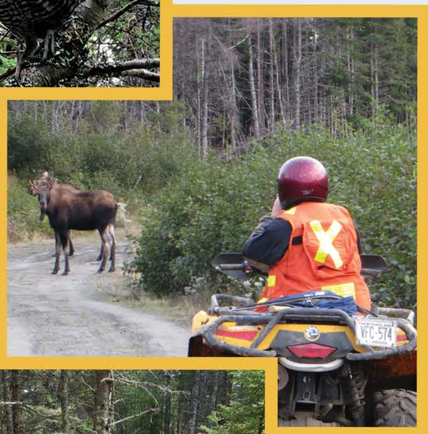
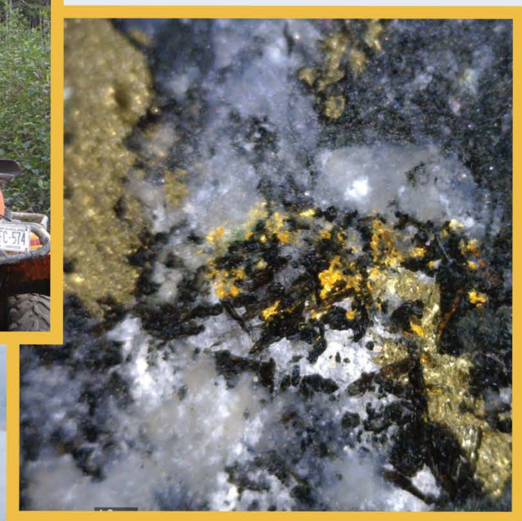
MARATHON GOLD

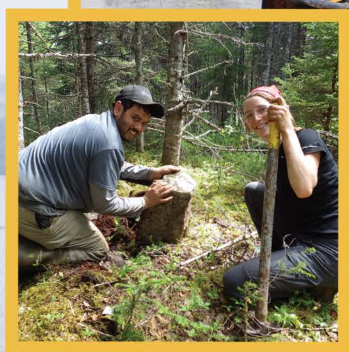
Valentine Gold Project

Baseline Study Appendix 4: Fish, Fish Habitat and Fisheries

September 2020







Valentine Gold Project
Environmental Impact Statement

Final Report

Baseline Study Appendix 4: Fish, Fish Habitat and Fisheries (BSA.4)

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September 25, 2020

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Abbreviations and Acronyms

ARD/ML	Acid Rock Drainage / Metal Leaching
BSA	Baseline Study Appendix
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSQG PEL	Canadian Sediment Quality Guidelines Probable Effects Limit
CWQG PAL	Canadian Water Quality Guidelines for the Protection of Aquatic Life
cm	centimetre
EIS	Environmental Impact Statement
ha	hectares
km	kilometres
LiDAR	light detection and ranging
LAA	Local Assessment Area
Marathon	Marathon Gold Corporation
mg/kg	mIlligrams per kilogram
m/s	metres per second
m^2	square metres
NL	Newfoundland and Labrador
NLDECCM	NL Department of Environment, Climate Change and Municipalities
NLEPA	*NL Environmental Protection Act*
RAA	Regional Assessment Area
SAR	species at risk
SOCC	species of conservation concern
Stantec	Stantec Consulting Inc.
TMF	tailings management facility
VC	Valued Component

1.0 INTRODUCTION

Marathon Gold Corporation (Marathon) is planning to develop an open pit gold mine south of Valentine Lake, located in the Central Region of the Island of Newfoundland, approximately 60 kilometres (km) southwest of the town of Millertown, Newfoundland and Labrador (NL) (Figure 1-1). The Valentine Gold Project (the Project) will consist primarily of open pits, waste rock piles, crushing and stockpiling areas, conventional milling and processing facilities (the mill), a tailings management facility, personnel accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities. The mine site is accessed by an existing public access road that extends south from Millertown approximately 88 km to Marathon's existing exploration camp. Marathon will upgrade and maintain the access road from a turnoff approximately 8 km southwest of Millertown to the mine site, a distance of approximately 76 km.

The Minister of the NL Department of Environment, Climate Change and Municipalities (NLDECCM) has determined that the Project will require preparation of an Environmental Impact Statement (EIS) under the provincial *Environmental Protection Act* (NLEPA). The Provincial EIS Guidelines require the preparation of a number of baseline studies to describe and provide data on specific components of the environment to address baseline data requirements to support the assessment of one or more Valued Components (VCs); and to support the development of mitigation measures and follow-up monitoring programs. Each has been prepared as a stand-alone Baseline Study Appendix (BSA) to the EIS:

- BSA.1: Dam Safety
- BSA.2: Woodland Caribou
- BSA.3: Water Resources
- BSA.4: Fish, Fish Habitat and Fisheries
- BSA.5: Acid Rock Drainage / Metal Leaching (ARD/ML)
- BSA.6: Atmospheric Environment
- BSA.7: Avifauna, Other Wildlife and Their Habitats
- BSA.8: Species at Risk / Species of Conservation Concern (SAR / SOCC)
- BSA.9: Community Health, Services and Infrastructure / Employment and Economy
- BSA.10: Historic Resources

Table 1.1 outlines the organization for BSA.4: Fish, Fish Habitat and Fisheries.

Table 1.1 BSA.4: Fish, Fish Habitat and Fisheries

Number	Baseline Study Appendix	Attachment Number	Attachment Name
BSA.4	Fish, Fish Habitat and Fisheries	4-A	Fish and Fish Habitat Data Report (2012)
		4-B	Valentine Project: 2018 Fish and Fish Habitat
		4-C	Aquatic Survey (2019)
		4-D	Ice Thickness Survey (2020)
		4-E	Fisheries Data Report (2020)

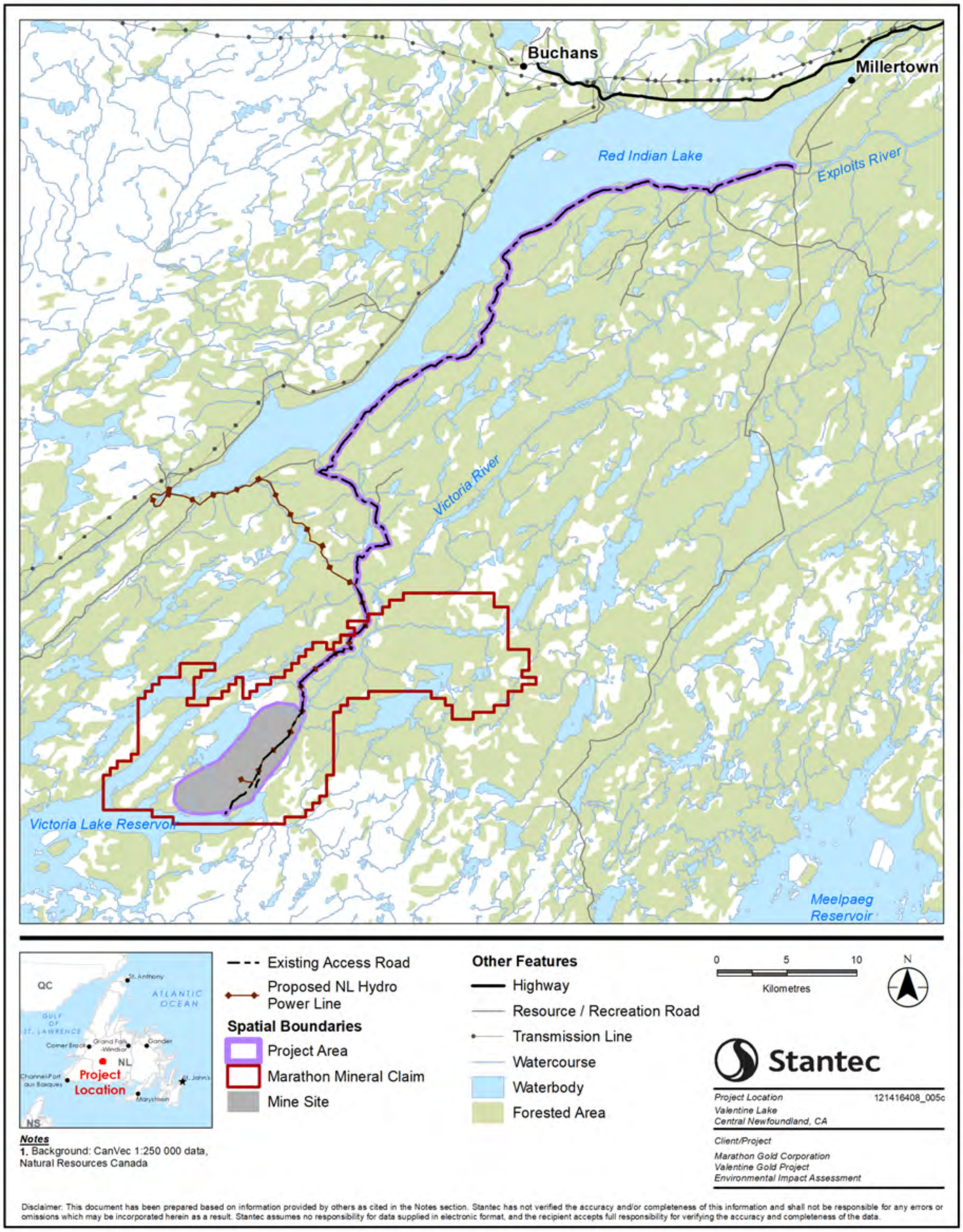

Figure 1-1 Project Area

Note that the BSAs consist of data reports that have been prepared for Marathon over a number of years (i.e., 2011 to 2020), during which the Project has undergone a series of refinements. The study areas and Project references in these data reports reflect the Project description at the time of preparation of these reports. The current Project description for the purposes of environmental assessment is found in Section 2 of the EIS.

2.0 SUMMARY OF FISH, FISH HABITAT AND FISHERIES BSA ATTACHMENTS

Four field programs and one desktop study were completed by Stantec Consulting Inc. (Stantec) in support of the assessment of fish, fish habitat and fisheries for the Project:

- 2011 aquatic field program
- 2018 aquatic field program
- 2019 aquatic field program
- 2020 survey of ice thickness in select bog holes
- desktop review of available information on fisheries

Table 2.1 provides a summary of the objectives, study areas, methods and results of each of these programs and studies.

Table 2.1 Summary of Fish, Fish Habitat and Fisheries BSA Attachments

Rationale / Objectives and Study Area	Methods	Results
Attachment 4-A - Fish and Fish Habitat Data Report (2012)		
Rationale / Objectives The 2011 survey focused on fishing and habitat classification of ponds and streams in the vicinity of the Leprechaun Deposit, plus road/stream crossings on the Marathon Property. The study objectives were to: 1. Conduct fish sampling to determine fish presence/absence in the Study Area 2. Conduct habitat classification of ponds, streams and stream crossing locations in the Study Area **Study Area** The Study Area included four ponds, plus nine connecting streams and road/stream crossings within the Marathon mineral claim area (Figure 1-1).	Field surveys were conducted from June 15 to 20, 2011. **Fish Sampling** involved fyke netting and gillnetting in ponds, and electrofishing in streams according to methods described in Sooley et al. (1998). Habitat surveys were conducted on foot (streams) and by boat (ponds). **Habitat Classification** for ponds and streams were conducted according to methods described in Bradbury et al. (2001) and McCarthy et al. (2007 Draft), respectively.	**Fish Sampling** Pond sampling confirmed the presence of threespine stickleback and the absence of salmonids in the four ponds. Stream sampling confirmed threespine stickleback presence in all inflowing and outflowing streams associated with the four ponds, and only in the outflow of another pond flowing into Valentine Lake. Salmonids were only present downstream of substantial waterfalls located on the Valentine and Victoria sub-watersheds. No salmonids were present upstream of these waterfalls. Electrofishing confirmed salmonid and stickleback presence at five of nine stream crossings and fish absence at four of nine. No fish SAR were captured within the Study Area during the 2011 surveys. **Habitat Classification** Pond surface areas ranged from 4.19 to 6.61 hectares (ha) and were shallow (< 2 m), thus littoral zone habitat and no profundal habitat present. Substrate in ponds was predominantly fine, with a small amount of medium and coarse substrate near shore. Aquatic vegetation was sparse. Substrate in streams was predominately cobble, followed by boulder, gravel, bedrock, rubble, fines and sand. Stream sections were <3 m in width, with the exception of one stream section into Valentine Lake, which had an average width of 4.9 m. Stream velocities were variable but predominately slow (<0.2 m/s), ranging from 0 m/s to 1.08 m/s (rapid areas). Riparian vegetation varied, with shrubs dominating.

Table 2.1 Summary of Fish, Fish Habitat and Fisheries BSA Attachments

Rationale / Objectives and Study Area	Methods	Results
Attachment 4-B - Valentine Project: 2018 Fish and Fish Habitat		
Rationale / Objectives The survey focused on fishing and habitat classification of ponds and streams not surveyed during 2011 that could be impacted by development of the Leprechaun, Sprite and Marathon deposits. Road and stream crossings on the Marathon mineral claim area were also surveyed. The study objectives were to: 1. Conduct fish sampling to determine fish presence within the lakes, ponds and streams not sampled in 2011 2. Conduct habitat classification of ponds, streams and stream crossing locations in the Study Area not surveyed in 2011. **Study Area** The Study Area included 10 ponds, 14 sites on inflowing and outflowing streams, Victoria Lake, Valentine Lake, and road and stream crossings (Figure 1-1).	Field surveys were conducted September 10 to 16, 2018, using the same methods described above for the 2011 study.	**Fish Sampling** Fyke net trapping in Valentine and Victoria Lakes confirmed the presence of brook trout and Atlantic salmon. Most of the ponds and streams surveyed were considered fish bearing, based on fish sampling results, visual observations and connectivity to known fish bearing waterbodies. The exception was one pond and portions of two streams, which had the potential to not be fish bearing. Nine of the fifteen stream crossings were confirmed to be fish bearing, and six were determined not to contain fish habitat. No fish SAR were captured within the Study Area. **Habitat Classification** Aerial surveys of four ponds revealed a shallow depth (estimated < 2 m) and a high proportion of fine substrate and low amounts of aquatic vegetation. Aerial and ground classification of streams showed that first order, low gradient streams flowing through bog or wetland habitats were generally characterized by shallow flats with an undefined thalweg, slow velocities and fine substrates. The lower reaches of streams were generally more riffle / run habitat, with increased gradient and velocities, coarser substrates and well-defined channels.

Table 2.1 Summary of Fish, Fish Habitat and Fisheries BSA Attachments

Rationale / Objectives and Study Area	Methods	Results
Attachment 4-C - Aquatic Survey (2019)		
Rationale / Objectives The 2019 study objectives were to: 1. Conduct qualitative fish sampling to further determine fish presence in areas where fish were not observed previously 2. Conduct quantitative fish sampling to assess fish abundance and productivity of fish in representative streams within the Study Area 3. Characterize habitat for inflowing and outflowing streams associated with the Victory Pit 4. Assess primary and secondary productivity at select ponds, lakes and streams within the Study Area 5. Collect sediment samples to characterize sediment quality 6. Collect in situ water quality readings to characterize water quality **Study Area** The Study Area included lakes, pond and streams potentially affected by the development of the Leprechaun, Sprite, Marathon and Victory deposits.	Field surveys were conducted during summer (August 3 to 9 2019) and fall (September 23 to 28 2019, and November 3, 2019). Fish sampling and habitat classification were conducted using methods described for the 2011 program above. **Primary Productivity** was determined by collecting chlorophyll “a” samples in lakes and ponds, and periphyton in streams. Primary productivity in streams was assessed according to methods outlined in Barbour et al. (1999). Sampling was conducted in both summer and fall to provide an indication of seasonal variability. **Secondary Productivity and Sediment Quality** were determined by collecting Ekman grab samples in ponds or surber and kick net samples in streams. Benthic and sediment sampling was conducted according to methods described in ECCC (2012).	**Fish Sampling** Gillnet sampling confirmed the presence of brook trout in a pond previously not assessed (M2). Gillnets set in Valentine Lake and Victoria Lake at greater depths than fished previously did not capture any new species, but captured eight Atlantic salmon and one brook trout. Quantitative electrofishing in four representative streams produced population estimates ranging from 0 to 5.8 juvenile Atlantic salmon per 100 m^2 and 0 to 38.6 brook trout per 100 m^2. No SAR were captured in ponds, lakes or streams in the Study Area. **Habitat Classification** A pond in the vicinity of the Victory Pit was characterized as having a maximum depth of 1.5 m, a high proportion of fines and moderate amounts of aquatic vegetation. A stream flowing out of the pond was generally narrow (<5 m), shallow (<0.5 m), slow flowing (<0.2 m/s) and intermittent in parts. A waterfall which was a barrier to fish passage was observed on the inlet of another pond. **Primary Productivity** Primary productivity in the Study Area was generally low. **Secondary productivity** was representative of unimpacted ponds, lakes and streams as indicated by benthic invertebrate community indices. Amphipods were the predominant taxa in ponds; chironomids were the predominant taxa in lakes and depositional areas (soft substrates) in streams; and ephemeroptera (mayflies) were the predominant taxa in erosional areas (hard substrate) in streams. **Sediment Quality** Arsenic was above the Canadian Sediment Quality Guidelines Probable Effects Limit (CSQG PEL) guidelines in all (12) sediment samples collected from ponds and lakes (18 to 290 mg/kg) and all (5) sediment samples collected from soft sediments in streams (43 to 240 mg/kg). No exceedances of the CSQG PEL were identified for cadmium, chromium, copper, lead, mercury and zinc in pond, lake or stream sediment.

Table 2.1 Summary of Fish, Fish Habitat and Fisheries BSA Attachments

Rationale / Objectives and Study Area	Methods	Results
		***In-Situ* Water Quality** Water temperatures were generally suitable for cold water fish species; dissolved oxygen concentrations were generally above the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG PAL) for all life stages of fish; pH was generally slightly acidic; and conductivity was low. Water column profiles conducted on Valentine Lake and Victoria Lake August 03, September 25 and November 3, 2019 showed the presence of a thermocline in Valentine Lake on August 3 only. A thermocline was present in Victoria Lake August 3 and September 25, 2019 but was not present November 3, 2019.
Attachment 4-D - Ice Thickness Survey (2020)		
Rationale / Objectives Small waterbodies (bog holes) near the Project are thought to be fishless because light detection and ranging (LIDAR) imagery shows no connectivity between the bog holes and fish bearing waters. The objective of the ice thickness survey was to investigate whether the targeted bog holes freeze to the bottom in winter, which would provide additional evidence that the bog holes are fishless. **Study Area** The ice thickness survey targeted small waterbodies that occur within and near the mine site.	An ice thickness survey was completed March 09 and 10, 2020. Bog holes were accessed by snowmobile and/or by foot (snowshoes). The field team used a gas-powered auger with 8-inch cutting blades to cut a hole in the center of each bog hole. Ice thickness was determined by inserting an “improvised staff” into the hole, and determining the ice thickness by use of a meter stick attached to the staff. The water depth from the bottom of the ice to the bottom of the bog hole was also recorded. Photos were taken of each hole drilled for sampling.	Of the 27 bog holes surveyed, eleven were within the Project mine site. The remainder are in close proximity, but outside the mine site. The average ice thickness for the 11 bog holes within the Project mine site was 55.3 cm, with thickness ranging from 44.5 cm to 83.5 cm. Five of the 11 bog holes surveyed were frozen to the bottom. At many locations, the ice was noted to be poor quality (soft, white ice, with unfrozen water layers, rather than hard, compact, blue ice). Similar ice conditions existed at many locations on the Island of Newfoundland in 2020 and is attributed to the large amount of snow cover that acted as an insulating layer, preventing ponds and lakes from freezing in a typical fashion.

Table 2.1 Summary of Fish, Fish Habitat and Fisheries BSA Attachments

Rationale / Objectives and Study Area	Methods	Results
Attachment 4-E – Fisheries Data Report (2020)		
Rationale / Objectives The fisheries data study was conducted to characterize fisheries species of interest and fisheries management approaches within the Study Area to identify fisheries activities potentially affected by the Project. **Study Area** Spatial boundaries were defined to focus data collection for the Study. These include a Local Assessment Area (LAA) and Regional Assessment Area (RAA).	Baseline information on fisheries was gathered through a review of literature sources, as well as through interviews and correspondence with relevant government departments and agencies, local authorities, Indigenous groups and residents	Recreational salmon fishing occurs within the region, however only catch-and-release, Class 0 salmon rivers are present within the RAA. The RAA comprises part of the Trout Angling Zone 1 and outfitters operate within the RAA, offering guided land locked salmon and brook trout fishing tours. The Northeast Newfoundland Atlantic salmon population is designated as 'Not-at-Risk' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and fishway counts at the Bishops Falls counting facility indicate a decrease in salmon numbers from previous years. There are no Indigenous commercial fisheries near the Project Area. Fishing activity; however, has been identified within the LAA in areas around Victoria Lake Reservoir, Red Indian Lake, and many of their associated tributaries. Fish typically harvested by the Mi'kmaq and known to be present in the LAA include brook trout and landlocked Atlantic salmon.

3.0 REFERENCES

Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Bradbury, C., A.S. Power and M.M. Roberge. 2001. Standard Methods Guide for the Classification/ Quantification of Lacustrine Habitat in Newfoundland and Labrador. Fisheries and Oceans, St. John's, NF. 60 p + app.

ECCC (Environment and Climate Change Canada). 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. Government of Canada. ISBN 978-1-100-20496-3, Cat. no.: En14-61/2012E-PDF.

McCarthy, J.H., C. Grant and D. Scruton. (2007 Draft) Standard Methods Guide for the Classification and Quantification of Fish Habitat in Rivers of Newfoundland and Labrador. Fisheries and Oceans, St. John's, NL.

Sooley, D.R., E.A. Luiker and M.A. Barnes. 1998. Standard Methods Guide for Freshwater Fish and Fish habitat surveys in Newfoundland and Labrador: Rivers and Streams. Fisheries and Oceans, St. John's, NL. iii + 50 pp.

ATTACHMENT 4-A

Fish and Fish Habitat Data Report (2012)

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Marathon Baseline Fish and Fish Habitat Data Report

Prepared for

Marathon Gold Incorporated

Final Report

File No. 121510621.300

Date: January 10, 2012

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1.0 INTRODUCTION

Marathon Gold Corp. (Marathon) is currently conducting a drilling program at its Valentine Lake prospect in Central Newfoundland (Figure 1.1). Drilling activities to date have targeted two sites the Valentine East site and the Leprechaun Pond site. Stantec Consulting Ltd. (Stantec) was engaged to design and conduct a Baseline Fish and Fish Habitat sampling program at the Valentine Lake prospect. The purpose of the sampling program is to characterize baseline fish and fish habitat conditions on site prior to any future mine development on the property. This report provides a summary of data from a field survey conducted June 15 to June 20, 2011.

1.1 Study Area

The study area for the 2011 field investigations is illustrated in Figure 1.2 and is comprised of:

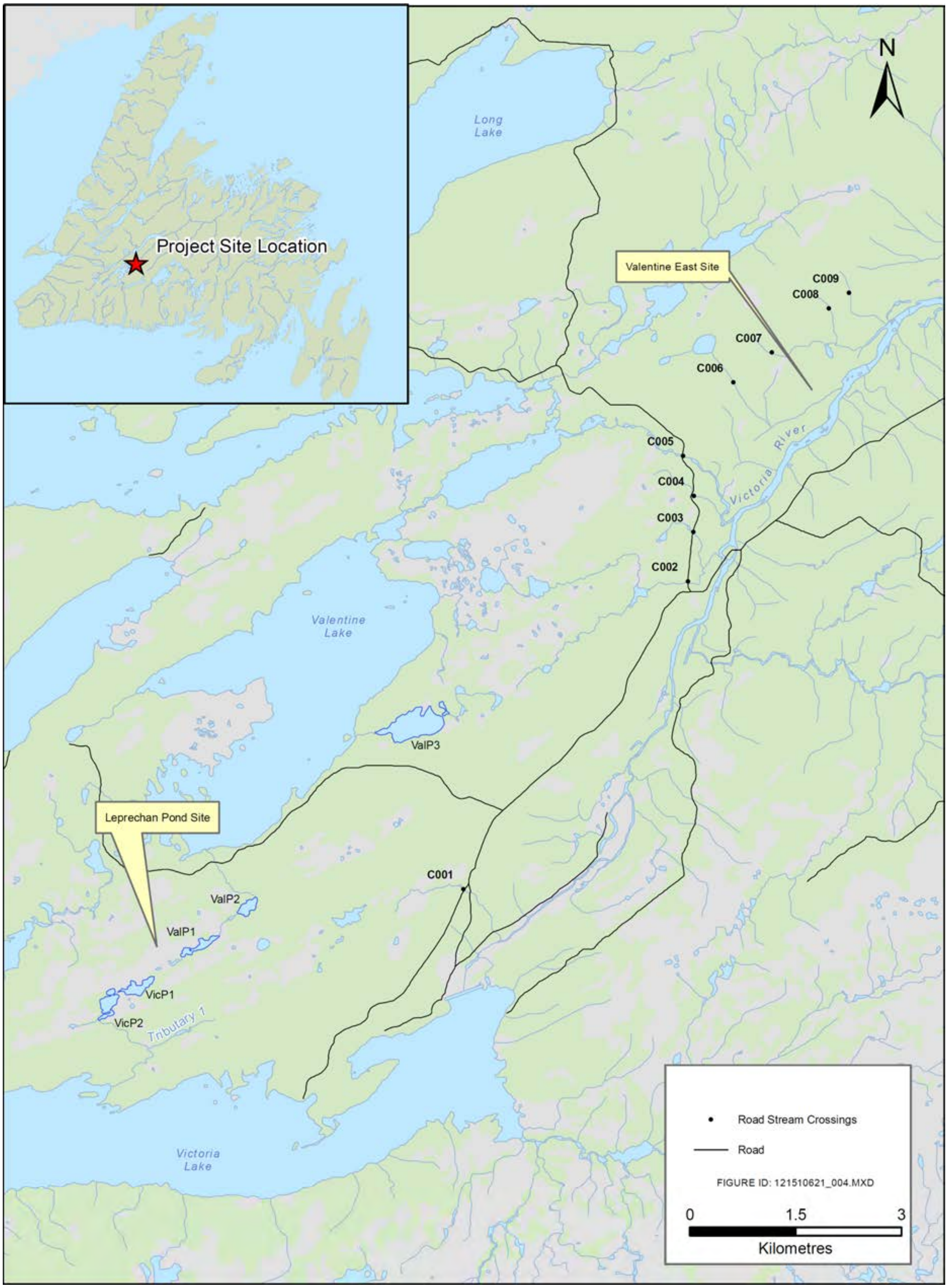
1. Ponds VicP1 and VicP2 plus connecting streams flowing south to Victoria Lake.
2. Ponds ValP1 and ValP2 and connecting streams flowing north to Valentine Lake.
3. An approximate 200 m section of stream located on the east side of Valentine Lake flowing from ValP3 to Valentine Lake.
4. Stream crossings C001 to C009 to a distance 50 m upstream and downstream of the road crossing.

1.2 Objectives

The objectives of the Baseline Fish and Fish Habitat study are:

1. Conduct fish sampling to determine fish presence within the ponds and streams in the study area.
2. Conduct bathymetric and substrate surveys of ponds ValP1, ValP2, VicP1 and VicP2 to determine existing fish habitat, as characterized by depth, substrate, presence of aquatic vegetation and extent of the littoral zone.
3. Characterize habitat for the following stream sections:
   - ValP1 to ValP2
   - ValP2 to Valentine Lake
   - VicP1 to VicP2
   - VicP2 to Victoria Lake
   - Tributary 1
   - 200 m steam section between ValP3 and Valentine Lake
   - crossings C001 to C009 to a distance 50 m upstream and 50 m downstream of the stream crossing.

Figure 1.1 Study Area Site Map



1.3 Study Team

Bill Tibble and Scott Finlay conducted the field surveys for this study. James Harrison and Barry Wicks compiled this report and Bruce Bennett provided senior review. Barry Wicks served as project Manager. Sherry Dunsworth was the Marathon client contact and provided project details/coordination to support the field study and reviewed the report.

2.0 METHODS

The 2011 field investigations included an assessment of fish presence and habitat classification of ponds and streams within the study area. The field surveys for this study were conducted June 15 to 20, 2011.

Fishing methods used in this study are described in Sooley et al. (1997). Methods associated with habitat classification are described in Bradbury et al. (2001) for pond habitat characterization and McCarthy et al. (2007 Draft) for stream habitat characterization.

2.1 Fish Sampling

All fishing activity was conducted in accordance with an Experimental Licence obtained from Fisheries and Oceans Canada (DFO). Fish sampling in ponds was conducted by fyke trapping and gillnetting. A minimum of two overnight fyke trap sets were conducted in each pond. Since no salmonids were captured by fyke trapping, a minimum of two gillnet sets were conducted using mesh sizes of 25 and 38 mm. Gillnets were checked at least daily (visual assessment) and left to fish for up to three nights, if no fish captures were evident.

Access to ValP2 prevented the transport of a boat to this pond, thus no fyke net trapping was conducted. To compensate for the lack of fyke trap sets in ValP2, additional gillnet sets (eight sets) were conducted in the littoral area of ValP2. Gillnet sets in ValP2 were deployed by wading the shallow water shoreline area to a depth of approximately 1 metre (m) (Photo 1).

Photo 1 Gill Net Set in Pond Margin Area of ValP2

Fish sampling in streams was conducted by index (qualitative) electrofishing using a backpack electrofishing unit. The time fished for each stream section was recorded and captured fish were measured, a representative number were weighed, identified to species and released alive. Fish data obtained from the sampling are included in Appendix A.

2.2 Pond Bathymetry and Fish Habitat Mapping

Bathymetry profiles of VicP1, VicP2 and ValP1 were obtained by establishing transects that criss-crossed each water body. An inflatable Zodiac travelled along each transect at a relatively constant speed, while the field team recorded depth soundings and GPS readings at regular intervals. Pond substrate along each transect was described based on visual observations or probing with a paddle, where necessary. Substrate was characterized based on substrate descriptions provided in Table 2.1. A bathymetry map was created for each pond using ArcGis software and substrate type was overlain on the bathymetry map.

The inability to get a boat in ValP2 prevented complete bathymetry mapping of the pond. Bathymetry of pond margin areas (to a depth of 1 m) was completed by wading the pond margin area and recording depth readings, GPS coordinates and substrate descriptions.

Table 2.1 Classification of Substrate

Class	Substrate	Description
Coarse	Bedrock (Br)	Continuous solid rock exposed by scouring forces.
	Boulder (B)	Boulder-sized rocks from 25 cm to greater than 1 m in diameter.
Medium	Rubble (R)	Large rocks from 14 to 25 cm in diameter.
	Cobble (C)	Moderate to small size rocks from 3 to 13 cm in diameter.
	Gravel (G)	Small stones from 2 mm to 3 cm in diameter.
Fine	Sand (S)	Fine deposits ranging from 0.06 to 2 mm in diameter.
	Silt (Si)	Fine material less than 0.06 mm in diameter, often carried by currents.
	Muck (M)	Silt and clay containing greater than 85% organic (detritus).
	Clay (mud)	Material of inorganic origin with greasy feel between fingers and no apparent structure.
	Fines (F)	Smaller-sized material of less than 0.06 mm. This classification is used for an indeterminate mix of sand, silt, muck and clay when the dominant component is not determined.
Adapted from: Bradbury et al. (2001) and McCarthy et al (2007 Draft)		

2.3 Stream Habitat Mapping

Stream habitat sections were assessed based on substrate composition, stream velocity readings and depth measurements. Water depth and flow measurements were obtained by recording measurements at ¼, ½ and ¾ stream widths at 25 m increments. All flows were obtained at 60% of the water depth using a SonTek FlowTracker®. Percent substrate composition was estimated for 50 m cells based on criteria outlined in Table 2.1. The percentage of aquatic vegetation composition was also noted. Photographs were taken viewing upstream and downstream at each transect and the percent coverage of riparian vegetation was noted. Potential barriers to fish migration were described, marked with GPS coordinates and photographed.

3.0 RESULTS

3.1 Fish Sampling

All stream sections and ponds within the study area were sampled to determine the fish species present and to determine if all areas represent fish habitat.

3.1.1 Pond Sampling

Fish sampling in ponds was conducted using a combination of fyke trap and gillnet sets. The coordinates are provided in Appendix A, Table A.1. The results showed evidence of three spine stickleback in the ponds but no evidence of salmonids. Results of the pond sampling efforts are summarized in Table 3.1.

Table 3.1 Summary of Fyke Netting and Gillnetting Effort and Catch

Pond	Method	Location	Catch			Fishing Time
			BT	AS	TSS	
VicP1	Fyke	FN01	0	0	16	Overnight
VicP1	Fyke	FN02	0	0	50	Overnight
VicP1	Gillnet	GN01	0	0	0	3 nights
VicP1	Gillnet	GN02	0	0	0	3 nights
VicP2	Fyke	FN01	0	0	64	Overnight
VicP2	Fyke	FN02	0	0	74	Overnight
VicP2	Gillnet	GN01	0	0	0	3 nights
VicP2	Gillnet	GN02	0	0	0	3 nights
ValP1	Fyke	FN01	0	0	6	Overnight
ValP1	Fyke	FN02	0	0	3	Overnight
ValP1	Fyke	FN03	0	0	10	2 nights
ValP1	Fyke	FN04	0	0	12	2 nights
ValP1	Gillnet	GN01	0	0	0	2 nights
ValP1	Gillnet	GN02	0	0	0	2 nights
ValP2	Gillnet	GN01	0	0	0	6 hrs 35 min
ValP2	Gillnet	GN02	0	0	0	7 hrs 9 min
ValP2	Gillnet	GN03	0	0	0	6 hrs 37 min
ValP2	Gillnet	GN04	0	0	0	6 hrs 16 min
ValP2	Gillnet	GN05	0	0	0	2 nights
ValP2	Gillnet	GN06	0	0	0	2 nights
ValP2	Gillnet	GN07	0	0	0	2 nights
ValP2	Gillnet	GN08	0	0	0	2 nights

A total of eight overnight fyke trap sets and 14 gillnet sets (of varying duration) were conducted during the survey. A total of 235 stickleback were captured by fyke trapping, none were captured by gillnetting. No salmonids were captured by either sampling method.

3.1.2 Stream Sampling

Fish sampling in streams was conducted by index (qualitative) electrofishing. Stream sampling confirmed the presence of Atlantic salmon (Photo 2), brook trout (Photo 3) and three spine stickleback within the study area. A summary of fish sampling is provided in Table 3.2, which shows the location fished, the fishing time, the number of fish caught, the minimum, mean and maximum fork lengths of brook trout and Atlantic salmon and the total number of stickleback caught. The complete fish sampling data and coordinates are provided in Appendix A, Tables A.2 and A.3.

Photo 3 Representative Photo of Atlantic Salmon

Photo 2 Representative Photo of Brook Trout

Table 3.2 Summary of Stream Electrofishing Results

Stream	Distance (m)	Fishing Time (secs)	Brook Trout Forklengths (mm)				Atlantic Salmon Forklengths (mm)				TSS
			N	Min	Mean	Max	N	Min	Mean	Max	N
C01	0-50m US/DS	316	29	29	76	162	0	-	-	-	0
C02	0-50m US/DS	135	0	-	-	-	1	-	118	-	0
C03	0-50m US/DS	151	3	70	82	90	0	-	-	-	0
C04	0-50m US/DS	93	0	-	-	-	0	-	-	-	0
C05	0-50m US/DS	166	1	-	46	-	8	58	80	115	0
C06	0-50m US/DS	152	6	36	149	149	0	-	-	-	0
C07	0-50m US/DS	NA	No stream evident at this location								
C08	0-50m DS	53*	0	-	-	-	0	-	-	-	0
C09	0-50m US/DS	116	0	-	-	-	0	-	-	-	0
Valentine Lake Streams											
ValLK-ValP2	0-450	844	50	33	70	120	9	28	63	84	1
	450-885	927	0	-	-	-	0	-	-	-	5
ValP1-ValP2	0-200	207	0	-	-	-	0	-	-	-	21
ValP3-ValLK	0-200	338	20	35	88	166	2	78	82	86	0
Victoria Lake Streams											
VicP2-VicLK	0-200	769	0	-	-	-	0	-	-	-	5
	200-750	706	61	31	74	135	0	-	-	-	0
	750-950	NA	Beaver pond – could not fish								
	950-1550	1053	81	31	74	135	9	64	80	93	10
VicP1-VicP2	0-22	388	0	-	-	-	0	-	-	-	0
Tributary		120	6	39	55	90	0	-	-	-	0
Note * Fished 50 m DS only, US too deep to fish.											

Electrofishing surveys at stream crossings confirmed that salmonids were present at five crossings (C01, C02, C03, C05, and C06) and absent at three crossings (C04, C08 and C09). Stream crossing C07 did not exist.

For streams within the Valentine Lake watershed, salmonids were present at two of the three streams investigated (ValLK-ValP2 and ValP3-ValLK), but were absent from ValP1 to ValP2 with only sticklebacks captured in this stream. For stream section ValLK-ValP2 salmonids are only present from 0-450 m US of Valentine Lake. A barrier (waterfall) at 450 m has precluded salmonid migration upstream of this point (Photo 4). Only sticklebacks were captured from 450-885 m upstream and in ponds ValP1 and ValP2.

For streams within the Victoria Lake watershed, salmonids were present in stream section VicP2 to Victoria Lake and in a tributary that confluences with this stream. Salmonids were absent from stream section VicP1-VicP2, with only sticklebacks captured in this stream section. For stream section VicP2 to Victoria Lake, salmonids are only present downstream of 200m from pond VicP2. A barrier at 200 m has precluded salmonid migration upstream of that point (Photo 5). Only stickleback were captured upstream of 200 m and in Ponds VicP1 and VicP2.

Photo 4 Barrier on ValLK to Val P2

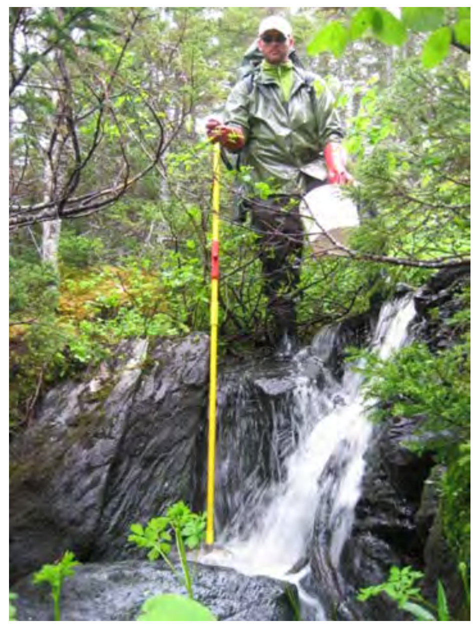


Photo 5 Barrier Located on VicP2 to VicLK

3.2 Habitat Characterization

3.2.1 Ponds

A bathymetric map for each pond was developed from the data collected at the transect stations. Substrate data were superimposed on the same maps and general areas of habitat type were delineated. Each map depicts the pond outline, bathymetric contours, substrate areas by type and the presence of aquatic vegetation. Given the shallow nature of the ponds investigated all habitat types can be considered to occur within the littoral zone. The habitat types included fine substrate with vegetation, fine without vegetation, medium substrate with vegetation, medium without vegetation and coarse substrate without vegetation. Given the shallow nature of the ponds investigated all habitat types can be considered to occur within the littoral zone. Habitat maps for ponds within the Valentine Lake and Victoria Lake watersheds are included in Figures 3.1 and 3.2 respectively. Areas associated with each habitat type are summarized in Table 3.3.

