6-C: Addendum 2016 Hydrology Baseline

January 2017

AGNICO EAGLE MINES: MEADOWBANK DIVISION - WHALE TAIL PIT PROJECT

2016 Hydrology Baseline Report

Submitted to:
Agnico Eagle Mines Limited
Ryan Vanengen
Environment Superintendent

REPORT

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Distribution:

1 copy: Agnico Eagle Mines Limited
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Golder Associates

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1.0 INTRODUCTION

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to develop Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. The Amaruq Exploration property is a 408 square kilometre (km^2) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut (Figure 1-1).

The Meadowbank Mine is an approved mining operation and Agnico Eagle intends to extend the life of the mine by constructing and operating Whale Tail Pit and Haul Road, and continues to evaluate the V Zone and other areas surrounding Whale Tail Pit that have future mining potential (referred to in this document as the Project), which is located on the Amaruq Exploration property. Baseline data have been collected in support of the Environmental Review to document existing conditions and to provide the foundation for a qualitative and quantitative assessment of project operations and the extension of the mine development, to be evaluated in the Environmental Impact Statement (EIS) for the Project.

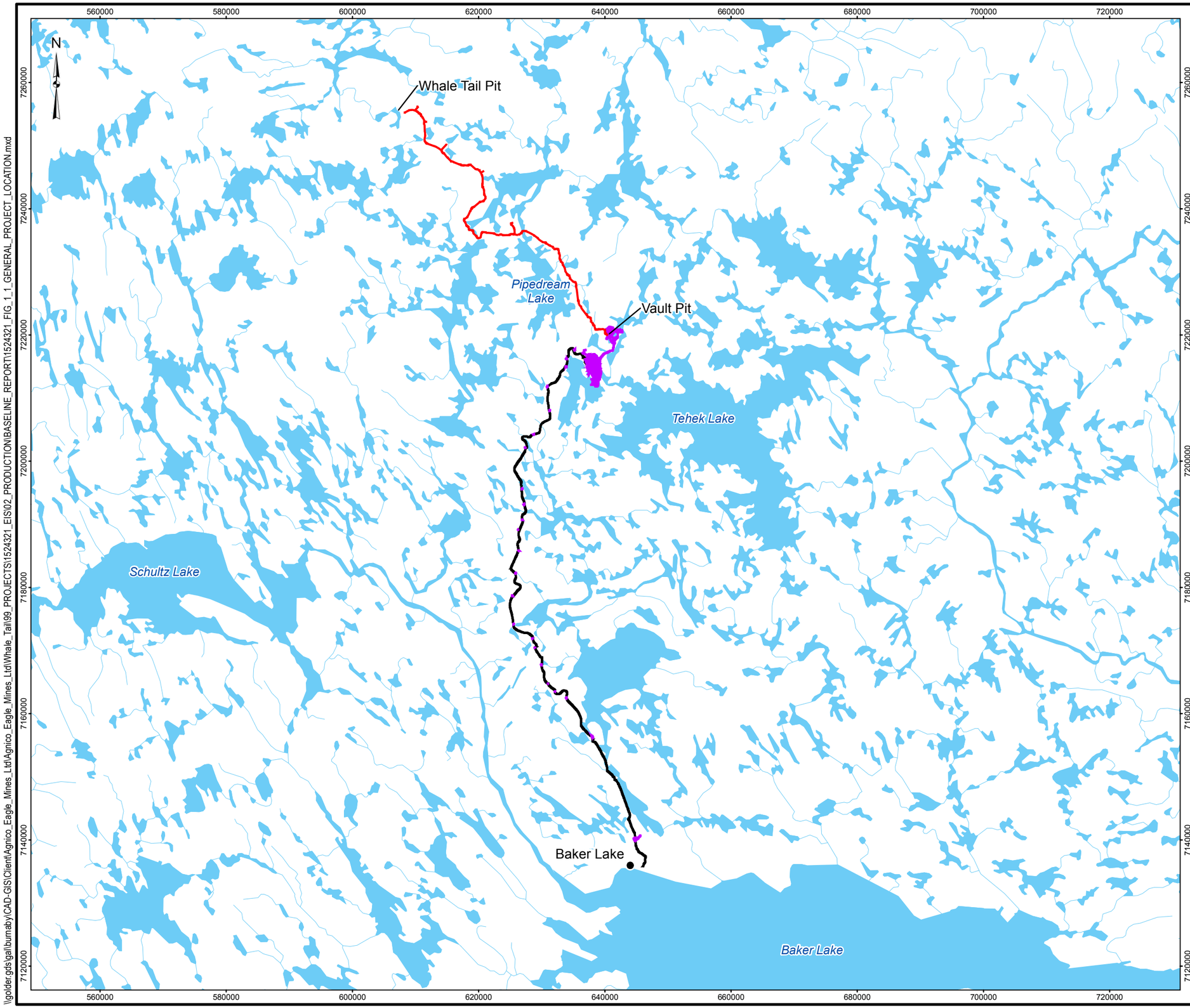
This report presents the results of a baseline hydrology study completed by Golder Associates Ltd. (Golder) during open water conditions of 2016, for the area associated with the Project. This report supplements previous baseline hydrology field studies conducted in 2014 and 2015 (Golder 2016).

1.1 Physical Setting

The Project is located at the southern limit of the Northern Arctic terrestrial ecozone, which is one of the coldest and driest regions of Canada, with a Low Arctic ecoclimate. This ecozone extends over most of the non-mountainous areas of the Arctic Islands, northeastern portions of the Kivalliq region of Nunavut, western Baffin Island, and a portion of northern Québec.

1.2 Hydrology Baseline Study Area

The Project is located in the Meadowbank River, Quoich River, and Thelon River watersheds. Building off previous studies (Golder 2016), the 2016 Hydrology BSA consisted of the A and C watersheds as shown on Figure 1-2.



\\golder.gds\gal\burnaby\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Agnico_Eagle_Mines_Ltd\Whale_Tail\99_PROJECTS\1524321_EIS\02_PRODUCTION\BASELINE_REPORT\1524321_FIG_1_1_GENERAL_PROJECT_LOCATION.mxd

LEGEND

- COMMUNITY
- PROPOSED HAUL ROAD
- ALL WEATHER ROAD
- MEADOWBANK INFRASTRUCTURE
- WATERCOURSE
- WATERBODY

REFERENCE

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200_R0.dwg
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
3. INSET MAP DATA OBTAINED FROM ESRI

DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

12 0 12
KILOMETRES

PROJECT
AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION
WHALE TAIL PIT PROJECT

TITLE

PROJECT LOCATION

Golder Associates

PROJECT		1524321	FILE No.	
DESIGN	JR	24 Sept. 2015	SCALE AS SHOWN	REV. A
GIS	CD	13 Nov. 2015		
CHECK	JR	16 Dec. 2015		
REVIEW	DRW	16 Dec. 2015		

FIGURE 1-1

595000 600000 605000 610000 615000

7265000 7260000 7255000 7250000

N

DS1 Nemo Lake Mammoth Lake Whale Tail Lake Whale Tail Pit

A B C

LEGEND

- CONTINUOUS STATION
- MANUAL STATION
- PROPOSED HAUL ROAD
- WATERSHED
- STREAM
- WATERCOURSE (CANVEC)
- WATERBODY (CANVEC)

REFERENCE

1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200_R0.dwg
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

1600 0 1600
METRES

PROJECT
AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION
WHALE TAIL PIT PROJECT

TITLE
HYDROLOGY BASELINE STUDY AREA

Golder Associates

PROJECT		1656381	FILE No.	
DESIGN	JL	22 DEC. 2016	SCALE AS SHOWN	REV. 0
GIS	AD	22 DEC. 2016	**FIGURE 1-2**	
CHECK	JL	10 JAN. 2017		
REVIEW	NS	10 JAN. 2017		

\\golder.gds\gal\burnaby\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Whale_Tail\99_PROJECTS\1656381\02_PRODUCTION\REPORT\MXD\Report\1656381_FIG_1_2_HYDROLOGY_STUDY_AREA.mxd

2.0 METHODS

2.1 Data Sources

This report is based on the following data sources:

- previous hydrology studies (Golder 2016); and
- three site-specific field visits from 10 to 14 June 2016, 11 to 17 August 2016, and 15 to 19 September 2016, non-inclusive of travel dates.

2.2 Hydrometry

Two types of hydrometric stations were installed in 2016, including continuous hydrometric stations (i.e., those equipped with data loggers) and manual hydrometric stations (i.e., those without data loggers, and primarily reliant on discrete discharge and water level measurements, and visual observations) (Figure 1-2). Photographs at each station are shown in Appendix A.

2.2.1 Continuous Hydrometric Stations

Nine continuous hydrometric stations were installed during the first field visit at Lake A5, Lake A12, Lake A15, Lake A17 (Whale Tail Lake), Lake A18, Lake A69, Lake A76, Lake C8 and Lake C38 (Nemo Lake). The locations of the continuous hydrometric stations are shown on Figure 1-2. These stations were equipped with water level loggers. Manual discharge and water level data measurements were also recorded at these stations during each field visit.

Hydrographs for all eight locations were derived using the following methods:

- Onset HOBO U20-001-04 Loggers were installed at each hydrometric station. Each data logger was programmed to record water pressure measurements at 10-minute intervals, and referenced to a local benchmark tied to the geodetic datum established by a mine surveyor.
- Two Onset HOBO U20-001-04 Loggers were installed on land at central locations to all nine sites to provide barometric pressure corrections.
- The data loggers were installed at the start of spring melt, as permitted by ice conditions and site access.
- During each site visit, water surface elevations were measured relative to a local benchmark.
- During the September trip, water levels and benchmarks were surveyed using a high accuracy Real Time Kinematic (RTK) GPS Altus APS-3 system.
- Stream discharge measurements were performed during each site visit at stations with flowing water according to the Water Survey of Canada standard described by Terzi et al. (1981). Velocity and depth measurements, which were used to calculate discharge, were collected using a Sontek Flow Tracker velocity meter and a top-setting wading rod.
- Data loggers at each station were downloaded during each site visit and pressure transducer readings corresponding to each discharge measurement were recorded.
- Data loggers were removed during the last site visit in September prior to freeze-up.

- A stage-discharge rating curve was derived for each station based on measured water surface elevations and discharges. This rating curve was applied to the continuous record of water surface elevations, as measured and recorded by the water level logger at each station, to derive a continuous record of discharges.

2.2.2 Manual Hydrometric Stations

Following the discharge and water level data collection methods described above, additional discrete discharge and water level measurements were also collected opportunistically at the following 13 locations:

- Lake A16 (Mammoth Lake);
- Lake A19;
- Lake A21;
- Lake A22;
- Lake A45;
- Lake A53
- Lake A55;
- Lake A60;
- Lake A62;
- Lake A63;
- Lake A65;
- Lake A72; and
- Lake A81.

The locations of the manual hydrometric stations are shown on Figure 1-2.

3.0 RESULTS

3.1 Continuous Hydrometric Stations

As stated in Section 2.2.1, continuous hydrometric stations were installed at Lake A5, Lake A12, Lake A15, Lake A17 (Whale Tail Lake), Lake A18, Lake A69, Lake A76, Lake C8, and Lake C38 (Nemo Lake). Hydrographs for all nine locations and field survey results are summarized below. In addition, Appendix A includes factsheets describing the location of each hydrometric station; photographs; derived stage-discharge rating curve based on data collected in 2015 and 2016; tabulated mean daily discharge and water level data; manual discharge measurement data; and related calculation sheets for each station.

3.1.1 Lake A5

The Lake A5 hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 11 June to 15 September 2016, based on continuous logger data. A 5 centimetre (cm) adjustment was made to the 2016 water surface elevations to account for a consistent discrepancy with benchmark survey elevations of the three separate surveys. Details of each site visit are provided in Table 3-1. The hydrographs for Lake A5 are presented in Figure 3-1. The stage-discharge rating curve was derived based on three very low discharge measurements, and the resulting discharge hydrograph is associated with a high degree of uncertainty.

Table 3-1: Surveys at Lake A5 Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	Outlet	Discharge (m^3/s)
10 June	None – Outlet frozen.	-	-	-	-
11 June	Measured discharge and water surface elevation, and installed data logger.	✓	132.35	✓	0.231
13 Aug	Measured Discharge and water surface elevation. Downloaded data logger.	✓	132.27	✓	0.129
15 Sep	Measured discharge and water surface elevation. Removed and downloaded data logger.	✓	132.22	✓	0.060

masl = metres above sea level, m^3/s = cubic metres per second.

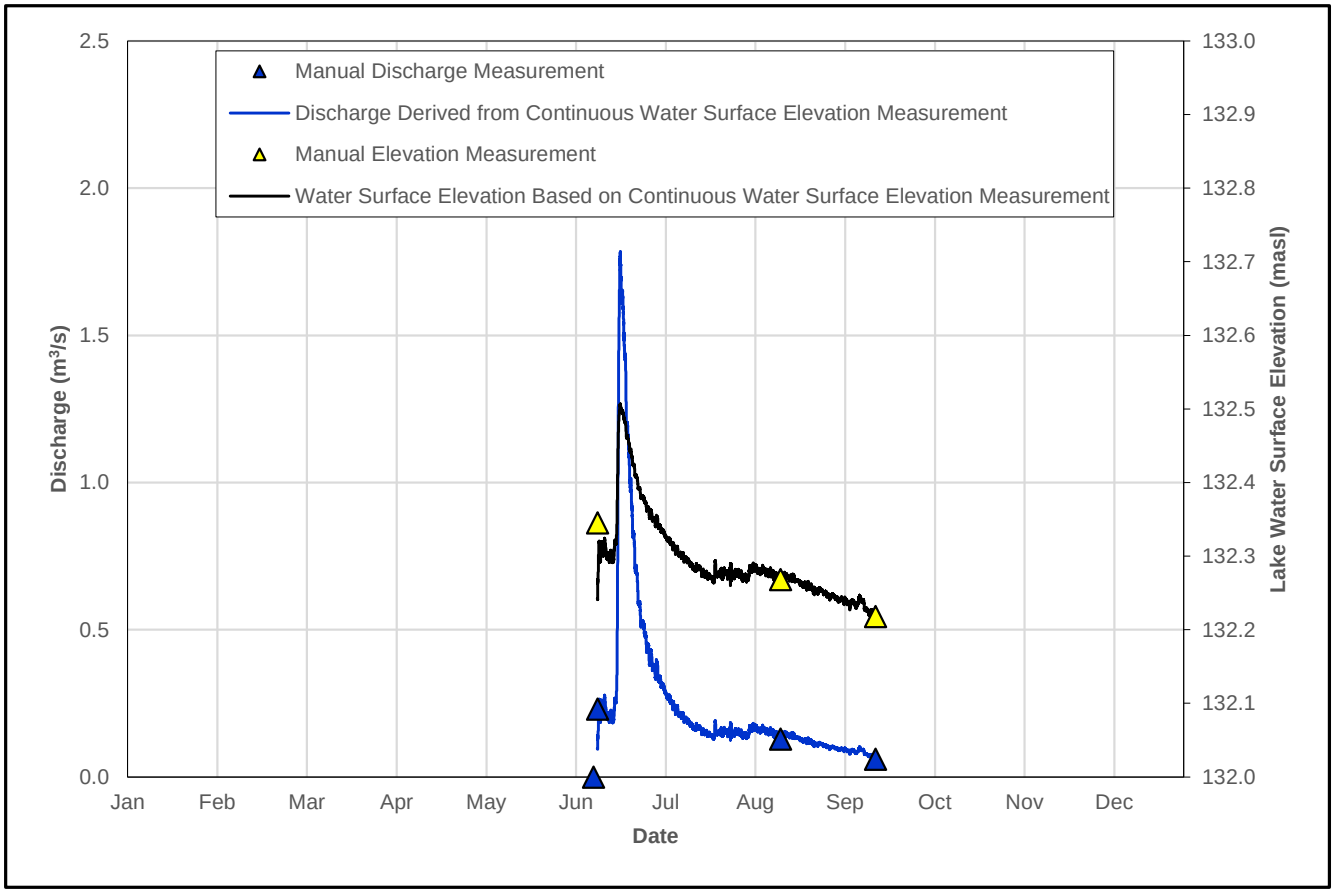


Figure 3-1: Hydrograph for Lake A5 in 2016

3.1.2 Lake A12

The Lake A12 hydrometric station was visited four times in 2016 and a continuous hydrograph was derived for the period of 14 June to 17 September 2016, based on continuous logger data. Due to the poorly defined outlets at Lake A12 as described by previous studies (Golder 2016), accurate discharge measurements were not possible, therefore neither a rating curve nor a discharge hydrograph were derived. Details of each site visit are provided in Table 3-2. The 2016 hydrograph (water surface elevation only) for Lake A12 are presented in Figure 3-2.

Table 3-2: Surveys at Lake A12 Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	To Lake A11		To Lake A76	
				Outlet	Discharge (m^3/s)	Outlet	Discharge (m^3/s)
10 Jun	None - Lake A12 and outlets frozen.	-	-	-	Frozen	-	Frozen
14 Jun	Measured discharge and water surface elevation, and installed data logger.	✓	148.88	-	Frozen	✓	0.051*
15 Aug	Measured discharge and water surface elevation. Downloaded data logger.	✓	148.84	✓	0.055*	✓	0.094*
17 Sep	Measured discharge and water surface elevation, and downloaded data logger.	✓	148.77	✓	0.0125**	✓	0.031*

masl = metres above sea level, m^3/s = cubic metres per second, * = discharge measurement associated with a high degree of uncertainty, ** = visually estimated

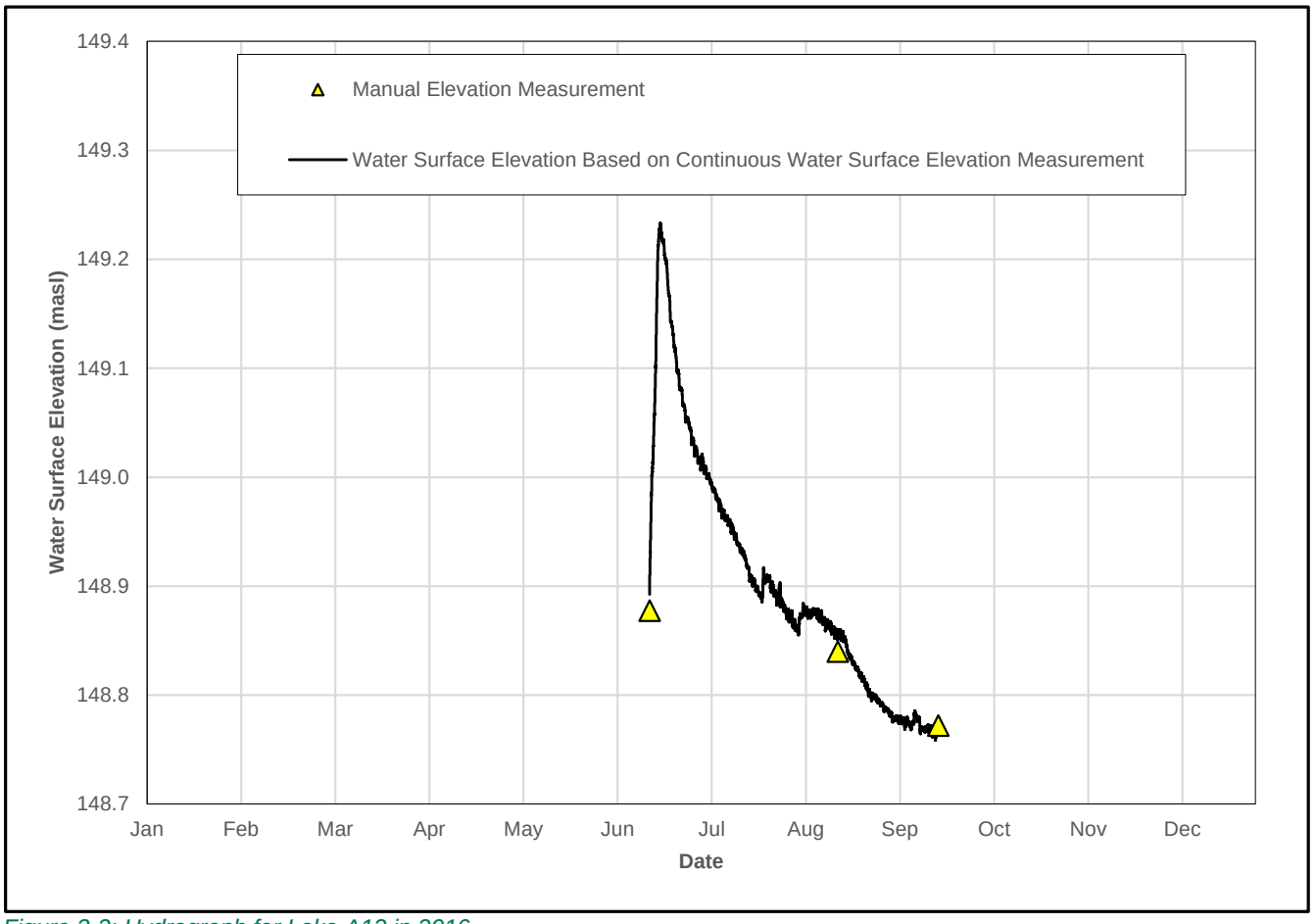


Figure 3-2: Hydrograph for Lake A12 in 2016

3.1.3 Lake A15

The Lake A15 hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 14 June to 17 September 2016, based on continuous logger data. Details of each site visit are provided in Table 3-3. The hydrographs for Lake A15 are presented in Figure 3-3.

Table 3-3: Surveys at Lake A15 Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	Outlet	Discharge (m^3/s)
10 Jun	None - Lake A15 and outlet frozen.	-	-	-	Frozen
14 Jun	Measured discharge and water surface elevation, and installed data logger.	✓	151.75	✓	0.549
15 Aug	Measured discharge and water surface elevation, and downloaded data logger.	✓	151.55	✓	0.198
17 Sep	Measured discharge and water surface elevation; removed and downloaded data logger.	✓	151.42	✓	0.0627

masl = metres above sea level, m^3/s = cubic metres per second

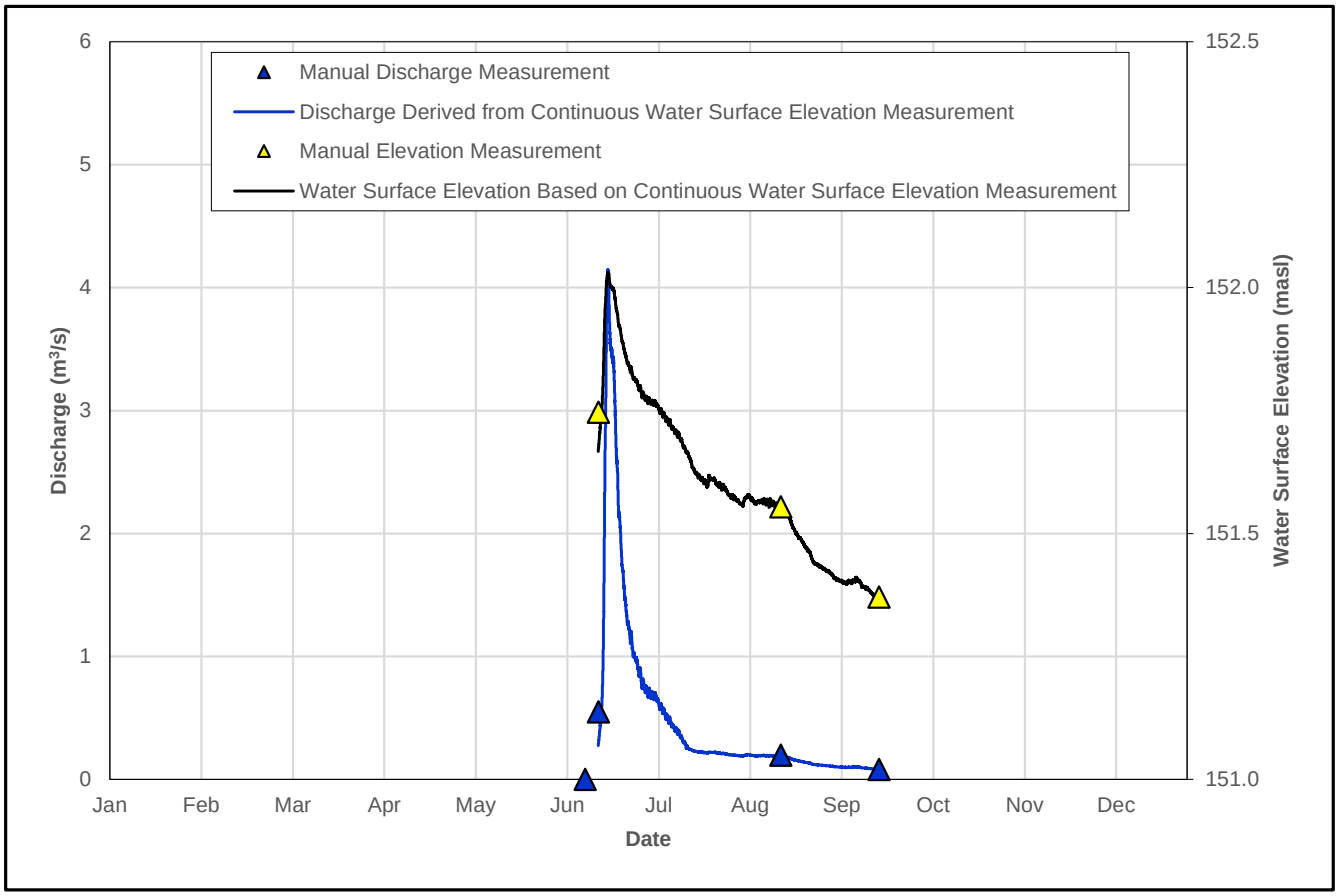


Figure 3-3: Hydrograph for Lake A15 in 2016

3.1.4 Lake A17 (Whale Tail Lake)

The Lake A17 (Whale Tail Lake) hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 14 June to 16 September 2016, based on continuous logger data. Issues with the velocity meter were encountered on 14 August 2016 at the Lake A17 (Whale Tail Lake) outlet, resulting in uncertainty with the estimated discharge. Details of each site visit are provided in Table 3-4. The hydrographs for Lake A17 are presented in Figure 3-4.

Table 3-4: Surveys at Lake A17 (Whale Tail Lake) Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	Outlet	Discharge (m^3/s)
10 Jun	None - Lake A17 and outlet are frozen.	-	-	-	Frozen
14 Jun	Installed data logger and measured water surface elevation.	✓	152.93	-	Frozen
14 Aug	Measured discharge and water surface elevation, and downloaded data logger.	✓	152.65	✓	0.441*
17 Sep	Measured discharge and water surface elevation; removed and downloaded data logger.	✓	152.62	✓	0.024

masl = metres above sea level, m^3/s = cubic metres per second, * = discharge measurement associated with uncertainty

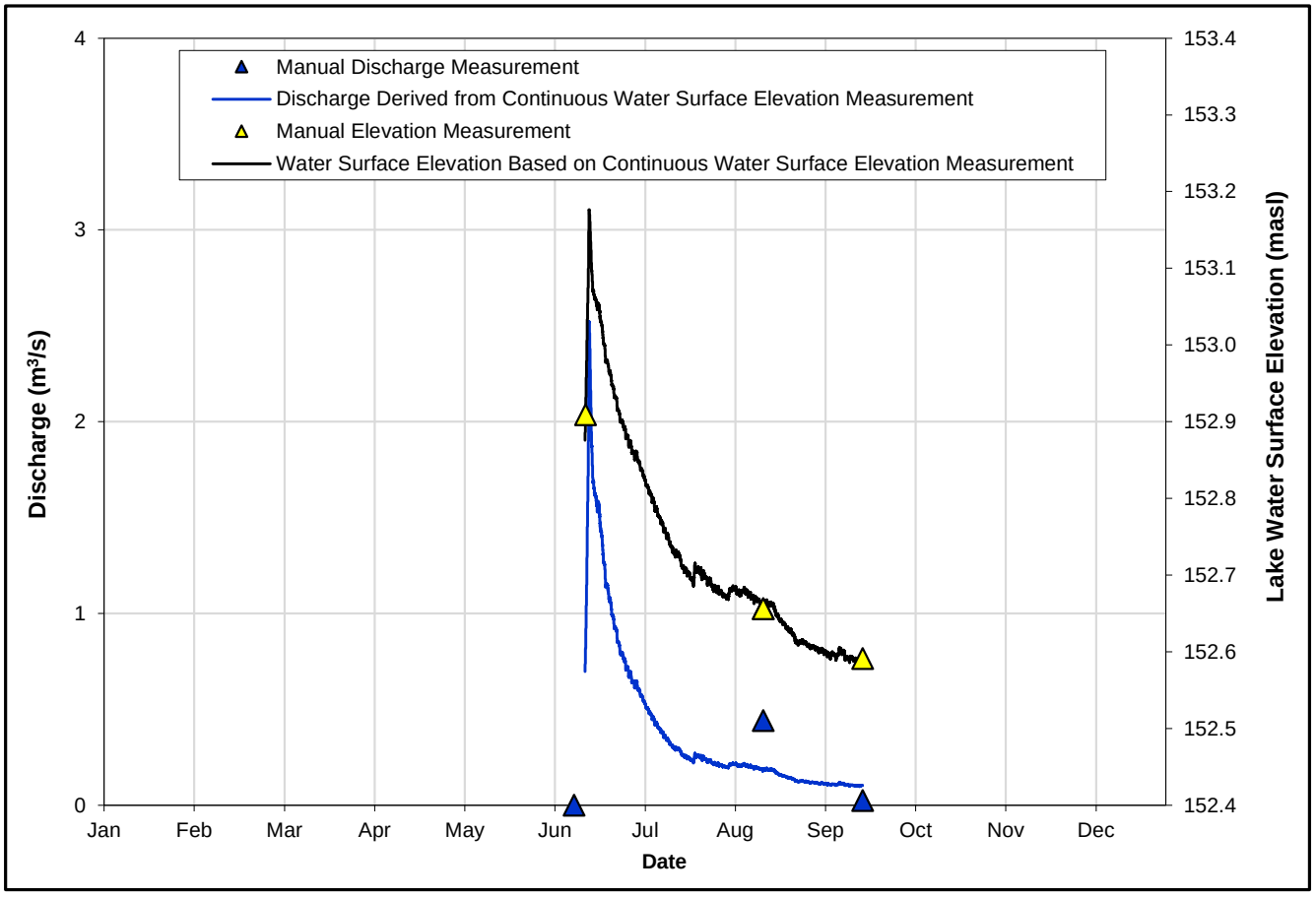


Figure 3-4: Hydrograph for Lake A17 (Whale Tail Lake) in 2016

3.1.5 Lake A18

The Lake A18 hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 13 June to 17 September 2016, based on continuous logger data. A 5 centimetre (cm) adjustment was made to the 2016 water surface elevations to account for a consistent discrepancy with benchmark survey elevations of the three separate surveys. Details of each site visit are provided in Table 3-5. The hydrographs for Lake A18 are presented in Figure 3-5.

