.274	24.191	24.149	-	-	-	-
26	-	-	-	-	-	24.277	24.190	24.149	-	-	-	-
27	-	-	-	-	-	24.278	24.189	24.148	-	-	-	-
28	-	-	-	-	-	24.279	24.189	24.142	-	-	-	-
29	-	-	-	-	-	24.281	24.185	24.142	-	-	-	-
30	-	-	-	-	-	24.278	24.175	24.144	-	-	-	-
31	-	-	-	-	-	-	24.172	24.142	-	-	-	-
MIN	-	-	-	-	-	24.267	24.172	24.142	24.131	-	-	-
MEAN	-	-	-	-	-	24.273	24.236	24.158	24.141	-	-	-
MAX	-	-	-	-	-	24.281	24.281	24.180	24.163	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

E - ESTIMATED

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 9 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM LEFT BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	0.70		0.05			0.10	0.15	0.001
1	1.00		0.09			0.11	0.30	0.003
2	1.30		0.10			0.32	0.25	0.008
3	1.50		0.11			0.40	0.20	0.009
4	1.70		0.09			0.15	0.20	0.003
5	1.90		0.07			0.10	0.20	0.001
Right Bank	2.10		0.03			0.06	0.95	0.002

0.026

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 19 June 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC/TA
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1100 hrs.
MEASUREMENT END TIME: 1200 hrs.

STATION	DISTANCE FROM LEFT BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Main Channel								
Left Bank	1.00		0.00			0.00	0.10	0.000
1	1.20		0.01			0.00	0.20	0.000
2	1.40		0.10			0.01	0.20	0.000
3	1.60		0.19			0.36	0.20	0.014
4	1.80		0.28			0.53	0.20	0.030
5	2.00		0.19			0.16	0.20	0.006
6	2.20		0.18			0.02	0.20	0.001
7	2.40		0.10			0.05	0.20	0.001
8	2.60		0.08			0.01	0.20	0.000
9	2.80		0.07			0.02	0.20	0.000
10	3.00		0.05			0.02	0.18	0.000
Bank	3.15		0.00			0.00	1.50	0.000

0.052

STATION	DISTANCE FROM LEFT BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
2 nd Channel								
Left Bank	0.80		0.00			0.00	0.10	0.000
1	1.00		0.02			0.00	0.20	0.000
2	1.20		0.02			0.00	0.20	0.000
3	1.40		0.08			0.01	0.20	0.000
4	1.60		0.08			0.00	0.20	0.000
5	1.80		0.10			0.04	0.20	0.001
6	2.00		0.06			0.05	0.20	0.001
7	2.20		0.01			0.00	0.20	0.000
8	2.40		0.01			0.00	0.20	0.000
9	2.60		0.01			0.00	0.20	0.000
10	2.80		0.05			0.00	0.20	0.000
11	3.00		0.09			0.00	0.20	0.000
12	3.20		0.14			0.01	0.20	0.000
13	3.40		0.15			0.02	0.20	0.001
14	3.60		0.14			0.02	0.20	0.001
15	3.80		0.10			0.01	0.20	0.000
16	4.00		0.07			0.02	0.20	0.000
17	4.20		0.08			0.01	0.20	0.000
18	4.40		0.10			0.05	0.20	0.001
19	4.60		0.07			0.01	0.20	0.000
20	4.80		0.09			0.01	0.20	0.000
21	5.00		0.08			0.00	0.20	0.000
22	5.20		0.05			0.00	0.16	0.000
Right Bank	5.31		0.00			0.00	2.60	0.000

0.005

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 2 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY:
SL
COMPUTATIONS BY:
NS

MEASUREMENT START TIME: 1110 hrs.
MEASUREMENT END TIME: 1130 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	3.00		0.04			0.01	0.10	0.000
1	2.80		0.03			0.01	0.10	0.000
2	2.60		0.08			0.02	0.10	0.000
3	2.40		0.10			0.02	0.10	0.000
4	2.20		0.13			0.04	0.10	0.001
5	2.00		0.21			0.02	0.05	0.000
6	1.90		0.20			0.06	0.05	0.001
7	1.80		0.22			0.27	0.05	0.003
8	1.70		0.29			0.47	0.05	0.007
9	1.60		0.32			0.60	0.05	0.010
10	1.50		0.29			0.41	0.05	0.006
11	1.40		0.16			0.06	0.05	0.000
12	1.30		0.12			0.02	0.05	0.000
13	1.20		0.08			0.02	0.05	0.000
14	1.10		0.04			0.00	0.10	0.000
Right Bank	0.90		0.00			0.00	0.45	0.000
0.028								

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 3 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: not recorded
MEASUREMENT END TIME: not recorded

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	3.90		0.01			0.00	1.90	0.00
1	3.80		0.02			0.00	0.10	0.00
2	3.70		0.06			0.00	0.10	0.00
3	3.60		0.09			0.05	0.10	0.00
4	3.50		0.10			0.03	0.10	0.00
5	3.40		0.10			0.04	0.10	0.00
6	3.30		0.11			0.03	0.10	0.00
7	3.20		0.12			0.04	0.10	0.00
8	3.10		0.13			0.04	0.10	0.00
9	3.00		0.10			0.04	0.10	0.00
10	2.90		0.09			0.02	0.10	0.00
11	2.80		0.10			0.01	0.10	0.00
12	2.70		0.18			0.04	0.10	0.00
13	2.60		0.25			0.09	0.10	0.00
14	2.50		0.32			0.52	0.10	0.02
15	2.40		0.29			0.60	0.10	0.02
16	2.30		0.18			0.56	0.10	0.01
17	2.20		0.11			0.39	0.10	0.00
18	2.10		0.10			0.38	0.10	0.00
19	2.00		0.10			0.20	0.10	0.00
20	1.90		0.10			0.12	0.10	0.00
21	1.80		0.07			0.18	0.10	0.00
22	1.70		0.02			0.01	0.10	0.00
Right Bank	1.60		0.01			0.00	0.85	0.00

0.063

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 4 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1230 hrs.
MEASUREMENT END TIME: 1300 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	3.80		0.04			0.01	0.05	0.00
1	3.70		0.06			0.02	0.10	0.00
2	3.60		0.08			0.01	0.10	0.00
3	3.50		0.10			0.03	0.10	0.00
4	3.40		0.10			0.03	0.10	0.00
5	3.30		0.10			0.02	0.10	0.00
6	3.20		0.11			0.01	0.10	0.00
7	3.10		0.13			0.03	0.10	0.00
8	3.00		0.09			0.01	0.10	0.00
9	2.90		0.08			0.01	0.10	0.00
10	2.80		0.10			0.02	0.10	0.00
11	2.70		0.18			0.02	0.10	0.00
12	2.60		0.25			0.08	0.10	0.00
13	2.50		0.29			0.43	0.10	0.01
14	2.40		0.31			0.56	0.10	0.02
15	2.30		0.30			0.65	0.10	0.02
16	2.20		0.12			0.45	0.10	0.01
17	2.10		0.11			0.36	0.10	0.00
18	2.00		0.10			0.15	0.10	0.00
19	1.90		0.10			0.14	0.10	0.00
20	1.80		0.08			0.13	0.10	0.00
21	1.70		0.05			0.05	0.10	0.00
22	1.60		0.03			0.00	0.10	0.00
Right Bank	1.50		0.00			0.00	0.05	0.00

0.067

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 5 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY:
SL

MEASUREMENT START TIME: 0845 hrs.

COMPUTATIONS BY:
NS

MEASUREMENT END TIME: 0930 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	3.50		0.06			0.03	1.65	0.00
1	3.30		0.09			0.03	0.20	0.00
2	3.10		0.01			0.03	0.20	0.00
3	2.90		0.12			0.02	0.15	0.00
4	2.80		0.12			0.02	0.10	0.00
5	2.70		0.09			0.02	0.10	0.00
6	2.60		0.09			0.01	0.10	0.00
7	2.50		0.09			0.02	0.10	0.00
8	2.40		0.25			0.24	0.10	0.01
9	2.30		0.34			0.48	0.10	0.02
10	2.20		0.24			0.59	0.10	0.01
11	2.10		0.19			0.62	0.10	0.01
12	2.00		0.11			0.14	0.10	0.00
13	1.90		0.11			0.05	0.10	0.00
14	1.80		0.09			0.25	0.10	0.00
15	1.70		0.10			0.37	0.10	0.00
16	1.60		0.09			0.30	0.10	0.00
17	1.50		0.08			0.06	0.10	0.00
18	1.40		0.02			0.01	0.10	0.00
Right Bank	1.30		0.00			0.00	0.70	0.00

0.064

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 6 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY:
SL

MEASUREMENT START TIME: 0845 hrs.

COMPUTATIONS BY:
NS

MEASUREMENT END TIME: 0930 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	3.30		0.06			0.10	1.55	0.01
1	3.10		0.07			0.03	0.20	0.00
2	2.90		0.07			0.03	0.20	0.00
3	2.70		0.10			0.03	0.20	0.00
4	2.50		0.09			0.01	0.15	0.00
5	2.40		0.10			0.01	0.10	0.00
6	2.30		0.16			0.01	0.10	0.00
7	2.20		0.24			0.10	0.10	0.00
8	2.10		0.29			0.45	0.10	0.01
9	2.00		0.30			0.54	0.10	0.02
10	1.90		0.23			0.62	0.10	0.01
11	1.80		0.12			0.36	0.10	0.00
12	1.70		0.10			0.33	0.10	0.00
13	1.60		0.10			0.15	0.10	0.00
14	1.50		0.10			0.11	0.10	0.00
15	1.40		0.08			0.12	0.10	0.00
16	1.30		0.03			0.01	0.10	0.00
Right Bank	1.20		0.00			0.00	0.65	0.00

0.068

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 7 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: SL
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1250 hrs.
MEASUREMENT END TIME: 1320 hrs.

STATION	DISTANCE FROM BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Bank	3.90		0.01			0.00	0.05	0.000
1	3.80		0.02			0.00	0.10	0.000
2	3.70		0.06			0.00	0.10	0.000
3	3.60		0.09			0.05	0.10	0.000
4	3.50		0.10			0.03	0.10	0.000
5	3.40		0.10			0.04	0.10	0.000
6	3.30		0.11			0.03	0.10	0.000
7	3.20		0.12			0.04	0.10	0.000
8	3.10		0.13			0.04	0.10	0.001
9	3.00		0.10			0.04	0.10	0.000
10	2.90		0.09			0.02	0.10	0.000
11	2.80		0.10			0.01	0.10	0.000
12	2.70		0.18			0.04	0.10	0.001
13	2.60		0.25			0.09	0.10	0.002
14	2.50		0.32			0.52	0.10	0.017
15	2.40		0.29			0.60	0.10	0.017
16	2.30		0.18			0.56	0.10	0.010
17	2.20		0.11			0.39	0.10	0.004
18	2.10		0.10			0.38	0.10	0.004
19	2.00		0.10			0.10	0.10	0.001
20	1.90		0.10			0.10	0.10	0.001
21	1.80		0.07			0.07	0.10	0.000
22	1.70		0.02			0.02	0.10	0.000
Bank	1.60		0.01			0.01	0.85	0.000

0.061

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 16 July 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: JC
COMPUTATIONS BY: BT/NS

MEASUREMENT START TIME: 1000 hrs.
MEASUREMENT END TIME: 1030 hrs.

STATION	DISTANCE FROM LEFT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	0.78		0.00			0.00	0.06	0.00
1	0.90		0.04			0.01	0.16	0.00
2	1.10		0.18			0.02	0.20	0.00
3	1.30		0.26			0.44	0.20	0.02
4	1.50		0.12			0.08	0.20	0.00
5	1.70		0.17			0.02	0.20	0.00
6	1.90		0.08			0.01	0.20	0.00
7	2.10		0.06			0.00	0.20	0.00
8	2.30		0.05			0.00	0.20	0.00
9	2.50		0.03			0.00	0.35	0.00
10	3.00		0.02			0.00	0.75	0.00
11	4.00		0.00			0.00	1.00	0.00
12	5.00		0.04			0.00	1.00	0.00
13	6.00		0.00			0.00	1.00	0.00
14	7.00		0.00			0.00	1.00	0.00
15	8.00		0.00			0.00	1.00	0.00
16	9.00		0.00			0.00	1.00	0.00
17	10.00		0.00			0.00	1.00	0.00
18	11.00		0.00			0.00	1.00	0.00
19	12.00		0.00			0.00	1.00	0.00
20	13.00		0.00			0.00	1.00	0.00
21	14.00		0.00			0.00	1.00	0.00
22	15.00		0.00			0.00	1.00	0.00
23	16.00		0.00			0.00	0.60	0.00
24	16.20		0.02			0.00	0.20	0.00
25	16.40		0.07			0.00	0.40	0.00
26	17.00		0.00			0.00	0.80	0.00
27	18.00		0.04			0.00	1.00	0.00
28	19.00		0.00			0.00	1.00	0.00
29	20.00		0.03			0.00	1.00	0.00
30	21.00		0.00			0.00	0.65	0.00
31	21.30		0.10			0.01	0.20	0.00
32	21.40		0.07			0.01	0.10	0.00
33	21.50		0.05			0.00	0.30	0.00
34	22.00		0.00			0.00	0.75	0.00
35	23.00		0.00			0.00	1.00	0.00
36	24.00		0.00			0.00	0.70	0.00
Right Bank	24.40		0.00			0.00	12.00	0.00
35.42								0.027

Project No.:	04-1373-009	Date:	3-Sep-04	Personnel:	HKS
Stream Name:	Tail Outflow	Start	Finish		
Station:	As noted below	Time:			hh:mm
Meter Type:	Swoffer				

Description	STATION (m)	TOTAL DEPTH (m)	VELOCITY			Flow Angle (if other than 0) (degrees)	Calculated Discharge (cms)
			0.2 Depth (m/s)	0.8 Depth (m/s)	0.6 Depth (m/s)		
D1W1 (in willows, dispersed flow)	0 0.07 0.1 0.13 0.2	0 0.04 0.07 0.06 0			0.00 0.10 0.18 0.07 0.00		0.00020 0.00038 0.00021
9/3/04 15:34	13 W 434162 7558959					TOTAL	0.00079
Inflow into lake D2W1	0 0.07 0.12 0.2 0.25 0.37	0 0.035 0.05 0.05 0.06 0			0.00 0.10 0.21 0.13 0.24 0.00		0.00021 0.00068 0.00042 0.00122
9/3/04 15:51	13 W 434159 7558943					TOTAL	0.00254
Upstream of willow 1 D3W1	0 0.05 0.1 0.15 0.2 0.25 0.3 0.32	0 0.09 0.13 0.16 0.2 0.16 0.1 0			0.00 0.01 0.10 0.15 0.12 0.11 0.01 0.00		0.00005 0.00065 0.00120 0.00120 0.00088 0.00004
9/3/04 16:03	13 W 434166 7558963					TOTAL	0.00401
Wider pool upstream of willow 1 D4	0 0.1 0.15 0.2 0.3 0.4 0.5 0.55 0.6 0.63	0 0.1 0.16 0.72 0.72 0.76 0.75 0.12 0.08 0			0.00 0.01 0.03 0.01 0.01 0.01 0.01 0.02 0.00 0.00		0.00008 0.00024 0.00054 0.00072 0.00076 0.00056 0.00012 0.00000
9/3/04 16:33	13 W 434182 7558969					TOTAL	0.00302
Downstream of willow 2 D5	0 0.1 0.15 0.2 0.25 0.3	0 0.11 0.16 0.15 0.12 0			0.00 0.01 0.03 0.28 0.13 0.00		0.00008 0.00024 0.00210 0.00078
9/3/04 16:40	13 W 434207 7558968					TOTAL	0.00320
Upstream of willow 2 D7	0 0.05 0.1 0.15 0.2 0.25	0.2 0.2 0.2 0.15 0.16 0.07			0.04 0.09 0.12 0.08 0.03 0.00		0.00020 0.00090 0.00120 0.00060 0.00024
9/3/04 17:01	13 W 434263 7558963					TOTAL	0.00314
Downstream of gauge D8	0 0.1 0.15 0.2 0.25 0.3 0.35 0.4	0.1 0.25 0.28 0.28 0.27 0.2 0.16 0.12			0.02 0.06 0.08 0.05 0.06 0.03 0.01 0.00		0.00010 0.00113 0.00112 0.00070 0.00081 0.00030 0.00008
9/3/04 17:13	13 W 434293 7558934					TOTAL	0.00424

Project No.: 04-1373-009 Date: 4-Sep-04 Personnel: HKS
Stream Name: Tail Outflow Start Finish
Station: As noted below Time: hh:mm
Meter Type: Swoffer

Description	STATION (m)	TOTAL DEPTH (m)	VELOCITY			Flow Angle (if other than 0) (degrees)	Calculated Discharge (cms)
			0.2 Depth (m/s)	0.8 Depth (m/s)	0.6 Depth (m/s)		
Downstream of W3 D9	0 0.2 0.3 0.4 0.5 0.6 0.7 0.77	0 0.12 0.02 0.2 0.12 0.1 0.05 0			0.00 0.04 0.01 0.05 0.04 0.02 0.00 0.00		0.00072 0.00002 0.00100 0.00048 0.00020 0.00000
9/4/04 13:17	13 W 434351 7558917					TOTAL	0.00242
Upstream of willow 3, 1 of 2 channels D10	0 0.1 0.2 0.25 0.3 0.35	0 0.08 0.08 0.05 0.04 0			0.00 0.23 0.13 0.06 0.05 0.00		0.00000 0.00184 0.00078 0.00015 0.00010 0.00000
Upstream of willow 3, 2 of 2 channels D11	0 0.05 0.1 0.15 0.22	0 0.09 0.09 0.07 0			0.00 0.01 0.04 0.08 0.00		0.00000 0.00005 0.00018 0.00034
9/4/04 13:36	13 W 434378 7558916					TOTAL 1+2	0.00343
Upstream of willow 3, d/s of grass chn. D12	0 0.05 0.1 0.15 0.2 0.27	0 0.1 0.13 0.14 0.08 0			0.00 0.26 0.27 0.11 0.03 0.00		0.00000 0.00130 0.00176 0.00077 0.00014
9/4/04 13:47	13 W 434403 7558918					TOTAL	0.00397

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: Tail Creek
LOCATION: Outlet of Tail Lake
COORDINATES: 434270 m E, 7558965 m N (NAD27)

MEASUREMENT DATE: 11 September 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: NS
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1130 hrs.
MEASUREMENT END TIME: 1150 hrs.

STATION	DISTANCE FROM LEFT BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	0.30		0.00			0.00	0.05	0.00
1	0.40		0.04			0.03	0.08	0.00
2	0.45		0.08			0.11	0.05	0.00
3	0.50		0.11			0.15	0.05	0.00
4	0.55		0.16			0.04	0.05	0.00
5	0.60		0.17			0.03	0.05	0.00
6	0.65		0.12			0.01	0.05	0.00
Right Bank	0.70		0.00			0.00	0.33	0.00

0.002

MISCELLANEOUS ADDITIONAL STREAM DISCHARGE MEASUREMENTS

PROJECT NAME: Miramar/Doris North/Doris Creek
PROJECT NO.: 04-1373-009.4000
DISCHARGE DATA

STREAM NAME: E14
LOCATION: Tributary to Roberts Lake
COORDINATES: 436824 m E, 7563107 m N (NAD27)

MEASUREMENT DATE: 21 August 2004
METER NUMBER: Marsh-McBirney

MEASUREMENT BY: HKS
COMPUTATIONS BY: NS

MEASUREMENT START TIME: 1449 hrs.
MEASUREMENT END TIME: 1450 hrs.

STATION	DISTANCE FROM RIGHT D/S BANK (m)	ICE THICKNESS (m)	DEPTH (m)	VELOCITY			WIDTH (m)	DISCHARGE (m ³ /sec)
				0.2 Depth	0.8 Depth	0.6 Depth		
				(m/sec)	(m/sec)	(m/sec)		
Left Bank	0.00		0.04			0.00	0.02	0.0000
1	0.04		0.06			0.18	0.02	0.0002
Right Bank	0.08		0.04			0.00	0.04	0.0000

0.0002

Snow Course Survey Raw Data – Open Lake Plots

Location OL-04-1 Patch Lake				Location OL-04-2 Ogama Lake				Location OL-04-3 Doris Lake				Location OL-04-4 Tail Lake			
Waypoint 001				Waypoint 012				Waypoint 015				Waypoint 020			
Date: 5-May-04				Date: 5-May-04				Date: 6-May-04				Date: 6-May-04			
Density				Density				Density				Density			
Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density
[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]
16.4	34	32	0.122	29	45	33	0.414	4	35	32.5	0.625	12.5	38	32.5	0.440
18	35	32	0.167	8	35.5	33	0.313	10	38	32.5	0.550	9	35	32.5	0.278
21	36	32	0.190	16	40	33	0.438	6	38	32.5	0.917	11	36.5	32.5	0.364
Average:			0.160	Average:			0.388	Average:			0.697	Average:			0.360
Depth				Depth				Depth				Depth			
SWE				SWE				SWE				SWE			
[cm]	[mm]			[cm]	[mm]			[cm]	[mm]			[cm]	[mm]		
8.5	13.6			6.1	23.7			0.0	0.0			12.7	45.8		
10.5	16.8			6.8	26.4			1.0	7.0			8.8	31.7		
9.5	15.2			10.5	40.7			0.9	6.3			12.1	43.6		
10.5	16.8			15.7	60.9			0.5	3.5			21.7	78.2		
7.0	11.2			11.8	45.8			2.3	16.0			19.9	71.7		
10.0	16.0			28.0	108.6			1.8	12.6			7.6	27.4		
8.8	14.1			28.0	108.6			1.7	11.9			9.3	33.5		
6.5	10.4			17.5	67.9			1.8	12.6			13.0	46.9		
8.7	13.9			10.0	38.8			0.7	4.9			16.0	57.7		
2.0	3.2			16.0	62.1			1.0	7.0			8.0	28.8		
8.5	13.6			16.5	64.0			1.5	10.5			6.2	22.3		
10.3	16.4			24.7	95.8			4.2	29.3			3.0	10.8		
4.4	7.0			18.0	69.8			3.6	25.1			0.0	0.0		
7.0	11.2			20.0	77.6			7.6	53.0			0.0	0.0		
2.6	4.2			21.0	81.5			5.8	40.4			0.1	0.4		
1.6	2.6			25.7	99.7			2.2	15.3			4.5	16.2		
1.2	1.9			28.0	108.6			2.5	17.4			0.0	0.0		
2.5	4.0			22.7	88.1			4.2	29.3			0.0	0.0		
3.7	5.9			20.5	79.5			0.0	0.0			3.0	10.8		
4.4	7.0			19.5	75.6			0.0	0.0			5.5	19.8		
5.2	8.3			19.5	75.6			1.2	8.4			3.0	10.8		
5.3	8.5			18.4	71.4			0.8	5.6			0.2	0.7		
20.0	31.9			13.6	52.8			1.5	10.5			4.2	15.1		
27.0	43.1			15.4	59.7			0.0	0.0			8.7	31.4		
16.4	26.2			23.5	91.2			2.7	18.8			3.0	10.8		
18.0	28.7			16.5	64.0			3.5	24.4			2.5	9.0		
24.7	39.4			4.5	17.5			3.9	27.2			3.0	10.8		
17.2	27.5			16.5	64.0			7.6	53.0			6.0	21.6		
14.4	23.0			15.5	60.1			5.5	38.3			10.0	36.0		
12.8	20.4			5.5	21.3			4.2	29.3			7.8	28.1		
9.6	15.4	Average		17.2	66.7	Average		2.5	17.2	Average		6.7	24.0	Average	

Snow Course Survey Raw Data – Exposed Lowland Plots

Location EL-04-1				Location EL-04-2				Location EL-04-3			
Waypoint 008				Waypoint 016				Waypoint 018			
Date: 5-May-04				Date: 6-May-04				Date: 6-May-04			
Density				Density				Density			
Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density
[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]
33	39	33	0.182	21	35	32.5	0.119	11	36	32.5	0.318
42	42	33	0.214	21	37	32.5	0.214	12	35	32.5	0.208
28.5	41	33	0.281	13	36	32.5	0.269	10	33.5	32.5	0.100
Average:			0.226	Average:			0.201	Average:			0.209
Depth	SWE			Depth	SWE			Depth	SWE		
[cm]	[mm]			[cm]	[mm]			[cm]	[mm]		
21.5	48.5			12.1	24.3			5.0	10.4		
20.0	45.1			13.7	27.5			2.6	5.4		
40.5	91.4			17.5	35.1			5.2	10.9		
21.0	47.4			16.1	32.3			2.8	5.8		
28.0	63.2			20.0	40.2			5.3	11.1		
43.2	97.5			14.8	29.7			4.6	9.6		
28.5	64.3			24.2	48.6			2.7	5.6		
34.5	77.8			25.3	50.8			10.0	20.9		
26.5	59.8			15.8	31.7			5.8	12.1		
18.7	42.2			18.8	37.8			3.4	7.1		
34.0	76.7			11.1	22.3			6.7	14.0		
33.0	74.4			20.0	40.2			13.2	27.6		
35.8	80.8			8.9	17.9			5.2	10.9		
27.4	61.8			90.0	180.8			4.3	9.0		
46.0	103.8			24.1	48.4			9.8	20.5		
40.5	91.4			30.5	61.3			11.5	24.0		
38.2	86.2			24.5	49.2			8.6	18.0		
26.9	60.7			18.0	36.2			5.5	11.5		
32.1	72.4			23.0	46.2			8.0	16.7		
39.4	88.9			23.3	46.8			5.0	10.4		
42.0	94.8			18.6	37.4			6.3	13.2		
42.0	94.8			15.3	30.7			7.8	16.3		
44.5	100.4			17.6	35.4			16.3	34.0		
56.9	128.4			13.2	26.5			15.5	32.4		
30.5	68.8			16.9	33.9			7.2	15.0		
29.2	65.9			22.6	45.4			16.0	33.4		
48.0	108.3			22.4	45.0			11.0	23.0		
31.2	70.4			21.6	43.4			8.2	17.1		
42.4	95.7			20.0	40.2			16.5	34.5		
24.0	54.1			21.5	43.2			11.3	23.6		
34.2	77.2	Average		21.4	42.9	Average		8.0	16.8	Average	

Snow Course Survey Raw Data – Sheltered Lowland Plots

Location SL-04-1				Location SL-04-2				Location SL-04-3			
Waypoint 005				Waypoint 014				Waypoint 022			
Date: 5-May-04				Date: 6-May-04				Date: 6-May-04			
Density				Density				Density			
Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density
[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]
30	39	33	0.200	67.7	50	32.5	0.258	25	37	32.5	0.180
20	36	33	0.150	70	52	32.5	0.279	26.5	38	32.5	0.208
35	41	33	0.229	32	38	32.5	0.172	broke snow sampler		32.5	
Average:			0.193	Average:			0.236	Average:			0.194
Depth				Depth				Depth			
SWE				SWE				SWE			
[cm]	[mm]			[cm]	[mm]			[cm]	[mm]		
26.7	51.5			67.7	160.0			18.5	35.8		
35.0	67.5			54.5	128.8			23.0	44.6		
24.9	48.0			41.0	96.9			9.8	19.0		
37.7	72.7			54.0	127.6			6.0	11.6		
24.8	47.8			51.3	121.2			21.0	40.7		
25.3	48.8			84.0	198.5			13.0	25.2		
26.7	51.5			100.0	236.3			24.5	47.5		
32.5	62.7			99.9	236.1			19.7	38.2		
32.6	62.9			130.0	307.2			41.5	80.4		
27.3	52.7			69.4	164.0			12.1	23.4		
38.6	74.4			48.5	114.6			17.2	33.3		
17.6	33.9			49.5	117.0			16.2	31.4		
26.0	50.1			43.0	101.6			39.2	76.0		
8.1	15.6			36.4	86.0			41.3	80.0		
27.8	53.6			30.5	72.1			39.4	76.3		
37.0	71.4			31.2	73.7			47.6	92.2		
35.4	68.3			28.2	66.6			59.1	114.5		
32.5	62.7			42.2	99.7			31.4	60.8		
17.7	34.1			29.0	68.5			52.1	101.0		
35.1	67.7			35.0	82.7			8.1	15.7		
33.8	65.2			35.4	83.7			11.1	21.5		
17.3	33.4			36.0	85.1			59.0	114.3		
23.7	45.7			11.6	27.4			14.0	27.1		
15.7	30.3			25.2	59.6			43.0	83.3		
21.2	40.9			39.0	92.2			44.0	85.3		
25.0	48.2			38.8	91.7			17.0	32.9		
40.0	77.1			44.2	104.5			22.2	43.0		
31.5	60.8			34.0	80.3			28.0	54.3		
40.7	78.5			32.0	75.6			21.0	40.7		
36.8	71.0			42.0	99.3			13.5	26.2		
28.5	55.0	Average		48.8	115.3	Average		27.1	52.5	Average	

Snow Course Survey Raw Data – North Aspect Plots

Location NA-04-1 Waypoint 002 Date: 5-May-04				Location NA-04-2 Waypoint 003 Date: 5-May-04				Location NA-04-3 Waypoint 019 Date: 6-May-04			
Density				Density				Density			
Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density
[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]
20	36	32	0.200	7.3	35	33	0.274	14.5	37	32.5	0.310
24	36.5	32	0.188	23.4	37	33	0.171	16.6	37	32.5	0.271
25	37	33	0.160	20.4	38	33	0.245	30	40	32.5	0.250
Average:			0.183	Average:			0.230	Average:			0.277
Depth	SWE			Depth	SWE			Depth	SWE		
[cm]	[mm]			[cm]	[mm]			[cm]	[mm]		
43.7	79.8			6.3	14.5			10.0	27.7		
27.8	50.7			15.5	35.7			10.3	28.5		
25.2	46.0			13.2	30.4			13.0	36.0		
17.5	31.9			18.1	41.6			16.8	46.6		
10.2	18.6			12.0	27.6			19.5	54.0		
7.3	13.3			17.4	40.0			10.9	30.2		
14.9	27.2			8.3	19.1			3.9	10.8		
13.3	24.3			2.2	5.1			1.9	5.3		
14.7	26.8			21.0	48.3			8.1	22.4		
16.7	30.5			23.2	53.4			7.8	21.6		
13.4	24.5			10.4	23.9			15.1	41.8		
14.5	26.5			11.7	26.9			8.3	23.0		
26.6	48.5			8.2	18.9			17.3	47.9		
14.3	26.1			6.5	15.0			10.8	29.9		
16.7	30.5			18.6	42.8			20.3	56.3		
16.0	29.2			13.4	30.8			7.1	19.7		
22.6	41.2			17.5	40.3			16.1	44.6		
14.7	26.8			17.0	39.1			16.5	45.7		
19.2	35.0			16.2	37.3			21.8	60.4		
20.3	37.0			4.6	10.6			23.7	65.7		
17.7	32.3			18.8	43.2			9.3	25.8		
30.1	54.9			16.0	36.8			8.4	23.3		
15.4	28.1			19.4	44.6			15.9	44.1		
8.0	14.6			21.2	48.8			21.8	60.4		
11.4	20.8			15.8	36.3			24.0	66.5		
20.0	36.5			27.3	62.8			12.0	33.3		
24.7	45.1			14.0	32.2			21.6	59.9		
19.9	36.3			7.0	16.1			17.7	49.1		
20.0	36.5			18.4	42.3			16.6	46.0		
24.5	44.7			15.6	35.9			22.1	61.2		
18.7	34.1	Average		14.5	33.3	Average		14.3	39.6	Average	

Snow Course Survey Raw Data – East Aspect Plots

Location EA-04-1				Location EA-04-2				Location EA-04-3			
Waypoint 006				Waypoint 009				Waypoint 021			
Date: 5-May-04				Date: 5-May-04				Date: 6-May-04			
Density				Density				Density			
Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density
[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]
27	38	33	0.185	21	37.5	33	0.214	28	38	32.5	0.196
23	38	33	0.217	35	41	33	0.229	22	36.5	32.5	0.182
33	40	33	0.212	30	39	33	0.200	16.5	36	32.5	0.212
Average:			0.205	Average:			0.214	Average:			0.197
Depth				Depth				Depth			
SWE				SWE				SWE			
[cm]	[mm]			[cm]	[mm]			[cm]	[mm]		
18.7	38.3			18.0	38.6			11.5	22.6		
41.0	84.0			24.6	52.7			15.0	29.5		
32.8	67.2			17.5	37.5			15.5	30.5		
24.8	50.8			35.7	76.5			29.6	58.2		
32.2	66.0			30.0	64.3			14.8	29.1		
28.9	59.2			29.5	63.2			23.0	45.3		
37.3	76.4			15.1	32.4			15.2	29.9		
24.2	49.6			25.5	54.6			15.0	29.5		
27.8	57.0			22.5	48.2			14.2	27.9		
27.0	55.3			15.0	32.1			12.0	23.6		
29.4	60.2			26.7	57.2			14.5	28.5		
34.4	70.5			34.8	74.6			23.0	45.3		
33.7	69.1			38.0	81.4			24.0	47.2		
27.8	57.0			36.5	78.2			16.0	31.5		
35.9	73.6			47.1	100.9			25.0	49.2		
42.8	87.7			38.3	82.1			28.5	56.1		
41.1	84.2			35.7	76.5			31.0	61.0		
28.5	58.4			41.7	89.4			20.0	39.4		
26.6	54.5			21.0	45.0			23.6	46.4		
25.1	51.4			26.7	57.2			19.4	38.2		
28.6	58.6			27.5	58.9			18.0	35.4		
31.7	65.0			28.0	60.0			16.2	31.9		
40.2	82.4			29.5	63.2			29.0	57.1		
38.3	78.5			28.0	60.0			19.5	38.4		
36.0	73.8			29.0	62.1			16.5	32.5		
33.7	69.1			25.0	53.6			15.0	29.5		
18.8	38.5			18.8	40.3			23.0	45.3		
28.2	57.8			22.5	48.2			22.0	43.3		
20.8	42.6			30.3	64.9			24.0	47.2		
26.0	53.3			25.5	54.6			29.5	58.1		
30.7	63.0	Average		28.1	60.3	Average		20.1	39.6	Average	