Figure 3.1 Bathymetry and Substrate Map for ValP1 and ValP2

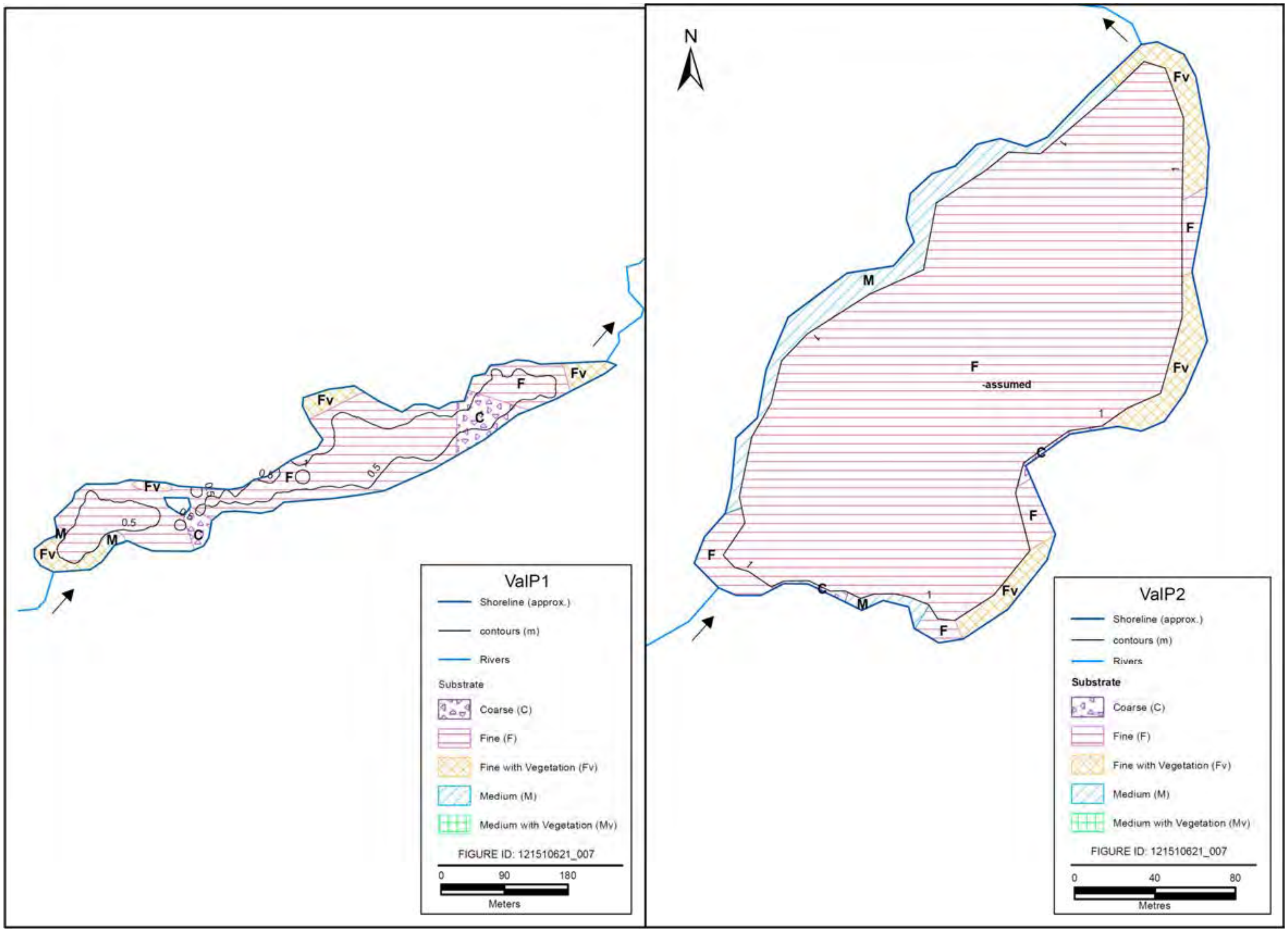


Figure 3.2 Bathymetry and Substrate Map for VicP1 and VicP2

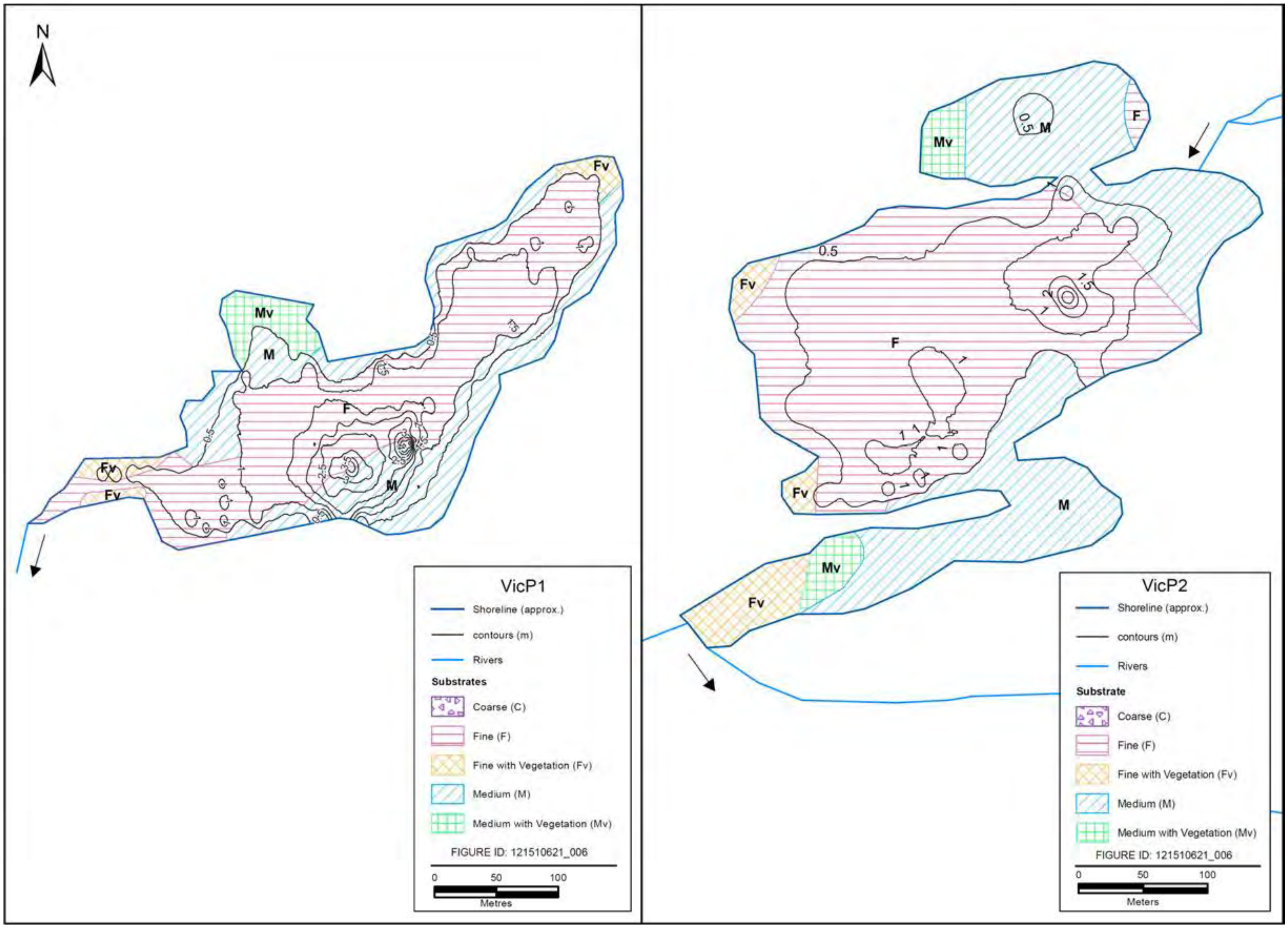


Table 3.3 Summary of Pond Habitat Areas

Substrate	Area M^2			
	VicP1	VicP2	ValP1	ValP2
Fine	32304.9	36339.6	36173.6	35984.5
Fine_Veg	2397.3	3810.8	4694.4	2794
Medium	19762.3	23459.5	622.9	2948.7
Medium_Veg	2945.8	2481.6	0	0
Coarse	0	0	4306.2	185
Total	**57410.3**	**66091.5**	**45797.1**	**41912.2**

3.2.2 Streams

Stream sections within the study area are characterized based on stream velocity measurements, substrate type, depth and the percent coverage of aquatic and riparian vegetation. A summary of habitat attributes is provided in Table 3.4 outlining the stream section surveyed, the distance along the stream section (50 m intervals) and the minimum, maximum and average stream width, velocity and mean depth. In addition, percent substrate, riparian vegetation and aquatic vegetation are identified. The complete habitat classification data set is included in Appendix B and representative photos are provided in Appendix C.

Table 3.4 Stream Habitat Summary Data

Location	Distance (m)	Stream Width (m)			Velocity (m/s)			Mean Depth (cm)			Substrate Composition (%)						Riparian Vegetation (%)			Aquatic Vegetation (%)
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	BR	B	R	C	G	S	F	S	G	T	
ValP1-ValP2	0 to 50	0.83	0.75	0.90	0.05	0.00	0.18	13	6	21	0	0	0	20	10	0	70	35	65	0	10
ValP1-ValP2	50 to 100	1.23	0.60	2.35	0.05	0.00	0.18	39	20	80	0	40	0	0	0	0	60	40	60	0	15
ValP1-ValP2	100 to 150	2.33	2.00	2.65	0.01	0.00	0.03	42	18	80	0	10	0	60	0	30	0	30	70	0	<5
ValP1-ValP2	150 to 200	1.73	1.45	2.00	0.03	0.00	0.04	18	10	20	0	30	0	40	0	0	30	30	70	0	10
VicP1 to VicP2	0 to 22	2.05	1.00	3.10	0.04	0.02	0.06	9	4	16	0	0	0	55	40	5	0	40	0	50	0
ValP3-ValLk	0 to 50	4.27	3.10	5.30	0.49	0.09	0.93	32	18	58	0	40	40	20	0	0	0	70	0	30	0
ValP3-ValLk	50 to 100	3.95	3.15	4.40	0.36	0.01	0.58	29	10	58	0	45	40	15	0	0	0	70	0	30	0
ValP3-ValLk	100 to 150	4.70	3.00	6.80	0.40	0.09	0.82	26	10	34	0	70	30	0	0	0	0	70	0	30	0
ValP3-ValLk	150 to 200	6.60	5.2	7.8	0.35	0.09	0.72	20	16	26	0	40	30	30	0	0	0	65	15	20	5
ValLK-ValP2	0 to 50	1.53	0.75	2.30	0.11	0.00	0.58	15	8	22	20	50	0	30	0	0	0	35	5	60	0
ValLK-ValP2	50 to 100	1.68	1.55	2.10	0.16	0.00	0.34	8	4	14	0	20	0	50	30	0	0	60	0	40	0
ValLK-ValP2	100 to 150	2.07	1.80	2.40	0.12	0.00	0.41	13	4	22	0	60	0	40	0	0	0	45	25	30	0
ValLK-ValP2	150 to 200	1.95	1.80	2.20	0.10	0.00	0.41	16	10	22	0	40	0	40	20	0	0	60	0	40	0
ValLK-ValP2	200 to 250	2.30	2.20	2.45	0.06	0.00	0.26	13	6	20	0	80	0	20	0	0	0	50	15	35	0
ValLK-ValP2	250 to 300	2.00	1.85	2.25	0.12	0.00	0.45	14	6	20	0	60	0	40	0	0	0	65	5	30	0
ValLK-ValP2	300 to 350	1.98	1.90	2.15	0.08	0.00	0.38	15	6	20	0	10	0	40	50	0	0	65	5	30	0
ValLK-ValP2	350 to 400	2.07	1.90	2.20	0.02	0.00	0.08	13	5	22	0	30	0	40	30	0	0	55	15	30	0
ValLK-ValP2	400 to 450	2.25	2.10	2.50	0.10	0.00	0.42	7	4	10	0	70	0	30	0	0	0	50	10	40	0
ValLK-ValP2	450 to 500	1.65	1.05	2.15	0.12	0.00	0.35	10	6	14	0	80	0	20	0	0	0	35	5	60	0

Table 3.4 Stream Habitat Summary Data

Location	Distance (m)	Stream Width (m)			Velocity (m/s)			Mean Depth (cm)			Substrate Composition (%)							Riparian Vegetation (%)			Aquatic Vegetation (%)
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	BR	B	R	C	G	S	F	S	G	T	
ValLK-ValP2	500 to 550	1.65	1.55	1.75	0.13	0.00	0.35	11	6	20	40	40	0	20	0	0	0	55	10	35	0
ValLK-ValP2	550 to 600	1.60	1.50	1.65	0.05	1.00	0.10	23	14	34	20	20	20	25	15	0	0	55	5	40	5
ValLK-ValP2	600 to 650	1.63	1.30	1.95	0.10	0.00	0.25	24	16	34	0	80	0	20	0	0	0	70	5	25	5
ValLK-ValP2	650 to 700	2.40	1.95	2.85	0.08	0.00	0.25	31	8	72	0	80	0	20	0	0	0	55	5	40	10
ValLK-ValP2	700 to 750	1.47	0.75	2.40	0.21	0.00	0.72	10	8	12	0	80	0	20	0	0	0	55	5	40	5
ValLK-ValP2	750 to 800	1.12	0.50	2.10	0.24	0.00	0.72	27	8	70	0	80	0	20	0	0	0	60	10	30	5
ValLK-ValP2	800 to 850	1.25	0.65	2.10	0.10	0.00	0.47	28	10	70	0	50	0	50	0	0	0	60	10	30	15
ValLK-ValP2	850 to 885	0.70	0.40	1.00	0.13	0.02	0.34	12	10	14	0	70	0	30	0	0	0	60	10	30	10
VicP2-VicLK	0 to 50	0.88	0.80	0.95	0.14	0.00	0.33	8	4	12	0	0	0	30	10	0	60	65	15	20	40
VicP2-VicLK	50 to 100	0.93	0.60	1.40	0.16	0.00	0.33	13	10	20	0	0	0	30	50	0	20	65	20	15	50
VicP2-VicLK	100 to 150	1.15	0.75	1.40	0.16	0.00	0.43	12	8	17	0	0	0	40	50	0	10	45	10	45	20
VicP2-VicLK	150 to 200	0.82	0.60	1.10	0.21	0.00	0.73	12	8	14	0	10	0	50	40	0	0	35	20	45	10
VicP2-VicLK	200 to 250	1.23	1.10	1.50	0.10	0.00	0.26	14	8	28	80	10	0	10	0	0	0	30	30	40	0
VicP2-VicLK	250 to 300	1.63	1.40	2.00	0.09	0.00	0.22	11	6	20	60	20	0	20	0	0	0	50	35	15	0
VicP2-VicLK	300 to 350	1.42	1.35	1.50	0.18	0.01	0.53	8	6	12	80	10	0	10	0	0	0	50	35	15	0
VicP2-VicLK	350 to 400	1.75	1.50	1.90	0.12	0.00	0.53	13	8	18	50	0	0	35	15	0	0	15	15	70	0
VicP2-VicLK	400 to 450	1.38	1.00	1.90	0.16	0.00	0.75	14	4	20	0	0	10	80	10	0	0	15	15	70	0
VicP2-VicLK	450 to 500	1.13	0.95	1.25	0.12	0.00	0.42	8	4	12	0	10	0	70	20	0	0	45	10	45	0
VicP2-VicLK	500 to 550	0.88	0.65	1.20	0.05	0.00	0.15	16	10	26	0	0	0	0	45	45	10	60	10	30	0
VicP2-VicLK	550 to 600	0.77	0.65	0.95	0.09	0.01	0.15	17	10	26	0	0	0	0	50	40	10	50	30	20	<5

Table 3.4 Stream Habitat Summary Data

Location	Distance (m)	Stream Width (m)			Velocity (m/s)			Mean Depth (cm)			Substrate Composition (%)							Riparian Vegetation (%)			Aquatic Vegetation (%)
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	BR	B	R	C	G	S	F	S	G	T	
VicP2-VicLK	600 to 650	1.02	0.95	1.10	0.12	0.00	0.27	13	6	22	0	0	0	20	70	0	10	50	65	15	0
VicP2-VicLK	650 to 700	1.37	0.80	2.20	0.16	0.00	0.31	11	6	14	0	0	0	60	35	0	5	60	35	5	0
VicP2-VicLK	700 to 750	1.12	0.45	2.20	0.13	0.02	0.31	16	8	22	0	0	0	20	70	0	10	60	40	0	<5
VicP2-VicLK	750 to 800	0.70	0.70	0.70	0.16	0.12	0.21	21	20	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VicP2-VicLK	800 t0 850	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VicP2-VicLK	850 to 900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VicP2-VicLK	900 to 950	2.20	2.20	2.20	0.02	0.01	0.03	47	44	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VicP2-VicLK	950 to 1000	1.98	1.75	2.20	0.23	0.00	0.45	22	6	50	0	0	0	70	30	0	0	60	30	10	0
VicP2-VicLK	1000 to 1050	2.08	2.00	2.20	0.19	0.00	0.63	10	5	14	0	10	0	60	30	0	0	35	35	30	0
VicP2-VicLK	1050 to 1100	1.73	1.55	2.05	0.20	0.00	0.63	8	5	12	0	0	20	60	20	0	0	40	40	20	0
VicP2-VicLK	1100 to 1150	1.68	1.40	2.10	0.14	0.00	0.46	11	6	18	0	10	0	60	30	0	0	50	50	0	<5
VicP2-VicLK	1150 to 1200	1.78	1.55	2.10	0.15	0.06	0.38	16	12	22	0	0	0	50	45	0	5	60	40	0	0
VicP2-VicLK	1200 to 1250	1.40	1.00	1.70	0.18	0.00	0.38	18	13	20	0	0	0	35	60	0	5	50	50	0	5
VicP2-VicLK	1250 to 1300	1.15	1.00	1.35	0.19	0.04	0.49	17	12	24	0	0	0	40	60	0	0	50	50	0	10
VicP2-VicLK	1300 to 1350	2.62	1.10	3.50	0.17	0.00	0.49	13	6	20	0	10	0	60	30	0	0	60	40	0	5
VicP2-VicLK	1350 to 1400	2.93	2.65	3.50	0.10	0.00	0.30	10	6	14	20	50	0	30	0	0	0	60	30	10	0
VicP2-VicLK	1400 to 1450	1.87	0.95	2.65	0.22	0.00	0.45	10	6	14	30	40	0	30	0	0	0	50	15	35	0
VicP2-VicLK	1450 to 1500	2.02	0.80	3.25	0.17	0.00	0.39	10	4	14	10	10	50	30	0	0	0	40	30	30	0
VicP2-VicLK	1500 to 1550	2.02	1.30	3.25	0.19	0.00	0.42	12	8	20	0	0	30	50	20	0	0	65	0	35	0
Trib	0 to 125	1.3	1.05	1.55	0.1	0.3	0.15	13	8	22	0	5	10	45	40	0	0	35	50	15	0

Table 3.4 Stream Habitat Summary Data

Location	Distance (m)	Stream Width (m)			Velocity (m/s)			Mean Depth (cm)			Substrate Composition (%)							Riparian Vegetation (%)			Aquatic Vegetation (%)
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	BR	B	R	C	G	S	F	S	G	T	
Trib	125 to 175	1.88	1.55	2.20	0.09	0.00	0.20	8	6	9	0	10	10	40	40	0	0	0	0	0	0
C01	0 to 50 US	2.40	1.80	3.40	0.06	0.00	0.18	17	4	30	0	20	15	50	10	0	5	70	15	15	0
C01	0 to 50 DS	2.10	1.00	3.40	0.04	0.00	0.14	16	10	30	0	10	30	50	10	0	5	70	10	20	0
C02	0 to 50 US	3.57	3.20	4.10	0.26	0.00	0.72	29	8	62	0	50	10	40	0	0	0	40	10	50	0
C02	0 to 50 DS	4.07	3.20	4.70	0.33	0.12	0.82	24	8	62	0	30	0	50	20	0	0	50	5	45	0
C03	0 to 50 US	2.43	1.95	2.90	0.16	0.01	0.30	19	12	27	0	40	20	40	0	0	0	50	50	0	0
C03	0 to 50 DS	2.50	1.70	2.90	0.28	0.03	0.49	11	4	20	30	0	0	30	40	0	0	70	15	15	0
C04	0 to 50 US	1.38	1.10	1.90	0.14	0.00	0.62	16	6	28	0	0	0	5	50	45	0	35	10	55	0
C04	0 to 50 DS	1.00	0.90	1.15	0.04	0.00	0.20	18	10	30	0	0	0	10	30	70	0	45	5	50	0
C05	0 to 50 US	10.60	10.60	10.60	0.65	0.06	1.08	30	14	40	0	100	0	0	0	0	0	30	0	70	0
C05	0 to 50 DS	10.60	10.60	10.60	0.95	0.87	1.08	34	22	40	0	100	0	0	0	0	0	30	0	70	0
C06	0 to 50 US	1.30	0.90	1.60	0.21	0.00	0.39	14	2	24	0	0	20	20	60	0	0	50	35	15	0
C06	0 to 50 DS	1.33	0.90	1.70	0.19	0.02	0.39	16	2	22	0	0	0	50	50	0	0	65	25	10	0
C07	0 to 50 US	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C07	0 to 50 DS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C08	0 to 50 US	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C08	0 to 50 DS	0.88	0.65	1.20	0.12	0.04	0.21	10	4	20	0	0	0	0	0	0	100	55	40	5	0

Table 3.4 Stream Habitat Summary Data

Location	Distance (m)	Stream Width (m)			Velocity (m/s)			Mean Depth (cm)			Substrate Composition (%)							Riparian Vegetation (%)			Aquatic Vegetation (%)
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	BR	B	R	C	G	S	F	S	G	T	
C09	0 to 50 US	1.73	1.30	2.00	0.01	0.00	0.04	24	12	28	0	0	0	0	0	0	100	60	25	15	<5
C09	0 to 50 DS	0.88	0.45	1.30	0.02	0.00	0.11	13	8	16	0	0	20	0	0	0	80	70	15	15	<5

Notes:
- Substrate classifications are: BR = Bedrock, B = Boulder, R = Rubble, C = Cobble, G = Gravel, S = Sand, F = Fines
- Riparian vegetation categories are: S = Shrubs, G = Grass, T = Trees

4.0 DISCUSSION

The 2011 baseline study confirmed the presence of Atlantic salmon, brook trout and three-spine stickleback in portions of the study area. Atlantic salmon and brook trout were only captured in stream habitats and were absent from the four ponds investigated. Substantial barriers (falls) exist 200 m downstream of VicP2 and approximately 450 m downstream of ValP2. No salmonids were captured in ponds or stream sections located upstream these barriers.

Four small ponds are present in the study area ranging in size from 4.19 hectares (ValP2) to 6.61 hectares (VicP2). The most prevalent habitat type is fine, followed by medium, fine with vegetation, medium with vegetation and coarse. Water depths encountered during the survey confirmed that all pond habitat types occur within the littoral zone. Note that this is assumed for pond ValP2 as complete bathymetry mapping was not conducted.

For streams, the most prevalent substrate type is cobble, followed by boulder, gravel, bedrock, rubble, fines and sand. Stream sections rarely exceeded 3 m in width, with the exception of stream section ValP3 – Val Lake which has an average width of 4.9 m. In addition, stream crossing C002 and C005 has an average width of 3.8 and 10.6 m respectively. Stream velocities were variable, but can be categorized as mainly slow (<0.2 m/s). Stream velocities ranged from 0 m/s in steady areas to a maximum of 1.08 m/s in cascade/rapid areas. The composition of riparian vegetation varies, with shrubs being the overall dominant type. Aquatic vegetation is absent or in low abundance in most stream sections and has its highest abundance 0-100 m downstream of VicP2.

5.0 REFERENCES

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APPENDIX A

Fish Data 2011

APPENDIX A: Fish Sampling Data 2011

Legend

Method:	Fyke Trap (FN), Gillnet (GN) and Electrofishing (EF)
Site:	Unique identifier assigned to each water body fished.
Location:	Established fish sampling areas for Gillnets and Fyke Nets or stream segment electrofished (0-50 m DS = fished from 0 to 50 m in a Downstream direction).
Start Date:	Date fishing commenced
End Date:	Date fishing ended
Fishing Time:	Number of seconds electrofishing was conducted or number of nights gillnetting or fyke trapping was conducted (1N = 1 Night, 2N = 2 Nights)
Species:	Atlantic salmon (AS), brook trout (BT), threespine stickleback (TSS)
Count:	Number of fish associated with line entry
Length:	Fork length in mm
Weight:	Total weight in grams.
(K) Condition:	Condition factor calculated as: $K = W \times 10^5 / L3$, where K = condition, W = Weight in g, L = Length in mm.

Table A.1. - Coordinates of Fish Sampling in Ponds 2011

Pond	Method	Location	Coordinates (Degrees, Decimal Minutes)
VicP1	Fyke	FN01	N48 21.426 W57 10.947
VicP1	Fyke	FN02	N48 21.353 W57 10.924
VicP1	Gillnet	GN01	N48 21.384 W57 10.871
VicP1	Gillnet	GN02	N48 21.484 W57 10.743
VicP2	Fyke	FN01	N48 21.336 W57 11.194
VicP2	Fyke	FN02	N48 21.241 W57 11.240
VicP2	Gillnet	GN01	N48 21.313 W57 11.157
VicP2	Gillnet	GN02	N48 21.334 W57 11.225
ValP1	Fyke	FN01	N48 21.669 W57 10.358
ValP1	Fyke	FN02	N48 21.750 W57 10.085
ValP1	Fyke	FN03	N48 21.750 W57 10.085
ValP1	Fyke	FN04	N48 21.669 W57 10.358
ValP1	Gillnet	GN01	N48 21.768 W57 10.146
ValP1	Gillnet	GN02	N48 21.712 W57 10.225
ValP2	Gillnet	GN01	N48 22.007 W57 09.757
ValP2	Gillnet	GN02	N48 22.066 W57 09.676
ValP2	Gillnet	GN03	N48 22.089 W57 09.589
ValP2	Gillnet	GN04	N48 22.073 W57 09.559
ValP2	Gillnet	GN05	N48 22.073 W57 09.559
ValP2	Gillnet	GN06	N48 22.089 W57 09.589
ValP2	Gillnet	GN07	N48 22.066 W57 09.676
ValP2	Gillnet	GN08	N48 22.007 W57 09.757

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	161	55.6	1.33
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	162	61.9	1.46
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	133	28.9	1.23
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	115	21.5	1.41
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	105	13	1.12
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	106	16.3	1.37
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	91	10.4	1.38
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	94	10.9	1.31
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	101	11	1.07
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	92	10.8	1.39
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	37	0.7	1.38
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	31	0.5	1.68
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	32	0.3	0.92
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	35	0.4	0.93
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	30	0.5	1.85
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	35	0.4	0.93
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	39	0.8	1.35
EF	C01	0-50m US	15-Jun-11	-	166s	BT	1	30	0.3	1.11
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	114	19.1	1.29
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	134	33.2	1.38
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	92	9.6	1.23
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	94	10.3	1.24
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	84	9.8	1.65
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	103	12.7	1.16

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	37	0.4	0.79
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	35	0.6	1.4
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	29	0.2	0.82
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	30	0.4	1.48
EF	C01	0-50m DS	15-Jun-11	-	150s	BT	1	33	0.4	1.11
FN	VICP1	FN01	16-Jun-11	17-Jun-11	1N	TSS	16	-	-	-
FN	VICP1	FN02	16-Jun-11	17-Jun-11	1N	TSS	50	-	-	-
FN	VICP2	FN02	16-Jun-11	17-Jun-11	1N	TSS	74	-	-	-
FN	VICP2	FN01	16-Jun-11	17-Jun-11	1N	TSS	64	-	-	-
EF	VicP2-VicLK	0-50m DS	16-Jun-11	-	123s	TSS	1	42	0.6	0.81
EF	VicP2-VicLK	0-50m DS	16-Jun-11	-	123s	TSS	1	37	0.4	0.79
EF	VicP2-VicLK	0-50m DS	16-Jun-11	-	123s	TSS	1	41	0.6	0.87
EF	VicP2-VicLK	0-50m DS	16-Jun-11	-	123s	TSS	1	34	0.5	1.27
EF	VicP2-VicLK	0-50m DS	16-Jun-11	-	123s	TSS	1	35	0.3	0.7
EF	VicP2-VicLK	50-100m DS	16-Jun-11	-	189s	NC	NA	NA	NA	NA
EF	VicP2-VicLK	100-150mDS	16-Jun-11	-	272s	NC	NA	NA	NA	NA
EF	VicP2-VicLK	150-200m DS	16-Jun-11	-	185s	NC	NA	NA	NA	NA
EF	VicP2-VicLK	200-250m DS	16-Jun-11	-	78s	BT	1	97	13.2	1.45
EF	VicP2-VicLK	200-250m DS	16-Jun-11	-	78s	BT	1	126	30.4	1.52
EF	VicP2-VicLK	200-250m DS	16-Jun-11	-	78s	BT	1	72	4.6	1.23
EF	VicP2-VicLK	200-250m DS	16-Jun-11	-	78s	BT	1	103	13.3	1.22
EF	VicP2-VicLK	200-250m DS	16-Jun-11	-	78s	BT	1	80	5.4	1.05
EF	VicP2-VicLK	200-250m DS	16-Jun-11	-	78s	BT	1	85	7.6	1.24
EF	VicP2-VicLK	200-250m DS	16-Jun-11	-	78s	BT	1	74	3.8	0.94

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	135	30.5	1.24
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	110	15.8	1.19
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	121	21.1	1.19
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	126	19.2	0.96
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	98	11.5	1.22
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	115	16.5	1.08
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	105	12.6	1.09
EF	VicP2-VicLK	250-300m DS	16-Jun-11	-	80s	BT	1	76	5.6	1.28
EF	VicP2-VicLK	300-350m DS	16-Jun-11	-	92s	BT	1	84	6.7	1.13
EF	VicP2-VicLK	300-350m DS	16-Jun-11	-	92s	BT	1	84	6.9	1.16
EF	VicP2-VicLK	300-350m DS	16-Jun-11	-	92s	BT	1	82	5.9	1.07
EF	VicP2-VicLK	300-350m DS	16-Jun-11	-	92s	BT	1	85	6.3	1.03
EF	VicP2-VicLK	300-350m DS	16-Jun-11	-	92s	BT	1	75	4.4	1.04
EF	VicP2-VicLK	300-350m DS	16-Jun-11	-	92s	BT	1	72	4.2	1.13
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	103	5.2	0.48
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	100	5.1	0.51
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	81	6.6	1.24
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	83	7	1.22
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	84	6.9	1.16
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	85	7.8	1.27
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	81	6.1	1.15
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	69	4.7	1.43
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	69	4.2	1.28
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	63	4	1.6

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	VicP2-VicLK	350-400m DS	16-Jun-11	-	109s	BT	1	35	0.55	1.28
EF	VicP2-VicLK	400-450m DS	19-Jun-11	-	47s	BT	1	78		NA
EF	VicP2-VicLK	400-450m DS	19-Jun-11	-	47s	BT	1	74		NA
EF	VicP2-VicLK	400-450m DS	19-Jun-11	-	47s	BT	1	100		NA
EF	VicP2-VicLK	400-450m DS	19-Jun-11	-	47s	BT	1	77		NA
EF	VicP2-VicLK	400-450m DS	19-Jun-11	-	47s	BT	1	77		NA
EF	VicP2-VicLK	450-500m DS	19-Jun-11	-	54s	BT	1	60		NA
EF	VicP2-VicLK	450-500m DS	19-Jun-11	-	54s	BT	1	47		NA
EF	VicP2-VicLK	500-550m DS	19-Jun-11	-	46s	BT	1	60		NA
EF	VicP2-VicLK	500-550m DS	19-Jun-11	-	46s	BT	1	43		NA
EF	VicP2-VicLK	550-600m DS	19-Jun-11	-	47s	BT	1	37		NA
EF	VicP2-VicLK	550-600m DS	19-Jun-11	-	47s	BT	1	65		NA
EF	VicP2-VicLK	600-650m DS	19-Jun-11	-	54s	BT	1	33		NA
EF	VicP2-VicLK	600-650m DS	19-Jun-11	-	54s	BT	1	35		NA
EF	VicP2-VicLK	600-650m DS	19-Jun-11	-	54s	BT	1	37		NA
EF	VicP2-VicLK	600-650m DS	19-Jun-11	-	54s	BT	1	35		NA
EF	VicP2-VicLK	650-700m DS	19-Jun-11	-	43s	BT	1	98		NA
EF	VicP2-VicLK	650-700m DS	19-Jun-11	-	43s	BT	1	39		NA
EF	VicP2-VicLK	650-700m DS	19-Jun-11	-	43s	BT	1	64		NA
EF	VicP2-VicLK	650-700m DS	19-Jun-11	-	43s	BT	1	74		NA
EF	VicP2-VicLK	650-700m DS	19-Jun-11	-	43s	BT	1	65		NA
EF	VicP2-VicLK	650-700m DS	19-Jun-11	-	43s	BT	1	62		NA
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	78		NA
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	87		NA

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	37		NA
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	38		NA
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	34		NA
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	32		NA
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	38		NA
EF	VicP2-VicLK	700-750m DS	19-Jun-11	-	56s	BT	1	31		NA
EF	VicP2-VicLK	750-800m DS	19-Jun-11	Wetland bog area and Beaver Complex -- No fish sampling performed						
EF	VicP2-VicLK	800-850m DS	19-Jun-11	Wetland bog area and Beaver Complex -- No fish sampling performed						
EF	VicP2-VicLK	850-900m DS	19-Jun-11	Wetland bog area and Beaver Complex -- No fish sampling performed						
EF	VicP2-VicLK	900-950m DS	19-Jun-11	Wetland bog area and Beaver Complex -- No fish sampling performed						
EF	VicP2-VicLK	950-1000m DS	19-Jun-11	-	125s	BT	1	75	-	NA
EF	VicP2-VicLK	950-1000m DS	19-Jun-11	-	125s	BT	1	64	-	NA
EF	VicP2-VicLK	950-1000m DS	19-Jun-11	-	125s	BT	1	41	-	NA
EF	VicP2-VicLK	950-1000m DS	19-Jun-11	-	125s	BT	1	75	-	NA
EF	VicP2-VicLK	950-1000m DS	19-Jun-11	-	125s	TSS	1	52	-	NA
EF	VicP2-VicLK	950-1000m DS	19-Jun-11	-	125s	TSS	1	35	-	NA
EF	VicP2-VicLK	950-1000m DS	19-Jun-11	-	125s	BT	1	37	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	34	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	40	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	98	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	122	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	AS	1	87	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	82	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	73	-	NA

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	66	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	97	-	NA
EF	VicP2-VicLK	1000-1050m DS	19-Jun-11	-	78s	BT	1	74	-	NA
EF	VicP2-VicLK	1050-1100m DS	19-Jun-11	-	48s	TSS	1	55	-	NA
EF	VicP2-VicLK	1050-1100m DS	19-Jun-11	-	48s	BT	1	63	-	NA
EF	VicP2-VicLK	1050-1100m DS	19-Jun-11	-	48s	BT	1	33	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	36	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	43	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	40	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	156	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	81	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	66	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	73	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	76	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	77	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	73	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	85	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	63	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	59	-	NA
EF	VicP2-VicLK	1100-1150m DS	19-Jun-11	-	116s	BT	1	66	-	NA
EF	VicP2-VicLK	1150-1200m DS	19-Jun-11	-	57s	BT	1	41	-	NA
EF	VicP2-VicLK	1200-1250m DS	19-Jun-11	-	37s	BT	1	36	-	NA
EF	VicP2-VicLK	1200-1250m DS	19-Jun-11	-	37s	BT	1	39	-	NA
EF	VicP2-VicLK	1200-1250m DS	19-Jun-11	-	37s	BT	1	107	-	NA

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	VicP2-VicLK	1200-1250m DS	19-Jun-11	-	37s	BT	1	96	-	NA
EF	VicP2-VicLK	1200-1250m DS	19-Jun-11	-	37s	BT	1	102	-	NA
EF	VicP2-VicLK	1200-1250m DS	19-Jun-11	-	37s	BT	1	70	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	AS	1	84	8.5	1.43
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	TSS	1	39	NA	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	125	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	63	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	67	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	92	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	88	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	40	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	31	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	66	-	NA
EF	VicP2-VicLK	1250-1300m DS	19-Jun-11	-	94s	BT	1	31	-	NA
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	163	50.1	1.16
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	35	0.4	0.93
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	138	31.9	1.21
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	30	0.1	0.37
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	TSS	1	42	0.7	0.94
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	39	0.7	1.18
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	73	4.2	1.08
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	136	27.7	1.1
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	37	0.3	0.59
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	30	0.3	1.11

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	93	10.2	1.27
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	TSS	1	41	NA	NA
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	TSS	1	48	NA	NA
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	35	-	NA
EF	VicP2-VicLK	1300-1350m DS	19-Jun-11	-	168s	BT	1	82	-	NA
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	100	10	1
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	84	5.8	0.98
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	AS	1	93	9.4	1.17
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	58	2.9	1.49
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	78	4.3	0.91
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	37	0.5	0.99
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	37	0.4	0.79
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	40	0.7	1.09
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	68	3.7	1.18
EF	VicP2-VicLK	1350-1400m DS	19-Jun-11	-	104s	BT	1	60	2.4	1.11
EF	VicP2-VicLK	1400-1450m DS	19-Jun-11	-	66s	BT	1	39	0.5	0.84
EF	VicP2-VicLK	1400-1450m DS	19-Jun-11	-	66s	BT	1	68	4	1.27
EF	VicP2-VicLK	1400-1450m DS	19-Jun-11	-	66s	BT	1	73	4.5	1.16
EF	VicP2-VicLK	1400-1450m DS	19-Jun-11	-	66s	BT	1	39	0.5	0.84
EF	VicP2-VicLK	1400-1450m DS	19-Jun-11	-	66s	BT	1	42	0.5	0.67
EF	VicP2-VicLK	1450-1500m DS	19-Jun-11	-	84s	AS	1	83	7.5	1.31
EF	VicP2-VicLK	1450-1500m DS	19-Jun-11	-	84s	AS	1	87	7.5	1.14
EF	VicP2-VicLK	1450-1500m DS	19-Jun-11	-	84s	BT	1	74	4.3	1.06
EF	VicP2-VicLK	1450-1500m DS	19-Jun-11	-	84s	BT	1	60	2.6	1.2

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	VicP2-VicLK	1450-1500m DS	19-Jun-11	-	84s	TSS	1		NA	NA
EF	VicP2-VicLK	1450-1500m DS	19-Jun-11	-	84s	AS	1	64	2.8	1.07
EF	VicP2-VicLK	1450-1500m DS	19-Jun-11	-	84s	AS	1	65	2.9	1.06
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	AS	1	78	5.9	1.24
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	AS	1	77	6.1	1.34
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	BT	1	112	18.6	1.32
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	BT	1	70	4	1.17
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	BT	1	77	5	1.1
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	BT	1	85	7.9	1.29
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	BT	1	60	2.7	1.25
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	BT	1	79	5.6	1.14
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	BT	1	58	2.5	1.28
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	TSS	1	58	1.5	0.77
EF	VicP2-VicLK	1500-1550m DS	19-Jun-11	-	154s	TSS	1	51	1.3	0.98
EF	Tributary	0-50m US	19-Jun-11	-	65s	BT	1	90	-	NA
EF	Tributary	0-50m US	19-Jun-11	-	65s	BT	1	39	-	NA
EF	Tributary	0-50m US	19-Jun-11	-	65s	BT	1	39	-	NA
EF	Tributary	50-100m US	19-Jun-11	-	55s	BT	1	39	-	NA
EF	Tributary	50-100m US	19-Jun-11	-	55s	BT	1	47	-	NA
EF	Tributary	50-100m US	19-Jun-11	-	55s	BT	1	74	-	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	51	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	61	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	53	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	71	NA	NA

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	49	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	37	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	59	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	33	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	30	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	29	NA	NA
EF	Vicp1-Vicp2	0-22m US	17-Jun-11	-	388s	TSS	1	37	NA	NA
GN	VicP2	GN01	17-Jun-11	20-Jun-11	3N	NC	NA	NA	NA	NA
GN	VicP2	GN02	17-Jun-11	20-Jun-11	3N	NC	NA	NA	NA	NA
GN	VicP1	GN01	17-Jun-11	20-Jun-11	3N	NC	NA	NA	NA	NA
GN	VicP1	GN02	17-Jun-11	20-Jun-11	3N	NC	NA	NA	NA	NA
FN	ValP1	FN01	17-Jun-11	18-Jun-11	1N	TSS	6	-	-	-
FN	ValP1	FN04	18-Jun-11	20-Jun-11	2N	TSS	12	-	-	-
FN	ValP1	FN02	17-Jun-11	18-Jun-11	1N	TSS	3	-	-	-
FN	ValP1	FN03	18-Jun-11	20-Jun-11	2N	TSS	10	-	-	-
GN	ValP1	GN01	18-Jun-11	20-Jun-11	2N	NC	NA	NA	NA	NA
GN	ValP1	GN02	18-Jun-11	20-Jun-11	2N	NC	NA	NA	NA	NA
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	50	1.1	0.88
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	48	0.9	0.81
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	48	0.6	0.54
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	38	0.4	0.73
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	47	0.9	0.87
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	40	0.6	0.94
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	40	0.5	0.78

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	44	0.8	0.94
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	38	0.5	0.91
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	54	1.3	0.83
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	45	0.6	0.66
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	42	0.5	0.67
EF	ValP1-ValP2	0-50m DS	18-Jun-11	-	207s	TSS	1	57	1.6	0.86
EF	ValP1-ValP2	50-100m DS	18-Jun-11	-	120s	TSS	1	42	0.8	1.08
EF	ValP1-ValP2	50-100m DS	18-Jun-11	-	120s	TSS	1	47	1.1	1.06
EF	ValP1-ValP2	100-150m DS	18-Jun-11	-	148s	TSS	1	52	1.6	1.14
EF	ValP1-ValP2	100-150m DS	18-Jun-11	-	148s	TSS	1	49	1.5	1.27
EF	ValP1-ValP2	100-150m DS	18-Jun-11	-	148s	TSS	1	40	0.6	0.94
EF	ValP1-ValP2	100-150m DS	18-Jun-11	-	148s	TSS	1	49	0.9	0.76
EF	ValP1-ValP2	100-150m DS	18-Jun-11	-	148s	TSS	1	41	0.5	0.73
EF	ValP1-ValP2	100-150m DS	18-Jun-11	-	148s	TSS	1	45	0.9	0.99
EF	ValP1-ValP2	150-200m DS	18-Jun-11	Stream too deep to fish						
GN	ValP2	GN01	18-Jun-11	18-Jun-11	6 hrs 35 m	NC	NA	NA	NA	NA
GN	ValP2	GN08	18-Jun-11	20-Jun-11	2N	NC	NA	NA	NA	NA
GN	ValP2	GN02	18-Jun-11	18-Jun-11	7 hrs 9 min	NC	NA	NA	NA	NA
GN	ValP2	GN07	18-Jun-11	20-Jun-11	2N	NC	NA	NA	NA	NA
GN	ValP2	GN03	18-Jun-11	18-Jun-11	6 hrs 37 m	NC	NA	NA	NA	NA
GN	ValP2	GN06	18-Jun-11	20-Jun-11	2N	NC	NA	NA	NA	NA
GN	ValP2	GN04	18-Jun-11	18-Jun-11	6 hrs 16 m	NC	NA	NA	NA	NA
GN	ValP2	GN05	18-Jun-11	20-Jun-11	2N	NC	NA	NA	NA	NA
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	92	8.1	1.04