Table 3-5: Surveys at Lake A18 Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	Outlet	Discharge (m^3/s)
10 Jun	None - Lake A18 and outlet are frozen.	-	-	-	Frozen
13 Jun	Measured discharge and water surface elevation, and installed data logger.	✓	154.03	✓	0.500
14 Aug	Measured discharge and water surface elevation, and downloaded data logger.	✓	153.82	✓	0.046
17 Sep	Measured discharge and water surface elevation; removed and downloaded data logger.	✓	153.76	✓	0.006

masl = metres above sea level, m^3/s = cubic metres per second

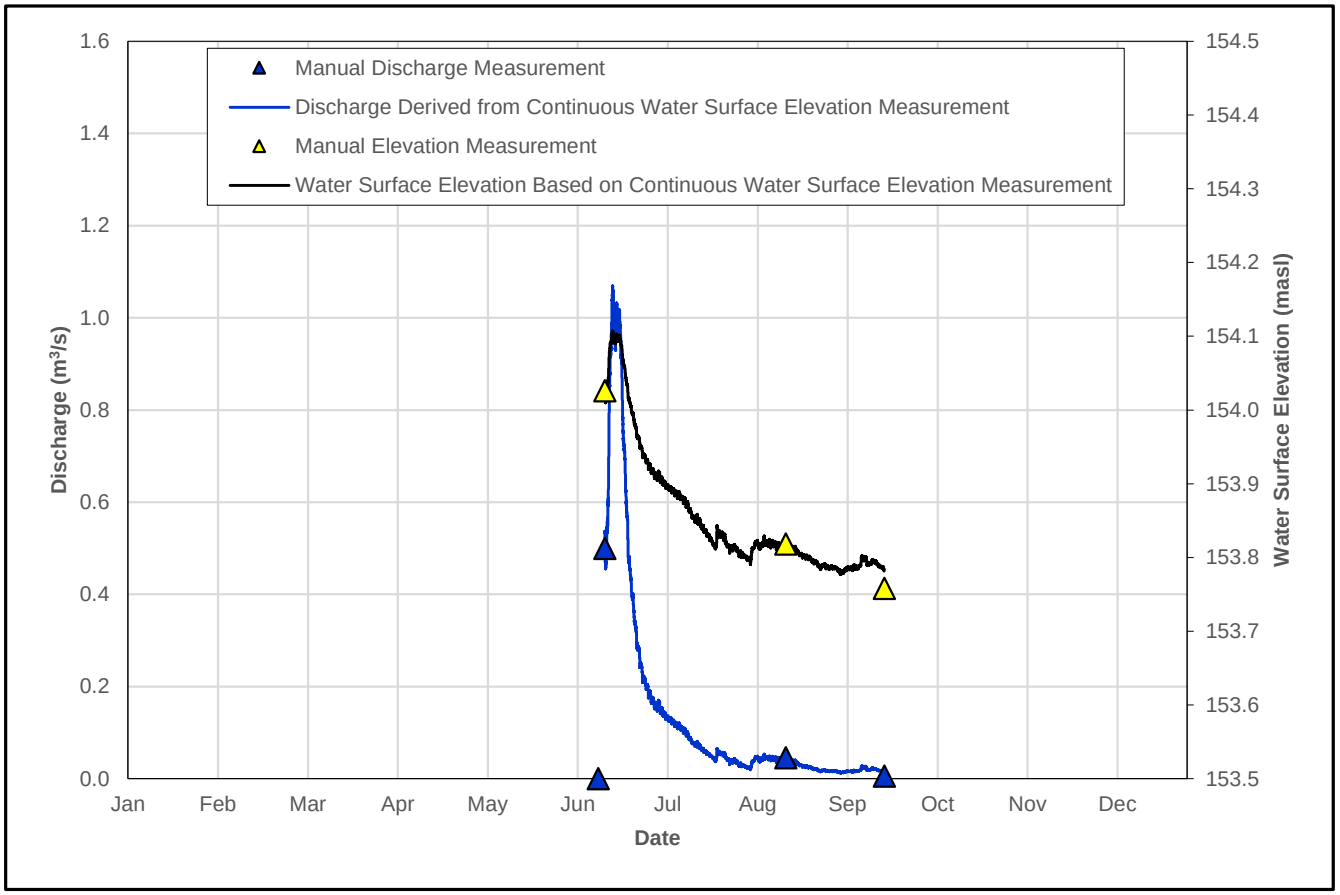


Figure 3-5: Hydrograph for Lake A18 in 2016

3.1.6 Lake A69

The Lake A69 hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 11 June to 15 September 2016, based on continuous logger data. Details of each site visit are provided in Table 3-6. The hydrographs for Lake A69 are presented in Figure 3-6.

Table 3-6: Surveys at Lake A69 Hydrometric Station, 2016

Date	Activities / Data Source	Lake	Lake Water Surface Elevation (masl)	Outflow	Discharge (m^3/s)
10 Jun	None - Lake A69 and outlet are frozen.	-	-	-	Frozen
11 Jun	Installed data logger. Measured discharge and water surface elevation.	✓	112.32	✓	1.10
13 Aug	Measured discharge and water surface elevation, and downloaded data logger.	✓	112.23	✓	0.521
15 Sep	Measured discharge and water surface elevation; removed and downloaded data logger.	✓	112.22	✓	0.537

masl = metres above sea level, m^3/s = cubic metres per second

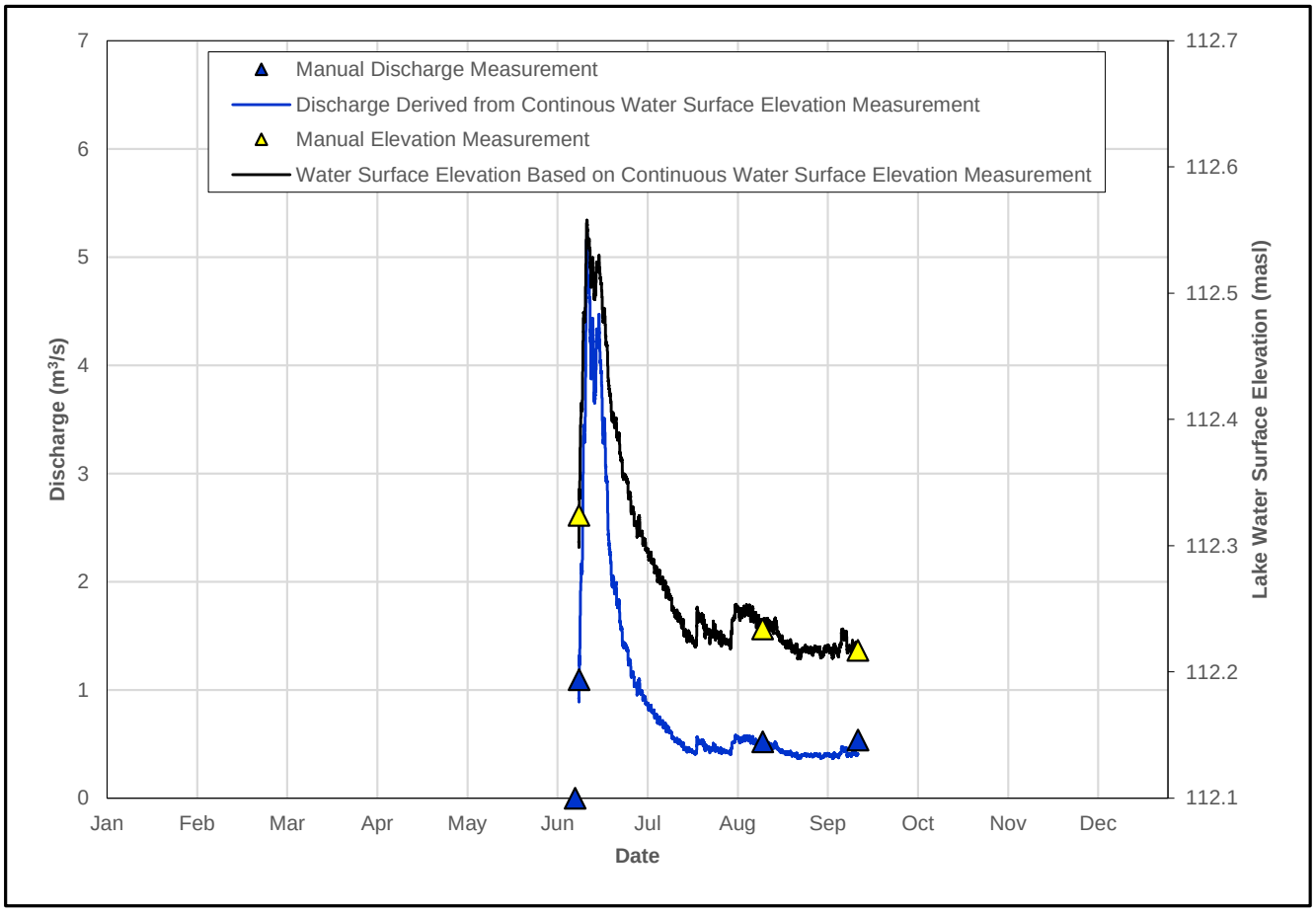


Figure 3-6: Hydrograph for Lake A69 in 2016

3.1.7 Lake A76

The Lake A76 hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 14 June to 15 September 2016, based on continuous logger data. Due to the poorly defined outlets at Lake A76 as described by previous studies (Golder 2016), accurate discharge measurements were not possible, therefore neither a rating curve nor a discharge hydrograph were derived. Very low shallow sub-surface discharges, through channel substrates, were observed at both lake outlets (i.e., to Lake A41 and to Lake A75) that were not measurable. Details of each site visit are provided in Table 3-7. The hydrograph (water surface elevation only) for Lake A76 are presented in Figure 3-7.

Table 3-7: Surveys at Lake A76 Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	To Lake A41		To Lake A75	
				Outlet	Discharge (m^3/s)	Outlet	Discharge (m^3/s)
10 Jun	None - Lake A76 and outlets are frozen.	-	-	-	Frozen	-	Frozen
14 Jun	Installed data logger. Outlets are frozen.	✓	147.56	-	Frozen	-	Frozen
15 Aug	Measured discharge and water surface elevation. Downloaded data logger.	✓	147.62	-	-*	-	-*
17 Sep	Measured discharge and water surface elevation, and downloaded data logger.	✓	147.45	-	-*	-	-*

masl = metres above sea level, m^3/s = cubic metres per second, * = discharge was only observed sub-surface and could not be measured

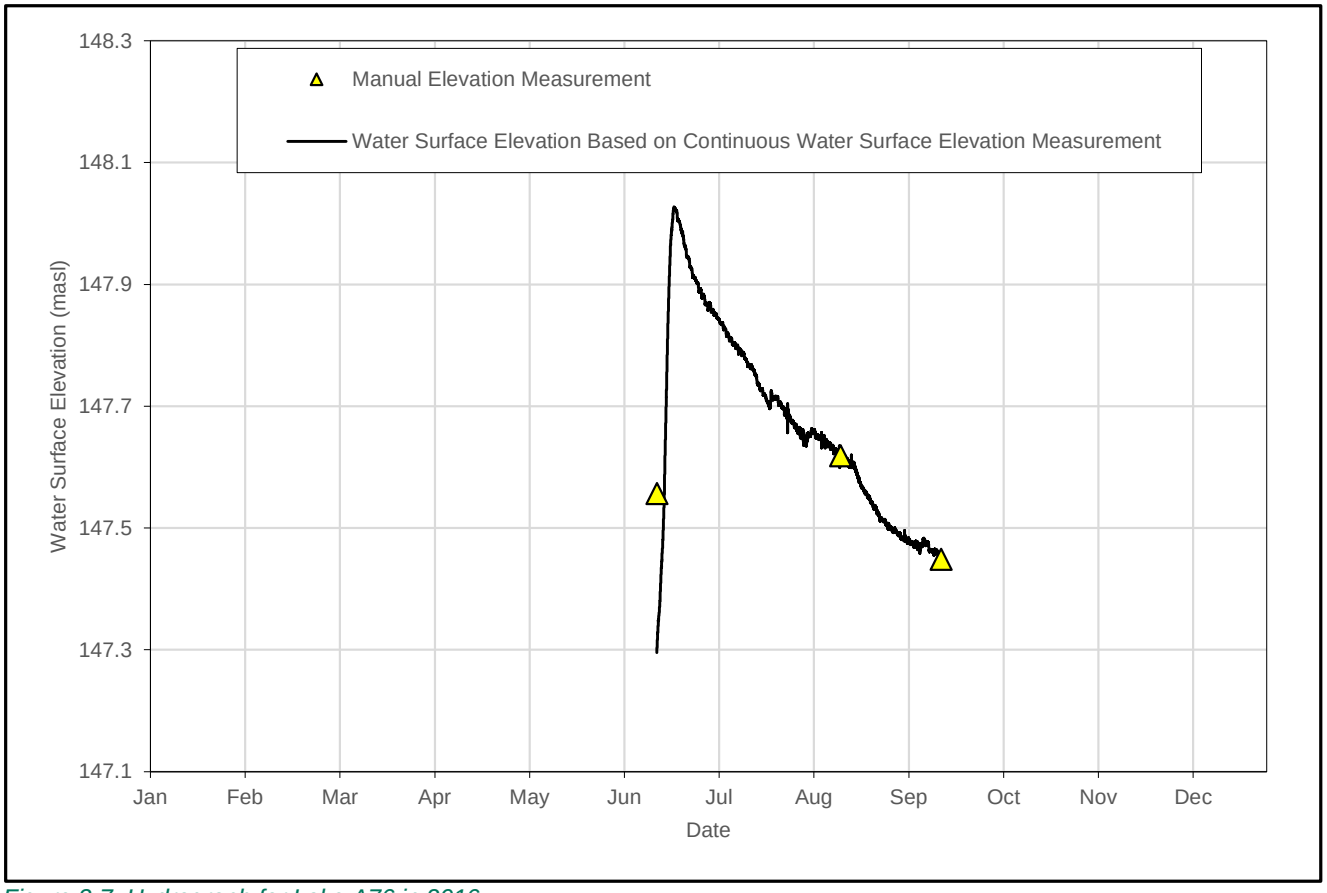


Figure 3-7: Hydrograph for Lake A76 in 2016

3.1.8 Lake C8

The Lake C8 hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 10 June to 15 September 2016, based on continuous logger data. Details of each site visit are provided in Table 3-8. The hydrographs for Lake C8 are presented in Figure 3-8.

Table 3-8: Surveys at Lake C8 Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	Outlet	Discharge (m^3/s)
10 Jun	None - Lake C8 and outlet are frozen.	-	Frozen	-	Frozen
12 Jun	Installed data logger. Measured discharge and water surface elevation.	✓	139.18	✓	0.673
14 Aug	Measured discharge and water surface elevation, and downloaded data logger.	✓	139.03	✓	0.133
15 Sep	Measured discharge and water surface elevation; removed and downloaded data logger.	✓	139.01	✓	0.068

masl = metres above sea level, m^3/s = cubic metres per second

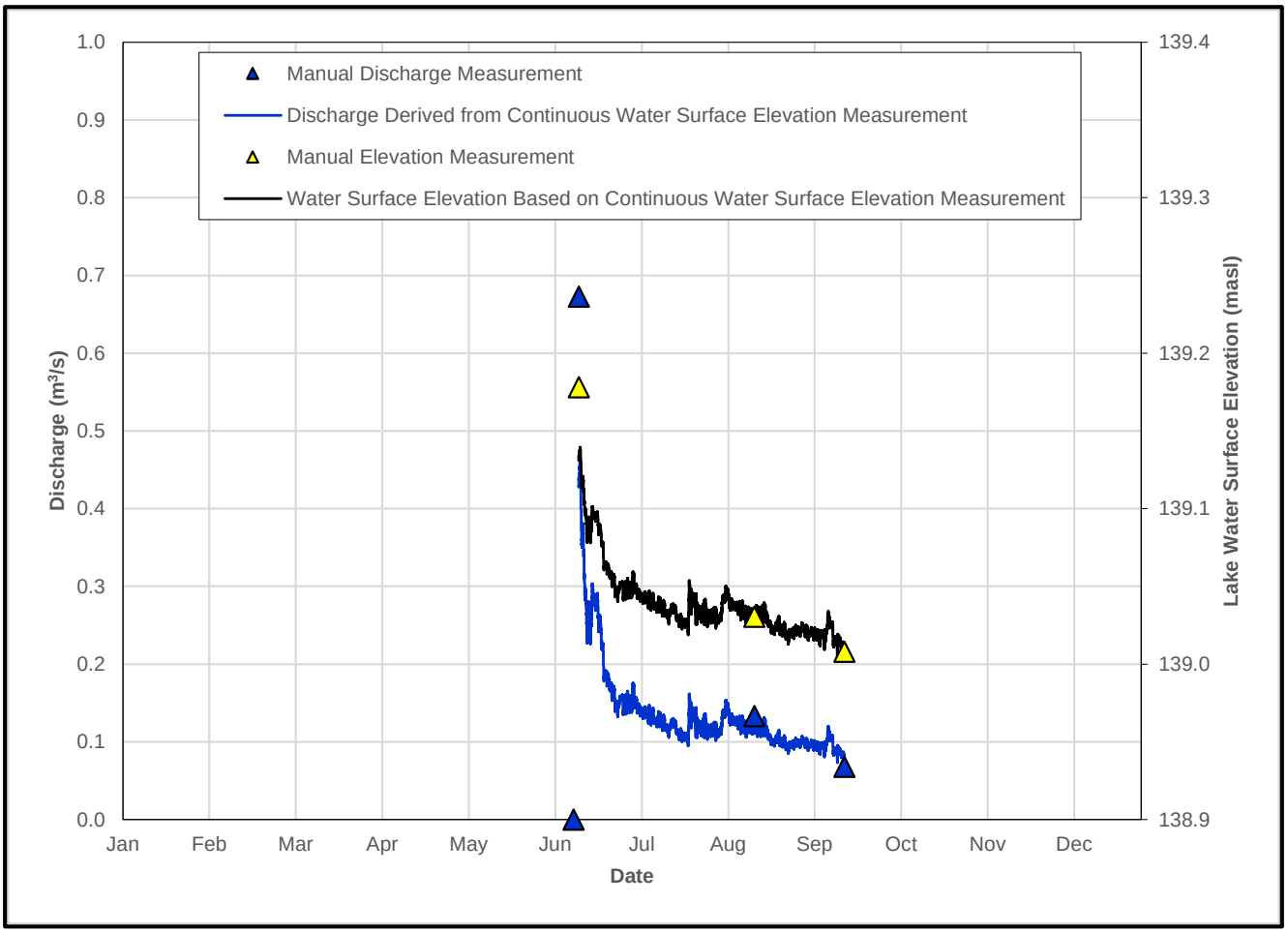


Figure 3-8: Hydrograph for Lake C8 in 2016

3.1.9 Lake C38 (Nemo Lake)

The Lake C38 (Nemo Lake) hydrometric station was visited four times in 2016, and a continuous hydrograph was derived for the period of 14 June to 15 September 2015, based on continuous logger data. Details of each site visit are provided in Table 3-9. The hydrographs for Lake C38 (Nemo Lake) are presented in Figure 3-9. Very low discharges were measured/observed in 14 August and 15 September 2016 which are associated with a degree of uncertainty. The discharge hydrograph was therefore derived primarily based on the 2015 rating curve (Golder 2016).

Table 3-9: Surveys at Lake C38 (Nemo Lake) Hydrometric Station, 2016

Date	Activities	Lake	Lake Water Surface Elevation (masl)	Outlet	Discharge (m^3/s)
10 Jun	Installed data logger. Measured water surface elevation.	✓	155.77	-	Frozen
14 Jun	Measured discharge and water surface elevation.	✓	155.92	✓	0.019
14 Aug	Measured discharge and water surface elevation, and downloaded data logger.	✓	155.80	✓	0.004*
15 Sep	Measured discharge and water surface elevation; removed and downloaded data logger.	✓	155.69	-	**

masl = metres above sea level, m^3/s = cubic metres per second, * = measurement may have been affected by windy conditions at the lake outlet and is expected to be underestimated, ** = very low discharge that could not be measured with velocity meter.

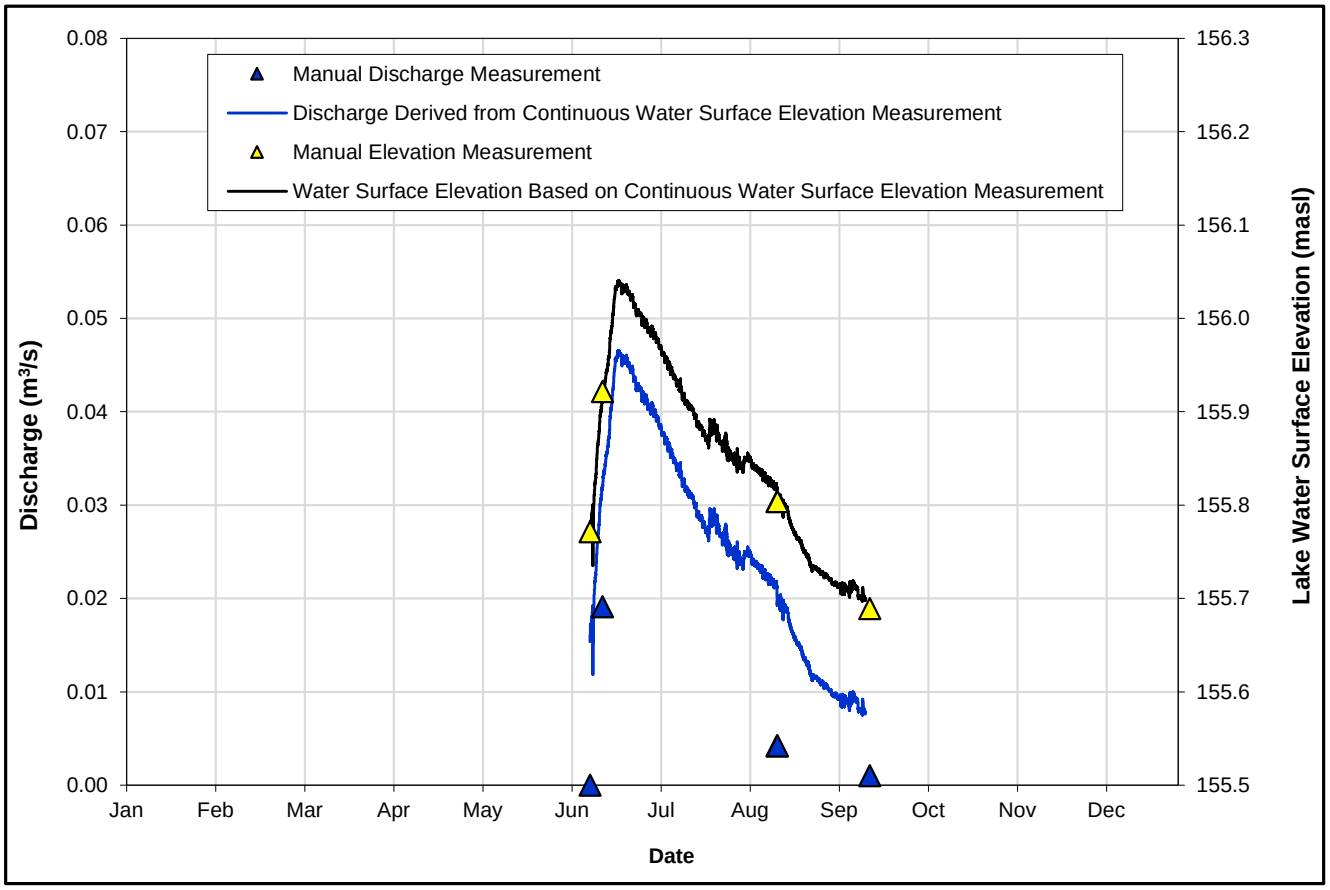


Figure 3-9: Hydrograph for Lake C38 (Nemo Lake) in 2016

3.1.10 Water Yields

Water yields for the open water season were calculated based on derived daily discharge values for stations with continuous hydrographs, and are presented in Table 3-10. The Lake A5 hydrograph was based on very low discharge measurements, and its derived runoff volume and water yield are associated with a high degree of uncertainty.

Table 3-10: Water Yield Values for the Continuous Stations over the Period of Record in 2016

Sub-Watershed	Watershed Area (km^2)	Hydrograph Period and Duration (number of days)	Runoff Volume (m^3)	Water Yield (mm)
Lake A5	57.6[a]	11 June to 15 September 2016 (97)	2,081,663	36.2[a]
Lake A12	42.4	14 June to 17 September 2016 (96)	[b]	[b]
Lake A15	40.8	13 June to 17 September 2016 (97)	3,996,618	97.9
Lake A17 (Whale Tail Lake)	28.1	14 June to 17 September 2016 (96)	3,229,668	115
Lake A18	8.89	13 June to 17 September 2016 (97)	1,123,850	27.1
Lake A69	43.4[c]	11 June to 15 September 2016 (97)	7,919,036	191[c]
Lake A76	2.9[d]	14 June to 15 September 2016 (94)	[b]	[b]
Lake C8	11.8	12 June to 15 September 2016 (96)	1,152,455	103
Lake C38 (Nemo Lake)	3.54	10 June to 14 September 2016 (97)	213,371	60.2

[a] inclusive of the Lake A76 sub-watershed (i.e., over the period of the record, it was assumed that all runoff from Lake A76 drained to Lake A41).

[b] a discharge hydrograph was not derived.

[c] exclusive of the Lake A76 sub-watershed (i.e., over the period of the record, it was assumed that all runoff from Lake A76 drained to Lake A41).

[d] exclusive of the Lake A12 sub-watershed (i.e., over the period of the record, it was assumed that all runoff from Lake A12 drained to Lake A11).

km^2 = square kilometres; m^3 = cubic metres; mm = millimetres

3.2 Manual Hydrometric Stations

Manual hydrometric measurements are summarized in Table 3-11.

Table 3-11: Manual Hydrometric Measurements

Lake Name	Date	Discharge (m^3/s)	Water Level (masl)	Comment
Lake A16	10-Jun-2016	Frozen	Frozen	
	16-Aug-2016	-[(a)]	152.25	
	16-Sep-2016	-[(a)]	152.12	
Lake A19	14-Jun-2016	0.6456	155.14	
	16-Aug-2016	-[(a)]	154.72	
	16-Sep-2016	-[(a)]	154.65	
Lake A21	13-Jun-2016	0.5727	155.18	
	16-Aug-2016	-[(a)]	154.76	
	16-Sep-2016	-[(a)]	154.70	
Lake A22	13-Jun-2016	0.6528	155.56	
	16-Aug-2016	-[(a)]	155.03	
	16-Sep-2016	-[(a)]	155.00	
Lake A45	10-Jun-2016	Frozen	Frozen	

Table 3-11: Manual Hydrometric Measurements (continued)

Lake Name	Date	Discharge (m^3/s)	Water Level (masl)	Comment
	14-Aug-2016	-(a)	-	Water level was not measured
	16-Sep-2016	-(a)	156.46	
Lake A53	14-Jun-2016	0.0959	Frozen	
	14-Aug-2016	0.0173	161.77	
	15-Sep-2016	0.0059	161.76	
Lake A55	12-Jun-2016	0.3521	155.30	
	16-Aug-2016	0.0349	155.07	
	18-Sep-2016	0.0179	155.04	
Lake A60	14-Jun-2016	Frozen	Frozen	
	16-Aug-2016	0.0013	170.59	
	18-Sep-2016	0.003	170.58	
Lake A62	14-Jun-2016	0.0875	155.52	
	15-Aug-2016	0	155.33	Dry outlet
	18-Sep-2016	0.0004	155.37	
Lake A63	14-Jun-2016	0.0688	154.68	
	15-Aug-2016	0.0018	154.52	
	18-Sep-2016	0.0022	154.51	
Lake A65	14-Jun-2016	Frozen	Frozen	
	16-Aug-2016	-(a)	-	Water level was not measured
	16-Sep-2016	-(a)	153.52	
Lake A72	10-Jun-2016	Frozen	Frozen	
	12-Jun-2016	4.00	117.91	
	13-Aug-2016	0.199	117.49	
	15-Sep-2015	0.101	117.45	
Lake A81	13-Jun-2016	2.616	120.19	
	16-Aug-2016	0.134	119.92	
	17-Sep-2016	0.0241	119.87	

masl = metres above sea level, m^3/s = cubic metres per second, (a) = discharge too low to measure, - = not available

4.0 CLOSURE

This report presents the results of a hydrology study completed Golder during open water conditions of 2016, for the area associated with the Project, and supplements previous baseline hydrology field studies (Golder 2016). Result presented herein were based on three field visits in June, August, and September 2016.

We trust that the content of this report meets your requirements. Please feel free to contact the undersigned should you have any questions or comments.

GOLDER ASSOCIATES LTD.

for:

Jordan Larkins, E.I.T. (Alberta)
Water Resources Engineer

Nathan Schmidt, Ph.D., P.Eng.
Principal, Senior Water Resources Engineer

Julien Lacrampe, P.Eng. (Alberta)
Water Resources Engineer

5.0 REFERENCES

Golder Associates Ltd. (Golder). 2016. Agnico Eagle Mines: Meadowbank Division – Whale Tail Pit Project. 2015 Hydrology Baseline Report. Submitted to Agnico Eagle Mines Limited, January 2016.

Terzi, R.A. (1981), Hydrometric Field Manual – Measurement of Streamflow, Environment Canada, Inland Waters Directorate, Water Resources Branch, Ottawa.

APPENDIX A

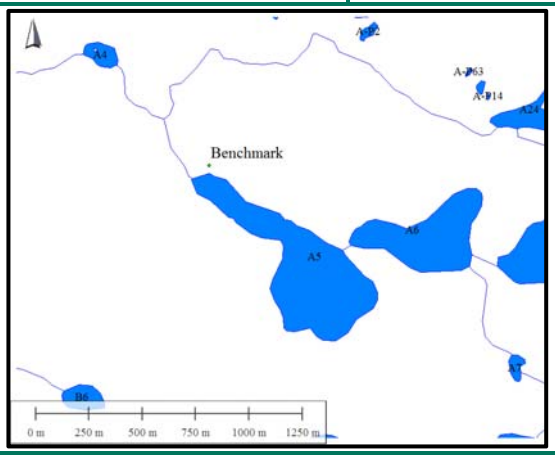
Hydrometric Stations

Table of Contents

FIGURES

A1.0 LAKE A5 & OUTLET (STREAM A5-A4)

Parameter	Value	Note
Benchmark Coordinates	600240 m E, 7260470 m N, 133.61 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel. Sub-surface flow present.	



Lake A5: Benchmark location.