Snow Course Survey Raw Data – South Aspect Plots

Location SA-04-1 Waypoint 004 Date: 5-May-04				Location SA-04-2 Waypoint 010 Date: 5-May-04				Location SA-04-3 Waypoint 017 Date: 6-May-04			
Density				Density				Density			
Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density
[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]
28.5	43	33	0.351	25	40	33	0.280	32	39.5	32.5	0.219
18	36	33	0.167	15.5	36.5	33	0.226	16.5	36	32.5	0.212
20	36	33	0.150	43.2	50	33	0.394	18	37	32.5	0.250
Average:			0.223	Average:			0.300	Average:			0.227
Depth	SWE			Depth	SWE			Depth	SWE		
[cm]	[mm]			[cm]	[mm]			[cm]	[mm]		
18.7	41.6			61.2	183.5			22.0	49.9		
40.4	89.9			85.0	254.8			19.6	44.5		
35.6	79.2			98.0	293.8			29.4	66.7		
34.3	76.3			16.5	49.5			13.3	30.2		
351.0	781.0			56.5	169.4			14.0	31.8		
33.5	74.5			66.0	197.9			16.1	36.5		
30.4	67.6			34.0	101.9			17.5	39.7		
33.2	73.9			41.0	122.9			20.6	46.8		
27.9	62.1			14.8	44.4			24.5	55.6		
9.3	20.7			23.5	70.4			9.0	20.4		
31.0	69.0			12.0	36.0			14.0	31.8		
11.6	25.8			12.5	37.5			13.0	29.5		
28.6	63.6			19.8	59.4			29.5	67.0		
11.0	24.5			28.8	86.3			22.8	51.7		
21.6	48.1			38.6	115.7			13.4	30.4		
35.0	77.9			41.0	122.9			23.5	53.3		
26.3	58.5			41.8	125.3			21.5	48.8		
24.6	54.7			36.6	109.7			29.0	65.8		
23.0	51.2			34.8	104.3			25.6	58.1		
16.6	36.9			37.5	112.4			21.0	47.7		
32.8	73.0			40.0	119.9			24.0	54.5		
23.8	53.0			48.0	143.9			7.0	15.9		
40.8	90.8			45.0	134.9			25.0	56.7		
28.2	62.7			41.8	125.3			24.0	54.5		
16.7	37.2			31.2	93.5			14.0	31.8		
21.1	47.0			35.6	106.7			33.5	76.0		
11.1	24.7			15.2	45.6			27.0	61.3		
23.1	51.4			14.0	42.0			16.0	36.3		
29.1	64.8			17.2	51.6			15.5	35.2		
21.0	46.7			18.3	54.9			27.5	62.4		
36.4	80.9	Average		36.9	110.5	Average		20.4	46.4	Average	

Snow Course Survey Raw Data – West Aspect Plots

Location WA-04-1 Waypoint 007 Date: 5-May-04				Location WA-04-2 Waypoint 011 Date: 5-May-04				Location WA-04-3 Waypoint 013 Date: 6-May-04			
Density				Density				Density			
Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density	Depth	Wgt	Tare	Density
[cm]			[g/cm3]	[cm]			[g/cm3]	[cm]			[g/cm3]
30	40	33	0.233	23	37	33	0.174	33	39	32.5	0.197
30	39	33	0.200	12	35	33	0.167	31	42	32.5	0.306
60	50	33	0.283	19.2	39	33	0.313	31	40	32.5	0.242
Average:			0.239	Average:			0.218	Average:			0.248
Depth	SWE			Depth	SWE			Depth	SWE		
[cm]	[mm]			[cm]	[mm]			[cm]	[mm]		
26.4	63.1			15.0	32.7			23.0	57.1		
22.0	52.6			25.8	56.2			23.5	58.4		
24.0	57.3			16.2	35.3			22.4	55.7		
20.0	47.8			14.5	31.6			32.7	81.2		
22.0	52.6			18.3	39.8			26.4	65.6		
17.0	40.6			15.8	34.4			14.1	35.0		
26.5	63.3			11.3	24.6			25.0	62.1		
21.8	52.1			21.5	46.8			46.0	114.3		
42.3	101.1			17.0	37.0			40.0	99.4		
42.5	101.5			23.2	50.5			26.7	66.3		
34.0	81.2			21.8	47.5			35.7	88.7		
368.0	879.1			21.5	46.8			40.3	100.1		
308.0	735.8			16.5	35.9			35.4	88.0		
12.0	28.7			21.2	46.2			36.7	91.2		
9.7	23.2			16.2	35.3			38.0	94.4		
33.1	79.1			21.7	47.2			25.7	63.9		
19.6	46.8			8.0	17.4			23.0	57.1		
22.4	53.5			22.3	48.5			19.7	48.9		
19.7	47.1			11.5	25.0			36.9	91.7		
16.8	40.1			27.0	58.8			20.2	50.2		
20.5	49.0			26.4	57.5			19.5	48.4		
25.0	59.7			15.2	33.1			34.5	85.7		
30.2	72.1			24.2	52.7			31.4	78.0		
19.0	45.4			17.6	38.3			28.0	69.6		
29.5	70.5			21.3	46.4			24.0	59.6		
33.2	79.3			23.2	50.5			25.0	62.1		
21.5	51.4			12.0	26.1			21.7	53.9		
18.0	43.0			8.7	18.9			28.0	69.6		
25.8	61.6			16.8	36.6			33.5	83.2		
20.0	47.8			19.0	41.4			25.0	62.1		
45.0	107.5	Average		18.4	40.0	Average		28.7	71.4	Average	

The following pages contain the results of evaporation calculations for the Doris Lake watershed. The WREVP model (Morton et al. 1985) was used for these calculations.

The WREVP model requires at least two years of data to run. The meteorological station at Doris Lake was installed in July 2003 and data were available through September 9, 2004. A data gap exists in the winter (November to February) of 2003-2004. Therefore, it was necessary to estimate input parameters for the winter period and to extend the record to a length of two years. The results are relatively insensitive to changes in relevant input parameters (relative humidity, air temperature and solar radiation) for the winter months, because evaporation in the region is essentially zero for this period. Because only one year of data are available and the program requires two years to run, the first year's data were repeated for the second year. A summary of input data is provided in the following table.

Doris Lake Watershed Input Data to the WREVP Program

Month	Mean Monthly Parameter Values		
	Relative Humidity (%)	Air Temperature (°C)	Total Solar Radiation (MJ/m ²)
Jul-03	70.1	11.3	18.01
Aug-03	72.7	8.2	10.29
Sep-03	80.5	3.7	6.04
Oct-03	89.4	-5.2	1.90
Nov-03	78.7 **	-21.5 *	0.00 estimated
Dec-03	72.3 **	-27.6 *	0.00 estimated
Jan-04	69.0 estimated	-31.6 *	0.00 estimated
Feb-04	69.0 estimated	-31.0 *	0.00 estimated
Mar-04	69.2	-30.3	6.89
Apr-04	77.7	-20.4	14.80
May-04	82.6	-10.8	20.43
Jun-04	78.7	3.8	18.69
Jul-04	72.8	8.8	17.62
Aug-04	76.7	7.1	9.29
Sep-04 to Jun-05	Used previous year's data		
Latitude	68.13°		
Elevation	40 m		
Mean Annual Precipitation	213 mm		
Mean Lake Depth	3.0 m (Tail Lake)		7.4 m (Doris Lake)
Lake Salinity	66 ppm (Tail Lake)		112.5 ppm (Doris Lake)

* Data from Boston Camp

** 1971-2000 Climate Normals for Cambridge Bay Airport

As noted in the body of this report, these results should be treated as estimates and are likely larger than the actual values.

Doris Lake Evaporation Calculation Results from Program WREVAP-CRLE

Doris North - 03/04 PHID= 68.13 ALTI= 40.0 DA= 7.4 SALT= 112.50 NET EVAPORATION											PAGE 1
YEAR	MONTH	STARTDAY	LENGTH	RELH	T	GIJ	HADD	RAD	POTENT	LAKE	GW(W/m ²)
2003	JULY	1	31	0.7	11.3	18.0	0.00	58	83	54	
2003	AUG	1	31	0.7	8.2	10.3	0.00	117	98	83	
2003	SEPT	1	30	0.8	3.7	6.0	0.00	99	65	63	
2003	OCT	1	31	0.9	-5.2	1.9	0.00	67	41	41	
2003	NOV	1	30	0.8	-21.5	0.0	0.00	23	17	17	
2003	DEC	1	31	0.7	-27.6	0.0	0.00	-11	1	1	
2004	JAN	1	31	0.7	-31.6	0.0	0.00	-22	0	0	
2004	FEB	1	29	0.7	-31.0	0.0	0.00	-25	0	0	
2004	MAR	1	31	0.7	-30.3	6.9	0.00	-46	0	0	
2004	APR	1	30	0.8	-20.4	14.8	0.00	-47	-2	-2	
2004	MAY	1	31	0.8	-10.8	20.4	0.00	-35	-2	-2	
2004	JUN	1	30	0.8	3.8	18.7	0.00	-5	13	13	
2004	JULY	1	31	0.7	8.8	17.6	0.00	58	72	51	184.00
2004	AUG	1	31	0.8	7.1	9.3	0.00	126	93	85	96.93
Total September 2003 to August 2004									298	267	
2004	SEPT	1	30	0.8	3.7	6.0	0.00	93	62	60	62.52
2004	OCT	1	31	0.9	-5.2	1.9	0.00	61	39	39	7.90
2004	NOV	1	30	0.8	-21.5	0.0	0.00	22	17	17	0.00
2004	DEC	1	31	0.7	-27.6	0.0	0.00	-11	1	1	0.00
2005	JAN	1	31	0.7	-31.6	0.0	0.00	-22	0	0	0.00
2005	FEB	1	28	0.7	-31.0	0.0	0.00	-24	0	0	0.00
2005	MAR	1	31	0.7	-30.3	6.9	0.00	-46	0	0	19.09
2005	APR	1	30	0.8	-20.4	14.8	0.00	-47	-2	-2	52.46
2005	MAY	1	31	0.8	-10.8	20.4	0.00	-35	-2	-2	99.51
2005	JUN	1	30	0.8	3.8	18.7	0.00	-5	13	13	195.45

**** GLBGN = 83.6987

**** GLEND = 83.6985

Tail Lake Evaporation Calculation Results from Program WREVAP-CRLE

Doris North - 03/04 PHID= 68.13 ALTI= 40.0 DA= 3.0 SALT= 66.00 NET EVAPORATION PAGE 1											
YEAR	MONTH	STARTDAY	LENGTH	RELH	T	GIJ	HADD	RAD	POTENT	LAKE	GW(W/m ²)
2003	JULY	1	31	0.7	11.3	18.0	0.00	58	116	92	
2003	AUG	1	31	0.7	8.2	10.3	0.00	117	95	79	
2003	SEPT	1	30	0.8	3.7	6.0	0.00	99	43	37	
2003	OCT	1	31	0.9	-5.2	1.9	0.00	67	7	7	
2003	NOV	1	30	0.8	-21.5	0.0	0.00	23	0	0	
2003	DEC	1	31	0.7	-27.6	0.0	0.00	-11	0	0	
2004	JAN	1	31	0.7	-31.6	0.0	0.00	-22	0	0	
2004	FEB	1	29	0.7	-31.0	0.0	0.00	-25	0	0	
2004	MAR	1	31	0.7	-30.3	6.9	0.00	-46	0	0	
2004	APR	1	30	0.8	-20.4	14.8	0.00	-47	0	0	
2004	MAY	1	31	0.8	-10.8	20.4	0.00	-35	5	5	
2004	JUN	1	30	0.8	3.8	18.7	0.00	-5	53	46	
2004	JULY	1	31	0.7	8.8	17.6	0.00	58	102	86	184.00
2004	AUG	1	31	0.8	7.1	9.3	0.00	126	87	79	96.93
Total September 2003 to August 2004									297	260	
2004	SEPT	1	30	0.8	3.7	6.0	0.00	93	40	34	62.52
2004	OCT	1	31	0.9	-5.2	1.9	0.00	61	6	6	7.90
2004	NOV	1	30	0.8	-21.5	0.0	0.00	22	0	0	0.00
2004	DEC	1	31	0.7	-27.6	0.0	0.00	-11	0	0	0.00
2005	JAN	1	31	0.7	-31.6	0.0	0.00	-22	0	0	0.00
2005	FEB	1	28	0.7	-31.0	0.0	0.00	-24	0	0	0.00
2005	MAR	1	31	0.7	-30.3	6.9	0.00	-46	0	0	19.09
2005	APR	1	30	0.8	-20.4	14.8	0.00	-47	0	0	52.46
2005	MAY	1	31	0.8	-10.8	20.4	0.00	-35	5	5	99.51
2005	JUN	1	30	0.8	3.8	18.7	0.00	-5	53	46	195.45

**** GLBGN = 168.1695

**** GLEND = 168.1695

APPENDIX B

PHYSICAL LIMNOLOGY AND WATER QUALITY

Appendix B1. Dissolved oxygen (DO) concentrations, water temperature and Secchi transparency in Doris North Project lakes, June-October 2004.

Doris Lake (13W 0433799E 7558286N)											
5-Jun-2004 9:00 AM Ice Depth = 2 m Total Depth = 15.8 m			20-Jul-2004 10:30 AM Secchi = 1.5 m Total Depth = 15.1 m			16-Aug-2004 3:30 PM Secchi = 1.9 m Total Depth = 14.5 m			10-Sep-2004 8:45 AM Secchi = 1.55 m Total Depth = 15 m		
Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)
0.1	9.3	1.3	0.1	10.0	4.9	0.1	10.6	9.0	0.1	12.4	6.4
1.0	10.0	1.5	1.0	9.5	4.9	1.0	10.5	9.4	1.0	12.4	6.2
2.0	10.0	1.5	2.0	9.4	5.0	2.0	10.5	9.6	2.0	12.5	6.1
3.0	9.8	1.5	3.0	9.3	5.0	3.0	10.4	9.7	3.0	12.6	6.1
4.0	10.0	1.6	4.0	9.2	5.0	4.0	10.4	9.7	4.0	12.6	6.0
5.0	10.2	1.6	5.0	9.2	5.0	5.0	10.5	9.8	5.0	12.7	5.9
6.0	10.2	1.6	6.0	9.1	5.0	6.0	10.5	9.8	6.0	12.8	5.9
7.0	10.2	1.6	7.0	9.1	5.0	7.0	10.5	9.8	7.0	12.9	5.9
8.0	9.9	1.6	8.0	9.1	5.0	8.0	10.5	9.8	8.0	13.0	5.9
9.0	10.2	1.6	9.0	9.1	5.0	9.0	10.5	9.8	9.0	13.0	5.8
10.0	10.3	1.7	10.0	9.1	5.0	10.0	10.5	9.9	10.0	13.1	5.8
11.0	1.8	1.9	11.0	9.0	5.0	11.0	10.5	9.9	11.0	13.2	5.8
12.0			12.0	9.1	5.0	12.0	10.5	9.9	12.0	13.3	5.8
13.0			13.0	8.6	5.0	13.0	10.5	9.9	13.0	13.3	5.8
14.0			14.0	8.7	5.0	14.0	10.6	9.9	14.0	13.4	5.8
									14.5	11.9	5.8

Tail Lake (13W 0434987E 7557952N)											
5-Jun-2004 11:00 AM Ice Depth = 2 m Total Depth = 8.5 m			19-Jul-2004 4:00 PM Secchi = 4.0 m Total Depth = 6.5 m			18-Aug-2004 12:45 PM Secchi = 2.35 m Total Depth = 5.7 m			11-Sep-2004 9:00 AM Secchi = 3.0 m Total Depth = 5.8 m		
Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)
0.1	10.3	0.3	0.1	9.6	9.0	0.1	11.0	7.1	0.1	13.1	4.8
0.5	11.4	2.0	1.0	9.3	9.0	0.5	10.8	7.3	0.5	13.2	4.7
1.0	11.5	2.4	2.0	9.1	9.0	1.0	10.8	7.3	1.0	13.2	4.6
1.5	11.4	2.5	3.0	9.1	9.0	1.5	10.8	7.3	1.5	13.2	4.5
2.0	11.2	2.9	4.0	9.0	9.0	2.0	10.8	7.4	2.0	13.2	4.4
2.5	10.4	2.9	5.0	9.0	9.0	2.5	10.8	7.4	2.5	13.2	4.3
3.0	9.3	3.0	6.0	9.0	9.0	3.0	10.9	7.4	3.0	13.3	4.3
3.5	8.3	3.0	6.5			3.5	10.9	7.4	3.5	13.3	4.3
4.0	7.1	3.0				4.0	10.9	7.4	4.0	13.3	4.2
4.5	4.7	3.1				4.5	10.9	7.3	4.5	13.3	4.2
5.0						5.0	10.9	7.4	5.0	13.4	4.2
5.5						5.5	11.0	7.3	5.5	13.2	4.1
6.0						6.0			6.0		
6.5						6.5			6.5		

Appendix B1. Dissolved oxygen (DO) concentrations, water temperature and Secchi transparency in Doris North Project lakes, June-October 2004.

Roberts Lake - Site B (13W 0435587E 7562161N)											
6-Jun-2004 9:00 AM Ice Depth = 2 m Total Depth = 6 m			17-Jul-2004 1:30 PM Secchi = 1.7 m Total Depth = 7.4 m			13-Aug-2004 2:00 PM Secchi = 1.6 m Total Depth = 7.0 m			13-Sep-2004 11:30 AM Secchi = 1.9 m Total Depth = 7.0 m		
Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)
0.1	11.8	4.0	0.1	9.5	8.5	0.1	10.9	10.8	0.1	12.8	6.3
0.5	12.6	4.1	1.0	9.5	8.5	0.5	11.0	10.3	0.5	12.9	5.9
1.0	12.7	4.0	2.0	9.4	8.2	1.0	11.0	10.2	1.0	13.0	5.9
1.5	12.5	4.2	3.0	9.4	8.0	1.5	11.0	10.1	1.5	13.0	5.8
2.0	10.2	4.0	4.0	9.4	6.8	2.0	11.0	10.2	2.0	13.0	5.7
2.5	8.1	3.7	5.0	9.3	5.6	2.5	11.0	10.0	2.5	13.0	5.7
3.0	6.3	3.6	6.0	9.4	5.3	3.0	11.1	9.9	3.0	13.0	5.7
3.5	5.5	3.5	7.0	9.4	5.0	3.5	11.1	9.9	3.5	13.1	5.6
4.0	3.4	3.4				4.0	11.1	9.9	4.0	13.1	5.6
4.5						4.5	11.1	9.8	4.5	13.1	5.6
5.0						5.0	11.1	9.9	5.0	13.2	5.6
5.5						5.5	11.1	9.8	5.5	13.2	5.5
6.0						6.0	11.1	9.8	6.0	13.2	5.5
6.5						6.5	11.2	9.6	6.5	13.3	5.5
						7.0	11.3	9.9	7.0	11.0	5.5

Little Roberts Lake (13W 434723E 7562724N)									
6-Jun-2004	19-Jul-2004 10:30 AM Secchi = 1.9 m Total Depth = 2.7 m			16-Aug-2004 11:20 AM Secchi = 0.8 m Total Depth = 3.45 m			13-Sep-2004 9:30 AM Secchi = 1.3 m Total Depth = 3.5 m		
	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)
Not Sampled Ice depth to the lake bottom	0.1	9.9	7.3	0.1	10.7	7.9	0.1	13.0	4.9
	0.5	9.9	7.3	0.5	10.6	7.9	0.5	13.1	4.7
	1.0	10.0	7.3	1.0	10.7	7.9	1.0	13.2	4.7
	1.5	9.6	7.3	1.5	10.7	7.9	1.5	13.2	4.6
	2.0	9.6	7.3	2.0	10.7	7.9	2.0	13.2	4.6
	2.5	9.3	7.3	2.5	10.7	7.8	2.5	13.2	4.6
	3.0			3.0	10.6	7.8	3.0	13.2	4.6
	3.5			3.5			3.5		

Appendix B1. Dissolved oxygen (DO) concentrations, water temperature and Secchi transparency in Doris North Project lakes, June-October 2004.

Roberts Bay (13W 433290E 7564019N)									
6-Jun-2004	19-Jul-2004 12:10 PM			14-Aug-2004 12:20 PM			9-Sep-2004 8:30 AM		
	Secchi = 3.7 m Total Depth = 3.7 m			Secchi = 3.0 m Total Depth = 3.6 m			Secchi = 1.4 m Total Depth = 4.1 m		
	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)	Depth (m)	DO (mg/L)	Temp (°C)
Not Sampled Ice depth to the ocean bottom	0.1	9.6	7.4	0.1	10.9	10.5	0.1	13.0	3.8
	0.5	9.5	7.4	0.5	10.9	10.4	0.5	12.9	3.8
	1.0	9.4	7.3	1.0	10.9	10.3	1.0	12.9	3.8
	1.5	9.4	7.1	1.5	10.9	10.2	1.5	12.9	3.9
	2.0	9.4	6.9	2.0	10.9	10.2	2.0	12.9	3.9
	2.5	9.4	6.7	2.5	10.9	10.2	2.5	13.0	3.9
	3.0	9.4	6.4	3.0	10.9	10.1	3.0	13.0	3.9
	3.5	9.6	6.0	3.5	11.0	10.1	3.5	13.1	4.0
	4.0			4.0			4.0	13.1	4.0

Appendix B2. Water chemistry results for QA/QC, Doris Lake, Doris Outflow, Tail Lake, Tail Outflow, Roberts Lake, Roberts Outflow, Little Roberts Lake, Little Roberts Outflow, and Roberts Bay.

QA/QC Samples

Parameter	Unit	Sample Label:		Equipment Blank Windy		Kemm Lake	Johnny Outflow	Kemm Lake	Hope Lake	Nygot Lake	Hope Lake	Kemm Lake
		Sample Type:		Kemmerer Blank	Bottle Blank	Kemmerer Blank	Blank DI Water	Kemmerer Blank	Blank DI Water	Tygon Tubing	Blank DI Water	Kemmerer Blank
Parameter	Unit	ETL's DL	ARC's DL	7-Jun-04	20-Jun-04	20-Jul-04	21-Jul-04	18-Aug-04	19-Aug-04	11-Sep-04	11-Sep-04	11-Sep-04
Total Metals												
Aluminum (Al)	ug/L	0.3	0.5	<0.3	1.00	0.71	<0.3	0.93	<0.5	6.93	2.62	2.30
Antimony (Sb)	ug/L	0.03	0.0005	0.26	0.0133	0.0462	0.15	0.0114	0.0184	0.2910	0.1340	0.1160
Arsenic (As)	ug/L	0.03	0.002	<0.03	0.0661	<0.002	<0.03	<0.002	<0.002	0.0209	0.0122	0.00458
Barium (Ba)	ug/L	0.05	0.004	<0.05	0.380	0.325	<0.05	0.112	0.0215	0.0888	0.015	0.015
Beryllium (Be)	ug/L	0.2	0.003	<0.2	<0.003	<0.003	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003
Boron (B)	ug/L	1	0.05	<1	0.300	<0.05	<1	<0.05	<0.05	0.463	0.552	0.307
Cadmium (Cd)	ug/L	0.05	0.002	<0.05	0.0020	0.0042	<0.05	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium (Ca)	mg/L	0.02	0.004	<0.02	0.0248	0.0631	<0.02	0.0301	0.0320	0.0457	<0.004	<0.004
Chromium (Cr)	ug/L	0.06	0.03	<0.06	0.0460	<0.03	<0.06	<0.03	<0.03	<0.03	<0.03	<0.03
Cobalt (Co)	ug/L	0.1	0.001	<0.1	0.0325	0.0242	<0.1	0.0051	0.0425	0.0218	0.0060	0.0044
Copper (Cu)	ug/L	0.6	0.05	<0.6	<0.05	<0.05	<0.6	<0.05	<0.05	<0.05	<0.05	0.328
Iron (Fe)	ug/L	5	2	<5	<2	<2	<5	<2	<2	2.64	<2	<2
Lead (Pb)	ug/L	0.05	0.001	<0.05	0.0130	0.0131	<0.05	0.0134	0.0060	0.1	0.0016	0.0134
Magnesium (Mg)	mg/L	0.004	0.0001	<0.004	0.0318	0.0142	<0.004	0.0018	0.0007	0.0168	0.0009	0.0006
Manganese (Mn)	ug/L	0.1	0.003	<0.1	0.306	0.372	0.10	0.0152	<0.003	0.161	0.0214	0.0432
Mercury (Hg) low level								0.0109	<0.0006	<0.0006	<0.0006	0.0116
Molybdenum (Mo)	ug/L	0.06	0.001	<0.06	0.0042	0.0102	<0.06	0.0092	<0.001	0.0136	0.0142	0.0099
Nickel (Ni)	ug/L	0.06	0.005	<0.06	0.0279	0.0917	<0.06	0.0456	<0.005	0.232	<0.005	0.0352
Potassium (K)	ug/L	20	2	<20	<2	<2	<20	<2	<2	10.3	<2	<2
Selenium (Se)	ug/L	0.1	0.1	<0.1	0.20	<0.1	<0.1	<0.1	<0.1	<0.1	0.10	<0.1
Silver (Ag)	ug/L	0.1	0.0005	<0.1	<0.0005	0.0018	<0.1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Sodium (Na)	ug/L	5	2	23	<2	<2	20.00	<2	<2	123	6.81	<2
Strontium (Sr)	ug/L	0.1	0.004	<0.1	0.0560	0.2580	<0.1	0.0921	0.0754	0.1870	0.0189	0.0183
Uranium (U)	ug/L	0.05	0.0001	<0.05	0.0002	0.0007	<0.05	0.0002	0.0001	<0.0001	<0.0001	<0.0001
Vanadium (V)	ug/L	0.05	0.005	<0.05	<0.005	<0.005	0.10	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc (Zn)	ug/L	0.8	0.1	<0.8	0.400	0.580	<0.8	0.540	0.387	0.845	0.778	0.754
ARC Sample ID					403863	403846		403831	403830	0404026	404023	0404027
ETL Sample ID				L178749-6			L191443-8					
Bismuth (Bi)	mg/L		0.00003	<0.00003			<0.00003					
Thallium (Tl)	mg/L		0.00003	<0.00003			<0.00003					
Tin (Sn)	mg/L		0.0001	<0.0001			<0.0001					
Cyanide, Total	mg/L		0.002	<0.002			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Radium 226	Bq/L	0.005				<0.005	<0.005					
ETL Sample ID				L178749-6		L191443-7	L191443-8	L200882-3	L200882-6	L207114-9	L207114-10	L207114-11
Phosphorus, Total	mg/L		0.001	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ammonia-N	mg/L		0.005	<0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Color, True	T.C.U.		3						<3	<3	<3	<3
Dissolved Organic Carbon	mg/L		1	<1			1	<1	<1	<1	<1	<1
Fluoride (F)	mg/L		0.05	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphide	mg/L		0.003	<0.003			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Total Dissolved Solids	mg/L		10	<10			30	<10	<10	<10	<10	<10
Total Kjeldahl Nitrogen	mg/L		0.05	<0.05			<0.05	<0.05	<0.05	0.07	<0.05	<0.05
Total Organic Carbon	mg/L		1	<1			1	<1	<1	<1	<1	<1
Total Suspended Solids	mg/L		3	<3			<3	<3	<3	<3	<3	<3
Routine Water Analysis												
Chloride (Cl)	mg/L		1	1			2	<1	<1	<1	<1	<1
Nitrate+Nitrite-N	mg/L		0.006	<0.006			<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Nitrate-N	mg/L		0.006	<0.006			<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Nitrite-N	mg/L		0.002	<0.002			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sulphate (SO4)	mg/L		0.05	<0.05			<0.05	<0.05	0.06	<0.05	0.06	<0.05
pH, Conductivity and Total Alkalinity												
pH	pH		0.1	6			5.7	5.6	5.7	5.8	5.7	5.6
Conductivity (EC)	uS/cm		0.2	1.5			1.1	1.2	1.1	1.2	1.1	1.2
Bicarbonate (HCO3)	mg/L		5	<5			<5	<5	<5	<5	<5	<5
Carbonate (CO3)	mg/L		5	<5			<5	<5	<5	<5	<5	<5
Hydroxide (OH)	mg/L		5	<5			<5	<5	<5	<5	<5	<5
Alkalinity, Total (as CaCO3)	mg/L		5	<5			<5	<5	<5	<5	<5	<5
Ion Balance Calculation												
Ion Balance	%			Low EC			Low EC	Low TDS	Low TDS	Low TDS	Low TDS	Low TDS
TDS (Calculated)	mg/L			1			2	<1	<1	<1	<1	<1
Hardness (as CaCO3)	mg/L			<1			<1	<1	<1	<1	<1	<1
ICP metals for routine water												
Calcium (Ca)	mg/L		0.5	<0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Potassium (K)	mg/L		0.1	<0.1			0.1	<0.1	0.1	<0.1	0.1	<0.1
Magnesium (Mg)	mg/L		0.1	<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium (Na)	mg/L		1	<1			<1	<1	<1	<1	<1	<1
ETL Sample ID				L178749-6		L191443-7	L191443-8	L200882-3	L200882-6	L207114-9	L207114-10	L207114-11

NOTE: In calculating the mean values for replicate samples, non-detect values were replaced with the detection limit.

Appendix B2. Water chemistry results for QA/QC, Doris Lake, Doris Outflow, Tail Lake, Tail Outflow, Roberts Lake, Roberts Outflow, Little Roberts Lake, Little Roberts Outflow, and Roberts Bay.