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	63	3.2	1.28
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	76	4.9	1.12
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	84	5.3	0.89
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	92	7.1	0.91
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	80	5.3	1.04
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	90	7.4	1.02
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	38	0.6	1.09
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	81	6	1.13
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	70	3.7	1.08
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	70	2.6	0.76
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	75	4.4	1.04
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	34	0.4	1.02
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	33	0.4	1.11
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	30	0.2	0.74
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	BT	1	36	0.4	0.86
EF	ValLK-ValP2	0-50m US	18-Jun-11	-	180s	AS	1	28	0.1	0.46
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	84	7.1	1.2
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	123	16.2	0.87
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	81	5.5	1.03
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	68	3.8	1.21
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	117	17.7	1.11
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	39	0.6	1.01
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	92	8.6	1.1
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	34	0.4	1.02

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	82	5.7	1.03
EF	ValLK-ValP2	50-100m US	18-Jun-11	-	105s	BT	1	40	0.6	0.94
EF	ValLK-ValP2	100-150m US	18-Jun-11	-	101s	BT	1	35	0.3	0.7
EF	ValLK-ValP2	100-150m US	18-Jun-11	-	101s	BT	1	72	3.9	1.04
EF	ValLK-ValP2	100-150m US	18-Jun-11	-	101s	BT	1	39	0.5	0.84
EF	ValLK-ValP2	100-150m US	18-Jun-11	-	101s	AS	1	70	3.4	0.99
EF	ValLK-ValP2	100-150m US	18-Jun-11	-	101s	BT	1	77	5.1	1.12
EF	ValLK-ValP2	100-150m US	18-Jun-11	-	101s	BT	1	34	0.8	2.04
EF	ValLK-ValP2	150-200m US	18-Jun-11	-	106s	BT	1	81	5.5	1.03
EF	ValLK-ValP2	150-200m US	18-Jun-11	-	106s	BT	1	110	13.1	0.98
EF	ValLK-ValP2	150-200m US	18-Jun-11	-	106s	BT	1	117	15.5	0.97
EF	ValLK-ValP2	150-200m US	18-Jun-11	-	106s	BT	1	78	5	1.05
EF	ValLK-ValP2	200-250m US	18-Jun-11	-	109s	BT	1	81	5.2	0.98
EF	ValLK-ValP2	200-250m US	18-Jun-11	-	109s	BT	1	120	16.8	0.97
EF	ValLK-ValP2	200-250m US	18-Jun-11	-	109s	BT	1	35	0.4	0.93
EF	ValLK-ValP2	200-250m US	18-Jun-11	-	109s	BT	1	78	4.7	0.99
EF	ValLK-ValP2	200-250m US	18-Jun-11	-	109s	BT	1	43	0.7	0.88
EF	ValLK-ValP2	250-300m US	18-Jun-11	-	80s	BT	1	83	7.4	1.29
EF	ValLK-ValP2	250-300m US	18-Jun-11	-	80s	BT	1	74	5.2	1.28
EF	ValLK-ValP2	300-350m US	18-Jun-11	-	39s	BT	1	38		NA
EF	ValLK-ValP2	300-350m US	18-Jun-11	-	39s	BT	1	39		NA
EF	ValLK-ValP2	300-350m US	18-Jun-11	-	39s	BT	1	42	0.5	0.67
EF	ValLK-ValP2	300-350m US	18-Jun-11	-	39s	BT	1	40	0.7	1.09
EF	ValLK-ValP2	300-350m US	18-Jun-11	-	39s	BT	1	75	4.8	1.14

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	ValLK-ValP2	350-400m US	18-Jun-11	-	54s	TSS	1	63	2.3	0.92
EF	ValLK-ValP2	350-400m US	18-Jun-11	-	54s	BT	1	85	7.1	1.16
EF	ValLK-ValP2	350-400m US	18-Jun-11	-	54s	BT	1	80	7.3	1.43
EF	ValLK-ValP2	350-400m US	18-Jun-11	-	54s	BT	1	116	18.2	1.17
EF	ValLK-ValP2	350-400m US	18-Jun-11	-	54s	BT	1	87	6.1	0.93
EF	ValLK-ValP2	350-400m US	18-Jun-11	-	54s	BT	1	94	8	0.96
EF	ValLK-ValP2	400-450m US	18-Jun-11	-	70s	BT	1	85	8.2	1.34
EF	ValLK-ValP2	400-450m US	18-Jun-11	-	70s	BT	1	92	9.5	1.22
EF	ValLK-ValP2	400-450m US	18-Jun-11	-	70s	BT	1	85	6.4	1.04
EF	ValLK-ValP2	400-450m US	18-Jun-11	-	70s	BT	1	80	5.6	1.09
EF	ValLK-ValP2	400-450m US	18-Jun-11	-	70s	BT	1	38	0.5	0.91
EF	ValLK-ValP2	450-500m US	18-Jun-11	-	89s	NC	NA	NA	NA	NA
EF	ValLK-ValP2	500-550m US	18-Jun-11	-	112s	NC	NA	NA	NA	NA
EF	ValLK-ValP2	550-600m US	18-Jun-11	-	128s	TSS	1	57	NA	NA
EF	ValLK-ValP2	600-650m US	18-Jun-11	-	101s	NC	NA	NA	NA	NA
EF	ValLK-ValP2	650-700m US	18-Jun-11	-	123s	NC	NA	NA	NA	NA
EF	ValLK-ValP2	700-750m US	18-Jun-11	-	107s	TSS	1	54	NA	NA
EF	ValLK-ValP2	700-750m US	18-Jun-11	-	107s	TSS	1	39	NA	NA
EF	ValLK-ValP2	750-800m US	18-Jun-11	-	114s	NC	NA	NA	NA	NA
EF	ValLK-ValP2	800-850m US	18-Jun-11	-	61s	TSS	1	65	NA	NA
EF	ValLK-ValP2	800-850m US	18-Jun-11	-	61s	TSS	1	61	NA	NA
EF	ValLK-ValP2	850-885m US	18-Jun-11	-	92s	NC	NA	NA	NA	NA
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	45	1.7	1.87
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	160	62.1	1.52

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	79	8	1.62
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	166	37.7	0.82
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	114	17.4	1.17
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	137	25.4	0.99
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	35	0.9	2.1
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	41	1.7	2.47
EF	ValP3-ValLk	0-50m DS	20-Jun-11	-	92s	BT	1	35	0.7	1.63
EF	ValP3-ValLk	50-100m DS	20-Jun-11	-	50s	BT	1	95	9.6	1.12
EF	ValP3-ValLk	50-100m DS	20-Jun-11	-	50s	BT	1	89	8.5	1.21
EF	ValP3-ValLk	50-100m DS	20-Jun-11	-	50s	BT	1	88	9.4	1.38
EF	ValP3-ValLk	50-100m DS	20-Jun-11	-	50s	BT	1	92	9.9	1.27
EF	ValP3-ValLk	50-100m DS	20-Jun-11	-	50s	BT	1	43	1.7	2.14
EF	ValP3-ValLk	100-150m DS	20-Jun-11	-	133s	AS	1	78	4.9	1.03
EF	ValP3-ValLk	100-150m DS	20-Jun-11	-	133s	AS	1	86	6.9	1.08
EF	ValP3-ValLk	100-150m DS	20-Jun-11	-	133s	BT	1	97	10.5	1.15
EF	ValP3-ValLk	100-150m DS	20-Jun-11	-	133s	BT	1	131	22.4	1
EF	ValP3-ValLk	150-200m DS	20-Jun-11	-	63s	BT	1	111	16.3	1.19
EF	ValP3-ValLk	150-200m DS	20-Jun-11	-	63s	BT	1	79	5.8	1.18
EF	ValP3-ValLk	150-200m DS	20-Jun-11	-	63s	BT	1	81	6.1	1.15
EF	ValP3-ValLk	150-200m DS	20-Jun-11	-	63s	BT	1	41	0.7	1.02
EF	C09	0-50m US	19-Jun-11	-	63s	NC	NA	NA	NA	NA
EF	C09	0-50m DS	19-Jun-11	-	53s	NC	NA	NA	NA	NA
EF	C08	0-50m US	19-Jun-11	Fished Downstream only – Upstream too deep to fish						
EF	C08	0-50m DS	19-Jun-11	-	53s	NC	NA	NA	NA	NA

Table A.2. - Fish Sampling Data 2011

Method	Site	Location	Start Date	End Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	C07	0-50m US	19-Jun-11	No Stream Visible						
EF	C07	0-50m DS	19-Jun-11	No Stream Visible						
EF	C06	0-50m US	19-Jun-11	-	41s	BT	1	149	37.1	1.12
EF	C06	0-50m US	19-Jun-11	-	41s	BT	1	42	1.2	1.62
EF	C06	0-50m US	19-Jun-11	-	41s	BT	1	43	0.6	0.75
EF	C06	0-50m DS	19-Jun-11	-	111s	BT	1	113	16.4	1.14
EF	C06	0-50m DS	19-Jun-11	-	111s	BT	1	45	0.9	0.99
EF	C06	0-50m DS	19-Jun-11	-	111s	BT	1	36	0.4	0.86
EF	C03	0-25m US	19-Jun-11	-	65s	BT	1	70	5.3	1.55
EF	C03	0-50m DS	19-Jun-11	-	86s	BT	1	86	9.3	1.46
EF	C03	0-50m DS	19-Jun-11	-	86s	BT	1	90	9.4	1.29
EF	C02	0-50m US	19-Jun-11	-	73s	AS	1	118	17.5	1.07
EF	C02	0-50m DS	19-Jun-11	-	62s	NC	NA	NA	NA	NA
EF	C04	0-50m US	19-Jun-11	-	63s	NC	NA	NA	NA	NA
EF	C04	0-50m DS	19-Jun-11	-	30s	NC	NA	NA	NA	NA
EF	C05	0-50m US	19-Jun-11	-	98s	AS	1	70	3.3	0.96
EF	C05	0-50m US	19-Jun-11	-	98s	AS	1	82	6.3	1.14
EF	C05	0-50m US	19-Jun-11	-	98s	AS	1	58	2.3	1.18
EF	C05	0-50m US	19-Jun-11	-	98s	AS	1	58	1	0.51
EF	C05	0-50m US	19-Jun-11	-	98s	AS	1	115	16.3	1.07
EF	C05	0-50m DS	19-Jun-11	-	68s	AS	1	115	15.6	1.03
EF	C05	0-50m DS	19-Jun-11	-	68s	AS	1	71	2.7	0.75
EF	C05	0-50m DS	19-Jun-11	-	68s	AS	1	68	4.1	1.3
EF	C05	0-50m DS	19-Jun-11	-	68s	BT	1	46	0.9	0.92

Table A.3. - Coordinates of Fish Sampling in Streams by Backpack Electrofishing, 2011

Stream	Distance (m)	Coordinates (Degrees, Decimal Minutes)	
		Start	End
C01	0-50m US/DS	N48 22.185 W57 07.206	N48 22.141 W57 07.137
C02	0-50m US/DS	N48 24.512 W57 04.648	N48 24.503 W57 04.579
C03	0-50m US/DS	48.415201 W-57.076324	N48 24.874 W57 04.524
C04	0-50m US/DS	N48 25.208 W57 04.569	N48 25.161 W57 04.545
C05	0-50m US/DS	N48 25.488 W57 04.719	N48 25.483 W57 04.637
C06	0-50m US/DS	N48 26.074 W57 04.094	N48 26.032 W57 04.057
C07	0-50m US/DS	No Stream Visible	
C08	0-50m DS	N48 26.609 W57 02.991	N48 26.596 W57 02.982
C09	0-50m US/DS	N48 26.757 W57 02.737	N48 26.698 W57 02.734
Valentine Lake Streams			
ValLK-ValP2	0-450	N48 22.463 W57 10.140	N48 22.169 W57 09.837
	450-885	N48 22.169 W57 09.837	N48 22.118 W57 09.569
ValP1-ValP2	0-200	N48 21.842 W57 09.971	N48 21.916 W57 09.901
ValP3-ValLK	0-200	N48 23.366 W57 08.234	N48 23.340 W57 08.419
Victoria Lake Streams			
VicP2-VicLK	0-200	N48 21.154 W57 11.355	N48 21.130 W57 11.198
	200-750	N48 21.130 W57 11.198	N48 20.992 W57 10.891
	750-950	N48 20.992 W57 10.891	N48 20.915 W57 10.770
	950-1550	N48 20.915 W57 10.770	N48 20.699 W57 11.099
VicP1-VicP2	0-22	N48 21.374 W57 11.160	N48 21.380 W57 11.176
Tributary		N48 20.957 W57 10.730	N48 20.960 W57 10.689

APPENDIX B

Stream Habitat Classification Data

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
ValP1-ValP2	0 to 50 m DS	0	0.85	0.09	0.06	0.00	6	8	6	0	0	0	20	10	0	70	35	65	0	10	Channel narrows and meanders through grass / shrub habitat. Flow type is steady.
		25	0.90	0.01	0.01	0.01	6	16	14												
		50	0.75	0.18	0.03	0.03	21	20	20												
ValP1-ValP2	50 to 100 m	50	0.75	0.18	0.03	0.03	21	20	20	0	40	0	0	0	0	60	40	60	0	15	Flow type is steady.
		75	0.60	0.08	0.15	0.00	21	24	26												
		100	2.35	0.01	0.00	0.01	80	76	62												
ValP1-ValP2	100 to 150 m	100	2.35	0.01	0.00	0.01	80	76	62	0	10	0	60	0	30	0	30	70	0	<5	Channel widens & slows. Some undercut banks. Flow type is steady.
		125	2.65	0.01	0.01	0.00	37	34	30												
		150	2.00	0.02	0.03	0.00	18	20	20												
ValP1-ValP2	150 to 200 m	150	2.00	0.02	0.03	0.00	18	20	20	0	30	0	40	0	0	30	30	70	0	10	Stream deepens and slows to beyond wadeable depths. Flow type is steady.
		175	1.45	0.00	0.04	0.10	19	10	20												
		200	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
ValLK-ValP2	0 to 50 m US	0	0.75	0.58	0.10	0.09	21	20	20	20	50	0	30	0	0	0	35	5	60	0	A series of drop - pools leading to a riffle at inflow to lake.
		25	2.30	0.03	0.01	0.00	22	12	12												
		50	1.55	0.00	0.00	0.17	12	8	10												
ValLK-ValP2	50 to 100 m	50	1.55	0.00	0.00	0.17	12	8	10	0	20	0	50	30	0	0	60	0	40	0	A series of riffle-runs leading to the steep drop-pool section at bottom.
		75	2.10	0.34	0.24	0.28	6	6	6												
		100	2.00	0.14	0.22	0.08	14	5	4												
ValLK-ValP2	100 to 150 m	100	2.00	0.14	0.22	0.08	14	5	4	0	60	0	40	0	0	0	45	25	30	0	Riffle-run with one major pool at 125m below log jam.
		125	2.40	0.01	0.11	0.01	17	22	10												
		150	1.80	0.41	0.09	0.00	17	16	14												
ValLK-ValP2	150 to 200 m	150	1.80	0.41	0.09	0.00	17	16	14	0	40	0	40	20	0	0	60	0	40	0	Series of riffle-drop-runs.
		175	1.85	0.07	0.01	0.23	16	16	22												
		200	2.20	0.00	0.10	0.00	10	18	16												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
ValLK-ValP2	200 to 250 m	200	2.20	0.00	0.10	0.00	10	18	16	0	80	0	20	0	0	0	50	15	35	0	Mostly riffles with some short cascade-runs.
		225	2.45	0.00	0.11	0.03	10	8	14												
		250	2.25	0.00	0.26	0.00	6	16	20												
ValLK-ValP2	250 to 300 m	250	2.25	0.00	0.26	0.00	6	16	20	0	60	0	40	0	0	0	65	5	30	0	Series of drop-runs with two small log jam pools.
		275	1.85	0.45	0.06	0.08	12	10	6												
		300	1.90	0.09	0.09	0.05	18	20	18												
ValLK-ValP2	300 to 350 m	300	1.90	0.09	0.09	0.05	18	20	18	0	10	0	40	50	0	0	65	5	30	0	Long slow runs separated by small riffles.
		325	2.15	0.02	0.38	0.03	12	6	12												
		350	1.90	0.08	0.00	0.00	16	18	12												
ValLK-ValP2	350 to 400 m	350	1.90	0.08	0.00	0.00	16	18	12	0	30	0	40	30	0	0	55	15	30	0	Series of small riffle-drop-runs.
		375	2.20	0.00	0.02	0.02	14	22	18												
		400	2.10	0.00	0.04	0.00	10	5	6												
ValLK-ValP2	400 to 450 m	400	2.10	0.00	0.04	0.00	10	5	6	0	70	0	30	0	0	0	50	10	40	0	Series of drop-pools & drop-runs. Barrier to fish passage @ 425-450m US of lake @wpt 422 (Photo 3266).
		425	2.50	0.00	0.42	0.20	5	4	6												
		450	2.15	0.23	0.00	0.01	6	10	10												
ValLK-ValP2	450 to 500 m	450	2.15	0.23	0.00	0.01	6	10	10	0	80	0	20	0	0	0	35	5	60	0	Series of drop-runs. Channel getting steeper at around 475m US.
		475	1.05	0.14	0.23	0.00	14	12	14												
		500	1.75	0.00	0.35	0.14	8	6	6												
ValLK-ValP2	500 to 550 m	500	1.75	0.00	0.35	0.14	8	6	6	40	40	0	20	0	0	0	55	10	35	0	Series of drop-pools or drop-runs.
		525	1.55	0.08	0.22	0.20	10	10	12												
		550	1.65	0.10	0.05	0.00	14	20	16												
ValLK-ValP2	550 to 600 m	550	1.65	0.10	0.05	0.00	14	20	16	20	20	20	25	15	0	0	55	5	40	5	Falls DS of 575 and slow narrow run above. Barrier to fish passage (falls) 575 m US of lake @ wpt 428 (photo 3273).
		575	1.50	0.10	0.09	0.00	30	26	16												
		600	1.65	0.05	0.09	0.00	32	34	22												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
ValLK-ValP2	600 to 650 m	600	1.65	0.05	0.09	0.00	32	34	22	0	80	0	20	0	0	0	70	5	25	5	Mostly pool-run with a small riffle @ 650m US.
		625	1.30	0.20	0.13	0.10	16	31	25												
		650	1.95	0.00	0.10	0.25	24	16	16												
ValLK-ValP2	650 to 700 m	650	1.95	0.00	0.10	0.25	24	16	16	0	80	0	20	0	0	0	55	5	40	10	Mostly small run with small riffle section at 700m.
		675	2.85	0.04	0.01	0.01	60	72	64												
		700	2.40	0.23	0.00	0.05	10	10	8												
ValLK-ValP2	700 to 750 m	700	2.40	0.23	0.00	0.05	10	10	8	0	80	0	20	0	0	0	55	5	40	5	Series of drop-runs with a long slow run in middle.
		725	1.25	0.42	0.15	0.00	10	10	8												
		750	0.75	0.16	0.72	0.15	12	12	12												
ValLK-ValP2	750 to 800 m	750	0.75	0.16	0.72	0.15	12	12	12	0	80	0	20	0	0	0	60	10	30	5	Long run with one long riffle in middle.
		775	0.50	0.50	0.27	0.31	8	12	12												
		800	2.10	0.01	0.00	0.03	42	70	60												
ValLK-ValP2	800 to 850 m	800	2.10	0.01	0.00	0.03	42	70	60	0	50	0	50	0	0	0	60	10	30	15	Series of drop-runs w a long flat at bottom.
		825	0.65	0.03	0.16	0.47	14	12	20												
		850	1.00	0.02	0.16	0.06	10	14	10												
ValLK-ValP2	850 to 885 m	850	1.00	0.02	0.16	0.06	10	14	10	0	70	0	30	0	0	0	60	10	30	10	A series of drop-runs with moderate slope and a small falls @ 875m (3288)
		875	0.40	0.34	0.21	0.03	12	12	14												
		885	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
ValP3-ValLK	0 to 50 m DS	0	3.10	0.52	0.40	0.93	20	40	36	0	40	40	20	0	0	0	70	0	30	0	Plunge-run series.
		25	5.30	0.47	0.49	0.45	20	30	18												
		50	4.40	0.58	0.09	0.45	58	34	36												
ValP3-ValLK	50 to 100 m	50	4.40	0.58	0.09	0.45	58	34	36	0	45	40	15	0	0	0	70	0	30	0	Rapids / cascades.
		75	3.15	0.32	0.01	0.24	14	20	26												
		100	4.30	0.41	0.83	0.31	34	30	10												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
ValP3-ValLK	100 to 150 m	100	4.30	0.41	0.83	0.31	34	30	10	0	70	30	0	0	0	0	70	0	30	0	Cascade / rapids with I small falls at 125m DS.
		125	3.00	0.72	0.82	0.13	34	28	34												
		150	6.80	0.14	0.09	0.15	22	24	16												
ValP3-ValLK	150 to 200 m	150	6.80	0.14	0.09	0.15	22	24	16	0	40	30	30	0	0	0	65	15	20	5	Long riffle with one small pool before widening out to shallow riffle.
		175	5.20	0.41	0.72	0.66	26	20	16												
		200	7.80	0.28	0.42	0.32	20	20	18												
VicP1 to VicP2	0 to 22 m DS	0	1.00	0.06	0.02		16	8	4	0	0	0	55	40	5	0	40	0	60	0	Flat under lake effect leading to small riffle section at IF to VicP2
		22	3.10	N/A	N/A	N/A	N/A	N/A	N/A												
VicP2-VicLK	0 to 50 m DS	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	30	10	0	60	65	15	20	40	Flow type is steady through marsh area.
		25	0.95	0.30	0.09	0.00	6	8	4												
		50	0.80	0.33	0.10	0.00	10	10	12												
VicP2-VicLK	50 to 100 m	50	0.80	0.33	0.10	0.00	10	10	12	0	0	0	30	50	0	20	65	20	15	50	Flow type is steady through marsh area.
		75	0.60	0.17	0.30	0.19	12	20	14												
		100	1.40	0.20	0.17	0.03	12	12	17												
VicP2-VicLK	100 to 150 m	100	1.40	0.20	0.17	0.03	12	12	17	0	0	0	40	50	0	10	45	10	45	20	Flow type is steady through marsh area.
		125	1.30	0.39	0.00	0.00	12	12	12												
		150	0.75	0.43	0.08	N/A	12	14	8												
VicP2-VicLK	150 to 200 m	150	0.75	0.43	0.08	N/A	12	14	8	0	10	0	50	40	0	0	35	20	45	10	Flow type is steady through marsh area.
		175	0.60	0.00	0.17	0.73	10	10	12												
		200	1.10	0.19	0.08	0.01	14	16	12												
VicP2-VicLK	200 to 250 m	200	1.10	0.19	0.08	0.01	14	16	12	80	10	0	10	0	0	0	30	30	40	0	Barrier to fish passage at 225m DS (photo 3182 / 83), > 1m high. Flow type is riffle-run with one falls.
		225	1.10	0.00	0.26	0.00	28	10	16												
		250	1.50	0.10	0.18	N/A	8	10	N/A												
VicP2-VicLK	250 to 300 m	250	1.50	0.10	0.18	N/A	8	10	N/A	69	20	0	20	0	0	0	50	35	15	0	Flow type is riffle.
		275	2.00	0.00	0.02	0.02	16	16	20												
		300	1.40	0.03	0.22	0.20	8	6	6												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
VicP2-VicLK	300 to 350 m	300	1.40	0.03	0.22	0.20	8	6	6	80	10	0	10	0	0	0	50	35	15	0	Flow type is riffle.
		325	1.35	0.29	0.08	0.15	8	6	9												
		350	1.50	0.53	0.01	0.09	12	10	10												
VicP2-VicLK	350 to 400 m	350	1.50	0.53	0.01	0.09	12	10	10	50	0	0	35	15	0	0	15	15	70	0	Flow type is riffle.
		375	1.86	0.16	0.09	0.00	11	12	8												
		400	1.90	0.00	0.23	0.00	18	16	16												
VicP2-VicLK	400 to 450 m	400	1.90	0.00	0.23	0.00	18	16	16	0	0	10	80	10	0	0	15	15	70	0	Series of drop-pool-run habitat. Moderate slope and undercut banks. Met up with previous section.
		425	1.00	0.00	0.75	0.10	20	14	16												
		450	1.25	0.31	0.00	0.02	12	8	4												
VicP2-VicLK	450 to 500 m	450	1.25	0.31	0.00	0.02	12	8	4	0	10	0	70	20	0	0	45	10	45	0	Short falls (0.6m) at 1075 m US of lake (photo 3341). Low slope riffle-run habitat below falls & plunge-run habitat above falls.
		475	0.95	0.42	0.18	N/A	5	6	N/A												
		500	1.20	0.00	0.03	0.00	12	10	10												
VicP2-VicLK	500 to 550 m	500	1.20	0.00	0.03	0.00	12	10	10	0	0	0	0	45	45	10	60	10	30	0	Banks high and undercut. Riffle - run habitat
		525	0.80	0.15	0.00	0.05	15	14	12												
		550	0.65	0.07	0.09	0.09	24	24	26												
VicP2-VicLK	550 to 600 m	550	0.65	0.07	0.09	0.09	24	24	26	0	0	0	0	50	40	10	50	30	20	<5	Mostly run habitat with a few short riffle sections. Channel splits between 975-1000m US becoming braided channel through wetland area.
		575	0.70	0.09	0.10	0.13	14	14	10												
		600	0.95	0.12	0.15	0.01	12	14	14												
VicP2-VicLK	600 to 650 m	600	0.95	0.12	0.15	0.01	12	14	14	0	0	0	20	70	0	10	50	35	15	0	Shallow meandering riffle-run flowing through marsh area. High undercut banks.
		625	1.00	0.08	0.12	0.09	10	18	22												
		650	1.10	0.00	0.23	0.27	12	10	6												
VicP2-VicLK	650 to 700 m	650	1.10	0.00	0.23	0.27	12	10	6	0	0	0	60	35	0	5	60	35	5	0	Shallow run with a few riffles. Low slope, wet, shrub / grass approach.
		675	0.80	0.16	0.14	0.13	12	14	14												
		700	2.20	0.12	0.31	0.08	14	10	8												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
VicP2-VicLK	700 to 750 m	700	2.20	0.12	0.31	0.08	14	10	8	0	0	0	20	70	0	10	60	40	0	<5	Stream shallow and slow flowing, predominately riffle or run with steep, undercut banks and low wet approach.
		725	0.45	0.02	0.13	0.13	16	18	12												
		750	0.70	0.15	0.12	0.21	22	22	20												
VicP2-VicLK	750 to 775 m	750	0.70	0.15	0.12	0.21	22	22	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Beaver pond / steady upstream of dam at wpt# . Wetland area from 750 to 950 m DS of outflow.
		775	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		800	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
VicP2-VicLK	800 to 850 m	800	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		825	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		850	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
VicP2-VicLK	850 to 900 m	850	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		875	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		900	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
VicP2-VicLK	900 to 950 m	900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		925	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		950	2.20	0.03	0.01	0.02	50	48	44												
VicP2-VicLK	950 to 1000 m	950	2.20	0.03	0.01	0.02	50	48	44	0	0	0	70	30	0	0	60	30	10	0	Flow type is steady. Beaver dam at upstream end of section
		975	1.75	0.45	0.42	0.00	6	7	6												
		1000	2.00	0.11	0.08	0.31	12	12	10												
VicP2-VicLK	1000 to 1050 m	1000	2.00	0.11	0.08	0.31	12	12	10	0	10	0	60	30	0	0	35	35	30	0	Mostly run habitat with a few small riffles.
		1025	2.20	0.00	0.19	0.04	14	14	8												
		1050	2.05	0.11	0.63	0.22	10	5	5												
VicP2-VicLK	1050 to 1100 m	1050	2.05	0.11	0.63	0.22	10	5	5	0	0	20	60	20	0	0	40	40	20	0	Series of riffle-runs with abundant undercuts.
		1075	1.60	0.23	0.19	0.19	10	12	10												
		1100	1.55	0.25	0.00	0.01	6	6	10												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
VicP2-VicLK	1100 to 1150 m	1100	1.55	0.25	0.00	0.01	6	6	10	0	10	0	60	30	0	0	50	50	0	<5	Long runs separated by riffles.
		1125	1.40	0.10	0.46	0.07	14	10	6												
		1150	2.10	0.17	0.12	0.10	14	18	18												
VicP2-VicLK	1150 to 1200 m	1150	2.10	0.17	0.12	0.10	14	18	18	0	0	0	50	45	0	5	60	40	0	0	Mostly runs with a few riffle sections.
		1175	1.55	0.06	0.07	0.11	12	14	22												
		1200	1.70	0.18	0.38	0.17	13	14	20												
VicP2-VicLK	1200 to 1250 m	1200	1.70	0.18	0.38	0.17	13	14	20	0	0	0	35	60	0	5	50	50	0	5	One long run meandering through shrub/grass wetland.
		1225	1.50	0.23	0.25	0.00	20	20	20												
		1250	1.00	0.04	0.19	0.21	20	18	16												
VicP2-VicLK	1250 to 1300 m	1250	1.00	0.04	0.19	0.21	20	18	16	0	0	0	40	60	0	0	50	50	0	10	Long flat through marsh.
		1275	1.35	0.15	0.14	0.08	24	20	20												
		1300	1.10	0.49	0.35	0.04	14	12	12												
VicP2-VicLK	1300 to 1350 m	1300	1.10	0.49	0.35	0.04	14	12	12	0	10	0	60	30	0	0	60	40	0	5	Long run with a small riffle in the middle.
		1325	3.25	0.00	0.20	0.00	16	20	14												
		1350	3.50	0.30	0.05	0.08	14	10	6												
VicP2-VicLK	1350 to 1400 m	1350	3.50	0.30	0.05	0.08	14	10	6	20	50	0	30	0	0	0	60	30	10	0	Flow type is riffle.
		1375	2.65	0.00	0.00	0.04	12	16	10												
		1400	2.65	0.08	0.08	0.28	10	6	6												
VicP2-VicLK	1400 to 1450 m	1400	2.65	0.08	0.08	0.28	10	6	6	30	40	0	30	0	0	0	50	15	35	0	Mostly runs with a few riffle sections.
		1425	0.95	0.45	0.00	0.40	14	18	6												
		1450	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
VicP2-VicLK	1450 to 1500 m	1450	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	10	50	30	0	0	0	40	30	30	0	Series of riffle-runs with several small drops. Moderate slope. Discharge = 0.0248 m^3/s, area = 0.152 m^2
		1475	0.80	0.22	0.07	0.00	12	10	4												
		1500	3.25	0.39	0.30	0.04	8	12	14												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
VicP2-VicLK	1500 to 1550 m	1500	3.25	0.39	0.30	0.04	8	12	14	0	0	30	50	20	0	0	65	0	35	0	Mostly riffles separated by short runs. Frequent undercut banks.
		1525	1.30	0.10	0.24	0.19	10	10	20												
		1550	1.50	0.07	0.42	0.00	8	14	8												
Trib	0 to 125 m	0	1.05	0.03	0.15	0.12	12	22	18	0	5	10	45	40	0	0	35	50	15	0	Side stream flowing into VicP2-VicLK stream at wpt 484. Started 75m upstream of confluence at wpt 485.
		125	1.55	0.08	0.11	N/A	8	8	8												
Trib	125 to 175 m	125	1.55	0.08	0.11	N/A	8	8	8	0	10	10	40	40	40	0	35	50	15	0	Riffle-run habitat through grass/shrub lowland in spruce forest.
		175	2.2	0.03	0.15	0.12	12	22	18												
C01	0 to 50 m US	50 m	1.80	0.14	0.01	0.01	20	20	22	0	20	15	50	10	0	5	70	15	15	0	Small riffle flowing into pool upstream of crossing.
		25 m	2.00	0.18	0.10	N/A	8	10	4												
		0	3.40	0.00	0.01	0.02	30	27	14												
C01	0 to 50 m DS	0	3.40	0.00	0.01	0.02	30	27	14	0	10	30	50	10	0	0	70	10	20	0	Pool below crossing becoming shallow riffle.
		25 m	1.00	0.07	0.08	0.00	10	16	12												
		50 m	1.90	0.05	0.00	0.14	10	12	16												
C02	0 to 50 m US	50 m	3.40	0.33	0.72	N/A	14.00	16.00	8.00	0	50	10	40	0	0	0	40	10	50	0	Steep banks lined with trees and mosses. Flow type is a series of plunges / pools.
		25 m	4.10	0.24	0.27	0.00	22.00	32.00	24.00												
		0	3.20	0.21	0.19	0.13	62.00	38.00	48.00												
C02	0 to 50 m DS	0	3.20	0.21	0.19	0.13	62.00	38.00	48.00	0	30	0	50	20	0	0	50	5	45	0	Series of riffle / drop / runs. One pool at bottom end of section caused by log jam.
		25 m	4.30	0.12	0.82	0.56	13.00	10.00	8.00												
		50 m	4.70	0.62	0.14	0.16	10.00	19.00	10.00												
C03	0 to 50 m US	50 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	40	20	40	0	0	0	50	50	0	0	Flow type is a series of riffle / drop / runs. Beaver dam and pond at upper end of upstream section.
		25 m	1.95	0.30	0.26	0.27	16.00	14.00	12.00												
		0	2.90	0.06	0.01	0.08	27.00	27.00	17.00												
C03	0 to 50 m DS	0	2.90	0.06	0.01	0.08	27.00	27.00	17.00	30	0	0	30	40	0	0	70	15	15	0	Flow type is a series of riffle / drop / runs, with one large pool directly below crossing.
		25 m	1.70	0.49	0.03	N/A	10.00	7.00	4.00												
		50 m	2.90	0.20	0.28	0.41	12.00	20.00	10.00												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
C04	0 to 50 m US	50 m	1.10	0.01	0.02	0.00	18.00	28.00	18.00	0	0	0	5	50	45	0	35	10	55	0	Becomes braided channel in upper 25m, going underground at times.
		25 m	1.90	0.12	0.62	0.27	8.00	6.00	6.00												
		0	1.15	0.02	0.00	0.20	20.00	18.00	22.00												
C04	0 to 50 m DS	0	1.15	0.02	0.00	0.20	20.00	18.00	22.00	0	0	0	10	25	65	0	45	5	50	0	Riffle-run habitat in top 25m becoming braided, slow wetland in bottom 25m.
		25 m	0.90	0.00	0.00	0.00	18.00	30.00	16.00												
		50 m	0.95	0.04	0.05	0.02	14.00	18.00	10.00												
C05	0 to 50 m US	50 m	N/A	0.32	0.06	0.89	26.00	14.00	46.00	0	100	0	0	0	0	0	30	0	70	0	Rapids
		25 m	N/A	0.68	0.59	0.50	24.00	20.00	36.00												
		0	10.60	0.90	0.87	1.08	40.00	22.00	40.00												
C05	0 to 50 m DS	0	10.60	0.90	0.87	1.08	40.00	22.00	40.00	0	100	0	0	0	0	0	30	0	70	0	Rapids. Unable to measure flows due to unsafe wading conditions. Current very fast and deep.
		25 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		50 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
C06	0 to 50 m US	50 m	1.60	0.00	0.05	0.04	20.00	22.00	24.00	0	0	20	20	60	0	0	50	35	15	0	Riffle-run habitat.
		25 m	1.40	0.33	0.10	0.39	6.00	10.00	10.00												
		0	0.90	0.31	0.39	0.25	10.00	20.00	2.00												
C06	0 to 50 m DS	0	0.90	0.31	0.39	0.25	10.00	20.00	2.00	0	0	0	50	50	0	0	65	25	10	0	Series of riffle-runs with two small log jams.
		25 m	1.70	0.08	0.14	0.09	20.00	10.00	26.00												
		50 m	1.40	0.02	0.25	0.20	16.00	22.00	14.00												
C07	0 to 50 m US	50 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	No channel found. A series of seeps from wetland area north of site.
		25 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		0	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
C07	0 to 50 m DS	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		25 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		50 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A												

Table B.1. - Stream Habitat Classification Data

Location	Sub-Section	Distance (m)	Stream Width (m)	Velocity (m/s)			Mean Depth (cm)			Substrate (%)							Riparian Veg (%)			Aquatic Veg (%)	Comment
				1/4	1/2	3/4	1/4	1/2	3/4	BR	B	R	C	G	S	F	S	G	T		
C08	0 to 50 m US	50 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	No channel US of crossing. Crossing receives drainage along skidder trail (Photos-3360-3362).
		25 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
		0	N/A	N/A	N/A	N/A	N/A	N/A	N/A												
C08	0 to 50 m DS	0	1.20	0.04	0.21	0.12	6.00	4.00	5.00	0	0	0	0	0	0	100	55	40	5	0	Channel becomes heavily overgrown and braided around 20m DS of crossing, becoming marsh area.
		25 m	0.80	0.00	0.00	0.00	8.00	8.00	6.00												
C09	0 to 50 m US	50 m	1.90	0.00	0.00	0.00	28.00	28.00	28.00	0	0	0	0	0	0	100	60	25	15	<5	Slow flow through marshy area with woody debris in channel.
		25 m	2.00	0.03	0.04	0.00	26.00	28.00	26.00												
		0	1.30	0.03	0.00	0.00	16.00	22.00	12.00												
C09	0 to 50 m DS	0	1.30	0.03	0.00	0.00	16.00	22.00	12.00	0	0	20	0	0	0	80	70	15	15	<5	Stream becomes braided @ 50 m DS.
		25 m	0.90	0.11	0.00	0.00	14.00	16.00	10.00												
		50 m	0.45	0.01	0.01	0.00	10.00	8.00	10.00												

Notes:
- Substrate classifications are: BR = Bedrock, B = Boulder, R = Rubble, C = Cobble, G = Gravel, S = Sand, F = Fines
- Riparian vegetation categories are: S = Shrubs, G = Grass, T = Trees

APPENDIX C

Photographs

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 1 ValP1

Photo 2 ValP2

Photo 3 VicP1

Photo 4 VicP2

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT	
	
Photo 5 ValP1 to ValP2 at Stream Beginning (0 m) Facing Downstream	**Photo 6** ValP1 to ValP2 at 100 m Facing Upstream
	
Photo 7 VicP1 to VicP2 at Stream Beginning (0 m) Facing Upstream into VicP1	**Photo 8** ValP3 to Valentine Lake at Stream Beginning (0 m) Facing Downstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 9 ValP3 to Valentine Lake at 100 m Facing Upstream

Photo 10 Valentine Lake to ValP2 at Stream Beginning (0 m) Facing Upstream

Photo 11 Valentine Lake to ValP2 at 100 m Facing Upstream

Photo 12 Valentine Lake to ValP2 at 200 m Facing Upstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 13 **Valentine Lake to ValP2 at 300 m Facing Downstream**

Photo 14 **Valentine Lake to ValP2 at 400 m Facing Downstream**

Photo 15 **Valentine Lake to ValP2 at 500 m Facing Downstream**

Photo 16 **Valentine Lake to ValP2 Falls at 575 m Facing Downstream**

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 17 Valentine Lake to ValP2 at 600 m Facing Downstream

Photo 18 Valentine Lake to ValP2 at 700 m Facing Upstream

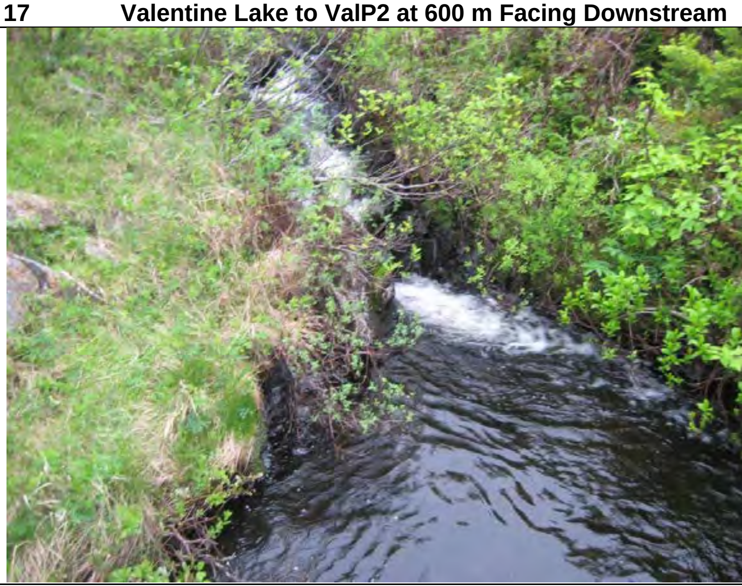

Photo 19 Valentine Lake to ValP2 at 800 m Facing Upstream

Photo 20 VicP2 to Victoria Lake at Stream Beginning (0 m) Facing Upstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 21 VicP2 to Victoria Lake at 100 m Facing Upstream

Photo 22 VicP2 to Victoria Lake at 200 m Facing Upstream

Photo 23 Barrier on VicP2 to Victoria Lake at 225 m Facing Upstream

Photo 24 VicP2 to Victoria Lake at 300 m Facing Upstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 25 VicP2 to Victoria Lake at 350 m Facing Upstream

Photo 26 VicP2 to Victoria Lake at 500 m Facing Downstream

Photo 27 VicP2 to Victoria Lake at 600 m Facing Downstream

Photo 28 VicP2 to Victoria Lake at 700 m Facing Upstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 29 VicP2 to Victoria Lake at 1000 m Facing Upstream

Photo 30 VicP2 to Victoria Lake at 1100 m Facing Downstream

Photo 31 VicP2 to Victoria Lake at 1200 m Facing Upstream

Photo 32 VicP2 to Victoria Lake at 1300 m Facing Downstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 33 **VicP2 to Victoria Lake at 1400 m Facing Downstream**

Photo 34 **VicP2 to Victoria Lake at 1500 m Facing Downstream**

Photo 35 **Trib to Victoria Lake at Stream Beginning (0 m) Facing Downstream**

Photo 36 **Trib to Victoria Lake at Road Crossing (50m) Facing Downstream**

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 37 **Stream Crossing C01 0 to 50 m Upstream Facing Upstream**

Photo 38 **Stream Crossing C01 0 to 50 m Upstream Facing Downstream**

Photo 39 **Stream Crossing C01 0 to 50 m Downstream Facing Upstream**

Photo 40 **Stream Crossing C01 0 to 50 m Downstream Facing Upstream**

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 41 **Stream Crossing C02 0 to 50 m Upstream Facing Upstream**

Photo 42 **Stream Crossing C02 0 to 50 m Upstream Facing Downstream**

Photo 43 **Stream Crossing C02 0 to 50 m Downstream Facing Upstream**

Photo 44 **Stream Crossing C02 0 to 50 m Downstream Facing Upstream**

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 45 **Stream Crossing C03 0 to 50 m Upstream Facing Upstream**

Photo 46 **Stream Crossing C03 0 to 50 m Upstream Facing Downstream**

Photo 47 **Stream Crossing C03 0 to 50 m Downstream Facing Upstream**

Photo 48 **Stream Crossing C03 0 to 50 m Downstream Facing Upstream**

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 49 **Stream Crossing C04 0 to 50 m Upstream Facing Upstream**

Photo 50 **Stream Crossing C04 0 to 50 m Upstream Facing Downstream**

Photo 51 **Stream Crossing C05 0 to 50 m Upstream Facing Upstream**

Photo 52 **Stream Crossing C05 0 to 50 m Downstream Facing Downstream**

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 53 Stream Crossing C06 0 to 50 m Upstream Facing Upstream

Photo 54 Stream Crossing C06 0 to 50 m Upstream Facing Downstream

Photo 55 Stream Crossing C08 0 to 50 m Upstream Facing Upstream

Photo 56 Stream Crossing C08 0 to 50 m Upstream Facing Downstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT

Photo 57 Stream Crossing C08 0 to 50 m Downstream Facing Upstream

Photo 58 Stream Crossing C08 0 to 50 m Downstream Facing Upstream

Photo 59 Stream Crossing C09 0 to 50 m Upstream Facing Upstream

Photo 60 Stream Crossing C09 0 to 50 m Upstream Facing Downstream

VALENTINE LAKE PROJECT: 2011 FISH AND FISH HABITAT DATA REPORT			
			
Photo 61	Stream Crossing C09 0 to 50 m Downstream Facing Upstream	Photo 62	Stream Crossing C09 0 to 50 m Downstream Facing Upstream

ATTACHMENT 4-B

Valentine Project: 2018 Fish and Fish Habitat

Valentine Lake Project: 2018 Fish and Fish Habitat Data Report

Prepared for:
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Report

February 1, 2019

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Executive Summary

The Valentine Lake Project is located in central Newfoundland and includes four near-surface, mainly pit-shell constrained, gold deposits: Marathon Deposit, Leprechaun Deposit, Sprite Deposit, and Victory Deposit with additional gold-mineralized zones within 1 km of existing deposits.