11 June 2016. Downstream view of the watercourse (northwest).

13 August 2016. View of Lake A5 and outlet (south).

15 September 2016. Downstream view of the watercourse (northwest).

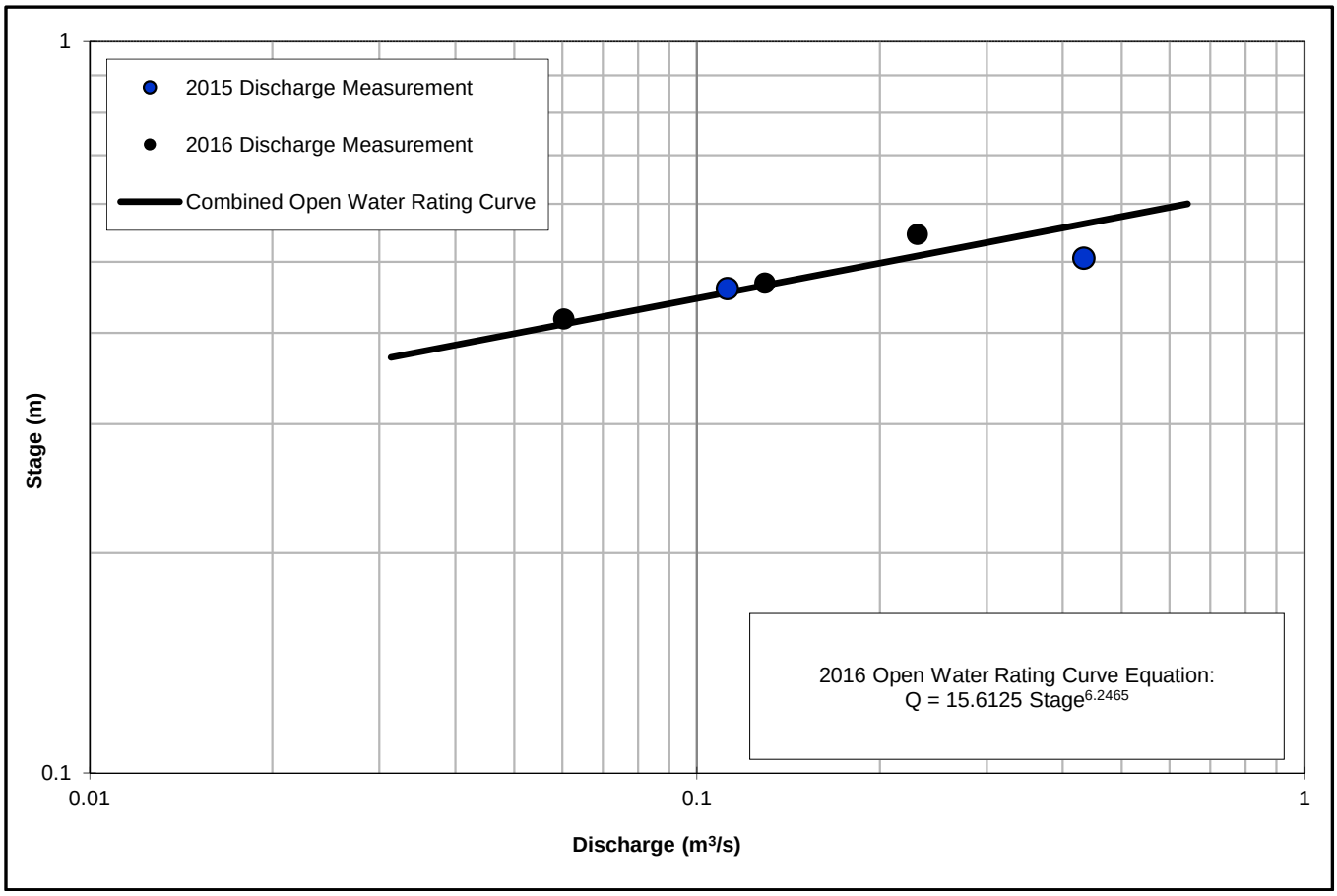


Figure A1: 2016 Stage-Discharge Rating Curve (Lake A5)

Lake A5 - 2016

MEAN DAILY DISCHARGE (m^3/s)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	0.368	0.141	0.099	-	-	-
2	-	-	-	-	-	-	0.343	0.147	0.094	-	-	-
3	-	-	-	-	-	-	0.318	0.163	0.094	-	-	-
4	-	-	-	-	-	-	0.298	0.171	0.092	-	-	-
5	-	-	-	-	-	-	0.275	0.162	0.091	-	-	-
6	-	-	-	-	-	-	0.261	0.160	0.085	-	-	-
7	-	-	-	-	-	-	0.245	0.161	0.091	-	-	-
8	-	-	-	-	-	-	0.232	0.157	0.084	-	-	-
9	-	-	-	-	-	-	0.217	0.154	0.091	-	-	-
10	-	-	-	-	-	-	0.208	0.153	0.094	-	-	-
11	-	-	-	-	-	0.183 P	0.197	0.149	0.085	-	-	-
12	-	-	-	-	-	0.228	0.192	0.145	0.077	-	-	-
13	-	-	-	-	-	0.235	0.179	0.141	0.073	-	-	-
14	-	-	-	-	-	0.218	0.169	0.144	0.072	-	-	-
15	-	-	-	-	-	0.203	0.168	0.145	0.073 P	-	-	-
16	-	-	-	-	-	0.198	0.169	0.141	-	-	-	-
17	-	-	-	-	-	0.250	0.155	0.140	-	-	-	-
18	-	-	-	-	-	1.00	0.151	0.137	-	-	-	-
19	-	-	-	-	-	1.68	0.146	0.133	-	-	-	-
20	-	-	-	-	-	1.52	0.143	0.129	-	-	-	-
21	-	-	-	-	-	1.24	0.141	0.124	-	-	-	-
22	-	-	-	-	-	1.05	0.159	0.122	-	-	-	-
23	-	-	-	-	-	0.873	0.153	0.122	-	-	-	-
24	-	-	-	-	-	0.727	0.150	0.117	-	-	-	-
25	-	-	-	-	-	0.616	0.157	0.112	-	-	-	-
26	-	-	-	-	-	0.534	0.153	0.110	-	-	-	-
27	-	-	-	-	-	0.501	0.149	0.113	-	-	-	-
28	-	-	-	-	-	0.450	0.147	0.108	-	-	-	-
29	-	-	-	-	-	0.415	0.154	0.105	-	-	-	-
30	-	-	-	-	-	0.383	0.151	0.099	-	-	-	-
31	-	-	-	-	-	-	0.142	0.102	-	-	-	-
MIN	-	-	-	-	-	0.183	0.141	0.099	0.072	-	-	-
MEAN	-	-	-	-	-	0.625	0.196	0.136	0.086	-	-	-
MAX	-	-	-	-	-	1.68	0.368	0.171	0.099	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

Water Yield (m^3) =	2,081,663	1,080,237	526,064	363,591	111,772
Water Yield (mm) =	36.2	52%	25%	17%	5%

Lake A5 - 2016
MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCT	NOV	DEC
1	-	-	-	-	-	-	132.349	132.271	132.245	-	-	-
2	-	-	-	-	-	-	132.343	132.274	132.241	-	-	-
3	-	-	-	-	-	-	132.336	132.282	132.241	-	-	-
4	-	-	-	-	-	-	132.331	132.285	132.240	-	-	-
5	-	-	-	-	-	-	132.324	132.281	132.239	-	-	-
6	-	-	-	-	-	-	132.319	132.280	132.234	-	-	-
7	-	-	-	-	-	-	132.314	132.281	132.239	-	-	-
8	-	-	-	-	-	-	132.310	132.279	132.233	-	-	-
9	-	-	-	-	-	-	132.304	132.277	132.239	-	-	-
10	-	-	-	-	-	-	132.301	132.277	132.241	-	-	-
11	-	-	-	-	-	132.287 P	132.297	132.275	132.234	-	-	-
12	-	-	-	-	-	132.308	132.295	132.273	132.227	-	-	-
13	-	-	-	-	-	132.311	132.289	132.271	132.223	-	-	-
14	-	-	-	-	-	132.304	132.284	132.272	132.223	-	-	-
15	-	-	-	-	-	132.299	132.284	132.273	132.223 P	-	-	-
16	-	-	-	-	-	132.297	132.285	132.270	-	-	-	-
17	-	-	-	-	-	132.316	132.278	132.270	-	-	-	-
18	-	-	-	-	-	132.432	132.276	132.269	-	-	-	-
19	-	-	-	-	-	132.500	132.273	132.267	-	-	-	-
20	-	-	-	-	-	132.489	132.272	132.264	-	-	-	-
21	-	-	-	-	-	132.466	132.270	132.261	-	-	-	-
22	-	-	-	-	-	132.449	132.280	132.260	-	-	-	-
23	-	-	-	-	-	132.430	132.277	132.260	-	-	-	-
24	-	-	-	-	-	132.412	132.275	132.257	-	-	-	-
25	-	-	-	-	-	132.396	132.279	132.254	-	-	-	-
26	-	-	-	-	-	132.382	132.277	132.253	-	-	-	-
27	-	-	-	-	-	132.377	132.274	132.254	-	-	-	-
28	-	-	-	-	-	132.367	132.274	132.251	-	-	-	-
29	-	-	-	-	-	132.359	132.278	132.249	-	-	-	-
30	-	-	-	-	-	132.352	132.276	132.245	-	-	-	-
31	-	-	-	-	-	132.349	132.271	132.247	-	-	-	-
MIN	-	-	-	-	-	132.287	132.270	132.245	132.223	-	-	-
MEAN	-	-	-	-	-	132.375	132.293	132.267	132.235	-	-	-
MAX	-	-	-	-	-	132.500	132.349	132.285	132.245	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

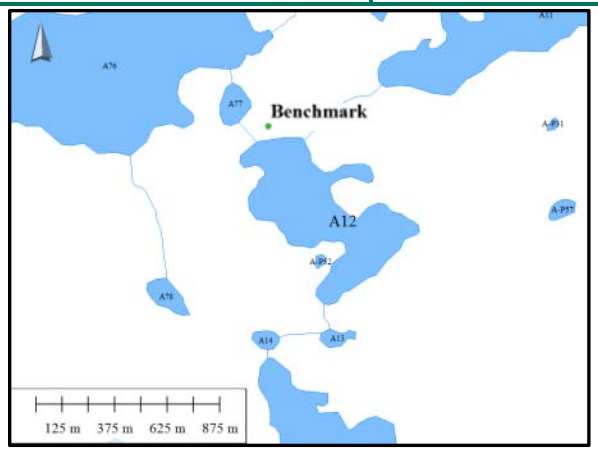
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	11-Jun-2016	
Waterbody:		Lake A5			**Start Time**	10:25	
Crossing ID:		A5-A4			**End Time**	10:40	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	600175	BM_read			**Transducer SN:**		
North	7260420	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.220**
2	2.00	0.22		0.15		**0.042**	**0.125**
3	2.50	0.28		0.08		**0.011**	**0.110**
4	3.00	0.16		0.12		**0.010**	**0.055**
5	3.50	0.06		0.10		**0.003**	**0.060**
6	4.00	0.18		0.05		**0.005**	**0.078**
7	4.50	0.13		0.05		**0.003**	**0.078**
8	5.00	0.18		0.11		**0.010**	**0.093**
9	5.50	0.19		0.20		**0.019**	**0.083**
10	6.00	0.14		0.15		**0.010**	**0.083**
11	6.50	0.19		0.11		**0.011**	**0.105**
12	7.00	0.23		0.03		**0.003**	**0.068**
13	7.50	0.04		0.02		**0.000**	**0.040**
14	8.00	0.12		0.05		**0.003**	**0.075**
15	8.50	0.18		0.19		**0.017**	**0.058**
16	9.00	0.05		0.19		**0.005**	**0.023**
17	9.50	0.04		0.16		**0.003**	**0.040**
18	10.00	0.12		0.16		**0.009**	**0.075**
19	10.50	0.18		0.11		**0.010**	**0.065**
20	11.00	0.08		0.13		**0.005**	**0.040**
21	11.50	0.08		0.06		**0.002**	**0.050**
22	12.00	0.12		0.03		**0.002**	**0.105**
23	12.50	0.30		0.11		**0.016**	**0.115**
24	13.00	0.16		0.16		**0.013**	**0.065**
25	13.50	0.10		0.15		**0.007**	**0.073**
26	14.00	0.19		0.12		**0.011**	**0.068**
27	14.50	0.08		0.04		**0.001**	**0.012**
28	14.80	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.230**
						A(m2)	**2.06**
						B(m)	**14.8**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	13-Aug-16	
Waterbody:		Lake A5			**Start Time**	17:13	
Crossing ID:		A5-A4			**End Time**	18:00	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	600175	BM_read			**Transducer SN:**		
North	7260420	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.050**
2	1.00	0.10		0.06		**0.006**	**0.040**
3	1.80	0.00		0.09		**0.000**	**0.005**
4	2.00	0.05		0.14		**0.001**	**0.003**
5	2.10	0.00		0.15		**0.000**	**0.015**
6	2.60	0.06		0.07		**0.002**	**0.006**
7	2.80	0.00		-0.09		**0.000**	**0.012**
8	3.10	0.08		0.02		**0.000**	**0.040**
9	3.50	0.12		0.09		**0.004**	**0.024**
10	3.90	0.00		0.08		**0.000**	**0.015**
11	4.50	0.05		0.05		**0.003**	**0.147**
12	6.60	0.09		0.13		**0.014**	**0.018**
13	7.00	0.00		-0.14		**0.000**	**0.006**
14	7.20	0.06		0.18		**0.003**	**0.009**
15	7.50	0.00		0.19		**0.000**	**0.012**
16	7.80	0.08		0.21		**0.005**	**0.024**
17	8.10	0.08		0.08		**0.002**	**0.024**
18	8.30	0.16		0.07		**0.004**	**0.066**
19	8.90	0.06		0.29		**0.012**	**0.096**
20	9.70	0.18		0.20		**0.018**	**0.018**
21	9.90	0.00		-0.08		**0.000**	**0.042**
22	10.50	0.14		0.25		**0.018**	**0.038**
23	10.90	0.05		0.28		**0.006**	**0.036**
24	11.30	0.13		0.12		**0.007**	**0.033**
25	11.80	0.00		-0.21		**0.000**	**0.000**
26	12.10	0.00		0.25		**0.000**	**0.000**
27	12.30	0.00		-0.04		**0.000**	**0.006**
28	12.50	0.06		0.25		**0.004**	**0.009**
29	12.80	0.00		0.01		**0.000**	**0.030**
30	13.30	0.12		0.09		**0.007**	**0.099**
31	14.20	0.10		0.19		**0.011**	**0.015**
32	14.50	0.00		-0.14		**0.000**	**0.009**
33	14.80	0.06		0.00		**0.000**	**0.040**
34	15.30	0.10		0.01		**0.000**	**0.018**
35	15.50	0.08		0.02		**0.000**	**0.014**
36	15.70	0.06		0.16		**0.001**	**0.003**
37	15.80	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.129**
						A(m2)	**1.02**
						B(m)	**15.8**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 3			**Date**		15-Sep-16	
Waterbody:		Lake A5			**Start Time**		12:32	
Crossing ID:		A5-A4			**End Time**		13:04	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	600175	BM_read			**Transducer SN:**			
North	7260420	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.015**
2	0.50	0.06		0.09			**0.002**	**0.009**
3	0.80	0.00		0.00			**0.000**	**0.027**
4	1.70	0.06		0.09			**0.003**	**0.009**
5	2.00	0.00		-0.01			**0.000**	**0.009**
6	2.30	0.06		0.10			**0.001**	**0.006**
7	2.40	0.06		-0.01			**0.000**	**0.014**
8	2.70	0.03		0.08			**0.001**	**0.050**
9	3.20	0.17		0.05			**0.003**	**0.017**
10	3.40	0.00		0.00			**0.000**	**0.008**
11	3.80	0.04		0.09			**0.002**	**0.035**
12	4.50	0.06		0.14			**0.006**	**0.048**
13	5.30	0.06		0.26			**0.012**	**0.064**
14	6.10	0.10		0.14			**0.009**	**0.045**
15	6.60	0.08		0.08			**0.003**	**0.048**
16	7.10	0.11		0.06			**0.002**	**0.017**
17	7.20	0.22		0.10			**0.003**	**0.034**
18	7.40	0.12		0.03			**0.001**	**0.056**
19	7.80	0.16		0.09			**0.006**	**0.048**
20	8.20	0.08		0.07			**0.002**	**0.018**
21	8.50	0.04		0.11			**0.001**	**0.014**
22	8.80	0.05		0.19			**0.003**	**0.014**
23	9.10	0.04		-0.11			**-0.001**	**0.006**
24	9.40	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.060**	
						A(m2)	**0.61**	
						B(m)	**9.4**	

A2.0 LAKE A12 & NORTHEAST OUTLET (STREAM A12-A11)

Parameter	Value	Note
Benchmark Coordinates	602835 m E, 7256612 m N, 149.82 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel. Sub surface flows present. Outlet was frozen during June 2016 trip.	



Lake A12.

13 June 2016. Downstream view of frozen outlet from Lake A12 (northeast).

17 September 2016. Upstream view of the watercourse (southwest).

17 September 2016. Downstream view of the watercourse (northeast).

Lake A12 - 2016

MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCT	NOV	DEC
1	-	-	-	-	-	-	148.962	148.811	148.731	-	-	-
2	-	-	-	-	-	-	148.956	148.809	148.726	-	-	-
3	-	-	-	-	-	-	148.950	148.820	148.726	-	-	-
4	-	-	-	-	-	-	148.944	148.826	148.725	-	-	-
5	-	-	-	-	-	-	148.936	148.822	148.724	-	-	-
6	-	-	-	-	-	-	148.930	148.822	148.722	-	-	-
7	-	-	-	-	-	-	148.922	148.824	148.723	-	-	-
8	-	-	-	-	-	-	148.916	148.823	148.720	-	-	-
9	-	-	-	-	-	-	148.910	148.820	148.725	-	-	-
10	-	-	-	-	-	-	148.907	148.818	148.727	-	-	-
11	-	-	-	-	-	-	148.902	148.814	148.720	-	-	-
12	-	-	-	-	-	-	148.895	148.812	148.716	-	-	-
13	-	-	-	-	-	-	148.888	148.808	148.717	-	-	-
14	-	-	-	-	-	148.877 P	148.881	148.805	148.716	-	-	-
15	-	-	-	-	-	148.957	148.876	148.804	148.714	-	-	-
16	-	-	-	-	-	149.051	148.868	148.802	148.712	-	-	-
17	-	-	-	-	-	149.161	148.857	148.799	148.714 P	-	-	-
18	-	-	-	-	-	149.170	148.852	148.791	-	-	-	-
19	-	-	-	-	-	149.153	148.847	148.783	-	-	-	-
20	-	-	-	-	-	149.128	148.842	148.778	-	-	-	-
21	-	-	-	-	-	149.095	148.841	148.773	-	-	-	-
22	-	-	-	-	-	149.072	148.856	148.768	-	-	-	-
23	-	-	-	-	-	149.051	148.855	148.763	-	-	-	-
24	-	-	-	-	-	149.032	148.849	148.758	-	-	-	-
25	-	-	-	-	-	149.018	148.843	148.752	-	-	-	-
26	-	-	-	-	-	149.003	148.838	148.746	-	-	-	-
27	-	-	-	-	-	148.996	148.837	148.746	-	-	-	-
28	-	-	-	-	-	148.983	148.830	148.743	-	-	-	-
29	-	-	-	-	-	148.973	148.823	148.740	-	-	-	-
30	-	-	-	-	-	148.965	148.821	148.737	-	-	-	-
31	-	-	-	-	-	-	148.817	148.734	-	-	-	-
MIN	-	-	-	-	-	148.877	148.817	148.734	148.712	-	-	-
MEAN	-	-	-	-	-	149.036	148.879	148.789	148.721	-	-	-
MAX	-	-	-	-	-	149.170	148.962	148.826	148.731	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**		15-Aug-16
Waterbody:		Lake A12			**Start Time**		13:11
Crossing ID:		A12-A11			**End Time**		13:43
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	603050	BM_read			**Transducer SN:**		
North	7256605	WL_read			**Meter Type/SN:**		Flow Tracker
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	

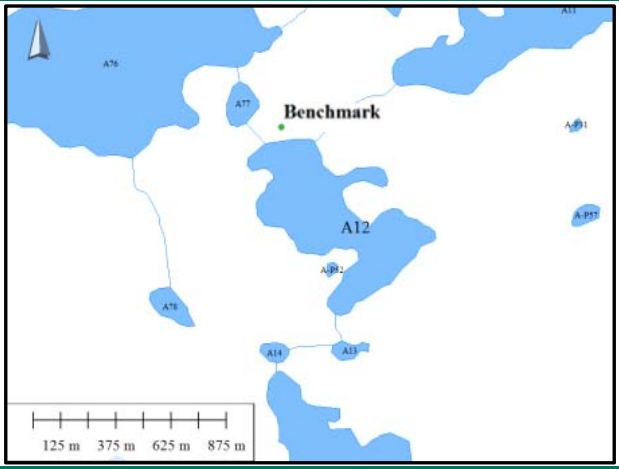
STATION Start LDB	DISTANCE FROM LDB (m)	DEPTH (m)	Velocity 0.2 DEPTH (m/s)	Velocity 0.6/0.8 DEPTH (m/s)	Optional ANGLE OF FLOW (º)	Qi (m3/s)	Ai (m2)
1	0.00	0.00		0.00			**0.015**
2	0.20	0.15		0.12		**0.004**	**0.015**
3	0.40	0.00		0.00		**0.000**	**0.004**
4	0.60	0.04		0.01		**0.000**	**0.004**
5	0.80	0.00		0.00		**0.000**	**0.020**
6	1.00	0.20		-0.02		**-0.001**	**0.040**
7	1.20	0.20		-0.02		**-0.001**	**0.039**
8	1.40	0.19		0.10		**0.004**	**0.031**
9	1.60	0.12		0.19		**0.005**	**0.032**
10	1.80	0.20		0.17		**0.007**	**0.034**
11	2.00	0.14		0.21		**0.006**	**0.014**
12	2.20	0.00		-0.01		**0.000**	**0.014**
13	2.40	0.14		0.00		**0.000**	**0.042**
14	2.60	0.28		0.17		**0.010**	**0.046**
15	2.80	0.18		0.23		**0.008**	**0.018**
16	3.00	0.00		0.00		**0.000**	**0.008**
17	3.20	0.08		0.15		**0.002**	**0.013**
18	3.40	0.05		0.18		**0.002**	**0.011**
19	3.60	0.06		0.06		**0.001**	**0.006**
20	3.80	0.00		0.00		**0.000**	**0.063**
21	4.50	0.18		0.00		**0.000**	**0.136**
22	5.30	0.16		0.00		**0.000**	**0.128**
23	6.10	0.16		0.00		**-0.001**	**0.168**
24	6.90	0.26		0.02		**0.005**	**0.168**
25	7.70	0.16		0.04		**0.004**	**0.064**
26	8.10	0.16		0.00		**0.000**	**0.048**
27	8.70	0.00		0.00		**0.000**	**0.000**

NOTES:		RESULTS:	
Discharge measurement associated with a high degree of uncertainty due to sub-surface flow.		**Q (m3/s)**	**0.055**
		A(m2)	**1.18**
		B(m)	**8.7**

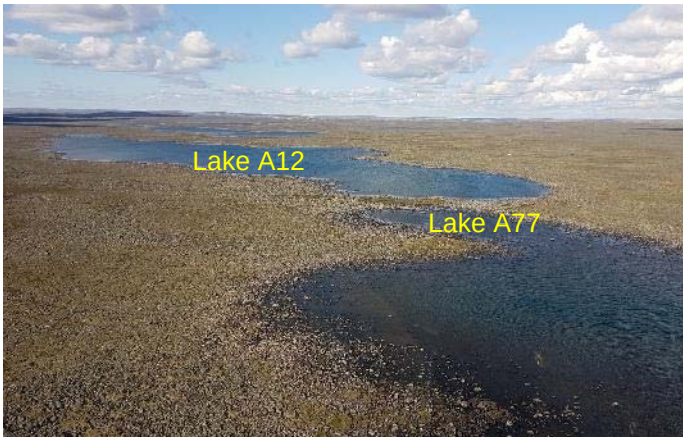
OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 3			**Date**		17-Sep-16	
Waterbody:		Lake A12			**Start Time**		12:32	
Crossing ID:		A12-A11			**End Time**		12:45	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	603050	BM_read			**Transducer SN:**			
North	7256605	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.020**
2	0.40	0.10		0.04			**0.001**	**0.015**
3	0.60	0.05		0.03			**0.000**	**0.011**
4	0.90	0.02		0.01			**0.000**	**0.008**
5	1.10	0.06		0.05			**0.001**	**0.026**
6	1.50	0.07		0.11			**0.004**	**0.030**
7	2.00	0.05		0.19			**0.004**	**0.015**
8	2.30	0.05		0.00			**0.000**	**0.023**
9	2.60	0.10		0.05			**0.002**	**0.021**
10	2.90	0.04		0.08			**0.001**	**0.006**
11	3.20	0.00		0.00			**0.000**	**0.000**
NOTES:	Discharge measurement associated with a high degree of uncertainty due to sub-surface flow.				**RESULTS:**	**Q (m3/s)**	**0.013**	
						A(m2)	**0.17**	
						B(m)	**3.2**	

A3.0 LAKE A12 & NORTHEAST OUTLET (STREAM A12-A77)

Parameter	Value	Note
Benchmark Coordinates	602835 m E, 7256612 m N, 149.82 masl	NAD83 Zone 14
Comment	Poorly defined boulder garden channels.	



Lake A12.



16 August 2016. Upstream view from Lake A76 to Lake A12 (south).

16 August 2016. View of the outlet (east).

17 September 2016. Downstream view of the watercourse (north)

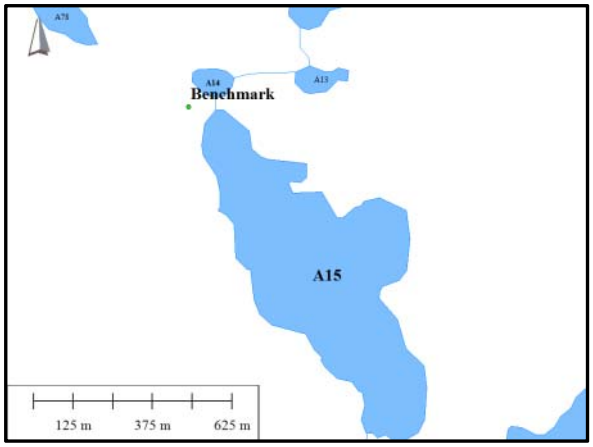
OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 1			**Date**		14-Jun-16	
Waterbody:		Lake A12			**Start Time**		11:29	
Crossing ID:		A12-A77			**End Time**		11:42	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	602770	BM_read			**Transducer SN:**			
North	7256635	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.025**
2	0.50	0.10		0.07			**0.003**	**0.015**
3	0.80	0.00		0.24			**0.000**	**0.012**
4	1.10	0.08		0.07			**0.001**	**0.012**
5	1.30	0.04		0.23			**0.002**	**0.004**
6	1.50	0.00		0.02			**0.000**	**0.025**
7	2.00	0.10		0.13			**0.007**	**0.055**
8	2.50	0.12		0.16			**0.010**	**0.080**
9	3.00	0.20		0.21			**0.021**	**0.095**
10	3.50	0.18		0.08			**0.006**	**0.027**
11	3.80	0.00		0.01			**0.000**	**0.009**
12	4.10	0.06		0.05			**0.001**	**0.055**
13	4.60	0.16		0.01			**0.001**	**0.040**
14	5.10	0.00		0.00			**0.000**	**0.000**
15	5.60	0.00		0.00			**0.000**	**0.000**
NOTES:	Discharge measurement associated with a high degree of uncertainty due to sub-surface flow.				**RESULTS:**	**Q (m3/s)**	**0.051**	
						A(m2)	**0.45**	
						B(m)	**5.6**	

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 2			**Date**		15-Aug-16	
Waterbody:		Lake A12			**Start Time**		11:17	
Crossing ID:		A12-A77			**End Time**		11:48	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	602770	BM_read			**Transducer SN:**			
North	7256635	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.020**
2	0.20	0.20		0.12			**0.005**	**0.046**
3	0.40	0.26		0.03			**0.002**	**0.044**
4	0.60	0.18		0.03			**0.001**	**0.037**
5	0.80	0.19		0.10			**0.004**	**0.043**
6	1.00	0.24		0.05			**0.003**	**0.064**
7	1.20	0.40		0.02			**0.002**	**0.105**
8	1.50	0.30		0.37			**0.028**	**0.062**
9	1.70	0.32		0.16			**0.013**	**0.071**
10	2.00	0.15		0.17			**0.005**	**0.008**
11	2.10	0.00		0.00			**0.000**	**0.016**
12	2.30	0.16		0.04			**0.002**	**0.765**
13	2.80	2.90		0.01			**0.029**	**1.475**
14	3.80	0.05		0.00			**0.000**	**0.050**
15	4.80	0.05		0.02			**0.001**	**0.100**
16	5.80	0.15		0.00			**0.000**	**0.015**
17	6.00	0.00		0.00			**0.000**	**0.000**
NOTES:	Discharge measurement associated with a high degree of uncertainty due to sub-surface flow.				**RESULTS:**	**Q (m3/s)**	**0.094**	
						A(m2)	**2.92**	
						B(m)	**6.0**	

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**	17-Sep-16	
Waterbody:		Lake A12			**Start Time**	13:14	
Crossing ID:		A12-A77			**End Time**	13:42	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	602770	BM_read			**Transducer SN:**		
North	7256635	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
0.00	0.00		0.00			**0.012**	0.00
0.40	0.06		0.02		**0.000**	**0.012**	0.40
0.60	0.06		0.00		**0.000**	**0.016**	0.60
0.80	0.10		0.07		**0.002**	**0.032**	0.80
1.20	0.06		0.04		**0.001**	**0.006**	1.20
1.30	0.06		0.18		**0.001**	**0.006**	1.30
1.40	0.06		0.19		**0.001**	**0.007**	1.40
1.50	0.08		0.10		**0.001**	**0.009**	1.50
1.60	0.10		0.13		**0.001**	**0.012**	1.60
1.70	0.14		0.13		**0.002**	**0.015**	1.70
1.80	0.16		0.16		**0.003**	**0.016**	1.80
1.90	0.16		0.08		**0.001**	**0.017**	1.90
2.00	0.18		0.05		**0.001**	**0.019**	2.00
2.10	0.20		0.10		**0.002**	**0.019**	2.10
2.20	0.18		0.31		**0.006**	**0.015**	2.20
2.30	0.12		0.31		**0.004**	**0.012**	2.30
2.40	0.12		0.19		**0.002**	**0.012**	2.40
2.50	0.12		0.17		**0.002**	**0.011**	2.50
2.60	0.10		0.05		**0.002**	**0.025**	2.60
3.10	0.00		0.00		**0.000**	**0.000**	3.10
NOTES:	Discharge measurement associated with a high degree of uncertainty due to sub-surface flow.				**RESULTS:**	**Q (m3/s)**	**0.031**
						A(m2)	**0.27**
						B(m)	**3.1**

A4.0 LAKE A15 & OUTLET (STREAM A15-A14)

Parameter	Value	Note
Benchmark Coordinates	602802m E 7255565 m N, 152.64 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel.	



Lake A15: Benchmark location.