QA/QC Samples

		Sample Label:		Doris Outflow							
		Sample Type:		Replicate		Mean	SD	Replicate		Mean	SD
Parameter	Unit	ETL's DL	ARC's DL	22-Jul-04	22-Jul-04			15-Aug-04	15-Aug-04		
Total Metals											
Aluminum (Al)	ug/L		0.5	49.7	60.2	55.0	5.3	64.0	61.9	63.0	1.0
Antimony (Sb)	ug/L		0.0005	0.451	0.470	0.461	0.010	4.65	1.04	2.845	1.805
Arsenic (As)	ug/L		0.002	0.275	0.267	0.271	0.004	0.379	0.349	0.364	0.015
Barium (Ba)	ug/L		0.004	2.71	2.80	2.76	0.04	2.97	3.02	3.00	0.03
Beryllium (Be)	ug/L		0.003	<0.003	<0.003	<0.003		<0.003	<0.003	<0.003	
Boron (B)	ug/L		0.05	18.0	18.3	18.2	0.2	23.7	22.6	23.2	0.6
Cadmium (Cd)	ug/L		0.002	<0.002	0.003	0.003	0.001	<0.002	<0.002	<0.002	
Calcium (Ca)	mg/L		0.004	7.38	7.40	7.39	0.01	7.62	7.58	7.60	0.02
Chromium (Cr)	ug/L		0.03	<0.03	<0.03	<0.03		0.383	0.179	0.281	0.102
Cobalt (Co)	ug/L		0.001	0.0503	0.0582	0.0543	0.0039	1.45	0.325	0.8875	0.5625
Copper (Cu)	ug/L		0.05	1.15	1.20	1.18	0.03	1.57	0.954	1.26	0.31
Iron (Fe)	ug/L		2	106	108	107.0	1.0	78.1	91.3	84.7	6.6
Lead (Pb)	ug/L		0.001	0.0798	0.0418	0.0608	0.0190	0.0462	0.0273	0.0368	0.0095
Magnesium (Mg)	mg/L		0.0001	5.02	4.98	5.00	0.02	6.49	6.75	6.62	0.13
Manganese (Mn)	ug/L		0.003	20.8	20.8	20.8	0.00	13.5	13.1	13.3	0.20
Mercury (Hg) low level				<0.0006		<0.0006		<0.0006		<0.0006	
Molybdenum (Mo)	ug/L		0.001	0.140	0.146	0.143	0.003	0.154	0.163	0.159	0.004
Nickel (Ni)	ug/L		0.005	0.443	0.693	0.568	0.125	0.435	0.477	0.456	0.021
Potassium (K)	ug/L		2	2150	2150	2150.00	0.00	2300	2510	2405	105
Selenium (Se)	ug/L		0.1	0.191	0.281	0.236	0.045	0.679	0.462	0.571	0.109
Silver (Ag)	ug/L		0.0005	<0.0005	0.0015	0.0010	0.0007	<0.0005	0.0008	0.0006	0.0002
Sodium (Na)	ug/L		2	29000	28800	28900	100	32900	35900	34400	1500
Strontium (Sr)	ug/L		0.004	38.6	38.7	38.7	0.0	32.9	36.7	34.8	1.9
Uranium (U)	ug/L		0.0001	0.0247	0.0273	0.0260	0.0013	0.0253	0.0276	0.0265	0.0011
Vanadium (V)	ug/L		0.005	<0.005	<0.005	<0.005		0.176	0.291	0.234	0.058
Zinc (Zn)	ug/L		0.1	1.86	1.25	1.56	0.305	1.14	1.79	1.465	0.325
ARC Sample ID				0403847	0403848			0403817	0403857		
ETL SampleID											
Bismuth (Bi)	mg/L	<0.0001		0.0002	0.0003	0.0003	0.0001				
Thallium (Tl)	mg/L	<0.0001		<0.0001	<0.0001	<0.0001	0.0000				
Tin (Sn)	mg/L	<0.0004		<0.0004	<0.0004	<0.0004	0.0000				
Cyanide, Total	mg/L		0.002	<0.002	<0.002	<0.002	0.000	<0.002		<0.002	
Radium 226	Bq/L	0.005		<0.005	<0.005	<0.005	0.000	<0.005		<0.005	
ETL SampleID				L191443-9	L191443-10			L199233-9			
Phosphorus, Total	mg/L		0.001	0.018	0.019	0.019	0.001	0.029		0.029	
Ammonia-N	mg/L		0.005	0.008	0.008	0.008	0.000	<0.005		<0.005	
Color, True	T.C.U.		3	20	20	20	0	20		20	
Dissolved Organic Carbon	mg/L		1	4	5	5	0.7	7		7	
Fluoride (F)	mg/L		0.05	0.07	0.07	0.07	0	0.07		0.07	
Sulphide	mg/L		0.003	<0.003	<0.003	<0.003	0.000	0.004		0.004	
Total Dissolved Solids	mg/L		10	170	180	175	7	130		130	
Total Kjeldahl Nitrogen	mg/L		0.05	0.34	0.37	0.36	0.02	0.32		0.32	
Total Organic Carbon	mg/L		1	5	5	5	0	7		7	
Total Suspended Solids	mg/L		3	6	3	5	2	<3		<3	
Routine Water Analysis											
Chloride (Cl)	mg/L		1	62	62	62	0.0	58		58	
Nitrate+Nitrite-N	mg/L		0.006	<0.006	<0.006	<0.006	0.000	<0.006		<0.006	
Nitrate-N	mg/L		0.006	<0.006	<0.006	<0.006	0.000	<0.006		<0.006	
Nitrite-N	mg/L		0.002	<0.002	<0.002	<0.002	0.000	<0.002		<0.002	
Sulphate (SO4)	mg/L		0.05	2.78	2.76	2.77	0.01	2.89		2.89	
pH, Conductivity and Total Alkalinity											
pH	pH		0.1	7.6	7.6	7.6	0.0	7.6		7.6	
Conductivity (EC)	uS/cm		0.2	251	251	251	0	263		263	
Bicarbonate (HCO3)	mg/L		5	32	33	33	1	33		33	
Carbonate (CO3)	mg/L		5	<5	<5	<5	0	<5		<5	
Hydroxide (OH)	mg/L		5	<5	<5	<5	0	<5		<5	
Alkalinity, Total (as CaCO3)	mg/L		5	26	27	27	1	27		27	
Ion Balance Calculation											
Ion Balance	%			93.6	94.9	94.3	0.92	94.6		94.6	
TDS (Calculated)	mg/L			125	127	126	1	120		120	
Hardness (as CaCO3)	mg/L			43	43	43	0	42		42	
ICP metals for routine water											
Calcium (Ca)	mg/L		0.5	7.1	7.3	7.2	0.14	7.1		7.1	
Potassium (K)	mg/L		0.1	2.2	2.2	2.2	0.00	2		2	
Magnesium (Mg)	mg/L		0.1	6.2	6.1	6.2	0.07	6		6	
Sodium (Na)	mg/L		1	29	30	30	1	28		28	
ETL SampleID				L191443-9	L191443-10			L199233-9			
Dissolved Metals											
Aluminum (Al)								3.58		3.58	
Antimony (Sb)								1.80		1.80	
Arsenic (As)								0.346		0.346	
Barium (Ba)								2.52		2.52	
Beryllium (Be)								<0.003		<0.003	
Boron (B)								23.7		23.7	
Cadmium (Cd)								<0.002		<0.002	
Calcium (Ca)								7.67		7.67	
Chromium (Cr)								0.145		0.145	
Cobalt (Co)								0.264		0.264	
Copper (Cu)								1.35		1.35	
Iron (Fe)								13.9		13.9	
Lead (Pb)								0.0111		0.0111	
Magnesium (Mg)								6.47		6.47	
Manganese (Mn)								7.12		7.12	
Molybdenum (Mo)								0.157		0.157	
Nickel (Ni)								0.217		0.217	
Potassium (K)								2310		2310	
Selenium (Se)								0.669		0.669	
Silver (Ag)								<0.0005		<0.0005	
Sodium (Na)								31900		31900	
Strontium (Sr)								42.8		42.8	
Uranium (U)								0.0304		0.0304	
Vanadium (V)								0.0374		0.0374	
Zinc (Zn)								0.322		0.322	
ARC Sample ID								0404012			

NOTE: In calculating the mean values for replicate samples, non-detect values were replaced with the detection limit.

Appendix B2. Water chemistry results for QA/QC, Doris Lake, Doris Outflow, Tail Lake, Tail Outflow, Roberts Lake, Roberts Outflow, Little Roberts Lake, Little Roberts Outflow, and Roberts Bay.

QA/QC Samples

		Sample Label:		Doris Outflow									
		Sample Type:		Replicates			Mean	SD	Replicates			Mean	SD
Parameter	Unit	ETL's DL	ARC's DL	12-Sep-04	12-Sep-04	12-Sep-04			22-Sep-04	22-Sep-04	22-Sep-04		
Total Metals													
Aluminum (Al)	ug/L		0.5	68.6	71.3	76.5	72.1	4.0	60.8	63.3	67.2	63.8	3.2
Antimony (Sb)	ug/L		0.0005	0.139	0.146	0.166	0.160	0.014	0.086	0.653	0.634	0.458	0.322
Arsenic (As)	ug/L		0.002	0.363	0.359	0.367	0.363	0.004	0.338	0.338	0.349	0.342	0.006
Barium (Ba)	ug/L		0.004	3.03	3.08	3.16	3.09	0.07	2.88	2.86	2.88	2.87	0.01
Beryllium (Be)	ug/L		0.003	<0.003	<0.003	<0.003	<0.003		<0.003	<0.003	<0.003	<0.003	
Boron (B)	ug/L		0.05	21.9	22.4	22.6	22.3	0.4	21.4	22.0	23.4	22.3	1.0
Cadmium (Cd)	ug/L		0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002	
Calcium (Ca)	mg/L		0.004	7.27	7.29	7.38	7.31	0.06	7.20	7.18	7.32	7.23	0.08
Chromium (Cr)	ug/L		0.03	0.244	0.229	0.271	0.248	0.021	0.170	0.175	0.190	0.178	0.010
Cobalt (Co)	ug/L		0.001	0.050	0.0493	0.0613	0.0535	0.0067	0.0347	0.100	0.0898	0.0748	0.0351
Copper (Cu)	ug/L		0.05	1.45	1.51	1.53	1.50	0.04	1.44	1.43	1.44	1.44	0.01
Iron (Fe)	ug/L		2	88.5	85.0	97.6	90.4	6.5	48.0	48.3	50.4	48.9	1.3
Lead (Pb)	ug/L		0.001	0.0386	0.0217	0.0466	0.0356	0.0127	0.0140	0.0157	0.0269	0.0189	0.0070
Magnesium (Mg)	mg/L		0.0001	6.42	6.45	6.56	6.48	0.07	6.28	6.35	6.48	6.37	0.10
Manganese (Mn)	ug/L		0.003	9.80	9.87	10.7	10.1	0.50	7.88	7.95	7.90	7.91	0.04
Mercury (Hg) low level				<0.0006	<0.0006	<0.0006	<0.0006		<0.0006	<0.0006	<0.0006	<0.0006	
Molybdenum (Mo)	ug/L		0.001	0.158	0.166	0.157	0.160	0.005	0.158	0.157	0.149	0.155	0.005
Nickel (Ni)	ug/L		0.005	0.409	0.429	0.461	0.433	0.026	0.404	0.430	0.355	0.396	0.038
Potassium (K)	ug/L		2	2320	2330	2370	2340	26	2310	2330	2370	2337	31
Selenium (Se)	ug/L		0.1	0.456	0.613	0.567	0.545	0.081	0.496	0.600	0.571	0.556	0.054
Silver (Ag)	ug/L		0.0005	<0.0005	0.0006	<0.0005	0.0005	0.0001	0.00096	<0.0005	0.0005	0.0007	0.0003
Sodium (Na)	ug/L		2	31900	32000	32500	32133	321	31000	31500	32100	31533	551
Strontium (Sr)	ug/L		0.004	40.0	39.9	40.0	40.0	0.1	39.2	38.9	39.8	39.3	0.5
Uranium (U)	ug/L		0.0001	0.0317	0.0312	0.0306	0.0312	0.0006	0.0316	0.0307	0.0310	0.0311	0.0005
Vanadium (V)	ug/L		0.005	0.137	0.116	0.162	0.138	0.023	0.118	0.122	0.124	0.121	0.003
Zinc (Zn)	ug/L		0.1	0.565	1.33	3.19	1.695	1.350	0.653	0.701	0.794	0.716	0.072
ARC Sample ID				0404029	0404030	0404031			0404220	0404221	0404222		
Cyanide, Total	mg/L		0.002	<0.002			<0.002		<0.002			<0.002	
Radium 226	Bq/L	0.005		<0.005			<0.005						
ETL SampleID				L207114-13					L210549-4				
Phosphorus, Total													
Ammonia-N	mg/L		0.001	0.015			0.015		0.024			0.024	
Color, True	T.C.U.		0.005	0.013			0.013		<0.005			<0.005	
Dissolved Organic Carbon	mg/L		3	20			20		15			15	
Fluoride (F)	mg/L		1	5			5		5			5	
Sulphide	mg/L		0.05	0.07			0.07		0.08			0.08	
Total Dissolved Solids	mg/L		0.003	0.003			0.003		<0.003			<0.003	
Total Kjeldahl Nitrogen	mg/L		10	120			120		170			170	
Total Organic Carbon	mg/L		0.05	0.54			0.54		0.46			0.46	
Total Suspended Solids	mg/L		1	5			5		6			6	
	mg/L		3	7			7		<3			<3	
Routine Water Analysis													
Chloride (Cl)	mg/L		1	62			62		63			63	
Nitrate+Nitrite-N	mg/L		0.006	<0.006			<0.006		<0.006			<0.006	
Nitrate-N	mg/L		0.006	<0.006			<0.006		<0.006			<0.006	
Nitrite-N	mg/L		0.002	<0.002			<0.002		<0.002			<0.002	
Sulphate (SO4)	mg/L		0.05	3.01			3.01		2.96			2.96	
pH, Conductivity and Total Alkalinity													
pH	pH		0.1	7.6			7.6		7.6			7.6	
Conductivity (EC)	uS/cm		0.2	261			261		258			258	
Bicarbonate (HCO3)	mg/L		5	33			33		32			32	
Carbonate (CO3)	mg/L		5	<5			<5		<5			<5	
Hydroxide (OH)	mg/L		5	<5			<5		<5			<5	
Alkalinity, Total (as CaCO3)	mg/L		5	27			27		26			26	
Ion Balance Calculation													
Ion Balance	%			96.2			96.2		94.2			94.2	
TDS (Calculated)	mg/L			127			127		127			127	
Hardness (as CaCO3)	mg/L			45			45		43			43	
ICP metals for routine water													
Calcium (Ca)	mg/L		0.5	7.6			7.6		7.3			7.3	
Potassium (K)	mg/L		0.1	2.3			2.3		2.1			2.1	
Magnesium (Mg)	mg/L		0.1	6.3			6.3		6.1			6.1	
Sodium (Na)	mg/L		1	30			30		30			30	
ETL SampleID				L207114-13					L210549-4				

NOTE: In calculating the mean values for replicate samples, non-detect values were replaced with the detection limit.

Appendix B2. Water chemistry results for QA/QC, Doris Lake, Doris Outflow, Tail Lake, Tail Outflow, Roberts Lake, Roberts Outflow, Little Roberts Lake, Little Roberts Outflow, and Roberts Bay.

QA/QC Samples

		Sample Label:		Doris Lake - 16 Aug 2004									
		Sample Type:		Replicates				Mean	SD	Replicates		Mean	SD
Parameter	Unit	ETL's DL	ARC's DL	Top	Top	Top	Top			Bottom	Bottom		
Total Metals													
Aluminum (Al)	ug/L	0.5		40.4	93.8	63.8	74.5	68.1	22.3	79.3	74.2	76.8	3.6
Antimony (Sb)	ug/L	0.0005		0.373	0.336	0.787	0.701	0.549	0.228	0.288	0.617	0.453	0.233
Arsenic (As)	ug/L	0.002		0.335	0.296	0.693	0.268	0.398	0.199	0.510	0.276	0.393	0.165
Barium (Ba)	ug/L	0.004		2.86	3.06	3.08	2.76	2.94	0.16	3.19	2.73	2.96	0.33
Beryllium (Be)	ug/L	0.003	<0.003		<0.003	0.0063	<0.003	0.0038	0.0016	0.0033	<0.003	0.0031	0.0002
Boron (B)	ug/L	0.05		20.3	18.0	37.4	17.7	23.4	9.4	31.2	17.4	24.3	9.8
Cadmium (Cd)	ug/L	0.002	<0.002		0.0038	0.0031	0.0048	0.0034	0.0012	0.0027	0.0123	0.0	0.0
Calcium (Ca)	mg/L	0.004		7.65	7.17	6.91	7.12	7.21	0.31	6.75	6.97	6.86	0.16
Chromium (Cr)	ug/L	0.03		0.181	<0.03	0.473	<0.03	0.179	0.209	0.460	<0.03	0.245	0.304
Cobalt (Co)	ug/L	0.001		0.127	0.0781	0.126	0.120	0.113	0.023	0.0625	0.195	0.1288	0.0937
Copper (Cu)	ug/L	0.05		1.19	1.16	1.25	1.04	1.16	0.09	1.30	1.16	1.23	0.10
Iron (Fe)	ug/L	2		62.4	79.7	76.3	69.2	71.9	7.7	72.8	69.5	71.2	2.3
Lead (Pb)	ug/L	0.001		0.0284	0.0859	0.0498	0.0312	0.0488	0.0265	0.0965	0.1440	0.1203	0.0336
Magnesium (Mg)	mg/L	0.0001		5.35	4.77	5.05	4.85	5.01	0.26	5.05	4.72	4.89	0.23
Manganese (Mn)	ug/L	0.003		12.6	12.8	13.0	12.7	12.8	0.2	12.2	12.5	12.4	0.2
Mercury (Hg) low level				<0.0006		<0.0006		<0.0006		0.0419		0.0419	
Molybdenum (Mo)	ug/L	0.001		0.147	0.148	0.144	0.205	0.161	0.029	0.172	0.250	0.211	0.055
Nickel (Ni)	ug/L	0.005		0.376	0.626	0.444	0.482	0.482	0.106	0.541	0.504	0.523	0.026
Potassium (K)	ug/L	2		2420	2080	2250	2080	2208	163	2170	2030	2100.0	99.0
Selenium (Se)	ug/L	0.1		0.514	0.225	1.820	0.269	0.707	0.753	1.07	0.321	0.696	0.530
Silver (Ag)	ug/L	0.0005		0.0024	0.0015	<0.0005	0.0025	0.0017	0.0009	<0.0005	0.0028	0.0016	0.0016
Sodium (Na)	ug/L	2		33500	27400	33100	27900	30475	3272	32900	27300	30100	3960
Strontium (Sr)	ug/L	0.004		38.0	38.2	31.8	38.0	36.5	3.1	31.3	37.4	34.4	4.3
Uranium (U)	ug/L	0.0001		0.0222	0.0309	0.0232	0.0276	0.0260	0.0040	0.0218	0.0273	0.0246	0.0039
Vanadium (V)	ug/L	0.005		0.118	<0.005	0.158	<0.005	0.072	0.079	0.200	<0.005	0.103	0.138
Zinc (Zn)	ug/L	0.1		1.10	12.1	0.883	0.943	3.757	5.563	0.915	2.64	1.778	1.220
ARC Sample ID				403829	403856	403824	403854			403825	403855		
Cyanide, Total	mg/L	0.002			0.002		<0.002	<0.002			<0.002	<0.002	
Radium 226	Bq/L	0.005		<0.005	<0.005			<0.005		<0.005	<0.005	<0.005	
ETL SampleID					L199233-8		L199233-6				L199233-7		
Phosphorus, Total	mg/L	0.001			0.026		0.027	0.027	0.001		0.025	0.025	
Ammonia-N	mg/L	0.005			<0.005		<0.005	<0.005			<0.005	<0.005	
Color, True	T.C.U.	3			20		15	18	4		20	20	
Dissolved Organic Carbon	mg/L	1			7		7	7	0		7	7	
Fluoride (F)	mg/L	0.05			0.07		0.07	0.07	0.00		0.06	0.06	
Sulphide	mg/L	0.003			0.058		0.009	0.034	0.035		0.16	0.16	
Total Dissolved Solids	mg/L	10			130		140	135	7		130	130	
Total Kjeldahl Nitrogen	mg/L	0.05			0.25		0.37	0.31	0.08		0.32	0.32	
Total Organic Carbon	mg/L	1			7		7	7	0		7	7	
Total Suspended Solids	mg/L	3			5		6	6	1		7	7	
Routine Water Analysis													
Chloride (Cl)	mg/L	1			58		58	58	0		58	58	
Nitrate+Nitrite-N	mg/L	0.006			<0.006		<0.006	<0.006			<0.006	<0.006	
Nitrate-N	mg/L	0.006			<0.006		<0.006	<0.006			<0.006	<0.006	
Nitrite-N	mg/L	0.002			<0.002		<0.002	<0.002			<0.002	<0.002	
Sulphate (SO4)	mg/L	0.05			2.78		2.93	2.855	0.106		2.99	2.99	
pH, Conductivity and Total Alkalinity													
pH	pH	0.1			7.7		7.6	7.7	0.1		7.6	7.6	
Conductivity (EC)	uS/cm	0.2			264		264	264	0		264	264	
Bicarbonate (HCO3)	mg/L	5			33		33	33	0		33	33	
Carbonate (CO3)	mg/L	5			<5		<5	5	0		<5	<5	
Hydroxide (OH)	mg/L	5			<5		<5	5	0		<5	<5	
Alkalinity, Total (as CaCO3)	mg/L	5			27		27	27	0		27	27	
Ion Balance Calculation													
Ion Balance	%				96.4		96.4	96.4	0.0		96.4	96.4	
TDS (Calculated)	mg/L				121		121	121	0		121	121	
Hardness (as CaCO3)	mg/L				42		42	42	0		42	42	
ICP metals for routine water													
Calcium (Ca)	mg/L	0.5			6.9		7	7.0	0.1		7	7	
Potassium (K)	mg/L	0.1			2.1		2.1	2.1	0.0		2.1	2.1	
Magnesium (Mg)	mg/L	0.1			6		6	6	0		6	6	
Sodium (Na)	mg/L	1			29		29	29	0		29	29	
ETL SampleID					L199233-8		L199233-6				L199233-7		
Dissolved Metals													
Aluminum (Al)					3.13		2.40	2.77	0.52		3.10	3.10	
Antimony (Sb)					0.272		0.370	0.321	0.069		0.527	0.527	
Arsenic (As)					0.349		0.350	0.350	0.001		0.344	0.344	
Barium (Ba)					2.52		2.49	2.51	0.02		2.58	2.58	
Beryllium (Be)					<0.003		<0.003	<0.003			<0.003	<0.003	
Boron (B)					23.9		23.7	23.8	0.1		24.0	24.0	
Cadmium (Cd)					<0.002		<0.002	<0.002			<0.002	<0.002	
Calcium (Ca)					7.47		7.42	7.45	0.04		7.38	7.38	
Chromium (Cr)					0.148		0.130	0.139	0.013		0.201	0.201	
Cobalt (Co)					0.0428		0.0374	0.0401	0.0038		0.0644	0.0644	
Copper (Cu)					1.28		1.28	1.28	0.00		1.44	1.44	
Iron (Fe)					8.00		7.37	7.69	0.45		9.61	9.61	
Lead (Pb)					1.18		0.0058	0.593	0.830		0.163	0.163	
Magnesium (Mg)					6.45		6.37	6.41	0.06		6.37	6.37	
Manganese (Mn)					0.702		0.555	0.629	0.104		0.672	0.672	
Molybdenum (Mo)					0.158		0.147	0.153	0.008		0.180	0.180	
Nickel (Ni)					0.193		0.184	0.189	0.006		0.283	0.283	
Potassium (K)					2350		2310	2330	28		2300	2300	
Selenium (Se)					0.612		0.590	0.601	0.016		0.457	0.457	
Silver (Ag)					<0.0005		<0.0005	<0.0005			<0.0005	<0.0005	
Sodium (Na)					32100		31600	31850	354		31800	31800	
Strontium (Sr)					41.4		41.2	41.3	0.1		41.2	41.2	
Uranium (U)					0.0297		0.0304	0.0301	0.0005				
Vanadium (V)					0.0189		0.0214	0.020	0.002		0.0536	0.0536	
Zinc (Zn)					0.294		0.170	0.232	0.09		2.39	2.39	
ARC Sample ID					0404016		0404014				0404013		

NOTE: In calculating the mean values for replicate samples, non-detect values were replaced with the detection limit.

Appendix B2. Water chemistry results for QA/QC, Doris Lake, Doris Outflow, Tail Lake, Tail Outflow, Roberts Lake, Roberts Outflow, Little Roberts Lake, Little Roberts Outflow, and Roberts Bay.

QA/QC Samples

Parameter	Unit	Sample Label:		Doris Lake - 10 Sept 2004			
		Sample Type:		Replicates		Mean	SD
		ETL's DL	ARC's DL	Top	Top		
Total Metals							
Aluminum (Al)	ug/L		0.5	42.9	46.1	44.5	2.3
Antimony (Sb)	ug/L		0.0005	0.156	0.172	0.164	0.011
Arsenic (As)	ug/L		0.002	0.357	0.374	0.366	0.012
Barium (Ba)	ug/L		0.004	2.82	3.06	2.94	0.17
Beryllium (Be)	ug/L		0.003	<0.003	<0.003	<0.003	
Boron (B)	ug/L		0.05	23	22.1	22.6	0.6
Cadmium (Cd)	ug/L		0.002	<0.002	<0.002	<0.002	
Calcium (Ca)	mg/L		0.004	7.18	7.01	7.10	0.12
Chromium (Cr)	ug/L		0.03	0.200	0.142	0.171	0.041
Cobalt (Co)	ug/L		0.001	0.0344	0.0425	0.0385	0.0057
Copper (Cu)	ug/L		0.05	1.43	1.44	1.44	0.01
Iron (Fe)	ug/L		2	53.0	51.1	52.1	1.3
Lead (Pb)	ug/L		0.001	0.0595	0.0572	0.0584	0.0016
Magnesium (Mg)	mg/L		0.0001	6.43	6.22	6.33	0.15
Manganese (Mn)	ug/L		0.003	8.75	8.84	8.80	0.06
Mercury (Hg) low level				<0.0006	0.0007	0.0007	0.0001
Molybdenum (Mo)	ug/L		0.001	0.173	0.149	0.161	0.017
Nickel (Ni)	ug/L		0.005	0.433	0.388	0.411	0.032
Potassium (K)	ug/L		2	2340	2280	2310	42
Selenium (Se)	ug/L		0.1	0.557	0.43	0.494	0.090
Silver (Ag)	ug/L		0.0005	<0.0005	<0.0005	<0.0005	
Sodium (Na)	ug/L		2	32100	31100	31600	707
Strontium (Sr)	ug/L		0.004	39.3	39.4	39.4	0.1
Uranium (U)	ug/L		0.0001	0.0292	0.0356	0.0324	0.0045
Vanadium (V)	ug/L		0.005	0.071	0.0776	0.0743	0.0047
Zinc (Zn)	ug/L		0.1	0.398	3.53	1.964	2.215
ARC Sample ID				0404018	0404021		
Cyanide, Total	mg/L	0.002		<0.002	<0.002	<0.002	
Radium 226	Bq/L	0.005		<0.005	<0.005	<0.005	
ETL SampleID				L207114-12	L207114-5		
Phosphorus, Total	mg/L	0.001		0.022	0.014	0.018	0.006
Ammonia-N	mg/L	0.005		0.008	<0.005	0.007	0.002
Color, True	T.C.U.	3		20	20	20	0
Dissolved Organic Carbon	mg/L	1		5	5	5	0
Fluoride (F)	mg/L	0.05		0.07	0.08	0.08	0.01
Sulphide	mg/L	0.003		<0.003	<0.003	<0.003	
Total Dissolved Solids	mg/L	10		130	150	140	14
Total Kjeldahl Nitrogen	mg/L	0.05		0.53	0.53	0.53	0.00
Total Organic Carbon	mg/L	1		5	5	5	0
Total Suspended Solids	mg/L	3		4	6	5	1
Routine Water Analysis							
Chloride (Cl)	mg/L	1		61	61	61	0
Nitrate+Nitrite-N	mg/L	0.006		<0.006	<0.006	<0.006	
Nitrate-N	mg/L	0.006		<0.006	<0.006	<0.006	
Nitrite-N	mg/L	0.002		<0.002	<0.002	<0.002	
Sulphate (SO4)	mg/L	0.05		2.84	2.83	2.84	0.01
pH, Conductivity and Total Alkalinity							
pH	pH	0.1		7.6	7.6	7.600	0.000
Conductivity (EC)	uS/cm	0.2		261	259	260	1
Bicarbonate (HCO3)	mg/L	5		32	33	33	1
Carbonate (CO3)	mg/L	5		<5	<5	<5	
Hydroxide (OH)	mg/L	5		<5	<5	<5	
Alkalinity, Total (as CaCO3)	mg/L	5		27	27	27	0
Ion Balance Calculation							
Ion Balance	%			99.5	97.0	98.3	1.8
TDS (Calculated)	mg/L			127	126	127	1
Hardness (as CaCO3)	mg/L			44	44	44	0
ICP metals for routine water							
Calcium (Ca)	mg/L	0.5		7.4	7.4	7.4	0.0
Potassium (K)	mg/L	0.1		2.2	2.3	2.3	0.1
Magnesium (Mg)	mg/L	0.1		6.3	6.3	6.3	0.0
Sodium (Na)	mg/L	1		31	30	31	1
ETL SampleID				L207114-12	L207114-5		

NOTE: In calculating the mean values for replicate samples, non-detect values were replaced with the detection limit.

Doris Outflow

										Mean of Replicates			Mean of Replicates	Mean of Replicates	Mean of Replicates	Water Quality Guidelines
Parameter	Unit	ETL's DL	ARC's DL	19-Jun-04	24-Jun-04	2-Jul-04	7-Jul-04	16-Jul-04	22-Jul-04	4-Aug-04	14-Aug-04	15-Aug-04	12-Sep-04	22-Sep-04		
Total Metals																
Aluminum (Al)	ug/L	0.3	0.5	33.2	23.1	59.7	10.3	47.5	55.0	62.9	80.7	63.0	72.1	63.8	100	
Antimony (Sb)	ug/L	0.03	0.0005	0.360	0.3	0.238	0.199	0.827	0.461	0.419	0.236	2.845	0.150	0.458		
Arsenic (As)	ug/L	0.03	0.002	0.471	0.33	0.398	0.341	0.340	0.271	0.357	0.253	0.364	0.363	0.342	5	
Barium (Ba)	ug/L	0.05	0.004	2.85	2.24	3.15	2.15	2.86	2.76	2.87	2.68	3.00	3.09	2.87		
Beryllium (Be)	ug/L	0.2	0.003	0.0057	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		
Boron (B)	ug/L	1	0.05	34.4	17	22.5	19.6	20.3	18.2	22.4	19.9	23.2	22.3	22.3		
Cadmium (Cd)	ug/L	0.05	0.002	<0.002	<0.05	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	0.02	
Calcium (Ca)	mg/L	0.02	0.004	8.47	6.07	7.54	6.37	7.81	7.39	7.38	5.59	7.60	7.31	7.23		
Chromium (Cr)	ug/L	0.06	0.03	0.219	0.64	0.252	0.244	<0.03	<0.03	0.455	<0.03	0.281	0.248	0.178		
Cobalt (Co)	ug/L	0.1	0.001	0.0462	<0.1	0.0452	0.0171	0.135	0.0543	0.129	0.0392	0.8875	0.0535	0.0748		
Copper (Cu)	ug/L	0.6	0.05	1.06	1.2	1.53	1.45	1.20	1.18	1.25	1.14	1.26	1.50	1.44	2	
Iron (Fe)	ug/L	5	2	42.6	51	80.8	19.5	125	107.0	67.8	65.7	84.7	90.4	48.9	300	
Lead (Pb)	ug/L	0.05	0.001	0.0175	<0.05	<0.001	<0.001	0.0306	0.0608	0.0313	0.0300	0.0368	0.0356	0.0189	1	
Magnesium (Mg)	mg/L	0.004	0.001	7.30	5.04	6.56	5.64	5.38	5.00	6.36	4.53	6.62	6.48	6.37		
Manganese (Mn)	ug/L	0.1	0.003	5.29	6.6	8.45	6.58	20.8	20.8	11.0	6.07	13.3	10.1	7.91		
Mercury (Hg) low level	ug/L		0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006		<0.0006	<0.0006	<0.0006	0.1	
Molybdenum (Mo)	ug/L	0.06	0.001	0.157	0.12	0.153	0.127	0.144	0.143	0.140	0.182	0.159	0.160	0.155	73	
Nickel (Ni)	ug/L	0.06	0.005	0.404	0.32	0.421	0.373	0.458	0.568	0.335	0.461	0.456	0.433	0.396	25	
Potassium (K)	ug/L	20	2	2820	1910	2380	2030	2420	2150.00	2240	1840	2405	2340	2337		
Selenium (Se)	ug/L	0.1	0.1	0.898	0.5	0.571	0.542	0.439	0.236	0.618	0.175	0.571	0.545	0.556	1	
Silver (Ag)	ug/L	0.1	0.0005	0.0008	<0.1	<0.0005	<0.0005	0.0005	0.0010	<0.0005	0.0007	0.0006	0.0005	0.0007	0.1	
Sodium (Na)	ug/L	5	2	39300	25000	32100	27800	33100	28900	31900	27300	34400	32133	31533		
Strontium (Sr)	ug/L	0.1	0.004	40.6	32	42.0	34.3	38.9	38.7	31.8	35.8	34.8	40.0	39.3		
Uranium (U)	ug/L	0.05	0.0001	0.0248	<0.05	0.0297	0.0189	0.0243	0.0260	0.0255	0.0378	0.0265	0.0312	0.0311		
Vanadium (V)	ug/L	0.05	0.005	0.0311	0.55	0.0442	<0.005	<0.005	<0.005	0.162	<0.005	0.234	0.138	0.121		
Zinc (Zn)	ug/L	0.8	0.1	0.850	0.9	3.16	2.13	1.70	1.56	0.868	2.84	1.465	1.695	0.716	30	
ARC Sample ID				0403860		0403368	0403369	0403835			0403816	0403851				
ETL SampleID					L183584-1											
Bismuth (Bi), Total	mg/L	0.00003			<0.00003											
Bismuth (Bi), Total	mg/L	0.0001		<0.0001		<0.0001	<0.0001	<0.0001	0.0003	<0.0001					0.8	
Thallium (Tl), Total	mg/L	0.00003			<0.00003										0.8	
Thallium (Tl), Total	mg/L	0.0001		<0.0001		<0.0001	<0.0001	0.0003	<0.0001	<0.0001						
Tin (Sn), Total	mg/L	0.0001			<0.0001											
Tin (Sn), Total	mg/L	0.0004		<0.0004		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004						
Cyanide, Total	mg/L	0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002		
Radium 226	Bq/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		
ETL SampleID				L181852-2	L183584-1	L186815-2	L186815-3	L189895-2			L195164-1	L199233-9	L207114-13	L210549-4		
Dissolved Metals																
Aluminum (Al)	ug/L		0.2	2.94	4.52	12.90						3.58				
Antimony (Sb)	ug/L	0.0005		0.359	1.03	0.378						1.80				
Arsenic (As)	ug/L	0.002		0.326	0.282	0.315						0.346				
Barium (Ba)	ug/L	0.004		2.40	2.18	2.40						2.52				
Beryllium (Be)	ug/L	0.003		<0.003	<0.003	<0.003						<0.003				
Boron (B)	ug/L	0.03		22.1	20.6	21.7						23.7				
Cadmium (Cd)	ug/L	0.002		<0.002	<0.002	<0.002						<0.002				
Calcium (Ca)	mg/L	0.004		7.88	6.98	7.23						7.67				
Chromium (Cr)	ug/L	0.03		0.155	0.143	0.152						0.145				
Cobalt (Co)	ug/L	0.001		0.0371	0.0770	0.0249						0.264				
Copper (Cu)	ug/L	0.05		1.33	1.20	1.27						1.35				
Iron (Fe)	ug/L	2		8.68	13.8	27.6						13.9				
Lead (Pb)	ug/L	0.001		0.0144	0.0100	0.0431						0.0111				
Magnesium (Mg)	mg/L	0.0001		6.11	5.16	5.59						6.47				
Manganese (Mn)	ug/L	0.003		4.02	5.79	5.35						7.12				
Molybdenum (Mo)	ug/L	0.001		0.150	0.137	0.141						0.157				
Nickel (Ni)	ug/L	0.005		0.209	0.244	0.266						0.217				
Potassium (K)	ug/L	2		2370	2190	2310						2310				
Selenium (Se)	ug/L	0.1		0.481	0.433	0.420						0.669				
Silver (Ag)	ug/L	0.0005		<0.0005	<0.0005	<0.0005						<0.0005				
Sodium (Na)	ug/L	2		30900	28900	30700						31900				
Strontium (Sr)	ug/L	0.004		42.9	37.7	38.8						42.8				
Uranium (U)	ug/L	0.0001		0.0281	0.0251	0.0252						0.0304				
Vanadium (V)	ug/L	0.005		<0.005	0.0368	0.0061						0.0374				
Zinc (Zn)	ug/L	0.05		0.791	0.578	0.849						0.322				
ARC Sample ID				0403999	0404003	0404004						0404012				
Phosphorus, Total	mg/L	0.001		0.017	0.016	0.019	0.014	0.020	0.019	0.019		0.029	0.015	0.024		
Ammonia-N	mg/L	0.005		<0.005	<0.005	0.008	<0.005	<0.005	0.008	0.014		<0.005	0.013	<0.005	5.79	
Color, True	T.C.U.	3		15	15	20	15	15	20	10		20	20	15		
Dissolved Organic Carbon	mg/L	1		6	5	6	5	5	5	8		7	5	5		
Fluoride (F)	mg/L	0.05		0.06	0.07	0.07	0.06	0.07	0.07	0.05		0.07	0.07	0.08		
Sulphide	mg/L	0.003		<0.003	<0.003	0.012	0.015	0.005	<0.003	<0.003		0.004	0.003	<0.003		
Total Dissolved Solids	mg/L	10		160	120	90	50	170	175	120		130	120	170		
Total Kjeldahl Nitrogen	mg/L	0.05		0.47	0.47	0.46	0.35	0.26	0.36	0.41		0.32	0.54	0.46		
Total Organic Carbon	mg/L	1		7	5	6	5	5	5	7		7	5	6		
Total Suspended Solids	mg/L	3		4	4	6	5	8	5	6		<3	7	<3		
Routine Water Analysis - low level																
Chloride (Cl)	mg/L	1		64	57	65	54	61	62	59		58	62	63		
Nitrate+Nitrite-N	mg/L	0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		<0.006	<0.006	<0.006		
Nitrate-N	mg/L	0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		<0.006	<0.006	<0.006		
Nitrite-N	mg/L	0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002		
Sulphate (SO4)	mg/L	0.05		2.98	2.63	2.87	2.42	2.79	2.77	2.8		2.89	3.01	2.96		
pH, Conductivity and Total Alkalinity																
pH	pH	0.1		7.2	7.5	7.6	7.6	7.6	7.6	7.						