Stantec Consulting Ltd. (Stantec) was contracted by Marathon Gold Corporation to undertake an additional Fish and Fish Habitat Baseline Study in 2018, to provide additional information to the Fish and Fish Habitat Baseline Study conducted in 2011. The 2011 and 2018 Fish and Fish Habitat Baseline Studies were designed to support the assessment of potential project interactions and environmental effects of the Projects on fish and fish habitat.

The 2018 field study included an assessment of fish presence and habitat classification of ponds and streams within the Study Area that had not been surveyed in 2011. The field surveys for this study were conducted on September 10 to 16, 2018, and were completed by ground and air as access permitted.

The 2018 field study confirmed the presence of Atlantic salmon, brook trout, and three-spine stickleback within the Study Area. The ponds surveyed were shallow (<2 m depth), contained high proportions of fines, and low amounts of aquatic vegetation throughout, with the exception of the areas immediately adjacent to shore. First order, low gradient streams that flowed through bog or wetland habitats were generally characterized by shallow flats with an undefined thalweg, slow velocities, and fine substrates. The lower reaches of streams were generally more riffle / run habitat, associated with increased gradient and velocities, coarser substrates, and well-defined channels.

The streams, ponds and lakes surveyed within the study area are considered to be fish bearing based on the fish sampling and visual observations of fish in ponds and streams and considering the connectivity of those ponds and streams; with the exception of M2 and portions of stream M3 to M2 which have the potential to not be fish bearing. Eleven of the fifteen stream crossings were deemed fish bearing and four were deemed to be not fish habitat. No fish species at risk (SAR) were captured within the Study Area.

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Marathon Gold Corporation (Marathon) to conduct environmental surveys at the Valentine Lake site mine development (the Project), including Fish and Fish Habitat Baseline Studies. The initial Fish and Fish Habitat Study was conducted in 2011 and provided information on ponds and streams potentially impacted by development of the Leprechaun Pit (Stantec 2012).

Mineral exploration activity since 2011 has expanded the Valentine Lake Project to include four near-surface, mainly pit-shell constrained, gold deposits: Marathon Deposit, Leprechaun Deposit, Sprite Deposit, and Victory Deposit (Figure 1.1). Additional gold-mineralized zones have been identified immediately to the southwest of the Leprechaun deposit (J. Frank zone) and approximately 1 km northeast of the Victory deposit. The overall site includes a gold system approximately 20 km long and 240 km^2 in central Newfoundland, approximately 57 km south of Buchans.

The 2018 Study was conducted to determine fish presence and to characterize fish habitat potentially affected by the expanded Project. The conceptual layout of the Project is provided in Figure 1.1

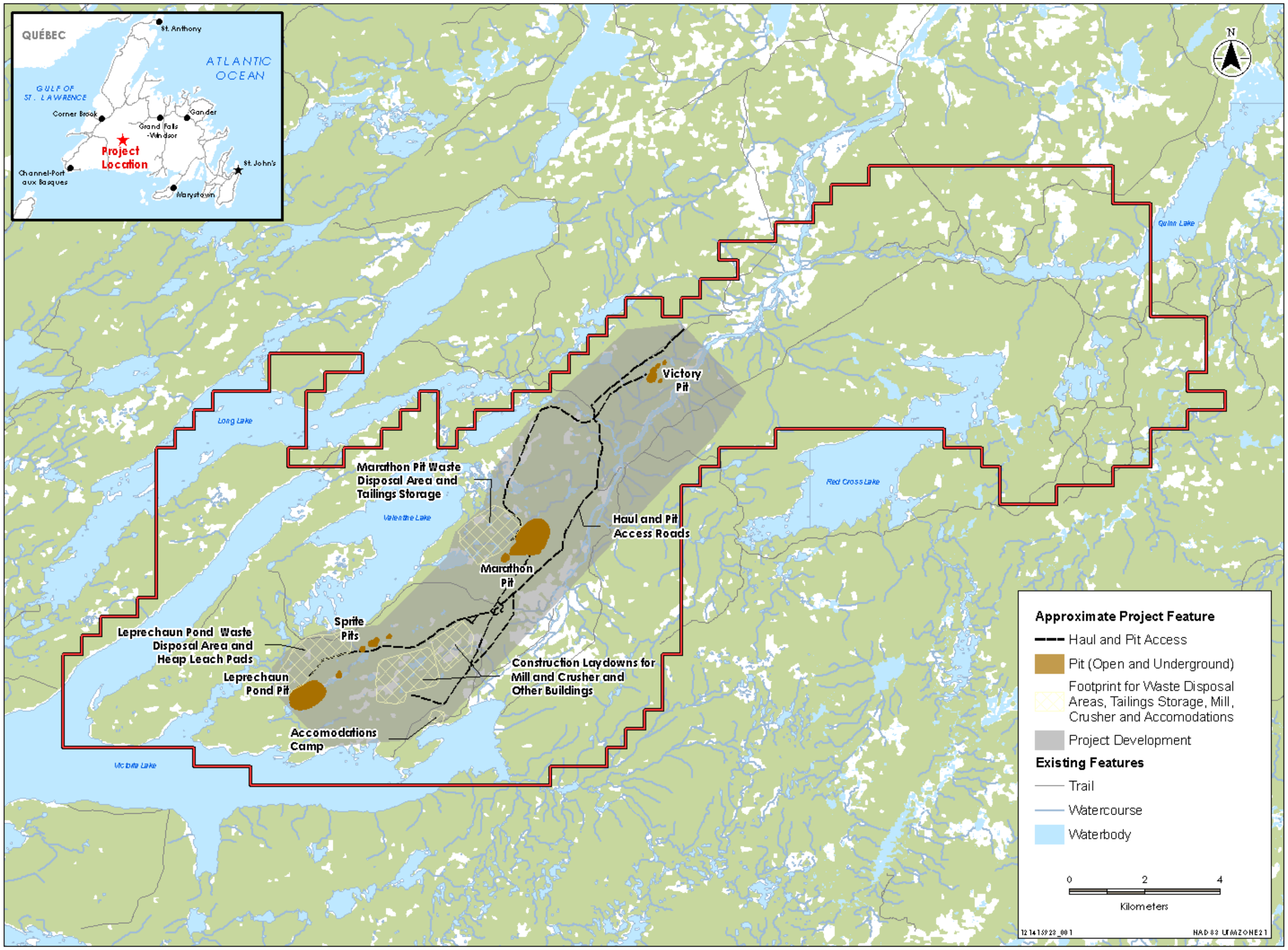

Figure 1.1 Valentine Lake Conceptual Layout as per the May 2018 Preliminary Economic Assessment Report

1.1 Objectives

The objectives of the 2018 Baseline Fish and Fish Habitat study are:

1. Conduct fish sampling to determine fish presence within the lakes, ponds and streams in the study area
2. Conduct surveys of ponds L1, L2, M1 to M8 and ValP3 to determine existing fish habitat, as characterized by depth, substrate, presence of aquatic vegetation and extent of the littoral zone
3. Characterize habitat for inflowing and outflowing streams associated with L1, L2, M1 to M8 and ValP3
4. Characterize habitat at existing and potential stream crossings C001a, and C001 to C014 to a distance 50 m upstream and 50 m downstream of the stream crossing

1.2 Study Team

Jenny Reid and Tony Parr conducted the field surveys for this study and compiled this report, with technical review conducted by Barry Wicks. Barry Wicks served as Project Manager. Sherry Dunsworth was the Marathon client contact and provided project details/coordination to support the field study.

2.0 AQUATIC BACKGROUND AND REGULATORY CONTEXT

The Project will require approval from the Government of Newfoundland and Labrador and is subject to an environmental assessment (EA) under the *Newfoundland and Labrador Environmental Protection Act* (NL EPA) and associated Environmental Assessment Regulations. Under the *Canadian Environmental Assessment Act* (CEAA 2012) the Project is a designated project pursuant to Section 15(a) Regulations Designating Physical Activities and will require a federal EA.

The 2011 and 2018 Fish and Fish Habitat Baseline Studies were designed to:

- support the assessment of potential project interactions and environmental effects of the Projects on fish and fish habitat
- determine the presence of commercial, recreational and Aboriginal fisheries or fish that support those fisheries
- support the determination of serious harm and the requirement for offsetting under the *Fisheries Act*;
- identify fish bearing waters in support of a Schedule 2 amendment under Schedule 36 of the *Fisheries Act* and to support the mine planning activities related to proposed locations of Project infrastructure where feasible
- form part of the supporting documentation for the EA completed for the Project.

3.0 METHODS

The 2018 field study included an assessment of fish presence and habitat classification of ponds and streams within the Study Area (Figure 3.1). The field surveys for this study were conducted on September 10 to 16, 2018.

Fishing methods used in this study are described in Sooley et al. (1997). Methods associated with habitat classification are described in Bradbury et al. (2001) for pond habitat characterization and McCarthy et al. (2007 Draft) for stream habitat characterization.

3.1 Study Area

The Study Area for the 2018 field study is illustrated in Figure 3.1 and is comprised of watersheds potentially affected by development of the Sprite, Marathon and Victory Deposits, which include the following ponds and streams:

- Victoria Lake and Valentine Lake
- L1, L2, M1 to M8 and ValP3 and their associated streams
- Streams crossings C001a and C001 to C0014

For ease of reference, stream locations are given a descriptive name and identifying number that is circled on Figure 3.1. This notation corresponds to the stream location names in the Appendices and in Tables included in Section 4.

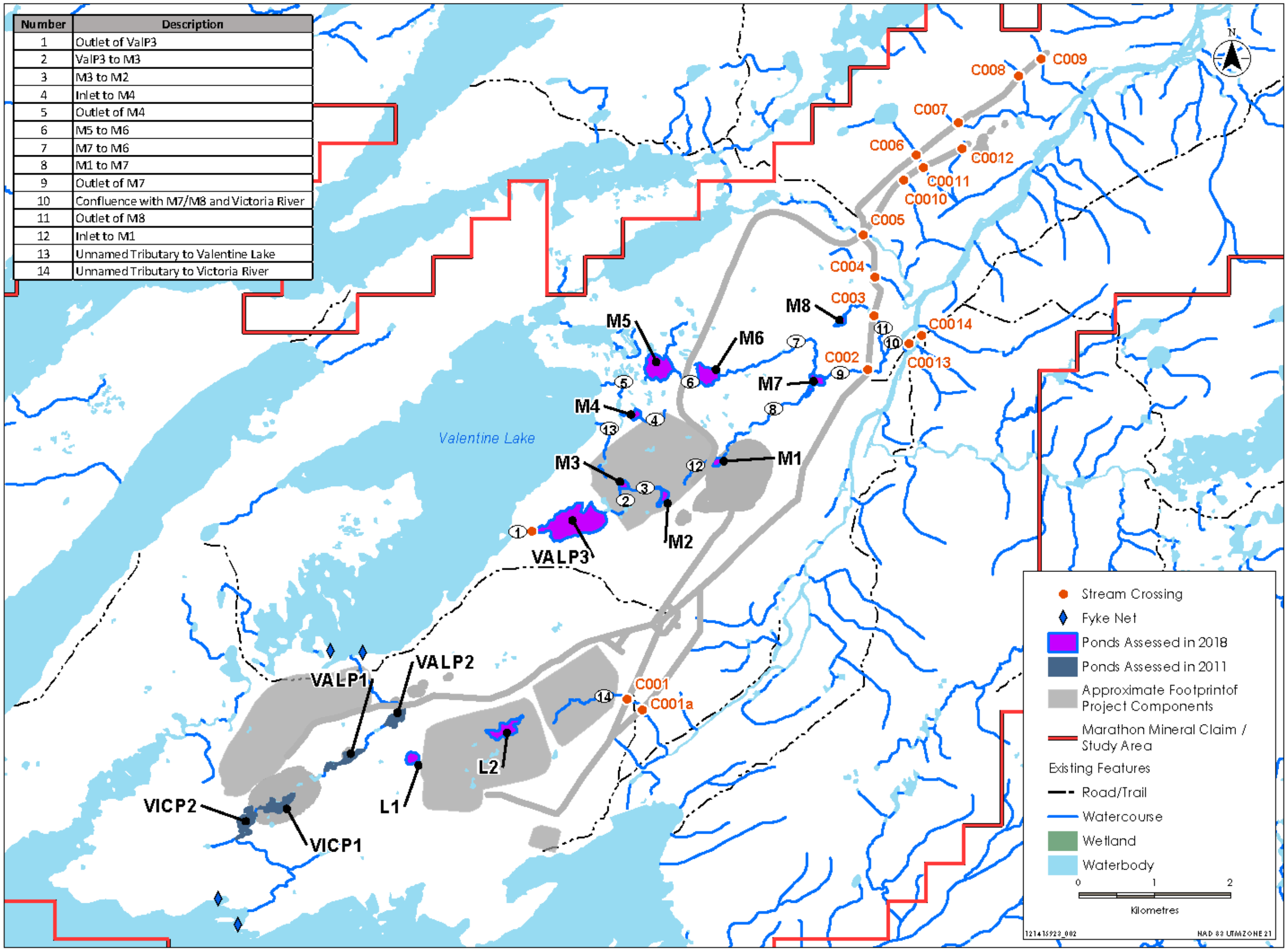

Figure 3.1 2018 Survey Areas

3.2 Fish Sampling

Fishing activity was conducted in accordance with Experimental License NL-4632-18 obtained from Fisheries and Oceans Canada (DFO).

3.2.1 Ponds and Lakes

Fish sampling in Victoria Lake and Valentine Lake was conducted by boat with fyke traps (Photo 1). A minimum of two fyke trap sets were fished for two consecutive nights resulting in four trap-nights of effort in each lake.

Ponds were accessed by helicopter, boat, or by foot depending on the presence of access roads. Fish sampling in ponds (L1, L2, M1 to M8 and Val P3) was conducted by minnow traps and/or gillnetting depending on access. One gill net consisting of two 15 m panels (mesh sizes of 25 and 38 mm) were deployed by wading along the shallow shoreline area of the pond to a depth of approximately 1 m or stringing the gillnet across a portion of the pond using a rope (Photo 2). The net was checked at 30 minute intervals, or until a fish was observed. Two minnow traps were also set for a minimum of 30 minutes at L1, L2, M4, M5, M6 to assist in confirming the presence of fish (Photo 3).

Photo 1 Fyke Net Set in Valentine Lake

Photo 2 Gill Net Set in M4

Photo 3 Minnow Trap Set in L2

3.2.2 Streams

Streams were accessed by helicopter, ATV or by foot depending on the presence of access roads and trails. Fish sampling in streams was conducted by index (qualitative) electrofishing using a backpack electrofishing unit (Smith Root LR-24). Approximately 250 m² of wetted habitat was electrofished in each inflowing and outflowing stream associated with Ponds L1, L2, M1, M2, M3, M4, M7, M8 and ValP3 and at each stream crossing (C001a, C001 to C014), unless sufficient habitat was lacking (i.e., channel ended, intermittent stream). The inflowing and outflowing streams associated with Pond M5 and M6 were not electrofished as part of the 2018 survey due to access issues. The time fished for each stream section was recorded and captured fish were measured, a representative number weighed, identified to species, and released alive. Fish data obtained from the sampling are included in Appendix A.

3.3 Fish Habitat Classification

3.3.1 Ponds

Valentine Lake and Victoria Lake were not included in the 2018 habitat classification.

Habitat classification was limited to Ponds L1, L2, M1 to M8 and Val P3. Pond habitat was characterized during aerial surveys from a helicopter. Data collected included a description of approximate depth, substrate type, and amount of aquatic vegetation in each pond. In addition to the aerial assessment, Pond Val P3 (the largest of the ponds classified) was surveyed by boat to confirm the habitat characteristics recorded during the aerial survey. Substrate was characterized based on descriptions provided in Table 3.1.

Table 3.1 Classification of Substrate

Class	Substrate	Description
Coarse	Bedrock (Br)	Continuous solid rock exposed by scouring forces.
	Boulder (B)	Boulder-sized rocks from 25 cm to greater than 1 m in diameter.
Medium	Rubble (R)	Large rocks from 14 to 25 cm in diameter.
	Cobble (C)	Moderate to small size rocks from 3 to 13 cm in diameter.
	Gravel (G)	Small stones from 2 mm to 3 cm in diameter.
Fine	Sand (S)	Fine deposits ranging from 0.06 to 2 mm in diameter.
	Silt (Si)	Fine material less than 0.06 mm in diameter, often carried by currents.
	Muck (M)	Silt and clay containing greater than 85% organic (detritus).
	Clay (mud)	Material of inorganic origin with greasy feel between fingers and no apparent structure.
	Fines (F)	Smaller-sized material of less than 0.06 mm. This classification is used for an indeterminate mix of sand, silt, muck and clay when the dominant component is not determined.
Adapted from: Bradbury et al. (2001) and McCarthy et al (2007 Draft)		

Data was collected on hard copy maps generated specifically for the field study, showing the outline of each pond. GPS coordinates and aerial photographs were also collected to support delineation of the habitat features present. Habitat maps for each pond were generated by GIS summarizing the general habitat types present. The pond habitat maps are included in Appendix B.

3.3.2 Streams

Stream habitat classification was conducted according to methods outlined in McCarthy et al. (2007 Draft) “Standard Methods Guide for the Classification of Riverine Habitats in Newfoundland and Labrador”. Streams were classified from either ground or aerial surveys. Streams classified from the ground included the inflowing and outflowing streams associated with Ponds L1, L2, M1, M2, M3, M4, M7 and M8 plus stream crossing locations. Streams classified as part of the aerial survey include the inflowing and outflowing streams associated with Ponds M5 and M6.

For the ground surveys, stream habitat was characterized by obtaining velocity measurements and depth readings at ¼, ½, and ¾ of the stream width within approximately 100 m reaches / segments of the stream. Within each 100 m segment the habitat was described based on substrate type, meso habitat type, stream gradient, riparian vegetation, and cover. Photos looking upstream (US) and downstream (DS) were taken within each stream segment at representative locations and GPS coordinates were recorded. Potential barriers to fish migration were noted, photographed and georeferenced.

For stream crossings C001a and C001 to C014 habitat was characterized to an approximate distance 50 m US and DS of the crossing location. Habitat was classified based on stream velocity, meso-habitat type, stream gradient, flow, depth, width, substrate and riparian vegetation according to methods described in McCarthy et al. (2007 draft).

For aerial surveys, streams were characterized at approximately 100 m reaches / segments by flying over the stream at reduced speed and altitude. At the start of each 100 m segment a GPS coordinate, photo and video were taken. The habitat was described based on approximate width, depth, substrate type, flow type and riparian vegetation. Potential barriers to fish migration were noted, photographed and georeferenced.

4.0 RESULTS

4.1 Fish Sampling

Lakes, ponds and stream sections potentially affected by the Valentine Lake Project were sampled to determine the fish species present and to determine if these areas represent fish habitat.

4.1.1 Ponds and Lakes

The fish sampling conducted in lakes and ponds confirmed that fish were present in Valentine Lake, Victoria Lake, L1, L2, M1, M5, M6 and VALP3 (Table 4.1). In total, 60 brook trout (*Salvelinus fontinalis*), four Atlantic salmon (*Salmo salar*) and 1409 three-spine stickleback (*Gasterosteus aculeatus*) were captured in lakes. No fish were captured in M2, M3, M4, M7 and M8, however stickleback was observed in M7 and M8. A trout redd (spawning location) was also observed in M8. No fish species at risk (SAR) were captured in ponds or lakes in the Study Area.

Table 4.1 Summary of Catch, Effort, and Descriptive Statistics for Fish Sampling in Lakes and Ponds

Location	Method	Effort (minutes)	Species								
			Brook Trout				Atlantic salmon				Three-spine stickleback
			Count	Min	Mean	Max	Count	Min	Mean	Max	
Valentine Lake	Fyke net 1	2825	6	92	122.5	150	2	106	179.5	253	256
Valentine Lake	Fyke net 2	2845	7	86	120.3	184	0	-	-	-	415
Victoria Lake	Fyke net 1	2855	27	75	160.4	243	1	278	278	278	540
Victoria Lake	Fyke net 2	2885	6	142	168.8	210	0	-	-	-	196
ValP3	Gill net	90	0	-	-	-	2	175	265	355	0
L1	Minnow trap	466	0	-	-	-	0	-	-	-	0
L1	Gill net	233	5	121	125.4	133	0	-	-	-	0
L2	Minnow trap	440	0	-	-	-	0	-	-	-	0
L2	Gill net	220	1	165	165.0	165	0	-	-	-	0
M1	Gill net	33	3	135	150.7	177	0	-	-	-	0
M2	Gill net	30	0	-	-	-	0	-	-	-	0
M3	Gill net	30	0	-	-	-	0	-	-	-	0
M4	Minnow trap	60	0	-	-	-	0	-	-	-	0
M4	Gill net	30	0	-	-	-	0	-	-	-	0
M5	Minnow trap	430	0	-	-	-	0	-	-	-	1
M5	Gill net	215	0	-	-	-	0	-	-	-	0
M6	Minnow trap	120	0	-	-	-	0	-	-	-	1
M6	Gill net	60	5	170	185.4	196	0	-	-	-	0
M7	Gill net	30	0	-	-	-	0	-	-	-	0
M8	Gill net	30	0	-	-	-	0	-	-	-	0
Total	**-**	**-**	**60**	**75**	**151.5**	**243**	**4**	**106**	**233.4**	**355**	**1,409**

4.1.2 Streams

Stream sampling confirmed the presence of Atlantic salmon (Photo 4), brook trout (Photo 5) and three spine stickleback (Photo 6) within the Study Area. A summary of fish sampling is provided in Table 4.2, which includes the location fished, the fishing time, the number of fish caught, the minimum, mean and maximum fork lengths of brook trout and Atlantic salmon and the total number of stickleback caught. The complete fish sampling data are provided in Appendix A.

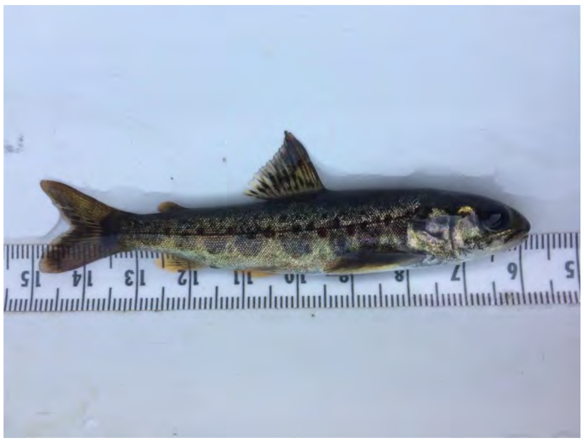

Photo 4 Representative Photo of Atlantic Salmon

Photo 5 Representative Photo of Brook Trout

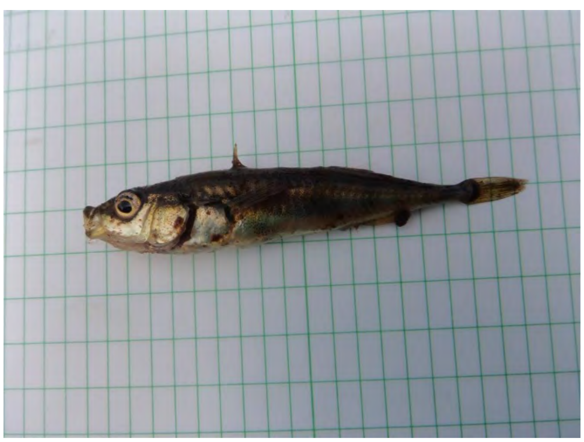

Photo 6 Representative Photo of Threespine Stickleback

Fish (unidentified species) were observed in the inlet to Pond M4. No fish SAR were captured in streams in the Study Area.

Table 4.2 Summary of Fish Sampling

Location	Effort (s)	Species								
		Atlantic Salmon				Brook Trout				Threespine Stickleback
		Count	Min (mm)	Average (mm)	Max (mm)	Count	Min (mm)	Average (mm)	Max (mm)	Count
C001/ (14) Unnamed Tributary to Victoria River	780	0	-	-	-	34	60	95	156	0
C001A/ (14) Unnamed Tributary to Victoria River	280	0	-	-	-	11	59	84	135	0
C002/ (9) Outlet of M7	500	11	83	100	129	7	96	120	200	0
C003/ (11) Outlet of M8	663	9	74	83	94	5	60	94	126	1
C004	90	0	-	-	-	0	-	-	-	0
C005	610	27	50	73	106	0	-	-	-	0
C006	208	0	-	-	-	13	41	59	99	0
C007	No fish sampling conducted as no stream present									
C008	176	0	-	-	-	0	-	-	-	0
C009	445	0	-	-	-	1	68	68	68	0
C010	No fish sampling conducted as no stream present									
C011	No fish sampling conducted – not fish habitat									
C012	No fish sampling conducted as no stream present									
C013	729	3	78	82	89	2	54	62	69	0
C014	611	2	94	130	166	0	-	-	-	0
(13) Inlet to M1	No fish sampling conducted as no stream present									
(8) M1 to M7	600	0	-	-	-	6	54	81	105	0
(3) M3 to M2	114	0	-	-	-	0	-	-	-	0
(1) Outlet of ValP3	354	1	103	103	103	14	51	98	145	0

Table 4.2 Summary of Fish Sampling

Location	Effort (s)	Species								
		Atlantic Salmon				Brook Trout				Threespine Stickleback
		Count	Min (mm)	Average (mm)	Max (mm)	Count	Min (mm)	Average (mm)	Max (mm)	Count
(4) Inlet to M4	138	0	-	-	-	0	-	-	-	2
(5) Outlet of M4	521	0	-	-	-	1	58	58	58	34
(13) Unnamed Tributary to Valentine Lake	113	0	-	-	-	0	-	-	-	0
(2) ValP3 to M3	445	0	-	-	-	1	58	58	58	0
Total	-	53	50	84	166	95	41	88	200	37

4.2 Fish Habitat Classification

4.2.1 Ponds and Lakes

The ponds surveyed were estimated to be a maximum of 2 m in depth, contain a high proportion of fines and low amounts of aquatic vegetation. Given the shallow nature of the ponds investigated (L1, L2, VALP3 and M1 to M8), all habitat types can be considered to occur within the littoral zone. The areas immediately adjacent to shore contained higher proportions of aquatic vegetation in most cases (Photos 7 to 16).

Photo 7 Aerial View of Fish Habitat in L1

Photo 8 Aerial View of Fish Habitat in L2

Photo 9 Aerial View of Fish Habitat in M1

Photo 10 Aerial View of Fish Habitat in M2

Photo 11 Aerial View of Fish Habitat in M3

Photo 12 Aerial View of Fish Habitat in M4

Photo 13 Aerial View of Fish Habitat in M5

Photo 14 Aerial View of Fish Habitat in M6

Photo 15 Aerial View of Fish Habitat in M7

Photo 16 Aerial View of Fish Habitat in M8

Habitat maps for each pond surveyed are provided in Appendix B. Areas associated with each habitat type are summarized in Table 4.3. Additional site photos can be found in Appendix C.

Table 4.3 Summary of Pond Habitat Areas by Substrate and Aquatic Vegetation

Lake	Area in m2				
	Fine Substrates (<2 cm diameter)	Fine Substrates / Aquatic Vegetation	Medium Substrates (2 to 25 cm diameter)	Medium Substrates / Aquatic Vegetation	Course (>25 cm diameter)
L1	14,777	7,306	209	0	15
L2	36,215	20,140	0	0	0
M1	0	762	2,564	135	1,313
M2	13,764	4,809	0	0	84
M3	7,504	6,645	0	0	0
M4	7,627	5,307	0	0	10
M5	85,970	0	14,160	0	1,415
M6	36,210	5,260	17,645	0	229
M7	0	27,719	411	0	4,520
M8	8,845	1,452	0	0	465
ValP3	19,1320	33,683	27,122	0	7,551

4.2.2 Streams

A summary of habitat attributes for the ground / aerial surveys is provided in Table 4.4 summarizing the average wetted and channel stream width, average velocity, depth, slope, overhead and instream cover, and dominant habitat type, substrate and riparian vegetation. The complete habitat classification data set is included in Appendix D. The streams that were surveyed were generally small (<5 m), shallow (<0.5 m), and slow flowing (<0.2 m/s). First order, low gradient streams that flowed through bog or wetland habitats were generally characterized by shallow flats with an undefined thalweg, slow velocities, and fine substrates. The lower reaches of streams were generally more riffle / run habitat, associated with increased gradient and velocities, coarser substrates, and well-defined channels.

There was no defined channel at the mapped location of the unnamed tributary to M1 and no visible channel at stream crossing C007, C010 or C012. The channel at stream crossing C008 was intermittent and dissipated within the downstream portion of the survey area.

Table 4.4 Summary of Habitat Characteristics for Streams Surveyed

Location	Assessment Method	Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m)	Mean Velocity (m/s)	Average Slope (%)	Dominant Habitat Type	Dominant Substrate Type	Dominant Riparian Vegetation	Average Overhead Cover	Average Instream Cover	Comments
(14) Unnamed Tributary to Victoria River	Ground	3.8	5.1	0.26	0.02	5	Riffle/Run (56%)	Fines (34%)	Grass (39%)	28	24	Stream is slow flowing and low gradient, changing to high gradient step pool habitat in lower reaches
(3) M3 to M2	Ground	1.5	1.6	0.47	0.00	0.5	Flat (100%)	Fines (100%)	Grass (80%)	40	30	Stream is series of dry, intermittent channels which becomes defined closer to M2
(2) ValP3 to M3	Ground	10.9	11.6	0.33	0.00	0.5	Flat (53%)	Fines (74%)	Grass (40%) /Shrub (40%)	22	42	Streams connect series of small ponds
(1) Outlet of ValP3	Ground	3.25	3.6	0.09	0.11	1	Riffle/Run (%)	Cobble/ Rubble (55%)	Trees (50%)	40	20	Series of riffles and pools, old water level dam at the end of the lake
(13) Unnamed Tributary to Valentine Lake	Ground	2.0	2.4	0.25	0.00	0.5	Flat (75%0	Fines (98%)	Grass (48%)	39	43	Defined channel that flows out of a string bog
(4) Inlet to M4	Ground	4.5	4.5	0.13	-	0.5	Flat (100%)	Fines (100%)	Grass (60%)	2	40	Poorly defined channel which drains grassy wetlands
(5) Outlet of M4	Ground	6.04	6.62	0.16	0.06	0.5	Flat (83%)	Fines (100%)	Grass (57%)	26	31	Series of defined channels and undefined channels through wetlands

Table 4.4 Summary of Habitat Characteristics for Streams Surveyed

Location	Assessment Method	Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m)	Mean Velocity (m/s)	Average Slope (%)	Dominant Habitat Type	Dominant Substrate Type	Dominant Riparian Vegetation	Average Overhead Cover	Average Instream Cover	Comments
(6) M6 to M5	Aerial	10	ND	ND	ND	0.5	Flat (100%)	Fines (100%)	Shrub (39%)	0	45	Slow flowing with undefined thalweg
(7) M7 to M6	Aerial	2.04	ND	ND	ND	0.5	Riffle/Run (57%)	Boulder (43%)	Shrub (54%)	4	15	Well-defined channel with shallow depths (<0.5 m)
(9) Outlet of M7	Ground	2.5	3.42	0.18	0.17	2.7	Riffle/Run (91%)	Boulder (34%)	Shrub (47%)	28	9	Well defined channel with course substrates
(11) Outlet of M8	Ground	2.36	2.69	0.18	0.05	1	Riffle/Run (47%)	Fines (48%)	Shrub (66%)	54	19	Well defined channel with reduced flow through bog
(10) Confluence of M7/M8 to Victoria River	Ground	3.43	4.13	0.16	0.07	1.5	Riffle/Run (87%)	Cobble/ Rubble (40%)	Shrub (48%)	15	6	Well defined channel with course substrates
(13) Inlet to M1	Ground	No defined channel										
(8) M1 to M7	Ground	2.33	2.71	0.16	0.05	0.9	Riffle/Run (56%)	Boulder (40%)	Shrub (48%)	29	28	Upper reaches flow through bogs with defined channels, higher gradient courser substrates in lower reaches

A summary of habitat attributes for stream crossings are provided in Table 4.5 summarizing the average wetted and channel stream width, average velocity, depth, slope, overhead and instream cover, and dominant habitat type, substrate, and riparian vegetation. The complete habitat classification data set is included in Appendix D.

The stream crossings surveyed were generally small (<5 m width), shallow (<0.5 m), and slow flowing (<0.2 m/s), with the exception of C001 which contained pond habitat, and C005, C013, and C012 which were larger streams (>15 m).

Table 4.5 Summary of Habitat Characteristics for Stream Crossings

Location	Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m)	Mean Velocity (m/s)	Average Slope (%)	Dominant Habitat Type	Dominant Substrate Type	Dominant Riparian Vegetation	Average Overhead Cover	Average Instream Cover
C001a	1.95	3.57	0.06	0.05	10	Riffle/run (70%)	Boulder (45%)	Shrub (38%)	23	20
C001	12.45	13	0.88	0.00	1	Pool (50%)/Pond (50%)	Fines (50%)	Shrub (65%)	8	20
C002	2.55	4.00	0.08	0.41	2.5	Riffle/Run (90%)	Cobble/Rubble (58%)	Trees (68%)	35	10
C003	1.57	2.07	0.1	0.07	2	Riffle/Run (90%)	Boulder (40%)	Shrub (70%)	58	5
C004	1.15	1.95	0.05	0.03	1	Riffle/Run (50%)/Flat (50%)	Fines (40%)	Shrub (45%)	25	0
C005	12.00	14.25	0.34	0.17	3.5	Riffle/Run (100%)	Boulder (55%)	Shrub (60%)	2	13
C006	1.15	1.26	0.11	0.03	1	Riffle/Run (100%)	Boulder (40%)	Shrub (75%)	33	8
C007	No defined channel									
C008	0.65	0.98	0.07	0.00	0.05	Riffle/Run (50%)/Flat (50%)	Fines (38%)	Shrub (50%)	40	20
C009	1.35	1.53	0.07	0.00	1	Flat (50%)	Fines (65%)	Shrub (75%)	70	20
C010	No defined channel									
C011	0.76	0.91	0.06	0.01	0.75	Flat (85%)	Fines (60%)	Shrub (75%)	65	8
C012	No defined channel									
C013	14.50	17.75	0.5	0.00	5	Pool (95%)	Bedrock (70%)	Shrub (63%)	2	5
C014	14	17	0.32	0.57	5.5	Pool (58%)	Bedrock (60%)	Shrub (53%)	1	5

4.3 Summary of Fish Bearing Streams, Ponds and Lakes

A summary of the likelihood of salmonid (brook trout or Atlantic salmon) and TSS presence in the ponds, lakes and streams surveyed in 2018 is included in Table 4.6. The likelihood of fish presence is categorized as confirmed (C), likely (L), or unlikely (U). Locations that had no visible fish habitat are indicated by a dash (-). The summary is based on the information obtained from fish sampling and fish habitat classification.

Based on the fish sampling in 2018, it is unclear whether M2 and the stream M3 to M2 contains fish. No fish were captured or observed in M2. Stream M3 to M2 is intermittent and no visible channel was documented approximately 125 m upstream of M3 which limits fish passage between lakes M3 and M2.

Table 4.6 Summary of the Likelihood of Fish Presence in Ponds, Lakes and Streams Surveyed in 2018

Location	Salmonids	Three Spine Stickleback	Comment
Valentine Lake	C	C	Salmonids and TSS confirmed present by fyke netting
Victoria Lake	C	C	Salmonids and TSS confirmed present by fyke netting.
ValP3	C	L	Salmonids confirmed present by gillnetting. TSS likely present based on the existence of suitable habitat and connectivity with Valentine Lake that contains TSS.
L1	C	L	Salmonids confirmed present by gillnetting. TSS likely present based on the existence of suitable habitat and TSS presence in other lakes in survey area.
L2	C	L	Salmonids confirmed present by gillnetting. TSS likely present based on the existence of suitable habitat and TSS presence in other lakes in survey area.
M1	C	L	Salmonids confirmed present by gillnetting. TSS likely present based on the existence of suitable habitat.
M2	U	U	Salmonid presence is unlikely based on no catches in gillnets and no connectivity between M2 and M3. TSS presence unlikely based on no connectivity to habitat with confirmed TSS presence.
M3	L	L	Salmonids likely present based on existence of suitable habitat and salmonid presence in stream section Val P3 to M3. TSS likely present based on the existence of suitable habitat and connectivity to Valentine Lake that contains TSS.
M4	L	L	Salmonids likely present based on the existence of suitable habitat and confirmed presence of salmonids at the outlet of M4. TSS likely present based on the existence of suitable habitat and connectivity to Valentine Lake that contains TSS.