14 June 2016. Downstream view of the watercourse (east).

13 August 2016. View of Lake A15, Lake A14, and Lake A13 (west).

17 September 2016. Upstream view of the watercourse (west).

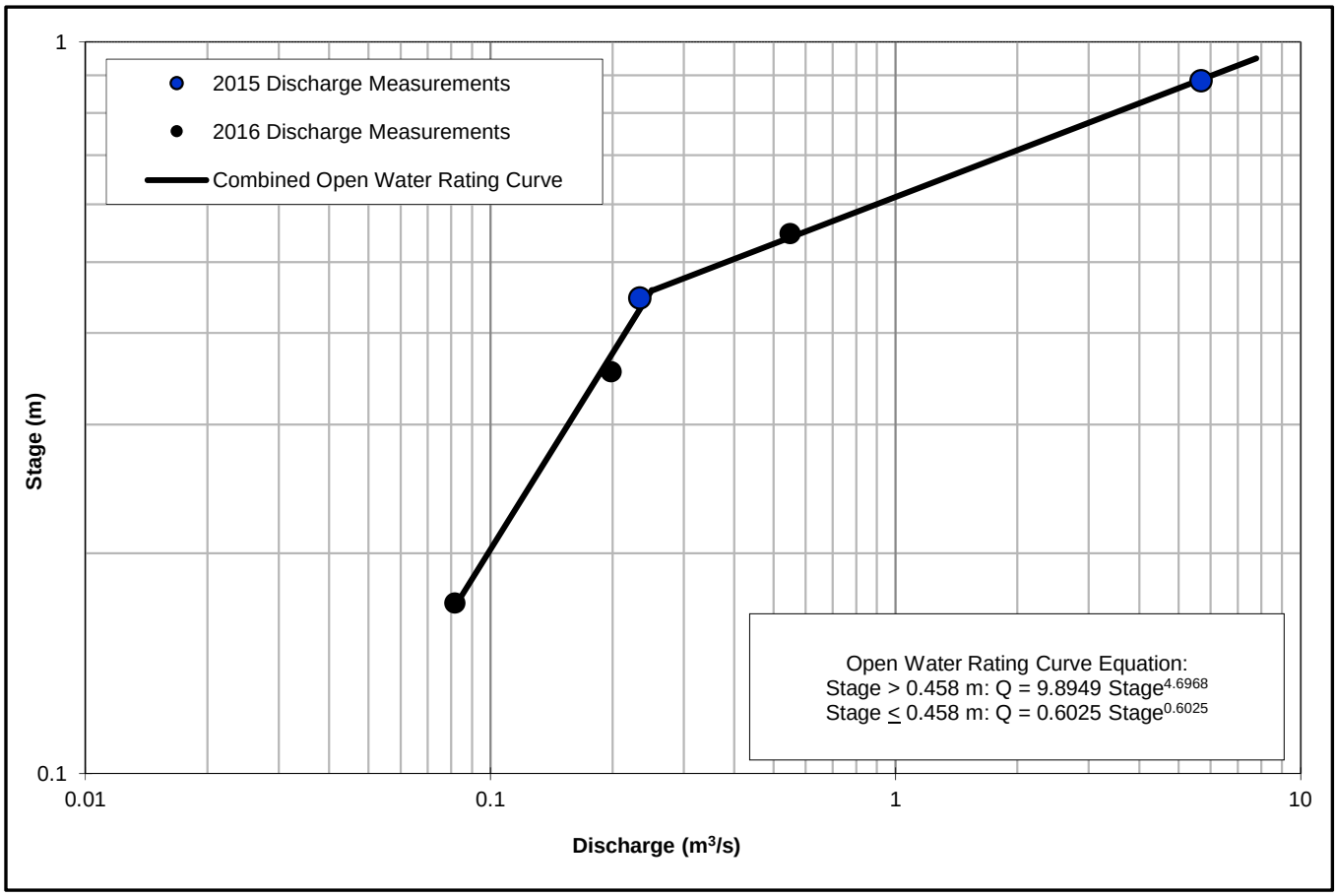


Figure A2: 2016 Stage-Discharge Rating Curve (Lake A15)

Lake A15 - 2016

MEAN DAILY DISCHARGE (m^3/s)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	0.709	0.192	0.108	-	-	-
2	-	-	-	-	-	-	0.690	0.191	0.104	-	-	-
3	-	-	-	-	-	-	0.685	0.199	0.102	-	-	-
4	-	-	-	-	-	-	0.649	0.201	0.101	-	-	-
5	-	-	-	-	-	-	0.598	0.197	0.099	-	-	-
6	-	-	-	-	-	-	0.560	0.193	0.098	-	-	-
7	-	-	-	-	-	-	0.514	0.193	0.100	-	-	-
8	-	-	-	-	-	-	0.482	0.194	0.100	-	-	-
9	-	-	-	-	-	-	0.443	0.195	0.102	-	-	-
10	-	-	-	-	-	-	0.414	0.194	0.101	-	-	-
11	-	-	-	-	-	-	0.387	0.193	0.097	-	-	-
12	-	-	-	-	-	-	0.347	0.193	0.094	-	-	-
13	-	-	-	-	-	-	0.305	0.191	0.093	-	-	-
14	-	-	-	-	-	0.336	0.274	0.189	0.089	-	-	-
15	-	-	-	-	-	0.572	0.248	0.187	0.086	-	-	-
16	-	-	-	-	-	1.87	0.236	0.183	0.083	-	-	-
17	-	-	-	-	-	3.83	0.229	0.180	0.082	-	-	-
18	-	-	-	-	-	3.65	0.225	0.173	-	-	-	-
19	-	-	-	-	-	3.38	0.222	0.163	-	-	-	-
20	-	-	-	-	-	2.78	0.218	0.156	-	-	-	-
21	-	-	-	-	-	2.20	0.216	0.151	-	-	-	-
22	-	-	-	-	-	1.79	0.222	0.147	-	-	-	-
23	-	-	-	-	-	1.49	0.221	0.141	-	-	-	-
24	-	-	-	-	-	1.28	0.217	0.136	-	-	-	-
25	-	-	-	-	-	1.16	0.214	0.130	-	-	-	-
26	-	-	-	-	-	1.02	0.212	0.122	-	-	-	-
27	-	-	-	-	-	0.958	0.209	0.120	-	-	-	-
28	-	-	-	-	-	0.875	0.203	0.118	-	-	-	-
29	-	-	-	-	-	0.787	0.200	0.115	-	-	-	-
30	-	-	-	-	-	0.734	0.199	0.113	-	-	-	-
31	-	-	-	-	-	-	0.196	0.111	-	-	-	-
MIN	-	-	-	-	-	0.336	0.196	0.111	0.082	-	-	-
MEAN	-	-	-	-	-	1.69	0.347	0.166	0.097	-	-	-
MAX	-	-	-	-	-	3.83	0.709	0.201	0.108	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

Water Yield (m^3) =	3,996,618	2,480,568	928,381	445,903	141,766
Water Yield (mm) =	97.9	62%	23%	11%	4%

Lake A15 - 2016

MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	151.770	151.562	151.418	-	-	-
2	-	-	-	-	-	-	151.767	151.560	151.410	-	-	-
3	-	-	-	-	-	-	151.766	151.573	151.407	-	-	-
4	-	-	-	-	-	-	151.760	151.577	151.404	-	-	-
5	-	-	-	-	-	-	151.750	151.569	151.402	-	-	-
6	-	-	-	-	-	-	151.743	151.564	151.399	-	-	-
7	-	-	-	-	-	-	151.733	151.564	151.403	-	-	-
8	-	-	-	-	-	-	151.726	151.565	151.402	-	-	-
9	-	-	-	-	-	-	151.716	151.566	151.406	-	-	-
10	-	-	-	-	-	-	151.709	151.564	151.405	-	-	-
11	-	-	-	-	-	-	151.702	151.564	151.397	-	-	-
12	-	-	-	-	-	-	151.690	151.563	151.392	-	-	-
13	-	-	-	-	-	-	151.677	151.559	151.389	-	-	-
14	-	-	-	-	-	151.686	151.666	151.557	151.383	-	-	-
15	-	-	-	-	-	151.743	151.653	151.553	151.377	-	-	-
16	-	-	-	-	-	151.893	151.635	151.546	151.371	-	-	-
17	-	-	-	-	-	152.017	151.624	151.541	151.370	-	-	-
18	-	-	-	-	-	152.009	151.617	151.529	-	-	-	-
19	-	-	-	-	-	151.996	151.611	151.513	-	-	-	-
20	-	-	-	-	-	151.963	151.605	151.501	-	-	-	-
21	-	-	-	-	-	151.926	151.601	151.492	-	-	-	-
22	-	-	-	-	-	151.895	151.612	151.485	-	-	-	-
23	-	-	-	-	-	151.868	151.610	151.475	-	-	-	-
24	-	-	-	-	-	151.847	151.603	151.467	-	-	-	-
25	-	-	-	-	-	151.833	151.599	151.456	-	-	-	-
26	-	-	-	-	-	151.816	151.596	151.442	-	-	-	-
27	-	-	-	-	-	151.808	151.591	151.438	-	-	-	-
28	-	-	-	-	-	151.797	151.581	151.434	-	-	-	-
29	-	-	-	-	-	151.783	151.575	151.430	-	-	-	-
30	-	-	-	-	-	151.775	151.573	151.426	-	-	-	-
31	-	-	-	-	-	151.770	151.568	151.423	-	-	-	-
MIN	-	-	-	-	-	151.686	151.568	151.423	151.370	-	-	-
MEAN	-	-	-	-	-	151.857	151.659	151.518	151.396	-	-	-
MAX	-	-	-	-	-	152.017	151.770	151.577	151.418	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**		14-Jun-16
Waterbody:		Lake A15			**Start Time**		12:12
Crossing ID:		A15-A14			**End Time**		12:37
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	602960	BM_read			**Transducer SN:**		
North	7255620	WL_read			**Meter Type/SN:**		Flow Tracker
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	

STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.080**
2	0.50	0.32		0.20		**0.047**	**0.222**
3	1.51	0.12		0.16		**0.019**	**0.105**
4	2.51	0.09		0.08		**0.008**	**0.135**
5	3.51	0.18		0.16		**0.029**	**0.190**
6	4.51	0.20		0.23		**0.045**	**0.140**
7	5.51	0.08		0.13		**0.011**	**0.080**
8	6.51	0.08		0.14		**0.011**	**0.089**
9	7.50	0.10		0.11		**0.011**	**0.090**
10	8.50	0.08		0.07		**0.006**	**0.105**
11	9.50	0.13		0.18		**0.024**	**0.265**
12	10.50	0.40		0.05		**0.019**	**0.240**
13	11.50	0.08		0.14		**0.011**	**0.080**
14	12.50	0.08		0.15		**0.012**	**0.200**
15	13.50	0.32		0.11		**0.035**	**0.310**
16	14.50	0.30		0.04		**0.011**	**0.240**
17	15.50	0.18		0.20		**0.036**	**0.300**
18	16.50	0.42		0.17		**0.072**	**0.290**
19	17.50	0.16		0.19		**0.030**	**0.180**
20	18.50	0.20		0.11		**0.022**	**0.250**
21	19.50	0.30		0.13		**0.039**	**0.255**
22	20.50	0.21		0.02		**0.004**	**0.175**
23	21.50	0.14		0.08		**0.011**	**0.180**
24	22.50	0.22		0.11		**0.024**	**0.130**
25	23.50	0.04		0.11		**0.005**	**0.050**
26	24.50	0.06		0.14		**0.008**	**0.030**
27	25.50	0.00		0.00		**0.000**	**0.000**

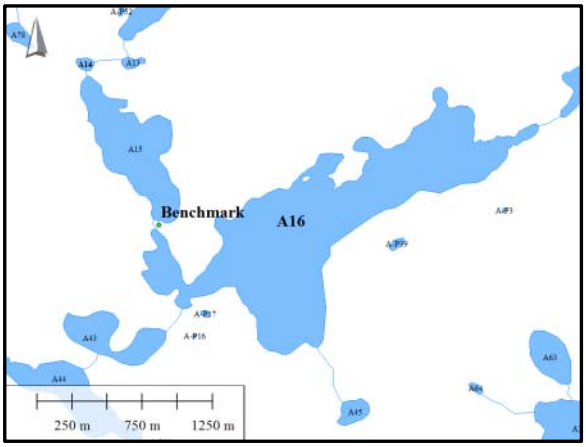
NOTES:		**RESULTS:**	**Q (m3/s)**	**0.549**
			A(m2)	**4.41**
			B(m)	**25.5**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	15-Aug-16	
Waterbody:		Lake A15			**Start Time**	8:28	
Crossing ID:		A15-A14			**End Time**	9:28	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	602960	BM_read			**Transducer SN:**		
North	7255620	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION Start LDB	DISTANCE FROM LDB (m)	DEPTH (m)	Velocity 0.2 DEPTH (m/s)	Velocity 0.6/0.8 DEPTH (m/s)	Optional ANGLE OF FLOW (º)	Qi (m3/s)	Ai (m2)
1	0.00	0.00		0.00			**0.065**
2	0.50	0.26		0.07		**0.008**	**0.140**
3	1.00	0.30		0.06		**0.016**	**0.165**
4	2.10	0.00		0.05		**0.000**	**0.024**
5	2.30	0.24		0.07		**0.003**	**0.019**
6	2.40	0.14		0.16		**0.003**	**0.014**
7	2.60	0.00		0.11		**0.000**	**0.015**
8	2.90	0.10		0.09		**0.002**	**0.032**
9	3.10	0.22		0.17		**0.016**	**0.140**
10	3.80	0.18		0.15		**0.015**	**0.072**
11	4.20	0.18		0.06		**0.005**	**0.060**
12	4.60	0.12		0.03		**0.001**	**0.052**
13	5.00	0.14		0.08		**0.005**	**0.075**
14	5.50	0.16		0.14		**0.012**	**0.075**
15	6.00	0.14		0.15		**0.010**	**0.060**
16	6.50	0.10		0.22		**0.011**	**0.065**
17	7.00	0.16		0.19		**0.015**	**0.150**
18	7.50	0.44		0.01		**0.002**	**0.165**
19	8.00	0.22		0.00		**0.000**	**0.080**
20	8.50	0.10		0.08		**0.004**	**0.078**
21	9.00	0.21		0.05		**0.006**	**0.110**
22	9.50	0.23		0.02		**0.002**	**0.118**
23	10.00	0.24		0.05		**0.006**	**0.100**
24	10.50	0.16		0.10		**0.008**	**0.075**
25	11.00	0.14		0.10		**0.007**	**0.065**
26	11.50	0.12		0.30		**0.018**	**0.030**
27	12.00	0.00		-0.01		**0.000**	**0.024**
28	12.40	0.12		0.05		**0.004**	**0.060**
29	13.40	0.00		0.11		**0.000**	**0.096**
30	14.00	0.32		0.05		**0.009**	**0.104**
31	14.40	0.20		0.09		**0.011**	**0.080**
32	15.20	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.198**
						A(m2)	**2.41**
						B(m)	**15.2**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 3			**Date**		17-Sep-16	
Waterbody:		Lake A15			**Start Time**		14:11	
Crossing ID:		A15-A14			**End Time**		14:50	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	602960	BM_read			**Transducer SN:**			
North	7255620	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.015**
2	0.30	0.10		0.03			**0.001**	**0.045**
3	0.80	0.08		0.04			**0.001**	**0.032**
4	1.20	0.08		0.00			**0.000**	**0.024**
5	1.50	0.08		0.03			**0.001**	**0.036**
6	1.80	0.16		0.03			**0.001**	**0.057**
7	2.10	0.22		0.04			**0.003**	**0.115**
8	2.60	0.24		0.00			**0.000**	**0.144**
9	3.20	0.24		0.02			**0.003**	**0.096**
10	3.60	0.24		0.00			**0.000**	**0.108**
11	4.20	0.12		0.03			**0.002**	**0.160**
12	5.00	0.28		0.03			**0.007**	**0.132**
13	5.60	0.16		0.01			**0.001**	**0.140**
14	6.60	0.12		0.02			**0.002**	**0.072**
15	7.40	0.06		0.03			**0.001**	**0.040**
16	7.90	0.10		0.10			**0.007**	**0.099**
17	8.80	0.12		0.02			**0.002**	**0.132**
18	9.90	0.12		0.04			**0.004**	**0.120**
19	10.50	0.28		0.03			**0.008**	**0.400**
20	12.10	0.22		0.03			**0.009**	**0.150**
21	13.10	0.08		0.05			**0.003**	**0.048**
22	13.70	0.08		0.08			**0.004**	**0.065**
23	14.20	0.18		0.01			**0.001**	**0.063**
24	14.90	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.063**	
						A(m2)	**2.29**	
						B(m)	**14.9**	

A5.0 LAKE A16 (MAMMOTH LAKE) & OUTLET (STREAM A16-A15)

Parameter	Value	Note
Benchmark Coordinates	602765 m E, 7255549 m N, 155.17 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel. Subsurface flow present. The channel was frozen on 14 June 2016, and the flow was too low to be estimated on 16 August and 16 September 2016.	



Lake A16 (Mammoth Lake): Benchmark location.

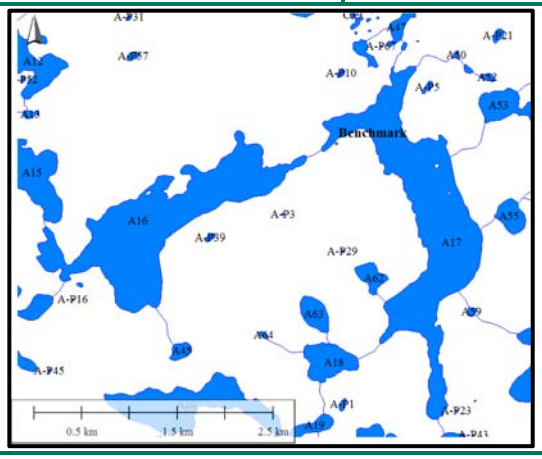
16 August 2016. View looking east towards Lake A16 (Mammoth Lake)

16 August 2016. Downstream view of the watercourse (north).

16 August 2016. Substrate and little to zero visible flow.

A6.0 LAKE A17 (WHALE TAIL LAKE) & OUTLET (STREAM A17-A16)

Parameter	Value	Note
Benchmark Coordinates	606378 m E, 7255327 m N, 153.93 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel. The outlet was frozen during the June 2016 trip.	



Lake A17 (Whale Tail Lake): Benchmark location.

14 August 2016. View of left downstream bank of outlet (south).

17 September 2016. Upstream view of the watercourse (northwest).

17 September 2016. Downstream view of the watercourse (southwest).

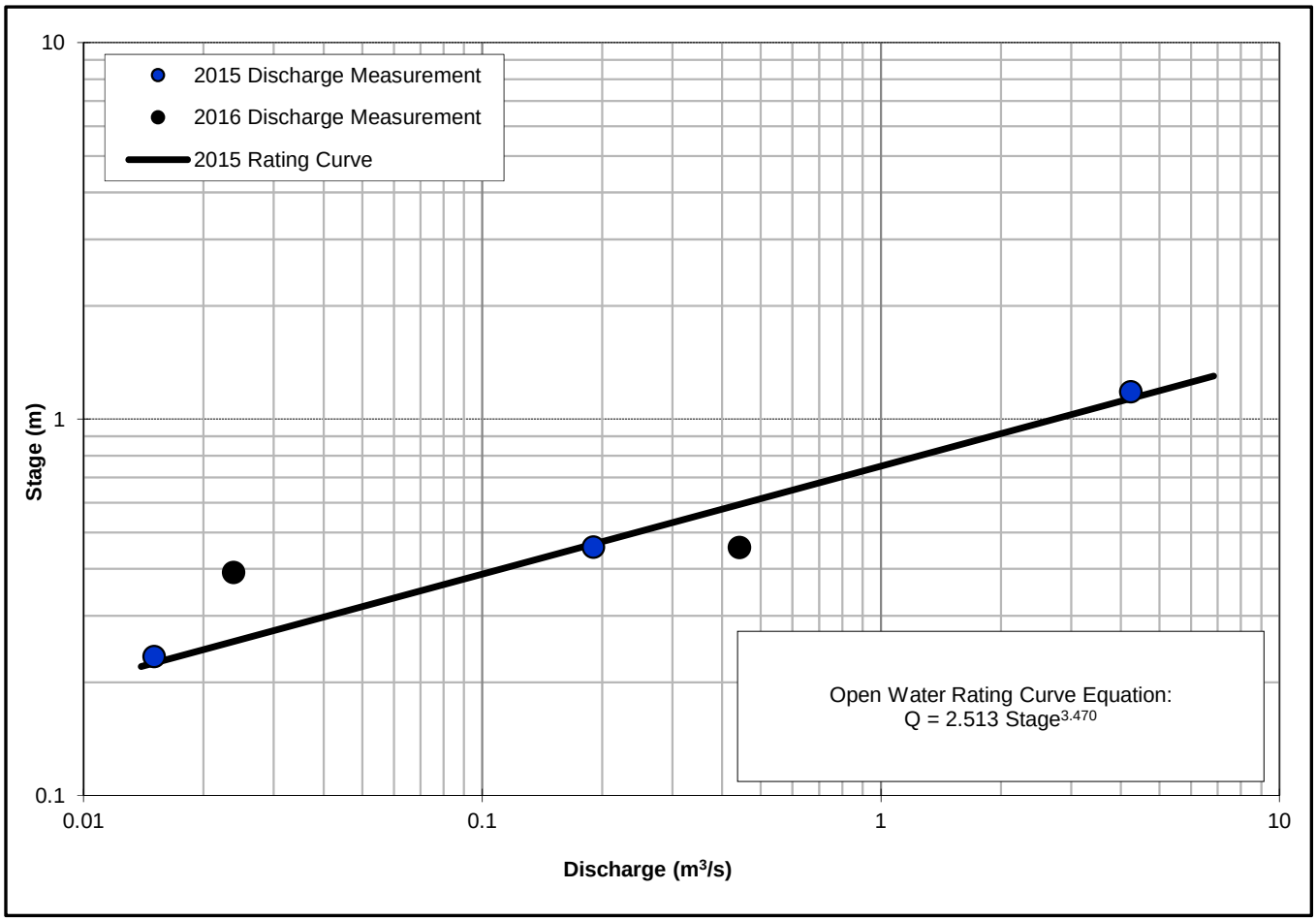


Figure A3: Stage-Discharge Rating Curve (Lake A17) (based on the 2015 Stage-Discharge Rating Curve)

Lake A17 - 2016

MEAN DAILY DISCHARGE (m^3/s)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	0.633	0.200	0.117	-	-	-
2	-	-	-	-	-	-	0.614	0.200	0.114	-	-	-
3	-	-	-	-	-	-	0.578	0.212	0.114	-	-	-
4	-	-	-	-	-	-	0.545	0.216	0.111	-	-	-
5	-	-	-	-	-	-	0.510	0.210	0.110	-	-	-
6	-	-	-	-	-	-	0.484	0.206	0.107	-	-	-
7	-	-	-	-	-	-	0.459	0.210	0.109	-	-	-
8	-	-	-	-	-	-	0.430	0.211	0.106	-	-	-
9	-	-	-	-	-	-	0.407	0.205	0.111	-	-	-
10	-	-	-	-	-	-	0.385	0.200	0.112	-	-	-
11	-	-	-	-	-	-	0.363	0.196	0.108	-	-	-
12	-	-	-	-	-	-	0.344	0.194	0.105	-	-	-
13	-	-	-	-	-	-	0.323	0.189	0.104	-	-	-
14	-	-	-	-	-	0.948 P	0.304	0.185	0.103	-	-	-
15	-	-	-	-	-	1.97	0.294	0.188	0.101	-	-	-
16	-	-	-	-	-	1.99	0.292	0.185	0.100	-	-	-
17	-	-	-	-	-	1.65	0.269	0.185	0.102 P	-	-	-
18	-	-	-	-	-	1.57	0.257	0.177	-	-	-	-
19	-	-	-	-	-	1.49	0.250	0.165	-	-	-	-
20	-	-	-	-	-	1.32	0.240	0.158	-	-	-	-
21	-	-	-	-	-	1.17	0.235	0.153	-	-	-	-
22	-	-	-	-	-	1.10	0.258	0.147	-	-	-	-
23	-	-	-	-	-	1.02	0.256	0.142	-	-	-	-
24	-	-	-	-	-	0.937	0.246	0.138	-	-	-	-
25	-	-	-	-	-	0.871	0.242	0.130	-	-	-	-
26	-	-	-	-	-	0.804	0.233	0.124	-	-	-	-
27	-	-	-	-	-	0.772	0.230	0.125	-	-	-	-
28	-	-	-	-	-	0.725	0.216	0.125	-	-	-	-
29	-	-	-	-	-	0.690	0.214	0.122	-	-	-	-
30	-	-	-	-	-	0.653	0.212	0.119	-	-	-	-
31	-	-	-	-	-	-	0.205	0.119	-	-	-	-
MIN	-	-	-	-	-	0.653	0.205	0.119	0.100	-	-	-
MEAN	-	-	-	-	-	1.16	0.340	0.172	0.108	-	-	-
MAX	-	-	-	-	-	1.99	0.633	0.216	0.117	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

Water Yield (m^3) =	3,229,668	1,700,248	909,729	461,110	158,581
Water Yield (mm) =	114.8	0.53	0.28	0.14	0.05

Lake A17 - 2016

MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	152.857	152.672	152.605	-	-	-
2	-	-	-	-	-	-	152.851	152.672	152.602	-	-	-
3	-	-	-	-	-	-	152.840	152.680	152.602	-	-	-
4	-	-	-	-	-	-	152.829	152.683	152.599	-	-	-
5	-	-	-	-	-	-	152.817	152.679	152.598	-	-	-
6	-	-	-	-	-	-	152.808	152.676	152.594	-	-	-
7	-	-	-	-	-	-	152.799	152.679	152.597	-	-	-
8	-	-	-	-	-	-	152.788	152.679	152.594	-	-	-
9	-	-	-	-	-	-	152.779	152.676	152.599	-	-	-
10	-	-	-	-	-	-	152.770	152.672	152.600	-	-	-
11	-	-	-	-	-	-	152.760	152.670	152.596	-	-	-
12	-	-	-	-	-	-	152.752	152.668	152.592	-	-	-
13	-	-	-	-	-	-	152.742	152.665	152.591	-	-	-
14	-	-	-	-	-	152.935	152.732	152.662	152.591	-	-	-
15	-	-	-	-	-	153.105	152.727	152.664	152.588	-	-	-
16	-	-	-	-	-	153.112	152.726	152.662	152.587	-	-	-
17	-	-	-	-	-	153.065	152.714	152.662	152.589	-	-	-
18	-	-	-	-	-	153.053	152.707	152.656	-	-	-	-
19	-	-	-	-	-	153.039	152.703	152.647	-	-	-	-
20	-	-	-	-	-	153.012	152.698	152.641	-	-	-	-
21	-	-	-	-	-	152.984	152.694	152.637	-	-	-	-
22	-	-	-	-	-	152.969	152.708	152.633	-	-	-	-
23	-	-	-	-	-	152.953	152.707	152.628	-	-	-	-
24	-	-	-	-	-	152.935	152.701	152.625	-	-	-	-
25	-	-	-	-	-	152.920	152.699	152.617	-	-	-	-
26	-	-	-	-	-	152.904	152.693	152.611	-	-	-	-
27	-	-	-	-	-	152.895	152.691	152.613	-	-	-	-
28	-	-	-	-	-	152.883	152.683	152.613	-	-	-	-
29	-	-	-	-	-	152.873	152.681	152.610	-	-	-	-
30	-	-	-	-	-	152.863	152.680	152.607	-	-	-	-
31	-	-	-	-	-	152.857	152.675	152.607	-	-	-	-
MIN	-	-	-	-	-	152.857	152.675	152.607	152.587	-	-	-
MEAN	-	-	-	-	-	152.964	152.742	152.650	152.596	-	-	-
MAX	-	-	-	-	-	153.112	152.857	152.683	152.605	-	-	-

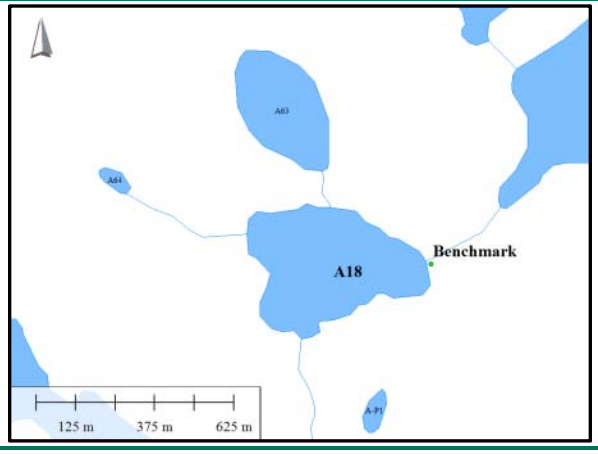
NOTES: P - PARTIAL DAILY AVERAGE

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	14-Aug-16	
Waterbody:		Lake A17			**Start Time**	11:47	
Crossing ID:		A17-A16			**End Time**	13:08	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606300	BM_read			**Transducer SN:**		
North	7255345	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.060**
2	1.00	0.12		0.00		**0.000**	**0.280**
3	3.00	0.16		0.00		**0.087**	**0.340**
4	5.00	0.18		0.00		**0.002**	**0.380**
5	7.00	0.20		0.00		**0.001**	**0.400**
6	9.00	0.20		0.01		**0.006**	**0.500**
7	11.00	0.30		0.01		**0.008**	**0.520**
8	13.00	0.22		0.00		**0.002**	**0.500**
9	15.00	0.28		0.01		**0.005**	**0.460**
10	17.00	0.18		0.01		**0.002**	**0.400**
11	19.00	0.22		0.01		**0.003**	**0.480**
12	21.00	0.26		0.01		**0.005**	**0.580**
13	23.00	0.32		0.00		**0.003**	**0.720**
14	25.00	0.40		0.02		**0.016**	**0.700**
15	27.00	0.30		0.01		**0.007**	**0.680**
16	29.00	0.38		0.01		**0.010**	**0.840**
17	31.00	0.46		0.01		**0.011**	**0.860**
18	33.00	0.40		0.01		**0.010**	**0.780**
19	35.00	0.38		0.02		**0.014**	**0.820**
20	37.00	0.44		0.02		**0.014**	**0.840**
21	39.00	0.40		0.02		**0.015**	**0.880**
22	41.00	0.48		0.02		**0.020**	**0.980**
23	43.00	0.50		0.02		**0.025**	**1.180**
24	45.00	0.68		0.02		**0.034**	**1.100**
25	47.00	0.42		0.03		**0.026**	**0.940**
26	49.00	0.52		0.03		**0.035**	**1.100**
27	51.00	0.58		0.05		**0.059**	**1.180**
28	53.00	0.60		0.05		**0.055**	**1.180**
29	55.00	0.58		0.04		**0.047**	**1.080**
30	57.00	0.50		0.01		**0.011**	**0.880**
31	59.00	0.38		0.01		**0.007**	**0.860**
32	61.00	0.48		0.00		**0.003**	**1.200**
33	66.00	0.00		0.00		**0.000**	**0.000**
NOTES:	Issues with velocity meter				**RESULTS:**	**Q (m3/s)**	**0.441**
						A(m2)	**23.70**
						B(m)	**66.0**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**	17-Sep-16	
Waterbody:		Lake A17			**Start Time**	16:24	
Crossing ID:		A17-A16			**End Time**	16:55	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606225	BM_read			**Transducer SN:**		
North	7255275	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.006**
2	0.20	0.06		0.02		**0.000**	**0.011**
3	0.40	0.05		0.02		**0.000**	**0.010**
4	0.60	0.05		0.01		**0.000**	**0.009**
5	0.80	0.04		-0.01		**0.000**	**0.020**
6	1.00	0.16		0.04		**0.001**	**0.028**
7	1.20	0.12		0.03		**0.001**	**0.022**
8	1.40	0.10		0.01		**0.000**	**0.020**
9	1.60	0.10		0.00		**0.000**	**0.032**
10	2.00	0.06		0.04		**0.001**	**0.010**
11	2.20	0.04		0.03		**0.000**	**0.008**
12	2.40	0.04		0.08		**0.001**	**0.008**
13	2.60	0.04		0.04		**0.000**	**0.008**
14	2.80	0.04		0.04		**0.000**	**0.017**
15	3.00	0.13		0.00		**0.000**	**0.035**
16	3.20	0.22		0.03		**0.001**	**0.030**
17	3.40	0.08		0.02		**0.000**	**0.013**
18	3.60	0.05		0.10		**0.001**	**0.017**
19	3.80	0.12		0.00		**0.000**	**0.024**
20	4.00	0.12		0.01		**0.000**	**0.024**
21	4.20	0.12		0.01		**0.000**	**0.018**
22	4.40	0.06		0.06		**0.001**	**0.010**
23	4.60	0.04		0.09		**0.001**	**0.012**
24	4.90	0.04		0.01		**0.000**	**0.012**
25	5.20	0.04		0.02		**0.000**	**0.036**
26	5.50	0.20		0.06		**0.004**	**0.038**
27	5.80	0.05		0.01		**0.000**	**0.010**
28	6.00	0.05		0.04		**0.000**	**0.013**
29	6.20	0.08		0.09		**0.001**	**0.036**
30	6.40	0.28		0.00		**0.000**	**0.034**
31	6.60	0.06		0.02		**0.000**	**0.021**
32	6.90	0.08		0.09		**0.002**	**0.018**
33	7.20	0.04		0.00		**0.000**	**0.021**
34	7.50	0.10		0.11		**0.004**	**0.040**
35	8.00	0.06		0.02		**0.001**	**0.050**
36	9.00	0.04		0.00		**0.000**	**0.040**
37	11.00	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.024**
						A(m2)	**0.76**
						B(m)	**11.0**

A7.0 LAKE A18 & OUTLET (STREAM A18-A17)

Parameter	Value	Note
Benchmark Coordinates	606615 m E, 7253064 m N, 154.60 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel.	