Doris Lake

			Under Ice				16-Aug-04		10-Sep-04		Water Quality Guidelines	
			5-Jun-04		19-Jul-04		Mean of Replicates	Mean of Replicates	Mean of Replicates			
Parameter	Unit	DL	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom		
Total Metals												
Aluminum (Al)	ug/L	0.5	67.5	3.85	40.2	45.0	68.1	76.8	44.5	70.9	100	
Antimony (Sb)	ug/L	0.0005	0.893	0.695	0.699	2.29	0.549	0.453	0.164	0.160		
Arsenic (As)	ug/L	0.002	0.694	0.384	0.256	0.264	0.398	0.393	0.366	0.376		5
Barium (Ba)	ug/L	0.004	3.39	2.72	2.61	2.66	2.94	2.96	2.94	3.09		
Beryllium (Be)	ug/L	0.003	<0.003	<0.003	<0.003	<0.003	0.0038	0.0031	<0.003	<0.003		
Boron (B)	ug/L	0.05	18.4	24.9	18.2	18.1	23.4	24.3	22.6	22.8		
Cadmium (Cd)	ug/L	0.002	0.0658	<0.002	<0.002	<0.002	0.0034	0.0	<0.002	<0.002	0.02	
Calcium (Ca)	mg/L	0.004	7.07	9.49	7.29	7.31	7.21	6.86	7.10	7.09		
Chromium (Cr)	ug/L	0.03	0.298	0.157	<0.03	<0.03	0.179	0.245	0.171	0.275		
Cobalt (Co)	ug/L	0.001	0.108	0.130	0.129	0.349	0.113	0.1288	0.0385	0.0672		
Copper (Cu)	ug/L	0.05	1.64	1.46	1.05	1.07	1.16	1.23	1.44	1.65	2	
Iron (Fe)	ug/L	2	136	3.44	108	114	71.9	71.2	52.1	83.9		300
Lead (Pb)	ug/L	0.001	6.69	0.137	0.0216	0.0210	0.0488	0.1203	0.0584	0.0436	1	
Magnesium (Mg)	mg/L	0.0001	4.84	6.81	5.00	4.95	5.01	4.89	6.33	6.38	0.1	
Manganese (Mn)	ug/L	0.003	5.05	2.13	25.6	25.8	12.8	12.4	8.80	10.0		
Mercury (Hg) low level	ug/L	0.0006	0.0024		<0.0006	0.0017	<0.0006	0.0307	0.0007	0.0060		
Molybdenum (Mo)	ug/L	0.001	0.170	0.182	0.128	0.131	0.161	0.211	0.161	0.189		73
Nickel (Ni)	ug/L	0.005	0.864	0.348	0.418	0.435	0.482	0.523	0.411	0.586	25	
Potassium (K)	ug/L	2	2240	2920	2140	2150	2208	2100.0	2310	2330	1	
Selenium (Se)	ug/L	0.1	0.443	0.609	0.188	0.315	0.707	0.696	0.494	0.542		
Silver (Ag)	ug/L	0.0005	0.0372	0.0021	0.0014	0.0006	0.0017	0.0016	<0.0005	0.0027		0.1
Sodium (Na)	ug/L	2	29200	40600	29100	28800	30475	30100	31600	32000		
Strontium (Sr)	ug/L	0.004	35.7	47.5	38.2	38.0	36.5	34.4	39.4	39.4	0.0321	
Uranium (U)	ug/L	0.0001	0.0200	0.0200	0.0253	0.0277	0.0260	0.0246	0.0324			
Vanadium (V)	ug/L	0.005	0.287	<0.005	<0.005	<0.005	0.072	0.103	0.0743	0.12		
Zinc (Zn)	ug/L	0.1	16.9	2.63	4.28	0.957	3.757	1.778	1.964	4.02		30
ARC Sample ID			403832	403833	403844	403845				0404022		
Bismuth (Bi), Total	mg/L	0.0001	<0.0001		<0.0001	<0.0001					0.8	
Thallium (Tl), Total	mg/L	0.0001	<0.0001		<0.0001	<0.0001						
Tin (Sn), Total	mg/L	0.0004	<0.0004		<0.0004	<0.0004						
Cyanide, Total	mg/L	0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Radium 226	Bq/L	0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	0.06		
ETL SampleID			L178749-1		L191443-5	L191443-6				L207114-6		
Dissolved Metals												
Aluminum (Al)	ug/L	0.2	3.32				2.77	3.10			6.5 - 9.0	
Antimony (Sb)	ug/L	0.0005	0.453				0.321	0.527				
Arsenic (As)	ug/L	0.002	0.300				0.350	0.344				
Barium (Ba)	ug/L	0.004	2.62				2.51	2.58				
Beryllium (Be)	ug/L	0.003	<0.003				<0.003	<0.003				
Boron (B)	ug/L	0.03	19.1				23.8	24.0				
Cadmium (Cd)	ug/L	0.002	0.0662				<0.002	<0.002				
Calcium (Ca)	mg/L	0.004	6.48				7.45	7.38				
Chromium (Cr)	ug/L	0.03	0.267				0.139	0.201				
Cobalt (Co)	ug/L	0.001	0.0537				0.0401	0.0644				
Copper (Cu)	ug/L	0.05	1.50				1.28	1.44				
Iron (Fe)	ug/L	2	22.1				7.69	9.61				
Lead (Pb)	ug/L	0.001	2.79				0.593	0.163				
Magnesium (Mg)	mg/L	0.0001	4.91				6.41	6.37				
Manganese (Mn)	ug/L	0.003	4.51				0.629	0.672				
Molybdenum (Mo)	ug/L	0.001	0.146				0.153	0.180				
Nickel (Ni)	ug/L	0.005	0.611				0.189	0.283				
Potassium (K)	ug/L	2	2080				2330	2300				
Selenium (Se)	ug/L	0.1	0.358				0.601	0.457				
Silver (Ag)	ug/L	0.0005	<0.0005				<0.0005	<0.0005				
Sodium (Na)	ug/L	2	26500				31850	31800				
Strontium (Sr)	ug/L	0.004	35.8				41.3	41.2				
Uranium (U)	ug/L	0.0001	0.0187				0.0301					
Vanadium (V)	ug/L	0.005	0.0234				0.020	0.0536				
Zinc (Zn)	ug/L	0.05	16.1				0.23	2.39				
ARC Sample ID			0403995					0404013				
Phosphorus, Total	mg/L	0.001	0.027		0.02	0.02	0.027	0.025	0.018	0.023	5.79	
Ammonia-N	mg/L	0.005	<0.005		<0.005	<0.005	<0.005	<0.005	0.007	0.007		
Color, True	T.C.U.	3	8		20	20	18	20	20	20		
Dissolved Organic Carbon	mg/L	1	6		5	5	7	7	5	5		
Fluoride (F)	mg/L	0.05	0.05		0.07	0.07	0.07	0.06	0.08	0.08		
Sulphide	mg/L	0.003	<0.003		<0.003	<0.003	0.034	0.16	<0.003	<0.003		
Total Dissolved Solids	mg/L	10	130		160	180	135	130	140	120		
Total Kjeldahl Nitrogen	mg/L	0.05	0.22		0.38	0.4	0.31	0.32	0.53	0.56		
Total Organic Carbon	mg/L	1	6		5	5	7	7	5	5		
Total Suspended Solids	mg/L	3	3		<3	4	6	7	5	29		
Routine Water Analysis - low level												
Chloride (Cl)	mg/L	1	54		62	62	58	58	61	61		6.5 - 9.0
Nitrate+Nitrite-N	mg/L	0.006	<0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		
Nitrate-N	mg/L	0.006	<0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		
Nitrite-N	mg/L	0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Sulphate (SO4)	mg/L	0.05	2.65		2.74	2.76	2.855	2.99	2.84	2.87		
pH, Conductivity and Total Alkalinity												
pH	pH	0.1	7.5		7.5	7.5	7.7	7.6	7.600	7.6		
Conductivity (EC)	uS/cm	0.2	234		250	251	264	264	260	259		
Bicarbonate (HCO3)	mg/L	5	31		33	32	33	33	33	33		
Carbonate (CO3)	mg/L	5	<5		<5	<5	<5	<5	<5	<5		
Hydroxide (OH)	mg/L	5	<5		<5	<5	<5	<5	<5	<5		
Alkalinity, Total (as CaCO3)	mg/L	5	25		27	26	27	27	27	27		
Ion Balance Calculation												
Ion Balance	%		98.6		90.9	94.1	96.4	96.4	98.3	99.2	127	
TDS (Calculated)	mg/L		114		124	125	121	121	127			
Hardness (as CaCO3)	mg/L		41		43	44	42	42	44	45		
ICP metals for routine water												
Calcium (Ca)	mg/L	0.5	6.9		7	7.3	7.0	7	7.4	7.4	2.3	
Potassium (K)	mg/L	0.1	2.4		2.2	2.2	2.1	2.1	2.3			
Magnesium (Mg)	mg/L	0.1	5.8		6.2	6.2	6	6	6.3	6.4		
Sodium (Na)	mg/L	1	27		28	29	29	29	31	31		
ETL SampleID			L178749-1		L191443-5	L191443-6				L207114-6		

Tail Outflow

Parameter	Unit	ETL's DL	ARC's DL	19-Jun-04	2-Jul-04	16-Jul-04	4-Aug-04	15-Aug-04	10-Sep-04	22-Sep-04	Water Quality Guidelines	
Total Metals												
Aluminum (Al)	ug/L	0.3	0.5	16.5	11.6	9.3	9.39	45.7	10.9	22.1	100	
Antimony (Sb)	ug/L	0.03	0.0005	0.13	0.13	0.26	0.580	0.166	0.159	0.661		
Arsenic (As)	ug/L	0.03	0.002	0.2	0.28	0.22	0.224	0.241	0.200	0.201		
Barium (Ba)	ug/L	0.05	0.004	1.66	1.93	1.87	2.25	2.73	2.31	2.27		
Beryllium (Be)	ug/L	0.2	0.003	<0.2	<0.2	<0.2	<0.003	<0.003	<0.003	<0.003		
Boron (B)	ug/L	1	0.05	12	15	13	15.8	13.9	13.7	12.2	0.01	
Cadmium (Cd)	ug/L	0.05	0.002	<0.05	<0.05	<0.05	<0.002	0.0034	<0.002	<0.002		
Calcium (Ca)	mg/L	0.02	0.004	5.18	6.89	5.82	6.82	7.17	6.59	6.48		
Chromium (Cr)	ug/L	0.06	0.03	0.37	0.11	0.74	0.855	0.254	0.109	0.0895		
Cobalt (Co)	ug/L	0.1	0.001	<0.1	<0.1	<0.1	0.0695	0.0823	0.0306	0.087		
Copper (Cu)	ug/L	0.6	0.05	0.9	1	0.8	0.668	0.726	0.714	0.660	2	
Iron (Fe)	ug/L	5	2	42	31	34	71.4	78.6	64.0	64.1	300	
Lead (Pb)	ug/L	0.05	0.001	<0.05	<0.05	<0.05	0.0181	0.0717	0.0102	0.0066	1	
Magnesium (Mg)	mg/L	0.004	0.0001	4.08	5.47	4.62	4.65	5.37	4.45	4.49	0.1	
Manganese (Mn)	ug/L	0.1	0.003	0.8	0.6	0.7	1.44	2.30	1.95	2.76		
Mercury (Hg) low level	ug/L		0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006		
Molybdenum (Mo)	ug/L	0.06	0.001	0.1	0.11	0.08	0.0691	0.0567	0.0781	0.0709		
Nickel (Ni)	ug/L	0.06	0.005	0.52	0.54	0.49	0.457	0.445	0.397	0.365		
Potassium (K)	ug/L	20	2	1580	1730	1350	1250	1460	1810	1870	25	
Selenium (Se)	ug/L	0.1	0.1	0.4	0.4	<0.1	0.308	0.335	0.264	0.318	1	
Silver (Ag)	ug/L	0.1	0.0005	<0.1	<0.1	<0.1	<0.0005	<0.0005	<0.0005	0.00413	0.1	
Sodium (Na)	ug/L	5	2	15700	18800	15200	16700	18100	18200	18000	28.0	
Strontium (Sr)	ug/L	0.1	0.004	21.8	26.9	23.3	23.5	24.7	29.2	28.0		
Uranium (U)	ug/L	0.05	0.0001	<0.05	<0.05	<0.05	0.0064	0.0060	0.0054	0.0059		
Vanadium (V)	ug/L	0.05	0.005	0.48	0.47	0.19	0.180	0.140	0.0152	<0.005		
Zinc (Zn)	ug/L	0.8	0.1	<0.8	<0.8	<0.8	2.24	1.39	8.24	0.693		
ARC Sample ID							0403815	0403818	0404020	0404224		
ETL SampleID												
Bismuth (Bi), Total	mg/L	0.00003		L181852-1	L186815-1	L189895-1					0.8	
Thallium (Tl), Total	mg/L	0.00003		<0.00003	<0.00003	<0.00003						
Tin (Sn), Total	mg/L	0.0001		<0.0001	<0.0001	0.0003						
Cyanide, Total	mg/L	0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Radium 226	Bq/L	0.005		<0.005	<0.005	0.006		0.03	<0.005			
ETL SampleID												
				L181852-1	L186815-1	L189895-1	L195164-2	L199233-10	L207114-14	L210549-3		
Dissolved Metals												
Aluminum (Al)	ug/L		0.2	10.9	6.70			5.39			9.16	
Antimony (Sb)	ug/L	0.0005		0.589	0.303			0.286				
Arsenic (As)	ug/L	0.002		0.204	0.236			0.335				
Barium (Ba)	ug/L	0.004		1.80	2.08			2.43				
Beryllium (Be)	ug/L	0.003		<0.003	<0.003			<0.003				
Boron (B)	ug/L	0.03		13.6	17.1			14.6				
Cadmium (Cd)	ug/L	0.002		<0.002	<0.002			<0.002				
Calcium (Ca)	mg/L	0.004		6.06	7.49			7.17				
Chromium (Cr)	ug/L	0.03		0.183	0.197			0.123				
Cobalt (Co)	ug/L	0.001		0.0408	0.0231			0.0335				
Copper (Cu)	ug/L	0.05		1.29	1.31			0.610				
Iron (Fe)	ug/L	2		30.0	15.9			43.3				
Lead (Pb)	ug/L	0.001		0.0838	0.0547			0.0046				
Magnesium (Mg)	mg/L	0.0001		4.15	5.33			4.66				
Manganese (Mn)	mg/L	0.003		0.462	0.769			2.21				
Molybdenum (Mo)	ug/L	0.001		0.0996	0.1000			0.0612				
Nickel (Ni)	ug/L	0.005		0.581	0.572			0.516				
Potassium (K)	ug/L	2		1710	1910			1520				
Selenium (Se)	ug/L	0.1		0.258	0.383			0.409				
Silver (Ag)	ug/L	0.0005		<0.0005	<0.0005			<0.0005				
Sodium (Na)	ug/L	2		15100	19900			17800				
Strontium (Sr)	ug/L	0.004		24.0	30.1			31.8				
Uranium (U)	ug/L	0.0001		0.0139	0.0107			0.0064				
Vanadium (V)	ug/L	0.005		0.0273	0.0139			0.0163				
Zinc (Zn)	ug/L	0.05		1.20	1.60			0.828				
ARC Sample ID								0404011				
Phosphorus, Total												
Ammonia-N	mg/L	0.001		0.009	0.005	0.005	0.003	0.005	0.002	0.003	9.16	
Color, True	mg/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	0.028	<0.005		
Dissolved Organic Carbon	T.C.U.	3		15	10	10	15	10	10	20		
Fluoride (F)	mg/L	1		6	7	4	5	6	4	5		
Sulphide	mg/L	0.05		0.06	0.08	0.07	0.06	0.06	0.08	0.07		
Total Dissolved Solids	mg/L	0.003		0.004	0.004	0.01	<0.003	0.004	<0.003	0.004		
Total Kjeldahl Nitrogen	mg/L	10		110	40	120	80	100	90	120		
Total Organic Carbon	mg/L	0.05		0.33	0.36	0.32	0.29	0.16	0.29	0.21		
Total Suspended Solids	mg/L	1		6	5	5	6	7	4	5		
	mg/L	3		3	3	<3	<3	<3	<3	<3		
Routine Water Analysis - low level												
Chloride (Cl)	mg/L	1		29	40	30	30	34	37	37	6.5 - 9.0	
Nitrate+Nitrite-N	mg/L	0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		
Nitrate-N	mg/L	0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		
Nitrite-N	mg/L	0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Sulphate (SO4)	mg/L	0.05		1.97	2.54	1.89	1.67	2.05	2.91	2.62		
pH, Conductivity and Total Alkalinity												
pH	pH	0.1		7.4	7.6	7.4	7.3	7.3	7.3	7.3		
Conductivity (EC)	uS/cm	0.2		147	186	149	155	179	177	175		
Bicarbonate (HCO3)	mg/L	5		30	38	32	33	33	30	31		
Carbonate (CO3)	mg/L	5		<5	<5	<5	<5	<5	<5	<5		
Hydroxide (OH)	mg/L	5		<5	<5	<5	<5	<5	<5	<5		
Alkalinity, Total (as CaCO	mg/L	5		25	31	26	27	27	24	25		
Ion Balance Calculation												
Ion Balance	%			97	96.2	91.2	99.4	95.1	96.6	94.9		
TDS (Calculated)	mg/L			72	95	73	75	81	85	85		
Hardness (as CaCO3)	mg/L			33	43	32	37	37	38	37		
ICP metals for routine water												
Calcium (Ca)	mg/L	0.5		5.8	7.5	5.8	6.6	6.7	6.7	6.6		
Potassium (K)	mg/L	0.1		1.6	1.9	1.3	1.1	1.3	1.8	1.7		
Magnesium (Mg)	mg/L	0.1		4.5	5.9	4.3	4.9	4.9	5.1	5		
Sodium (Na)	mg/L	1		14	19	14	15	16	17	17		
ETL SampleID				L181852-1	L186815-1	L189895-1	L195164-2	L199233-10	L207114-14	L210549-3		

Tail Lake

				Under Ice								Water Quality Guidelines
				5-Jun-04		19-Jul-04		18-Aug-04		11-Sep-04		
Parameter	Unit	ETL's DL	ARC's DL	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom	
Total Metals												
Aluminum (Al)	ug/L	0.3	0.5	76.7	11.2	41.7	48.1	147	141	75.2	74.5	100
Antimony (Sb)	ug/L	0.03	0.0005	0.42	0.28	0.176	1.82	0.286	0.676	0.181	0.152	5
Arsenic (As)	ug/L	0.03	0.002	0.42	0.37	0.345	0.124	0.253	0.254	0.225	0.215	
Barium (Ba)	ug/L	0.05	0.004	2.63	3.22	1.93	1.97	3.02	2.68	2.18	2.19	
Beryllium (Be)	ug/L	0.2	0.003	<0.2	<0.2	<0.003	<0.003	0.0033	<0.003	<0.003	<0.003	
Boron (B)	ug/L	1	0.05	12	26	17.9	10.7	15.3	14.7	14.5	14.5	
Cadmium (Cd)	ug/L	0.05	0.002	<0.05	<0.05	0.0024	0.0021	0.0068	0.0044	<0.002	<0.002	0.01
Calcium (Ca)	mg/L	0.02	0.004	6.07	13.3	5.86	5.76	5.99	5.85	5.65	5.65	
Chromium (Cr)	ug/L	0.06	0.003	0.11	0.42	0.238	0.143	0.434	0.479	0.170	0.314	
Cobalt (Co)	ug/L	0.1	0.001	<0.1	<0.1	0.0391	0.232	0.109	0.130	0.0497	0.0524	
Copper (Cu)	ug/L	0.6	0.05	1.3	1.6	0.812	0.805	1.33	1.13	1.10	1.25	2
Iron (Fe)	ug/L	5	2	211	38	60.2	54.8	125	135	77	80.7	300
Lead (Pb)	ug/L	0.05	0.001	23.6	0.39	0.0249	0.0383	0.143	0.233	0.0266	0.352	1
Magnesium (Mg)	mg/L	0.004	0.0001	4.66	10.1	3.64	3.70	4.18	3.91	4.14	4.08	
Manganese (Mn)	ug/L	0.1	0.003	6.5	4.9	7.21	7.19	4.26	4.34	2.69	2.81	
Mercury (Hg) low level	ug/L		0.0006			<0.0006	0.0115	<0.0006	0.0166	<0.0006	0.0041	0.1
Molybdenum (Mo)	ug/L	0.06	0.001	0.1	0.14	0.0899	0.0962	0.109	0.142	0.122	0.166	73
Nickel (Ni)	ug/L	0.06	0.005	0.73	0.84	0.484	0.509	0.510	0.585	0.435	0.629	25
Potassium (K)	ug/L	20	2	1370	2880	1530	1410	1570	1540	1550	1550	
Selenium (Se)	ug/L	0.1	0.1	0.4	0.8	0.804	<0.1	0.298	0.309	0.227	0.267	1
Silver (Ag)	ug/L	0.1	0.0005	<0.1	<0.1	<0.0005	<0.0005	<0.0005	0.0026	<0.0005	<0.0005	0.1
Sodium (Na)	ug/L	5	2	14300	31700	15000	14300	16800	16300	16200	16000	
Strontium (Sr)	ug/L	0.1	0.004	21.9	41.1	22.4	22.3	19.4	18.9	23.5	23.3	
Uranium (U)	ug/L	0.05	0.0001	<0.05	<0.05	0.0148	0.0148	0.0200	0.0208	0.021	0.021	
Vanadium (V)	ug/L	0.05	0.005	0.62	0.52	0.0435	<0.005	0.257	0.249	0.112	0.114	
Zinc (Zn)	ug/L	0.8	0.1	18	<0.8	3.38	2.67	2.18	1.19	0.469	1.14	30
ARC Sample ID						0403842	0403843	0403819	0403820	0404024	0404025	
ETL SampleID				L178749-3	L178749-4							
Bismuth (Bi), Total	mg/L	0.00003		<0.00003	<0.00003							
Bismuth (Bi), Total	mg/L	0.0001				<0.0001	<0.0001					
Thallium (Tl), Total	mg/L	0.00003		<0.00003	<0.00003							0.8
Thallium (Tl), Total	mg/L	0.0001				<0.0001	<0.0001					0.8
Tin (Sn), Total	mg/L	0.0001		<0.0001	<0.0001							
Tin (Sn), Total	mg/L	0.0004				<0.0004	0.0005					
Cyanide, Total	mg/L	0.002				<0.002	<0.002			<0.002	<0.002	
Radium 226	Bq/L	0.005				<0.005	<0.005					
ETL SampleID				L178749-3	L178749-4	L191443-3	L191443-4			L207114-7	L207114-8	
Dissolved Metals												
Aluminum (Al)	ug/L		0.2	7.99	6.06							
Antimony (Sb)	ug/L		0.0005	0.525	0.647							
Arsenic (As)	ug/L		0.002	0.202	0.356							
Barium (Ba)	ug/L		0.004	1.99	3.60							
Beryllium (Be)	ug/L		0.003	<0.003	<0.003							
Boron (B)	ug/L		0.03	13.6	26.7							
Cadmium (Cd)	ug/L		0.002	0.0089	<0.002							
Calcium (Ca)	mg/L		0.004	5.91	11.8							
Chromium (Cr)	ug/L		0.03	0.293	0.219							
Cobalt (Co)	ug/L		0.001	0.0382	0.0989							
Copper (Cu)	ug/L		0.05	1.04	1.72							
Iron (Fe)	ug/L		2	40.7	12.7							
Lead (Pb)	ug/L		0.001	14.8	0.0407							
Magnesium (Mg)	mg/L		0.0001	4.17	9.31							
Manganese (Mn)	ug/L		0.003	6.03	6.04							
Molybdenum (Mo)	ug/L		0.001	0.0959	0.148							
Nickel (Ni)	ug/L		0.005	0.652	0.850							
Potassium (K)	ug/L		2	1460	2960							
Selenium (Se)	ug/L		0.1	0.244	0.481							
Silver (Ag)	ug/L		0.0005	<0.0005	<0.0005							
Sodium (Na)	ug/L		2	15200	30800							
Strontium (Sr)	ug/L		0.004		48.5							
Uranium (U)	ug/L		0.0001	0.0160	0.0247							
Vanadium (V)	ug/L		0.005	0.0115	0.0192							
Zinc (Zn)	ug/L		0.05	10.0	0.765							
ARC Sample ID				0403996	0403998							
Phosphorus, Total	mg/L	0.001				0.007	0.009	0.017	0.013	0.007	0.033	5.79
Ammonia-N	mg/L	0.005				<0.005	<0.005	<0.005	<0.005	0.006	0.007	
Color, True	T.C.U.	3				10	10	5	5	10	10	
Dissolved Organic Carbon	mg/L	1				5	4	6	6	4	5	
Fluoride (F)	mg/L	0.05				0.07	0.07	0.07	0.07	0.08	0.08	
Sulphide	mg/L	0.003				<0.003	<0.003	0.008	0.014	<0.003	<0.003	
Total Dissolved Solids	mg/L	10				220	110	70	70	70	70	
Total Kjeldahl Nitrogen	mg/L	0.05				0.25	0.25	0.23	0.21	0.34	0.36	
Total Organic Carbon	mg/L	1				5	5	7	6	5	5	
Total Suspended Solids	mg/L	3				<3	<3	5	5	<3	<3	
Routine Water Analysis - low level												
Chloride (Cl)	mg/L	1				33	30	29	29	30	30	6.5 - 9.0
Nitrate+Nitrite-N	mg/L	0.006				<0.006	0.021	<0.006	<0.006	<0.006	<0.006	
Nitrate-N	mg/L	0.006				<0.006	0.022	<0.006	<0.006	<0.006	<0.006	
Nitrite-N	mg/L	0.002				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Sulphate (SO4)	mg/L	0.05				2.02	2.06	1.98	2.01	2.19	2.19	
pH, Conductivity and Total Alkalinity												
pH	pH	0.1				7.7	7.7	7.6	7.6	7.6	7.6	6.5 - 9.0
Conductivity (EC)	uS/cm	0.2				146	145	150	149	155	156	
Bicarbonate (HCO3)	mg/L	5				29	30	30	31	30	31	
Carbonate (CO3)	mg/L	5				<5	<5	<5	<5	<5	<5	
Hydroxide (OH)	mg/L	5				<5	<5	<5	<5	<5	<5	
Alkalinity, Total (as CaCO3)	mg/L	5				24	24	24	25	24	25	
Ion Balance Calculation												
Ion Balance	%					90.9	91.3	95.5	97.5	102	101	6.5 - 9.0
TDS (Calculated)	mg/L					76	72	71	72	75	75	
Hardness (as CaCO3)	mg/L					31	31	32	32	34	34	
ICP metals for routine water												
Calcium (Ca)	mg/L	0.5				5.4	5.4	5.5	5.5	5.8	5.8	6.5 - 9.0
Potassium (K)	mg/L	0.1				1.6	1.5	1.4	1.4	1.5	1.5	
Magnesium (Mg)	mg/L	0.1				4.3	4.2	4.5	4.5	4.7	4.8	
Sodium (Na)	mg/L	1				15	14	14	15	16	16	
ETL SampleID						L191443-3	L191443-4	L200882-4	L200882-2	L207114-7	L207114-8	