Table 4.6 Summary of the Likelihood of Fish Presence in Ponds, Lakes and Streams Surveyed in 2018

Location	Salmonids	Three Spine Stickleback	Comment
M5	L	C	Salmonids likely present based on the existence of suitable habitat and connectivity to M6 that contains salmonids. TSS confirmed present by use of minnow traps.
M6	C	C	Salmonids confirmed present by gillnetting. TSS confirmed present by use of minnow traps.
M7	L	L	Salmonids likely present based on the existence of suitable habitat and the presence of salmonids in connected watercourses (M6, M1 to M7 and Outlet of M7). TSS likely present based on the existence of suitable habitat and connectivity to M6 that contains TSS.
M8	L	L	Salmonids and TSS likely present based on the existence of suitable habitat, plus salmonid and TSS presence in connected watercourses (outlet of M8).
C001	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat.
C001a	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat.
C002	C	L	Salmonids confirmed present by electrofishing. present. TSS likely to be present based on the existence of suitable habitat.
C003	C	C	Salmonids and TSS confirmed present by electrofishing.
C004	-	-	Not fish habitat
C005	C	U	Salmonids confirmed present by electrofishing. TSS unlikely to be present based on habitat characteristics.
C006	C	U	Salmonids confirmed present by electrofishing. TSS unlikely to be present based on habitat characteristics.
C007	-	-	Not fish habitat
C008	-	-	Not fish habitat
C009	C	U	Salmonids confirmed present by electrofishing. TSS unlikely to be present based on habitat characteristics.
C010	-	-	Not fish habitat
C011	-	-	Not fish habitat
C012	-	-	Not fish habitat
C013	C	L	Salmonids confirmed present by electrofishing. TSS likely to be present based on the existence of suitable habitat.
C014	C	L	Salmonids confirmed present by electrofishing. TSS likely to be present based on the existence of suitable habitat.
(14) Unnamed Tributary to Victoria River	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat.

Table 4.6 Summary of the Likelihood of Fish Presence in Ponds, Lakes and Streams Surveyed in 2018

Location	Salmonids	Three Spine Stickleback	Comment
(3) M3 to M2	U	U	Salmonids and TSS are unlikely to be present based on the intermittent nature of the stream and lack of a defined stream bed.
(2) ValP3 to M3	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat and connectivity to Valentine Lake that contains TSS.
(1) Outlet of ValP3	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat and connectivity to Valentine Lake that contains TSS.
(13) Unnamed Tributary to Valentine Lake	L	L	Salmonids and TSS likely present based on the existence of suitable habitat and connectivity to Valentine Lake that contains salmonids and TSS.
(4) Inlet to M4	L	C	Salmonids likely present based on the existence of suitable habitat and connectivity to the outlet of M4 that contains salmonids. TSS presence confirmed by electrofishing.
(5) Outlet of M4	C	C	Salmonids and TSS confirmed by electrofishing.
(6) M6 to M5	L	L	Salmonids likely present based on the existence of suitable habitat and connectivity to M6 that contains salmonids. TSS likely present based on the existence of suitable habitat and connectivity to M5 and M6 that contains TSS.
(7) M7 to M6	L	L	Salmonids and TSS likely present based on the existence of suitable habitat and connectivity to M6 that contains salmonids and TSS.
(9) Outlet of M7	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat and connectivity to M6 that contains TSS.
(11) Outlet of M8	C	C	Salmonids and TSS confirmed present by electrofishing.
(10) Confluence of M7/M8 to Victoria River	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat and connectivity to M6 that contains TSS.
(8) M1 to M7	C	L	Salmonids confirmed present by electrofishing. TSS likely present based on the existence of suitable habitat and connectivity to M6 that contains TSS.
(13) Inlet to M1	-	-	Not fish habitat

5.0 SUMMARY

The 2018 field study confirmed the presence of Atlantic salmon, brook trout and three-spine stickleback. Atlantic salmon were captured in Valentine Lake, Victoria Lake and ValP3 pond, at five of the stream crossings (C002, C003, C005, C013 and C014), and the outlet of ValP3 pond. Brook trout were captured in five of the eleven ponds sampled, seven of the twelve stream crossings, and seven of the ten streams surveyed. Most lakes, ponds, and streams surveyed are considered fish bearing, based on fish sampling results, visual observations, and connectivity of the waterbodies. The exception is Pond M2 and portions of stream M3 to M2 which have the potential to not be fish bearing. Eleven of the fifteen stream crossings were confirmed to be fish bearing, and four were determined to be not fish habitat. No fish SAR were captured within the Study Area.

The ponds surveyed were estimated to be up to 2 m in depth, contain a high proportion of fines and low amounts of aquatic vegetation, with a higher proportion of aquatic vegetation immediately adjacent to shore.

First order or low gradient streams that flowed through bog or wetland habitats were generally characterized by shallow flats with an undefined thalweg, slow velocities and fine substrates. The lower reaches of streams were generally more riffle / run habitat, with increased gradient and velocities, coarser substrates, and well-defined channels.

6.0 REFERENCES

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APPENDIX A

Fish Data

APPENDIX A: Fish Sampling Data 2018

Legend

Method:	Fyke Trap (FN), Gillnet (GN), Electrofishing (EF), Minnow Trap (MT) and Not Applicable (NA)
Site:	Unique identifier assigned to each water body or stream fished.
Coordinates:	Area of fish sampling in decimal degrees
Location:	fishing location described as stream segment electrofished, FN#, GN# or MT#
Start Date:	Date fishing commenced
Fishing Time:	Number of seconds electrofishing was conducted, number of minutes gill netting and minnow trapping was conducted, number of nights fyke trapping was conducted (2N = 2 Nights)
Species:	Atlantic salmon (AS), brook trout (BT), three spine stickleback (TSS)
Count:	Number of fish associated with line entry
Length:	Fork length in mm
Weight:	Total weight in grams

(K) Condition: Condition factor calculated as: $K = W \times 10^5 / L^3$

Where: K = condition,
W = Weight in g,
L = Length in mm.

Table A.1. Raw Fish Sampling Data 2018

Method	Site	Coordinates	Location	Start Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	71	3.6	1.01
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	84	6.1	1.03
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	84	5.8	0.98
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	114	13.5	0.91
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	156	41.3	1.09
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	139	27.7	1.03
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	139	28.9	1.08
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	79	5	1.01
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	136	26.9	1.07
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	124	18.3	0.96
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	73	3.9	1.00
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	80	5.1	1.00
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	72	3.7	0.99
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	69	3.3	1.00
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	79	5.3	1.07
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36995 W57.12124	C001 to 100m US	13-Sep-18	430s	BT	1	131	23.1	1.03
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	125	22.6	1.16
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	127	24.1	1.18
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	75	4.2	1.00
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	80	5.9	1.15
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	134	26.7	1.11
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	64	2.9	1.11
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	148	36.1	1.11
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	65	3.1	1.13
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	83	6.1	1.07
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	132	23.2	1.01
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	72	3.5	0.94
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	82	5.7	1.03
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	79	4.8	0.97
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	65	3	1.09
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	73	4.5	1.16
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	70	3.7	1.08
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	71	3.4	0.95
EF	C001/ (14) Unnamed Tributary to Victoria River	N48.36975 W57.12012	100 m to 200 m DS of C001	13-Sep-18	350s	BT	1	60	2.2	1.02
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	84	6.1	1.03
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	68	3.2	1.02
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	135	27.9	1.13
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	59	2.1	1.02
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	74	4.6	1.14
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	73	4.1	1.05
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	67	3.2	1.06
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	81	5.7	1.07
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	130	21.9	1.00
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	81	5.9	1.11
EF	C001A/ (14) Unnamed Tributary to Victoria River	N48.36815 W57.11741	C001a to 100 m DS	13-Sep-18	280s	BT	1	73	3.8	0.98
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	91	7.5	1.00
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	106	12	1.01
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	90	8.3	1.14
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	BT	1	99	9.3	0.96
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	95	8.9	1.04
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	BT	1	110	13.9	1.04
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	BT	1	200	74	0.93
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	109	14.8	1.14
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	119	16	0.95
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	95	9.2	1.07
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	BT	1	96	8.7	0.98
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	88	6.9	1.01
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	94	8.7	1.05
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	129	19.4	0.90
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	BT	1	113	13.7	0.95
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	BT	1	125	15.9	0.81
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	AS	1	83	5.6	0.98
EF	C002/ (9) Outlet of M7	N48.40832 W57.07857	50 m DS to 100 m US of C002	12-Sep-18	500s	BT	1	100	9.1	0.91
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	79	5.1	1.03
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	84	5.7	0.96
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	BT	1	126	19.4	0.97
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	94	8.6	1.04
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	85	5.7	0.93
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	74	-	-
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	BT	1	62	2.2	0.92
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	86	5.7	0.90
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	79	5	1.01
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	82	5.6	1.02
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	BT	1	120	17.6	1.02
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	AS	1	87	6.2	0.94
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	BT	1	102	9.3	0.88
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	BT	1	60	1.7	0.79
EF	C003/ (11) Outlet of M8	N48.41520 W57.07632	50 m DS to 600 m US of C003	14-Sep-18	663s	TSS	1	-	-	-
EF	C004	N48.41969 W57.07615	NA	13-Sep-18	NA	NC	NA	NA	NA	-
EF	C004	N48.41969 W57.07615	25 m DS to 20 m US of C004	13-Sep-18	90s	NC	NA	NA	NA	-
EF	C004	N48.41969 W57.07615	25 m DS to 20 m US of C004	13-Sep-18	90s	NC	NA	NA	NA	-
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	550s	AS	1	80	4.8	0.94
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	550s	AS	1	82	5.7	1.03
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	550s	AS	1	66	2.6	0.90
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	550s	AS	1	106	12.7	1.07
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	550s	AS	1	51	1.4	1.06

Table A.1. Raw Fish Sampling Data 2018

Method	Site	Coordinates	Location	Start Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	550s	AS	1	67	2.8	0.93
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	68	3.3	1.05
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	94	7.4	0.89
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	101	10.7	1.04
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	72	4.5	1.21
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	78	5.3	1.12
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	83	6.1	1.07
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	69	3.5	1.07
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	71	3.8	1.06
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	51	1.3	0.98
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	54	1.6	1.02
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	81	5.8	1.09
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	56	1.8	1.02
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	75	4.6	1.09
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	82	5.9	1.07
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	80	5.9	1.15
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	82	5.8	1.05
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	56	1.8	1.02
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	77	4.5	0.99
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	80	4.8	0.94
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	50	1.4	1.12
EF	C005	N48.42484 W57.07822	80m DS to 100m US of C005	13-Sep-18	610s	AS	1	70	3.6	1.05
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	284s	BT	1	53	-	-
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	284s	BT	1	52	-	-
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	284s	BT	1	62	2.9	1.22
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	284s	BT	1	63	2.7	1.08
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	284s	BT	1	68	3.4	1.08
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	284s	BT	1	62	2.5	1.05
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	208s	BT	1	54	1.6	1.02
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	208s	BT	1	53	1.2	0.81
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	208s	BT	1	99	9.5	0.98
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	208s	BT	1	56	1.6	0.91
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	208s	BT	1	45	0.8	0.88
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	208s	BT	1	58	1.9	0.97
EF	C006	N48.43413 W57.06803	100 m DS to 100 m US of C006	13-Sep-18	208s	BT	1	41	-	-
NA	C007	N48.437887 W57.060764	NA	13-Sep-18	0s	NC	NA	NA	NA	-
EF	C008	N48.44353 W57.05015	50 m DS to 50 m US of C008	13-Sep-18	176s	NC	NA	NA	NA	-
EF	C009	N48.44545 W57.04556	50 m DS to 50 m US of C009	13-Sep-18	445s	BT	1	68	3	0.95
NA	C010	N48.43113 W57.070407	NA	14-Sep-18	0s	NC	NA	NA	NA	-
NA	C011	N48.432571 W57.066925	NA	14-Sep-18	0s	NC	NA	NA	NA	-
NA	C012	N48.434852 W57.060039	NA	14-Sep-18	0s	NC	NA	NA	NA	-
EF	C013	N48.41127 W57.06927	50 m DS to 50 m US of C013	13-Sep-18	729s	AS	1	80	4.7	0.92
EF	C013	N48.41127 W57.06927	50 m DS to 50 m US of C013	13-Sep-18	729s	AS	1	78	4.7	0.99
EF	C013	N48.41127 W57.06927	50 m DS to 50 m US of C013	13-Sep-18	729s	BT	1	54	1.5	0.95
EF	C013	N48.41127 W57.06927	50 m DS to 50 m US of C013	13-Sep-18	729s	AS	1	89	7.4	1.05
EF	C013	N48.41127 W57.06927	50 m DS to 50 m US of C013	13-Sep-18	729s	BT	1	69	3.4	1.03
EF	C014	N48.41267 W57.06756	C013 to 50 m US	14-Sep-18	611s	AS	1	94	8.9	1.07
EF	C014	N48.41267 W57.06756	C013 to 50 m US	14-Sep-18	611s	AS	1	166	43.8	0.96
EF	(4) Inlet to M4	N48.40309 W57.11736	75 m US of M4	10-Sep-18	138s	TSS	2	-	-	-
GN	L1	N48.36268 W57.15708	GN1	9-Sep-18	223min	BT	1	122	19.6	1.08
GN	L1	N48.36268 W57.15708	GN1	9-Sep-18	223min	BT	1	126	22.2	1.11
GN	L1	N48.36268 W57.15708	GN1	9-Sep-18	223min	BT	1	121	17.3	0.98
GN	L1	N48.36268 W57.15708	GN1	9-Sep-18	223min	BT	1	133	23	0.98
GN	L1	N48.36268 W57.15708	GN1	9-Sep-18	223min	BT	1	125	21.5	1.10
MT	L1	N48.36268 W57.15708	MT1	9-Sep-18	223min	NC	NA	NA	NA	-
MT	L1	N48.36268 W57.15708	MT2	9-Sep-18	223min	NC	NA	NA	NA	-
GN	L2	N48.36614 W57.13996	GN1	9-Sep-18	220min	BT	1	165	55	1.22
MT	L2	N48.36614 W57.13996	MT1	9-Sep-18	220min	NC	NA	NA	NA	-
MT	L2	N48.36614 W57.13996	MT2	9-Sep-18	220min	NC	NA	NA	NA	-
GN	M1	N48.39767 W57.10308	GN1	12-Sep-18	33min	BT	1	135	23.9	0.97
GN	M1	N48.39767 W57.10308	GN1	12-Sep-18	33min	BT	1	177	56.8	1.02
GN	M1	N48.39767 W57.10308	GN1	12-Sep-18	33min	BT	1	140	30.5	1.11
EF	(8) M1 to M7	N48.40093 W57.09893	200 m to 450 m DS of M1	12-Sep-18	600s	BT	1	54	1.7	1.08
EF	(8) M1 to M7	N48.40093 W57.09893	200 m to 450 m DS of M1	12-Sep-18	600s	BT	1	95	7.1	0.83
EF	(8) M1 to M7	N48.40093 W57.09893	200 m to 450 m DS of M1	12-Sep-18	600s	BT	1	87	5.6	0.85
EF	(8) M1 to M7	N48.40093 W57.09893	200 m to 450 m DS of M1	12-Sep-18	600s	BT	1	105	10.3	0.89
EF	(8) M1 to M7	N48.40093 W57.09893	200 m to 450 m DS of M1	12-Sep-18	600s	BT	1	84	5.8	0.98
EF	(8) M1 to M7	N48.40093 W57.09893	200 m to 450 m DS of M1	12-Sep-18	600s	BT	1	60	2	0.93
GN	M2	N48.39290 W57.11379	GN1	11-Sep-18	30min	NC	NA	NA	NA	-
GN	M3	N48.39434 W57.11952	GN1	11-Sep-18	30min	NC	NA	NA	NA	-
EF	(3) M3 to M2	N48.39429 W57.11642	200 m to 250 m US from M3	12-Sep-18	114s	NC	NA	NA	NA	-
GN	M4	N48.40374 W57.11783	GN1	10-Sep-18	30min	NC	NA	NA	NA	-
MT	M5	N48.40744 W57.11546	MT1	9-Sep-18	215min	TSS	1	50	1	0.80
MT	M5	N48.40744 W57.11546	MT2	9-Sep-18	215min	NC	NA	NA	NA	-
GN	M6	N48.40823 W57.10369	GN1	9-Sep-18	60min	BT	1	170	53.7	1.09
GN	M6	N48.40823 W57.10369	GN1	9-Sep-18	60min	BT	1	195	77.9	1.05
GN	M6	N48.40823 W57.10369	GN1	9-Sep-18	60min	BT	1	196	77.4	1.03
GN	M6	N48.40823 W57.10369	GN1	9-Sep-18	60min	BT	1	178	58.8	1.04
GN	M6	N48.40823 W57.10369	GN1	9-Sep-18	60min	BT	1	188	72.3	1.09
MT	M6	N48.40823 W57.10369	MT1	9-Sep-18	60min	TSS	1	NA	NA	-
MT	M6	N48.40823 W57.10369	MT2	9-Sep-18	60min	NC	NA	NA	NA	-
GN	M7	N48.40684 W57.08528	GN1	12-Sep-18	30min	NC	NA	NA	NA	-
GN	M8	N48.41396 W57.08180	GN1	13-Sep-18	30min	NC	NA	NA	NA	-
EF	(5) Outlet of M4	N48.40674 W57.12356	M4 to 250 m DS	10-Sep-18	521s	BT	1	58	1.8	-
EF	(5) Outlet of M4	N48.40674 W57.12356	M4 to 250 m DS	10-Sep-18	521s	TSS	34	-	-	-
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	64	2.7	1.03

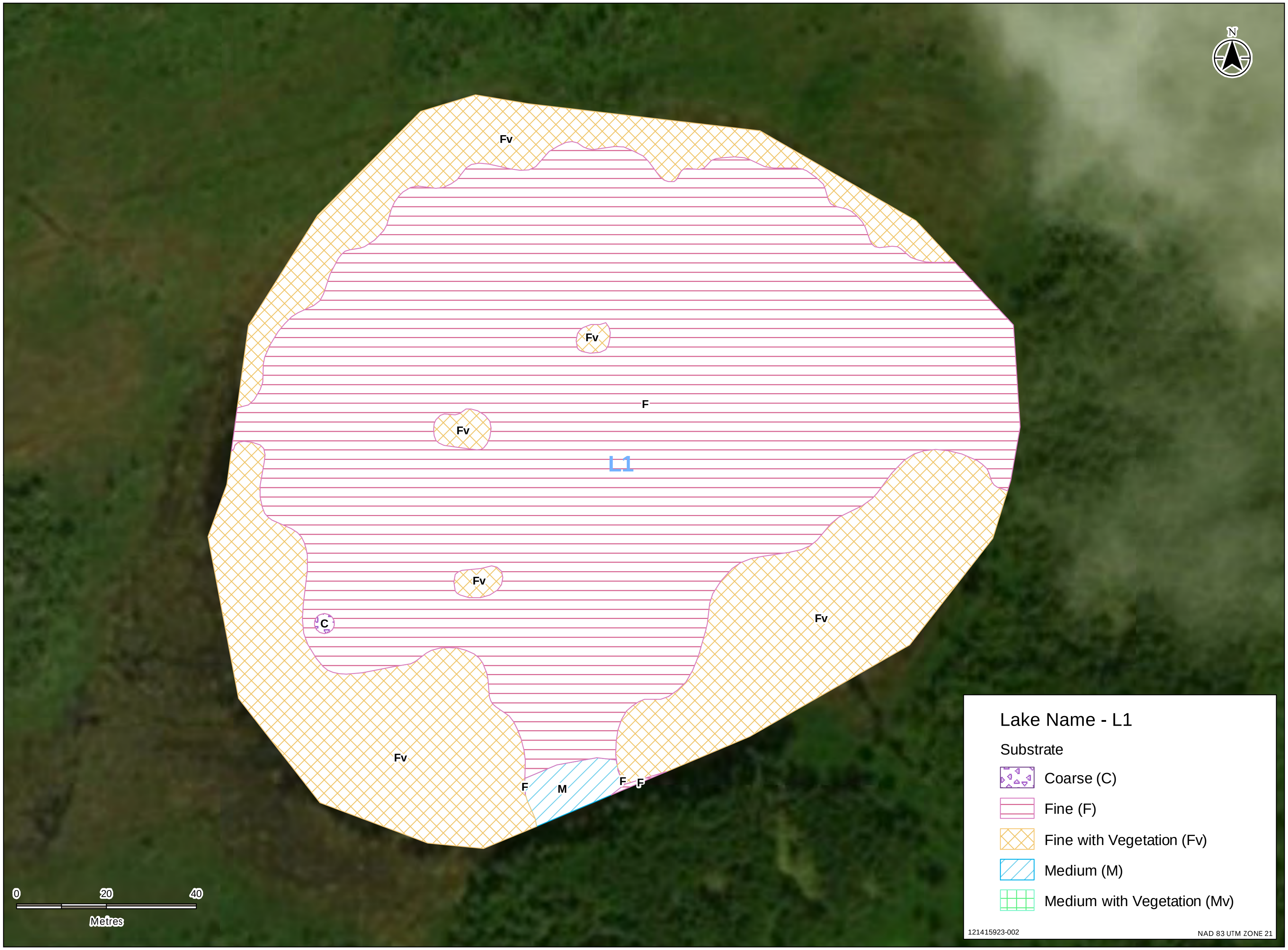
Table A.1. Raw Fish Sampling Data 2018

Method	Site	Coordinates	Location	Start Date	Fishing Time	Species	Count	L (mm)	W (g)	K
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	101	10.6	1.03
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	56	1.7	0.97
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	56	1.7	0.97
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	51	1	0.75
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	142	32.8	1.15
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	140	27.3	0.99
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	127	23.8	1.16
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	145	34.1	1.12
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	AS	1	103	12.9	1.18
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	111	14.6	1.07
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	125	20.7	1.06
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	101	10.6	1.03
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	96	9.1	1.03
EF	(1) Outlet of ValP3	N48.38934 W57.13806	ValP3 to 100m DS	11-Sep-18	354s	BT	1	56	1.7	0.97
EF	(13) Unnamed Tributary to Valentine Lake	N48.40211 W57.12389	Valentine Lake to 100 m US	10-Sep-18	113s	NC	NA	NA	NA	-
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	BT	1	106	10	0.84
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	AS	1	253	159.1	0.98
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	BT	1	124	17.8	0.93
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	BT	1	141	25.6	0.91
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	BT	1	150	28.4	0.84
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	BT	1	92	5.9	0.76
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	BT	1	122	18.1	1.00
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	AS	1	106	13.1	1.10
FN	Valentine Lake	N48.37481 W57.16682	FN1	12-Sep-18	2N	TSS	256	-	-	-
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	BT	1	156	40.1	1.06
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	BT	1	116	15.8	1.01
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	BT	1	86	6.6	1.04
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	BT	1	121	15.5	0.87
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	BT	1	93	6.8	0.85
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	BT	1	86	4.9	0.77
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	BT	1	184	61.4	0.99
FN	Valentine Lake	N48.375044 W57.172595	FN2	12-Sep-18	2N	TSS	415			-
GN	VALP3	N48.39127 W57.12404	GN1	11-Sep-18	90min	AS	1	355	475	1.06
GN	VALP3	N48.39127 W57.12404	GN1	11-Sep-18	90min	AS	1	175	50.8	0.95
EF	(2) ValP3 to M3	N48.39178 W57.12246	ValP3 to 50 m US	12-Sep-18	445s	BT	1	58	2	1.03
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	129	-	-
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	AS	1	278	202.3	0.94
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	243	125.9	0.88
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	199	68.3	0.87
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	228	128.7	1.09
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	219	102.4	0.97
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	220	97.8	0.92
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	171	46.2	0.92
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	168	40.7	0.86
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	123	-	-
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	195	64.4	0.87
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	114	-	-
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	115	-	-
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	185	58.7	0.93
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	97	8.5	0.93
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	100	8.9	0.89
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	178	47.8	0.85
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	174	50.4	0.96
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	184	54.4	0.87
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	75	3.3	0.78
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	145	29.3	0.96
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	156	33	0.87
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	184	62.1	1.00
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	174	49.7	0.94
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	151	35.2	1.02
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	109	12.3	0.95
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	178	50.6	0.90
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	BT	1	116	15.4	0.99
FN	Victoria Lake	N48.34254 W57.18897	FN1	13-Sep-18	2N	TSS	540	-	-	-
FN	Victoria Lake	N48.34556 W57.19250	FN2	13-Sep-18	2N	BT	1	161	-	-
FN	Victoria Lake	N48.34556 W57.19250	FN2	13-Sep-18	2N	BT	1	210	87.3	0.94
FN	Victoria Lake	N48.34556 W57.19250	FN2	13-Sep-18	2N	BT	1	150	43.3	1.28
FN	Victoria Lake	N48.34556 W57.19250	FN2	13-Sep-18	2N	BT	1	168	48.3	1.02
FN	Victoria Lake	N48.34556 W57.19250	FN2	13-Sep-18	2N	BT	1	142	26.4	0.92
FN	Victoria Lake	N48.34556 W57.19250	FN2	13-Sep-18	2N	BT	1	182	61.5	1.02
FN	Victoria Lake	N48.34556 W57.19250	FN2	13-Sep-18	2N	TSS	196	-	-	-

Note: Fishing Time at C002/ (9) Outlet of M7 estimated

APPENDIX B

Lake Habitat Maps



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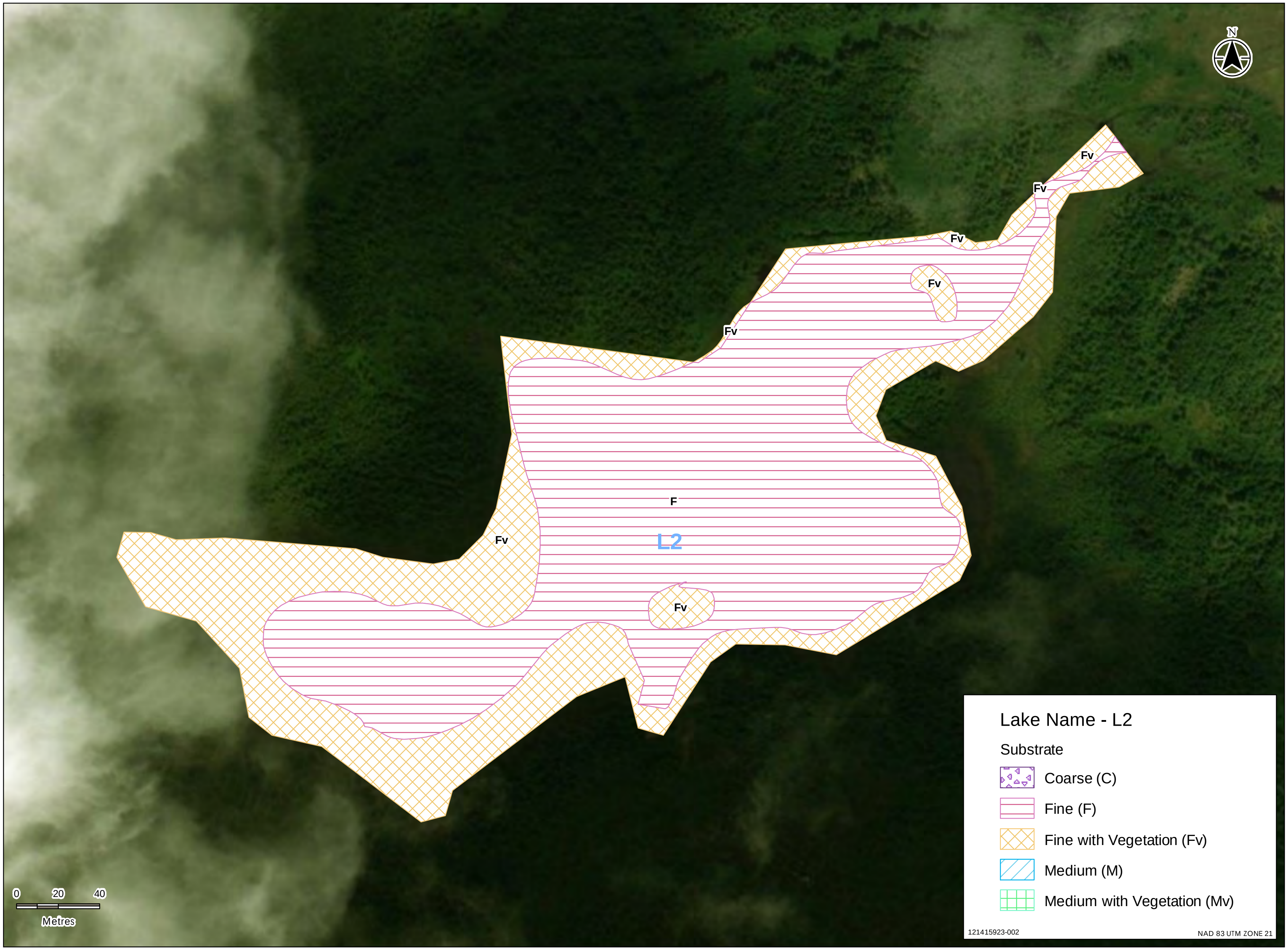

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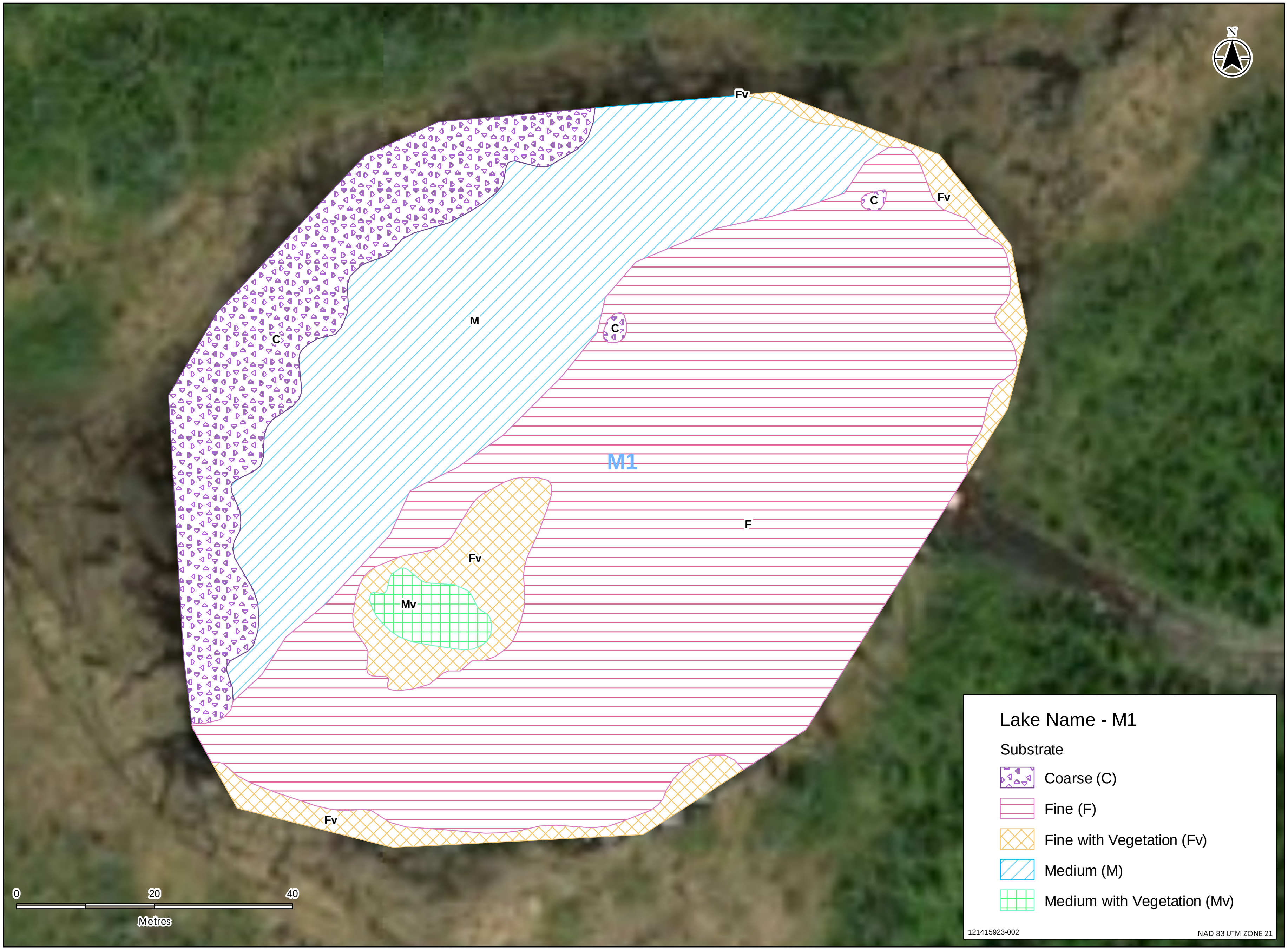

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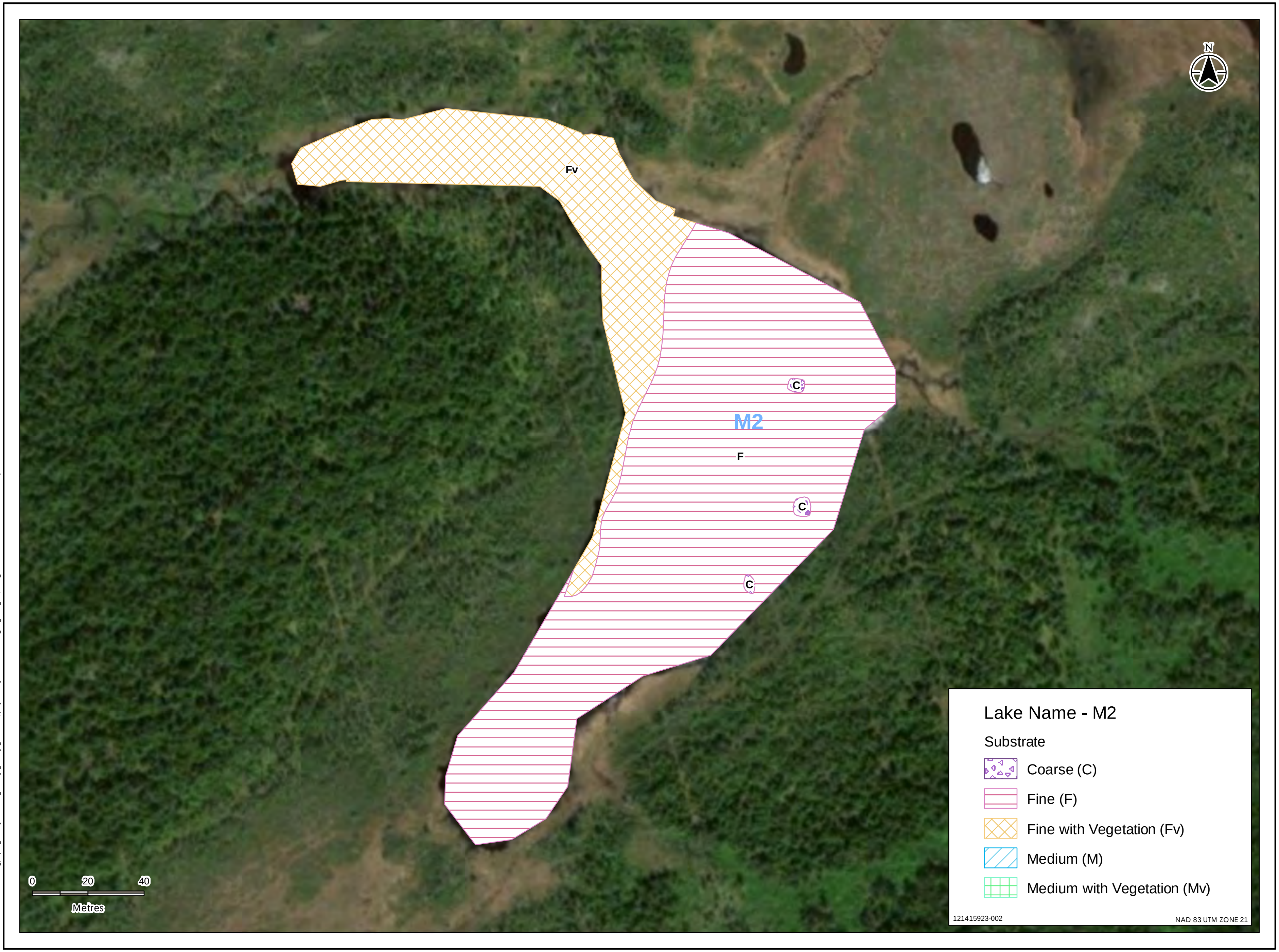

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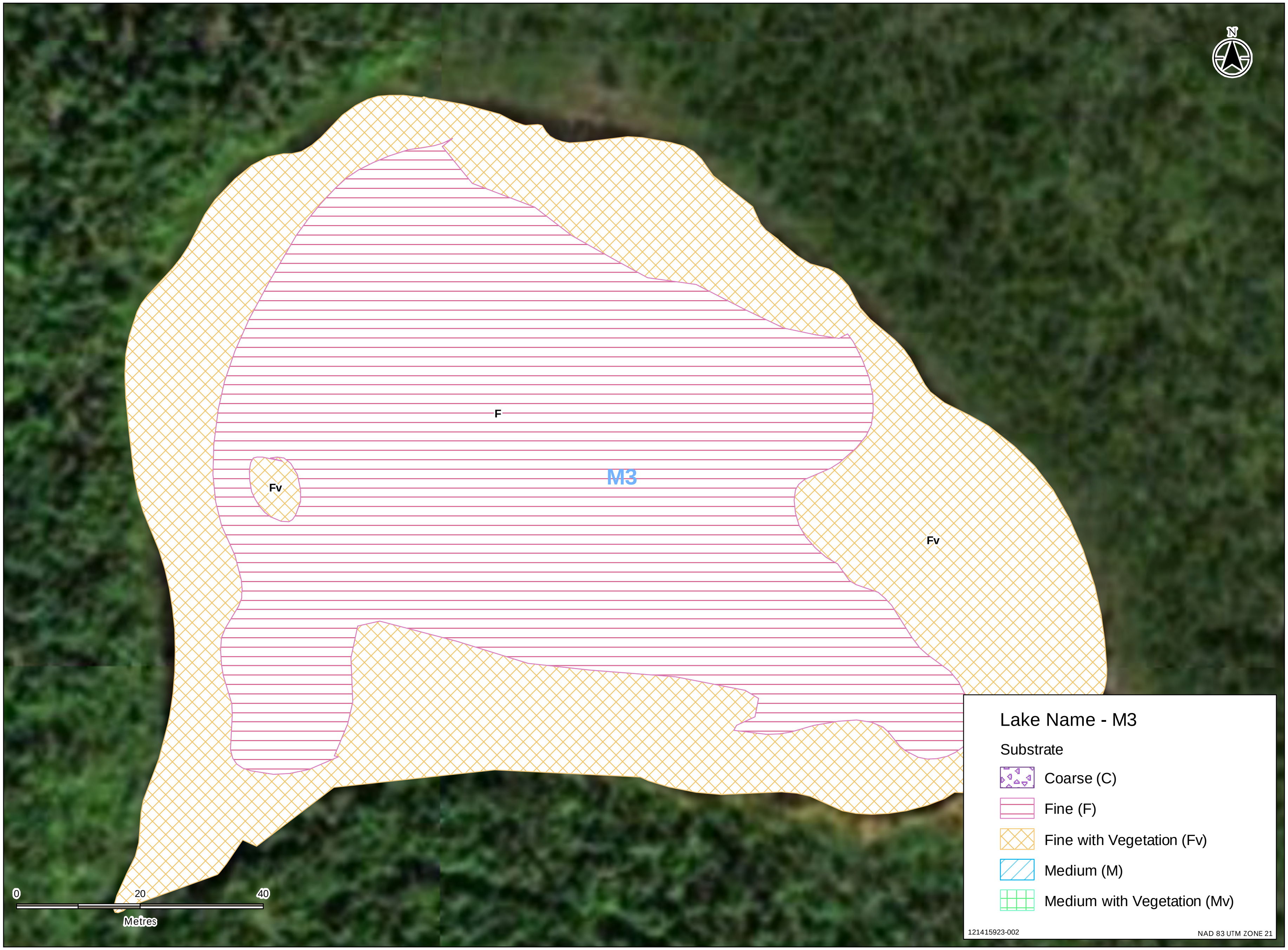