Lake A18: Benchmark location.

13 June 2016. Upstream view of the watercourse (southwest).

14 August 2016. Upstream view of the watercourse at lake outlet (southwest).

17 September 2016. Downstream view of the watercourse (northeast).

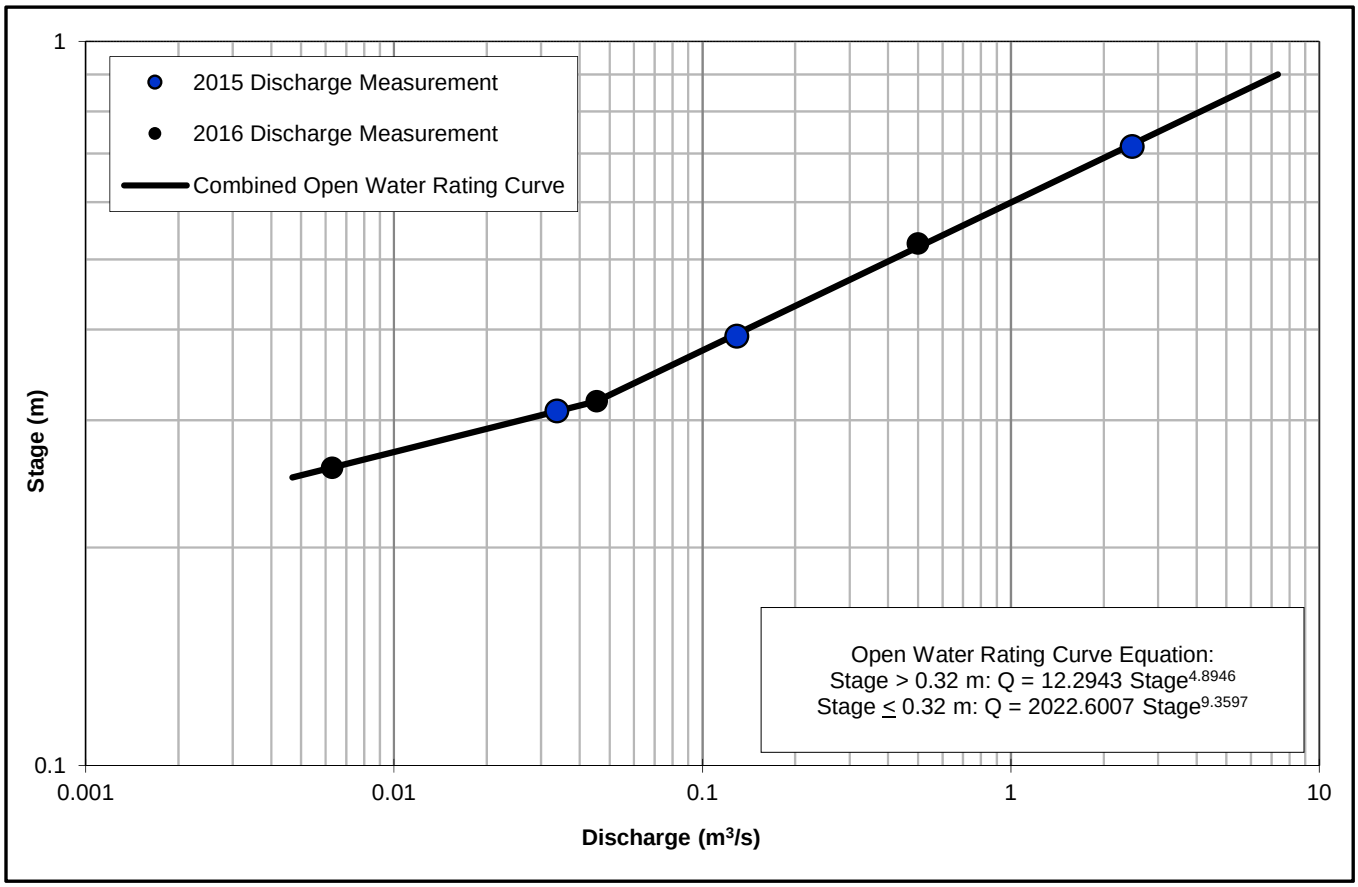


Figure A4: Stage-Discharge Rating Curve (Lake A18)

Lake A18 - 2016

MEAN DAILY DISCHARGE (m^3/s)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	0.160	0.025	0.015	-	-	-
2	-	-	-	-	-	-	0.152	0.025	0.014	-	-	-
3	-	-	-	-	-	-	0.143	0.038	0.014	-	-	-
4	-	-	-	-	-	-	0.135	0.046	0.016	-	-	-
5	-	-	-	-	-	-	0.130	0.041	0.016	-	-	-
6	-	-	-	-	-	-	0.125	0.043	0.016	-	-	-
7	-	-	-	-	-	-	0.120	0.047	0.017	-	-	-
8	-	-	-	-	-	-	0.116	0.046	0.017	-	-	-
9	-	-	-	-	-	-	0.111	0.045	0.022	-	-	-
10	-	-	-	-	-	-	0.106	0.045	0.025	-	-	-
11	-	-	-	-	-	-	0.099	0.043	0.023	-	-	-
12	-	-	-	-	-	-	0.088	0.042	0.020	-	-	-
13	-	-	-	-	-	0.491	0.079	0.038	0.022	-	-	-
14	-	-	-	-	-	0.658	0.074	0.039	0.021	-	-	-
15	-	-	-	-	-	0.964	0.073	0.042	0.019	-	-	-
16	-	-	-	-	-	0.990	0.066	0.039	0.017	-	-	-
17	-	-	-	-	-	0.988	0.061	0.038	0.016	-	-	-
18	-	-	-	-	-	0.974	0.056	0.034	-	-	-	-
19	-	-	-	-	-	0.794	0.052	0.030	-	-	-	-
20	-	-	-	-	-	0.638	0.046	0.028	-	-	-	-
21	-	-	-	-	-	0.494	0.044	0.026	-	-	-	-
22	-	-	-	-	-	0.416	0.057	0.026	-	-	-	-
23	-	-	-	-	-	0.352	0.054	0.023	-	-	-	-
24	-	-	-	-	-	0.295	0.051	0.021	-	-	-	-
25	-	-	-	-	-	0.256	0.043	0.020	-	-	-	-
26	-	-	-	-	-	0.222	0.038	0.017	-	-	-	-
27	-	-	-	-	-	0.205	0.039	0.018	-	-	-	-
28	-	-	-	-	-	0.188	0.038	0.018	-	-	-	-
29	-	-	-	-	-	0.173	0.031	0.017	-	-	-	-
30	-	-	-	-	-	0.163	0.030	0.017	-	-	-	-
31	-	-	-	-	-	-	0.027	0.017	-	-	-	-
MIN	-	-	-	-	-	0.163	0.027	0.017	0.014	-	-	-
MEAN	-	-	-	-	-	0.515	0.079	0.032	0.018	-	-	-
MAX	-	-	-	-	-	0.990	0.160	0.047	0.025	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

Water Yield (m^3) =	1,123,850	800,278	211,066	85,822	26,684
Water Yield (mm) =	27.1	71%	19%	8%	2%

Lake A18 - 2016
MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCT	NOV	DEC
1	-	-	-	-	-	-	153.912	153.798	153.784	-	-	-
2	-	-	-	-	-	-	153.907	153.798	153.780	-	-	-
3	-	-	-	-	-	-	153.903	153.813	153.781	-	-	-
4	-	-	-	-	-	-	153.898	153.820	153.784	-	-	-
5	-	-	-	-	-	-	153.895	153.815	153.785	-	-	-
6	-	-	-	-	-	-	153.891	153.817	153.785	-	-	-
7	-	-	-	-	-	-	153.888	153.821	153.787	-	-	-
8	-	-	-	-	-	-	153.886	153.820	153.787	-	-	-
9	-	-	-	-	-	-	153.882	153.819	153.794	-	-	-
10	-	-	-	-	-	-	153.878	153.819	153.798	-	-	-
11	-	-	-	-	-	-	153.873	153.817	153.795	-	-	-
12	-	-	-	-	-	-	153.865	153.816	153.792	-	-	-
13	-	-	-	-	-	154.018	153.856	153.813	153.795	-	-	-
14	-	-	-	-	-	154.049	153.852	153.814	153.794	-	-	-
15	-	-	-	-	-	154.094	153.850	153.816	153.790	-	-	-
16	-	-	-	-	-	154.098	153.843	153.813	153.787	-	-	-
17	-	-	-	-	-	154.097	153.838	153.812	153.785	-	-	-
18	-	-	-	-	-	154.096	153.832	153.809	-	-	-	-
19	-	-	-	-	-	154.071	153.827	153.804	-	-	-	-
20	-	-	-	-	-	154.046	153.820	153.802	-	-	-	-
21	-	-	-	-	-	154.018	153.819	153.800	-	-	-	-
22	-	-	-	-	-	154.001	153.833	153.800	-	-	-	-
23	-	-	-	-	-	153.984	153.830	153.797	-	-	-	-
24	-	-	-	-	-	153.967	153.825	153.794	-	-	-	-
25	-	-	-	-	-	153.953	153.817	153.792	-	-	-	-
26	-	-	-	-	-	153.940	153.813	153.787	-	-	-	-
27	-	-	-	-	-	153.933	153.813	153.789	-	-	-	-
28	-	-	-	-	-	153.926	153.812	153.788	-	-	-	-
29	-	-	-	-	-	153.919	153.806	153.786	-	-	-	-
30	-	-	-	-	-	153.914	153.805	153.787	-	-	-	-
31	-	-	-	-	-	153.912	153.802	153.786	-	-	-	-
MIN	-	-	-	-	-	153.912	153.802	153.786	153.780	-	-	-
MEAN	-	-	-	-	-	154.002	153.851	153.805	153.788	-	-	-
MAX	-	-	-	-	-	154.098	153.912	153.821	153.798	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

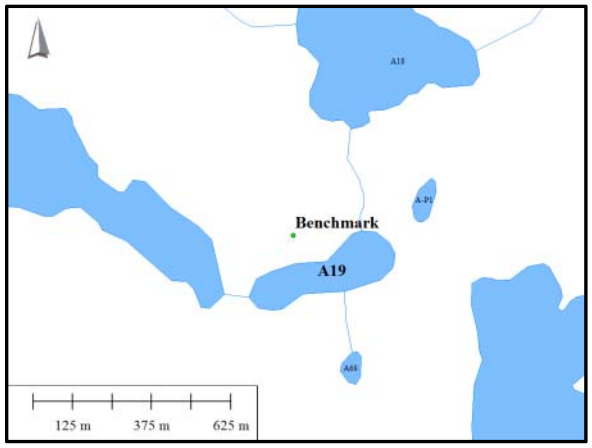
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	13-Jun-16	
Waterbody:		Lake A18			**Start Time**	8:35	
Crossing ID:		A18-A17			**End Time**	8:49	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606625	BM_read			**Transducer SN:**		
North	7253065	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.028**
2	0.50	0.11		0.14		**0.011**	**0.140**
3	1.50	0.17		0.14		**0.025**	**0.155**
4	2.50	0.14		0.16		**0.022**	**0.170**
5	3.50	0.20		0.20		**0.040**	**0.210**
6	4.50	0.22		0.20		**0.044**	**0.220**
7	5.50	0.22		0.20		**0.044**	**0.290**
8	6.50	0.36		0.23		**0.082**	**0.350**
9	7.50	0.34		0.20		**0.069**	**0.295**
10	8.50	0.25		0.17		**0.042**	**0.235**
11	9.50	0.22		0.15		**0.034**	**0.160**
12	10.50	0.10		0.28		**0.028**	**0.100**
13	11.50	0.10		0.22		**0.022**	**0.110**
14	12.50	0.12		0.24		**0.028**	**0.080**
15	13.50	0.04		0.07		**0.003**	**0.040**
16	14.50	0.04		0.00		**0.000**	**0.060**
17	16.00	0.04		0.08		**0.005**	**0.045**
18	17.50	0.02		0.03		**0.001**	**0.015**
19	19.00	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.500**
						A(m2)	**2.70**
						B(m)	**19.0**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	14-Aug-16	
Waterbody:		Lake A18			**Start Time**	15:50	
Crossing ID:		A18-A17			**End Time**	16:37	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606605	BM_read			**Transducer SN:**		
North	7253090	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.020**
2	0.20	0.20		0.00		**0.000**	**0.010**
3	0.30	0.00		-0.01		**0.000**	**0.004**
4	0.50	0.04		-0.01		**0.000**	**0.024**
5	0.80	0.12		0.00		**0.000**	**0.027**
6	1.10	0.06		0.00		**0.000**	**0.023**
7	1.40	0.09		-0.01		**0.000**	**0.032**
8	1.70	0.12		-0.01		**0.000**	**0.027**
9	2.00	0.06		0.03		**0.001**	**0.018**
10	2.30	0.06		0.01		**0.000**	**0.033**
11	2.60	0.16		0.00		**0.000**	**0.059**
12	2.90	0.23		0.01		**0.001**	**0.041**
13	3.10	0.18		0.02		**0.001**	**0.076**
14	3.50	0.20		0.02		**0.001**	**0.038**
15	3.70	0.18		0.00		**0.000**	**0.054**
16	4.00	0.18		0.01		**0.000**	**0.048**
17	4.30	0.14		0.01		**0.001**	**0.033**
18	4.60	0.08		0.04		**0.001**	**0.016**
19	5.00	0.00		-0.01		**0.000**	**0.033**
20	5.30	0.22		0.00		**0.000**	**0.060**
21	5.60	0.18		0.04		**0.002**	**0.063**
22	5.90	0.24		0.03		**0.002**	**0.065**
23	6.20	0.19		0.02		**0.001**	**0.057**
24	6.50	0.19		0.01		**0.001**	**0.053**
25	6.80	0.16		0.03		**0.001**	**0.063**
26	7.10	0.26		0.04		**0.003**	**0.075**
27	7.40	0.24		0.04		**0.003**	**0.087**
28	7.70	0.34		0.03		**0.003**	**0.093**
29	8.00	0.28		0.04		**0.003**	**0.075**
30	8.30	0.22		0.05		**0.004**	**0.066**
31	8.60	0.22		0.05		**0.003**	**0.063**
32	8.90	0.20		0.04		**0.002**	**0.045**
33	9.20	0.10		0.02		**0.001**	**0.015**
34	9.50	0.00		-0.07		**0.000**	**0.027**
35	9.80	0.18		0.06		**0.003**	**0.048**
36	10.10	0.14		0.07		**0.002**	**0.028**
37	10.30	0.14		0.07		**0.003**	**0.057**
38	10.60	0.24		0.06		**0.004**	**0.036**
39	10.90	0.00		0.00		**0.000**	**0.000**
40							
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.046**
						A(m2)	**1.69**
						B(m)	**10.9**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**	17-Sep-16	
Waterbody:		Lake A18			**Start Time**	15:25	
Crossing ID:		A18-A17			**End Time**	15:43	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606625	BM_read			**Transducer SN:**		
North	7253065	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.008**
2	0.20	0.08		0.05		**0.001**	**0.015**
3	0.50	0.02		-0.01		**0.000**	**0.006**
4	0.70	0.04		0.04		**0.001**	**0.020**
5	1.20	0.04		0.02		**0.000**	**0.012**
6	1.50	0.04		0.05		**0.001**	**0.014**
7	1.80	0.05		0.00		**0.000**	**0.033**
8	2.30	0.08		0.02		**0.001**	**0.027**
9	2.60	0.10		0.02		**0.001**	**0.035**
10	3.10	0.04		0.04		**0.001**	**0.009**
11	3.40	0.02		0.00		**0.000**	**0.009**
12	3.70	0.04		0.04		**0.000**	**0.015**
13	4.00	0.06		0.02		**0.000**	**0.027**
14	4.30	0.12		0.02		**0.001**	**0.018**
15	4.60	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.006**
						A(m2)	**0.25**
						B(m)	**4.6**

A8.0 LAKE A19 & OUTLET (STREAM A19-A18)

Parameter	Value	Note
Benchmark Coordinates	606159 m E, 7252461 m N, 155.94 masl	NAD83 Zone 14
Comment	Poorly defined channel. Discharge was too low to be measured on 16 August and 16 September 2016.	



Lake A19: Benchmark location.

14 June 2016. View of Lake A19 and watercourse (south).

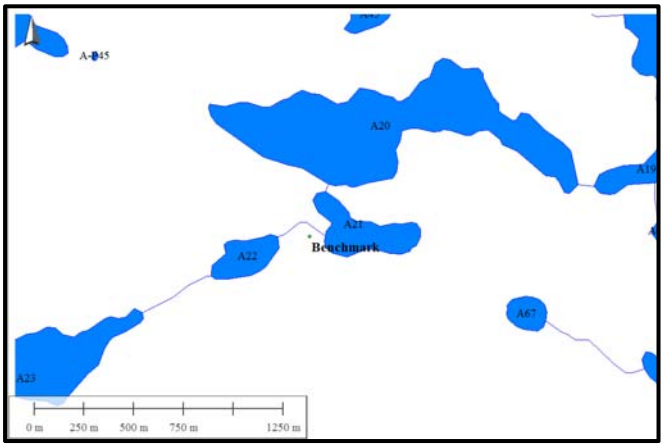
16 August 2016. Downstream view of watercourse (north).

16 August 2016. Upstream view of watercourse (south).

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 1			**Date**		14-Jun-16	
Waterbody:		Lake A19			**Start Time**		17:51	
Crossing ID:		A19-A18			**End Time**		18:12	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	606225	BM_read			**Transducer SN:**			
North	7252585	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.018**
2	0.30	0.12		0.04			**0.005**	**0.280**
3	2.30	0.16		0.03			**0.009**	**0.300**
4	4.30	0.14		0.06			**0.017**	**0.480**
5	6.30	0.34		0.01			**0.007**	**0.720**
6	8.30	0.38		-0.01			**-0.005**	**0.600**
7	10.30	0.22		0.09			**0.038**	**0.540**
8	12.30	0.32		0.00			**0.000**	**1.080**
9	16.30	0.22		0.05			**0.026**	**0.240**
10	17.30	0.26		0.18			**0.070**	**0.340**
11	19.30	0.08		0.34			**0.040**	**0.140**
12	20.30	0.20		0.56			**0.139**	**0.285**
13	21.80	0.18		0.29			**0.064**	**0.240**
14	22.80	0.30		0.46			**0.116**	**0.133**
15	23.50	0.08		0.13			**0.009**	**0.130**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.646**	
						A(m2)	**5.87**	
						B(m)	**27.0**	

A9.0 LAKE A21 & OUTLET (STREAM A21-A20)

Parameter	Value	Note
Benchmark Coordinates	604454 m E, 7252042 m N, 157.36 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel. Discharge was too low to be measured on 16 August and 16 September 2016.	



Lake A21: Benchmark location.

13 June 2016. View of watercourse (east).

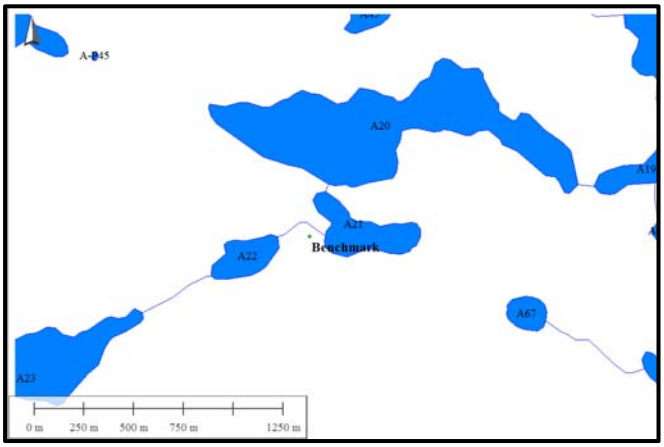
13 June 2016. Upstream view (west).

13 June 2016. Downstream view (north).

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	13-Jun-16	
Waterbody:		Lake A21			**Start Time**	12:09	
Crossing ID:		A21-A20			**End Time**	12:44	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	604485	BM_read			**Transducer SN:**		
North	7252305	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.16		0.00			**0.075**
2	0.50	0.14		0.07		**0.007**	**0.140**
3	1.50	0.14		0.10		**0.015**	**0.110**
4	2.50	0.08		0.18		**0.011**	**0.035**
5	3.00	0.06		0.15		**0.004**	**0.040**
6	3.50	0.10		0.13		**0.010**	**0.100**
7	4.50	0.10		0.10		**0.016**	**0.200**
8	6.50	0.10		0.02		**0.003**	**0.090**
9	7.50	0.08		0.30		**0.024**	**0.140**
10	8.50	0.20		0.23		**0.047**	**0.180**
11	9.50	0.16		0.22		**0.035**	**0.130**
12	10.50	0.10		0.08		**0.008**	**0.110**
13	11.50	0.12		0.02		**0.002**	**0.150**
14	12.50	0.18		0.09		**0.016**	**0.150**
15	13.50	0.12		0.03		**0.003**	**0.100**
16	14.50	0.08		0.17		**0.013**	**0.120**
17	15.50	0.16		0.16		**0.026**	**0.105**
18	16.50	0.05		0.11		**0.005**	**0.145**
19	17.50	0.24		0.13		**0.030**	**0.150**
20	18.50	0.06		0.20		**0.012**	**0.130**
21	19.50	0.20		0.09		**0.018**	**0.200**
22	20.50	0.20		0.12		**0.024**	**0.160**
23	21.50	0.12		0.08		**0.009**	**0.150**
24	22.50	0.18		0.12		**0.022**	**0.180**
25	23.50	0.18		0.15		**0.028**	**0.160**
26	24.50	0.14		0.09		**0.012**	**0.180**
27	25.50	0.22		0.23		**0.050**	**0.160**
28	26.50	0.10		0.05		**0.005**	**0.090**
29	27.50	0.08		0.15		**0.012**	**0.060**
30	28.50	0.04		0.18		**0.007**	**0.060**
31	29.50	0.08		0.15		**0.012**	**0.150**
32	30.50	0.22		0.18		**0.039**	**0.150**
33	31.50	0.08		0.07		**0.006**	**0.065**
34	32.50	0.05		0.26		**0.013**	**0.050**
35	33.50	0.05		0.05		**0.002**	**0.045**
36	34.50	0.04		0.02		**0.001**	**0.120**
37	36.50	0.08		0.11		**0.018**	**0.160**
38	38.50	0.08		0.02		**0.004**	**0.080**
39	40.50	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.570**
						A(m2)	**4.62**
						B(m)	**40.5**

A10.0 LAKE A22 & OUTLET (STREAM A22-A21)

Parameter	Value	Note
Benchmark Coordinates	604454 m E, 7252042 m N, 157.36 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel. Discharge was too low to be measured on 16 August and 16 September 2016.	



Lake A22: Benchmark location.

13 June 2016. Side view of the watercourse (southeast)

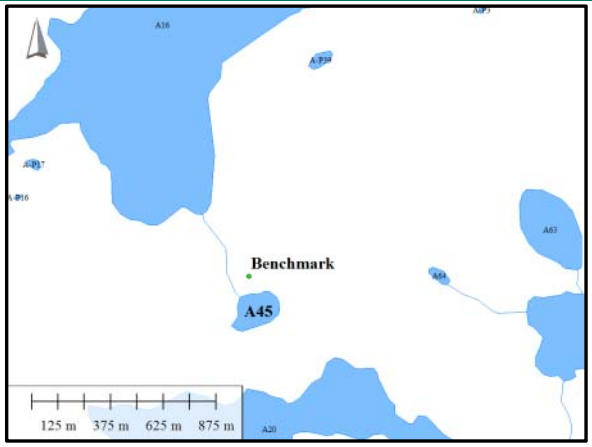
16 August 2016. View of Lake A22 and watercourse (east).

16 August 2016. Downstream view (east).

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	13-Jun-16	
Waterbody:		Lake A22			**Start Time**	11:22	
Crossing ID:		A22-A21			**End Time**	11:45	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	604465	BM_read			**Transducer SN:**		
North	7252115	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.038**
2	1.50	0.05		0.06		**0.003**	**0.085**
3	2.50	0.12		0.56		**0.067**	**0.100**
4	3.50	0.08		0.07		**0.005**	**0.090**
5	4.50	0.10		0.27		**0.034**	**0.165**
6	6.00	0.12		0.37		**0.055**	**0.110**
7	7.00	0.10		0.61		**0.061**	**0.100**
8	8.00	0.10		0.31		**0.031**	**0.100**
9	9.00	0.10		0.15		**0.015**	**0.090**
10	10.00	0.08		0.30		**0.024**	**0.080**
11	11.00	0.08		0.22		**0.017**	**0.060**
12	12.00	0.04		0.14		**0.006**	**0.060**
13	13.00	0.08		0.06		**0.005**	**0.080**
14	14.00	0.08		0.08		**0.007**	**0.080**
15	15.00	0.08		0.09		**0.007**	**0.100**
16	16.00	0.12		0.09		**0.011**	**0.120**
17	17.00	0.12		0.25		**0.030**	**0.100**
18	18.00	0.08		0.07		**0.005**	**0.110**
19	19.00	0.14		0.36		**0.050**	**0.120**
20	20.00	0.10		0.16		**0.016**	**0.100**
21	21.00	0.10		0.22		**0.022**	**0.200**
22	22.00	0.30		0.13		**0.038**	**0.280**
23	23.00	0.26		0.22		**0.056**	**0.180**
24	24.00	0.10		0.23		**0.023**	**0.125**
25	25.00	0.15		0.12		**0.018**	**0.125**
26	26.00	0.10		0.16		**0.016**	**0.065**
27	27.00	0.03		0.00		**0.000**	**0.065**
28	28.00	0.10		0.27		**0.027**	**0.075**
29	29.00	0.05		0.08		**0.004**	**0.025**
30	30.00	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.653**
						A(m2)	**3.03**
						B(m)	**30.0**

A11.0 LAKE A45 & OUTLET (STREAM A45-A16)

Parameter	Value	Note
Benchmark Coordinates	604716 m E, 7253325 m N, 159.66 masl	NAD83 Zone 14
Comment	Deep boulder garden channel with predominantly subsurface flows especially later in the open water season. The lake outlet was frozen on 10 June 2016, and the discharge was too low to be measured on 14 August and 16 September 2016.	



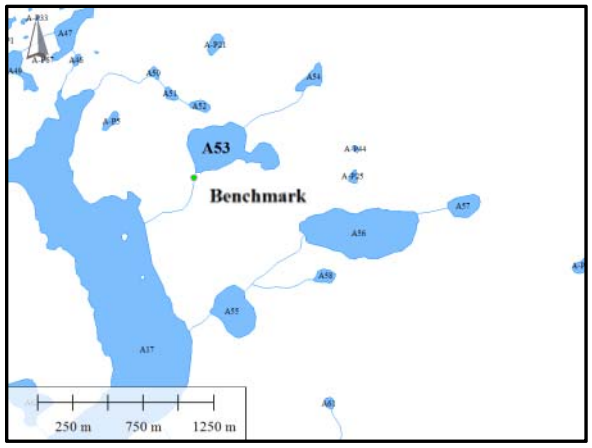
Lake A45: Benchmark location.

16 September 2016. Downstream view of Lake A45 and watercourse (northwest)

16 September 2016. Downstream view of watercourse (northwest)

A12.0 LAKE A53 & OUTLET (STREAM A53-A17)

Parameter	Value	Note
Benchmark Coordinates	607920 m E, 7255519 m N, 162.13 masl	NAD83 Zone 14
Comment	Well defined channel, with a high width to depth ratio. The outlet was frozen during the June 2016 trip.	



Lake A53.

16 August 2016. Downstream view of the watercourse (south).

15 September 2016. Upstream view towards Lake A53 (north).

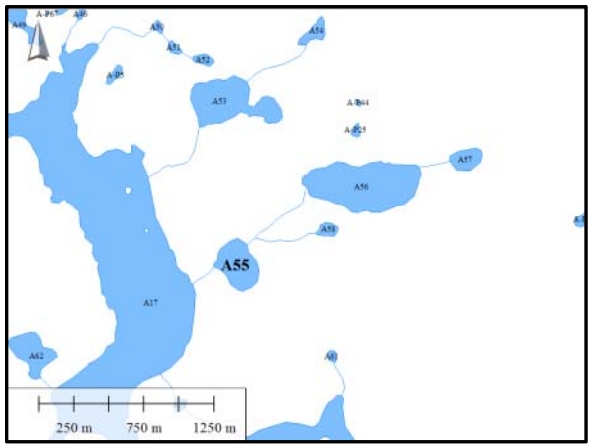
15 September 2016. Downstream view of watercourse (south).