Roberts Lake

			Under Ice							Water Quality Guidelines	
			6-Jun-04	17-Jul-04		13-Aug-04		13-Sep-04			
Parameter	Unit	DL	Mid Column	Top	Bottom	Top	Bottom	Top	Bottom		
Total Metals											
Aluminum (Al)	ug/L	0.5	31.3	128	137	63.8	65.1	127	110	100	
Antimony (Sb)	ug/L	0.0005	0.515	0.437	0.397	0.201	0.281	0.154	0.216	5	
Arsenic (As)	ug/L	0.002	0.357	0.294	0.290	0.356	0.363	0.357	0.366		
Barium (Ba)	ug/L	0.004	3.21	3.31	3.42	2.74	2.74	3.31	3.31		
Beryllium (Be)	ug/L	0.003	<0.003	0.0067	0.0049	<0.003	<0.003	0.0066	0.0047		
Boron (B)	ug/L	0.05	30.0	19.4	19.1	23.7	25.0	24.1	24.0	0.01	
Cadmium (Cd)	ug/L	0.002	0.0039	0.0028	0.0024	0.0034	0.0036	<0.002	<0.002		
Calcium (Ca)	mg/L	0.004	7.53	5.32	5.38	5.71	5.71	5.48	5.50		
Chromium (Cr)	ug/L	0.03	<0.03	<0.03	<0.03	0.278	0.350	0.272	0.273		
Cobalt (Co)	ug/L	0.001	0.0487	0.0637	0.0640	0.0608	0.0823	0.0481	0.0514	2	
Copper (Cu)	ug/L	0.05	1.73	1.27	1.22	1.44	1.56	1.63	1.65		
Iron (Fe)	ug/L	2	19.6	130	128	60.6	58.6	101	103		
Lead (Pb)	ug/L	0.001	0.0971	0.0575	0.0515	0.0353	0.359	0.0336	0.114		
Magnesium (Mg)	mg/L	0.0001	6.18	4.70	4.70	6.04	6.06	4.97	5.13	1	
Manganese (Mn)	ug/L	0.003	15.90	6.55	6.61	5.82	5.78	4.70	4.80	0.1	
Mercury (Hg) low level	ug/L	0.0006	<0.0006	<0.0006	<0.0006	0.0030	0.020	<0.0006	0.07085		
Molybdenum (Mo)	ug/L	0.001	0.221	0.166	0.229	0.212	0.325	0.180	0.202		
Nickel (Ni)	ug/L	0.005	0.557	0.545	0.560	0.488	0.734	0.487	0.472		
Potassium (K)	ug/L	2	2660	1970	1970	2020	2020	2060	2060	25	
Selenium (Se)	ug/L	0.1	0.627	0.259	0.280	0.545	0.586	0.570	0.460		
Silver (Ag)	ug/L	0.0005	0.0007	0.0017	0.0026	<0.0005	<0.0005	<0.0005	<0.0005		
Sodium (Na)	ug/L	2	40400	29500	29400	31600	31900	30300	30300		
Strontium (Sr)	ug/L	0.004	45.7	33.5	33.8	29.9	30.2	36.6	36.9	0.1	
Uranium (U)	ug/L	0.0001	0.0346	0.0343	0.0361	0.0337	0.0324	0.0417	0.0424		
Vanadium (V)	ug/L	0.005	<0.005	0.0389	0.0076	0.0933	0.105	0.181	0.172		
Zinc (Zn)	ug/L	0.1	3.30	1.05	2.45	0.724	2.43	2.56	3.92		
ARC Sample ID			403834	0403838	0403839	0403821	0403822	0404032	0404033		
Bismuth (Bi), Total	mg/L	0.0001	<0.0001	<0.0001	<0.0001					0.8	
Thallium (Tl), Total	mg/L	0.0001	<0.0001	0.0003	0.0003						
Tin (Sn), Total	mg/L	0.0004	<0.0004	<0.0004	<0.0004						
Cyanide, Total	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Radium 226	Bq/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.06		
ETL SampleID			L178749-5	L189895-5	L189895-6	L199233-1	L199233-2	L207114-3	L207114-4		
Dissolved Metals											5.79
Aluminum (Al)	ug/L	0.2	2.56			4.44	9.63				
Antimony (Sb)	ug/L	0.0005	0.236			0.308	0.299				
Arsenic (As)	ug/L	0.002	0.233			0.301	0.298				
Barium (Ba)	ug/L	0.004	1.88			2.20	2.33				
Beryllium (Be)	ug/L	0.003	<0.003			<0.003	<0.003				
Boron (B)	ug/L	0.03	15.5			24.5	23.6				
Cadmium (Cd)	ug/L	0.002	0.0044			<0.002	<0.002				
Calcium (Ca)	mg/L	0.004	3.35			5.51	5.53				
Chromium (Cr)	ug/L	0.03	0.184			0.158	0.430				
Cobalt (Co)	ug/L	0.001	0.0369			0.0380	0.0215				
Copper (Cu)	ug/L	0.05	0.898			2.91	1.70				
Iron (Fe)	ug/L	2	7.70			10.1	16.9				
Lead (Pb)	ug/L	0.001	2.70			0.200	0.109				
Magnesium (Mg)	mg/L	0.0001	3.37			5.10	5.65				
Manganese (Mn)	ug/L	0.003	2.80			1.05	1.72				
Molybdenum (Mo)	ug/L	0.001	0.130			0.510	0.205				
Nickel (Ni)	ug/L	0.005	0.314			1.09	0.520				
Potassium (K)	ug/L	2	1420			2040	2040				
Selenium (Se)	ug/L	0.1	0.276			0.281	0.337				
Silver (Ag)	ug/L	0.0005	<0.0005			<0.0005	<0.0005				
Sodium (Na)	ug/L	2	19500			30600	30800				
Strontium (Sr)	ug/L	0.004	23.1			36.1	36.4				
Uranium (U)	ug/L	0.0001	0.0224			0.0362	0.0352				
Vanadium (V)	ug/L	0.005	0.0516			<0.005	0.107				
Zinc (Zn)	ug/L	0.05	4.22			7.92	0.843				
ARC Sample ID			0403997			0404006	0404007				
Phosphorus, Total	mg/L	0.001		0.018	0.013	0.013	0.013	0.011	0.018	6.5 - 9.0	
Ammonia-N	mg/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	0.005		
Color, True	T.C.U.	3		10	13	10	10	15	10		
Dissolved Organic Carbon	mg/L	1		5	4	6	6	<1	4		
Fluoride (F)	mg/L	0.05		0.06	0.06	0.06	0.05	0.07	0.07		
Sulphide	mg/L	0.003		0.010	0.010	0.017	0.017	<0.003	<0.003		
Total Dissolved Solids	mg/L	10		150	140	120	130	230	130		
Total Kjeldahl Nitrogen	mg/L	0.05		0.21	0.2	0.19	0.14	0.31	0.46		
Total Organic Carbon	mg/L	1		5	4	6	6	4	4		
Total Suspended Solids	mg/L	3		6	3	<3	<3	<3	3		
Routine Water Analysis - low level											
Chloride (Cl)	mg/L	1		55	55	54	54	52	59		
Nitrate+Nitrite-N	mg/L	0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		
Nitrate-N	mg/L	0.006		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006		
Nitrite-N	mg/L	0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Sulphate (SO4)	mg/L	0.05		4.38	4.46	4.85	4.87	4.71	4.65		
pH, Conductivity and Total Alkalinity											
pH	pH	0.1		7.6	7.6	7.5	7.6	7.6	7.5		
Conductivity (EC)	uS/cm	0.2		222	223	246	253	240	238		
Bicarbonate (HCO3)	mg/L	5		20	21	26	26	27	25		
Carbonate (CO3)	mg/L	5		<5	<5	<5	<5	<5	<5		
Hydroxide (OH)	mg/L	5		<5	<5	<5	<5	<5	<5		
Alkalinity, Total (as CaCO3)	mg/L	5		17	17	21	22	22	20		
Ion Balance Calculation											
Ion Balance	%			90.6	96	94.2	92.7	106	98.1		
TDS (Calculated)	mg/L			106	109	111	111	113	119		
Hardness (as CaCO3)	mg/L			33	34	35	36	38	39		
ICP metals for routine water											
Calcium (Ca)	mg/L	0.5		4.7	5.0	5.3	5.4	5.7	5.7		
Potassium (K)	mg/L	0.1		1.7	1.9	1.9	1.9	2.0	2.1		
Magnesium (Mg)	mg/L	0.1		5.1	5.3	5.4	5.5	5.8	5.9		
Sodium (Na)	mg/L	1		25	27	27	26	30	30		
ETL SampleID				L189895-5	L189895-6	L199233-1	L199233-2	L207114-3	L207114-4		

Roberts Outflow

Parameter	Unit	DL	20-Jun-04	17-Jul-04	14-Aug-04	19-Aug-04	12-Sep-04	22-Sep-04	Water Quality Guidelines
Total Metals									
Aluminum (Al)	ug/L	0.5	147	153		315	108	141	100
Antimony (Sb)	ug/L	0.0005	0.587	4.59		0.630	0.176	0.638	
Arsenic (As)	ug/L	0.002	0.422	0.299		0.448	0.339	0.358	5
Barium (Ba)	ug/L	0.004	4.05	3.56		4.73	3.15	3.55	
Beryllium (Be)	ug/L	0.003	0.0081	0.0058		0.0043	<0.003	0.00492	
Boron (B)	ug/L	0.05	28.8	19.2		30.0	23.3	23.7	
Cadmium (Cd)	ug/L	0.002	0.0053	<0.002		0.0028	<0.002	<0.002	0.01
Calcium (Ca)	mg/L	0.004	5.14	5.37		5.34	5.57	5.48	
Chromium (Cr)	ug/L	0.03	0.366	<0.03		0.750	0.287	0.269	
Cobalt (Co)	ug/L	0.001	0.145	0.804		0.113	0.0611	0.120	
Copper (Cu)	ug/L	0.05	1.05	1.22		1.40	1.63	1.60	2
Iron (Fe)	ug/L	2	262	146		182	103	122	300
Lead (Pb)	ug/L	0.001	0.0602	0.0541		0.0779	0.0465	0.0459	1
Magnesium (Mg)	mg/L	0.0001	6.32	4.69		4.80	5.36	5.76	
Manganese (Mn)	ug/L	0.003	30.8	7.21		7.39	5.73	6.02	
Mercury (Hg) low level	ug/L	0.0006	0.0018	<0.0006	<0.0006		<0.0006	<0.0006	0.1
Molybdenum (Mo)	ug/L	0.001	0.184	0.170		0.189	0.206	0.188	73
Nickel (Ni)	ug/L	0.005	0.592	0.528		0.653	0.514	0.461	25
Potassium (K)	ug/L	2	2390	1980		1960	2060	2090	
Selenium (Se)	ug/L	0.1	0.749	0.336		0.802	0.511	0.541	1
Silver (Ag)	ug/L	0.0005	0.0014	0.0011		<0.0005	<0.0005	0.000995	0.1
Sodium (Na)	ug/L	2	35400	29600		31600	30200	30300	
Strontium (Sr)	ug/L	0.004	30.7	33.8		30.3	36.7	36.5	
Uranium (U)	ug/L	0.0001	0.0358	0.0349		0.0375	0.0438	0.0447	
Vanadium (V)	ug/L	0.005	0.254	0.0592		0.598	0.2	0.206	
Zinc (Zn)	ug/L	0.1	5.76	1.40		1.07	1.07	0.558	30
ARC Sample ID			0403861	0403837		0403826	0404028	0404225	
Bismuth (Bi) Total	mg/L	0.0001	<0.0001	<0.0001					
Thallium (Tl) Total	mg/L	0.0001	<0.0001	<0.0001					0.8
Tin (Sn) total	mg/L	0.0004	<0.0004	<0.0004					
Cyanide, Total	mg/L	0.002	<0.002	<0.002	<0.002		<0.002	<0.002	
Radium 226	Bq/L	0.005	<0.005	<0.005	<0.005		<0.005		
ETL SampleID			L181852-4	L189895-4	L199233-3		L207114-15	L210549-1	
Dissolved Metals									
Aluminum (Al)	ug/L	0.2	16.0		4.96				
Antimony (Sb)	ug/L	0.0005	0.404		0.301				
Arsenic (As)	ug/L	0.002	0.374		0.250				
Barium (Ba)	ug/L	0.004	2.73		1.84				
Beryllium (Be)	ug/L	0.003	<0.003		<0.003				
Boron (B)	ug/L	0.03	19.2		19.8				
Cadmium (Cd)	ug/L	0.002	<0.002		<0.002				
Calcium (Ca)	mg/L	0.004	4.74		4.63				
Chromium (Cr)	ug/L	0.03	0.171		0.174				
Cobalt (Co)	ug/L	0.001	0.0989		0.0160				
Copper (Cu)	ug/L	0.05	1.40		1.16				
Iron (Fe)	ug/L	2	131		8.07				
Lead (Pb)	ug/L	0.001	0.0157		0.0517				
Magnesium (Mg)	mg/L	0.0001	4.75		4.35				
Manganese (Mn)	ug/L	0.003	30.9		0.850				
Molybdenum (Mo)	ug/L	0.001	0.159		0.150				
Nickel (Ni)	ug/L	0.005	0.478		0.304				
Potassium (K)	ug/L	2	1970		1740				
Selenium (Se)	ug/L	0.1	0.450		0.340				
Silver (Ag)	ug/L	0.0005	<0.0005		<0.0005				
Sodium (Na)	ug/L	2	27500		26000				
Strontium (Sr)	ug/L	0.004	32.2		30.4				
Uranium (U)	ug/L	0.0001	0.0379		0.0307				
Vanadium (V)	ug/L	0.005	0.0499		0.0192				
Zinc (Zn)	ug/L	0.05	0.885		1.87				
ARC Sample ID			0404001		0404010				
Phosphorus, Total	mg/L	0.001	0.018	0.015	0.013		0.01	0.013	
Ammonia-N	mg/L	0.005	<0.005	<0.005	<0.005		0.007	<0.005	9.16
Color, True	T.C.U.	3	30	13	10		15	25	
Dissolved Organic Carbon	mg/L	1	6	5	6		4	5	
Fluoride (F)	mg/L	0.05	0.05	0.06	0.06		0.07	0.07	
Sulphide	mg/L	0.003	0.003	0.007	0.004		<0.003	0.003	
Total Dissolved Solids	mg/L	10	140	140	130		100	150	
Total Kjeldahl Nitrogen	mg/L	0.05	0.36	0.16	0.15		0.3	0.23	
Total Organic Carbon	mg/L	1	7	5	6		4	5	
Total Suspended Solids	mg/L	3	5	7	<3		6	4	
Routine Water Analysis - low level									
Chloride (Cl)	mg/L	1	56	55	54		56	58	
Nitrate+Nitrite-N	mg/L	0.006	<0.006	<0.006	<0.006		<0.006	<0.006	
Nitrate-N	mg/L	0.006	<0.006	<0.006	<0.006		<0.006	<0.006	
Nitrite-N	mg/L	0.002	<0.002	<0.002	<0.002		<0.002	<0.002	
Sulphate (SO4)	mg/L	0.05	4.2	4.38	4.82		4.75	4.71	
pH, Conductivity and Total Alkalinity									
pH	pH	0.1	7	7.5	7.5		7.5	7.5	6.5 - 9.0
Conductivity (EC)	nS/cm	0.2	225	222	261		239	236	
Bicarbonate (HCO3)	mg/L	5	19	21	26		26	26	
Carbonate (CO3)	mg/L	5	<5	<5	<5		<5	<5	
Hydroxide (OH)	mg/L	5	<5	<5	<5		<5	<5	
Alkalinity, Total (as CaCO3)	mg/L	5	15	17	21		21	21	
Ion Balance Calculation									
Ion Balance	%		95	92.8	98.1		98.6	92.2	
TDS (Calculated)	mg/L		108	107	113		116	116	
Hardness (as CaCO3)	mg/L		35	33	37		38	36	
ICP metals for routine water									
Calcium (Ca)	mg/L	0.5	4.8	4.8	5.5		5.7	5.5	
Potassium (K)	mg/L	0.1	1.9	1.8	1.9		2	1.8	
Magnesium (Mg)	mg/L	0.1	5.6	5.2	5.7		5.8	5.5	
Sodium (Na)	mg/L	1	26	26	28		29	28	
ETL SampleID			L181852-4	L189895-4	L199233-3		L207114-15	L210549-1	

Parameter	Unit	DL	5-Jun-04	19-Jul-04	16-Aug-04	19-Aug-04	13-Sep-04	Water Quality Guidelines
Total Metals								
Aluminum (Al)	ug/L	0.5	Ice to the Lake Bottom	98.1	582	321	134	100
Antimony (Sb)	ug/L	0.0005		0.405	0.470	0.751	0.171	
Arsenic (As)	ug/L	0.002		0.293	0.375	0.479	0.369	5
Barium (Ba)	ug/L	0.004		3.26	7.38	5.57	3.9	
Beryllium (Be)	ug/L	0.003		0.0059	0.0167	0.0100	<0.003	
Boron (B)	ug/L	0.05		21.3	18.2	27.9	24.1	
Cadmium (Cd)	ug/L	0.002		0.0021	0.0039	0.0024	<0.002	0.02
Calcium (Ca)	mg/L	0.004		6.87	6.85	6.34	6.52	
Chromium (Cr)	ug/L	0.03		<0.03	0.139	0.789	0.28	
Cobalt (Co)	ug/L	0.001		0.0582	0.394	0.262	0.0676	
Copper (Cu)	ug/L	0.05	1.35	1.62	1.47	1.62	2	
Iron (Fe)	ug/L	2	105	462		133	300	
Lead (Pb)	ug/L	0.001	0.0504	0.239	0.115	0.173	1	
Magnesium (Mg)	mg/L	0.0001	5.05	4.95	5.09	6.49		
Manganese (Mn)	ug/L	0.003	9.50	13.2	8.88	6.8		
Mercury (Hg) low level	ug/L	0.0006	<0.0006	<0.0006		<0.0006	0.1	
Molybdenum (Mo)	ug/L	0.001	0.214	0.186	0.181	0.183	73	
Nickel (Ni)	ug/L	0.005	0.481	0.996	0.761	0.532	25	
Potassium (K)	ug/L	2	2200	2190	2110	2250		
Selenium (Se)	ug/L	0.1	0.359	0.249	0.629	0.655	1	
Silver (Ag)	ug/L	0.0005	0.0029	0.0039	<0.0005	<0.0005	0.1	
Sodium (Na)	ug/L	2	31200	28000	32700	33000		
Strontium (Sr)	ug/L	0.004	0.378	41.2	33.3	40.9		
Uranium (U)	ug/L	0.0001	0.0310	0.0542	0.0366	0.0397		
Vanadium (V)	ug/L	0.005	<0.005	0.849	0.655	0.206		
Zinc (Zn)	ug/L	0.1	2.77	2.36	1.68	0.817	30	
ARC Sample ID				0403840	403852	403828	0404034	
Bismuth (Bi), Total	mg/L	0.0001		0.0001				0.8
Thallium (Tl), Total	mg/L	0.0001		<0.0001				
Tin (Sn), Total	mg/L	0.0004		<0.0004				
Cyanide, Total	mg/L	0.002		<0.002	<0.002	<0.002		
Radium 226	Bq/L	0.005		<0.005	<0.005		0.06	
ETL SampleID				L191443-1	L199233-4		L207114-1	
Dissolved Metals								
Aluminum (Al)	ug/L	0.2			9.14			17.05
Antimony (Sb)	ug/L	0.0005			0.291			
Arsenic (As)	ug/L	0.002			0.384			
Barium (Ba)	ug/L	0.004			2.84			
Beryllium (Be)	ug/L	0.003			<0.003			
Boron (B)	ug/L	0.03			25.5			
Cadmium (Cd)	ug/L	0.002			<0.002			
Calcium (Ca)	mg/L	0.004			7.08			
Chromium (Cr)	ug/L	0.03			0.159			
Cobalt (Co)	ug/L	0.001			0.0339			
Copper (Cu)	ug/L	0.05			1.34			
Iron (Fe)	ug/L	2			24.9			
Lead (Pb)	ug/L	0.001			0.0146			
Magnesium (Mg)	mg/L	0.0001			6.54			
Manganese (Mn)	ug/L	0.003			4.50			
Molybdenum (Mo)	ug/L	0.001			0.205			
Nickel (Ni)	ug/L	0.005			0.396			
Potassium (K)	ug/L	2			2260			
Selenium (Se)	ug/L	0.1			0.656			
Silver (Ag)	ug/L	0.0005			<0.0005			
Sodium (Na)	ug/L	2			32900			
Strontium (Sr)	ug/L	0.004			42.9			
Uranium (U)	ug/L	0.0001			0.0412			
Vanadium (V)	ug/L	0.005			0.119			
Zinc (Zn)	ug/L	0.05			0.352			
ARC Sample ID					0404015			
Phosphorus, Total	mg/L	0.001		0.015	0.029		0.012	17.05
Ammonia-N	mg/L	0.005	</					

Parameter	Unit	DL	20-Jun-04	16-Jul-04	14-Aug-04	19-Aug-04	12-Sep-04	22-Sep-04	Water Quality Guidelines
Total Metals									
Aluminum (Al)	ug/L	0.5	243	114	95.1	191	140	151	100
Antimony (Sb)	ug/L	0.0005	0.416	1.71	0.334	1.16	0.176	0.61	
Arsenic (As)	ug/L	0.002	0.415	0.318	0.267	0.512	0.409	0.37	5
Barium (Ba)	ug/L	0.004	5.08	3.40	3.11	4.41	4.15	4.09	
Beryllium (Be)	ug/L	0.003	0.0065	<0.003	<0.003	0.0043	0.00385	<0.003	
Boron (B)	ug/L	0.05	29.2	20.0	18.4	28.1	26.2	23.4	
Cadmium (Cd)	ug/L	0.002	0.0024	0.0040	<0.002	0.0145	<0.002	<0.002	0.02
Calcium (Ca)	mg/L	0.004	7.71	6.61	6.67	6.69	7.45	6.87	
Chromium (Cr)	ug/L	0.03	0.491	<0.03	<0.03	0.559	0.383	0.318	
Cobalt (Co)	ug/L	0.001	0.149	0.300	0.0721	0.357	0.0825	0.113	
Copper (Cu)	ug/L	0.05	1.15	1.30	1.15	1.60	1.84	1.54	2
Iron (Fe)	ug/L	2	278	137	98.7	178	155	136	300
Lead (Pb)	ug/L	0.001	0.0661	0.0469	0.0385	0.0891	0.251	0.0491	1
Magnesium (Mg)	mg/L	0.0001	6.96	5.00	4.78	5.18	7.09	6.63	
Manganese (Mn)	ug/L	0.003	23.7	8.45	12.4	8.10	7.74	5.76	
Mercury (Hg) low lev	ug/L	0.0006	<0.0006	<0.0006		<0.0006	<0.0006	<0.0006	0.1
Molybdenum (Mo)	ug/L	0.001	0.180	0.164	0.235	0.179	0.196	0.178	73
Nickel (Ni)	ug/L	0.005	0.639	0.492	0.501	0.635	0.568	0.501	25
Potassium (K)	ug/L	2	2690	2170	1990	2160	2460	2310	
Selenium (Se)	ug/L	0.1	0.640	0.365	0.230	0.821	0.592	0.548	1
Silver (Ag)	ug/L	0.0005	0.0032	<0.0005	0.0029	<0.0005	<0.0005	0.00125	0.1
Sodium (Na)	ug/L	2	37400	31000	28000	33500	36000	33400	
Strontium (Sr)	ug/L	0.004	44.1	36.9	39.0	33.6	45.2	41.2	
Uranium (U)	ug/L	0.0001	0.0351	0.0312	0.0337	0.0317	0.0421	0.0361	
Vanadium (V)	ug/L	0.005	0.423	0.0916	<0.005	0.447	0.284	0.251	
Zinc (Zn)	ug/L	0.1	3.46	1.66	0.616	1.53	5.1	0.683	30
ARC Sample ID			0403862	0403836	0403853	0403827	0404019	0404223	
Bismuth (Bi) Total	mg/L	0.0001	<0.0001	<0.0001					
Thallium (Tl) Total	mg/L	0.0001	<0.0001	0.0003					0.8
Tin (Sn) total	mg/L	0.0004	<0.0004	<0.0004					
Cyanide, Total	mg/L	0.002	<0.002	<0.002	<0.002		<0.002	<0.002	
Radium 226	Bq/L	0.005	<0.005	<0.005	<0.005		<0.005		
ETL SampleID			L181852-3	L189895-3	L199233-5		L207114-16	L210549-2	
Dissolved Metals									
Aluminum (Al)	ug/L	0.2	11.0		13.3				
Antimony (Sb)	ug/L	0.0005	0.568		0.306				
Arsenic (As)	ug/L	0.002	0.327		0.314				
Barium (Ba)	ug/L	0.004	2.93		2.57				
Beryllium (Be)	ug/L	0.003	<0.003		<0.003				
Boron (B)	ug/L	0.03	21.1		22.8				
Cadmium (Cd)	ug/L	0.002	<0.002		<0.002				
Calcium (Ca)	mg/L	0.004	7.22		6.57				
Chromium (Cr)	ug/L	0.03	0.160		0.234				
Cobalt (Co)	ug/L	0.001	0.176		0.0362				
Copper (Cu)	ug/L	0.05	1.35		1.32				
Iron (Fe)	ug/L	2	83.6		31.7				
Lead (Pb)	ug/L	0.001	0.0144		0.0114				</

Parameter	Unit	DL	6-Jun-04	19-Jul-04	14-Aug-04	16-Aug-04	9-Sep-04	Water Quality Guidelines
Total Metals								
Aluminum (Al)	ug/L	0.5	Ice to the Ocean Bottom	63.7	25.5	25.0	158	100
Antimony (Sb)	ug/L	0.0005		0.306	0.213	0.324	0.348	
Arsenic (As)	ug/L	0.002		8.02	15.2	13.1	22.3	5
Barium (Ba)	ug/L	0.004		4.59	7.15	7.60	9.43	
Beryllium (Be)	ug/L	0.003		0.0055	0.0136	0.0144	0.0157	
Boron (B)	ug/L	0.05		1210	2220	1990	2410	
Cadmium (Cd)	ug/L	0.002		0.0151	0.0392	0.0232	<0.002	0.02
Calcium (Ca)	mg/L	0.004		86.0	162	161	203	
Chromium (Cr)	ug/L	0.03		0.726	1.33	0.829	1.74	
Cobalt (Co)	ug/L	0.001		0.185	0.435	0.326	0.124	
Copper (Cu)	ug/L	0.05	1.27	1.86	1.31	4.67	2	
Iron (Fe)	ug/L	2	77.6	46.4	76.1	213	300	
Lead (Pb)	ug/L	0.001	0.0441	0.167	0.0291	0.0620	1	
Magnesium (Mg)	mg/L	0.0001	246	443	452	659		
Manganese (Mn)	ug/L	0.003	4.15	2.79	2.36	4.16		
Mercury (Hg) low level	ug/L	0.0006	<0.0006	<0.0006		<0.0006	0.1	
Molybdenum (Mo)	ug/L	0.001	2.38	4.34	4.70	5.90	73	
Nickel (Ni)	ug/L	0.005	0.129	<0.005	2.66	0.0715	25	
Potassium (K)	ug/L	2	83200	157000	159000	201000		
Selenium (Se)	ug/L	0.1	31.8	58.8	50.5	82.6	1	
Silver (Ag)	ug/L	0.0005	0.0077	0.0090	0.0077	0.0072	0.1	
Sodium (Na)	ug/L	2	2280000	4230000	4390000	5650000		
Strontium (Sr)	ug/L	0.004	1730	3310	3660	4090		
Uranium (U)	ug/L	0.0001	0.594	1.07	1.02	1.63		
Vanadium (V)	ug/L	0.005	<0.005	<0.005	<0.005	<0.005		
Zinc (Zn)	ug/L	0.1	1.65	2.98	2.10	6.07	30	
ARC Sample ID				0403841	0403823	0403858	0404017	
Bismuth (Bi), Total	mg/L	0.0001		0.0002				0.8
Thallium (Tl), Total	mg/L	0.0001		<0.0001				
Tin (Sn), Total	mg/L	0.0004		<0.0004				
Cyanide, Total	mg/L	0.002		<0.002	<0.002	<0.002	<0.005	
Radium 226	Bq/L	0.005		<0.005	0.02			
ETL SampleID				L191443-2	L199233-11		L207114-2	
Dissolved Metals								
Aluminum (Al)	ug/L	0.2			0.380			
Antimony (Sb)	ug/L	0.0005			0.462			
Arsenic (As)	ug/L	0.002			15.6			
Barium (Ba)	ug/L	0.004			6.77			
Beryllium (Be)	ug/L	0.003			0.0118			
Boron (B)	ug/L	0.03			2100			
Cadmium (Cd)	ug/L	0.002			<0.002			
Calcium (Ca)	mg/L	0.004			187			
Chromium (Cr)	ug/L	0.03			1.93			
Cobalt (Co)	ug/L	0.001			0.135			
Copper (Cu)	ug/L	0.05			2.91			
Iron (Fe)	ug/L	2			31.3			
Lead (Pb)	ug/L	0.001			<0.001			
Magnesium (Mg)	mg/L	0.0001			537			
Manganese (Mn)	ug/L	0.003			1.86			
Molybdenum (Mo)	ug/L	0.001			4.97			
Nickel (Ni)	ug/L	0.005			0.0358			
Potassium (K)	ug/L	2			173000			
Selenium (Se)	ug/L	0.1			55.5			
Silver (Ag)	ug/L	0.0005			0.0084			
Sodium (Na)	ug/L	2			4890000			
Strontium (Sr)	ug/L	0.004			3640			
Uranium (U)	ug/L	0.0001			1.51			
Vanadium (V)	ug/L	0.005			<0.005			
Zinc (Zn)	ug/L	0.05			3.03			
ARC Sample ID					0404008			
Phosphorus, Total	mg/L	0.001		0.013	0.019		0.026	7.28
Ammonia-N	mg/L	0.005		<0.005				

APPENDIX C

FISH CAPTURE AND LIFE HISTORY DATA

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
1	LKTR	487	1350		G	3034	TRAP	4	8-Aug-04	Lower Trap	Roberts Outflow	1	2003 recapture from Roberts Bay
2	LKTR	390	560		G	3575	TRAP	4	8-Aug-04	Upper Trap	Roberts Outflow	0	not captured in D/S trap
3	LKTR	470	830		G	4000	TRAP	5	8-Aug-04	Lower Trap	Roberts Outflow	0	
4	LKTR	447	1010		B	036	TRAP	5	8-Aug-04	Lower Trap	Roberts Outflow	1	2000 recapture from Little Roberts L.
5	LKTR	510	1805		G	4001	TRAP	5	8-Aug-04	Lower Trap	Roberts Outflow	0	
6	LKTR	539	2000		G	4002	TRAP	5	8-Aug-04	Lower Trap	Roberts Outflow	0	
7	LKTR	418	790		G	4003	TRAP	5	8-Aug-04	Lower Trap	Roberts Outflow	0	
8	ARCH	852	5475	M	W	2337	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow
9	ARCH	819	5120	M	G	4004	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
10	ARCH	758	4950	F	G	4005	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
11	ARCH	725	4110	F	G	4006	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
12	LKTR	623	2620		G	4007	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
13	ARCH	700	4235	F	G	4008	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
14	LKTR	580	2280		G	4009	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
15	LKTR	496	1505		G	4010	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
16	LKTR	487	1430		G	4011	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
17	LKTR	596	2710		G	4012	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
18	LKTR	508	1630		G	4013	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, tight
19	LKTR	481	1310		G	4014	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, tight
20	LKTR	406	1070		G	4015	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
21	LKTR	432	910		G	4016	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	fresh scar behind dorsal
22	LKTR	473	1185		G	4017	TRAP	6	9-Aug-04	Lower Trap	Roberts Outflow	0	
23	LKTR				B	036	TRAP	6	9-Aug-04	Upper Trap	Roberts Outflow	2	2000 recapture from Little Roberts L.; 2nd recapture in D/S trap on 8 Aug
24	NNST	48					FN		9-Aug-04	TL FN01	Tail Lake	0	
25	NNST	43					FN		9-Aug-04	TL FN01	Tail Lake	0	
26	NNST	32					FN		9-Aug-04	TL FN01	Tail Lake	0	
27	LKTR	582	1945		Y	951	GN		9-Aug-04	TL GN02	Tail Lake	1	2000 recapture from Tail Lake
28	LKTR	525	1440		G	4018	GN		9-Aug-04	TL GN02	Tail Lake	0	
29	NNST	53					GT		9-Aug-04	TL GT02	Tail Lake	0	
30	NNST	46					GT		9-Aug-04	TL GT02	Tail Lake	0	
31	ARCH	790	4225	M	W	2525	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow
32	ARCH	609	2220	F	G	4019	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	
33	ARCH	802	7130	M	G	4021	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
34	ARCH	784	5345	M	G	4020	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	
35	ARCH	782	4545	F	G	4022	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	
36	LKTR	584	2280		G	4023	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	
37	LKTR	485	1340		G	4024	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	
38	ARCH	605	2740	F	G	4025	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	
39	LKTR	531	2075		G	4026	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, tight
40	LKTR	504	1565		G	4027	TRAP	7	9-Aug-04	Lower Trap	Roberts Outflow	0	orange fins
41	LKTR				G	4009	TRAP	7	9-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
42	LKTR				G	4010	TRAP	7	9-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
43	ARCH	860	6830	F	G	4028	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	
44	ARCH	708	3710	F	G	4029	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	
45	ARCH	825	5650	M	G	3490	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	1	2003 recapture from Roberts Outflow; abscess on left jaw
46	LKTR	512	1930		G	4030	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	
47	LKTR	530	2115		G	4031	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	orange fins
48	LKTR	549	2010		G	4032	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	
49	ARCH	740	4520	F	G	4033	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	
50	LKTR	522	1855		G	4034	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	orange fins
51	LKTR	436	1020		G	4035	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	
52	LKTR	419	940		G	4036	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	very orange fins, tight
53	LKTR	489	1430		G	4037	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, tight
54	LKTR	524	1685		G	4038	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	orange fins
55	LKTR	455	1085		G	4039	TRAP	8	10-Aug-04	Lower Trap	Roberts Outflow	0	
56	LKTR				G	4016	TRAP	8	10-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
57	LKTR				G	4015	TRAP	8	10-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
58	LKTR	580	1735		Y	0976	GN		10-Aug-04	TL GN03	Tail Lake	0	2000 recapture (Rescan)
59	LKTR	589	1965		G	4040	GN		10-Aug-04	TL GN03	Tail Lake	0	
60	LKTR	560	1360		G	4041	GN		10-Aug-04	TL GN03	Tail Lake	0	
61	LKTR	585	1925		G	4042	GN		10-Aug-04	TL GN03	Tail Lake	0	
62	LKTR	580	1705		G	4043	GN		10-Aug-04	TL GN03	Tail Lake	0	
63	LKTR	710	3725		G	4045	GN		10-Aug-04	TL GN03	Tail Lake	0	
64	LKTR	520	1320	M			GN		10-Aug-04	TL GN03	Tail Lake	mort	stomach = 20% caddis
65	NNST	32					GT		10-Aug-04	TL GT07	Tail Lake	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
66	NNST	49					GT		10-Aug-04	TL GT08	Tail Lake	0	
67	NNST	38					GT		10-Aug-04	TL GT08	Tail Lake	0	
68	NNST	39					GT		10-Aug-04	TL GT08	Tail Lake	0	
69	NNST	38					GT		10-Aug-04	TL GT08	Tail Lake	0	
70	NNST	48					GT		10-Aug-04	TL GT08	Tail Lake	0	
71	LKTR	600	2205		G	4046	GN		10-Aug-04	TL GN04	Tail Lake	0	
72	LKTR	568	1595		G	4048	GN		10-Aug-04	TL GN04	Tail Lake	0	
73	LKTR	545	1440		G	4049	GN		10-Aug-04	TL GN04	Tail Lake	0	
74	LKTR	580	1765		Y	0961	GN		10-Aug-04	TL GN04	Tail Lake	1	2000 recapture from Tail Lake
75	LKTR	509	1705	M			GN		10-Aug-04	TL GN04	Tail Lake	0	
76	NNST	65					FN		10-Aug-04	TL FN02	Tail Lake	0	
77	ARCH	583	1985	F	G	3226	TRAP	9	10-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
78	ARCH	592	2150	F	G	4047	TRAP	9	10-Aug-04	Lower Trap	Roberts Outflow	0	
79	ARCH				G	4005	TRAP	9	10-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
80	LKTR	461	1120		G	4050	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
81	ARCH	383	585		G	4051	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
82	LKTR	463	1040		G	4052	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, tight
83	LKTR	495	1555		G	4053	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
84	LKTR	422	930		G	3206	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow; orange fins, tight
85	LKTR	435	950		G	4054	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, tight
86	LKTR	538	2070		G	4055	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
87	LKTR	461	1005		G	4056	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
88	LKTR	411	845		G	4057	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
89	LKTR	570	2170		G	4058	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
90	LKTR	553	2260		G	4059	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	orange fins
91	LKTR	454	1085		G	4060	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
92	ARCH	613	2400	F	G	3214	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow
93	ARCH	631	3015	F	G	4061	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	
94	LKTR	546	1945		G	4062	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	0	orange fins
95	ARCH	773	4255	F	G	3067	TRAP	10	11-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow; lesion on rear tail & along lateral line
96	ARCH				G	4006	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
97	ARCH				G	3226	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	3	captured in lower trap on 10 Aug