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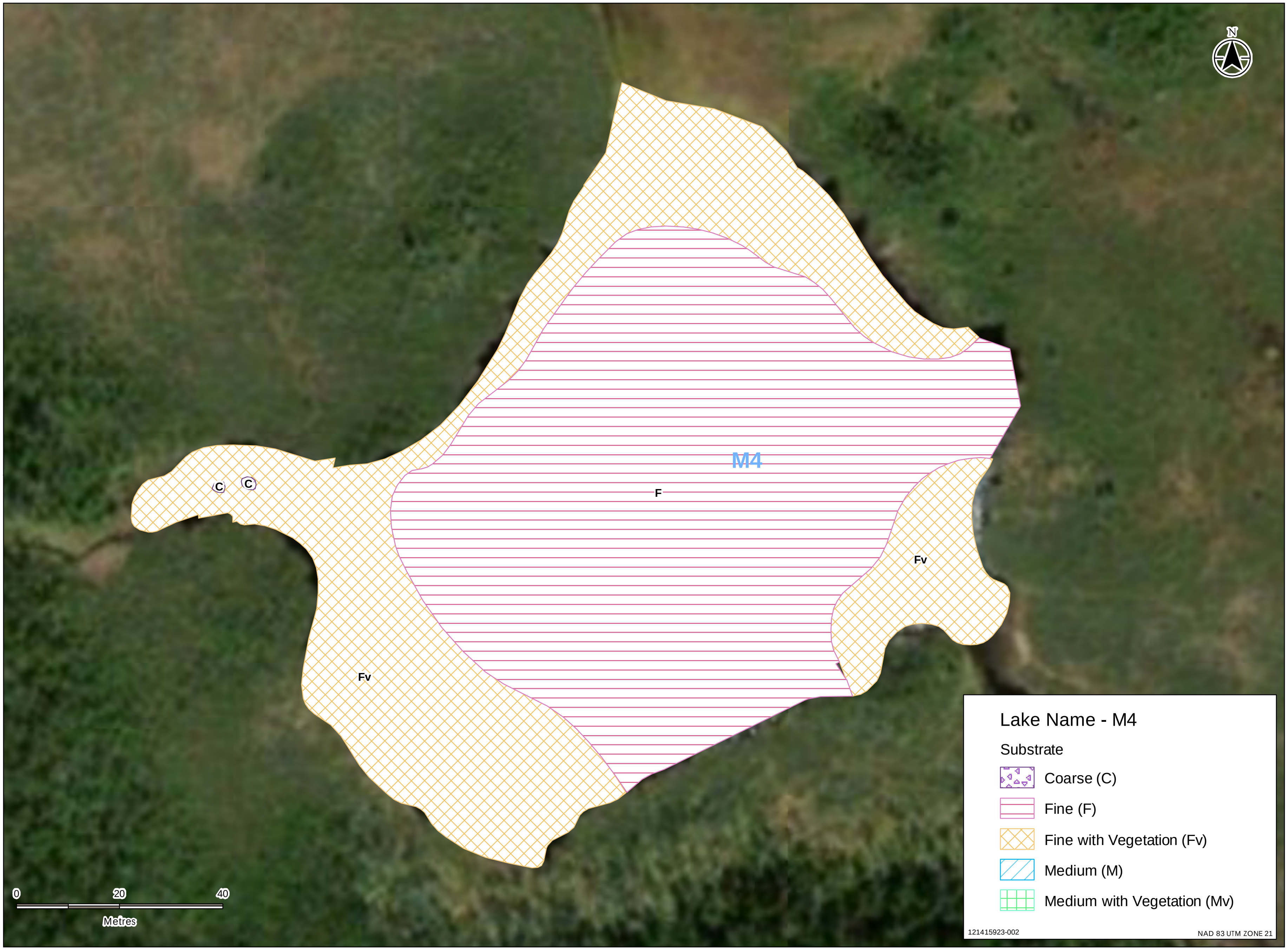

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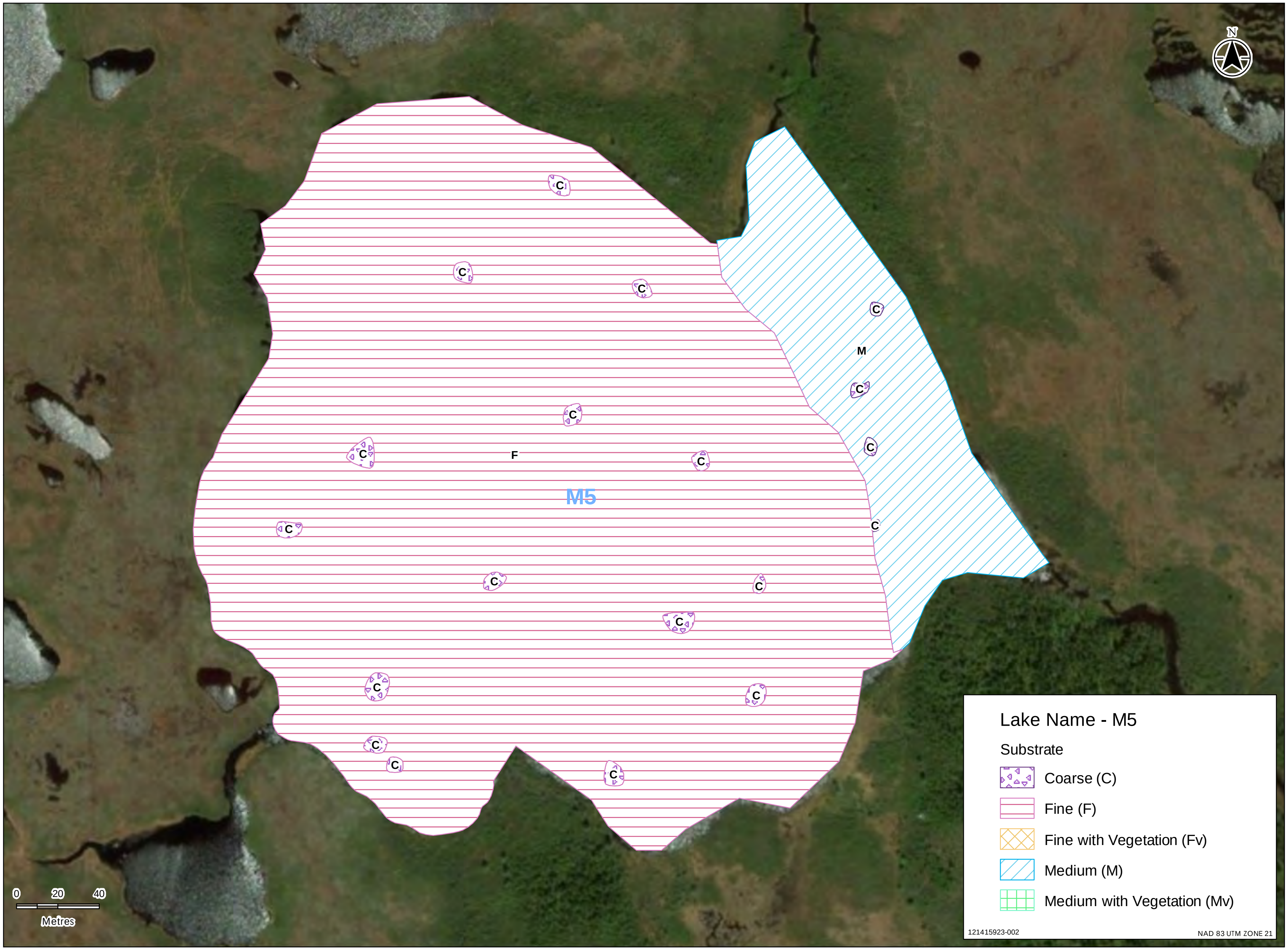

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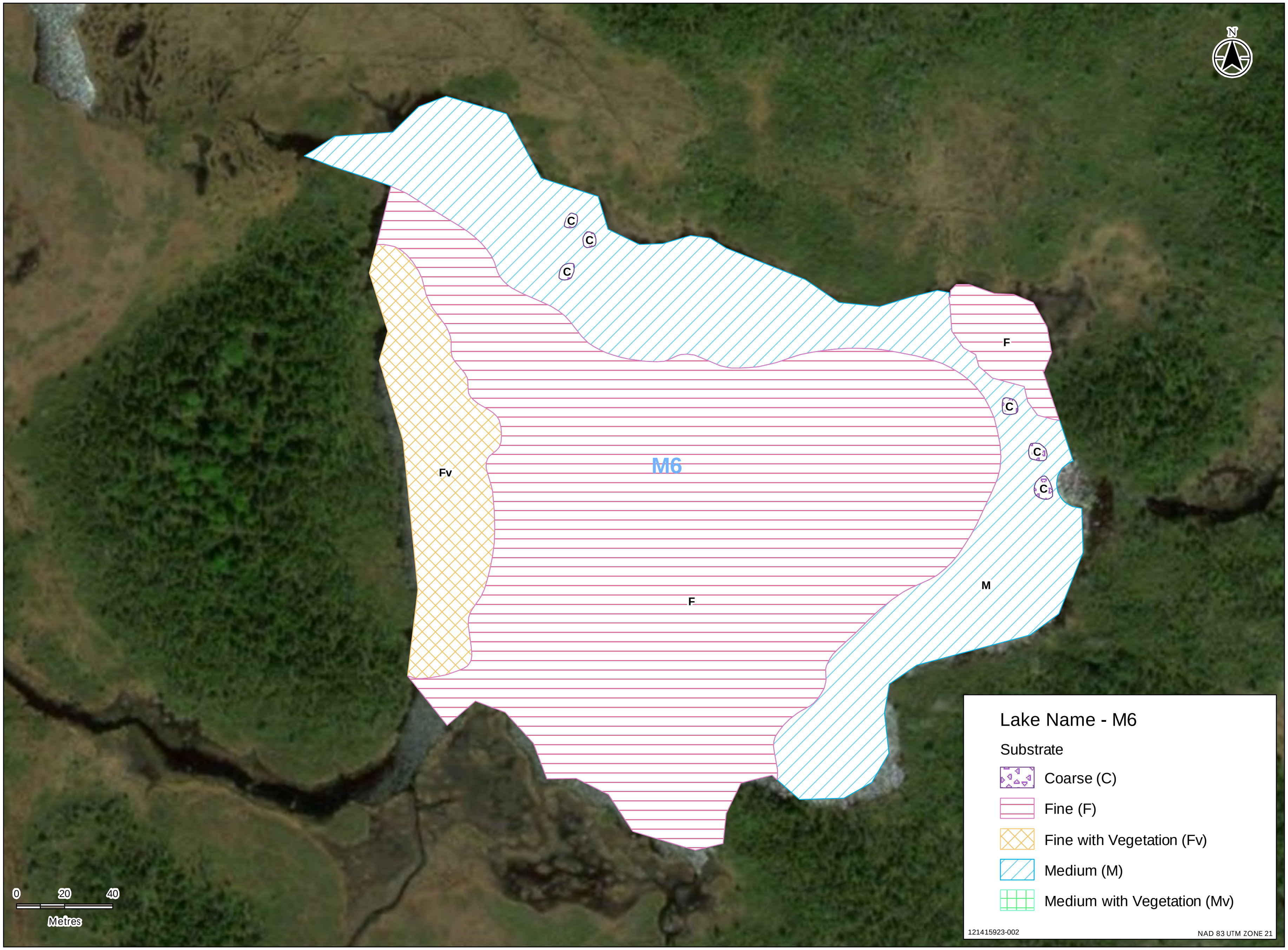

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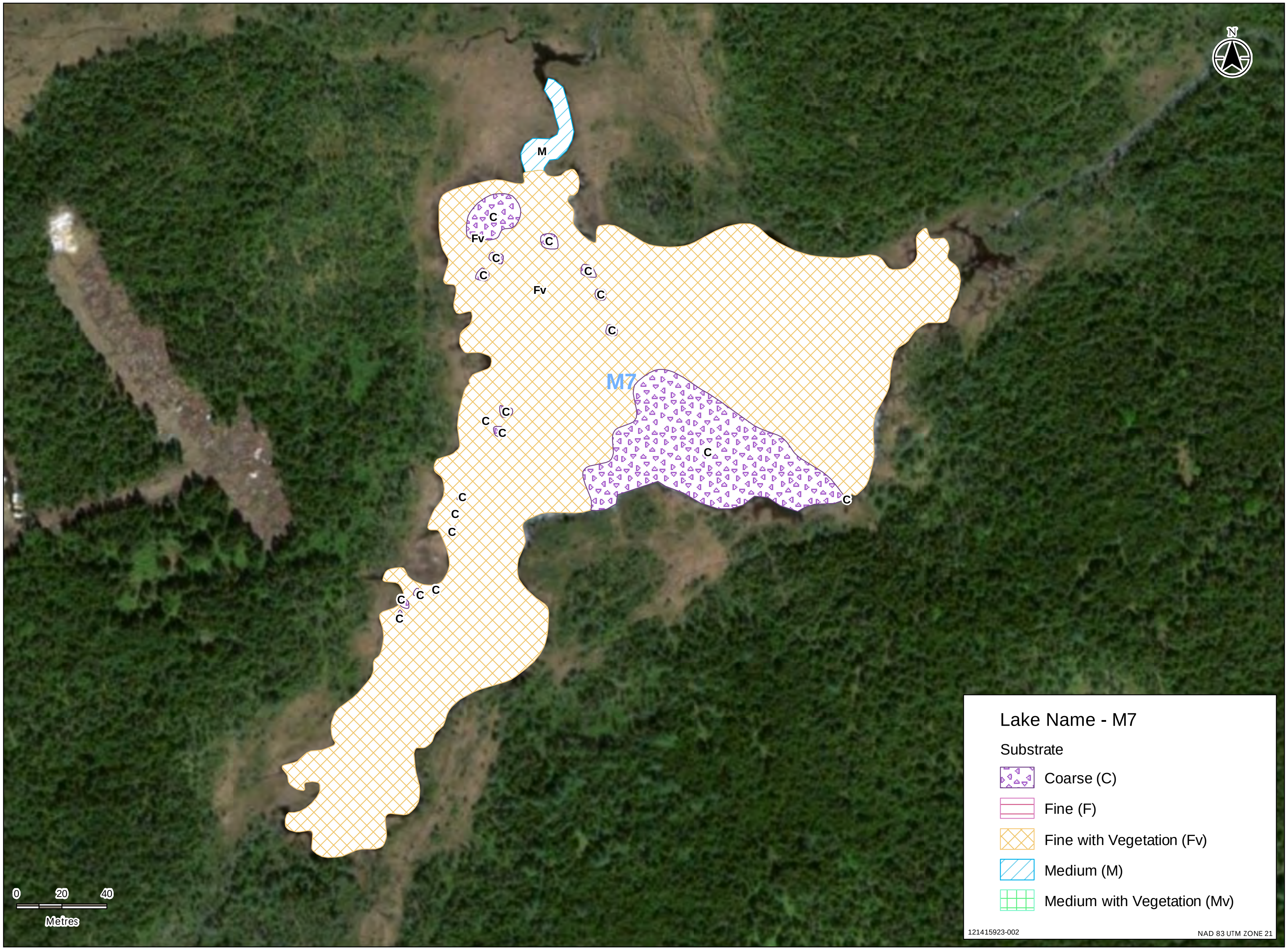
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C
Fv
M7
0
20
40
Metres
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Substrate
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Fine (F)
Fine with Vegetation (Fv)
Medium (M)
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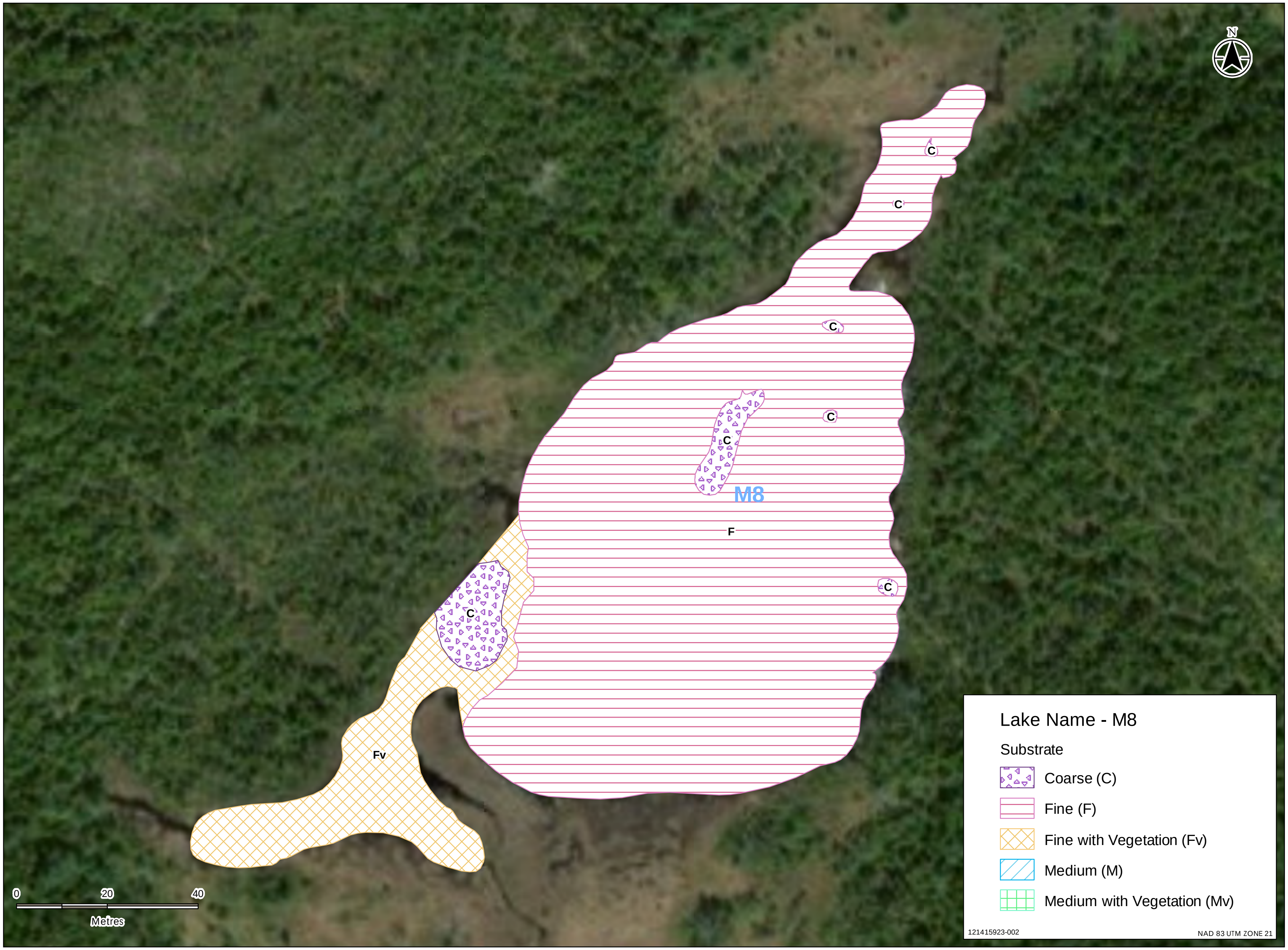
121415923-002
NAD 83 UTM ZONE 21



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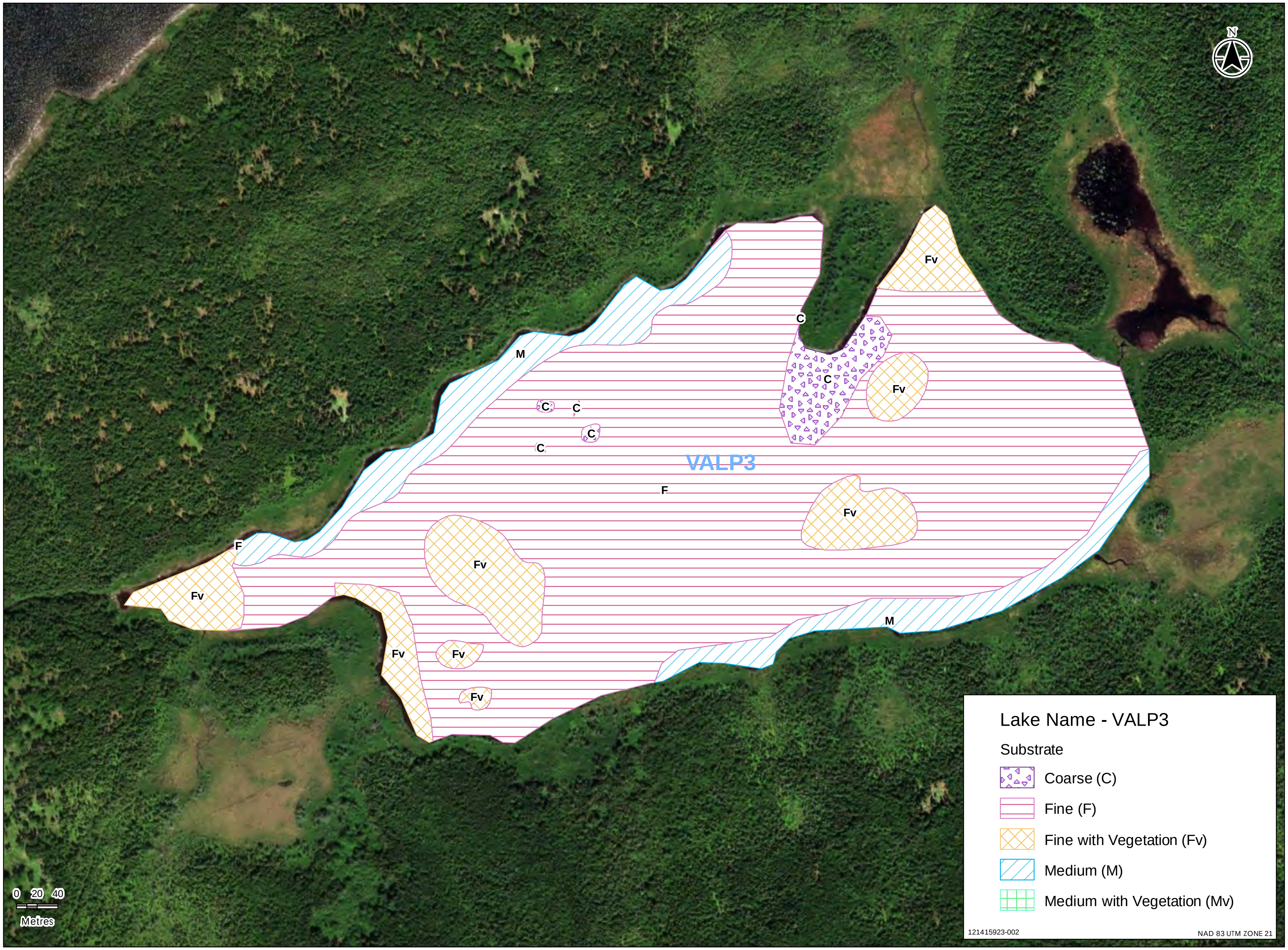

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APPENDIX C

Photos

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<tr><th colspan="2">Ponds and Lakes</th></tr>
<tr><td></td><td></td></tr>
<tr><td>Photo 1 Lake Habitat in L1 Facing Southwest</td><td>Photo 2 Emergent Aquatic Vegetation Along Shoreline at L1 at Northern End of the Lake</td></tr>
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<tr><td>Photo 3 Rubble/Boulder Substrate Along Shoreline of L1 at Northern End of the Lake</td><td>Photo 4 L2 Shoreline Facing East</td></tr>
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Ponds and Lakes	
	
Photo 5 **Facing Southwest in L2**	**Photo 6** **Aquatic Vegetation Along the Shoreline at L2**
	
Photo 7 **Aquatic Vegetation Near the Southern Shoreline of M2**	**Photo 8** **M2 Facing North East**

Ponds and Lakes	
	
Photo 9 **Downstream View of M2 Facing East**	**Photo 10** **Southern end of M2**
	
Photo 11 **Eastern End of M3 Facing West**	**Photo 12** **Middle of M3 Facing North**

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Photo 13 **Western End of M3 Facing North**

Photo 14 **M4 Facing South**

Photo 15 **M4 Facing South**

Photo 16 **M4 Facing South**

Ponds and Lakes	
	
Photo 17 **Facing Northwest from the Southern End of M5**	**Photo 18** **Facing North East From the Southern End of M5**
	
Photo 19 **Large Substrates and Sparse Aquatic Vegetation**	**Photo 20** **Facing East From the Southern End of M5**

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Photo 21 **Facing Southwest from the Northeastern Corner of M6**	**Photo 22** **Facing West from the Northeastern Corner of M6**
	
Photo 23 **Facing South from the Northeastern Corner of M6**	**Photo 24** **Substrate in the Northeastern Corner of M6**

Ponds and Lakes

Photo 25 **Facing West from the Eastern Side of M7**

Photo 26 **Facing North from the Eastern Side of M7**

Photo 27 **Facing North from the Southern end of M7**

Photo 28 **Aquatic Vegetation and Fine Substrates in M7**

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<tr><td>Photo 37 Unnamed Tributary to Victoria River at 400m From Stream Beginning Facing Upstream</td><td>Photo 38 Unnamed Tributary to Victoria River at 600m From Stream Beginning Facing Upstream</td></tr>
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Stream Surveyed by Ground or Air

Photo 39	**Unnamed Tributary to Victoria River at 800m From Stream Beginning Facing Downstream**	**Photo 40**	**Unnamed Tributary to Victoria River at 1000m From Stream Beginning Facing Upstream**

Photo 41	**Unnamed Tributary to Victoria River at 1200m From Stream Beginning Facing Downstream**	**Photo 42**	**Unnamed Tributary to Victoria River at 1400m From Stream Beginning Facing Upstream**

Stream Surveyed by Ground or Air	
	
Photo 43 **Unnamed Tributary to Victoria River at 1600m From Stream Beginning Facing Upstream**	**Photo 44** **Approximately 3 m high falls 1600 to 1700 m downstream of stream beginning in Unnamed Tributary to Victoria River**
	
Photo 45 **Unnamed Tributary to Victoria River at 1800m From Stream Beginning Facing Upstream**	**Photo 46** **Unnamed Tributary to Victoria River at 1950m From Stream Beginning Facing Upstream**

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<tr><td>Photo 47 Stream M3 to M2 at 0 m from Stream Beginning Facing Downstream</td><td>Photo 48 Stream M3 to M2 at 100 m from Stream Beginning Facing Downstream</td></tr>
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Stream Surveyed by Ground or Air

Photo 51 **Stream ValP3 to M3 at 200 m from ValP3 Facing Downstream**

Photo 52 **Stream ValP3 to M3 at 400 m from ValP3 Facing Downstream**

Photo 53 **Potential Old Water Level Dam at Outlet of ValP3**

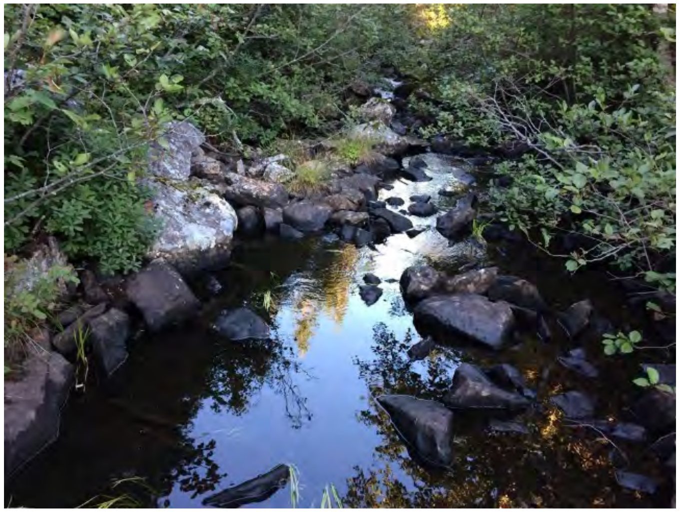

Photo 54 **Stream ValP3 at 100 m Downstream of Outlet Facing Downstream**

Stream Surveyed by Ground or Air

Photo 55 **Unnamed Tributary to Valentine Lake at Stream Beginning (0 m) Facing Upstream**

Photo 56 **Unnamed Tributary to Valentine Lake at Stream Beginning (100 m) Facing Upstream**

Photo 57 **Unnamed Tributary to Valentine Lake at Stream Beginning (200 m) Facing Downstream**

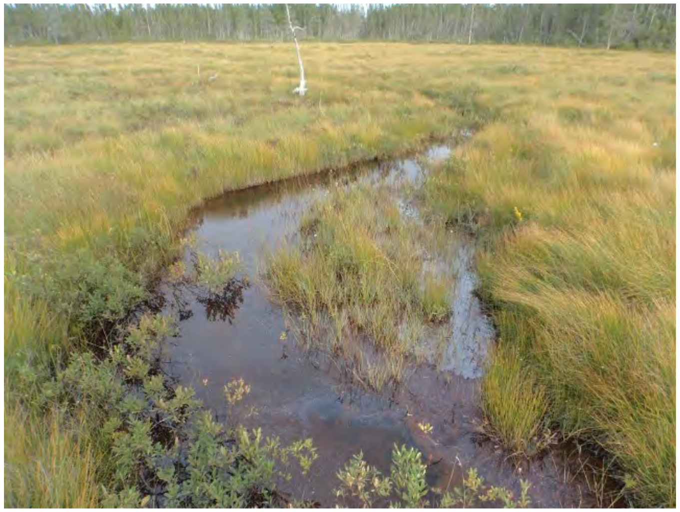

Photo 58 **Unnamed Tributary to Valentine Lake at Stream Beginning (300 m) Facing Downstream**

Stream Surveyed by Ground or Air

Photo 59 **Inlet to M4 0 m from M4 Facing Upstream**

Photo 60 **Inlet to M4 100 m Upstream from M4 Facing Upstream**

Photo 61 **Outlet of M4 0 m from Valentine Lake Facing Downstream**

Photo 62 **Outlet of M4 200 m from Valentine Lake Facing Upstream**

Stream Surveyed by Ground or Air

Photo 63 **Outlet of M4 400 m from Valentine Lake Facing Upstream**

Photo 64 **Outlet of M4 600 m from Valentine Lake Facing Upstream**

Photo 65 **Stream M6 to M5 at 100 m from M6 Facing Upstream**

Photo 66 **Stream M6 to M5 at 200 m from M6 Facing Upstream**

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<tr><td>Photo 73 Stream M7 to M6 at 1000 m Upstream of M7 Facing Upstream</td><td>Photo 74 Stream M7 to M6 at 1200 m Upstream of M7 Facing Upstream</td></tr>
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Stream Surveyed by Ground or Air

Photo 75 Stream M7 to M6 at 1400 m Upstream of M7 Facing Upstream

Photo 76 Stream M7 to M6 at 1600 m Upstream of M7 Facing Upstream

Photo 77 Outlet of M7 at 0 to 100 m From M7 Facing Downstream

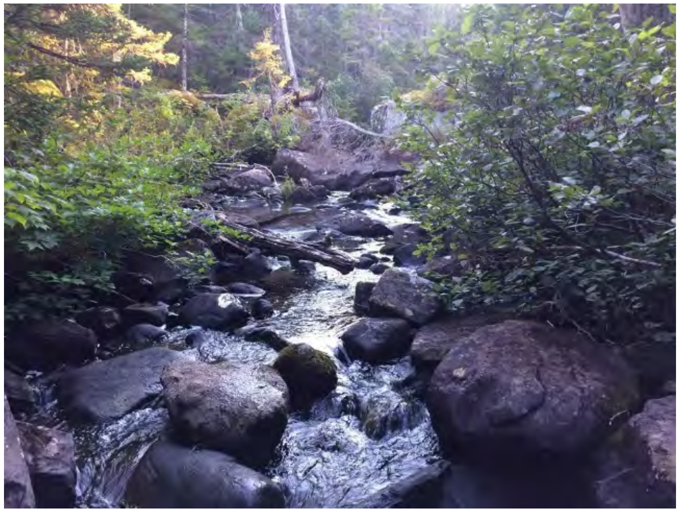

Photo 78 Outlet of M7 at 200 to 300 m From M7 Facing Upstream

Stream Surveyed by Ground or Air

Photo 79 **Outlet of M7 at 400 to 500 m From M7 Facing Upstream**

Photo 80 **Outlet of M7 at 600 to 700 m From M7 Facing Upstream**

Photo 81 **Outlet of M7 at 800 to 900 m From M7 Facing Upstream**

Photo 82 **Outlet of M8 at 0 to 100 m From M8 Facing Upstream**

Stream Surveyed by Ground or Air

Photo 83 **Outlet of M8 at 200 to 300 m From M8 Facing Upstream**

Photo 84 **Outlet of M8 at 400 to 500 m From M8 Facing Upstream**

Photo 85 **Outlet of M8 at 600 to 700 m From M8 Facing Downstream**

Photo 86 **Outlet of M8 at 800 to 900 m From M8 Facing Upstream**

<table>
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<tr><td>Photo 87</td><td>Outlet of M8 at 1000 to 1100 m From M8 Facing Upstream</td><td>Photo 88</td><td>Confluence of M7/M8 to Victoria River at 0 to 100 m DS from Confluence Facing Upstream</td></tr>
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<tr><td>Photo 89</td><td>Confluence of M7/M8 to Victoria River at 100 to 200 m DS from Confluence Facing Upstream</td><td>Photo 90</td><td>Confluence of M7/M8 to Victoria River at 200 to 300 m DS from Confluence Facing Downstream</td></tr>
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<table>
<tr><th colspan="2">Stream Surveyed by Ground or Air</th></tr>
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Stream Surveyed by Ground or Air

Photo 95 **Stream M1 to M7 at 600 to 700 m DS of M1 Facing Upstream**

Photo 96 **Stream M1 to M7 at 800 to 900 m DS of M1 Facing Upstream**

Photo 97 **Stream M1 to M7 at 1000 to 1100 m DS of M1 Facing Downstream**

Photo 98 **Stream M1 to M7 at 1200 to 1300 m DS of M1 Facing Upstream**

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Stream Crossing

Photo 101	**Stream Crossing C001 0 to 50 m Upstream Facing Upstream**
Photo 102	**Stream Crossing C001 0 to 50 m Downstream Facing Upstream**

Photo 103	**Stream Crossing C001a 0 to 50 m Upstream Facing Downstream**
Photo 104	**Stream Crossing C001a 0 to 50 m Downstream Facing Upstream**

Stream Crossing

Photo 105 **Stream Crossing C002 0 to 50 m Upstream Facing Downstream**

Photo 106 **Stream Crossing C002 0 to 50 m Downstream Facing Upstream**

Photo 107 **Stream Crossing C003 0 to 50 m Upstream Facing Upstream**

Photo 108 **Stream Crossing C003 0 to 50 m Downstream Facing Upstream**

<table>
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<tr><td>Photo 111 Stream Crossing C005 0 to 50 m Upstream Facing Downstream</td><td>Photo 112 Stream Crossing C005 0 to 50 m Downstream Facing Upstream</td></tr>
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Stream Crossing	
	
Photo 113 **Stream Crossing C006 0 to 50 m Upstream Facing Upstream**	**Photo 114** **Stream Crossing C006 0 to 50 m Downstream Facing Downstream**
	
Photo 115 **Stream Crossing C008 0 to 50 m Upstream Facing Upstream**	**Photo 116** **Stream Crossing C008 0 to 50 m Downstream Facing Upstream**