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	12-Jun-16	
Waterbody:		Lake A53			**Start Time**	18:24	
Crossing ID:		A53-A17			**End Time**	18:43	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	607710	BM_read			**Transducer SN:**		
North	7255280	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.011**
2	0.20	0.11		0.00		**0.000**	**0.013**
3	0.30	0.14		0.00		**0.000**	**0.015**
4	0.40	0.15		0.00		**0.000**	**0.015**
5	0.50	0.15		0.14		**0.002**	**0.015**
6	0.60	0.15		0.08		**0.001**	**0.016**
7	0.70	0.16		0.17		**0.003**	**0.016**
8	0.80	0.16		0.38		**0.006**	**0.015**
9	0.90	0.14		0.38		**0.005**	**0.014**
10	1.00	0.14		0.23		**0.003**	**0.014**
11	1.10	0.14		0.09		**0.001**	**0.014**
12	1.20	0.14		0.17		**0.002**	**0.014**
13	1.30	0.14		0.28		**0.004**	**0.015**
14	1.40	0.15		0.07		**0.001**	**0.016**
15	1.50	0.16		0.00		**0.000**	**0.017**
16	1.60	0.18		0.00		**0.000**	**0.018**
17	1.70	0.18		0.10		**0.002**	**0.019**
18	1.80	0.20		0.41		**0.008**	**0.020**
19	1.90	0.20		0.10		**0.002**	**0.021**
20	2.00	0.21		0.52		**0.011**	**0.019**
21	2.10	0.16		0.60		**0.010**	**0.018**
22	2.20	0.20		0.57		**0.011**	**0.018**
23	2.30	0.16		0.52		**0.008**	**0.014**
24	2.40	0.12		0.24		**0.014**	**0.081**
25	3.30	0.06		0.00		**0.000**	**0.026**
26	3.70	0.07		0.00		**0.000**	**0.014**
27	4.10	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.096**
						A(m2)	**0.48**
						B(m)	**4.1**

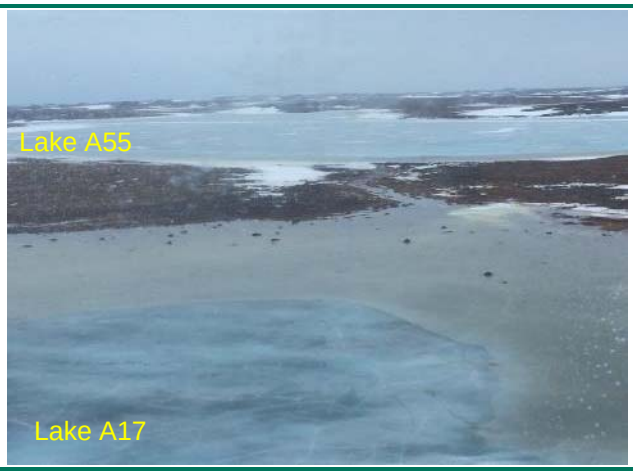
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	14-Aug-16	
Waterbody:		Lake A53			**Start Time**	17:31	
Crossing ID:		A53-A17			**End Time**	18:01	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	607920	BM_read			**Transducer SN:**		
North	7255490	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.012**
2	0.40	0.06		0.00		**0.000**	**0.016**
3	0.60	0.10		0.02		**0.000**	**0.020**
4	0.80	0.10		0.04		**0.001**	**0.020**
5	1.00	0.10		0.05		**0.001**	**0.018**
6	1.20	0.08		0.01		**0.000**	**0.016**
7	1.40	0.08		0.07		**0.001**	**0.017**
8	1.60	0.09		0.07		**0.001**	**0.020**
9	1.80	0.11		0.07		**0.001**	**0.019**
10	2.00	0.08		0.07		**0.001**	**0.017**
11	2.20	0.09		0.10		**0.002**	**0.015**
12	2.40	0.06		0.04		**0.001**	**0.012**
13	2.60	0.06		0.05		**0.001**	**0.012**
14	2.80	0.06		0.03		**0.000**	**0.014**
15	3.00	0.08		0.04		**0.001**	**0.016**
16	3.20	0.08		0.04		**0.001**	**0.017**
17	3.40	0.09		0.02		**0.000**	**0.021**
18	3.60	0.12		0.03		**0.001**	**0.024**
19	3.80	0.12		0.08		**0.002**	**0.022**
20	4.00	0.10		0.07		**0.001**	**0.016**
21	4.20	0.06		0.06		**0.001**	**0.012**
22	4.40	0.06		0.04		**0.001**	**0.009**
23	4.70	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.017**
						A(m2)	**0.37**
						B(m)	**4.7**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 3			**Date**		15-Sep-16	
Waterbody:		Lake A53			**Start Time**		17:00	
Crossing ID:		A53-A17			**End Time**		17:13	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	607920	BM_read			**Transducer SN:**			
North	7255490	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.020**
2	1.00	0.04		0.02			**0.000**	**0.015**
3	1.30	0.06		0.01			**0.000**	**0.009**
4	1.60	0.00		0.00			**0.000**	**0.009**
5	1.90	0.06		0.00			**0.000**	**0.021**
6	2.20	0.08		0.02			**0.001**	**0.029**
7	2.50	0.11		0.01			**0.000**	**0.038**
8	2.80	0.14		0.03			**0.001**	**0.041**
9	3.10	0.13		0.01			**0.000**	**0.044**
10	3.40	0.16		0.01			**0.001**	**0.036**
11	3.70	0.08		0.01			**0.000**	**0.030**
12	4.00	0.12		0.00			**0.000**	**0.032**
13	4.30	0.09		0.00			**0.000**	**0.029**
14	4.60	0.10		0.02			**0.001**	**0.033**
15	4.90	0.12		0.01			**0.000**	**0.036**
16	5.20	0.12		0.01			**0.000**	**0.036**
17	5.50	0.12		0.02			**0.001**	**0.036**
18	5.80	0.12		0.00			**0.000**	**0.018**
19	6.10	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.006**	
						A(m2)	**0.51**	
						B(m)	**6.1**	

A13.0 LAKE A55 & OUTLET (STREAM A55-A17)



Lake A55.



12 June 2016. View looking upstream towards Lake A55 and watercourse (east).

16 August 2016. Upstream view of the watercourse (northeast).

18 September 2018. Upstream view of the watercourse (northeast).

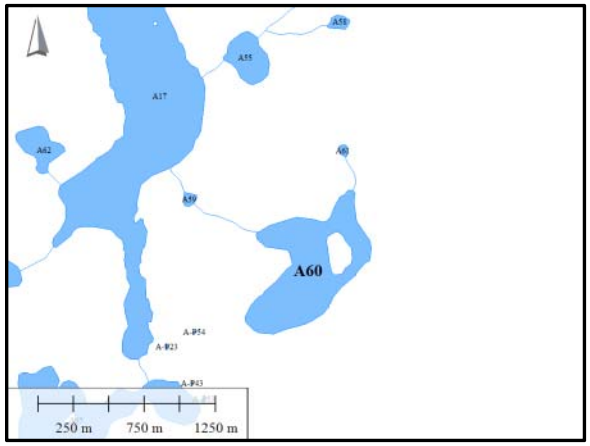
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	12-Jun-16	
Waterbody:		Lake A55			**Start Time**	12:27	
Crossing ID:		A55-A17			**End Time**	12:49	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	608000	BM_read			**Transducer SN:**		
North	7254540	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.010**
2	0.20	0.10		0.00		**0.000**	**0.030**
3	0.50	0.10		0.20		**0.006**	**0.042**
4	0.80	0.18		0.15		**0.008**	**0.060**
5	1.10	0.22		0.23		**0.015**	**0.062**
6	1.40	0.19		0.25		**0.014**	**0.066**
7	1.70	0.25		0.26		**0.019**	**0.071**
8	2.00	0.22		0.32		**0.021**	**0.080**
9	2.30	0.31		0.20		**0.018**	**0.083**
10	2.60	0.24		0.27		**0.019**	**0.078**
11	2.90	0.28		0.26		**0.022**	**0.084**
12	3.20	0.28		0.28		**0.024**	**0.081**
13	3.50	0.26		0.28		**0.022**	**0.081**
14	3.80	0.28		0.22		**0.018**	**0.075**
15	4.10	0.22		0.38		**0.025**	**0.069**
16	4.40	0.24		0.24		**0.018**	**0.072**
17	4.70	0.24		0.31		**0.022**	**0.059**
18	5.00	0.15		0.24		**0.011**	**0.056**
19	5.30	0.22		0.21		**0.014**	**0.069**
20	5.60	0.24		0.16		**0.012**	**0.077**
21	5.90	0.27		0.24		**0.020**	**0.071**
22	6.20	0.20		0.12		**0.007**	**0.048**
23	6.50	0.12		0.10		**0.004**	**0.039**
24	6.80	0.14		0.12		**0.005**	**0.033**
25	7.10	0.08		0.05		**0.001**	**0.018**
26	7.40	0.04		0.05		**0.001**	**0.029**
27	7.70	0.15		0.04		**0.002**	**0.027**
28	8.00	0.03		0.05		**0.000**	**0.020**
29	8.30	0.10		0.03		**0.004**	**0.115**
30	10.60	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.352**
						A(m2)	**1.70**
						B(m)	**10.6**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 2			**Date**		16-Aug-16	
Waterbody:		Lake A55			**Start Time**		14:33	
Crossing ID:		A55-A17			**End Time**		15:18	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	608000	BM_read			**Transducer SN:**			
North	7254540	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.028**
2	0.50	0.11		0.10			**0.004**	**0.028**
3	0.75	0.11		0.04			**0.001**	**0.019**
4	1.00	0.04		0.11			**0.001**	**0.020**
5	1.25	0.12		0.00			**0.000**	**0.023**
6	1.50	0.06		0.13			**0.002**	**0.015**
7	1.75	0.06		0.11			**0.002**	**0.013**
8	2.00	0.04		0.00			**0.000**	**0.021**
9	2.25	0.13		0.01			**0.000**	**0.033**
10	2.50	0.13		0.19			**0.006**	**0.031**
11	2.75	0.12		0.02			**0.000**	**0.030**
12	3.00	0.12		0.13			**0.004**	**0.028**
13	3.25	0.10		0.10			**0.003**	**0.028**
14	3.50	0.12		0.03			**0.001**	**0.023**
15	3.75	0.06		0.12			**0.002**	**0.015**
16	4.00	0.06		0.05			**0.001**	**0.018**
17	4.25	0.08		0.00			**0.000**	**0.023**
18	4.50	0.10		0.09			**0.002**	**0.025**
19	4.75	0.10		0.19			**0.005**	**0.025**
20	5.00	0.10		0.01			**0.000**	**0.020**
21	5.25	0.06		0.00			**0.000**	**0.025**
22	5.50	0.14		0.00			**0.000**	**0.033**
23	5.75	0.12		0.02			**0.001**	**0.015**
24	6.00	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.035**	
						A(m2)	**0.53**	
						B(m)	**6.0**	

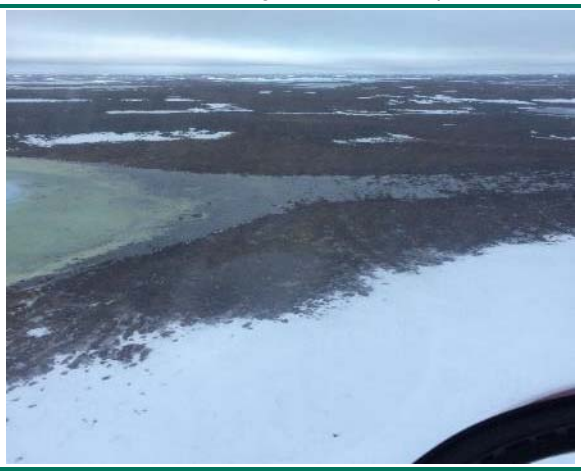
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**	18-Sep-16	
Waterbody:		Lake A55			**Start Time**	11:12	
Crossing ID:		A55-A17			**End Time**	11:35	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	608000	BM_read			**Transducer SN:**		
North	7254540	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.014**
2	0.40	0.07		0.00		**0.000**	**0.011**
3	0.60	0.04		0.00		**0.000**	**0.008**
4	0.80	0.04		0.00		**0.000**	**0.005**
5	0.90	0.06		0.02		**0.000**	**0.010**
6	1.10	0.04		0.07		**0.001**	**0.010**
7	1.30	0.06		0.14		**0.002**	**0.012**
8	1.50	0.06		0.00		**0.000**	**0.016**
9	1.70	0.10		0.07		**0.001**	**0.016**
10	1.90	0.06		0.15		**0.002**	**0.010**
11	2.10	0.04		0.12		**0.001**	**0.012**
12	2.30	0.08		0.05		**0.001**	**0.023**
13	2.50	0.15		0.00		**0.000**	**0.027**
14	2.70	0.12		0.12		**0.003**	**0.014**
15	2.90	0.02		0.13		**0.001**	**0.015**
16	3.20	0.08		0.02		**0.000**	**0.020**
17	3.40	0.12		0.11		**0.003**	**0.020**
18	3.60	0.08		0.01		**0.000**	**0.016**
19	3.80	0.08		0.02		**0.000**	**0.012**
20	4.00	0.04		0.05		**0.000**	**0.008**
21	4.20	0.04		0.10		**0.001**	**0.011**
22	4.40	0.07		0.08		**0.001**	**0.017**
23	4.60	0.10		0.00		**0.000**	**0.014**
24	4.80	0.04		0.06		**0.000**	**0.002**
25	4.90	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.018**
						A(m2)	**0.32**
						B(m)	**4.9**

A14.0 LAKE A60 & OUTLET (STREAM A60-A59)

Parameter	Note
Comment	Poorly defined boulder channel. The outlet was frozen during the June 2016 trip.



Lake A60.



14 June 2016. View of Lake A60 and watercourse (south).

18 September 2016. Downstream view of the watercourse (west).

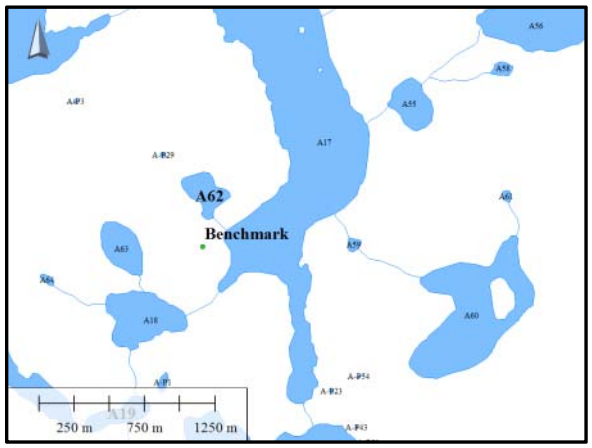
18 September 2016. Upstream view of the watercourse (east).

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 2			**Date**		16-Aug-16	
Waterbody:		Lake A60			**Start Time**		11:49	
Crossing ID:		A60-A17			**End Time**		12:01	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	608145	BM_read			**Transducer SN:**			
North	7253360	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.008**
2	0.20	0.08		0.00			**0.000**	**0.010**
3	0.30	0.12		0.00			**0.000**	**0.010**
4	0.40	0.08		0.00			**0.000**	**0.005**
5	0.50	0.01		0.00			**0.000**	**0.003**
6	0.60	0.04		0.05			**0.000**	**0.005**
7	0.70	0.06		0.00			**0.000**	**0.007**
8	0.80	0.07		0.00			**0.000**	**0.007**
9	0.90	0.06		0.00			**0.000**	**0.005**
10	1.00	0.04		0.04			**0.000**	**0.004**
11	1.10	0.04		0.05			**0.000**	**0.004**
12	1.20	0.04		0.03			**0.000**	**0.005**
13	1.30	0.06		0.00			**0.000**	**0.006**
14	1.40	0.06		0.02			**0.000**	**0.006**
15	1.50	0.06		0.03			**0.000**	**0.007**
16	1.60	0.08		0.02			**0.000**	**0.005**
17	1.70	0.03		0.04			**0.000**	**0.002**
18	1.80	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.001**	
						A(m2)	**0.10**	
						B(m)	**1.8**	

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 3			**Date**		18-Sep-16	
Waterbody:		Lake A60			**Start Time**		15:34	
Crossing ID:		A60-A17			**End Time**		15:52	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	608145	BM_read			**Transducer SN:**			
North	7253360	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.025**
2	0.50	0.10		0.01			**0.000**	**0.005**
3	0.55	0.10		0.02			**0.000**	**0.005**
4	0.60	0.10		0.01			**0.000**	**0.005**
5	0.65	0.10		0.02			**0.000**	**0.006**
6	0.70	0.14		0.01			**0.000**	**0.007**
7	0.75	0.14		0.01			**0.000**	**0.008**
8	0.80	0.16		0.01			**0.000**	**0.008**
9	0.85	0.16		0.00			**0.000**	**0.008**
10	0.90	0.16		0.00			**0.000**	**0.009**
11	0.95	0.20		0.01			**0.000**	**0.010**
12	1.00	0.20		0.02			**0.000**	**0.011**
13	1.05	0.23		0.02			**0.000**	**0.011**
14	1.10	0.22		0.03			**0.000**	**0.019**
15	1.20	0.15		0.04			**0.000**	**0.008**
16	1.25	0.15		0.01			**0.000**	**0.009**
17	1.30	0.22		0.01			**0.000**	**0.011**
18	1.35	0.22		0.01			**0.000**	**0.018**
19	1.45	0.13		0.01			**0.000**	**0.007**
20	1.50	0.13		0.00			**0.000**	**0.012**
21	1.60	0.10		0.01			**0.000**	**0.012**
22	1.75	0.06		0.00			**0.000**	**0.009**
23	2.05	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.003**	
						A(m2)	**0.22**	
						B(m)	**2.1**	

A15.0 LAKE A62 & OUTLET (STREAM A62-A17)

Parameter	Value	Note
Benchmark Coordinates	606791 m E, 7253734 m N, 156.03 masl	NAD83 Zone 14
Comment	No defined channel. No flow noted during August 2016 trip.	



Lake A62: Benchmark location.

14 June 2016. Upstream view of the watercourse (northwest).

18 September 2016. Downstream view of the watercourse (southeast)

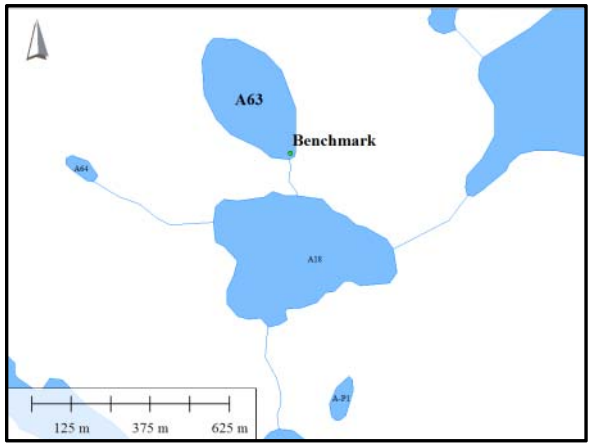
18 September 2016. Upstream view of the watercourse (northwest)

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	14-Jun-16	
Waterbody:		Lake A62			**Start Time**	16:25	
Crossing ID:		A62-A17			**End Time**	16:38	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606880	BM_read			**Transducer SN:**		
North	7253755	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.004**
2	0.10	0.08		0.00		**0.000**	**0.009**
3	0.20	0.10		0.00		**0.000**	**0.020**
4	0.40	0.10		0.04		**0.001**	**0.022**
5	0.60	0.12		0.19		**0.003**	**0.011**
6	0.70	0.10		0.36		**0.005**	**0.020**
7	0.90	0.10		0.01		**0.000**	**0.007**
8	1.00	0.04		0.53		**0.003**	**0.014**
9	1.20	0.10		0.04		**0.002**	**0.077**
10	1.90	0.12		0.00		**0.000**	**0.045**
11	2.20	0.18		0.18		**0.008**	**0.038**
12	2.40	0.20		0.69		**0.027**	**0.038**
13	2.60	0.18		0.47		**0.017**	**0.032**
14	2.80	0.14		0.60		**0.017**	**0.025**
15	3.00	0.11		0.02		**0.001**	**0.048**
16	3.50	0.08		0.10		**0.003**	**0.008**
17	3.70	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.087**
						A(m2)	**0.42**
						B(m)	**3.7**

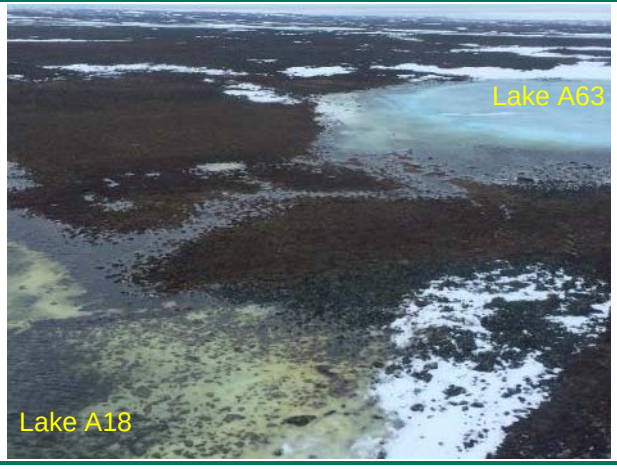
OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 3			**Date**		18-Sep-16	
Waterbody:		Lake A62			**Start Time**		15:01	
Crossing ID:		A62-A17			**End Time**		15:05	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	606815	BM_read			**Transducer SN:**			
North	7253650	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.006**
2	0.20	0.06		0.00			**0.000**	**0.003**
3	0.25	0.05		0.01			**0.000**	**0.002**
4	0.30	0.04		0.03			**0.000**	**0.002**
5	0.35	0.04		0.05			**0.000**	**0.002**
6	0.40	0.05		0.07			**0.000**	**0.002**
7	0.45	0.04		0.02			**0.000**	**0.002**
8	0.50	0.04		0.00			**0.000**	**0.005**
9	0.60	0.05		0.00			**0.000**	**0.003**
10	0.70	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.0004**	
						A(m2)	**0.03**	
						B(m)	**0.7**	

A16.0 LAKE A63 & OUTLET (STREAM A63-A18)

Parameter	Value	Note
Benchmark Coordinates	606276 m E, 7253375 m N, 155.24 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel.	



Lake A63.



14 June 2016. View of Lake A63 and A18 (west).

18 September 2016. View of Lake A63 and watercourse (south).

18 September 2016. Upstream view of watercourse (north).

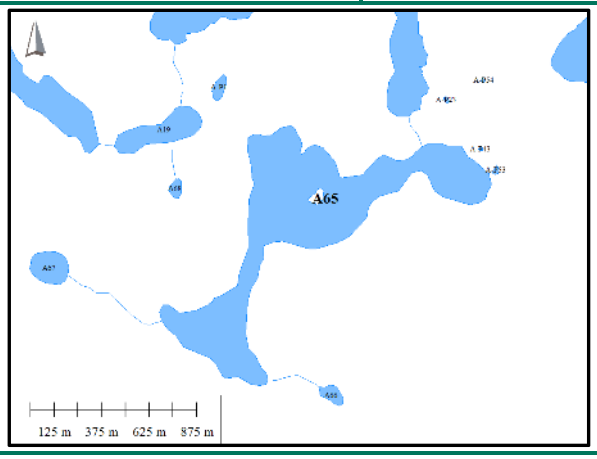
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	14-Jun-16	
Waterbody:		Lake A63			**Start Time**	17:17	
Crossing ID:		A63-A18			**End Time**	17:24	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606270	BM_read			**Transducer SN:**		
North	7253325	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.027**
2	0.30	0.18		0.02		**0.001**	**0.034**
3	0.50	0.16		0.13		**0.004**	**0.028**
4	0.70	0.12		0.28		**0.007**	**0.024**
5	0.90	0.12		0.13		**0.003**	**0.026**
6	1.10	0.14		0.07		**0.002**	**0.028**
7	1.30	0.14		0.40		**0.011**	**0.028**
8	1.50	0.14		0.22		**0.009**	**0.064**
9	1.90	0.18		0.06		**0.003**	**0.038**
10	2.10	0.20		0.54		**0.021**	**0.030**
11	2.30	0.10		0.23		**0.007**	**0.020**
12	2.70	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.069**
						A(m2)	**0.35**
						B(m)	**2.7**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	15-Aug-16	
Waterbody:		Lake A63			**Start Time**	15:31	
Crossing ID:		A63-A18			**End Time**	16:03	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606270	BM_read			**Transducer SN:**		
North	7253325	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION Start LDB	DISTANCE FROM LDB (m)	DEPTH (m)	Velocity 0.2 DEPTH (m/s)	Velocity 0.6/0.8 DEPTH (m/s)	Optional ANGLE OF FLOW (º)	Qi (m3/s)	Ai (m2)
1	0.00	0.00		0.00			**0.018**
2	0.60	0.06		0.01		**0.000**	**0.001**
3	0.62	0.06		0.01		**0.000**	**0.001**
4	0.64	0.06		0.02		**0.000**	**0.001**
5	0.66	0.06		0.02		**0.000**	**0.001**
6	0.68	0.06		0.03		**0.000**	**0.001**
7	0.70	0.08		0.01		**0.000**	**0.002**
8	0.72	0.08		0.00		**0.000**	**0.002**
9	0.74	0.08		0.00		**0.000**	**0.002**
10	0.76	0.08		0.00		**0.000**	**0.002**
11	0.78	0.10		0.00		**0.000**	**0.002**
12	0.80	0.10		0.00		**0.000**	**0.002**
13	0.82	0.12		0.00		**0.000**	**0.002**
14	0.84	0.12		0.03		**0.000**	**0.002**
15	0.86	0.10		0.04		**0.000**	**0.002**
16	0.88	0.10		0.05		**0.000**	**0.002**
17	0.90	0.10		0.05		**0.000**	**0.002**
18	0.92	0.10		0.05		**0.000**	**0.002**
19	0.94	0.10		0.08		**0.000**	**0.002**
20	0.96	0.10		0.08		**0.000**	**0.002**
21	0.98	0.08		0.08		**0.000**	**0.002**
22	1.00	0.08		0.09		**0.000**	**0.002**
23	1.02	0.08		0.10		**0.000**	**0.001**
24	1.04	0.06		0.11		**0.000**	**0.002**
25	1.10	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.002**
						A(m2)	**0.06**
						B(m)	**1.1**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**	18-Sep-16	
Waterbody:		Lake A63			**Start Time**	13:57	
Crossing ID:		A63-A18			**End Time**	14:18	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	606270	BM_read			**Transducer SN:**		
North	7253325	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION Start LDB	DISTANCE FROM LDB (m)	DEPTH (m)	Velocity 0.2 DEPTH (m/s)	Velocity 0.6/0.8 DEPTH (m/s)	Optional ANGLE OF FLOW (º)	Qi (m3/s)	Ai (m2)
1	0.00	0.00		0.00			**0.002**
2	0.10	0.04		0.00		**0.000**	**0.002**
3	0.15	0.04		0.00		**0.000**	**0.003**
4	0.20	0.07		0.00		**0.000**	**0.004**
5	0.25	0.08		0.01		**0.000**	**0.004**
6	0.30	0.08		0.01		**0.000**	**0.004**
7	0.35	0.08		0.00		**0.000**	**0.004**
8	0.40	0.08		0.02		**0.000**	**0.005**
9	0.45	0.10		0.01		**0.000**	**0.005**
10	0.50	0.10		0.03		**0.000**	**0.005**
11	0.55	0.10		0.06		**0.000**	**0.005**
12	0.60	0.10		0.07		**0.000**	**0.005**
13	0.65	0.10		0.06		**0.000**	**0.005**
14	0.70	0.10		0.05		**0.000**	**0.005**
15	0.75	0.08		0.05		**0.000**	**0.004**
16	0.80	0.08		0.05		**0.000**	**0.004**
17	0.85	0.08		0.03		**0.000**	**0.004**
18	0.90	0.06		0.01		**0.000**	**0.003**
19	0.95	0.06		0.00		**0.000**	**0.003**
20	1.00	0.04		0.00		**0.000**	**0.002**
21	1.05	0.04		0.00		**0.000**	**0.002**
22	1.15	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.002**
						A(m2)	**0.08**
						B(m)	**1.2**

A17.0 LAKE A65 & OUTLET (STREAM A65-A17)

Parameter	Note
Comment	The lake outlet was frozen during the June 2016 trip, and the discharge was too low to be measured on 16 August and 16 September 2016.



Lake A65

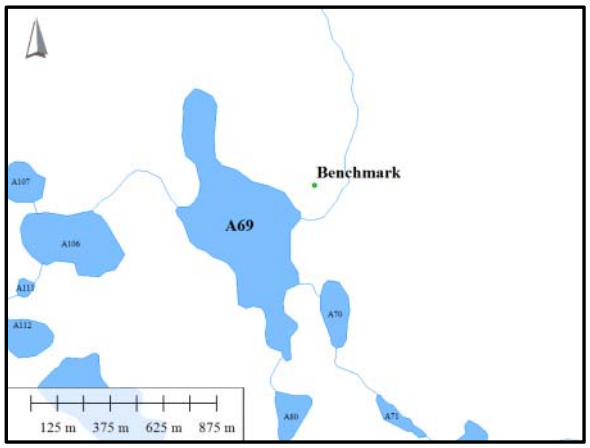
14 June 2016. View of Lake A65 (north).

14 June 2016. View of Lake A65 and outlet (south).

18 September 2016. Downstream view of watercourse (north).

A18.0 LAKE A69 & OUTLET (STREAM A69-DS1)

Parameter	Value	Note
Benchmark Coordinates	598344 m E, 7256822 m N, 115.40 masl	NAD83 Zone 14
Comment	Well defined boulder channel.	



Lake A69: Benchmark location.