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
98	ARCH				G	4033	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
99	ARCH				G	4022	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
100	LKTR				G	4032	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
101	LKTR				G	4000	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
102	ARCH	687	3435	F	W	2309	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow; did not get in lower trap
103	LKTR				G	4030	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
104	LKTR				G	4039	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
105	LKTR	561	1875		G	4063	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	0	did not get in D/S trap
106	LKTR	619	2170		G	4064	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	0	did not get in D/S trap
107	LKTR				G	3034	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	2	2003 recapture from Roberts Bay; captured in d/s trap on 8 Aug
108	ARCH	787	5810	F	G	4065	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	0	did not get in D/S trap
109	ARCH	773	5165	F	G	4066	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	0	did not get in D/S trap
110	LKTR				G	4027	TRAP	10	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
111	LKTR	385	655		G	3308	TRAP	11	11-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow
112	LKTR	455	985		G	3306	TRAP	11	11-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow
113	LKTR	410	785		G	4067	TRAP	11	11-Aug-04	Lower Trap	Roberts Outflow	0	
114	ARCH				G	4008	TRAP	11	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
115	LKTR				G	4053	TRAP	11	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
116	LKTR				G	4055	TRAP	11	11-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
117	LKTR				G	3206	TRAP	11	11-Aug-04	Upper Trap	Roberts Outflow	3	2003 recapture; captured D/S on 11 Aug
118	LKTR	475	1140		G	4068	TRAP	11	11-Aug-04	Upper Trap	Roberts Outflow	0	
119	ARCH	821	5625	M	G	3099	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow
120	ARCH	892	6455	M	G	4069	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	tattered fins & scrapes
121	ARCH	780	5405	F	G	4072	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	dark patch on left side
122	ARCH	580	2030	F	W	2325	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow
123	LKTR	580	2160		G	4073	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
124	ARCH	780	5120	F	G	3066	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow
125	ARCH	778	5175	F	G	4074	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	
126	ARCH	819	6755	M	G	4076	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	deep body
127	ARCH	819	6755	F	G	4077	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	
128	ARCH	613	2580	F	G	3183	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
129	ARCH	719	4185	F	G	4078	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	
130	ARCH	775	4880	F	G	4079	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	
131	LKTR	550	2020		G	4080	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	
132	ARCH	815	4815	F	G	3095	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow; lesions & hemmoraging on caudal peduncle
133	ARCH	700	3100	F	G	3133	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow
134	LKTR	470	1080		G	4081	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
135	LKTR	560	2085		G	4082	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	
136	LKTR	400	810		B	041	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	1	2000 recapture from Little Roberts L.
137	ARCH	440	935		G	3362	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	1	2003 recapture from Roberts Outflow
138	LKTR	465	1090		G	4083	TRAP	12	12-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
139	LKTR				G	4060	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
140	LKTR	385	620		G	3308	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	2003 recapture from Roberts Outflow; not captured in lower trap during 2004
141	LKTR				G	4050	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
142	LKTR				G	3306	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	3	2003 recapture from Roberts Outflow; captured in lower trap on 11 Aug
143	LKTR				G	4035	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
144	LKTR				G	4034	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
145	LKTR				G	4054	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
146	LKTR				G	4056	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
147	LKTR				G	4062	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
148	LKTR				G	4067	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
149	LKTR				G	4052	TRAP	12	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
150	ARCH	93					FN		12-Aug-04	RL FN01	Roberts Lake	0	
151	ARCH	78					FN		12-Aug-04	RL FN01	Roberts Lake	0	
152	ARCH	167					FN		12-Aug-04	RL FN01	Roberts Lake	0	
153	LKTR	179					FN		12-Aug-04	RL FN01	Roberts Lake	0	
154	LKTR	835	5610		G	4084	GN		12-Aug-04	RL GN02	Roberts Lake	0	
155	LKWH	440	1175		G	4085	GN		12-Aug-04	RL GN02	Roberts Lake	0	
156	LKTR	470	945		G	4086	GN		12-Aug-04	RL GN02	Roberts Lake	0	
157	LKWH	337	500	F			GN		12-Aug-04	RL GN02	Roberts Lake	mort	resting; stomach 100% full, UND invertebrates

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
158	LSCS	149	30	M			GN		12-Aug-04	RL GN02	Roberts Lake	mort	resting; stomach 75% full, UND invertebrates
159	ARCH	726	4560	F	G	3270	TRAP	13	12-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow
160	ARCH	753	4615	M	G	4087	TRAP	13	12-Aug-04	Lower Trap	Roberts Outflow	0	
161	ARCH	696	4415	F	G	4088	TRAP	13	12-Aug-04	Lower Trap	Roberts Outflow	0	
162	ARCH	672	3175	F	G	4089	TRAP	13	12-Aug-04	Lower Trap	Roberts Outflow	0	
163	LKTR	545	2100		G	4090	TRAP	13	12-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
164	LKTR	512	1450		G	4091	TRAP	13	12-Aug-04	Lower Trap	Roberts Outflow	0	tag scar
165	LKTR	467	1055		G	4092	TRAP	13	12-Aug-04	Lower Trap	Roberts Outflow	0	
166	ARCH				G	3066	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	3	2003 recapture from Roberts Outflow; captured in lower trap on 12 Aug 2004
167	ARCH				G	4019	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
168	ARCH				G	3099	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	3	2003 recapture from Roberts Outflow; captured in lower trap on 12 Aug 2004
169	ARCH	496		F	G	4093	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	0	not captured in d/s trap
170	ARCH				W	2525	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	2	2002 recapture from Roberts Outflow; captured in lower trap on 9 Aug 2004
171	ARCH				G	4078	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 12 Aug
172	LKTR				G	4059	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
173	ARCH				G	3067	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	3	2003 recapture from Roberts Outflow; captured in lower trap on 11Aug 2004
174	ARCH				G	3214	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	3	2003 recapture from Roberts Outflow; captured in lower trap on 11 Aug 2004
175	ARCH				G	3183	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	3	2003 recapture from Roberts Outflow; captured in lower trap on 12 Aug 2004
176	ARCH				W	2325	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	2	2002 recapture from Roberts Outflow; captured in lower trap on 12 Aug 2004
177	ARCH	725	3055	F	G	4094	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	0	Tag scar -- do not recognize
178	ARCH				G	4047	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
179	ARCH				G	4051	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
180	LKTR				G	4036	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
181	LKTR				G	4023	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
182	LKTR	487			G	4095	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	0	
183	ARCH				G	3362	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow; captured in lower trap on 12 Aug 2004
184	LKTR				G	4017	TRAP	13	12-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 8 Aug
185	LKTR	424	845		W	2232	TRAP	14	13-Aug-04	Lower Trap	Roberts Outflow	1	2002 recap from Roberts Outflow; orange fins tight

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
186	LKTR	477	1090		G	4096	TRAP	14	13-Aug-04	Lower Trap	Roberts Outflow	0	
187	LKTR	481	1290		G	4097	TRAP	14	13-Aug-04	Lower Trap	Roberts Outflow	0	
188	LKTR	475	1200		G	4098	TRAP	14	13-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, little bit of milt
189	ARCH	733	4475	F	G	3087	TRAP	15	13-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow; broken jaw
190	ARCH	756	4580	M	G	4100	TRAP	15	13-Aug-04	Lower Trap	Roberts Outflow	0	
191	ARCH	438	985		G	4101	TRAP	15	13-Aug-04	Lower Trap	Roberts Outflow	0	
192	LKTR	436	820		G	4102	TRAP	15	13-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
193	LKTR				G	4007	TRAP	15	13-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 9 Aug
194	ARCH	833	6130	M	G	3064	TRAP	16	14-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
195	LKTR	573	1800		G	4103	TRAP	16	14-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
196	ARCH	726	3970	F	G	4104	TRAP	16	14-Aug-04	Lower Trap	Roberts Outflow	0	
197	ARCH	470	1060	F	G	4105	TRAP	16	14-Aug-04	Lower Trap	Roberts Outflow	0	
198	LKTR	450	1060		G	4106	TRAP	16	14-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
199	LKTR	397	645		G	4107	TRAP	16	14-Aug-04	Lower Trap	Roberts Outflow	0	
200	LKTR	471	1035		G	4108	TRAP	16	14-Aug-04	Lower Trap	Roberts Outflow	0	orange fins tight
201	LKTR				G	4090	TRAP	16	14-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 12 Aug
202	LKTR				G	4098	TRAP	16	14-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 13 Aug
203	LKTR				G	4102	TRAP	16	14-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 13 Aug
204	LKTR				G	4083	TRAP	16	14-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 12 Aug
205	LKWH	470					FN		14-Aug-04	RL FN02	Roberts Lake	0	Adipose clip, no premaxillary
206	LKTR				G	4057	TRAP	17	14-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 11 Aug
207	ARCH				G	3087	TRAP	17	14-Aug-04	Upper Trap	Roberts Outflow	3	2003 recap from Roberts Outflow; captured in lower trap on 13 Aug 2004
208	LKTR	488	1310		G	4109	TRAP	17	14-Aug-04	Lower Trap	Roberts Outflow	0	
209	LKWH	376	650	M			GN		13-Aug-04	RL GN03	Roberts Lake	mort	Resting, scales and OT taken, stomach 100% full; clams, periphyton
210	LKTR	132	20				GN		13-Aug-04	RL GN03	Roberts Lake	0	scales taken
211	LKTR	159	35	F			GN		13-Aug-04	RL GN03	Roberts Lake	mort	immature, scales & OT taken, stomach 80% full w/ clams and inverts
212	ARCH	135	20	F			GN		13-Aug-04	RL GN03	Roberts Lake	mort	Scales and OT, 100% stomach (caddis 10%)
213	ARCH	782	6485	F	G	4110	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	0	
214	ARCH	595	2335	F	G	4111	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
215	ARCH	793	4950	M	G	4112	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	0	
216	ARCH	722	4605	F	G	4113	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	0	
217	ARCH	421	760		G	3404	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
218	ARCH	517	1635	F	G	4114	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	0	
219	ARCH	389	565		G	4115	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	0	
220	ARCH	408	630		G	4116	TRAP	18	15-Aug-04	Lower Trap	Roberts Outflow	0	
221	ARCH	870	7500	M	G	4117	TRAP	19	16-Aug-04	Lower Trap	Roberts Outflow	0	
222	ARCH	725	4465	F	G	4118	TRAP	19	16-Aug-04	Lower Trap	Roberts Outflow	0	
223	LKTR	490	1185		W	2147	TRAP	19	16-Aug-04	Lower Trap	Roberts Outflow	3	2002 recap from Roberts Outflow; orange fins, tight, skinny
224	ARCH	715	4455	F	G	4119	TRAP	19	16-Aug-04	Lower Trap	Roberts Outflow	0	
225	LKTR	398	665		G	4120	TRAP	19	16-Aug-04	Lower Trap	Roberts Outflow	0	
226	LKTR	430	770		G	4121	TRAP	19	16-Aug-04	Lower Trap	Roberts Outflow	0	orange fins, tight
227	ARCH				G	4028	TRAP	19	16-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
228	ARCH				G	4116	TRAP	19	16-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 15 Aug
229	ARCH	695	3425	F	G	3213	TRAP	20	17-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
230	ARCH				G	4104	TRAP	20	17-Aug-04	Upper Trap	Roberts Outflow	mort	Caught D/S 14-Aug, eaten
231	LKTR	134	25				EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	vermic
232	LKTR	170	55				EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	11 parr, vermic
233	LKTR	105	15				EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	11 parr, vermic
234	LKTR	124	20				EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	11 parr, vermic
235	ARCH	105	15				EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	10 parr, no vermic
236	LKTR	124	20				EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	12 parr, vermic
237	LKTR	111	15				EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	11 parr, vermic
238	LKTR	79					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	8 parr, gold colour
239	LKTR	74					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	8 parr, gold colour
240	ARCH	68					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	
241	ARCH	70					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	
242	ARCH	88					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	
243	ARCH	68					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	
244	ARCH	330	345		G	4122	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	
245	ARCH	753	4100	M	G	4123	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	
246	ARCH	475	1030		W	2220	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	2	2002 recapture from Roberts Outflow
247	ARCH	339	375		G	4126	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
248	ARCH	352	420		G	4131	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	Tag jam, #'s out of sequence
249	ARCH	556	1715	F	G	4132	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	
250	LKTR	452	1140		G	3301	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
251	ARCH	253	200		G	4133	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	
252	ARCH	240	140				TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	Too small for tag
253	ARCH	355	460		G	4134	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	
254	ARCH	419	620		G	4135	TRAP	21	18-Aug-04	Lower Trap	Roberts Outflow	0	
255	LKTR				G	4038	TRAP	9	10-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 10 Aug
256	ARCH	145					EF		19-Aug-04	E18	Little Roberts Outflow	0	
257	ARCH	137					EF		19-Aug-04	E18	Little Roberts Outflow	0	
258	ARCH	160					EF		19-Aug-04	E18	Little Roberts Outflow	0	
259	ARCH	112					EF		19-Aug-04	E18	Little Roberts Outflow	0	
260	ARCH	141					EF		19-Aug-04	E18	Little Roberts Outflow	0	
261	ARCH	112					EF		19-Aug-04	E18	Little Roberts Outflow	0	
262	ARCH	84					EF		19-Aug-04	E18	Little Roberts Outflow	0	
263	NNST	42					EF		19-Aug-04	E18	Little Roberts Outflow	0	
264	NNST	45					EF		19-Aug-04	E18	Little Roberts Outflow	0	
265	NNST	45					EF		19-Aug-04	E18	Little Roberts Outflow	0	
266	NNST	45					EF		19-Aug-04	E18	Little Roberts Outflow	0	
267	ARCH	786	5245	M	G	3378	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	1	2003 recap from Roberts Outflow
268	ARCH	730	3985	M	W	2321	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow
269	LKTR	772	5360		G	4136	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	0	
270	ARCH	765	4015	F	G	3398	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
271	LKTR	425	880		G	3259	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	1	2003 recap; orange fins, tight
272	ARCH	354	475		G	4138	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	0	
273	ARCH	297	250		G	4139	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	0	clipped caudal
274	ARCH	313	315		G	4141	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	0	
275	ARCH	326	380		G	4142	TRAP	22	19-Aug-04	Lower Trap	Roberts Outflow	0	
276	ARCH				W	2220	TRAP	22	19-Aug-04	Upper Trap	Roberts Outflow	3	2002 recapture from Roberts Outflow
277	LKTR	416	845		G	4143	TRAP	23	20-Aug-04	Lower Trap	Roberts Outflow	0	
278	ARCH	412	700	F	G	3387	TRAP	23	20-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
279	ARCH				G	4123	TRAP	23	20-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 18 Aug
280	LKTR	806	5740		G	4144	GN		20-Aug-04	RL GN05	Roberts Lake	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
281	LKWH	477	1340				GN		20-Aug-04	RL GN05	Roberts Lake	0	No tag
282	BRWH	463	1245		G	4147	GN		20-Aug-04	RL GN05	Roberts Lake	0	
283	LKWH	430	1095		G	4148	GN		20-Aug-04	RL GN05	Roberts Lake	0	
284	LKTR	705	3740	F			GN		20-Aug-04	RL GN05	Roberts Lake	mort	100% full, 1 cisco, resting, ageing
285	LKTR	739	4195	F			GN		20-Aug-04	RL GN05	Roberts Lake	mort	Empty stomach, resting
286	LKWH	456	1330	M			GN		20-Aug-04	RL GN05	Roberts Lake	mort	20% full, unid inverts
287	LKWH	433	1105	F			GN		20-Aug-04	RL GN05	Roberts Lake	mort	Seasonal development, 20% full unid inverts
288	LKTR	670	2710		G	4149	GN		20-Aug-04	RL GN06	Roberts Lake	0	
289	LKTR	798	4765		G	4146	GN		20-Aug-04	RL GN06	Roberts Lake	0	
290	LKWH	445	1125		G	4128	GN		20-Aug-04	RL GN06	Roberts Lake	0	
291	LKWH	459	1425		G	4130	GN		20-Aug-04	RL GN06	Roberts Lake	0	
292	LKTR				G	4099	GN		20-Aug-04	RL GN06	Roberts Lake	0	
293	LKWH	478	1565		G	4125	GN		20-Aug-04	RL GN06	Roberts Lake	0	
294	LKWH	508	1790		G	4127	GN		20-Aug-04	RL GN06	Roberts Lake	0	
295	LKWH	491	1775		G	4129	GN		20-Aug-04	RL GN06	Roberts Lake	0	
296	LKWH	545	2340		G	4140	GN		20-Aug-04	RL GN06	Roberts Lake	0	
297	LKWH	412	950	M			GN		20-Aug-04	RL GN06	Roberts Lake	mort	Empty stomach, scales
298	LKTR	740	3785	M			GN		20-Aug-04	RL GN06	Roberts Lake	mort	Empty stomach, resting
299	LKTR	708	3875	M			GN		20-Aug-04	RL GN06	Roberts Lake	mort	full stomach, 100% LKWH (3), resting
300	LKTR	745	4100	F			GN		20-Aug-04	RL GN06	Roberts Lake	mort	empty stomach, resting
301	LKTR	754	4415				GN		20-Aug-04	RL GN06	Roberts Lake	mort	empty stomach, F/SD
302	LKTR	462	1150		W	2151	TRAP	24	20-Aug-04	Lower Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow
303	LKTR	454	1030		G	4137	TRAP	24	20-Aug-04	Lower Trap	Roberts Outflow	0	
304	ARCH	493	1260		G	4145	TRAP	24	20-Aug-04	Lower Trap	Roberts Outflow	0	
305	SFCD	250	60				FN		21-Aug-04	RB FN01	Roberts Bay	0	
306	SFCD	238	80				FN		21-Aug-04	RB FN01	Roberts Bay	0	
307	RNSM	88					BS		21-Aug-04	RB BS01	Roberts Bay	0	
308	ARCH	400	665		G	3472	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
309	ARCH	484	1165		B	027	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	1	2000 recapture from Little Roberts L.; spawning colors
310	ARCH	720	4280	F	G	3267	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
311	ARCH	580	2120	F	G	4124	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
312	ARCH	640	3105	F	G	4150	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	0	
313	ARCH	535	1680	M	G	4151	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	0	
314	LKTR	456	1065		W	2252	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	1	2002 recap from Roberts Outflow
315	ARCH	722	4145	F	G	4152	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	0	
316	ARCH	432	865	F	G	4154	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	0	
317	ARCH	461	905	F	G	4156	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	0	
318	LKTR	492	1235		G	3389	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	2	2003 recapture from Roberts Outflow; orange fins, tight
319	ARCH	324	330		G	4199	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	0	
320	ARCH	465	1070		G	3406	TRAP	25	21-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
321	LKTR				G	4143	TRAP	25	21-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 20 Aug
322	LKTR				G	4121	TRAP	25	21-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 16 Aug
323	LKTR				W	2232	TRAP	25	21-Aug-04	Upper Trap	Roberts Outflow	1	2002 recap from Roberts Outflow
324	ARCH	130	25				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
325	ARCH	85	10				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
326	LKTR	170	40				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
327	LKTR	134	25				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
328	LKTR	128	25				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
329	ARCH	121	20				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
330	ARCH	149	35				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
331	LKTR	135	25				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
332	ARCH	80					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
333	LKTR	112	20				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
334	ARCH	85	10				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
335	LKTR	78					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
336	ARCH	80	10				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
337	LKTR	82	10				EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
338	LKTR	80					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
339	ARCH	75					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
340	ARCH	50					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
341	ARCH	74					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
342	LKTR	86					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
343	ARCH	70					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
344	LKTR	80					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
345	ARCH	75					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
346	ARCH	82					EF		21-Aug-04	Boulder Garden	Roberts Outflow	0	
347	ARCH	64					EF		21-Aug-04	E14	Roberts Inflow	0	
348	ARCH	66					EF		21-Aug-04	E14	Roberts Inflow	0	
349	ARCH	50					EF		21-Aug-04	E14	Roberts Inflow	0	
350	ARCH	38					EF		21-Aug-04	E14	Roberts Inflow	0	
351	ARCH	65					EF		21-Aug-04	E14	Roberts Inflow	0	
352	NNST	60					EF		21-Aug-04	E14	Roberts Inflow	0	
353	ARCH	68					EF		21-Aug-04	E14	Roberts Inflow	0	
354	ARCH	65					EF		21-Aug-04	E14	Roberts Inflow	0	
355	ARCH	68					EF		21-Aug-04	E14	Roberts Inflow	0	
356	ARCH	46					EF		21-Aug-04	E14	Roberts Inflow	0	
357	ARCH	45					EF		21-Aug-04	E14	Roberts Inflow	0	
358	NNST	47					EF		21-Aug-04	E14	Roberts Inflow	0	
359	ARCH	44					EF		21-Aug-04	E14	Roberts Inflow	0	
360	ARCH	49					EF		21-Aug-04	E14	Roberts Inflow	0	
361	NNST	54					EF		21-Aug-04	E14	Roberts Inflow	0	
362	ARCH	63					EF		21-Aug-04	E14	Roberts Inflow	0	
363	LKTR				G	3389	TRAP	26	23-Aug-04	Upper Trap	Roberts Outflow	3	2003 recap from Roberts Outflow; captured in lower trap on 21 Aug 2004
364	ARCH				G	4114	TRAP	26	23-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 15 Aug
365	ARCH				G	4154	TRAP	26	23-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 21 Aug
366	ARCH				G	3472	TRAP	26	23-Aug-04	Upper Trap	Roberts Outflow	3	2003 recap from Roberts Outflow; captured in lower trap on 21 Aug 2004
367	ARCH				G		TRAP	26	23-Aug-04	Upper Trap	Roberts Outflow	1	escaped, tag no. not obtained
368	ARCH				B	027	TRAP	26	23-Aug-04	Upper Trap	Roberts Outflow	2	2000 recapture from Little Roberts L.; captured in lower trap on 21 Aug 2004
369	ARCH				G	4132	TRAP	26	23-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 18 Aug
370	ARCH	627	2370	F	G	4157	TRAP	26	23-Aug-04	Lower Trap	Roberts Outflow	0	
371	ARCH	704	4180	F	G	4159	TRAP	26	23-Aug-04	Lower Trap	Roberts Outflow	0	
372	ARCH	724	3930	F	G	4160	TRAP	26	23-Aug-04	Lower Trap	Roberts Outflow	0	
373	ARCH				G	4157	TRAP	27	23-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 23 Aug
374	LKTR	477	1270		G	4168	TRAP	27	23-Aug-04	Lower Trap	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
375	ARCH	722	3605	F	G	4169	TRAP	27	23-Aug-04	Lower Trap	Roberts Outflow	0	
376	LKTR	563	1670		G	4161	AN		23-Aug-04	RL AN01	Roberts Lake	0	
377	LKTR	343	380		G	4162	AN		23-Aug-04	RL AN01	Roberts Lake	0	
378	LKTR	428	895		G	4163	AN		23-Aug-04	RL AN01	Roberts Lake	0	
379	LKTR	384	595		G	4164	AN		23-Aug-04	RL AN01	Roberts Lake	0	
380	LKTR	396	665		G	4165	AN		23-Aug-04	RL AN01	Roberts Lake	0	
381	LKTR	688	3160		G	4166	AN		23-Aug-04	RL AN01	Roberts Lake	0	
382	LKTR	766	4430		G	4167	AN		23-Aug-04	RL AN01	Roberts Lake	0	
383	ARCH	785	5240	F	G	3356	TRAP	28	25-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
384	ARCH	820	5925	F			TRAP	28	25-Aug-04	Lower Trap	Roberts Outflow	0	
385	LKTR	470	1080		G	3063	TRAP	28	25-Aug-04	Lower Trap	Roberts Outflow	1	2003 recap from Roberts Outflow
386	LKTR	410	750		G	4170	TRAP	28	25-Aug-04	Lower Trap	Roberts Outflow	0	
387	ARCH	127	20				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
388	LKTR	80					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
389	ARCH	189	85				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
390	LKTR	83					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
391	LKTR	128	25				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
392	LKTR	80					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
393	LKTR	83					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
394	LKTR	73					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
395	LKTR	71					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
396	LKTR	48					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	caudal fin damaged
397	LKTR	82					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
398	LKTR	88	10				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
399	ARCH	125	20				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
400	LKTR	85	10				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
401	LKTR	84					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
402	ARCH	171	50				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
403	LKTR	76					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
404	LKTR	75					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
405	ARCH	152	40				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
406	LKTR	76					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
407	LKTR	150	30				EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
408	LKTR	86					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
409	LKTR	55					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	
410	ARCH	500	1085	F	G	4171	TRAP	29	25-Aug-04	Upper Trap	Roberts Outflow	0	teeth mark/punctures, No tag = bypassed downed D/S trap
411	ARCH	459	1115	F	G	3471	TRAP	30	26-Aug-04	Lower Trap	Roberts Outflow	1	2003 recap from Roberts Outflow
412	LKTR				G	3063	TRAP	30	26-Aug-04	Upper Trap	Roberts Outflow	2	2003 recap from Roberts Outflow; captured in lower trap on 25 Aug 2004
413	ARCH	113	20				EF		26-Aug-04	E10	Roberts Lake	0	
414	ARCH	73					EF		26-Aug-04	E10	Roberts Lake	0	
415	LKTR	70					EF		26-Aug-04	E10	Roberts Lake	0	
416	ARCH	763	4705	F	G	4172	TRAP	31	26-Aug-04	Lower Trap	Roberts Outflow	0	
417	ARCH	705	3235	F	W	2510	TRAP	32	27-Aug-04	Lower Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow
418	ARCH	752	5285	F	G	3221	TRAP	32	27-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
419	ARCH	650	2630	F	W	2346	TRAP	32	27-Aug-04	Lower Trap	Roberts Outflow	1	2002 recapture from Roberts Outflow
420	ARCH	772	4810	F	G	4173	TRAP	32	27-Aug-04	Lower Trap	Roberts Outflow	0	
421	ARCH	534	1720	F	G	4174	TRAP	32	27-Aug-04	Lower Trap	Roberts Outflow	0	
422	ARCH	793	5390	M	G	3265	TRAP	32	27-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
423	ARCH	293	220		G	4186	TRAP	33	27-Aug-04	Lower Trap	Roberts Outflow	0	
424	ARCH	424	810		G	4187	TRAP	33	27-Aug-04	Lower Trap	Roberts Outflow	0	teeth marks (predator)
425	ARCH	406	760		G	4188	TRAP	33	27-Aug-04	Lower Trap	Roberts Outflow	0	
426	ARCH	307	305		G	4189	TRAP	33	27-Aug-04	Lower Trap	Roberts Outflow	0	
427	ARCH	382	490		G	3381	TRAP	33	27-Aug-04	Lower Trap	Roberts Outflow	1	2003 recap from Roberts Outflow
428	ARCH	429	865		G	4190	TRAP	33	27-Aug-04	Lower Trap	Roberts Outflow	0	
429	ARCH				G	4156	TRAP	33	27-Aug-04	Lower Trap	Roberts Outflow	1	second capture at downstream fence; the fence was down 2 days ago, scars on fish likely from a predator
430	LKTR	276	235		G	4175	AN		27-Aug-04	RL AN02	Roberts Lake	0	
431	LKTR	488	1315		G	4176	AN		27-Aug-04	RL AN02	Roberts Lake	0	
432	LKTR	648	2305		G	4177	AN		27-Aug-04	RL AN02	Roberts Lake	0	
433	LKTR	660	2665		G	4178	AN		27-Aug-04	RL AN02	Roberts Lake	0	
434	LKTR	859	6385		G	4179	AN		27-Aug-04	RL AN02	Roberts Lake	0	
435	LKTR	706	2645		G	4180	AN		27-Aug-04	RL AN02	Roberts Lake	0	
436	LKTR	625	2010		G	4181	AN		27-Aug-04	RL AN02	Roberts Lake	0	
437	LKTR	812	5820		G	4182	AN		27-Aug-04	RL AN02	Roberts Lake	0	
438	LKTR	615	2270		G	4183	AN		27-Aug-04	RL AN02	Roberts Lake	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
439	LKTR	877	5355		G	4184	AN		27-Aug-04	RL AN02	Roberts Lake	0	
440	LKTR	762	5260		G	4185	AN		27-Aug-04	RL AN02	Roberts Lake	0	
441	ARCH	205	95				TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	Too small to tag
442	ARCH	360	485		G	4191	TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	
443	ARCH	250	155				TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	Too small to tag
444	ARCH	520	1320		G	3467	TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
445	ARCH	217	105				TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	Too small to tag
446	ARCH	226	120				TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	Too small to tag
447	ARCH	355	480		G	4192	TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	
448	ARCH	279	245		G	4193	TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	
449	ARCH	245	140				TRAP	34	28-Aug-04	Lower Trap	Roberts Outflow	0	Too small to tag
450	ARFL	239	210				EF		28-Aug-04	E18	Little Roberts Outflow	0	
451	LKTR	103	10				EF		28-Aug-04	E18	Little Roberts Outflow	0	
452	LKTR	111	15				EF		28-Aug-04	E18	Little Roberts Outflow	0	
453	NNST	56					EF		28-Aug-04	E18	Little Roberts Outflow	0	
454	NNST	59					EF		28-Aug-04	E18	Little Roberts Outflow	0	
455	LKTR	347	615		G	4194	EF		28-Aug-04	E17	Little Roberts Outflow	0	
456	NNST	60					EF		28-Aug-04	E17	Little Roberts Outflow	0	
457	LKTR	78					EF		28-Aug-04	E17	Little Roberts Outflow	0	
458	LKTR	89	10				EF		28-Aug-04	E17	Little Roberts Outflow	0	
459	ARCH	111	15				EF		28-Aug-04	E17	Little Roberts Outflow	0	
460	LKTR	98	10				EF		28-Aug-04	E17	Little Roberts Outflow	0	
461	ARCH	92	10				EF		28-Aug-04	E17	Little Roberts Outflow	0	
462	ARCH	86	10				EF		28-Aug-04	E17	Little Roberts Outflow	0	
463	ARCH	80					EF		28-Aug-04	E17	Little Roberts Outflow	0	
464	ARCH	76					EF		28-Aug-04	E17	Little Roberts Outflow	0	
465	NNST	67					EF		28-Aug-04	E17	Little Roberts Outflow	0	
466	NNST	50					EF		28-Aug-04	E17	Little Roberts Outflow	0	
467	NNST	56					EF		28-Aug-04	E17	Little Roberts Outflow	0	
468	NNST	70					EF		28-Aug-04	E17	Little Roberts Outflow	0	
469	NNST	46					EF		28-Aug-04	E17	Little Roberts Outflow	0	
470	NNST	55					EF		28-Aug-04	E17	Little Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
471	NNST	55					EF		28-Aug-04	E17	Little Roberts Outflow	0	
472	NNST	60					EF		28-Aug-04	E17	Little Roberts Outflow	0	
473	NNST	45					EF		28-Aug-04	E17	Little Roberts Outflow	0	
474	NNST	50					EF		28-Aug-04	E17	Little Roberts Outflow	0	
475	NNST	42					EF		28-Aug-04	E17	Little Roberts Outflow	0	
476	NNST	40					EF		28-Aug-04	E17	Little Roberts Outflow	0	
477	NNST	63					EF		28-Aug-04	E17	Little Roberts Outflow	0	
478	NNST	45					EF		28-Aug-04	E17	Little Roberts Outflow	0	
479	NNST	43					EF		28-Aug-04	E17	Little Roberts Outflow	0	
480	NNST	40					EF		28-Aug-04	E17	Little Roberts Outflow	0	
481	ARCH	255	175		G	4195	TRAP	35	28-Aug-04	Lower Trap	Roberts Outflow	0	
482	ARCH	302	285		G	4196	TRAP	36	29-Aug-04	Lower Trap	Roberts Outflow	0	
483	ARCH	327	390		G	4197	TRAP	36	29-Aug-04	Lower Trap	Roberts Outflow	0	
484	ARCH	272	190		G	4198	TRAP	36	29-Aug-04	Lower Trap	Roberts Outflow	0	
485	ARCH	405	640		G	3458	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	1	2003 recap from Roberts Outflow
486	ARCH	278	250		G	4200	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	0	
487	ARCH	290	215		G	4201	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	0	
488	ARCH	246	145				TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	0	To small to tag -- adipose clip
489	ARCH	323	345		G	4202	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	0	
490	ARCH	437	825		G	3455	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
491	ARCH	297	260		G	4203	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	0	
492	ARCH	284	255		G	4204	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	0	
493	ARCH	741	3965		W	2106	TRAP	37	30-Aug-04	Lower Trap	Roberts Outflow	1	2002 recap from Roberts Outflow
494	LKTR	903	7055		G	4205	AN		30-Aug-04	RL AN03	Roberts Lake	0	
495	LKTR	790	5055		G	4206	AN		30-Aug-04	RL AN03	Roberts Lake	0	
496	LKTR	880	4395		G	4207	AN		30-Aug-04	RL AN03	Roberts Lake	0	
497	LKWH	442			G	4208	GN		30-Aug-04	RL GN07	Roberts Lake	0	
498	LKTR	350	460		G	4209	AN		30-Aug-04	RL AN04	Roberts Lake	0	
499	ARCH	337	345		G	4210	TRAP	38	30-Aug-04	Lower Trap	Roberts Outflow	0	
500	ARCH	325	340		G	4211	TRAP	38	30-Aug-04	Lower Trap	Roberts Outflow	0	
501	ARCH	476	1055		G	3400	TRAP	38	30-Aug-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
502	ARCH	504	1280	F	G	4212	TRAP	38	30-Aug-04	Lower Trap	Roberts Outflow	0	
503	ARCH	252	170		G	4213	TRAP	39	31-Aug-04	Lower Trap	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
504	ARCH	308	330		G	4214	TRAP	39	31-Aug-04	Lower Trap	Roberts Outflow	0	
505	LKTR	445	845		G	4215	TRAP	39	31-Aug-04	Lower Trap	Roberts Outflow	0	
506	ARCH	259	180		G	4216	TRAP	39	31-Aug-04	Lower Trap	Roberts Outflow	0	
507	ARCH				G	3467	TRAP	39	31-Aug-04	Upper Trap	Roberts Outflow	3	2003 recap from Roberts Outflow; captured in lower trap on 28 Aug 2004
508	LKTR	164	50				EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
509	LKTR	145	35				EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
510	LKTR	185	60				EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
511	ARCH	90	10				EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
512	LKTR	85					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
513	ARCH	84					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
514	ARCH	83	10				EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
515	LKTR	83					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
516	ARCH	74					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
517	LKTR	81					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
518	LKTR	86	10				EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
519	LKTR	81					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
520	LKTR	80					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
521	ARCH	71					EF		31-Aug-04	Boulder Garden	Roberts Outflow	0	
522	ARCH				G	4216	TRAP	40	31-Aug-04	Upper Trap	Roberts Outflow	1	captured in lower trap on 31 Aug
523	ARCH	798	6255	M	W	2282	TRAP	41	1-Sep-04	Lower Trap	Roberts Outflow	1	2002 recap from Roberts Outflow
524	ARCH	273	225		G	4217	TRAP	41	1-Sep-04	Lower Trap	Roberts Outflow	0	
525	ARCH	296	240		G	4218	TRAP	41	1-Sep-04	Lower Trap	Roberts Outflow	0	
526	ARCH	707	3660		G	4219	TRAP	41	1-Sep-04	Lower Trap	Roberts Outflow	0	
527	CISC	331	415		G	4221	TRAP	41	1-Sep-04	Lower Trap	Roberts Outflow	0	spinal deformation
528	ARCH				G	4188	TRAP	41	1-Sep-04	Lower Trap	Roberts Outflow	1	second capture at downstream fence
529	LKTR	782	5275		G	4220	GN		1-Sep-04	RL GN11	Roberts Lake	0	
530	LKTR	546	1840		G	4222	GN		1-Sep-04	RL GN12	Roberts Lake	0	
531	LKTR	696	3885		G	4223	GN		1-Sep-04	RL GN12	Roberts Lake	0	
532	LKTR	729	4495		G	4224	GN		1-Sep-04	RL GN12	Roberts Lake	0	
533	LKWH	385	710		G	4226	GN		1-Sep-04	RL GN12	Roberts Lake	0	
534	LKWH	395	845	F			GN		1-Sep-04	RL GN12	Roberts Lake	mort	stomach 10%, unid inverts