Stream Crossing

Photo 117 **Stream Crossing C009 0 to 50 m Upstream Facing Upstream**

Photo 118 **Stream Crossing C009 0 to 50 m Downstream Facing Upstream**

Photo 119 **Stream Crossing C010 0 to 50 m Upstream Facing Upstream**

Photo 120 **Stream Crossing C010 0 to 50 m Downstream Facing Upstream**

Stream Crossing

Photo 121 **Stream Crossing C011 0 to 100 m Upstream Facing Upstream**

Photo 122 **Stream Crossing C011 0 to 100 m Downstream Facing Upstream**

Photo 123 **Stream Crossing C012 0 to 100 m Upstream Facing Upstream**

Photo 124 **Stream Crossing C012 0 to 100 m Downstream Facing Downstream**

Stream Crossing

Photo 125 **Stream Crossing C013 0 to 50 m Upstream Facing Upstream**

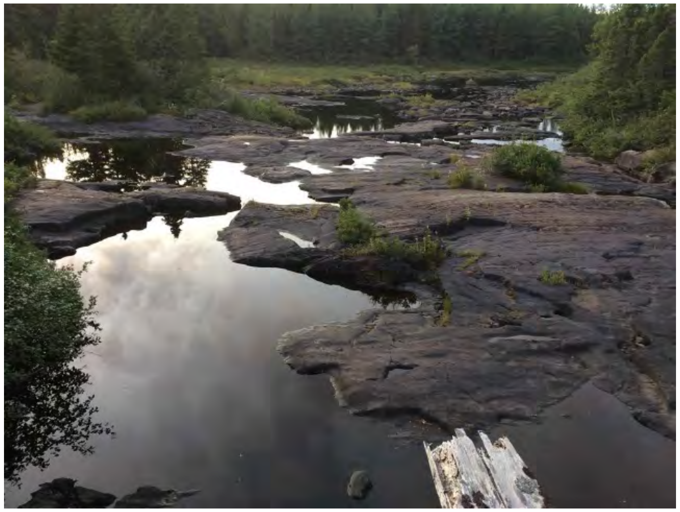

Photo 126 **Stream Crossing C013 0 to 50 m Upstream Facing Downstream**

Photo 127 **Stream Crossing C014 0 to 50 m Upstream Facing Upstream**

Photo 128 **Stream Crossing C014 0 to 50 m Upstream Facing Downstream**

APPENDIX D

Stream Habitat Classification Data

Table D.1. Habitat Classification Data from Streams Surveyed by Ground or Air

Location	Sub-section	Distance [1] (m)	Photo US	Photo DS	WPT	Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m) 1/4	Mean Depth (m) 1/2	Mean Depth (m) 3/4	Velocity [2] (m/s) 1/4	Velocity [2] (m/s) 1/2	Velocity [2] (m/s) 3/4	Slope	Habitat Type (%) Riffle/Run	Habitat Type (%) Pool	Habitat Type (%) Flat	Habitat Type (%) Pond	Substrate [3] (%) Fines	Substrate [3] (%) Gravel	Substrate [3] (%) Cobble/Rubble	Substrate [3] (%) Boulder	Substrate [3] (%) Bedrock	Riparian Vegetation [4] (%) Grass	Riparian Vegetation [4] (%) Shrub	Riparian Vegetation [4] (%) Trees	Overhead Cover (%)	Instream Cover (%)	Comment
(14) Unnamed Tributary to Victoria River	0 to 100 m DS	0	3011	3014	67	25.00	29.00	0.60	0.60	0.70	0.00	0.00	0.00	1	0	0	0	100	100	0	0	0	0	40	40	20	2	90	No defined channel at beginning of mapped watercourse, beaver impoundment
(14) Unnamed Tributary to Victoria River	100 to 200 m DS	100	3015	3016	70	1.80	1.90	0.46	0.46	0.49	0.00	0.00	0.00	1	0	100	0	0	95	0	0	0	5	60	40	0	10	20	
(14) Unnamed Tributary to Victoria River	200 to 300 m DS	200	3017	3018	72	0.90	2.00	-	0.20	-	-	0.08	-	1	0	0	100	0	100	0	0	0	0	100	0	0	60	30	channel dissipates through wetland, brook trout observed in pool
(14) Unnamed Tributary to Victoria River	300 to 400 m DS	300	3020	3019	75	1.80	2.50	-	0.10	-	-	0.00	-	1	0	0	100	0	100	0	0	0	0	80	20	0	10	20	channel dissipated through wetland
(14) Unnamed Tributary to Victoria River	400 to 500 m DS	400	3021	3022	76	1.37	1.55	-	0.16	-	-	0.00	-	1	0	0	100	0	100	0	0	0	0	80	20	0	20	80	well defined channel
(14) Unnamed Tributary to Victoria River	500 to 600 m DS	500	3023	3024	77	0.80	1.00	-	0.16	-	-	0.06	-	1	0	0	100	0	70	0	30	0	0	50	50	0	50	60	brook trout observed
(14) Unnamed Tributary to Victoria River	600 to 700 m DS	600	3025	3026	81	0.70	2.20	-	0.05	-	-	-	-	1	100	0	0	0	0	10	50	40	0	0	100	0	100	30	watercourse leaves bog
(14) Unnamed Tributary to Victoria River	700 to 800 m DS	700	3027	3028	82	2.36	2.40	0.05	0.05	0.04	-	-	-	1	95	5	0	0	5	15	70	10	0	5	95	0	95	10	
(14) Unnamed Tributary to Victoria River	800 to 900 m DS	800	3029	3030	83	1.20	1.30	0.07	0.10	0.10	-	0.03	-	1	95	5	0	0	0	75	20	5	0	10	80	10	70	10	
(14) Unnamed Tributary to Victoria River	900 to 1000 m DS	900	3031	3032	85	2.90	4	0.12	0.20	0.70	-	0.01	-	1	90	10	0	0	5	60	25	10	0	10	70	20	70	10	brook trout observed
(14) Unnamed Tributary to Victoria River	1000 to 1100 m DS	1000	3033	3034	86	23.00	23	1.50	2.00	1.50	-	0.00	-	1	10	0	0	90	95	0	5	0	0	10	70	20	5	30	
(14) Unnamed Tributary to Victoria River	1100 to 1200 m DS	1100	3038	3039	88	1.90	3	0.09	0.11	0.07	-	-	-	1	10	90	0	0	5	25	45	25	0	30	60	10	10	10	hanging culvert (Photo 3040), water goes under culvert
(14) Unnamed Tributary to Victoria River	1200 to 1300 m DS	1200	3043	3042	90	2.50	3	0.02	0.09	0.06	-	-	-	10	90	10	0	0	5	15	30	50	0	40	50	10	5	30	high gradient, ~five brook trout observed
(14) Unnamed Tributary to Victoria River	1300 to 1400 m DS	1300	3044	3045	92	1.39	4.04	0.08	0.05	0.07	-	0.05	-	10	50	50	0	0	5	30	25	40	0	20	25	55	40	10	high gradient
(14) Unnamed Tributary to Victoria River	1400 to 1500 m DS	1400	3046	3047	93	1.72	4.00	0.09	0.11	0.05	-	0.02	-	10	80	20	0	0	0	20	60	20	0	40	5	55	5	5	high gradient
(14) Unnamed Tributary to Victoria River	1500 to 1600 m DS	1500	3049	3048	94	2.59	3.40	0.11	0.19	0.14	-	0.01	-	10	80	20	0	0	5	20	35	40	0	30	0	70	0	20	high gradient, few small holding pools
(14) Unnamed Tributary to Victoria River	1600 to 1700 m DS	1600	3050	3051	95	0.67	5.00	-	0.14	-	-	0.11	-	20	100	0	0	0	0	15	25	60	0	60	0	40	5	5	Step pool habitat, ~3m high falls (Photo 3052)
(14) Unnamed Tributary to Victoria River	1700 to 1800 m DS	1700	3052	3053	97	2.13	3.56	0.12	0.17	0.20	-	0.01	-	20	100	0	0	0	0	15	25	60	0	60	0	40	0	0	Step pool habitat
(14) Unnamed Tributary to Victoria River	1800 to 1850 m DS	1800	3054	3055	98	1.57	4.12	0.04	0.01	0.05	-	-	-	10	85	15	0	0	0	15	40	45	0	30	0	70	5	15	
(14) Unnamed Tributary to Victoria River	1850 to 1950 m DS	1850	1204	1205	99	1.25	2.75	0.06	0.09	0.04	-	0.00	-	1	90	10	0	0	5	20	35	40	0	60	10	30	15	10	low gradient, culvert
(14) Unnamed Tributary to Victoria River	1950 to 2050 m DS	1950	1209	1207	294	1.51	2.76	0.10	0.14	0.14	0.00	0.00	0.01	1	95	5	0	0	10	40	30	20	0	5	10	85	15	5	Survey ends at confluence with Victoria River
Summary						**3.76**	**5.07**		**0.26**			**0.02**		**5.0**	**56%**	**16%**	**19%**	**9%**	**34%**	**18%**	**26%**	**22%**	**0%**	**39%**	**35%**	**25%**	**28**	**24**	
(3) M3 to M2	0 to 100	100	897	898	194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Channel becomes intermittent at ~50 m ds
(3) M3 to M2	100 to 200	200	903	904	196	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	dry intermittent channel, no visible channel
(3) M3 to M2	200 to 300	300	906	907	197	1.50	1.60	0.40	0.60	0.40	0.00	0.00	0.00	0.5	0	0	100	0	100	0	0	0	0	80	10	10	40	30	defined channel , beaver dam ~6' wide ~25 m from lake
Summary						**1.50**	**1.60**		**0.47**			**0.00**		**0.5**	**0%**	**0%**	**100%**	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**80%**	**10%**	**10%**	**40**	**30**	
(2) ValP3 to M3	0 to 100 m US	100	129	130	185	8.00	8.50	0.30	0.40	0.30	0.00	0.00	0.00	0.5	20	0	0	80	75	0	5	20	0	30	65	5	5	40	
(2) ValP3 to M3	100 to 200 m US	200	132	131	186	2.50	3.00	0.00	0.40	0.00	-	0.01	0.00	0.5	0	0	100	0	0	0	50	50	0	10	75	15	40	10	
(2) ValP3 to M3	200 to 300 m US	300	133	134	187	3.50	4.50	0.60	1.00	0.60	0.00	0.00	0.00	0.5	0	0	20	80	70	0	0	30	0	95	0	5	5	30	
(2) ValP3 to M3	300 to 400 m US	400	135	136	189	50.00	52.00	0.30	0.80	0.30	0.00	0.00	0.00	0.5	0	0	0	100	100	0	0	0	0	65	15	20	10	60	
(2) ValP3 to M3	400 to 500 m US	500	137	138	190	0.77	0.88	0.19	0.15	0.18	0.00	0.00	0.00	0.5	0	0	100	0	100	0	0	0	0	30	55	15	30	80	
(2) ValP3 to M3	500 to 600 m US	600	888	890	191	0.50	0.69	0.14	0.17	0.09	0.00	0.00	0.00	0.5	0	0	100	0	100	0	0	0	0	10	30	60	40	30	Survey ends at lake
Summary						**10.88**	**11.60**		**0.33**			**0.00**		**0.5**	**3%**	**0%**	**53%**	**43%**	**74%**	**0%**	**9%**	**14%**	**0%**	**40%**	**40%**	**20%**	**22**	**42**	
(1) Outlet of ValP3	0 to 100 m DS	0	926	930	213	3.25	3.60	0.06	0.14	0.06	0.01	0.30	0.01	1	60	40	0	0	10	10	55	25	0	10	40	50	40	20	Series of riffles and pools, old water level dam between lake and brook
Summary						**3.25**	**3.60**		**0.09**			**0.11**		**1**	**60%**	**40%**	**0%**	**0%**	**10%**	**10%**	**55%**	**25%**	**0%**	**10%**	**40%**	**50%**	**40**	**20**	
(13) Unnamed Tributary to Valentine Lake	0 to 100 m	100	101	100	118	0.63	1.20	0.20	0.22	0.14	-	0.00	-	0.5	0	0	100	0	100	0	0	0	0	70	30	0	40	60	
(13) Unnamed Tributary to Valentine Lake	100 to 200 m	200	102	103	119	6.00	7.00	0.30	0.60	0.40	0.00	0.00	0.00	0.5	0	0	0	100	95	0	0	5	0	20	30	50	2	40	
(13) Unnamed Tributary to Valentine Lake	200 to 300 m	300	104	105	120	0.58	0.61	-	0.10	-	0.00	0.01	0.00	0.5	0	0	100	0	95	0	0	5	0	30	65	5	80	30	
(13) Unnamed Tributary to Valentine Lake	300 to 400 m	400	107	108	121	0.78	0.85	0.16	0.31	0.15	0.00	0.01	0.00	0.5	0	0	100	0	100	0	0	0	0	70	30	0	35	40	Watercourse ends in a string bog, end of defined channel at approximately 483 m from beginning of survey, manganese floc present on surface, lots of brown floc
Summary						**2.00**	**2.42**		**0.26**			**0.00**		**0.5**	**0%**	**0%**	**75%**	**25%**	**98%**	**0%**	**0%**	**3%**	**0%**	**48%**	**39%**	**14%**	**39**	**43**	
(4) Inlet to M4	0 to 100 m	100	3089	-	114	-	-	0.05	-	-	-	-	-	0.5	0	0	0	0	-	-	-	-	-	-	-	-	-	-	Poorly defined channel which drains grassy wetlands
(4) Inlet to M4	100 to 150 m	150	3090	3091	115	4.50	4.50	0.12	0.08	0.25	-	-	-	0.5	0	0	100	0	100	0	0	0	0	60	40	0	2	40	fish present where water forms pools
Summary						**4.50**	**4.50**		**0.13**			**-**		**0.5**	**0%**	**0%**	**100%**	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**60%**	**40%**	**0%**	**2**	**40**	
(5) Outlet of M4	0 to 100 m US	0	3066	3067	101	0.38	1.40	0.01	0.04	0.03	-	-	-	1	0	0	100	0	100	0	0	0	0	50	50	0	0	20	
(5) Outlet of M4	100 to 200 Us	100	3071	3072	103	0.60	0.60	0.08	0.09	0.05	-	0.00	-	0.5	0	0	100	0	70	0	0	30	0	50	50	0	90	40	
(5) Outlet of M4	200 to 300 US	200	3073	3074	104	1.95	2.00	0.16	0.16	0.14	0.02	0.01	0.00	0.5	0	0	100	0	40	0	0	60	0	70	30	0	5	80	
(5) Outlet of M4	300 to 400 US	300	3075	3076	105	1.43	1.48	0.26	0.22	0.05	0.00	0.00	0.00	0.5	0	0	100	0	60	0	0	40	0	80	20	0	5	50	
(5) Outlet of M4	400 to 500 US	400	3081	3081	106	0.79	0.86	0.08	0.12	0.05	0.00	0.01	0.00	0.5	0	0	100	0	70	0	0	30	0	80	20	0	5	50	
(5) Outlet of M4	500 to 600 US	500	3082	3083	107	-	-	-	-	-	-	-	-	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	Undefined channel through wetland
(5) Outlet of M4	600 to 700 US	600	3084	3085	108	1.50	1.50	0.11	0.22	0.11	0.00	0.01	0.00	0.5	0	0	100	0	100	0	0	0	0	100	0	0	60	20	
(5) Outlet of M4	700 to 800 US	700	3086	3087	109	0.94	1.53	0.11	0.10	0.05	-	0.01	-	0.5	0	0	100	0	60	0	30	10	0	20	80	0	60	10	
(5) Outlet of M4	800 to 900 DS	800	-	-	110	50.00	53.00	0.40	1.00	0.40	-	-	-	0.5	0	0	0	100	90	0	0	10	0	20	70	10	2	15	fish observed in pools
(5) Outlet of M4	900 to 1000 DS	900	-	-	111	4.00	5.50	0.21	0.22	0.12	-	0.00	-	0.5	0	0	0	100	60	0	0	40	0	45	50	5	2	10	
(5) Outlet of M4	1000 to 1100 DS	1000	-	-	112	-	-	-	-	-	-	-	-	-	0	0	100	0	-	-	-	-	0	-	-	-	-	-	Undefined channel through wetland
(5) Outlet of M4	1100 to 1200 DS	1100	3088	-	113	0.30	0.40	0.07	0.10	0.05	-	-	-	0.5	0	0	100	0	90	0	0	10	0	50	50	0	60	10	
(5) Outlet of M4	1200 to 1300 DS	1200	3089	-	114	-	-	0.05	-	-	-	-	-	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	Poorly defined channel
(5) Outlet of M4	1300 to 1400 DS	1300	3090	3091	115	4.50	4.50	0.12	0.08	0.25	-	-	-	0.5	0	0	100	0	100	0	0	0	0	60	40	0	2	40	
Summary						**6.04**	**6.62**		**0.16**			**0.06**		**0.5**	**0%**	**0%**	**83%**	**17%**	**76%**	**0%**	**3%**	**21%**	**0%**	**57%**	**42%**	**1%**	**26**	**31**	
(6) M6 to M5	0 to 100 m US	100	1261	-	42	16	-	-	-	-	-	-	-	0.5	0	0	100	0	100	0	0	0	0	20	40	40	0	40	instream cover is aquatic vegetation
(6) M6 to M5	100 to 200 m US	200	1262	-	44	10	-	-	-	-	-	-	-	0.5	0	0	100	0	100	0	0	0	0	40	55	5	0	60	
(6) M6 to M5	200 to 300 m US	300	1263	-	45	6	-	-	-	-	-	-	-	0.5	0	0	100	0	100	0	0	0	0	30	40	30	0	30	
(6) M6 to M5	300 to 400 m US	400	1265	-	47	8	-	-	-	-	-	-	-	0.5	0	0	100	0	100	0	0	0	0	10	20	70	0	50	
Summary						**10.00**	**-**		**-**			**-**		**0.5**	**0%**	**0%**	**100%**	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**25%**	**39%**	**36%**	**0**	**45**	
(7) M7 to M6	0 to 100 m US	100	1268	-	48	2	-	-	-	-	-	-	-	0.5	0	0	90	10	40	0	30	30	0	45	50	5	0	5	
(7) M7 to M6	100 to 200 m US	200	1269	-	49	2	-	-	-	-	-	-	-	0.5	0	0	100	0	40	0	30	30	0	50	50	0	0	5	
(7) M7 to M6	200 to 300 m US	300	1270	-	50	3	-	-	-	-	-	-	-	0.5	100	0	0	0	40	0	30	30	0	20	50	30	0	5	
(7) M7 to M6	300 to 400 m US	400	1271	-	51	1	-	-	-	-	-	-	-	0.5	100	0	0	0	40	0	30	30	0	0	50	50	0	10	
(7) M7 to M6	400 to 500 m US	500	1272	-	52	2	-	-	-	-	-	-	-	0.5	100	0	0	0	0	0	0	90	0	0	50	50	10	0	
(7) M7 to M6	500 to 600 m US	600	1273	-	53	-	-	-	-	-	-	-	-	0.5	100	0	0	0	0	0	0	70	0	10	40	50	20	0	
(7) M7 to M6	600 to 700 m US	700	1274	-	54	1	-	-	-	-	-	-	-	0.5	100	0	0	0	0	0	0	0	0	0	30	70	0	50	
(7) M7 to M6	700 to 800 m US	800	1275	-	55	-	-	-	-	-	-	-	-	0.5	50	0	25	25	0	0	30	70	0	10	40	50	10	0	
(7) M7 to M6	800 to 900 m US	900	1276	-	56	2.5	-	-	-	-	-	-	-	0.5	100	0	0	0	0	0	30	70	0	0	90	10	0	0	
(7) M7 to M6	900 to 1000 m US	1000	1277	-	57		-	-	-	-	-	-	-	0.5	60	0	40	0	-	-	-	-	-	10	70	20	0	0	could not determine substrate
(7) M7 to M6	1000 to 1100 m US	1100	1278	-	58	-	-	-	-	-	-	-	-	0.5	100	0	0	0	50	0	20	30	0	40	50	10	10	0	
(7) M7 to M6	1100 to 1200 m US	1200	1279	-	59	1.5	-	-	-	-	-	-	-	0.5	0	0	90	10	50	0	10	40	0	0	90	10	0	0	
(7) M7 to M6	1200 to 1300 m US	1300	1280	-	60	3	-	-	-	-	-	-	-	0.5	0	0	100	0	100	0	0	0	0	10	50	40	0	90	submergent vegetation
(7) M7 to M6	1300 to 1400 m US	1400	1281	-	61	1.5	-	-	-	-	-	-	-	0.5	100	0	0	0	0	0	20	80	0	0	60	40	10	0	
(7) M7 to M6	1400 to 1500 m US	1500	1282	-	63	2	-	-	-	-	-	-	-	0.5	0	0	100	0	95	0	0	5	0	0	60	40	0	80	submergent vegetation
(7) M7 to M6	1500 to 1600 m US	1600	1284	-	65	3	-	-	-	-	-	-	-	0.5	0	0	100	0	20	0	70	10	0	0	40	60	10	0	

Note: - indicates data not available, for velocity it was a result of insufficient depths

Table D.1. Habitat Classification Data from Streams Surveyed by Ground or Air

Location	Sub-section	Distance [1] (m)				Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m)			Velocity [2] (m/s)			Slope	Habitat Type (%)				Substrate [3] (%)					Riparian Vegetation [4] (%)			Overhead Cover (%)	Instream Cover (%)	Comment
			Photo US	Photo DS	WPT			1/4	1/2	3/4	1/4	1/2	3/4		Riffle/Run	Pool	Flat	Pond	Fines	Gravel	Cobble/Rubbl	Boulder	Bedrock	Grass	Shrub	Trees			
Summary						**2.04**	**-**		**-**			**-**		**0.5**	**57%**	**0%**	**40%**	**3%**	**35%**	**0%**	**22%**	**43%**	**0%**	**12%**	**54%**	**33%**	**4**	**15**	
(9) Outlet of M7	0 to 100 m DS	100	1121	1123	240	2.70	3.70	0.09	0.17	0.11	0.20	0.50	0.20	2	90	10	0	0	0	5	30	65	0	5	75	20	10	10	Eastern pearlshell mussels observed
(9) Outlet of M7	100 to 200 m DS	200	1027	1028	241	2.03	2.17	0.10	0.15	0.08	0.15	0.05	0.20	2	85	15	0	0	0	10	40	50	0	5	35	60	15	10	
(9) Outlet of M7	200 to 300 m DS	300	1029	1030	242	3.04	3.64	0.19	0.19	0.16	0.30	0.08	0.20	10	80	20	0	0	0	5	30	60	5	5	40	55	15	10	
(9) Outlet of M7	300 to 400 m DS	400	1031	1032	243	2.52	3.10	0.14	0.24	0.16	0.05	0.20	0.18	5	90	10	0	0	0	5	30	60	5	45	10	45	5	10	
(9) Outlet of M7	400 to 500 m DS	500	1033	1034	244	3.80	4.30	0.07	0.11	0.13	0.05	0.20	0.00	3	90	10	0	0	0	5	60	35	0	30	15	55	10	10	
(9) Outlet of M7	500 to 600 m DS	600	1138	1139	245	1.30	3.70	0.06	0.02	0.07	0.30	1.00	0.90	2	100	0	0	0	0	10	55	30	5	5	15	80	60	10	
(9) Outlet of M7	600 to 700 m DS	700	1143	1144	246	2.40	3.30	0.28	0.30	0.28	0.03	0.03	0.00	0.5	100	0	0	0	15	65	10	5	5	30	65	5	40	5	
(9) Outlet of M7	700 to 800 m DS	800	1141	1142	285	2.40	3.30	0.28	0.30	0.28	0.03	0.03	0.00	0.5	100	0	0	0	15	65	10	5	5	30	65	5	40	5	Possible fish passage barrier from debris jam on top of large boulder
(9) Outlet of M7	800 to 900 m DS	900	1138	1139	284	2.40	3.30	0.10	0.18	0.20	0.06	0.10	0.05	1	75	25	0	0	0	35	40	20	5	25	60	15	40	5	
(9) Outlet of M7	900 to 1000 m DS	1000	1136	1137	283	2.41	3.70	0.28	0.30	0.28	0.03	0.03	0.00	0.5	100	0	0	0	15	65	10	5	5	30	65	5	40	10	Eastern pearlshell mussels observed
Summary						**2.50**	**3.42**		**0.18**			**0.17**		**2.7**	**91%**	**9%**	**0%**	**0%**	**5%**	**27%**	**32%**	**34%**	**4%**	**21%**	**47%**	**36%**	**28**	**9**	
(11) Outlet of M8	0 to 100 m DS	100	179	180	267	1.27	1.30	0.11	0.18	0.09	-	0.05	-	0.5	0	0	100	0	100	0	0	0	0	10	85	5	95	30	highly braided 20 to 60 m ds of lake, brook trout and stickleback observed
(11) Outlet of M8	100 to 200 m DS	200	181	182	268	1.05	1.34	0.09	0.10	0.05	0.12	0.20	0.08	1	40	60	0	0	50	0	20	30	0	10	75	15	50	20	
(11) Outlet of M8	200 to 300 m DS	300	183	184	269	1.41	1.91	0.09	0.10	0.06	0.05	0.06	0.02	1	90	10	0	0	10	10	40	40	0	25	70	5	10	5	
(11) Outlet of M8	300 to 400 m DS	400	185	186	270	12.00	12.20	0.50	1.00	0.60	0.00	0.00	0.00	0	0	0	0	100	95	0	2	3	0	10	40	50	2	30	
(11) Outlet of M8	400 to 500 m DS	500	187	188	271	1.13	1.85	0.10	0.10	0.12	0.04	0.07	0.07	2	100	0	0	0	15	10	30	45	0	5	85	10	80	5	
(11) Outlet of M8	500 to 600 m DS	600	189	190	272	2.00	2.28	0.14	0.00	0.12	0.06	-	0.10	2	100	0	0	0	5	25	35	35	0	5	55	40	35	5	
(11) Outlet of M8	600 to 700 m DS	700	191	192	273	1.55	2.00	0.18	0.21	0.16	0.00	0.02	0.00	0.5		0	100	0	95	0	5	0	0	5	90	5	95	15	Flow substantially reduced through shrub bog, ~14 brook trout and a school of sticklebacks observed
(11) Outlet of M8	700 to 800 m DS	800	193	194	274	1.12	1.30	0.14	0.10	0.18	0.00	0.00	0.00	0.5	0	25	75	0	70	0	10	20	0	40	60	0	50	30	
(11) Outlet of M8	800 to 900 m DS	900	195	196	275	1.83	2.39	0.10	0.16	0.12	0.05	0.07	0.40	1	85	15	0	0	20	20	25	35	0	10	45	45	20	15	
(11) Outlet of M8	900 to 1000 m DS	1000	199	200	276	1.40	1.50	0.18	0.24	0.16	0.01	0.05	0.00	1	100	0	0	0	30	30	20	20	0	25	45	30	65	30	eastern pearlshell mussels observed
(11) Outlet of M8	1000 to 1100 m DS	1100	201	202	277	1.20	1.50	0.25	0.20	0.06	0.01	0.05	0.01	1	0	0	100	0	40	10	20	30	0	15	80	5	90	20	
Summary						**2.36**	**2.69**		**0.18**			**0.05**		**1.0**	**47%**	**10%**	**34%**	**9%**	**48%**	**10%**	**19%**	**23%**	**0%**	**15%**	**66%**	**19%**	**54**	**19**	
(10) Confluence of M7/M8 to Victoria River	1000 to 1100 m DS	1100	1121	1123	278	2.54	2.62	0.20	0.20	0.08	0.05	0.07	0.00	1	100	0	0	0	10	15	35	40	0	10	80	10	40	10	Eastern pearlshell mussels observed
(10) Confluence of M7/M8 to Victoria River	1100 to 1200 m DS	1200	1127	1128	279	4	4.50	0.20	0.20	0.16	0.02	0.06	0.02	2	70	30	0	0	5	20	35	40	0	5	65	30	10	5	
(10) Confluence of M7/M8 to Victoria River	12000 to 1300 m DS	1300	1130	1131	280	3.60	4.20	0.14	0.12	0.20	0.09	0.08	0.10	2	90	10	0	0	5	10	45	40	0	5	35	55	5	5	
(10) Confluence of M7/M8 to Victoria River	1300 to 1400 m DS	1400	1132	1133	281	3.56	5.21	0.10	0.10	0.22	0.14	0.12	0.07	1	70	30	0	0	5	20	45	30	0	10	30	60	5	5	Confluence with Victoria River
Summary						**3.43**	**4.13**		**0.16**			**0.07**		**1.5**	**87%**	**12%**	**83%**	**0%**	**6%**	**16%**	**40%**	**38%**	**0%**	**8%**	**48%**	**22%**	**15**	**6**	
(8) M1 to M7	0 to 100 m DS	0	145	146	220	1.60	1.80	0.06	0.03	0.10	0.00	0.10	0.05	0.5	60	0	40	0	10	10	45	35	0	40	45	5	30	10	
(8) M1 to M7	100 to 200 m DS	100	148	147	221	2.00	2.20	0.25	0.20	0.25	0.00	0.05	0.00	0.5	0	0	60	40	85	0	5	10	0	45	40	5	30	40	
(8) M1 to M7	200 to 300 m DS	200	149	150	222	1.50	1.80	0.10	0.14	0.29	0.05	-	0.05	0.5	40	0	60	0	80	0	5	15	0	30	30	10	25	30	
(8) M1 to M7	300 to 400 m DS	300	974	975	223	1.30	1.50	0.16	0.21	0.09	0.01	0.05	0.01	0.5	0	0	100	0	85	0	5	10	0	40	40	10	80	60	watercourse runs through bog
(8) M1 to M7	400 to 500 m DS	400	976	977	224	1.15	2.10	0.14	0.15	0.11	0.01	0.01	0.01	0.5	0	0	100	0	90	5	0	5	0	65	30	5	40	40	watercourse runs through bog
(8) M1 to M7	500 to 600 m DS	500	978	-	225	10.00	11.00	0.05	0.80	0.40	0.00	0.00	0.00	0.5	20	0	10	70	90	0	0	10	0	25	25	50	10	90	steady flow, brook trout captured
(8) M1 to M7	600 to 700 m DS	600	982	983	226	5.00	5.20	0.22	0.24	0.10	0.10	0.10	0.05	0.5	0	0	30	70	95	0	0	5	0	50	45	5	60	70	watercourse flows between small ponds
(8) M1 to M7	700 to 800 m DS	700	984	986	227	1.60	2.25	0.10	0.14	0.08	0.01	0.10	0.05	0.5	100	0	0	0	10	0	40	50	0	30	30	40	15	10	
(8) M1 to M7	800 to 900 m DS	800	987	988	228	1.65	1.85	0.16	0.12	0.14	0.01	0.02	0.01	0.5	100	0	0	0	0	5	30	65	0	20	50	30	20	10	higher gradient, courser substrates
(8) M1 to M7	1000 to 1100 m DS	900	989	991	229	1.40	1.91	0.09	0.12	0.05	0.00	0.00	0.01	0.5	100	0	0	0	0	5	30	65	0	20	50	30	20	10	
(8) M1 to M7	1100 to 1200 m DS	1000	993	994	230	1.32	1.85	0.21	0.24	0.24	0.00	0.00	0.00	1	30	0	70	0	50	0	10	40	0	10	70	20	30	5	
(8) M1 to M7	1200 to 1300 m DS	1100	995	996	231	1.55	1.96	0.09	0.16	0.11	0.00	0.10	0.00	1	80	0	20	0	0	0	10	90	0	5	70	25	30	10	
(8) M1 to M7	1300 to 1400 m DS	1200	998	-	232	1.60	1.70	0.09	0.19	0.09	0.05	0.10	0.00	1	100	0	0	0	10	0	20	70	0	15	55	30	40	10	overhead cover is large woody debris
(8) M1 to M7	1400 to 1500 m DS	1300	1001	1002	233	1.30	1.70	0.09	0.14	0.06	0.15	0.30	0.10	1	70	0	30	0	15	5	30	50	0	15	55	30	20	10	
(8) M1 to M7	1500 to 1600 m DS	1400	1003	1004	234	2.30	2.40	0.10	0.15	0.09	0.00	0.30	0.10	5	100	0	0	0	5	5	30	60	0	20	50	30	10	20	gradient increases
(8) M1 to M7	1600 to 1700 m DS	1500	1005	1006	236	2.00	2.20	0.10	0.15	0.09	0.00	0.30	0.10	1	100	0	0	0	5	5	30	60	0	20	50	30	10	20	
Summary						**2.33**	**2.71**		**0.16**			**0.05**		**0.9**	**56%**	**0%**	**33%**	**11%**	**39%**	**3%**	**18%**	**40%**	**0%**	**29%**	**48%**	**23%**	**29**	**28**	
(13) Inlet to M1	0 to 100 m US	**No visible channel**																											

Note: - indicates data not available, for velocity it was a result of insufficient depths

Table D.2. Habitat Classification Data from Stream Crossings

Location	Sub-section	Distance [1] (m)	Photo US	Photo DS	WPT	Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m)			Velocity [2] (m/s)			Slope	Habitat Type (%)				Substrate [3] (%)					Riparian Vegetation [4] (%)			Overhead Cover (%)	Instream Cover (%)	Comment
								1/4	1/2	3/4	1/4	1/2	3/4		Riffle/Run	Pool	Flat	Pond	Fines	Gravel	Cobble/Rubble	Boulder	Bedrock	Grass	Shrub	Trees			
C001a	0 to 50 m US	50	3043	3042	90	2.50	3	0.02	0.09	0.06	-	-	-	10	90	10	0	0	5	15	30	50	0	40	50	10	5	30	high gradient, brook trout observed
C001a	0 to 50 m DS	100	3044	3045	92	1.39	4.04	0.08	0.05	0.07	-	0.05	-	10	50	50	0	0	5	30	25	40	0	20	25	55	40	10	high gradient, culvert damaged (Photo 3040-3041)
Summary						1.95	3.57		0.06			0.05		10	70%	30%	0%	0%	5%	23%	28%	45%	0%	30%	38%	33%	23	20	
C001	0 to 50 m US	50	3033	3034	86	23.00	23	1.50	2.00	1.50	-	0.00	-	1	10	0	0	90	95	0	5	0	0	10	70	20	5	30	
C001	0 to 50 m DS	100	3038	3039	88	1.90	3	0.09	0.11	0.07	-	-	-	1	10	90	0	0	5	25	45	25	0	30	60	10	10	10	hanging culvert (Photo 3040), water goes under culvert
Summary						12.45	13		0.88			0.00		1	10%	45%	0%	45%	50%	13%	25%	13%	0%	20%	65%	15%	8	20	
C002	0 to 50 m DS	50	1138	1139	245	3.80	4.30	0.07	0.11	0.13	0.05	0.20	0.00	3	90	10	0	0	0	5	60	35	0	30	15	55	10	10	
C002	0 to 50 m US	100	1143	1144	246	1.30	3.70	0.06	0.02	0.07	0.30	1.00	0.90	2	100	0	0	0	5	10	55	30	0	5	15	80	60	10	
Summary						2.55	4.00		0.08			0.41		2.5	95%	5%	0%	0%	3%	8%	58%	33%	0%	18%	15%	68%	35	10	
C003	0 to 50 m US	50	187	188	271	1.13	1.85	0.10	0.10	0.12	0.04	0.07	0.07	2	100	0	0	0	15	10	30	45	0	5	85	10	80	5	watercourse drains small pond, steady flow
C003	0 to 50 m DS	100	189	190	272	2.00	2.28	0.14	0.00	0.12	0.06	-	0.10	2	100	0	0	0	5	25	35	35	0	5	55	40	35	5	
Summary						1.57	2.07		0.10			0.07		2	100%	0%	0%	0%	10%	18%	33%	40%	0%	5%	70%	25%	58	5	
C004	0 to 50 m US	50	1100	1099	263	1.00	2.50	0.08	0.00	0.02	0.10	-	0.00	1	100	0	0	0	35	20	30	15	0	40	30	30	10	0	Runs north through the ditch which runs along the existing woods road, goes underground, becomes intermittent in parts.
C004	0 to 50 m DS	100	1101	1102	248	1.30	1.40	0.08	0.10	0.04	0.00	0.00	-	1	0	0	100	0	45	0	25	30	0	25	60	15	40	0	Water flows through culvert at crossing but dissipates underground ~20 m downstream, unlikely fish habitat
Summary						1.15	1.95		0.05			0.03		1	50%	0%	50%	0%	40%	10%	28%	23%	0%	33%	45%	23%	25	0	
C005	0 to 50 m US	100	1088	1090	258	16.00	17.00	0.48	0.00	0.14	0.32	-	0.06	3	100	0	0	0	0	5	30	60	5	0	60	40	1	15	Abundance of eastern pearlshell mussels, large falls immediately downstream of survey area
C005	0 to 50 m DS	50	1093	1095	259	8.00	11.50	0.62	0.46	0.32	0.19	0.18	0.10	4	100	0	0	0	0	10	40	50	0	0	60	40	2	10	Existing bridge crossing, fast flowing riffle
Summary						12.00	14.25		0.34			0.17		3.5	100%	0%	0%	0%	0%	8%	35%	55%	3%	0%	60%	40%	2	13	
C006	0 to 50 m US	100	1081	1082	256	1.25	1.35	0.14	0.18	0.14	0.01	0.01	0.00	1	100	0	0	0	15	15	45	25	0	30	60	10	25	10	Meanders around large cobble/boulders
C006	0 to 50 m DS	50	1084	1085	255	1.04	1.17	0.06	0.04	0.11	-	0.08	-	1	100	0	0	0	15	20	10	55	0	0	90	10	40	5	Watercourse has decent flow, existing culvert
Summary						1.15	1.26		0.11			0.03		1	100%	0%	0%	0%	15%	18%	28%	40%	0%	15%	75%	10%	33	8	
C007		No visible channel																											
Summary		-																											
C008	0 to 50 m US	100	1071	1072	249	0.60	0.90	0.09	0.11	0.07	0.00	0.00	0.00	0.5	0	0	100	0	70	15	15	0	0	50	45	5	60	10	Little flow through stream, drains cut line, unlikely fish habitat
C008	0 to 50 m DS	50	1073	1074	250	0.70	1.05	0.04	0.09	0.04	-	0.00	-	0.5	100	0	0	0	5	25	20	50	0	30	55	15	20	30	Flows from small grassy lowlying area through culvert, dissipates downstream of culvert
Summary						0.65	0.98		0.07			0.00		0.5	50%	0%	50%	0%	38%	20%	18%	25%	0%	40%	50%	10%	40	20	
C009	0 to 50 m DS	50	1077	1078	253	0.70	0.95	0.00	0.03	0.09	0.01	-	-	1	90	10	0	0	30	0	20	50	0	40	60	0	40	10	Low flow through existing culvert
C009	0 to 50 m US	100	1075	1076	252	2.00	2.10	0.06	0.10	0.15	0.00	0.00	0.00	1	0	0	100	0	100	0	0	0	0	10	90	0	100	30	Lots of overhead cover provided by alders
Summary						1.35	1.53		0.07			0.00		1	45%	5%	50%	0%	65%	0%	10%	25%	0%	25%	75%	0%	70	20	
C010		No visible channel																											
Summary		-																											
C011	0 to 100 m US	200	1157	1155	288	0.70	0.75	0.09	0.07	0.09	0.00	0.00	0.03	0.5	0	0	100	0	35	5	20	40	0	10	80	10	60	5	braids 30 m upstream from proposed crossing location
C011	0 to 100 m DS	100	1163	1164	287	0.82	1.07	0.00	0.06	0.06	-	-	-	1	30	0	70	0	85	5	5	5	0	30	60	10	70	10	stagnant and dissipates through wetland, iron floc present, unlikley fish habitat
Summary						0.76	0.91		0.06			0.01		0.75	15%	0%	85%	0%	60%	5%	13%	23%	0%	20%	70%	10%	65	8	
C012		No visible channel																											
Summary		-																											
C013	0 to 50 m US	100	1105	1113	C0013	17.00	17.50	0.40	0.30	0.50	0.00	0.00	0.00	5	0	100	0	0	2	3	2	3	90	5	55	40	2	5	Existing bridge crossing, large pools formed by bedrock
C013	0 to 50 m DS	50	-	1107	264	12.00	18.00	0.50	0.60	0.70	0.00	0.00	0.00	5	10	90	0	0	0	5	15	30	50	15	70	15	2	5	Low flow at this crossing, large pools formed by bedrock, large numbers of eastern pearlshell mussels observed
Summary						14.50	17.75		0.50			0.00		5	5%	95%	0%	0%	1%	4%	9%	17%	70%	10%	63%	28%	2	5	
C014	0 to 50 m DS	50	1192	1174	293	14.00	16.00	0.22	0.00	0.46	0.64	-	1.13	1	5	95	0	0	0	0	5	55	40	0	50	50	0	5	Large pool beneath bedrock cascascade, not safe to get depth in middle (~2m deep)
C014	0 to 50 m US	100	1172	1178	292	14.00	18.00	0.46	0.54	0.24	0.35	0.50	0.25	10	80	20	0	0	0	5	5	10	80	30	55	15	2	5	Bedrock cascade
Summary						14	17		0.32			0.574		5.5	43%	58%	0%	0%	0%	3%	5%	33%	60%	15%	53%	33%	1	5	

Note: - indicates data not available, for velocity it was a result of insufficient depths

ATTACHMENT 4-C

Aquatic Survey (2019)

Valentine Gold Project: 2019 Aquatic Study

Prepared for:

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Report

File No: 121416288

June 29, 2020

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Executive Summary

Stantec Consulting Ltd. (Stantec) was contracted by Marathon Gold Corporation (Marathon) to undertake an aquatic baseline study in 2019 at the Valentine Gold Project (the Project) site located in central Newfoundland. This survey was conducted, to provide additional information to the aquatic studies conducted in 2011 and 2018. The 2011 and 2018 aquatic studies were designed to support the assessment of potential interactions between the Project and the aquatic environment.

The 2019 field work included an assessment of primary and secondary productivity, fish abundance, and habitat characterization of representative ponds, lakes and streams within the Study Area. In addition, one pond and one stream near the Victory Pit (that was not previously surveyed) was classified during the 2019 study. The field work for the 2019 Aquatic Baseline Study was conducted in August, September and November 2019.

The results of the 2019 aquatic study indicated that primary productivity in the Study Area is generally low, based on chlorophyll “a” concentration in surface water from ponds and lakes and from periphyton attached to rocks in streams.

Secondary productivity was assessed by sampling the benthic invertebrate community (BIC) in ponds, lakes, and streams and by comparing the community descriptors (density, richness, evenness, similarity and Ephemeroptera, Plecoptera, Tricoptera (EPT) index. Results showed that density was variable even within similar habitat types. Generally, ponds had low evenness and moderate diversity, lakes and streams with soft substrates had moderate evenness and diversity and streams with hard substrates had low evenness and high diversity. Overall, the BICs were representative of unimpacted ponds, lakes and streams. Amphipods were the predominant taxa in ponds, chironomids were the predominant taxa in lakes and depositional areas (soft substrates) in streams and ephemeroptera (mayflies) were the predominant taxa in erosional areas (hard substrate) in streams.

Gillnets set in Pond M2, a Pond that was previously unassessed for fish presence, confirmed the presence of brook trout. Gillnets set in Valentine Lake and Victoria Lake at greater depths than fished previously, caught a total of eight Atlantic salmon and one brook trout. Population estimates in four small streams indicated a range of 0 to 5.8 juvenile Atlantic salmon per 100 m^2 and a range of 0 to 38.6 brook trout per 100 m^2. Consistent with aquatic studies conducted in 2012 and 2018, no fish species at risk (SAR) were captured in ponds, lakes or streams in the Study Area during the 2019 aquatic survey.

Pond V1 was estimated to be up to 1.5 m in depth, contain a high proportion of fines and moderate amounts of aquatic vegetation. The fish habitat characterization indicated that the stream associated with V1 was generally narrow (<5 m), shallow (<0.5 m), slow flowing (<0.2 m/s) and intermittent in parts. A waterfall which was a barrier to fish passage was observed on the inlet of V1.

In situ water quality readings revealed that water temperatures in the Study Area are generally suitable for cold water fish species. Dissolved oxygen concentrations are generally above the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG PAL) for all life stages of fish. The pH of surface water in the Study Area is slightly acidic and conductivity is low. Real time water quality profiling identified thermoclines in Valentine Lake in August and in Victoria Lake in August and September 2019. A thermocline was absent for both lakes, in November 2019.

There were no exceedances of the Canadian Sediment Quality Guideline Probable Effect Limit (CSQG PEL) identified for cadmium, chromium, copper, lead, mercury and zinc in pond, lake, or stream sediments, however arsenic was above the CSQG PEL in all samples. In ponds, grain size class was distributed relatively equally between sand, silt and clay, while in lakes, silt was generally the predominant grain size class. Grain size distribution at sample locations was highly variable in streams.

Overall the ponds, lakes and streams in the Study Area provide food and habitat for freshwater fish species in the area and are representative of unimpacted aquatic habitats in central Newfoundland.

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Marathon Gold Corporation (Marathon) to conduct a number of environmental surveys at the Valentine Gold Project Site (the Project), including Aquatic Baseline Surveys. The results of the baseline surveys will be used to support the environmental assessment (EA) of the Project.

At the time of this study (summer and fall 2019), Marathon's Valentine Gold Project includes four near-surface, mainly pit-shell constrained, gold deposits: Marathon Deposit, Leprechaun Deposit, Sprite Deposit, and Victory Deposit. Additional gold-mineralized zones have been identified immediately to the southwest of the Leprechaun deposit (J. Frank zone) and approximately 1 km northeast of the Victory deposit. The overall site includes a gold system approximately 20 km long, covering an area of 240 km^2. The Project is located in central Newfoundland, approximately 57 km south of Buchans.

The 2019 Aquatic Baseline Study builds on previous studies conducted in 2011 and 2018 and provide information on ponds, lakes and streams potentially affected by development of Valentine Gold Project (Stantec 2012, 2019).