13 June 2016. View of Lake A69 and watercourse (north).

13 June 2016. Upstream view of the watercourse (west).

15 September 2016. View of Lake A69 and watercourse (west).

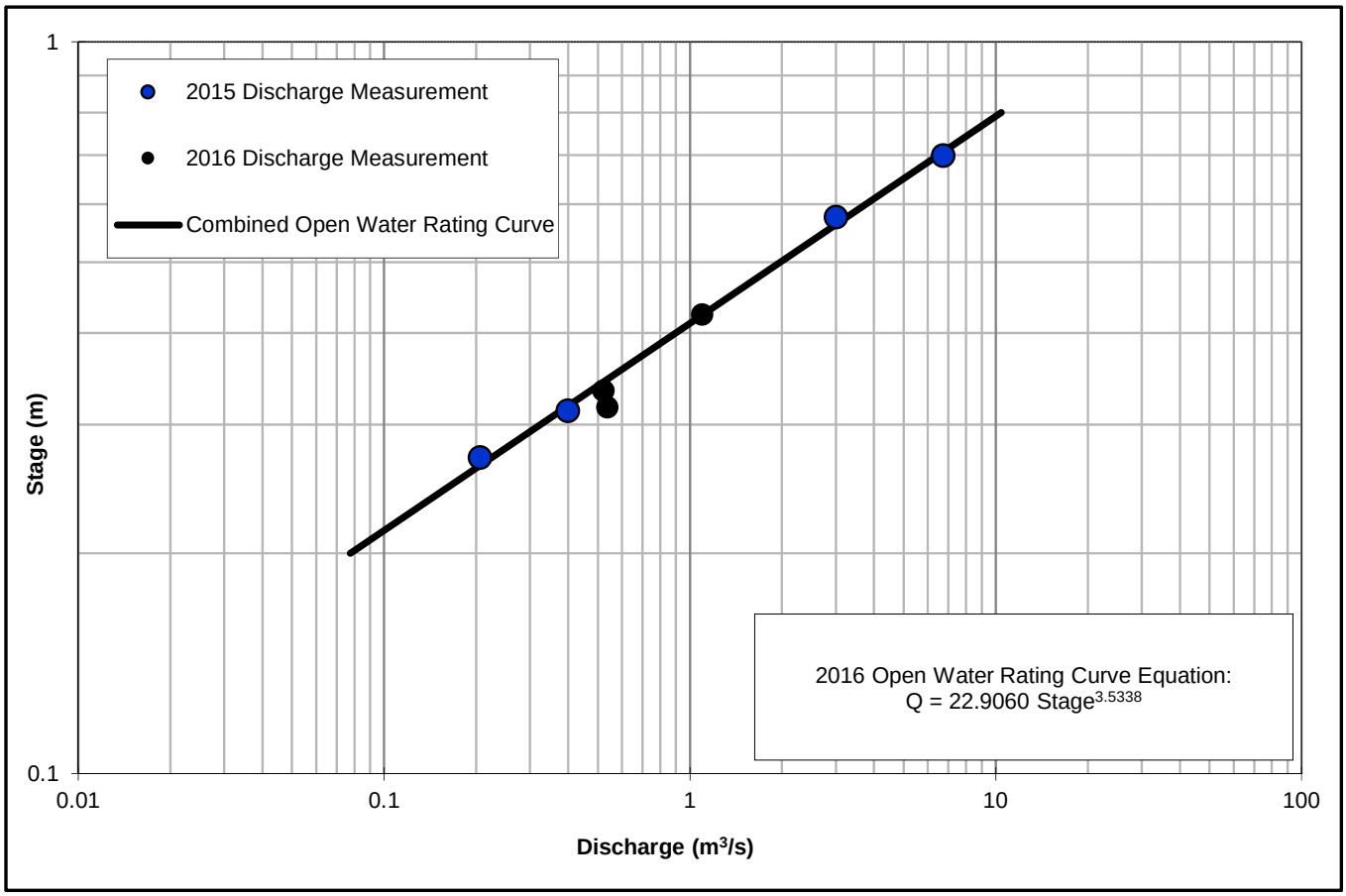


Figure A5: Stage-Discharge Rating Curve (Lake A69)

Lake A69 - 2016

MEAN DAILY WATER DISCHARGE (m^3/s)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	1.03	0.43	0.40	-	-	-
2	-	-	-	-	-	-	1.01	0.43	0.39	-	-	-
3	-	-	-	-	-	-	0.94	0.52	0.39	-	-	-
4	-	-	-	-	-	-	0.89	0.56	0.40	-	-	-
5	-	-	-	-	-	-	0.84	0.54	0.40	-	-	-
6	-	-	-	-	-	-	0.81	0.54	0.39	-	-	-
7	-	-	-	-	-	-	0.77	0.56	0.40	-	-	-
8	-	-	-	-	-	-	0.73	0.56	0.39	-	-	-
9	-	-	-	-	-	-	0.71	0.54	0.43	-	-	-
10	-	-	-	-	-	-	0.68	0.53	0.45	-	-	-
11	-	-	-	-	-	1.46 P	0.65	0.52	0.43	-	-	-
12	-	-	-	-	-	2.51	0.62	0.50	0.40	-	-	-
13	-	-	-	-	-	3.86	0.57	0.50	0.41	-	-	-
14	-	-	-	-	-	4.88	0.54	0.50	0.41	-	-	-
15	-	-	-	-	-	4.21	0.53	0.50	0.40 P	-	-	-
16	-	-	-	-	-	3.93	0.50	0.48	-	-	-	-
17	-	-	-	-	-	4.17	0.47	0.49	-	-	-	-
18	-	-	-	-	-	4.17	0.45	0.47	-	-	-	-
19	-	-	-	-	-	3.53	0.45	0.44	-	-	-	-
20	-	-	-	-	-	3.17	0.43	0.43	-	-	-	-
21	-	-	-	-	-	2.51	0.44	0.42	-	-	-	-
22	-	-	-	-	-	2.10	0.53	0.42	-	-	-	-
23	-	-	-	-	-	1.97	0.52	0.41	-	-	-	-
24	-	-	-	-	-	1.84	0.49	0.40	-	-	-	-
25	-	-	-	-	-	1.67	0.47	0.39	-	-	-	-
26	-	-	-	-	-	1.45	0.45	0.39	-	-	-	-
27	-	-	-	-	-	1.40	0.47	0.40	-	-	-	-
28	-	-	-	-	-	1.29	0.46	0.40	-	-	-	-
29	-	-	-	-	-	1.16	0.44	0.40	-	-	-	-
30	-	-	-	-	-	1.07	0.44	0.40	-	-	-	-
31	-	-	-	-	-	-	0.44	0.40	-	-	-	-
MIN	-	-	-	-	-	1.068	0.430	0.385	0.385	-	-	-
MEAN	-	-	-	-	-	2.617	0.606	0.466	0.406	-	-	-
MAX	-	-	-	-	-	4.876	1.029	0.563	0.453	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

Water Yield (m^3) =	7,919,036	4,521,526	1,622,373	1,248,459	526,678
Water Yield (mm) =	191.4	57%	20%	16%	7%

Lake A69 - 2016

MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCT	NOV	DEC
1	-	-	-	-	-	-	112.316	112.224	112.218	-	-	-
2	-	-	-	-	-	-	112.313	112.225	112.215	-	-	-
3	-	-	-	-	-	-	112.305	112.242	112.216	-	-	-
4	-	-	-	-	-	-	112.299	112.250	112.219	-	-	-
5	-	-	-	-	-	-	112.293	112.246	112.218	-	-	-
6	-	-	-	-	-	-	112.289	112.247	112.215	-	-	-
7	-	-	-	-	-	-	112.283	112.249	112.219	-	-	-
8	-	-	-	-	-	-	112.277	112.249	112.216	-	-	-
9	-	-	-	-	-	-	112.273	112.246	112.225	-	-	-
10	-	-	-	-	-	-	112.270	112.245	112.230	-	-	-
11	-	-	-	-	-	112.356 P	112.265	112.242	112.224	-	-	-
12	-	-	-	-	-	112.433	112.260	112.240	112.219	-	-	-
13	-	-	-	-	-	112.503	112.252	112.238	112.220	-	-	-
14	-	-	-	-	-	112.545	112.246	112.239	112.220	-	-	-
15	-	-	-	-	-	112.519	112.244	112.239	112.219 P	-	-	-
16	-	-	-	-	-	112.507	112.239	112.235	-	-	-	-
17	-	-	-	-	-	112.517	112.233	112.236	-	-	-	-
18	-	-	-	-	-	112.517	112.230	112.234	-	-	-	-
19	-	-	-	-	-	112.489	112.228	112.227	-	-	-	-
20	-	-	-	-	-	112.471	112.225	112.225	-	-	-	-
21	-	-	-	-	-	112.434	112.226	112.222	-	-	-	-
22	-	-	-	-	-	112.408	112.244	112.222	-	-	-	-
23	-	-	-	-	-	112.399	112.243	112.220	-	-	-	-
24	-	-	-	-	-	112.390	112.237	112.218	-	-	-	-
25	-	-	-	-	-	112.376	112.233	112.217	-	-	-	-
26	-	-	-	-	-	112.358	112.230	112.215	-	-	-	-
27	-	-	-	-	-	112.354	112.234	112.218	-	-	-	-
28	-	-	-	-	-	112.343	112.231	112.218	-	-	-	-
29	-	-	-	-	-	112.330	112.227	112.218	-	-	-	-
30	-	-	-	-	-	112.320	112.226	112.217	-	-	-	-
31	-	-	-	-	-	112.316	112.226	112.218	-	-	-	-
MIN	-	-	-	-	-	112.316	112.225	112.215	112.215	-	-	-
MEAN	-	-	-	-	-	112.423	112.255	112.232	112.219	-	-	-
MAX	-	-	-	-	-	112.545	112.316	112.250	112.230	-	-	-

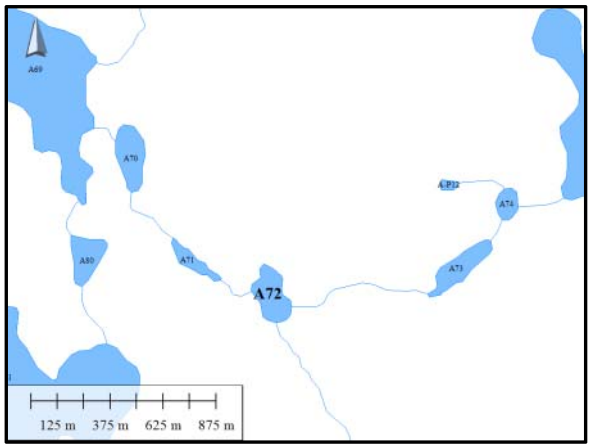
NOTES: P - PARTIAL DAILY AVERAGE

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	11-Jun-16	
Waterbody:		Lake A69			**Start Time**	8:45	
Crossing ID:		A69-DS1			**End Time**	9:17	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	598355	BM_read			**Transducer SN:**		
North	7256735	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION Start LDB	DISTANCE FROM LDB (m)	DEPTH (m)	Velocity 0.2 DEPTH (m/s)	Velocity 0.6/0.8 DEPTH (m/s)	Optional ANGLE OF FLOW (º)	Qi (m3/s)	Ai (m2)
1	0.00	0.00		0.00			**0.010**
2	0.10	0.20		0.32		**0.016**	**0.100**
3	0.50	0.30		0.22		**0.030**	**0.155**
4	1.00	0.32		0.17		**0.027**	**0.160**
5	1.50	0.32		0.42		**0.067**	**0.150**
6	2.00	0.28		0.61		**0.085**	**0.115**
7	2.50	0.18		0.66		**0.059**	**0.120**
8	3.00	0.30		0.60		**0.090**	**0.120**
9	3.50	0.18		0.72		**0.065**	**0.130**
10	4.00	0.34		0.53		**0.090**	**0.160**
11	4.50	0.30		0.53		**0.080**	**0.155**
12	5.00	0.32		0.42		**0.068**	**0.115**
13	5.50	0.14		0.41		**0.029**	**0.080**
14	6.00	0.18		0.42		**0.037**	**0.123**
15	6.50	0.31		0.30		**0.046**	**0.143**
16	7.00	0.26		0.37		**0.047**	**0.100**
17	7.50	0.14		0.33		**0.023**	**0.070**
18	8.00	0.14		0.28		**0.019**	**0.095**
19	8.50	0.24		0.44		**0.052**	**0.130**
20	9.00	0.28		0.24		**0.034**	**0.175**
21	9.50	0.42		0.16		**0.033**	**0.180**
22	10.00	0.30		0.34		**0.051**	**0.110**
23	10.50	0.14		0.67		**0.047**	**0.035**
24	11.00	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**1.097**
						A(m2)	**2.73**
						B(m)	**11.0**

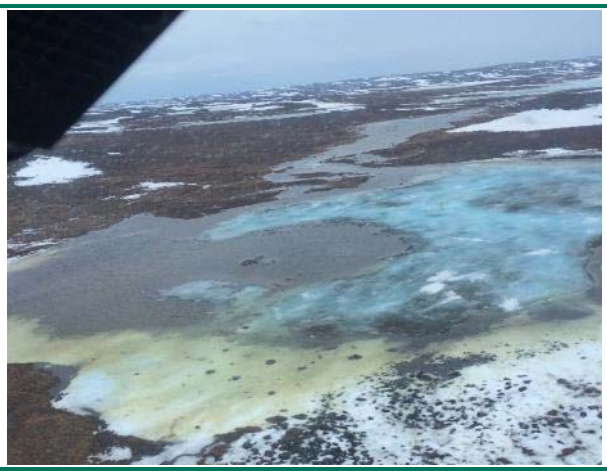
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	13-Aug-16	
Waterbody:		Lake A69			**Start Time**	13:11	
Crossing ID:		A69-DS1			**End Time**	13:40	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	598455	BM_read			**Transducer SN:**		
North	7256735	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION Start LDB	DISTANCE FROM LDB (m)	DEPTH (m)	Velocity 0.2 DEPTH (m/s)	Velocity 0.6/0.8 DEPTH (m/s)	Optional ANGLE OF FLOW (º)	Qi (m3/s)	Ai (m2)
1	0.00	0.00		0.00			**0.060**
2	1.00	0.12		0.03		**0.004**	**0.150**
3	2.00	0.18		0.13		**0.024**	**0.190**
4	3.00	0.20		0.02		**0.005**	**0.220**
5	4.00	0.24		0.08		**0.020**	**0.220**
6	5.00	0.20		0.13		**0.027**	**0.200**
7	6.00	0.20		0.17		**0.033**	**0.210**
8	7.00	0.22		0.13		**0.028**	**0.220**
9	8.00	0.22		0.00		**0.000**	**0.200**
10	9.00	0.18		0.16		**0.028**	**0.190**
11	10.00	0.20		0.15		**0.031**	**0.220**
12	11.00	0.24		0.10		**0.023**	**0.230**
13	12.00	0.22		0.02		**0.004**	**0.220**
14	13.00	0.22		0.11		**0.024**	**0.210**
15	14.00	0.20		0.10		**0.020**	**0.170**
16	15.00	0.14		0.13		**0.018**	**0.190**
17	16.00	0.24		0.08		**0.018**	**0.230**
18	17.00	0.22		0.12		**0.026**	**0.255**
19	18.00	0.29		0.11		**0.031**	**0.255**
20	19.00	0.22		0.10		**0.022**	**0.220**
21	20.00	0.22		0.12		**0.027**	**0.260**
22	21.00	0.30		0.10		**0.031**	**0.255**
23	22.00	0.21		0.12		**0.024**	**0.175**
24	23.00	0.14		0.00		**-0.001**	**0.140**
25	24.00	0.14		0.13		**0.018**	**0.150**
26	25.00	0.16		0.03		**0.005**	**0.180**
27	26.00	0.20		0.04		**0.009**	**0.160**
28	27.00	0.12		0.02		**0.002**	**0.160**
29	28.00	0.20		0.02		**0.004**	**0.180**
30	29.00	0.16		0.06		**0.009**	**0.150**
31	30.00	0.14		0.03		**0.004**	**0.110**
32	31.00	0.08		0.02		**0.001**	**0.040**
33	32.00	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.521**
						A(m2)	**6.02**
						B(m)	**32.0**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 3			**Date**		15-Sep-16	
Waterbody:		Lake A69			**Start Time**		8:44	
Crossing ID:		A69-DS1			**End Time**		9:10	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	598455	BM_read			**Transducer SN:**			
North	7256735	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.680**
2	1.70	0.80		0.10			**0.110**	**0.800**
3	2.70	0.80		0.11			**0.084**	**0.800**
4	3.70	0.80		0.14			**0.109**	**0.470**
5	4.70	0.14		0.07			**0.010**	**0.125**
6	5.70	0.11		0.10			**0.011**	**0.155**
7	6.70	0.20		0.12			**0.024**	**0.190**
8	7.70	0.18		0.02			**0.003**	**0.230**
9	8.70	0.28		0.07			**0.019**	**0.270**
10	9.70	0.26		0.08			**0.020**	**0.220**
11	10.70	0.18		0.12			**0.021**	**0.120**
12	11.70	0.06		0.10			**0.006**	**0.180**
13	12.70	0.30		0.02			**0.005**	**0.280**
14	13.70	0.26		0.08			**0.020**	**0.210**
15	14.70	0.16		0.14			**0.022**	**0.170**
16	15.70	0.18		0.07			**0.013**	**0.160**
17	16.70	0.14		0.14			**0.020**	**0.160**
18	17.70	0.18		0.03			**0.005**	**0.150**
19	18.70	0.12		0.16			**0.020**	**0.130**
20	19.70	0.14		-0.01			**-0.001**	**0.160**
21	20.70	0.18		0.00			**0.001**	**0.140**
22	21.70	0.10		0.05			**0.005**	**0.080**
23	22.70	0.06		-0.02			**-0.001**	**0.070**
24	23.70	0.08		0.06			**0.005**	**0.070**
25	24.70	0.06		0.08			**0.005**	**0.090**
26	25.70	0.12		0.00			**0.001**	**0.258**
27	30.00	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.537**	
						A(m2)	**6.37**	
						B(m)	**30.0**	

A19.0 LAKE A72 & OUTLET (STREAM A72-A71)



Lake A72.



12 June 2016. View of Lake A72 and watercourse to A71 (west).

13 August 2016. Upstream view of the watercourse (east).

15 September 2016. View of Lake A72 and watercourse to A71 (west).

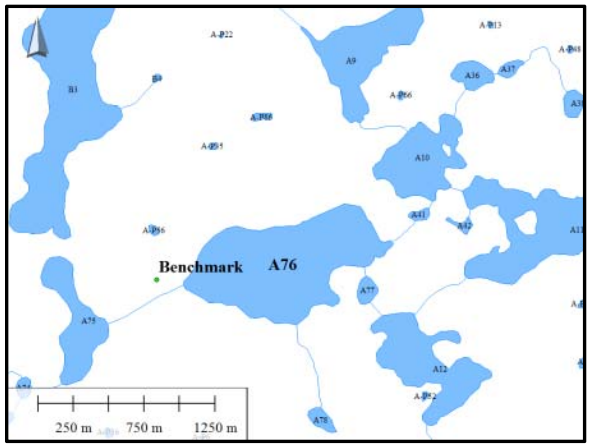
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	12-Jun-16	
Waterbody:		Lake A72			**Start Time**	9:04	
Crossing ID:		A72-A71			**End Time**	9:36	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	599050	BM_read			**Transducer SN:**		
North	7255640	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.220**
2	2.00	0.22		0.05		**0.015**	**0.220**
3	3.00	0.22		0.06		**0.013**	**0.180**
4	4.00	0.14		0.05		**0.007**	**0.120**
5	5.00	0.10		0.01		**0.001**	**0.090**
6	6.00	0.08		0.00		**0.000**	**0.580**
7	8.00	0.50		0.06		**0.065**	**1.000**
8	10.00	0.50		0.28		**0.276**	**1.020**
9	12.00	0.52		0.35		**0.367**	**1.040**
10	14.00	0.52		0.38		**0.393**	**1.040**
11	16.00	0.52		0.36		**0.373**	**1.040**
12	18.00	0.52		0.32		**0.328**	**0.960**
13	20.00	0.44		0.31		**0.277**	**0.740**
14	22.00	0.30		0.27		**0.159**	**0.600**
15	24.00	0.30		0.15		**0.092**	**0.560**
16	26.00	0.26		0.03		**0.014**	**0.600**
17	28.00	0.34		0.04		**0.025**	**0.680**
18	30.00	0.34		0.04		**0.025**	**0.400**
19	32.00	0.06		0.37		**0.045**	**0.400**
20	34.00	0.34		0.25		**0.173**	**0.700**
21	36.00	0.36		0.35		**0.250**	**0.820**
22	38.00	0.46		0.28		**0.260**	**1.080**
23	40.00	0.62		0.29		**0.364**	**0.970**
24	42.00	0.35		0.24		**0.165**	**0.630**
25	44.00	0.28		0.31		**0.176**	**0.560**
26	46.00	0.28		0.15		**0.087**	**0.540**
27	48.00	0.26		0.09		**0.046**	**0.380**
28	50.00	0.12		0.00		**0.000**	**0.240**
29	52.00	0.12		0.00		**0.000**	**0.600**
30	62.00	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**3.995**
						A(m2)	**18.01**
						B(m)	**62.0**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	13-Aug-16	
Waterbody:		Lake A72			**Start Time**	14:42	
Crossing ID:		A72-A71			**End Time**	15:05	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	599050	BM_read			**Transducer SN:**		
North	7255640	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.100**
2	2.00	0.10		0.03		**0.004**	**0.050**
3	2.50	0.10		0.04		**0.002**	**0.050**
4	3.00	0.10		0.03		**0.002**	**0.053**
5	3.50	0.11		0.00		**0.000**	**0.058**
6	4.00	0.12		0.13		**0.008**	**0.063**
7	4.50	0.13		0.00		**0.000**	**0.070**
8	5.00	0.15		0.06		**0.004**	**0.090**
9	5.50	0.21		0.13		**0.013**	**0.110**
10	6.00	0.23		0.20		**0.023**	**0.123**
11	6.50	0.26		0.17		**0.022**	**0.140**
12	7.00	0.30		0.09		**0.014**	**0.160**
13	7.50	0.34		0.04		**0.007**	**0.178**
14	8.00	0.37		0.23		**0.043**	**0.168**
15	8.50	0.30		0.18		**0.026**	**0.160**
16	9.00	0.34		0.12		**0.031**	**0.170**
17	10.00	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.199**
						A(m2)	**1.74**
						B(m)	**10.0**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**	15-Sep-16	
Waterbody:		Lake A72			**Start Time**	10:57	
Crossing ID:		A72-A71			**End Time**	11:34	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	599050	BM_read			**Transducer SN:**		
North	7255640	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.025**
2	1.00	0.05		0.02		**0.001**	**0.015**
3	1.30	0.05		0.00		**0.000**	**0.017**
4	1.60	0.06		0.01		**0.000**	**0.024**
5	1.90	0.10		0.01		**0.000**	**0.030**
6	2.20	0.10		0.00		**0.000**	**0.038**
7	2.50	0.15		0.02		**0.001**	**0.047**
8	2.80	0.16		0.07		**0.003**	**0.048**
9	3.10	0.16		0.03		**0.002**	**0.048**
10	3.40	0.16		0.02		**0.001**	**0.042**
11	3.70	0.12		0.07		**0.003**	**0.039**
12	4.00	0.14		0.00		**0.000**	**0.042**
13	4.30	0.14		0.03		**0.001**	**0.045**
14	4.60	0.16		0.08		**0.004**	**0.044**
15	4.90	0.13		0.06		**0.002**	**0.039**
16	5.20	0.13		0.10		**0.004**	**0.039**
17	5.50	0.13		0.10		**0.004**	**0.050**
18	5.80	0.20		0.16		**0.010**	**0.072**
19	6.10	0.28		0.20		**0.017**	**0.090**
20	6.40	0.32		0.17		**0.016**	**0.096**
21	6.70	0.32		0.10		**0.010**	**0.096**
22	7.00	0.32		0.16		**0.023**	**0.096**
23	7.60	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.101**
						A(m2)	**1.08**
						B(m)	**7.6**

A20.0 LAKE A76 & EAST OUTLET (STREAM A76-A41)

Parameter	Value	Note
Benchmark Coordinates	601213 m E, 7256820 m N, 154.00 masl	NAD83 Zone 14
Comment	Boulder channel. The channel was frozen during the June 2016 trip, and the discharge was too low to measure on 15 August and 17 September 2016.	



Lake A76: Benchmark location.

14 June 2016. View of Lake A76 (south)

15 August 2016. Upstream view of the watercourse (southwest)

15 August 2016. Downstream view of the watercourse (northeast)

Lake A76 - 2016

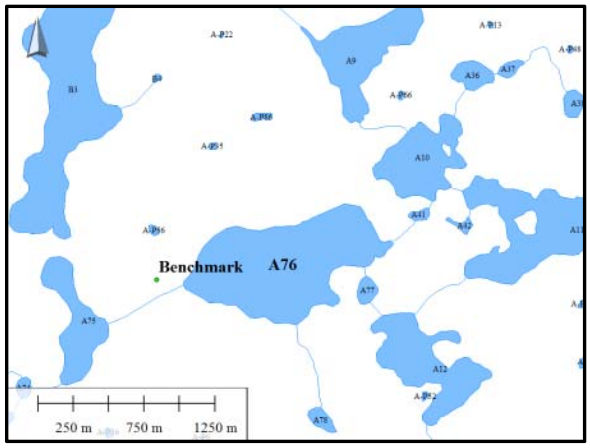
MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	147.865	147.650	147.490	-	-	-
2	-	-	-	-	-	-	147.859	147.645	147.485	-	-	-
3	-	-	-	-	-	-	147.853	147.652	147.484	-	-	-
4	-	-	-	-	-	-	147.845	147.659	147.480	-	-	-
5	-	-	-	-	-	-	147.837	147.653	147.477	-	-	-
6	-	-	-	-	-	-	147.829	147.649	147.472	-	-	-
7	-	-	-	-	-	-	147.820	147.645	147.474	-	-	-
8	-	-	-	-	-	-	147.812	147.643	147.468	-	-	-
9	-	-	-	-	-	-	147.804	147.638	147.476	-	-	-
10	-	-	-	-	-	-	147.799	147.634	147.475	-	-	-
11	-	-	-	-	-	-	147.792	147.629	147.469	-	-	-
12	-	-	-	-	-	-	147.788	147.625	147.463	-	-	-
13	-	-	-	-	-	-	147.779	147.620	147.461	-	-	-
14	-	-	-	-	-	147.315 P	147.768	147.617	147.459	-	-	-
15	-	-	-	-	-	147.375	147.764	147.613	147.456 P	-	-	-
16	-	-	-	-	-	147.477	147.756	147.606	-	-	-	-
17	-	-	-	-	-	147.665	147.741	147.604	-	-	-	-
18	-	-	-	-	-	147.876	147.729	147.597	-	-	-	-
19	-	-	-	-	-	147.990	147.722	147.582	-	-	-	-
20	-	-	-	-	-	148.023	147.711	147.569	-	-	-	-
21	-	-	-	-	-	148.009	147.704	147.561	-	-	-	-
22	-	-	-	-	-	147.992	147.716	147.553	-	-	-	-
23	-	-	-	-	-	147.970	147.714	147.544	-	-	-	-
24	-	-	-	-	-	147.948	147.707	147.535	-	-	-	-
25	-	-	-	-	-	147.932	147.700	147.528	-	-	-	-
26	-	-	-	-	-	147.915	147.691	147.517	-	-	-	-
27	-	-	-	-	-	147.906	147.685	147.513	-	-	-	-
28	-	-	-	-	-	147.893	147.677	147.508	-	-	-	-
29	-	-	-	-	-	147.883	147.670	147.502	-	-	-	-
30	-	-	-	-	-	147.871	147.663	147.498	-	-	-	-
31	-	-	-	-	-	147.865	147.657	147.495	-	-	-	-
MIN	-	-	-	-	-	147.315	147.657	147.495	147.456	-	-	-
MEAN	-	-	-	-	-	147.826	147.757	147.590	147.473	-	-	-
MAX	-	-	-	-	-	148.023	147.865	147.659	147.490	-	-	-

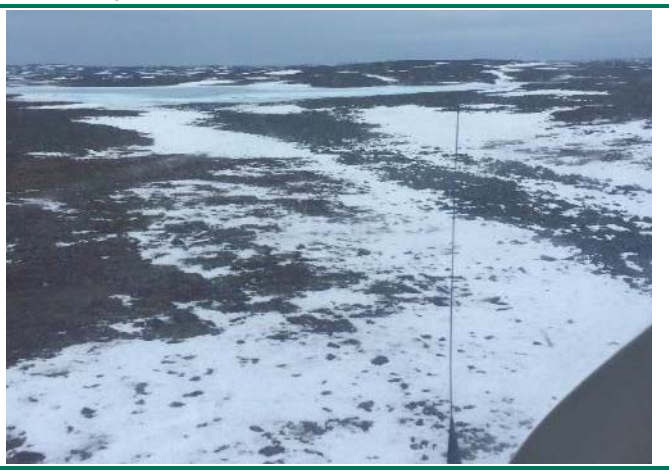
NOTES: P - PARTIAL DAILY AVERAGE

A21.0 LAKE A76 & WEST OUTLET (STREAM A76-A75)

Parameter	Value	Note
Benchmark Coordinates	601417 m E, 7256726 m N, 149.30 masl	NAD83 Zone 14
Comment	Boulder channel. The channel was frozen during the June 2016 trip, and the discharge was too low to measure on 15 August and 17 September 2016.	



Lake A76: Benchmark location.



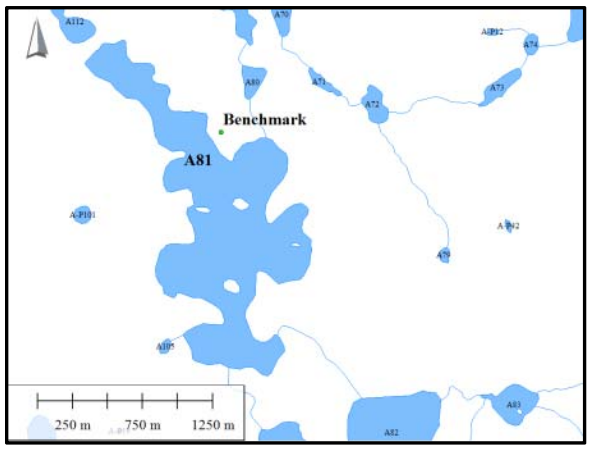
14 June 2016. Downstream view of watercourse (west).

13 August 2016. Downstream view of watercourse (west).

15 September 2016. Downstream view of watercourse (west)

A22.0 LAKE A81 & OUTLET (STREAM A81-A80)

Parameter	Value	Note
Benchmark Coordinates	598307 m E, 7255364 m N, 119.87 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel.	



Lake A81: Benchmark location.

13 June 2016. Upstream view of the watercourse to Lake A81 (south).

16 August 2016. Downstream view of the watercourse (north).

17 September 2016. Downstream view of the watercourse (north).

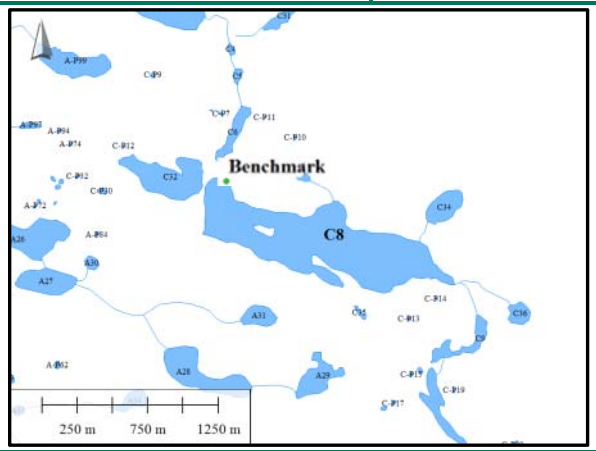
OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 1			**Date**		13-Jun-16	
Waterbody:		Lake A81			**Start Time**		10:04	
Crossing ID:		A81-A80			**End Time**		10:24	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	598370	BM_read			**Transducer SN:**			
North	7255430	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.060**
2	1.00	0.12		0.34			**0.062**	**0.200**
3	3.00	0.08		0.20			**0.032**	**0.160**
4	5.00	0.08		0.20			**0.032**	**0.280**
5	7.00	0.20		0.30			**0.118**	**0.400**
6	9.00	0.20		0.47			**0.188**	**0.300**
7	11.00	0.10		0.47			**0.094**	**0.220**
8	13.00	0.12		0.23			**0.056**	**0.280**
9	15.00	0.16		0.25			**0.081**	**0.280**
10	17.00	0.12		0.53			**0.127**	**0.460**
11	19.00	0.34		0.30			**0.203**	**0.500**
12	21.00	0.16		0.42			**0.135**	**0.340**
13	23.00	0.18		0.59			**0.213**	**0.360**
14	25.00	0.18		0.39			**0.139**	**0.480**
15	27.00	0.30		0.60			**0.358**	**0.660**
16	29.00	0.36		0.16			**0.112**	**0.560**
17	31.00	0.20		0.34			**0.135**	**0.400**
18	33.00	0.20		0.29			**0.116**	**0.300**
19	35.00	0.10		0.60			**0.119**	**0.280**
20	37.00	0.18		0.39			**0.139**	**0.400**
21	39.00	0.22		0.18			**0.079**	**0.580**
22	41.00	0.36		0.11			**0.079**	**0.360**
23	43.00	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**2.616**	
						A(m2)	**7.86**	
						B(m)	**43.0**	

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 2			**Date**		16-Aug-16	
Waterbody:		Lake A81			**Start Time**		9:03	
Crossing ID:		A81-A80			**End Time**		9:50	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	598370	BM_read			**Transducer SN:**			
North	7255430	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.014**
2	0.30	0.09		0.01			**0.000**	**0.020**
3	0.60	0.04		0.02			**0.000**	**0.021**
4	0.90	0.10		0.01			**0.000**	**0.030**
5	1.20	0.10		0.11			**0.002**	**0.010**
6	1.30	0.10		0.00			**0.000**	**0.021**
7	1.60	0.04		0.16			**0.003**	**0.024**
8	2.20	0.04		0.00			**0.000**	**0.021**
9	2.50	0.10		0.03			**0.001**	**0.030**
10	2.80	0.10		0.00			**0.000**	**0.024**
11	3.10	0.06		0.13			**0.002**	**0.018**
12	3.40	0.06		0.17			**0.003**	**0.012**
13	3.60	0.06		0.04			**0.001**	**0.051**
14	3.90	0.28		0.12			**0.009**	**0.050**
15	4.10	0.22		0.13			**0.007**	**0.039**
16	4.40	0.04		0.17			**0.002**	**0.012**
17	4.70	0.04		0.13			**0.002**	**0.012**
18	5.00	0.04		0.00			**0.000**	**0.012**
19	5.30	0.04		0.29			**0.003**	**0.015**
20	5.60	0.06		0.17			**0.003**	**0.010**
21	5.80	0.04		0.14			**0.001**	**0.012**
22	6.10	0.04		0.10			**0.001**	**0.024**
23	6.50	0.08		0.06			**0.002**	**0.032**
24	6.90	0.08		0.14			**0.005**	**0.030**
25	7.40	0.04		0.19			**0.004**	**0.016**
26	7.80	0.04		0.03			**0.000**	**0.023**
27	8.10	0.11		0.21			**0.007**	**0.027**
28	8.40	0.07		0.24			**0.004**	**0.019**
29	8.60	0.12		0.01			**0.000**	**0.070**
30	9.10	0.16		0.14			**0.009**	**0.048**
31	9.40	0.16		0.07			**0.003**	**0.034**
32	9.70	0.07		0.08			**0.002**	**0.034**
33	10.10	0.10		0.14			**0.006**	**0.048**
34	10.50	0.14		0.06			**0.003**	**0.040**
35	10.90	0.06		0.22			**0.005**	**0.028**
36	11.30	0.08		0.08			**0.003**	**0.042**
37	11.70	0.13		0.10			**0.005**	**0.042**
38	12.10	0.08		0.18			**0.007**	**0.035**
39	12.60	0.06		0.06			**0.002**	**0.030**
40	13.10	0.06		0.07			**0.002**	**0.015**
41	13.60	0.00		0.13			**0.000**	**0.028**
42	14.10	0.11		0.10			**0.005**	**0.053**
43	14.60	0.10		0.17			**0.008**	**0.040**
44	15.10	0.06		0.13			**0.011**	**0.072**
45	17.50	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.134**	
						A(m2)	**1.29**	
						B(m)	**17.5**	

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**		16-Aug-16
Waterbody:		Lake A81			**Start Time**		9:03
Crossing ID:		A81-A80			**End Time**		9:50
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	598370	BM_read			**Transducer SN:**		
North	7255430	WL_read			**Meter Type/SN:**		Flow Tracker
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.012**
2	0.30	0.08		0.26		**0.005**	**0.015**
3	0.50	0.07		0.17		**0.003**	**0.026**
4	0.80	0.10		0.24		**0.008**	**0.040**
5	1.20	0.10		0.09		**0.006**	**0.090**
6	2.10	0.10		0.01		**0.001**	**0.016**
7	2.30	0.06		0.08		**0.001**	**0.012**
8	2.50	0.06		0.00		**0.000**	**0.003**
9	2.60	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.024**
						A(m2)	**0.21**
						B(m)	**2.6**

A23.0 LAKE C8 & OUTLET (STREAM C8-C7)

Parameter	Value	Note
Benchmark Coordinates	604239 m E, 7260867 m N, 140.71	NAD83 Zone 14
Comment	Well defined channel. A -0.135 m adjustment was made to the 2016 water surface elevations to account for a discrepancy with the 2016 benchmark survey elevation.	