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
535	LKWH	371	665	M			GN		1-Sep-04	RL GN12	Roberts Lake	0	
536	LKWH	416	1105	F			GN		1-Sep-04	RL GN12	Roberts Lake	mort	60% full of unid inverts
537	ARCH	245	170			Adipose	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag -- adipose clip
538	ARCH	243	135			Adipose	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag -- adipose clip
539	ARCH	344	420		G	4227	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	
540	LKTR	380	500		G	4228	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	
541	ARCH	230	115			Adipose	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag -- adipose clip
542	ARCH	242	140			Adipose	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag -- adipose clip
543	ARCH	308	280		G	4229	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	bite marks
544	ARCH	270	180		G	4230	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	bite marks and scars
545	ARCH	245	135			Adipose	TRAP	42	2-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag -- adipose clip
546	LKTR				G	4166	GN		2-Sep-04	RL GN11	Roberts Lake	1	originally tagged on 23 Aug 2004
547	ARCH	292	290		G	4231	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
548	ARCH	296	275		G	4232	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
549	ARCH	254	135		G	4233	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
550	ARCH	269	200		G	4234	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
551	ARCH	290	225		G	4235	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
552	ARCH	276	205		G	4236	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
553	ARCH	217	95			Adipose	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag -- adipose clip
554	ARCH	218	100			Adipose	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag
555	ARCH	223	110			Adipose	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag
556	ARCH	240	125			Adipose	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag
557	ARCH	256	185		G	4237	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
558	ARCH	323	345		G	4238	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
559	ARCH	302	265		G	4239	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
560	ARCH	347	395		G	4240	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
561	ARCH	337	420		G	4241	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
562	ARCH	278	235		G	4242	TRAP	43	3-Sep-04	Lower Trap	Roberts Outflow	0	
563	ARCH	101	15				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
564	ARCH	79					EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
565	LKTR	86	10				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
566	ARCH	46					EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
567	ARCH	83	10				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
568	ARCH	82	10				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
569	ARCH	82	10				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
570	ARCH	55					EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
571	ARCH	128	25				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
572	LKTR	82	10				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
573	LKTR	79					EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
574	ARCH	73					EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
575	ARCH	143	35				EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
576	LKTR	79					EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
577	LKTR	78					EF		3-Sep-04	Boulder Garden	Roberts Outflow	0	
578	ARCH	730	4840	F	W	2509	TRAP	44	4-Sep-04	Lower Trap	Roberts Outflow	1	2002 recap from Roberts Outflow
579	ARCH	675	3045	M	W	2322	TRAP	44	4-Sep-04	Lower Trap	Roberts Outflow	1	2002 recap from Roberts Outflow; scars on back
580	ARCH	638	2635	F	W	2312	TRAP	44	4-Sep-04	Lower Trap	Roberts Outflow	1	2002 recap from Roberts Outflow
581	LKTR	72					EF		4-Sep-04	Boulder Garden	Roberts Outflow	0	
582	ARCH	75					EF		4-Sep-04	Boulder Garden	Roberts Outflow	0	
583	ARCH	110	20				EF		4-Sep-04	Boulder Garden	Roberts Outflow	0	
584	ARCH	85	10				EF		4-Sep-04	Boulder Garden	Roberts Outflow	0	
585	ARCH	85					EF		4-Sep-04	Boulder Garden	Roberts Outflow	0	
586	LKTR	143	35				EF		4-Sep-04	Boulder Garden	Roberts Outflow	0	
587	ARCH	185	55				EF		4-Sep-04	Boulder Garden	Roberts Outflow	0	
588	ARCH	635	2840	F	G	3368	TRAP	45	4-Sep-04	Lower Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
589	ARCH	382	525		G	4243	TRAP	45	4-Sep-04	Lower Trap	Roberts Outflow	0	
590	ARCH	602	2205	F	G	4244	TRAP	45	4-Sep-04	Lower Trap	Roberts Outflow	0	
591	ARCH	689	3220	F	W	2319	TRAP	45	4-Sep-04	Lower Trap	Roberts Outflow	1	2002 Recap from Roberts Outflow
592	ARCH	354	445		G	4245	TRAP	45	4-Sep-04	Lower Trap	Roberts Outflow	0	
593	ARCH	512	1460	F	G	3411	TRAP	45	4-Sep-04	Lower Trap	Roberts Outflow	1	2003 recap from Roberts Outflow
594	ARCH	308			G	4246	TRAP	45	4-Sep-04	Lower Trap	Roberts Outflow	0	
595	ARCH				G	3411	TRAP	47	6-Sep-04	Upper Trap	Roberts Outflow	2	2003 recap from Roberts Outflow
596	LKTR	87					EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	
597	ARCH	82					EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	
598	LKTR	89					EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	
599	ARCH	144	30				EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
600	LKTR	57					EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	
601	ARCH	78					EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	
602	NNST	66					EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	
603	ARCH	45					EF		6-Sep-04	Boulder Garden	Roberts Outflow	0	
604	LKTR	347	615		G	4194	TRAP	48	7-Sep-04	Lower Trap	Roberts Outflow	1	recap from EF sampling in Little Roberts Outflow on 28 Aug; was not recaptured in upstream fish fence
605	LKTR	266	185		G	4249	TRAP	48	7-Sep-04	Lower Trap	Roberts Outflow	0	
606	ARCH	307	295		G	4248	TRAP	48	7-Sep-04	Lower Trap	Roberts Outflow	0	
607	ARCH	268	190		G	4250	TRAP	48	7-Sep-04	Lower Trap	Roberts Outflow	0	
608	LKTR				G	4031	EF		8-Sep-04	Betw fences	Roberts Outflow	1	deep pool between fences
609	ARCH				G	4244	BS		8-Sep-04	Betw fences	Roberts Outflow	1	Deep pool between fences
610	ARCH				W	2312	BS		8-Sep-04	Betw fences	Roberts Outflow	2	Deep pool between fences
611	LKTR				G	4228	BS		8-Sep-04	Betw fences	Roberts Outflow	1	deep pool between fences
612	LKTR				G	4024	BS		8-Sep-04	Betw fences	Roberts Outflow	1	deep pool between fences
613	LKTR				G	4096	BS		8-Sep-04	Betw fences	Roberts Outflow	1	deep pool between fences
614	LKTR	624	2570		G	4251	BS		8-Sep-04	Betw fences	Roberts Outflow	0	tight; fished the deep pool between fences; not captured at either fish fence
615	ARCH	853	7820	M	G	4252	Dipnet		8-Sep-04	Betw fences	Roberts Outflow	0	Deep pool between fences; not captured at either fish fence
616	ARCH	666	2940	F	G	4253	Dipnet		8-Sep-04	Betw fences	Roberts Outflow	0	Deep pool between fences; not captured at either fish fence
617	ARCH	263	170				TRAP	49	8-Sep-04	Lower Trap	Roberts Outflow	0	Too small to tag
618	ARCH	335	340		G	4254	TRAP	49	8-Sep-04	Lower Trap	Roberts Outflow	0	
619	LKTR	425	945	F	G	4255	TRAP	49	8-Sep-04	Lower Trap	Roberts Outflow	0	eggs, spent, orange fins
620	ARCH	423	750		G	4256	TRAP	49	8-Sep-04	Lower Trap	Roberts Outflow	0	
621	LKTR	~680					GN		12-Aug-04	RL GN01	Roberts Lake	0	escaped
622	LKWH	~320					GN		12-Aug-04	RL GN01	Roberts Lake	0	escaped
623	LKTR	~900					GN		13-Aug-04	RL GN04	Roberts Lake	0	escaped
624	LKTR						GN		13-Aug-04	RL GN03	Roberts Lake	0	escaped
625	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
626	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
627	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
628	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
629	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed

Appendix C1. Data for individual fish captured in the Doris North Project area, 2004.

Sample	Species	Fork Length	Weight	Sex	Tag Colour	Tag no.	Capture Method	Trap Check no.	Date	Site	Location	Capture Code	Comments
630	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
631	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
632	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
633	Char spp	juvenile					EF		17-Aug-04	Boulder Garden	Roberts Outflow	0	observed
634	Char spp.						EF		21-Aug-04	E14	Roberts Inflow	0	observed
635	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
636	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
637	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
638	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
639	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
640	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
641	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
642	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
643	Char spp	juvenile					EF		25-Aug-04	Boulder Garden	Roberts Outflow	0	observed
644	ARCH	juvenile					EF		26-Aug-04	E09	Roberts Inflow	0	released, no data
645	ARCH	juvenile					EF		26-Aug-04	E09	Roberts Inflow	0	released, no data
646	LKTR	juvenile					EF		26-Aug-04	E09	Roberts Inflow	0	released, no data
647	Char spp	juvenile					EF		26-Aug-04	E09	Roberts Inflow	0	observed

CODES:

Method: BS Beach Seine
 DN Dip Net
 EF Backpack Electrofishing
 FN Fyke Net
 GN Gill Net
 GT Minnow Trap
 Trap Fish Fence

Sex: F Female
 M Male

Condition Factor = $\text{Weight [in g]} \times 10^5 / (\text{FL [in mm]})^3$

Tag Colour: B Blue
 G Green
 W White

Species: ARCH Arctic char
 ARFL Arctic flounder
 BRWH Broad whitefish
 CISC Cisco
 LKTR Lake trout
 LKWH Lake whitefish
 LSCS Least Cisco
 NNST Ninespine stickleback
 RNSM Rainbow smelt
 SFCD Saffron cod

FL: Fork length (in mm)

Capture Codes: 0 = first time capture
 1 = first re-capture
 2 = second re-capture
 3 = third re-capture
 mort = mortality

Appendix C2. Location, effort, catch, and CPUE data for fyke net sets in the Doris North Project area, 2004.

Water-body	Set No.	UTM Location (Zone 13W)		Set Date/Time	Set Date/Time	Water Depth (m)	Substrate	Set Period (h)	Number Captured / CPUE (fish/24 h)					
		Arctic char	Lake trout						Lake whitefish	Ninespine sticklebac k	Saffron cod	All Species		
		n CPUE	n CPUE						n CPUE	n CPUE	n CPUE	n CPUE		
Roberts Bay	RBFN1	433592	7563543	20-Aug 10:45	21-Aug 9:00	0.9	silt/sand	22.3					2 2.16	2 2.16
	Total							22.3	0	0	0	0	2	2
	Mean CPUE								0.00	0.00	0.00	0.00	2.16	2.16
	Standard Deviation											0.00	0.00	
Tail Lake	TLFN1	435261	7557850	8-Aug 14:40	9-Aug 12:30	0.9	sand	21.8				3 3.30		3 3.30
	TLFN2	434775	7558186	9-Aug 16:00	10-Aug 14:44	0.9	silt/sand	22.7				1 1.06		1 1.06
	Total							44.6	0	0	0	4	0	4
	Mean CPUE								0.00	0.00		2.15		2.15
Standard Deviation											1.59		1.59	
Roberts Lake	RLFN1	436828	7563072	11-Aug 12:36	12-Aug 12:20	0.9	sand/silt	23.7	3 3.03	1 1.01				4 4.04
	RLFN2	435470	7562508	12-Aug 12:55	14-Aug 10:00	1.0	sand/silt	45.1			1 0.53			1 0.53
	Total							68.8	3	1	1	0	0	5
	Mean CPUE								1.05	0.35	0.35	0.00	0.00	1.74
Standard Deviation													2.48	

NOTES:

n = number of captured fish

CPUE = catch per unit effort (fish/24 h)

Appendix C3a. Location, effort, and catch data for gill net sets in Doris North Project lakes, 2004.

Lake	Set No.	UTM Location		Set Date/Time	Pull Date/Time	Set Period (h)	Net Area (m ²)	No. Panels	Net Units ^a	Mesh Sizes (cm)	Number of Fish Captured					
		Zone 13W Easting	Northing								Arctic char	Lake trout	Lake whitefish	Least cisco	Broad whitefish	All Species
Roberts Lake	RL GN01	435308	7562518	11-Aug 13:10	12-Aug 14:00	24.8	37.2	1	0.38	1.9		1	1			2
	RL GN02	435506	7562453	11-Aug 13:25	12-Aug 14:10	24.8	37.2	1	0.38	1.9		2	2	1		5
	RL GN03	436073	7562447	12-Aug 14:55	13-Aug 18:00	27.1	37.2	1	0.42	1.9	1	3	1			5
	RL GN04	436796	7563071	12-Aug 15:10	13-Aug 16:55	25.7	37.2	1	0.40	1.9		1				1
	RL GN05	435967	7562257	19-Aug 16:10	20-Aug 13:55	21.8	37.2	1	0.34	11.4		3	4		1	8
	RL GN06	436615	7562332	19-Aug 16:25	20-Aug 16:00	23.6	37.2	2	0.73	12.7		7	7			14
	RL GN07	435721	7562552	30-Aug 11:00	30-Aug 13:40	2.7	37.2	1	0.04	12.7			1			1
	RL GN08	435990	7562691	30-Aug 11:15	30-Aug 13:22	2.1	37.2	1	0.03	12.7						0
	RL GN09	436735	7563326	30-Aug 13:30	30-Aug 15:45	2.3	37.2	1	0.03	12.7						0
	RL GN10	435721	7562552	30-Aug 13:45	30-Aug 16:00	2.3	37.2	1	0.03	12.7						0
	RL GN11	436770	7563317	31-Aug 16:13	1-Sep 9:40	17.5	37.2	1	0.27	1.9		1				1
	RL GN12	436487	7562504	31-Aug 16:30	1-Sep 10:00	17.5	37.2	1	0.27	1.9		3	4			7
	RL GN13	436770	7563317	1-Sep 9:40	2-Sep 9:45	24.1	37.2	1	0.37	1.9		1				1
Total						166.5					1	22	20	1	1	45
Tail Lake	TL GN01	435243	7557813	8-Aug 14:55	9-Aug 13:05	22.2	37.2		0.34	1.9						0
	TL GN02	435300	7557889	8-Aug 15:45	9-Aug 12:40	20.9	37.2		0.32	1.9		2				2
	TL GN03	435604	7556107	9-Aug 14:00	10-Aug 13:00	23.0	37.2		0.36	1.9		7				7
	TL GN04	434987	7558461	9-Aug 15:15	10-Aug 14:15	23.0	37.2		0.36	1.9		5				5
Total						321.2					0	14	0	0	0	14

^a one net unit equals 100 m² of net set for 24 hours

Appendix C3b. Location, effort, and catch data for gill net sets in Doris North Project lakes, 2004.

Lake	Set No.	UTM Location		Set Date/Time	Pull Date/Time	Set Period (h)	Net Area (m ²)	No. Panels	Net Units ^a	Mesh Sizes (cm)	CPUE of Fish Captured					
		Zone 13W Easting	Northing								Arctic char	Lake trout	Lake whitefish	Least cisco	Broad whitefish	All Species
Roberts Lake	RL GN01	435308	7562518	11-Aug 13:10	12-Aug 14:00	24.8	37.2	1	0.38	1.9		2.60	2.60			5.20
	RL GN02	435506	7562453	11-Aug 13:25	12-Aug 14:10	24.8	37.2	1	0.38	1.9		5.21	5.21	2.61		13.03
	RL GN03	436073	7562447	12-Aug 14:55	13-Aug 18:00	27.1	37.2	1	0.42	1.9	2.38	7.15	2.38			11.91
	RL GN04	436796	7563071	12-Aug 15:10	13-Aug 16:55	25.7	37.2	1	0.40	1.9		2.51				2.51
	RL GN05	435967	7562257	19-Aug 16:10	20-Aug 13:55	21.8	37.2	1	0.34	11.4		8.90	11.87		2.97	23.73
	RL GN06	436615	7562332	19-Aug 16:25	20-Aug 16:00	23.6	37.2	2	0.73	12.7		9.57	9.57			19.15
	RL GN07	435721	7562552	30-Aug 11:00	30-Aug 13:40	2.7	37.2	1	0.04	12.7			24.19			24.19
	RL GN08	435990	7562691	30-Aug 11:15	30-Aug 13:22	2.1	37.2	1	0.03	12.7						0.00
	RL GN09	436735	7563326	30-Aug 13:30	30-Aug 15:45	2.3	37.2	1	0.03	12.7						0.00
	RL GN10	435721	7562552	30-Aug 13:45	30-Aug 16:00	2.3	37.2	1	0.03	12.7						0.00
	RL GN11	436770	7563317	31-Aug 16:13	1-Sep 9:40	17.5	37.2	1	0.27	1.9		3.70				3.70
	RL GN12	436487	7562504	31-Aug 16:30	1-Sep 10:00	17.5	37.2	1	0.27	1.9		11.06	14.75			25.81
	RL GN11	436770	7563317	1-Sep 9:40	2-Sep 9:45	24.1	37.2	1	0.37	1.9		2.68				2.68
Total						166.5			3.71		0.27	5.92	5.38	0.27	0.27	12.11
Tail Lake	TL GN01	435243	7557813	8-Aug 14:55	9-Aug 13:05	22.2	37.2		0.34	1.9						0.00
	TL GN02	435300	7557889	8-Aug 15:45	9-Aug 12:40	20.9	37.2		0.32	1.9		6.17				6.17
	TL GN03	435604	7556107	9-Aug 14:00	10-Aug 13:00	23.0	37.2		0.36	1.9		19.64				19.64
	TL GN04	434987	7558461	9-Aug 15:15	10-Aug 14:15	23.0	37.2		0.36	1.9		14.03				14.03
Total						321.2			1.38			10.14	0.00	0.00	0.00	10.14

^a one net unit equals 100 m² of net set for 24 hours

Appendix C4. Backpack electrofishing sampling locations, effort, habitat, fish catches and catch-per-unit-effort (CPUE) in Doris North Project Waterbodies, 2004.

Waterbody / Site	Date	Time	D/S UTM (13W)		Effort		Number of Fish Captured ^a										CPUE (Number of Fish / 100 s)									
			Easting	Northing	(m)	(s)	ARCH	LKTR	LKWH	CISC	LSCS	FRSC	NNST	Arctic flounder	Char Spp.	Total	ARCH	LKTR	LKWH	CISC	LSCS	FRSC	NNST	Arctic flounder	Char spp.	Total
Roberts Lake Tributary E07	21-Aug	16:50	438534	7561328	negligible flow	0																				
Roberts Lake Tributary E08	21-Aug	16:50	438534	7561328	negligible flow	0																				
Roberts Lake Tributary E09a	26-Aug	11:30	441175	7559401	100	219	2	1							1	4	0.91	0.46						0.46	1.83	
Roberts Lake Tributary E09b	26-Aug	12:00	440411	7560385	no water present	0																				
Roberts Lake Tributary E11	26-Aug	10:15	441314	7559276	20	105																				
Roberts Lake Tributary E12	26-Aug	9:50	441414	7559246	no water present	0																				
Roberts Lake Tributary E13	26-Aug	12:30	439072	7561367	negligible flow	0																				
Roberts Lake Tributary E14	21-Aug	15:00	436824	7563107	165	399	13						3		1	17	3.26					0.75		0.25	4.26	
Subtotal					285	723	15	1					3		2	21	2.07	0.14					0.41	0.28	2.90	
Roberts Lake Shoreline E10	26-Aug	11:10	441119	7559630	100	381	2	1								3	0.52	0.26							0.79	
Subtotal					100	381	2	1								3	0.52	0.26							0.79	
Pelvic Outflow E06	26-Aug	14:00	435869	7560832	75	487																				
Subtotal					75	487										0										
Little Roberts Outflow E18	19-Aug	12:15	434149	7562970	150	558	7						4			11	1.25					0.72				
Little Roberts Outflow E17	28-Aug	14:00	434114	7563053	150	1019	5	4					17			26	0.49	0.39				1.67				
Little Roberts Outflow E18	28-Aug	11:15	433692	7563455	140	1039		2					2	1		5		0.19				0.19	0.10			
Subtotal					440	2616	12	6					23	1		42	0.46	0.23					0.88	0.04	0.04	1.61
Boulder Garden at Roberts Outflow	17-Aug	16:00	435258	7562620	30	269	5	8							9	22	1.86	2.97						3.35		
	21-Aug	13:45	435258	7562620	30	513	13	10								23	2.53	1.95								
	25-Aug	14:30	435258	7562620	30	661	5	18							9	32	0.76	2.72						1.36		
	31-Aug	14:30	435258	7562620	30	410	5	9								14	1.22	2.20								
	3-Sep	10:00	435258	7562620	30	455	10	5								15	2.20	1.10								
	4-Sep	11:00	435258	7562620	30	225	5	2								7	2.22	0.89								
	6-Sep	9:30	435258	7562620	30	390	4	3				1				8	1.03	0.77				0.26				
	8-Sep	10:00	435243	7562621	20	150		1								1		0.67								
Subtotal					90	3073	47	55					1		18	121	1.53	1.79					0.03	0.5857	3.94	
Total						7280									187											0.03

^a see Table 4.1 for explanation of fish species codes

Appendix C5. Beach seine sampling locations, effort, habitat, fish catches and catch-per-unit-effort (CPUE) in the Doris North Project area, 2004

Waterbody	Site No.	UTM (13W) NAD27		Date	Time	Effort (m ²)	Number of Fish Captured ^a							CPUE (Number of Fish / 100 m ²)						
		Easting	Northing				ARCH	LKTR	LKWH	CISC	FRSC	SFCD	Total	ARCH	LKTR	LKWH	CISC	FRSC	RNSM	Total
Tail Lake	TL BS01	435400	7557889	8-Aug	16:00	450							0							0
Roberts Bay	RB BS01	433592	7563543	21-Aug	9:30	1380						1	1						0.07	0.07
Roberts Lake	RL BS01	435524	7562503	8-Sep	9:00	240							0							0
	RL BS02	435243	7562402	8-Sep	9:30	240							0							0
Roberts Outflow	Boulder Garden	435258	7562620	8-Sep	10:30	180	2	4					6	1.11	2.22					3.33
Total						2490	2	4				1	7	0.08	0.16				0.04	0.28

^a see Table 4.1 for explanation of fish species codes

Appendix C6. Location, effort, catch, and CPUE^a data for minnow trap sets in the Doris North Project area, 2004

Waterbody	Set	UTM Location (Zone 13W)		Set Date/Time	Pull Date/Time	Water Depth (m)	Substrate ^b	Set Period (h)	Ninespine stickleback	
		Easting	Northing						<i>n</i>	CPUE
Tail Lake	TL GT01	435277	7557858	8-Aug 14:45	9-Aug 13:15	0.50	co	22.5	2	2.13
	TL GT02	435286	7557867	8-Aug 14:50	9-Aug 13:20	0.50	sa/gr	22.5		
	TL GT03	435322	7557913	8-Aug 14:55	9-Aug 13:30	0.50	sa	22.6		
	TL GT04	435326	7557917	8-Aug 14:57	9-Aug 13:35	0.70	sa	22.6		
	TL GT05	435328	7557934	8-Aug 15:01	9-Aug 13:36	0.50	sa	22.6		
	TL GT06	435242	7557816	8-Aug 15:24	9-Aug 13:10	0.60	co/bo	21.8		
	TL GT07	435387	7556308	9-Aug 14:15	10-Aug 13:20	0.50	bo/si	23.1	1	1.04
	TL GT08	435280	7556676	9-Aug 14:30	10-Aug 13:30	0.30	be	23.0	5	5.22
	TL GT09	435220	7556876	9-Aug 14:40	10-Aug 13:35	0.40	si	22.9		
	TL GT10	435056	7557584	9-Aug 14:55	10-Aug 14:00	0.40	sa/co	23.1		
	TL GT11	434793	7557897	9-Aug 15:03	10-Aug 14:05	0.50	co/bo	23.0		
	TL GT12	434843	7558249	9-Aug 15:08	10-Aug 14:10	0.40	co/bo	23.0		
	Total							272.7	8	0.70
Roberts Lake	RL GT01	435811	7560980	11-Aug 13:45	12-Aug 13:15	0.25	sa	23.5		
	RL GT02	435801	7561187	11-Aug 13:50	12-Aug 13:20	0.30	co/si	23.5		
	RL GT03	435548	7561412	11-Aug 13:55	12-Aug 13:25	0.25	bo	23.5		
	RL GT04	435406	7561791	11-Aug 14:00	12-Aug 13:30	0.40	bo/be	23.5		
	RL GT05	435351	7562109	11-Aug 14:05	12-Aug 13:35	0.40	co	23.5		
	RL GT06	435253	7562391	11-Aug 14:10	12-Aug 13:40	0.40	bo/sa	23.5		
	RL GT07	435772	7562325	12-Aug 14:35	13-Aug 18:25	0.25	gr/co	27.8		
	RL GT08	436041	7562464	12-Aug 14:40	13-Aug 17:10	0.25	gr	26.5		
	RL GT09	436786	7563099	12-Aug 15:00	13-Aug 17:05	0.25	gr/co	26.1		
	RL GT11	436820	7563090	12-Aug 15:20	13-Aug 17:00			25.7		
	Total							247.1	0	0.00
Roberts Inflow (Stream E14)	RL GT10	436826	7563103	12-Aug 15:15	13-Aug 17:02			25.8		
	Total							25.8	0	0.00

NOTES:

^a CPUE = catch per unit effort (fish/24 h)

Appendix C7. Data for fish captured at the fish fence traps in the Doris North Project area, 2004.