Lake C8.

12 June 2016. Upstream view of the watercourse (southwest).

12 June 2016. Upstream view of the watercourse (southwest).

14 August 2016. Upstream view of the watercourse (west)

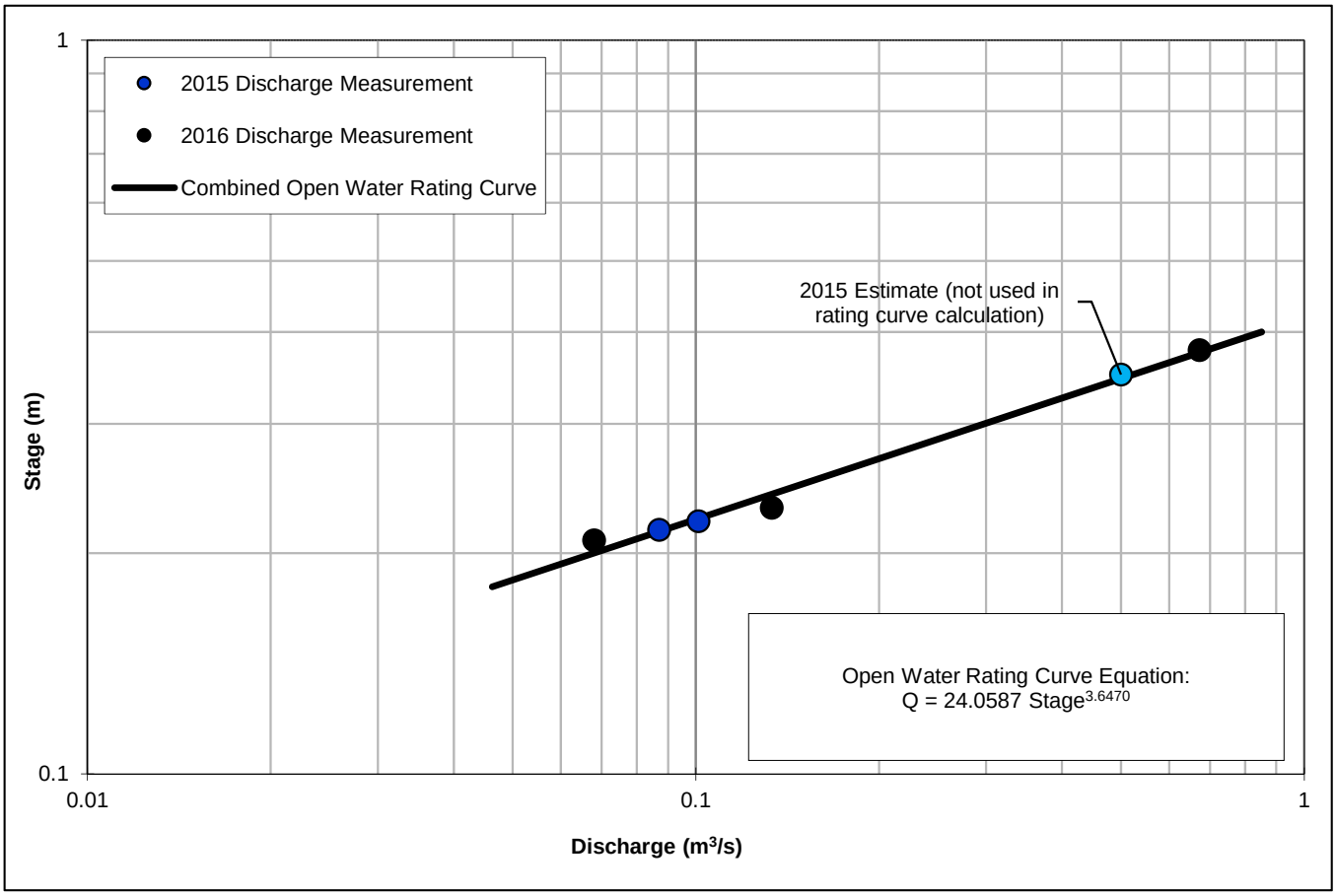


Figure A6: Stage-Discharge Rating Curve (Lake C8)

Lake C8 - 2016

MEAN DAILY DISCHARGE (m^3/s)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	0.158	0.113	0.099	-	-	-
2	-	-	-	-	-	-	0.155	0.119	0.095	-	-	-
3	-	-	-	-	-	-	0.146	0.135	0.098	-	-	-
4	-	-	-	-	-	-	0.141	0.144	0.095	-	-	-
5	-	-	-	-	-	-	0.138	0.131	0.095	-	-	-
6	-	-	-	-	-	-	0.138	0.129	0.091	-	-	-
7	-	-	-	-	-	-	0.136	0.126	0.096	-	-	-
8	-	-	-	-	-	-	0.134	0.125	0.092	-	-	-
9	-	-	-	-	-	-	0.130	0.122	0.106	-	-	-
10	-	-	-	-	-	-	0.128	0.122	0.106	-	-	-
11	-	-	-	-	-	-	0.128	0.119	0.096	-	-	-
12	-	-	-	-	-	0.448 P	0.126	0.119	0.089	-	-	-
13	-	-	-	-	-	0.386	0.121	0.116	0.089	-	-	-
14	-	-	-	-	-	0.312	0.116	0.118	0.085	-	-	-
15	-	-	-	-	-	0.256	0.122	0.119	0.083 P	-	-	-
16	-	-	-	-	-	0.250	0.124	0.117	-	-	-	-
17	-	-	-	-	-	0.285	0.116	0.119	-	-	-	-
18	-	-	-	-	-	0.278	0.110	0.117	-	-	-	-
19	-	-	-	-	-	0.262	0.108	0.107	-	-	-	-
20	-	-	-	-	-	0.237	0.107	0.101	-	-	-	-
21	-	-	-	-	-	0.195	0.114	0.100	-	-	-	-
22	-	-	-	-	-	0.183	0.138	0.104	-	-	-	-
23	-	-	-	-	-	0.175	0.135	0.102	-	-	-	-
24	-	-	-	-	-	0.164	0.125	0.100	-	-	-	-
25	-	-	-	-	-	0.153	0.121	0.098	-	-	-	-
26	-	-	-	-	-	0.145	0.120	0.093	-	-	-	-
27	-	-	-	-	-	0.156	0.123	0.096	-	-	-	-
28	-	-	-	-	-	0.151	0.117	0.097	-	-	-	-
29	-	-	-	-	-	0.153	0.114	0.099	-	-	-	-
30	-	-	-	-	-	0.150	0.116	0.098	-	-	-	-
31	-	-	-	-	-	0.158	0.116	0.101	-	-	-	-
MIN	-	-	-	-	-	0.145	0.107	0.093	0.083	-	-	-
MEAN	-	-	-	-	-	0.225	0.126	0.113	0.094	-	-	-
MAX	-	-	-	-	-	0.448	0.158	0.144	0.106	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

Water Yield (m^3) =	1,152,455		388,675	338,618	302,961	122,202
Water Yield (mm) =	102.9		34%	29%	26%	11%

Lake C8 - 2016

MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	139.052	139.030	139.022	-	-	-
2	-	-	-	-	-	-	139.051	139.033	139.019	-	-	-
3	-	-	-	-	-	-	139.047	139.041	139.021	-	-	-
4	-	-	-	-	-	-	139.044	139.046	139.020	-	-	-
5	-	-	-	-	-	-	139.043	139.039	139.019	-	-	-
6	-	-	-	-	-	-	139.043	139.038	139.016	-	-	-
7	-	-	-	-	-	-	139.042	139.037	139.020	-	-	-
8	-	-	-	-	-	-	139.041	139.036	139.017	-	-	-
9	-	-	-	-	-	-	139.039	139.035	139.026	-	-	-
10	-	-	-	-	-	-	139.038	139.035	139.026	-	-	-
11	-	-	-	-	-	-	139.038	139.033	139.020	-	-	-
12	-	-	-	-	-	139.135 P	139.037	139.033	139.015	-	-	-
13	-	-	-	-	-	139.122	139.034	139.032	139.015	-	-	-
14	-	-	-	-	-	139.104	139.031	139.033	139.012	-	-	-
15	-	-	-	-	-	139.088	139.035	139.033	139.011 P	-	-	-
16	-	-	-	-	-	139.086	139.036	139.032	-	-	-	-
17	-	-	-	-	-	139.096	139.032	139.033	-	-	-	-
18	-	-	-	-	-	139.094	139.028	139.032	-	-	-	-
19	-	-	-	-	-	139.090	139.027	139.026	-	-	-	-
20	-	-	-	-	-	139.081	139.026	139.023	-	-	-	-
21	-	-	-	-	-	139.067	139.030	139.022	-	-	-	-
22	-	-	-	-	-	139.062	139.043	139.025	-	-	-	-
23	-	-	-	-	-	139.059	139.041	139.023	-	-	-	-
24	-	-	-	-	-	139.055	139.036	139.022	-	-	-	-
25	-	-	-	-	-	139.050	139.034	139.021	-	-	-	-
26	-	-	-	-	-	139.046	139.034	139.018	-	-	-	-
27	-	-	-	-	-	139.051	139.035	139.020	-	-	-	-
28	-	-	-	-	-	139.049	139.032	139.021	-	-	-	-
29	-	-	-	-	-	139.050	139.030	139.022	-	-	-	-
30	-	-	-	-	-	139.049	139.032	139.021	-	-	-	-
31	-	-	-	-	-	139.052	139.031	139.023	-	-	-	-
MIN	-	-	-	-	-	139.046	139.026	139.018	139.011	-	-	-
MEAN	-	-	-	-	-	139.074	139.037	139.030	139.019	-	-	-
MAX	-	-	-	-	-	139.135	139.052	139.046	139.026	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

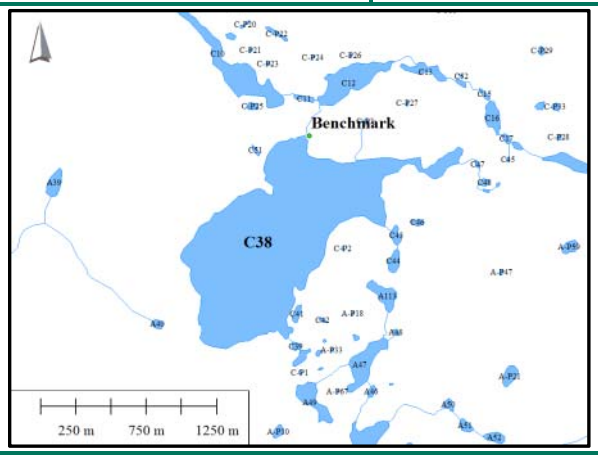
OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 1			**Date**	12-Jun-16	
Waterbody:		Lake C8			**Start Time**	10:42	
Crossing ID:		C8-C7			**End Time**	11:05	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	604270	BM_read			**Transducer SN:**		
North	7260865	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.008**
2	0.10	0.16		0.03		**0.001**	**0.054**
3	0.40	0.20		0.13		**0.008**	**0.063**
4	0.70	0.22		0.13		**0.009**	**0.074**
5	1.00	0.27		0.18		**0.014**	**0.080**
6	1.30	0.26		0.19		**0.015**	**0.078**
7	1.60	0.26		0.22		**0.017**	**0.078**
8	1.90	0.26		0.25		**0.019**	**0.084**
9	2.20	0.30		0.22		**0.020**	**0.090**
10	2.50	0.30		0.26		**0.023**	**0.093**
11	2.80	0.32		0.26		**0.024**	**0.099**
12	3.10	0.34		0.27		**0.028**	**0.101**
13	3.40	0.33		0.29		**0.029**	**0.101**
14	3.70	0.34		0.29		**0.030**	**0.102**
15	4.00	0.34		0.27		**0.028**	**0.108**
16	4.30	0.38		0.29		**0.033**	**0.111**
17	4.60	0.36		0.31		**0.033**	**0.111**
18	4.90	0.38		0.33		**0.038**	**0.120**
19	5.20	0.42		0.29		**0.037**	**0.129**
20	5.50	0.44		0.29		**0.038**	**0.132**
21	5.80	0.44		0.32		**0.042**	**0.129**
22	6.10	0.42		0.32		**0.040**	**0.108**
23	6.40	0.30		0.31		**0.028**	**0.096**
24	6.70	0.34		0.33		**0.034**	**0.099**
25	7.00	0.32		0.33		**0.032**	**0.090**
26	7.30	0.28		0.31		**0.026**	**0.072**
27	7.60	0.20		0.32		**0.026**	**0.050**
28	8.10	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.673**
						A(m2)	**2.46**
						B(m)	**8.1**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 2			**Date**	14-Aug-16	
Waterbody:		Lake C8			**Start Time**	8:02	
Crossing ID:		C8-C7			**End Time**	8:34	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	604270	BM_read			**Transducer SN:**		
North	7260865	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.025**
2	0.50	0.10		0.01		**0.000**	**0.065**
3	1.00	0.16		0.00		**0.000**	**0.080**
4	1.50	0.16		0.01		**0.001**	**0.075**
5	2.00	0.14		0.04		**0.003**	**0.065**
6	2.50	0.12		0.02		**0.001**	**0.055**
7	3.00	0.10		0.06		**0.003**	**0.050**
8	3.50	0.10		0.05		**0.002**	**0.060**
9	4.00	0.14		0.06		**0.004**	**0.070**
10	4.50	0.14		0.05		**0.004**	**0.075**
11	5.00	0.16		0.05		**0.004**	**0.090**
12	5.50	0.20		0.06		**0.006**	**0.093**
13	6.00	0.17		0.06		**0.005**	**0.088**
14	6.50	0.18		0.06		**0.005**	**0.100**
15	7.00	0.22		0.06		**0.007**	**0.105**
16	7.50	0.20		0.07		**0.007**	**0.100**
17	8.00	0.20		0.05		**0.005**	**0.100**
18	8.50	0.20		0.05		**0.005**	**0.105**
19	9.00	0.22		0.05		**0.006**	**0.110**
20	9.50	0.22		0.06		**0.006**	**0.110**
21	10.00	0.22		0.04		**0.005**	**0.120**
22	10.50	0.26		0.03		**0.003**	**0.125**
23	11.00	0.24		0.05		**0.006**	**0.110**
24	11.50	0.20		0.05		**0.005**	**0.100**
25	12.00	0.20		0.05		**0.005**	**0.100**
26	12.50	0.20		0.05		**0.005**	**0.100**
27	13.00	0.20		0.05		**0.005**	**0.095**
28	13.50	0.18		0.06		**0.005**	**0.095**
29	14.00	0.20		0.06		**0.006**	**0.095**
30	14.50	0.18		0.07		**0.006**	**0.070**
31	15.00	0.10		0.05		**0.003**	**0.050**
32	15.50	0.10		0.03		**0.001**	**0.050**
33	16.00	0.10		0.06		**0.003**	**0.030**
34	16.60	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.133**
						A(m2)	**2.76**
						B(m)	**16.6**

OPEN WATER DISCHARGE CALCULATION SPREADSHEET							
Project Name, Number:		Amaruq - trip 3			**Date**	15-Sep-16	
Waterbody:		Lake C8			**Start Time**	15:05	
Crossing ID:		C8-C7			**End Time**	15:35	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**		
East	604270	BM_read			**Transducer SN:**		
North	7260865	WL_read			**Meter Type/SN:**	Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC	
STATION	DISTANCE		Velocity		Optional		
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW	Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)	(m3/s)	(m2)
1	0.00	0.00		0.00			**0.025**
2	0.50	0.10		0.01		**0.000**	**0.050**
3	1.00	0.10		0.02		**0.001**	**0.035**
4	1.50	0.04		0.03		**0.001**	**0.035**
5	2.00	0.10		0.02		**0.001**	**0.055**
6	2.50	0.12		0.00		**0.000**	**0.060**
7	3.00	0.12		0.03		**0.002**	**0.060**
8	3.50	0.12		0.04		**0.002**	**0.060**
9	4.00	0.12		0.04		**0.002**	**0.065**
10	4.50	0.14		0.04		**0.003**	**0.080**
11	5.00	0.18		0.04		**0.003**	**0.090**
12	5.50	0.18		0.03		**0.003**	**0.095**
13	6.00	0.20		0.03		**0.003**	**0.095**
14	6.50	0.18		0.04		**0.004**	**0.105**
15	7.00	0.24		0.03		**0.004**	**0.110**
16	7.50	0.20		0.02		**0.002**	**0.095**
17	8.00	0.18		0.03		**0.003**	**0.095**
18	8.50	0.20		0.03		**0.003**	**0.088**
19	9.00	0.15		0.04		**0.003**	**0.098**
20	9.50	0.24		0.04		**0.004**	**0.100**
21	10.00	0.16		0.04		**0.003**	**0.080**
22	10.50	0.16		0.03		**0.003**	**0.085**
23	11.00	0.18		0.02		**0.002**	**0.085**
24	11.50	0.16		0.03		**0.002**	**0.085**
25	12.00	0.18		0.03		**0.003**	**0.095**
26	12.50	0.20		0.03		**0.003**	**0.095**
27	13.00	0.18		0.02		**0.002**	**0.085**
28	13.50	0.16		0.03		**0.002**	**0.075**
29	14.00	0.14		0.02		**0.002**	**0.060**
30	14.50	0.10		0.03		**0.001**	**0.020**
31	14.90	0.00		0.00		**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.068**
						A(m2)	**2.26**
						B(m)	**14.9**

A24.0 LAKE C38 (NEMO LAKE) & OUTLET (STREAM C38-C12)

Parameter	Value	Note
Benchmark Coordinates	606627 m E, 7258151 m N, 155.70 masl	NAD83 Zone 14
Comment	Poorly defined boulder channel with some well-defined portions. The discharge was too low to be measured during the September 2016 trip.	



Lake C38: Benchmark location.

14 June 2016. Upstream view of the watercourse and Lake C38 (southeast).

14 August 2016. Upstream view of the watercourse and Lake C38 (south)

14 August 2016. Downstream view of the watercourse (north).

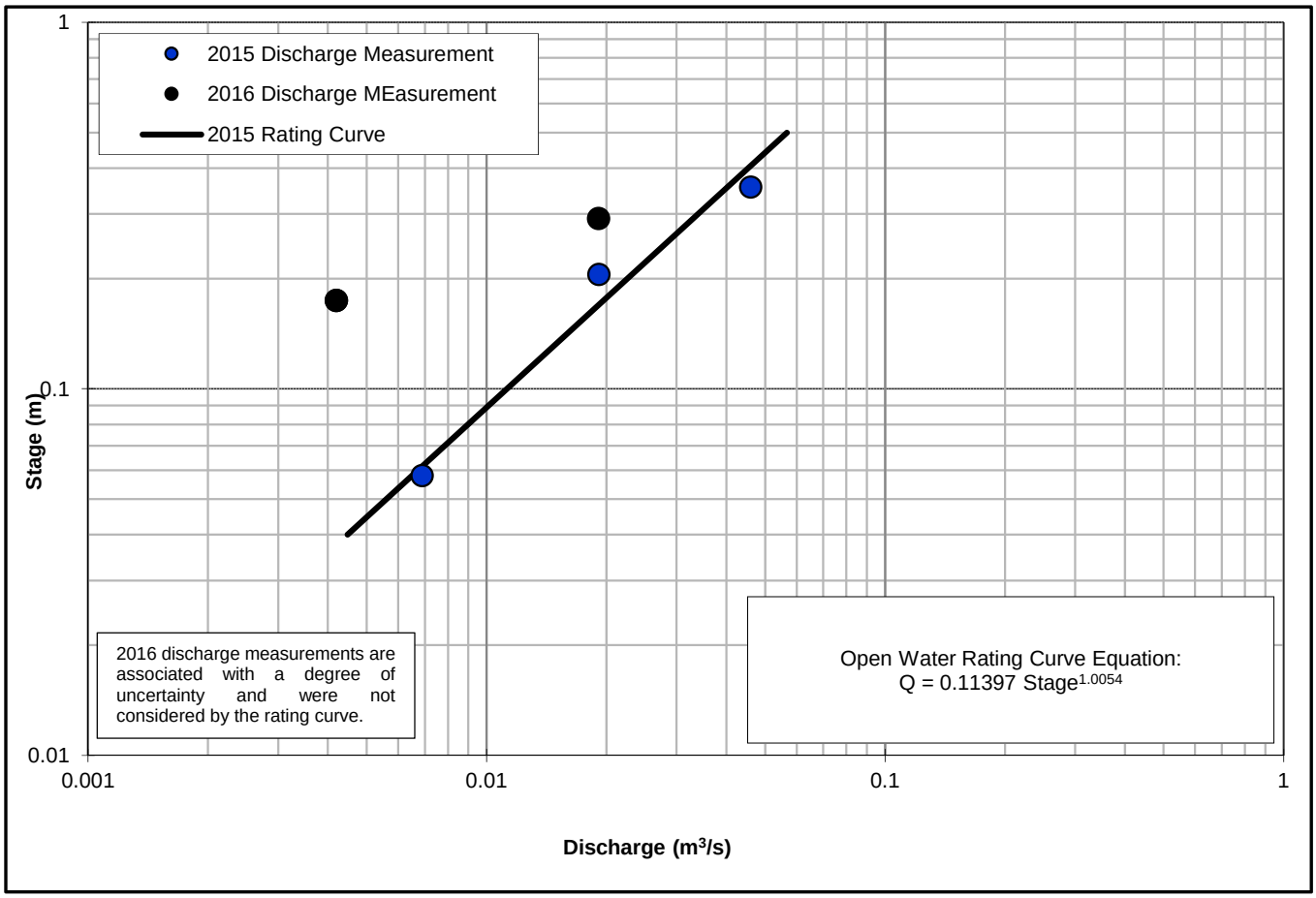


Figure A7: Stage-Discharge Rating Curve (Lake C38) (based on the 2015 Stage-Discharge Rating Curve)

Lake C38 (Nemo Lake) - 2016

MEAN DAILY DISCHARGE (m^3/s)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	0.040	0.024	0.010	-	-	-
2	-	-	-	-	-	-	0.040	0.024	0.010	-	-	-
3	-	-	-	-	-	-	0.040	0.025	0.010	-	-	-
4	-	-	-	-	-	-	0.039	0.025	0.009	-	-	-
5	-	-	-	-	-	-	0.038	0.025	0.009	-	-	-
6	-	-	-	-	-	-	0.037	0.024	0.009	-	-	-
7	-	-	-	-	-	-	0.037	0.024	0.009	-	-	-
8	-	-	-	-	-	-	0.036	0.023	0.009	-	-	-
9	-	-	-	-	-	-	0.035	0.023	0.009	-	-	-
10	-	-	-	-	-	0.017	0.034	0.023	0.010	-	-	-
11	-	-	-	-	-	0.018	0.034	0.022	0.009	-	-	-
12	-	-	-	-	-	0.023	0.033	0.022	0.008	-	-	-
13	-	-	-	-	-	0.027	0.032	0.022	0.008	-	-	-
14	-	-	-	-	-	0.031	0.032	0.021	0.008	-	-	-
15	-	-	-	-	-	0.034	0.031	0.020	-	-	-	-
16	-	-	-	-	-	0.036	0.031	0.019	-	-	-	-
17	-	-	-	-	-	0.039	0.030	0.019	-	-	-	-
18	-	-	-	-	-	0.042	0.029	0.018	-	-	-	-
19	-	-	-	-	-	0.045	0.028	0.017	-	-	-	-
20	-	-	-	-	-	0.046	0.028	0.016	-	-	-	-
21	-	-	-	-	-	0.046	0.027	0.015	-	-	-	-
22	-	-	-	-	-	0.046	0.029	0.015	-	-	-	-
23	-	-	-	-	-	0.045	0.029	0.014	-	-	-	-
24	-	-	-	-	-	0.045	0.028	0.013	-	-	-	-
25	-	-	-	-	-	0.044	0.027	0.013	-	-	-	-
26	-	-	-	-	-	0.043	0.027	0.012	-	-	-	-
27	-	-	-	-	-	0.043	0.027	0.012	-	-	-	-
28	-	-	-	-	-	0.042	0.026	0.011	-	-	-	-
29	-	-	-	-	-	0.042	0.025	0.011	-	-	-	-
30	-	-	-	-	-	0.041	0.025	0.011	-	-	-	-
31	-	-	-	-	-	-	0.025	0.011	-	-	-	-
MIN	-	-	-	-	-	0.017	0.025	0.011	0.008	-	-	-
MEAN	-	-	-	-	-	0.038	0.032	0.018	0.009	-	-	-
MAX	-	-	-	-	-	0.046	0.040	0.025	0.010	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

Water Yield (m^3) =	213,371		68,594	84,422	49,398	10,956
Water Yield (mm) =	60.2		32%	40%	23%	5%

Lake C38 (Nemo Lake) - 2016

MEAN DAILY WATER SURFACE ELEVATION (masl)

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-	-	-	-	-	-	155.986	155.844	155.722	-	-	-
2	-	-	-	-	-	-	155.985	155.839	155.719	-	-	-
3	-	-	-	-	-	-	155.980	155.848	155.716	-	-	-
4	-	-	-	-	-	-	155.973	155.851	155.714	-	-	-
5	-	-	-	-	-	-	155.965	155.847	155.712	-	-	-
6	-	-	-	-	-	-	155.959	155.841	155.709	-	-	-
7	-	-	-	-	-	-	155.953	155.839	155.710	-	-	-
8	-	-	-	-	-	-	155.947	155.836	155.709	-	-	-
9	-	-	-	-	-	-	155.940	155.833	155.709	-	-	-
10	-	-	-	-	-	155.781	155.933	155.830	155.715	-	-	-
11	-	-	-	-	-	155.789	155.928	155.827	155.709	-	-	-
12	-	-	-	-	-	155.830	155.921	155.826	155.702	-	-	-
13	-	-	-	-	-	155.872	155.914	155.822	155.702	-	-	-
14	-	-	-	-	-	155.904	155.908	155.815	155.700	-	-	-
15	-	-	-	-	-	155.927	155.905	155.804	-	-	-	-
16	-	-	-	-	-	155.946	155.900	155.800	-	-	-	-
17	-	-	-	-	-	155.973	155.892	155.798	-	-	-	-
18	-	-	-	-	-	156.003	155.885	155.791	-	-	-	-
19	-	-	-	-	-	156.030	155.881	155.779	-	-	-	-
20	-	-	-	-	-	156.038	155.875	155.772	-	-	-	-
21	-	-	-	-	-	156.033	155.870	155.766	-	-	-	-
22	-	-	-	-	-	156.032	155.884	155.762	-	-	-	-
23	-	-	-	-	-	156.031	155.884	155.755	-	-	-	-
24	-	-	-	-	-	156.024	155.880	155.749	-	-	-	-
25	-	-	-	-	-	156.020	155.872	155.744	-	-	-	-
26	-	-	-	-	-	156.010	155.865	155.734	-	-	-	-
27	-	-	-	-	-	156.007	155.868	155.733	-	-	-	-
28	-	-	-	-	-	156.001	155.859	155.732	-	-	-	-
29	-	-	-	-	-	155.996	155.854	155.729	-	-	-	-
30	-	-	-	-	-	155.992	155.851	155.726	-	-	-	-
31	-	-	-	-	-	155.986	155.848	155.724	-	-	-	-
MIN	-	-	-	-	-	155.781	155.848	155.724	155.700	-	-	-
MEAN	-	-	-	-	-	155.965	155.909	155.793	155.711	-	-	-
MAX	-	-	-	-	-	156.038	155.986	155.851	155.722	-	-	-

NOTES: P - PARTIAL DAILY AVERAGE

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 1			**Date**		14-Jun-16	
Waterbody:		Lake C38			**Start Time**		15:26	
Crossing ID:		C38-C12			**End Time**		15:32	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	606650	BM_read			**Transducer SN:**			
North	7258170	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & KB		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.024**
2	0.40	0.12		0.11			**0.004**	**0.036**
3	0.70	0.12		0.02			**0.001**	**0.027**
4	1.00	0.06		0.14			**0.003**	**0.017**
5	1.30	0.05		0.16			**0.002**	**0.017**
6	1.60	0.06		0.14			**0.003**	**0.017**
7	1.90	0.05		0.14			**0.002**	**0.017**
8	2.20	0.06		0.03			**0.000**	**0.024**
9	2.50	0.10		0.00			**0.000**	**0.024**
10	2.80	0.06		0.11			**0.004**	**0.027**
11	3.70	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.019**	
						A(m2)	**0.23**	
						B(m)	**3.7**	

OPEN WATER DISCHARGE CALCULATION SPREADSHEET								
Project Name, Number:		Amaruq - trip 2			**Date**		14-Aug-16	
Waterbody:		Lake C38			**Start Time**		10:22	
Crossing ID:		C38-C12			**End Time**		10:39	
Left Downstream Bank (LDB) UTM Location		**Survey**			**Datalogger SN:**			
East	606650	BM_read			**Transducer SN:**			
North	7258170	WL_read			**Meter Type/SN:**		Flow Tracker	
Elevation, Zone	14W	WL_Elev			**Crew:**	JRL & CC		
STATION	DISTANCE		Velocity		Optional			
Start	FROM LDB	DEPTH	0.2 DEPTH	0.6/0.8 DEPTH	ANGLE OF FLOW		Qi	Ai
LDB	(m)	(m)	(m/s)	(m/s)	(º)		(m3/s)	(m2)
1	0.00	0.00		0.00				**0.008**
2	0.15	0.10		0.00			**0.000**	**0.005**
3	0.20	0.09		0.00			**0.000**	**0.009**
4	0.30	0.09		0.14			**0.001**	**0.011**
5	0.40	0.12		0.04			**0.001**	**0.012**
6	0.50	0.12		0.03			**0.000**	**0.012**
7	0.60	0.11		0.08			**0.001**	**0.010**
8	0.70	0.08		0.15			**0.001**	**0.004**
9	0.80	0.00		0.00			**0.000**	**0.003**
10	0.90	0.05		0.01			**0.000**	**0.003**
11	1.00	0.00		0.00			**0.000**	**0.000**
NOTES:					**RESULTS:**	**Q (m3/s)**	**0.004**	
						A(m2)	**0.07**	
						B(m)	**1.0**	

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Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Ltd.
16820 107 Avenue
Edmonton, Alberta, T5P 4C3
Canada
T: +1 (780) 483 3499

Golder Associates