Sample ID No.	Species ^a	Fork Length	Weight	Sex	Tag Colour	Tag No.	Date	Trap Check No.	Location	Year Originally Tagged	Recaptured Upstream
1	LKTR	487	1350		G	3034	8-Aug	4	Lower Trap	2003	
2	LKTR	390	560		G	3575	8-Aug	4	Upper Trap	2004	yes
3	LKTR	470	830		G	4000	8-Aug	5	Lower Trap	2004	
4	LKTR	447	1010		B	036	8-Aug	5	Lower Trap	2000	
5	LKTR	510	1805		G	4001	8-Aug	5	Lower Trap	2004	
6	LKTR	539	2000		G	4002	8-Aug	5	Lower Trap	2004	
7	LKTR	418	790		G	4003	8-Aug	5	Lower Trap	2004	
8	ARCH	852	5475	M	W	2337	9-Aug	6	Lower Trap	2002	
9	ARCH	819	5120	M	G	4004	9-Aug	6	Lower Trap	2004	
10	ARCH	758	4950	F	G	4005	9-Aug	6	Lower Trap	2004	
11	ARCH	725	4110	F	G	4006	9-Aug	6	Lower Trap	2004	
12	LKTR	623	2620		G	4007	9-Aug	6	Lower Trap	2004	
13	ARCH	700	4235	F	G	4008	9-Aug	6	Lower Trap	2004	
14	LKTR	580	2280		G	4009	9-Aug	6	Lower Trap	2004	
15	LKTR	496	1505		G	4010	9-Aug	6	Lower Trap	2004	
16	LKTR	487	1430		G	4011	9-Aug	6	Lower Trap	2004	
17	LKTR	596	2710		G	4012	9-Aug	6	Lower Trap	2004	
18	LKTR	508	1630		G	4013	9-Aug	6	Lower Trap	2004	
19	LKTR	481	1310		G	4014	9-Aug	6	Lower Trap	2004	
20	LKTR	406	1070		G	4015	9-Aug	6	Lower Trap	2004	
21	LKTR	432	910		G	4016	9-Aug	6	Lower Trap	2004	
22	LKTR	473	1185		G	4017	9-Aug	6	Lower Trap	2004	
23	LKTR				B	036	9-Aug	6	Upper Trap		yes
31	ARCH	790	4225	M	W	2525	9-Aug	7	Lower Trap	2002	
32	ARCH	609	2220	F	G	4019	9-Aug	7	Lower Trap	2004	
33	ARCH	802	7130	M	G	4021	9-Aug	7	Lower Trap	2004	
34	ARCH	784	5345	M	G	4020	9-Aug	7	Lower Trap	2004	
35	ARCH	782	4545	F	G	4022	9-Aug	7	Lower Trap	2004	
36	LKTR	584	2280		G	4023	9-Aug	7	Lower Trap	2004	
37	LKTR	485	1340		G	4024	9-Aug	7	Lower Trap	2004	
38	ARCH	605	2740	F	G	4025	9-Aug	7	Lower Trap	2004	
39	LKTR	531	2075		G	4026	9-Aug	7	Lower Trap	2004	
40	LKTR	504	1565		G	4027	9-Aug	7	Lower Trap	2004	
41	LKTR				G	4009	9-Aug	7	Upper Trap		yes
42	LKTR				G	4010	9-Aug	7	Upper Trap		yes
43	ARCH	860	6830	F	G	4028	10-Aug	8	Lower Trap	2004	
44	ARCH	708	3710	F	G	4029	10-Aug	8	Lower Trap	2004	
45	ARCH	825	5650	M	G	3490	10-Aug	8	Lower Trap	2003	
46	LKTR	512	1930		G	4030	10-Aug	8	Lower Trap	2004	
47	LKTR	530	2115		G	4031	10-Aug	8	Lower Trap	2004	
48	LKTR	549	2010		G	4032	10-Aug	8	Lower Trap	2004	
49	ARCH	740	4520	F	G	4033	10-Aug	8	Lower Trap	2004	
50	LKTR	522	1855		G	4034	10-Aug	8	Lower Trap	2004	
51	LKTR	436	1020		G	4035	10-Aug	8	Lower Trap	2004	
52	LKTR	419	940		G	4036	10-Aug	8	Lower Trap	2004	
53	LKTR	489	1430		G	4037	10-Aug	8	Lower Trap	2004	
54	LKTR	524	1685		G	4038	10-Aug	8	Lower Trap	2004	
55	LKTR	455	1085		G	4039	10-Aug	8	Lower Trap	2004	
56	LKTR				G	4016	10-Aug	8	Upper Trap		yes
57	LKTR				G	4015	10-Aug	8	Upper Trap		yes
77	ARCH	583	1985	F	G	3226	10-Aug	9	Lower Trap	2003	
78	ARCH	592	2150	F	G	4047	10-Aug	9	Lower Trap	2004	
79	ARCH				G	4005	10-Aug	9	Upper Trap		yes
80	LKTR	461	1120		G	4050	11-Aug	10	Lower Trap	2004	
81	ARCH	383	585		G	4051	11-Aug	10	Lower Trap	2004	
82	LKTR	463	1040		G	4052	11-Aug	10	Lower Trap	2004	
83	LKTR	495	1555		G	4053	11-Aug	10	Lower Trap	2004	
84	LKTR	422	930		G	3206	11-Aug	10	Lower Trap	2003	
85	LKTR	435	950		G	4054	11-Aug	10	Lower Trap	2004	

Appendix C7. Data for fish captured at the fish fence traps in the Doris North Project area, 2004.

Sample ID No.	Species ^a	Fork Length	Weight	Sex	Tag Colour	Tag No.	Date	Trap Check No.	Location	Year Originally Tagged	Recaptured Upstream
86	LKTR	538	2070		G	4055	11-Aug	10	Lower Trap	2004	
87	LKTR	461	1005		G	4056	11-Aug	10	Lower Trap	2004	
88	LKTR	411	845		G	4057	11-Aug	10	Lower Trap	2004	
89	LKTR	570	2170		G	4058	11-Aug	10	Lower Trap	2004	
90	LKTR	553	2260		G	4059	11-Aug	10	Lower Trap	2004	
91	LKTR	454	1085		G	4060	11-Aug	10	Lower Trap	2004	
92	ARCH	613	2400	F	G	3214	11-Aug	10	Lower Trap	2003	
93	ARCH	631	3015	F	G	4061	11-Aug	10	Lower Trap	2004	
94	LKTR	546	1945		G	4062	11-Aug	10	Lower Trap	2004	
95	ARCH	773	4255	F	G	3067	11-Aug	10	Lower Trap	2003	
96	ARCH				G	4006	11-Aug	10	Upper Trap		yes
97	ARCH				G	3226	11-Aug	10	Upper Trap		yes
98	ARCH				G	4033	11-Aug	10	Upper Trap		yes
99	ARCH				G	4022	11-Aug	10	Upper Trap		yes
100	LKTR				G	4032	11-Aug	10	Upper Trap		yes
101	LKTR				G	4000	11-Aug	10	Upper Trap		yes
102	ARCH	687	3435	F	W	2309	11-Aug	10	Upper Trap	2002; not captured in D/S trap	yes
103	LKTR				G	4030	11-Aug	10	Upper Trap		yes
104	LKTR				G	4039	11-Aug	10	Upper Trap		yes
105	LKTR	561	1875		G	4063	11-Aug	10	Upper Trap	2004; not captured in D/S trap	yes
106	LKTR	619	2170		G	4064	11-Aug	10	Upper Trap	2004; not captured in D/S trap	yes
107	LKTR				G	3034	11-Aug	10	Upper Trap		yes
108	ARCH	787	5810	F	G	4065	11-Aug	10	Upper Trap	2004; not captured in D/S trap	yes
109	ARCH	773	5165	F	G	4066	11-Aug	10	Upper Trap	2004; not captured in D/S trap	yes
110	LKTR				G	4027	11-Aug	10	Upper Trap		yes
111	LKTR	385	655		G	3308	11-Aug	11	Lower Trap	2003	
112	LKTR	455	985		G	3306	11-Aug	11	Lower Trap	2003	
113	LKTR	410	785		G	4067	11-Aug	11	Lower Trap	2004	
114	ARCH				G	4008	11-Aug	11	Upper Trap		yes
115	LKTR				G	4053	11-Aug	11	Upper Trap		yes
116	LKTR				G	4055	11-Aug	11	Upper Trap		yes
117	LKTR				G	3206	11-Aug	11	Upper Trap		yes
118	LKTR	475	1140		G	4068	11-Aug	11	Upper Trap	2004; not captured in D/S trap	yes
119	ARCH	821	5625	M	G	3099	12-Aug	12	Lower Trap	2003	
120	ARCH	892	6455	M	G	4069	12-Aug	12	Lower Trap	2004	
121	ARCH	780	5405	F	G	4072	12-Aug	12	Lower Trap	2004	
122	ARCH	580	2030	F	W	2325	12-Aug	12	Lower Trap	2002	
123	LKTR	580	2160		G	4073	12-Aug	12	Lower Trap	2004	
124	ARCH	780	5120	F	G	3066	12-Aug	12	Lower Trap	2003	
125	ARCH	778	5175	F	G	4074	12-Aug	12	Lower Trap	2004	
126	ARCH	819	6755	M	G	4076	12-Aug	12	Lower Trap	2004	
127	ARCH	819	6755	F	G	4077	12-Aug	12	Lower Trap	2004	
128	ARCH	613	2580	F	G	3183	12-Aug	12	Lower Trap	2003	
129	ARCH	719	4185	F	G	4078	12-Aug	12	Lower Trap	2004	
130	ARCH	775	4880	F	G	4079	12-Aug	12	Lower Trap	2004	
131	LKTR	550	2020		G	4080	12-Aug	12	Lower Trap	2004	
132	ARCH	815	4815	F	G	3095	12-Aug	12	Lower Trap	2003	
133	ARCH	700	3100	F	G	3133	12-Aug	12	Lower Trap	2003	
134	LKTR	470	1080		G	4081	12-Aug	12	Lower Trap	2004	
135	LKTR	560	2085		G	4082	12-Aug	12	Lower Trap	2004	
136	LKTR	400	810		B	041	12-Aug	12	Lower Trap	2000	
137	ARCH	440	935		G	3362	12-Aug	12	Lower Trap	2003	
138	LKTR	465	1090		G	4083	12-Aug	12	Lower Trap	2004	
139	LKTR				G	4060	12-Aug	12	Upper Trap		yes
140	LKTR	385	620		G	3308	12-Aug	12	Upper Trap	2003	yes
141	LKTR				G	4050	12-Aug	12	Upper Trap		yes
142	LKTR				G	3306	12-Aug	12	Upper Trap		yes
143	LKTR				G	4035	12-Aug	12	Upper Trap		yes
144	LKTR				G	4034	12-Aug	12	Upper Trap		yes

Appendix C7. Data for fish captured at the fish fence traps in the Doris North Project area, 2004.

Sample ID No.	Species ^a	Fork Length	Weight	Sex	Tag Colour	Tag No.	Date	Trap Check No.	Location	Year Originally Tagged	Recaptured Upstream
145	LKTR				G	4054	12-Aug	12	Upper Trap		yes
146	LKTR				G	4056	12-Aug	12	Upper Trap		yes
147	LKTR				G	4062	12-Aug	12	Upper Trap		yes
148	LKTR				G	4067	12-Aug	12	Upper Trap		yes
149	LKTR				G	4052	12-Aug	12	Upper Trap		yes
159	ARCH	726	4560	F	G	3270	12-Aug	13	Lower Trap	2003	
160	ARCH	753	4615	M	G	4087	12-Aug	13	Lower Trap	2004	
161	ARCH	696	4415	F	G	4088	12-Aug	13	Lower Trap	2004	
162	ARCH	672	3175	F	G	4089	12-Aug	13	Lower Trap	2004	
163	LKTR	545	2100		G	4090	12-Aug	13	Lower Trap	2004	
164	LKTR	512	1450		G	4091	12-Aug	13	Lower Trap	2004	
165	LKTR	467	1055		G	4092	12-Aug	13	Lower Trap	2004	
166	ARCH				G	3066	12-Aug	13	Upper Trap		yes
167	ARCH				G	4019	12-Aug	13	Upper Trap		yes
168	ARCH				G	3099	12-Aug	13	Upper Trap		yes
169	ARCH	496	2470	F	G	4093	12-Aug	13	Upper Trap	2004; not captured in D/S trap	yes
170	ARCH				W	2525	12-Aug	13	Upper Trap		yes
171	ARCH				G	4078	12-Aug	13	Upper Trap		yes
172	LKTR				G	4059	12-Aug	13	Upper Trap		yes
173	ARCH				G	3067	12-Aug	13	Upper Trap		yes
174	ARCH				G	3214	12-Aug	13	Upper Trap		yes
175	ARCH				G	3183	12-Aug	13	Upper Trap		yes
176	ARCH				W	2325	12-Aug	13	Upper Trap		yes
177	ARCH	725	3055	F	G	4094	12-Aug	13	Upper Trap	2004; not captured in D/S trap	yes
178	ARCH				G	4047	12-Aug	13	Upper Trap		yes
179	ARCH				G	4051	12-Aug	13	Upper Trap		yes
180	LKTR				G	4036	12-Aug	13	Upper Trap		yes
181	LKTR				G	4023	12-Aug	13	Upper Trap		yes
182	LKTR	487	2405		G	4095	12-Aug	13	Upper Trap	2004	yes
183	ARCH				G	3362	12-Aug	13	Upper Trap		yes
184	LKTR				G	4017	12-Aug	13	Upper Trap		yes
185	LKTR	424	845		W	2232	13-Aug	14	Lower Trap	2002	
186	LKTR	477	1090		G	4096	13-Aug	14	Lower Trap	2004	
187	LKTR	481	1290		G	4097	13-Aug	14	Lower Trap	2004	
188	LKTR	475	1200		G	4098	13-Aug	14	Lower Trap	2004	
189	ARCH	733	4475	F	G	3087	13-Aug	15	Lower Trap	2003	
190	ARCH	756	4580	M	G	4100	13-Aug	15	Lower Trap	2004	
191	ARCH	438	985		G	4101	13-Aug	15	Lower Trap	2004	
192	LKTR	436	820		G	4102	13-Aug	15	Lower Trap	2004	
193	LKTR				G	4007	13-Aug	15	Upper Trap		yes
194	ARCH	833	6130	M	G	3064	14-Aug	16	Lower Trap	2003	
195	LKTR	573	1800		G	4103	14-Aug	16	Lower Trap	2004	
196	ARCH	726	3970	F	G	4104	14-Aug	16	Lower Trap	2004	
197	ARCH	470	1060	F	G	4105	14-Aug	16	Lower Trap	2004	
198	LKTR	450	1060		G	4106	14-Aug	16	Lower Trap	2004	
199	LKTR	397	645		G	4107	14-Aug	16	Lower Trap	2004	
200	LKTR	471	1035		G	4108	14-Aug	16	Lower Trap	2004	
201	LKTR				G	4090	14-Aug	16	Upper Trap		yes
202	LKTR				G	4098	14-Aug	16	Upper Trap		yes
203	LKTR				G	4102	14-Aug	16	Upper Trap		yes
204	LKTR				G	4083	14-Aug	16	Upper Trap		yes
206	LKTR				G	4057	14-Aug	17	Upper Trap		yes
207	ARCH				G	3087	14-Aug	17	Upper Trap		yes
208	LKTR	488	1310		G	4109	14-Aug	17	Lower Trap	2004	
213	ARCH	782	6485	F	G	4110	15-Aug	18	Lower Trap	2004	
214	ARCH	595	2335	F	G	4111	15-Aug	18	Lower Trap	2004	
215	ARCH	793	4950	M	G	4112	15-Aug	18	Lower Trap	2004	
216	ARCH	722	4605	F	G	4113	15-Aug	18	Lower Trap	2004	
217	ARCH	421	760		G	3404	15-Aug	18	Lower Trap	2003	

Appendix C7. Data for fish captured at the fish fence traps in the Doris North Project area, 2004.

Sample ID No.	Species ^a	Fork Length	Weight	Sex	Tag Colour	Tag No.	Date	Trap Check No.	Location	Year Originally Tagged	Recaptured Upstream
218	ARCH	517	1635	F	G	4114	15-Aug	18	Lower Trap	2004	
219	ARCH	389	565		G	4115	15-Aug	18	Lower Trap	2004	
220	ARCH	408	630		G	4116	15-Aug	18	Lower Trap	2004	
221	ARCH	870	7500	M	G	4117	16-Aug	19	Lower Trap	2004	
222	ARCH	725	4465	F	G	4118	16-Aug	19	Lower Trap	2004	
223	LKTR	490	1185		W	2147	16-Aug	19	Lower Trap	2002	
224	ARCH	715	4455	F	G	4119	16-Aug	19	Lower Trap	2004	
225	LKTR	398	665		G	4120	16-Aug	19	Lower Trap	2004	
226	LKTR	430	770		G	4121	16-Aug	19	Lower Trap	2004	
227	ARCH				G	4028	16-Aug	19	Upper Trap		yes
228	ARCH				G	4116	16-Aug	19	Upper Trap		yes
229	ARCH	695	3425	F	G	3213	17-Aug	20	Lower Trap	2003	
230	ARCH				G	4104	17-Aug	20	Upper Trap		yes, but eaten
244	ARCH	330	345		G	4122	18-Aug	21	Lower Trap	2004	
245	ARCH	753	4100	M	G	4123	18-Aug	21	Lower Trap	2004	
246	ARCH	475	1030		W	2220	18-Aug	21	Lower Trap	2002	
247	ARCH	339	375		G	4126	18-Aug	21	Lower Trap	2004	
248	ARCH	352	420		G	4131	18-Aug	21	Lower Trap	2004	
249	ARCH	556	1715	F	G	4132	18-Aug	21	Lower Trap	2004	
250	LKTR	452	1140		G	3301	18-Aug	21	Lower Trap	2003	
251	ARCH	253	200		G	4133	18-Aug	21	Lower Trap	2004	
252	ARCH	240	140			^b	18-Aug	21	Lower Trap		
253	ARCH	355	460		G	4134	18-Aug	21	Lower Trap	2004	
254	ARCH	419	620		G	4135	18-Aug	21	Lower Trap	2004	
255	LKTR				G	4038	10-Aug	9	Upper Trap		yes
267	ARCH	786	5245	M	G	3378	19-Aug	22	Lower Trap	2003	
268	ARCH	730	3985	M	W	2321	19-Aug	22	Lower Trap	2002	
269	LKTR	772	5360		G	4136	19-Aug	22	Lower Trap	2004	
270	ARCH	765	4015	F	G	3398	19-Aug	22	Lower Trap	2003	
271	LKTR	425	880		G	3259	19-Aug	22	Lower Trap	2003	
272	ARCH	354	475		G	4138	19-Aug	22	Lower Trap	2004	
273	ARCH	297	250		G	4139	19-Aug	22	Lower Trap	2004	
274	ARCH	313	315		G	4141	19-Aug	22	Lower Trap	2004	
275	ARCH	326	380		G	4142	19-Aug	22	Lower Trap	2004	
276	ARCH				W	2220	19-Aug	22	Upper Trap		yes
277	LKTR	416	845		G	4143	20-Aug	23	Lower Trap	2004	
278	ARCH	412	700	F	G	3387	20-Aug	23	Lower Trap	2003	
279	ARCH				G	4123	20-Aug	23	Upper Trap		yes
302	LKTR	462	1150		W	2151	20-Aug	24	Lower Trap	2002	
303	LKTR	454	1030		G	4137	20-Aug	24	Lower Trap	2004	
304	ARCH	493	1260		G	4145	20-Aug	24	Lower Trap	2004	
308	ARCH	400	665		G	3472	21-Aug	25	Lower Trap	2003	
309	ARCH	484	1165		B	027	21-Aug	25	Lower Trap	2000	
310	ARCH	720	4280	F	G	3267	21-Aug	25	Lower Trap	2003	
311	ARCH	580	2120	F	G	4124	21-Aug	25	Lower Trap	2004	
312	ARCH	640	3105	F	G	4150	21-Aug	25	Lower Trap	2004	
313	ARCH	535	1680	M	G	4151	21-Aug	25	Lower Trap	2004	
314	LKTR	456	1065		W	2252	21-Aug	25	Lower Trap	2002	
315	ARCH	722	4145	F	G	4152	21-Aug	25	Lower Trap	2004	
316	ARCH	432	865	F	G	4154	21-Aug	25	Lower Trap	2004	
317	ARCH	461	905	F	G	4156	21-Aug	25	Lower Trap	2004	
318	LKTR	492	1235		G	3389	21-Aug	25	Lower Trap	2003	
319	ARCH	324	330		G	4199	21-Aug	25	Lower Trap	2004	
320	ARCH	465	1070		G	3406	21-Aug	25	Lower Trap	2003	
321	LKTR				G	4143	21-Aug	25	Upper Trap		yes
322	LKTR				G	4121	21-Aug	25	Upper Trap		yes
323	LKTR				W	2232	21-Aug	25	Upper Trap		yes
363	LKTR				G	3389	23-Aug	26	Upper Trap		yes
364	ARCH				G	4114	23-Aug	26	Upper Trap		yes

Appendix C7. Data for fish captured at the fish fence traps in the Doris North Project area, 2004.

Sample ID No.	Species ^a	Fork Length	Weight	Sex	Tag Colour	Tag No.	Date	Trap Check No.	Location	Year Originally Tagged	Recaptured Upstream
365	ARCH				G	4154	23-Aug	26	Upper Trap		yes
366	ARCH				G	3472	23-Aug	26	Upper Trap		yes
367	ARCH				G		23-Aug	26	Upper Trap		yes
368	ARCH				B	027	23-Aug	26	Upper Trap		yes
369	ARCH				G	4132	23-Aug	26	Upper Trap		yes
370	ARCH	627	2370	F	G	4157	23-Aug	26	Lower Trap	2004	
371	ARCH	704	4180	F	G	4159	23-Aug	26	Lower Trap	2004	
372	ARCH	724	3930	F	G	4160	23-Aug	26	Lower Trap	2004	
373	ARCH				G	4157	23-Aug	27	Upper Trap		yes
374	LKTR	477	1270		G	4168	23-Aug	27	Lower Trap	2004	
375	ARCH	722	3605	F	G	4169	23-Aug	27	Lower Trap	2004	
383	ARCH	785	5240	F	G	3356	25-Aug	28	Lower Trap	2003	
384	ARCH	820	5925	F	G		25-Aug	28	Lower Trap	2004	
385	LKTR	470	1080		G	3063	25-Aug	28	Lower Trap	2003	
386	LKTR	410	750		G	4170	25-Aug	28	Lower Trap	2004	
410	ARCH	500	1085	F	G	4171	25-Aug	29	Upper Trap	2004; not captured in D/S trap	yes
411	ARCH	459	1115	F	G	3471	26-Aug	30	Lower Trap	2003	
412	LKTR				G	3063	26-Aug	30	Upper Trap		yes
416	ARCH	763	4705	F	G	4172	26-Aug	31	Lower Trap	2004	
417	ARCH	705	3235	F	W	2510	27-Aug	32	Lower Trap	2002	
418	ARCH	752	5285	F	G	3221	27-Aug	32	Lower Trap	2003	
419	ARCH	650	2630	F	W	2346	27-Aug	32	Lower Trap	2002	
420	ARCH	772	4810	F	G	4173	27-Aug	32	Lower Trap	2004	
421	ARCH	534	1720	F	G	4174	27-Aug	32	Lower Trap	2004	
422	ARCH	793	5390	M	G	3265	27-Aug	32	Lower Trap	2003	
423	ARCH	293	220		G	4186	27-Aug	33	Lower Trap	2004	
424	ARCH	424	810		G	4187	27-Aug	33	Lower Trap	2004	
425	ARCH	406	760		G	4188	27-Aug	33	Lower Trap	2004	
426	ARCH	307	305		G	4189	27-Aug	33	Lower Trap	2004	
427	ARCH	382	490		G	3381	27-Aug	33	Lower Trap	2003	
428	ARCH	429	865		G	4190	27-Aug	33	Lower Trap	2004	
429	ARCH				G	4156	27-Aug	33	Lower Trap		
441	ARCH	205	95			^b	28-Aug	34	Lower Trap		
442	ARCH	360	485		G	4191	28-Aug	34	Lower Trap	2004	
443	ARCH	250	155			^b	28-Aug	34	Lower Trap		
444	ARCH	520	1320		G	3467	28-Aug	34	Lower Trap	2003	
445	ARCH	217	105			^b	28-Aug	34	Lower Trap		
446	ARCH	226	120			^b	28-Aug	34	Lower Trap		
447	ARCH	355	480		G	4192	28-Aug	34	Lower Trap	2004	
448	ARCH	279	245		G	4193	28-Aug	34	Lower Trap	2004	
449	ARCH	245	140			^b	28-Aug	34	Lower Trap		
481	ARCH	255	175		G	4195	28-Aug	35	Lower Trap	2004	
482	ARCH	302	285		G	4196	29-Aug	36	Lower Trap	2004	
483	ARCH	327	390		G	4197	29-Aug	36	Lower Trap	2004	
484	ARCH	272	190		G	4198	29-Aug	36	Lower Trap	2004	
485	ARCH	405	640		G	3458	30-Aug	37	Lower Trap	2003	
486	ARCH	278	250		G	4200	30-Aug	37	Lower Trap	2004	
487	ARCH	290	215		G	4201	30-Aug	37	Lower Trap	2004	
488	ARCH	246	145			^b	30-Aug	37	Lower Trap		
489	ARCH	323	345		G	4202	30-Aug	37	Lower Trap	2004	
490	ARCH	437	825		G	3455	30-Aug	37	Lower Trap	2003	
491	ARCH	297	260		G	4203	30-Aug	37	Lower Trap	2004	
492	ARCH	284	255		G	4204	30-Aug	37	Lower Trap	2004	
493	ARCH	741	3965		W	2106	30-Aug	37	Lower Trap	2002	
499	ARCH	337	345		G	4210	30-Aug	38	Lower Trap	2004	
500	ARCH	325	340		G	4211	30-Aug	38	Lower Trap	2004	
501	ARCH	476	1055		G	3400	30-Aug	38	Lower Trap	2003	
502	ARCH	504	1280	F	G	4212	30-Aug	38	Lower Trap	2004	
503	ARCH	252	170		G	4213	31-Aug	39	Lower Trap	2004	

Appendix C7. Data for fish captured at the fish fence traps in the Doris North Project area, 2004.

Sample ID No.	Species ^a	Fork Length	Weight	Sex	Tag Colour	Tag No.	Date	Trap Check No.	Location	Year Originally Tagged	Recaptured Upstream
504	ARCH	308	330		G	4214	31-Aug	39	Lower Trap	2004	
505	LKTR	445	845		G	4215	31-Aug	39	Lower Trap	2004	
506	ARCH	259	180		G	4216	31-Aug	39	Lower Trap	2004	
507	ARCH				G	3467	31-Aug	39	Upper Trap		yes
522	ARCH				G	4216	31-Aug	40	Upper Trap		yes
523	ARCH	798	6255	M	W	2282	1-Sep	41	Lower Trap	2002	
524	ARCH	273	225		G	4217	1-Sep	41	Lower Trap	2004	
525	ARCH	296	240		G	4218	1-Sep	41	Lower Trap	2004	
526	ARCH	707	3660		G	4219	1-Sep	41	Lower Trap	2004	
527	CISC	331	415		G	4221	1-Sep	41	Lower Trap	2004	
528	ARCH				G	4188	1-Sep	41	Lower Trap		
537	ARCH	245	170			Adipose	2-Sep	42	Lower Trap		
538	ARCH	243	135			Adipose	2-Sep	42	Lower Trap		
539	ARCH	344	420		G	4227	2-Sep	42	Lower Trap	2004	
540	LKTR	380	500		G	4228	2-Sep	42	Lower Trap	2004	
541	ARCH	230	115			Adipose	2-Sep	42	Lower Trap		
542	ARCH	242	140			Adipose	2-Sep	42	Lower Trap		
543	ARCH	308	280		G	4229	2-Sep	42	Lower Trap	2004	
544	ARCH	270	180		G	4230	2-Sep	42	Lower Trap	2004	
545	ARCH	245	135			Adipose	2-Sep	42	Lower Trap		
547	ARCH	292	290		G	4231	3-Sep	43	Lower Trap	2004	
548	ARCH	296	275		G	4232	3-Sep	43	Lower Trap	2004	
549	ARCH	254	135		G	4233	3-Sep	43	Lower Trap	2004	
550	ARCH	269	200		G	4234	3-Sep	43	Lower Trap	2004	
551	ARCH	290	225		G	4235	3-Sep	43	Lower Trap	2004	
552	ARCH	276	205		G	4236	3-Sep	43	Lower Trap	2004	
553	ARCH	217	95			Adipose	3-Sep	43	Lower Trap		
554	ARCH	218	100			Adipose	3-Sep	43	Lower Trap		
555	ARCH	223	110			Adipose	3-Sep	43	Lower Trap		
556	ARCH	240	125			Adipose	3-Sep	43	Lower Trap		
557	ARCH	256	185		G	4237	3-Sep	43	Lower Trap	2004	
558	ARCH	323	345		G	4238	3-Sep	43	Lower Trap	2004	
559	ARCH	302	265		G	4239	3-Sep	43	Lower Trap	2004	
560	ARCH	347	395		G	4240	3-Sep	43	Lower Trap	2004	
561	ARCH	337	420		G	4241	3-Sep	43	Lower Trap	2004	
562	ARCH	278	235		G	4242	3-Sep	43	Lower Trap	2004	
578	ARCH	730	4840	F	W	2509	4-Sep	44	Lower Trap	2002	
579	ARCH	675	3045	M	W	2322	4-Sep	44	Lower Trap	2002	
580	ARCH	638	2635	F	W	2312	4-Sep	44	Lower Trap	2002	
588	ARCH	635	2840	F	G	3368	4-Sep	45	Lower Trap	2003	
589	ARCH	382	525		G	4243	4-Sep	45	Lower Trap	2004	
590	ARCH	602	2205	F	G	4244	4-Sep	45	Lower Trap	2004	
591	ARCH	689	3220	F	W	2319	4-Sep	45	Lower Trap	2002	
592	ARCH	354	445		G	4245	4-Sep	45	Lower Trap	2004	
593	ARCH	512	1460	F	G	3411	4-Sep	45	Lower Trap	2003	
594	ARCH	308			G	4246	4-Sep	45	Lower Trap	2004	
595	ARCH				G	3411	6-Sep	47	Upper Trap		yes
604	LKTR	347	615		G	4194	7-Sep	48	Lower Trap	2004	
605	LKTR	266	185		G	4249	7-Sep	48	Lower Trap	2004	
606	ARCH	307	295		G	4248	7-Sep	48	Lower Trap	2004	
607	ARCH	268	190		G	4250	7-Sep	48	Lower Trap	2004	
614	LKTR	624	2570		G	4251	8-Sep		Betw fences	2004	
615	ARCH	853	7820	M	G	4252	8-Sep		Betw fences	2004	
616	ARCH	666	2940	F	G	4253	8-Sep		Betw fences	2004	
617	ARCH	263	170			^b	8-Sep	49	Lower Trap		
618	ARCH	335	340		G	4254	8-Sep	49	Lower Trap	2004	
619	LKTR	425	945	F	G	4255	8-Sep	49	Lower Trap	2004	
620	ARCH	423	750		G	4256	8-Sep	49	Lower Trap	2004	

Appendix C7. Data for fish captured at the fish fence traps in the Doris North Project area, 2004.

Sample ID No.	Species ^a	Fork Length	Weight	Sex	Tag Colour	Tag No.	Date	Trap Check No.	Location	Year Originally Tagged	Recaptured Upstream
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^a see Table 4.1 for explanation of fish species codes

^b these fish not tagged because of their small size

Appendix C8. Length, weight, and condition factor statistics for fish captured in Doris North Project area, 2004.

Waterbody	Species	Fork Length (mm)					Weight (g)					Condition Factor				
		<i>n</i>	Mean	SD	Min	Max	<i>n</i>	Mean	SD	Min	Max	<i>n</i>	Mean	SD	Min	Max
Roberts Outflow	Arctic char juveniles*	62	129	67	45	246	39	63	53	10	170	39	1.22	0.31	0.87	1.95
	Arctic char maturing**	172	543	201	250	892	170	2432	2138	135	7820	170	1.05	0.13	0.80	2.02
	All Arctic char	234	433	254	45	892	209	1990	2144	10	7820	209	1.08	0.18	0.80	1.95
	Lake trout juveniles*	55	97	32	48	185	23	25	15	10	60	23	1.24	0.28	0.81	1.81
	Lake trout maturing**	89	480	71	266	772	88	1370	706	185	5360	88	1.15	0.16	0.80	2.08
	All Lake trout	144	334	196	48	772	111	1091	830	10	5360	111	1.17	0.18	0.80	1.81
	Cisco	1	331	-	-	-	1	415	-	-	-	1	1.14	-	-	-
	Ninespine stickleback	1	66	-	-	-	-	-	-	-	-	-	-	-	-	-
Roberts Lake	Arctic char	6	110	38	73	167	2	20	-	-	-	2	1.1	-	-	-
	Broad whitefish	1	463				1	1245				1	1.25			
	Least cisco	1	149	-	-	-	1	30	-	-	-	1	0.91	-	-	-
	Lake trout	41	612	225	70	903	39	3191	2002	20	7055	39	0.99	0.12	0.64	1.19
	Lake whitefish	20	438	51	337	545	18	1194	469	500	2340	18	1.37	0.09	1.22	1.53
Little Roberts Outflow	Arctic char	12	111	29	76	160	3	12	3	10	15	3	1.32	0.24	1.1	1.57
	Arctic flounder	1	239	-	-	-	1	210	-	-	-	1	1.54	-	-	-
	Lake trout	6	138	103	78	347	5	132	270	10	615	5	1.19	0.24	0.92	1.47
	Ninespine stickleback	23	51	9	40	70	-	-	-	-	-	-	-	-	-	-
Roberts Bay	Rainbow smelt	1	88													
	Saffron cod	2	244	8.5	238	250	2	70	14	60	80	2	0.49	0.15	0.38	0.59
Tail Lake	Lake trout	14	574	48	509	710	14	1845	598	1320	3725	14	0.96	0.12	0.77	1.29
	Ninespine stickleback	12	44	9	32	65	-	-	-	-	-	-	-	-	-	-
Roberts Inflow E14	Arctic char	13	56	11	38	68	-	-	-	-	-	-	-	-	-	-
	Ninespine stickleback	3	54	7	47	60	-	-	-	-	-	-	-	-	-	-

* Fork Length ≤ 250 mm

** Fork Length ≥ 250 mm