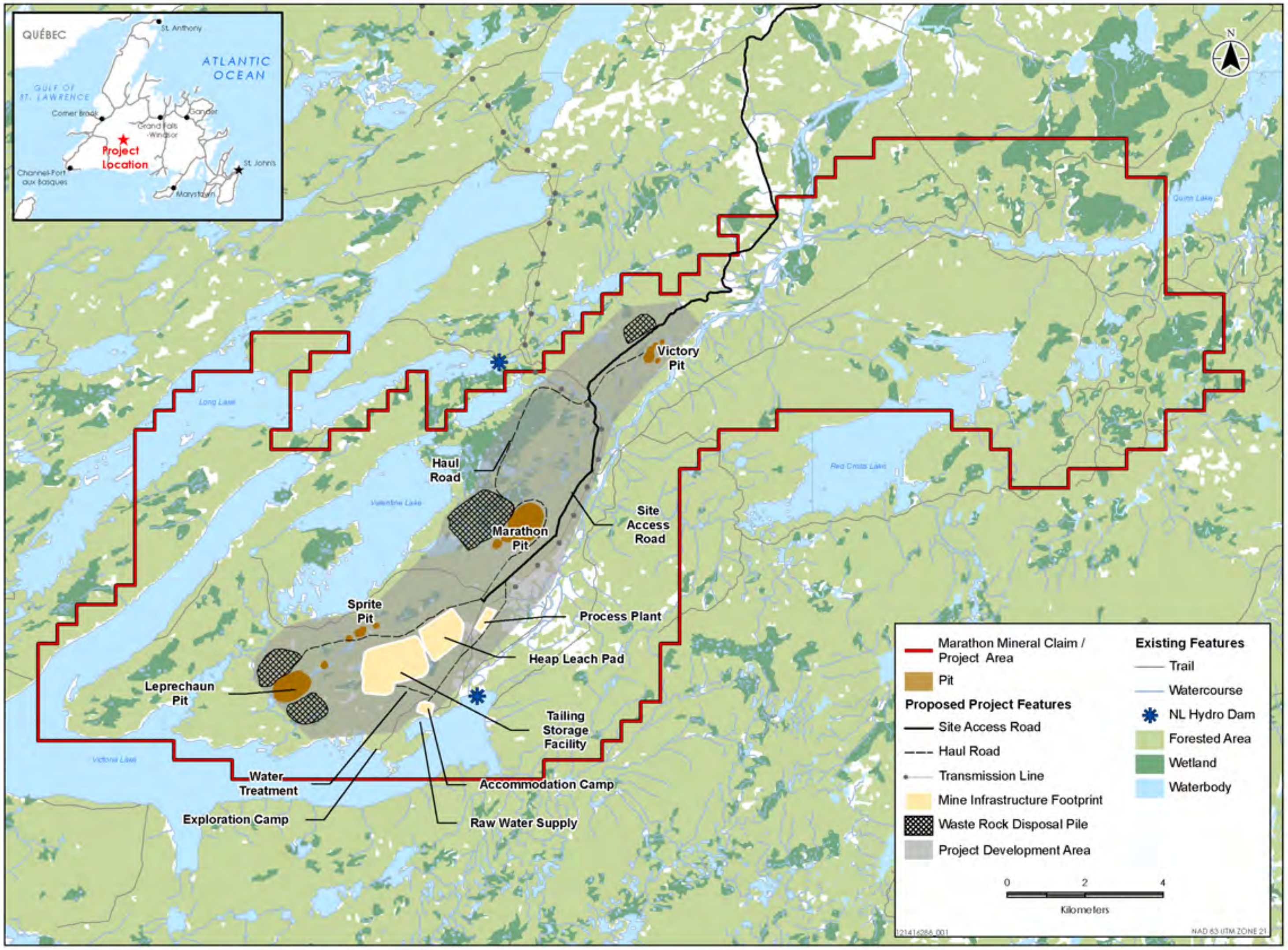

Figure 1.1 Valentine Gold Project Site Plan

2.0 AQUATIC BACKGROUND AND REGULATORY CONTEXT

2.1 OBJECTIVES

The objectives of the 2019 Aquatic study are:

1. Conduct surveys for periphyton in streams, and chlorophyll "a" in ponds and lakes to assess primarily productivity
2. Conduct benthic invertebrate surveys in streams, ponds and lakes to assess secondary productivity
3. Characterize habitat for inflowing and outflowing streams associated with the Victory Pit
4. Conduct qualitative fish sampling to further determine fish presence in areas where fish were not observed previously
5. Conduct quantitative fish sampling to assess fish abundance and productivity of fish in representative streams within the study area
6. Collect sediment quality samples to characterize sediment quality
7. Collect in situ water quality readings to characterize water quality

2.2 REGULATIONS

The Project will require approval from the Government of Newfoundland and Labrador and is subject to an environmental assessment (EA) under the *Newfoundland and Labrador Environmental Protection Act* (NL EPA) and associated *Environmental Assessment Regulations*. Under the *Canadian Environmental Assessment Act 2012* (CEAA 2012) the Project is a designated project pursuant to Section 15(a) *Regulations Designating Physical Activities* and will require a federal EA.

The 2011, 2018, and 2019 Aquatic Studies were designed to:

- support the assessment of potential project interactions and environmental effects of the Project on the aquatic environment
- determine the presence of fish
- support the determination of harmful alteration, disruption or destruction of fish habitat and the requirement for offsetting under the *Fisheries Act*;
- identify fish bearing waters to support mine planning activities related to locating Project infrastructure to avoid waters frequented by fish, where feasible
- form part of the supporting documentation for the EA completed for the Project.

3.0 METHODS

The 2019 field study included an assessment of primary and secondary productivity, fish habitat and fish productivity in the Study Area. The field surveys for this study were conducted during the summer (August 3 to 9 2019), and fall (September 23 to 28 2019, and November 3, 2019). Sampling locations are shown on Figure 3.1.

3.1 STUDY AREA

The Study Area for the 2019 field study includes the watersheds potentially affected by development of the Leprechaun, Sprite, Marathon, and Victory Deposits. The following ponds and streams within the Study Area were sampled as part of the 2019 surveys.

- Lakes - Victoria Lake and Valentine Lake
- Ponds – VALP2, VICP2, VALP3, L1, M7, M2, V1
- Streams – Outlet of VALP2, Outlet of VICP2, Outlet of VALP3, C001, Outlet of M1, Outlet of M2, inlet and outlet of V1

For ease of reference, stream locations are given a descriptive name and identifying number that is circled on Figure 3.1. This notation corresponds to the stream location names in the Appendices and in Tables.

Given that the 2011 and 2018 studies identified ponds and stream habitat within the Study Area to be relatively homogeneous, a sub-watershed approach was used to characterize the aquatic environment in 2019. For each sub-watershed a pond and stream were selected and assessed to provide representative information about primary and secondary productivity, sediment quality, and physical water quality parameters. Representative streams within each sub-watershed were further assessed to provide information on fish productivity. Table 3.1 provides a list of the six sub-watersheds in the Study Area and the associated pond and stream sampling sites.

Table 3.1 Representative Ponds and Streams Associated with Each Sub-Watershed Within the Valentine Gold Study Area

Sub-Watershed	Pond	Stream
Ponds VIC P1, Vic P2 and associated streams	VICP2	VICP2 outlet (16)
Ponds VAL P1 and Val P2 and associated streams	VALP2	VALP2 outlet (20)
Unnamed Tributary to Victoria River (C001 stream)	L2	C001 (14)
Pond V1 and associated streams	V1	V1 inlet and outlet (22 and 24)
Pond VALP3 and associated streams	VALP3	Outlet of VALP3 (1), M3 to M2 (3)
Pond M1/M7 and associated streams	M7	Outlet of M1 (8)

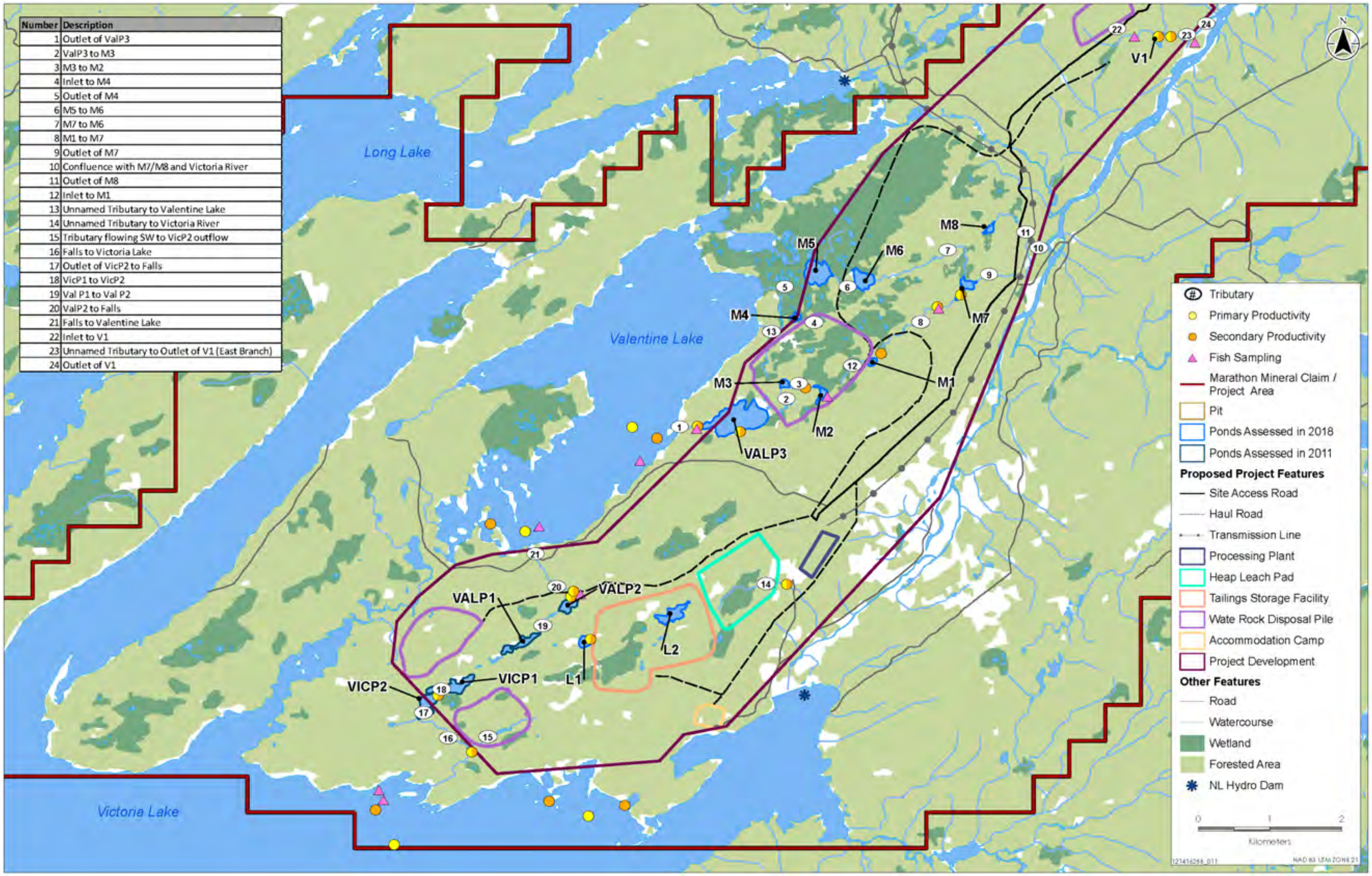

Figure 3.1 **2019 Field Study Area**

3.2 STUDY TEAM

Experienced professionals were responsible for the design, logistical planning, and data collection for the 2019 aquatic study. Sampling was performed by qualified professionals (i.e., biologists / ecologists) with knowledge and experience in these areas. The members of the study team are provided in Table 3.2.

Table 3.2 Study Team – 2019 Aquatic Study

Role	Personnel
Project Manager	Barry Wicks, B.Sc.
Project Scientist	Barry Wicks, B.Sc.
Quality / Independent Review	Barry Wicks, B.Sc.
	Elizabeth Way, M.Sc.
Field Team	Jenny Reid, M.Sc. and Tony Parr, M.Sc.
Data Analysis and Report Preparation	Annick St-Amand, B.Sc., M.Sc., Ph.D.
	Jenny Reid, M.Sc.
Information Management / GIS	Megan Blackwood, B.Sc., Dip. GIS

Sherry Dunsworth was the Marathon client contact for field activities and provided logistical support and coordination to support the field study. Jamie Powell was the Marathon environmental contact for the project and provided project details to support project scoping.

3.3 PRIMARY PRODUCTIVITY SAMPLING

Primary productivity was determined by collecting chlorophyll “a” in lakes and ponds and periphyton in streams. Primary productivity in streams was assessed according to methods outlined in the Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (Barbour et al 1999). Sampling was conducted in both summer and fall to provide an indication of seasonal variability.

3.3.1 Ponds and Lakes

Samples were collected from six ponds and two lakes and analyzed for chlorophyll “a” concentration. For ponds (which are typically smaller than lakes), samples were collected in the surface waters. In lakes, three samples were collected, two at the surface and one at mid-depth within the thermocline. A maximum of one litre of water was filtered within 48 hours of collection using a glass funnel filter with 0.45 µm filter and a vacuum pump. Filtered samples were stored in tinfoil and frozen prior to submission to the RPC laboratory in Fredericton for analysis. Chlorophyll “a” analysis results from the lake and pond sampling are provided in Appendix A, Table A1 along with the GPS coordinates of each sample location.

3.3.2 Streams

In streams, periphyton samples were collected from rocks in six sampling areas. In the field, cobble-sized rocks were removed from the substrate, placed "right side up" in a white plastic washtub with a ruler for scale, and photographed from above. The rocks were scraped and scrubbed to remove periphyton biomass, with periphyton and "rinsings" being deposited in the washtub. The volume of the samples collected in this way is made up to one litre (1 L) using stream water, as required.

Samples were kept in dark containers on ice until filtering. Generally, fifteen milliliters of sample were filtered within 48 hours of collection using a glass funnel filter with 0.45 µm filters and a vacuum pump. Filtered samples were frozen and stored in tinfoil prior to submission to the RPC laboratory in Fredericton for analysis.

At the RPC laboratory, samples were analyzed for chlorophyll "a" with the results being reported in µg/L. To calculate the mass of periphyton per unit area (µg/m^2) the surface area of the rocks was estimated from photographs of the rocks. The area of the rocks and a 10 x 10 cm area was cut from the printed photographs of the rocks and ruler and weighed using a 0.001 g analytical balance. The ruler had a known length, and therefore provided a scale measure for reference.

Lab results were reported as µg/L and these values were related to the mass of periphyton per unit area (µg/m^2) through the known sample volume of "rinsings" collected and area of rocks sampled based on the weight of the paper.

Chlorophyll "a" analysis results from the stream (periphyton) sampling are provided in Appendix A, Table A2 along with the GPS coordinates of each sample location. Photos are provided in Appendix A3.

3.4 SECONDARY PRODUCTIVITY SAMPLING

Secondary productivity in lakes, ponds, and streams was determined through the collection of benthic invertebrates, in fall. Late summer or early fall is the optimal time to assess benthic invertebrates because they are abundant, diversity is at its peak, they have grown sufficiently for taxonomic identification and represent a similar benthic community to what would be observed during a spring sampling event.

3.4.1 Ponds and Lakes

BIC samples were collected in six ponds and two lakes using an Ekman grab sampler with a collection surface area of 0.0225 m^2. One sample was collected in each pond and three samples were collected in each lake. For the lakes, one sample was collected in each of the littoral (<2 m), sublittoral (3-6 m) and profundal (>6 m) areas of the lake (three samples total). Each sample was comprised of three composited subsamples. Samples were sieved in the field through a 500 µm bucket sieve, prior to preservation. Water depth at each sampling location was collected using a digital depth sounder. GPS coordinates were collected for each sample station. The physical condition of each sample was described on the basis of odour, colour, texture, and presence of debris. Samples were preserved using 10% buffered formalin. Samples were shipped to Bill Morton in Guelph, Ontario for identification and enumeration. Raw BIC data are provided in Appendix B, Table B.1, habitat characteristics at each sample station and GPS coordinates are provided in Appendix B, Table B.2, BIC descriptors for ponds and lakes are provided in Appendix B, Table B3 and BIC descriptors for streams are provided in Appendix B, Table B4. Sample locations are shown on Figure 3.1.

3.4.2 Streams

BIC samples were collected in a total of six streams, with two samples collected in each stream; one from hard substrate (denoted -01 on samples) and one from soft substrate (denoted -02 on samples). A surber sampler was used to collect the BIC sample from hard substrates and an Eckman grab sampler was used to collect the BIC sample from soft depositional sediments. The surber sampler had a mesh size of 500 µm and a surface area of 0.09 m^2. The Eckman had a surface area of 0.0.0225 m^2. Each sample was comprised of three composited subsamples. Samples were sieved through a 500 µm bucket sieve in the field prior to preservation in 10% buffered formalin. Raw BIC data are provided in Appendix B, Table B.1, habitat characteristics at each sample station and GPS coordinates are provided in Appendix B, Table B.2, and BIC descriptors for streams are provided in Appendix B, Table B4. Sample locations are shown on Figure 3.1.

3.4.3 Data Analysis

BIC data were analyzed by family and species using fives indices: total invertebrate density, taxa richness, Simpson's Evenness Index, Simpson's Diversity Index, and Ephemeroptera, Plecoptera, and Trichoptera (EPT) Index. These indices are consistent with technical guidance provided for BIC data analysis for mines regulated under the *Metal and Diamond Mining Effluent Regulations* (Environment Canada 2012).

The BIC endpoints are defined below.

- Mean invertebrate abundance: number of organisms per m^2
- Mean taxa richness: mean number of taxa
- Mean Simpson's Evenness Index (E): a measure of the distribution of individuals among sampled taxa (range: 0 to 1) and calculated at the family level; a more equitable distribution (values approaching 1) indicates how evenly the individual species in the community are distributed
- Mean Simpson's Diversity Index (D): the probability that two organisms, selected at random, are from a different taxonomic group (range: 0 to 1, with larger values indicative of more diverse communities); this index is influenced by the numerically dominant taxa and calculated at the family level
- EPT Index: a measure of three orders of aquatic insects (Ephemeroptera, Plecoptera, Tricoptera) that are commonly used as indicators of good water quality

Cladocera were removed from the analysis as described in Environment Canada (2012). For the analysis of species, Erpobdellidae juveniles and Tubificidae were treated as separate taxon.

3.5 FISH SAMPLING

Fishing activity was conducted in accordance with Experimental License NL-5388-19 obtained from Fisheries and Oceans Canada (DFO). Fish sampling included gillnetting in lakes and ponds and electrofishing in streams. Methods are as described in Sooley et al. (1998).

3.5.1 Ponds and Lakes

To provide supplemental information on fish species in the Study Area, fish sampling was conducted in two lakes (i.e., Victoria Lake, Valentine Lake) and one pond (M2). Fishing locations are shown on Figure 3.1. Two gill nets were set in Victoria Lake and Valentine Lake and one gill net was set in M2. Each gill net consisted of two 15 m panels with mesh sizes of 25 and 38 mm. In Victoria Lake and Valentine Lake, one gill net was set in shallow depths (<6m) and one was set in deeper depths (6-10m). The net was checked at 30-minute intervals, or until a fish was observed. Fish data are provided in Appendix C, Table C1.

3.5.2 Streams

To assess productivity of fish in streams, quantitative electrofishing was conducted at four stream locations using a Smith Root LR-24 backpack electrofishing unit (Figure 3.1).

Barrier nets were installed upstream and downstream of the four sampling stations, to isolate a section of stream with an area of approximately 200 m^2. A minimum of three passes were completed and the effort and number of fish per pass was recorded. Brook trout and Atlantic salmon were measured for length, weighed, and released outside the barricaded area. Sticklebacks were counted and weighed as a batch. The external condition of fish was assessed for the presence of lesions, tumours, parasites, or other abnormalities. Fish data recorded from the sampling are provided in Appendix C, Table C1.

Population densities and biomass of brook trout and Atlantic salmon at each site were determined using Microfish 3.0 for Windows software and standardized to one unit of habitat (1 unit = 100 m^2).

In addition to the quantitative electrofishing surveys, a qualitative survey was conducted upstream of a large waterfall on the inlet to V1 to assess the presence of fish. Effort was recorded and fish were processed as described for quantitative electrofishing.

3.6 FISH HABITAT CHARACTERIZATION

Habitat characterization has been completed for most ponds and streams potentially affected by the Valentine Gold Project during previous baseline studies (Stantec 2012 and 2019). Habitat characterization for the 2019 study is limited to one pond and stream potentially affected by the development of the Victory Pit (not previously assessed) and to collecting *in situ* water quality data and sediment quality data to support habitat classifications completed during the 2011 and 2018 baseline studies.

The following sub-section describe methods used to collect *in situ* water quality and sediment quality from ponds, lakes, and streams to characterize fish habitat and assess habitat quality. Pond habitat is classified according to methods outlined in the Standard Methods Guide for the classification/quantification of Lacustrine Habitat in Newfoundland and Labrador (Bradbury et al 2001) and stream habitat is classified according to methods outlined in the Standard Methods Guide for the Classification and Quantification of Fish Habitat in Rivers of Newfoundland and Labrador (McCarthy et al 2007 Draft).

3.6.1 Fish Habitat Classification Near Victory Pit

Habitat classification was conducted on streams and a small pond (V1) potentially affected by the development of the Victory Pit. Methods were consistent with those used in previous baseline programs (Stantec, 2012 and 2019).

Stream habitat was characterized by obtaining velocity measurements and depth readings at ¼, ½, and ¾ of the stream width within approximately 100 m reaches / segments of the stream. Within each 100 m segment the habitat was described based on substrate type, meso habitat type, stream gradient, riparian vegetation, and cover. Photos were taken within each stream segment at representative locations and GPS coordinates were recorded at the end of each 100 m stream segment. Potential barriers to fish migration were noted, photographed and georeferenced. Habitat characterization data and representative photos are provided in Appendix D.1 and D.2, respectively.

V1 was assessed from the shoreline on the basis of approximate depth, substrate type, and amount of aquatic vegetation.

3.6.2 Water Quality

In situ water quality data was collected for select ponds and streams at a single location during September 2019. Data collected included measurements of pH, dissolved oxygen, temperature and conductivity. The pH was measured using a Hanna pH pen (HI98127), other parameters were measured by a YSI2030 water quality meter. For Victoria and Valentine Lakes, vertical lake profiles were collected during July, September, and November 2019 at a single station in each lake, using a YSI6600 sonde. In addition, a secchi depth measurement was collected in each lake to assess water transparency. Water quality profiles and photos of Victoria and Valentine Lakes are provided in Appendix D.

Water chemistry sampling was conducted at approximately 30 locations throughout the Valentine Gold Property. Results are discussed in the Valentine Gold Project Hydrology and Surface Water Quality Monitoring Baseline Report (Stantec 2020).

3.6.3 Sediment Quality

Sediment samples were collected for select lakes, ponds, and streams during September 2019. Samples were collected at a single location in ponds and streams and at three locations in Victoria and Valentine Lakes. The sediment sample locations corresponded with the location of the BIC sampling stations

(Figure 3.1). Sediment samples were analyzed by Bureau Veritas for total organic carbon, trace metals, mercury, and particle size. Sediment quality data are provided in Appendix D.

4.0 RESULTS

This section describes the results of the 2019 aquatic study.

4.1 PRIMARY PRODUCTIVITY

The results of the studies on primary productivity for ponds, lakes, and streams are summarized in the sections below. The concentration of chlorophyll "a" present in the water is directly related to the number of algae living in the water. Chlorophyll "a" concentration from periphyton and surface water are often positively associated with nutrient availability and is used to assess primary productivity. Chlorophyll "a" produces a food supply at the base of the food chain for many aquatic organisms. Chlorophyll in lakes and ponds comes mostly from floating algae. In streams, periphyton comprises a functionally defined assemblage of algal (chlorophyll a) and other species, which live attached to solid surfaces such as logs and rocks.

4.1.1 Ponds and Lakes

Water samples were collected from two lakes and six ponds for the determination of Chlorophyll "a" concentration in both summer and fall. Sample sites are indicated on (Figure 3.1). Primary productivity, represented by chlorophyll "a" concentration, ranged from non-detect (<0.5) to 1.8 µg/L, indicating low primary productivity (e.g., oligotrophic), which is defined as a lake with a chlorophyll "a" concentration <2 µg/L (Mackie 2001). Chlorophyll "a" concentration from samples collected in 2019 are included in Table 4.1. Concentrations of chlorophyll "a" did not vary substantially between summer and fall periods. Coordinates of sampling locations and laboratory results are provided in Appendix A, Table A.1.

Table 4.1 Primary Productivity in Ponds and Lakes in Summer and Fall 2019

Waterbody	Sample Location	Chlorophyll "a" Concentration (µg/L)	
		Summer	Fall
Lakes	VAL01-Surface	< 0.5	0.7
	VAL01-Mid	1.4	0.8
	VAL03-Surface	0.8	0.8
	VIC01-Surface	0.9	0.7
	VIC01-Mid	< 0.5	0.6
	VIC03-Surface	0.7	0.9
Ponds	L1-Surface	1	1.3
	M7-Surface	1	0.6
	VICP2-Surface	1.7	1.4
	VALP2-Surface	1.8	1.7
	VALP3-Surface	1.5	1.3
	V1	-	0.5

Note: - indicates no sample collected

4.1.2 Streams

Periphyton samples were collected from six streams for the determination of Chlorophyll "a" concentration in both summer and fall (Figure 3.1). Primary productivity which was represented by chlorophyll "a" concentration in periphyton ranged from 0.8 to 2.5 µg/cm²) (Table 4.2). There were no clear trends between summer and fall sampling events. Concentrations of chlorophyll "a" in periphyton indicated oligotrophic-mesotrophic conditions in streams surrounding the Project (Barbour et al. 1999). Coordinates of sampling locations, and laboratory results are provided in Appendix A, Table A.2. Photos of periphyton on rocks sampled is provided in Appendix A, Photos A1 to A12.

Table 4.2. Primary Productivity in Streams in Summer and Fall

Location	Chlorophyll-a Density (µg/cm²)	
	Summer	Fall
(1) VALP3out	0.8	2.5
(14) COO1	0.9	0.8
(8) M1out	1.4	1.9
(16) VICP2out	1.8	1.3
(20) VALP2out	1.5	2.3
(24) V1out	1.4	1.3

4.2 SECONDARY PRODUCTIVITY

The results of the studies on secondary productivity for ponds, lakes, and streams are summarized in the sections below. Benthic invertebrates represent an important link in the aquatic food web. They consist of a wide range of feeding groups (e.g., shredders, gatherers, filter feeders, scrapers and predators) and are responsible for converting both non-living organic matter (i.e., coarse and fine particulate organic matter) and living organic matter (including algal cells, microscopic multicellular animals, and other benthic invertebrates) into animal tissue that represents a major food resource for fish populations.

4.2.1 Ponds and Lakes

In total, 32 different species from 20 different families were identified in the BIC samples collected from ponds. The predominant benthic invertebrate taxa collected from ponds was generally Amphipoda (amphipods), with the exception of VICP2 which had higher proportions of Diptera (true flies) (Figure 4.1). The density of benthic invertebrates collected from ponds ranged from 607 to 3,733 individuals per m² and had a Simpson's Evenness Index ranging from 0.16 to 0.42 and a Simpson's Diversity Index of 0.22 to 0.74, indicating generally low evenness and moderate diversity. Detailed results on the taxonomic identification, counts per sample and BIC indices, substrate characteristics and depths are provided in Appendix B.

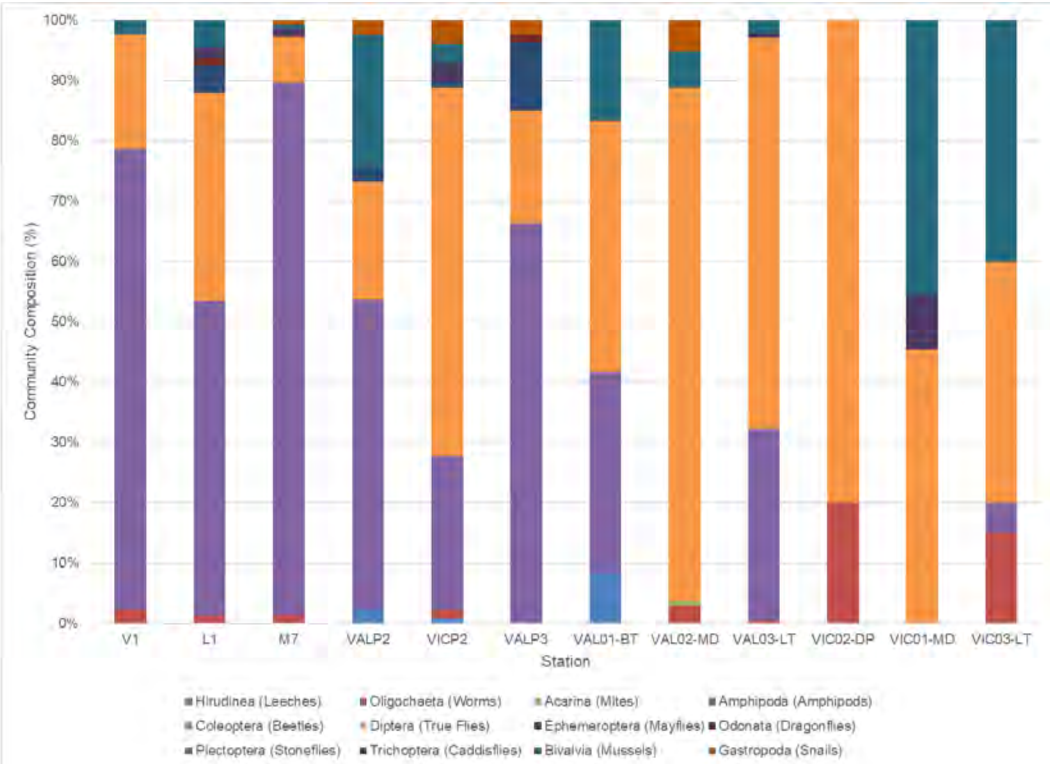

Figure 4.1 Benthic Invertebrate Community Composition for Ponds and Lakes

In total, 29 different species from 12 different families were identified in the BIC samples collected in lakes (Table 4.3). The predominant benthic invertebrate taxa collected from lakes was generally Diptera (true flies) and consisted primarily of Chironomidae. Chironomids made up between 40% and 85% of the individuals identified. The density of benthic invertebrates collected from lakes ranged from 74 to 3,585 individuals per m^2. The BIC had a Simpson's Evenness Index ranging from 0.27 to 0.79 and a Simpson's Diversity index ranging from 0.27 to 0.68, indicating moderate evenness and diversity. When Simpson's Diversity was calculated by species the lakes generally indicated high diversity (Appendix B). Benthic invertebrate densities were lower in Victoria Lake than Valentine Lake, which may be a result of the large changes in water level within Victoria Lake. In both lakes, highest densities of benthic invertebrates were observed in the littoral zone, followed by mid-depths, with the lowest densities being observed in the profundal zone.

Table 4.3 Taxon Richness, Simpson's Evenness and Diversity, Density and EPT Index for Ponds and Lakes by Family

Location	Taxon Richness	Simpson's Evenness	Simpson's Diversity	Density (#/m^2)	EPT Index
Ponds					
V1	5	0.33	0.40	3733	0.00
L1	12	0.22	0.63	2356	0.06
M7	8	0.16	0.22	2148	0.01
VALP2	7	0.42	0.66	607	0.02
VICP2	11	0.35	0.74	1867	0.04
VALP3	6	0.34	0.52	2370	0.11
Lakes					
VAL01-profundal	4	0.78	0.68	267	0.00
VAL02-sublittoral	5	0.27	0.27	2000	0.00
VAL03-littoral	6	0.33	0.49	3585	0.01
VIC02-profundal	2	0.74	0.32	74	0.00
VIC01-sublittoral	3	0.79	0.58	326	0.09
VIC03-littoral	4	0.72	0.66	593	0.00

4.2.2 Streams

In total, 47 different species from 28 families were identified in the BIC samples collected from hard substrates in streams. The predominant benthic invertebrate taxa collected from hard substrates in streams was generally Ephemeroptera (mayflies), with the exception of VALP3out-01 which had higher proportions of Bivalvia (mussels) (Figure 4.2). EPT made up between 25% and 94% of the individuals identified. Lower proportions of EPT in VALP3out-01 may have been a result of the very low (negligible) flow conditions which were observed during sampling. Density of benthic invertebrates collected from hard substrates ranged from 278 to 4,930 individuals per m^2 (Table 4.4). The BIC had a Simpson's Evenness Index ranging from 0.2 to 0.5 and a Diversity Index ranging from 0.66 to 0.88, indicating low evenness and high diversity. Detailed results on the taxonomic identification, counts per sample and BIC indices are provided in Appendix B, Table B.1 and Table B.4.

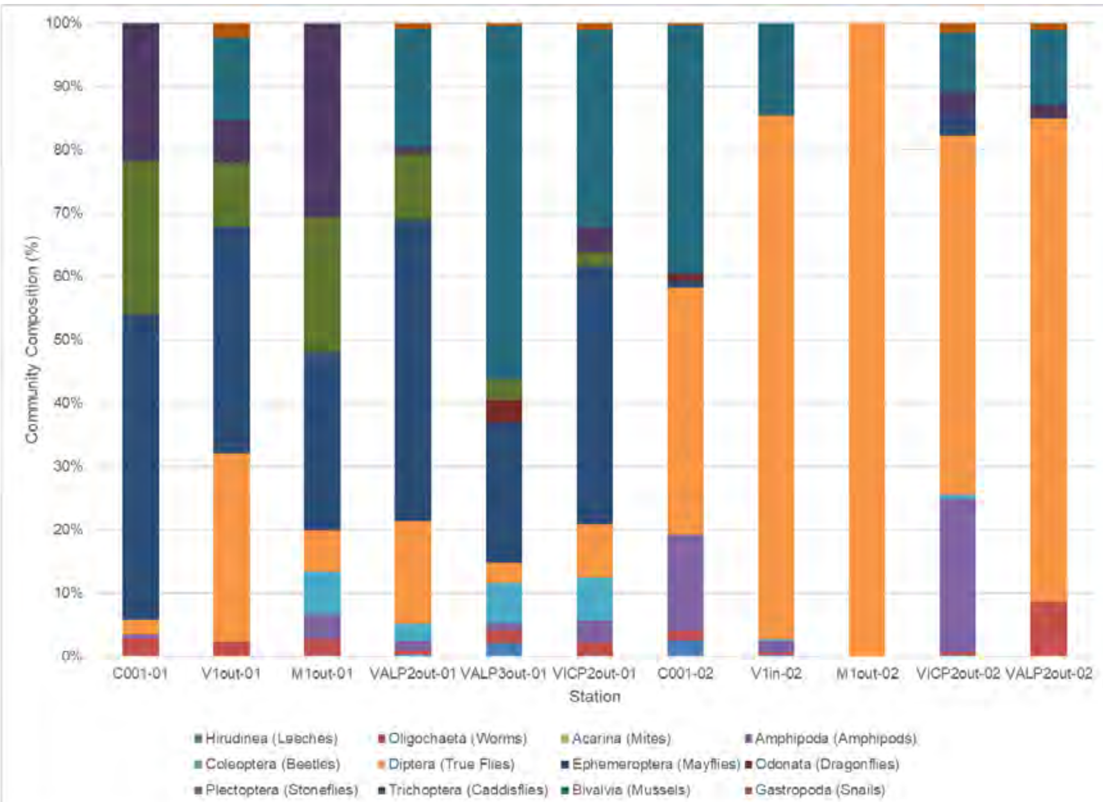

Figure 4.2 Benthic Invertebrate Community Composition for Hard (-01) and Soft Substrates (-02) in Streams

Table 4.4. Taxon Richness, Simpson's Evenness and Diversity, Density, and EPT Index for Hard (-01) and Soft (-02) Substrates in Streams by Family

Location	Taxon Richness	Simpson's Evenness	Simpson's Diversity	Density (#/m^2)	EPT Index
(14) C001-01	14	0.32	0.77	644	0.94
(24) V1out-01	14	0.41	0.83	485	0.53
(8) M1out-01	17	0.50	0.88	278	0.80
(20) VALP2out-01	16	0.22	0.72	4930	0.59
(1) VALP3out-01	15	0.20	0.66	704	0.25
(16) VICP2out-01	14	0.30	0.76	656	0.47
(14) C001-02	10	0.30	0.67	9096	0.01
(22) V1in-02	7	0.21	0.30	5467	0.00
(8) M1out-02	1	1.00	0.00	30	0.00
(16) VICP2out-02	12	0.22	0.63	3822	0.07
(20) VALP2out-02	5	0.33	0.40	1378	0.02

In total 35 different species from 18 different families were identified in the BIC samples collected from soft substrates in streams. The predominant benthic invertebrate taxa collected from soft substrates in streams was generally Diptera (true flies) and consisted primarily of Chironomidae. Chironomids made up between 39% and 100% of the individuals identified. Density of benthic invertebrates collected from soft substrates ranged from 30 to 9,096 individuals per m^2. The BIC had a Simpson's Evenness Index ranging from 0.22 to 1 and a Diversity Index ranging from 0 to 0.67, indicating moderate evenness and diversity (Table 4.4). When Simpson's Diversity was calculated by species, BIC communities generally indicated high diversity (Appendix B, Table B.4).

4.3 FISH SAMPLING

Fish sampling was conducted to provide additional information on the abundance (i.e., productivity) of fish in representative streams, to determine if fish were present in ponds (where fish presence was not previously confirmed (e.g., M2), and to determine fish presence in lakes at greater water depths than was previously fished. Fisheries productivity is the sustained yield of all component populations and species which support and contribute to a fishery (Randall et al. 2013). The abundance of fish (e.g., population estimates or biomass) is a metric which can be used to assess changes in fisheries productivity.

4.3.1 Ponds and Lakes

Fish sampling was conducted in Valentine and Victoria Lake to provide additional information on fish abundance in lakes, particularly at greater depths than fished during previous aquatic surveys and to confirm the presence or absence of fish in pond M2. In total, 27 brook trout (*Salvelinus fontinalis*) and eight Atlantic salmon (*Salmo salar*) were captured in lakes and ponds (Table 4.5). Brook trout were observed to be present in M2 near its outflow and a gillnet set for 5 minutes caught 26 brook trout. Two multi-panel gillnets set in Valentine Lake for a total of 115 minutes at depths of 3 to 6 m caught two Atlantic salmon. Two multi-panel gillnets set in Victoria Lake for a total of 100 minutes at depths of 6 to 11 m caught six Atlantic salmon and one brook trout. Consistent with aquatic studies conducted in 2011 and 2018, no fish species at risk (SAR) were captured in ponds or lakes during the 2019 aquatic survey.

Table 4.5 Summary of Catch, Effort, and Descriptive Statistics for Fish Sampling in Lakes and Ponds

Location	Method	Effort (minutes)	Depth (m)	Species							
				Brook Trout				Atlantic salmon			
				Count	Min	Mean	Max	Count	Min	Mean	Max
Valentine Lake	Gill Net 1	60	3 to 5	0	-	-	-	0	-	-	-
Valentine Lake	Gill Net 2	55	6	0	-	-	-	2	321	322	322
Victoria Lake	Gill Net 1	50	6 to 10	0	-	-	-	2	40	83	126
Victoria Lake	Gill Net 2	50	10 to 11	1	180	-	180	4	204	260	322
M2	Gill net	5*	1	26	139	205	296	0	-	-	-
Total	**-**	**-**	**-**	**27**	**-**	**-**	**-**	**8**	**-**	**-**	**-**

Note:
* = Effort not representative as fish were accidentally spooked into net

4.3.2 Streams

Stream sampling confirmed the presence of Atlantic salmon (Photo 1), brook trout (Photo 2) and threespine stickleback (Photo 3) within the Study Area. A summary of quantitative electrofishing is provided in Table 4.6, which includes the location fished, the fishing time, the number of fish caught, the minimum, mean and maximum fork lengths of brook trout and Atlantic salmon, and the total number of stickleback caught.

No fish were caught in the inlet to V1, upstream of the waterfall at electrofishing site V1out-02 despite 212 seconds of effort in a large pool connected to an intermittent stream.

Photo 1 Representative Photo of Atlantic Salmon

Photo 2 Representative Photo of Brook Trout

Table 4.6 shows the total catch by species, mean length (mm), mean weight (g) and number of fish removed during each pass for the four locations sampled quantitatively. Population estimates and biomass of fish for streams sampled during 2019 are provided in Table 4.7. The population estimate for fish ranged from 33.9 to 107 fish per 100 m^2 and biomass for fish ranged from 29.6 to 652 g/100 m^2. The highest population estimate and biomass for fish was obtained at the outlet of V1, with a catch comprised of brook trout and threespine stickleback. The lowest population estimate and biomass for fish was found in the outlet of VALP2 (VALP2out), which only contained threespine stickleback. Streams containing salmonids (e.g., brook trout and juvenile Atlantic salmon) had higher fisheries productivity than streams only containing threespine stickleback.

Population estimates indicated a range of 0 to 5.8 juvenile Atlantic salmon per 100 m^2 in streams and a range of 0 to 38.6 brook trout. Fish sampling data are provided in Appendix C.

Photo 3 Representative Photo of Threespine Stickleback

Table 4.6 Quantitative Electrofishing Capture Results for the Valentine Gold Project in 2019

Parameter	Brook Trout	Atlantic Salmon	Threespine Stickleback
ValP3 Outlet			
Catch	64	12	0
Mean Length (mm)	68	87	-
Mean Weight (g)	5.5	7.1	-
Removal	41, 18, 5	8, 1, 3	0, 0, 0
Outlet of M1			
Catch	74	0	0
Mean Length (mm)	73	-	-
Mean Weight (g)	6.2	-	-
Removal	46, 16, 12	0, 0, 0	0
Outlet of VALP2			
Catch	0	0	32
Mean Length (mm)	0	0	-
Mean Weight (g)	0	0	0.9
Removal	0, 0, 0, 0	0, 0, 0, 0	6, 12, 11, 3
Outlet of V1-01			
Catch	47	0	111
Mean Length (mm)	126	-	-
Mean Weight (g)	18.9	-	0.7
Removal	28, 3, 6	0, 0, 0	45, 33, 33

Table 4.7 Population Estimates and Biomass with 95% Confidence Intervals for Streams in the Valentine Gold Project, in 2019

Parameter	Atlantic Salmon	Brook Trout	Three-spine Stickleback	Total
VALP3 Outlet				
Area (m²)	208			
Catch	12	64	0	79
Population Estimate (#/100m²)	5.8	32.2	0	38.5
Biomass (g/100m²)	40.7	178.1	0	221.9
95% Confidence Interval	4.3 to 7.2	29.8 to 34.6	-	35.1 to 41.8
Outlet of M1				
Area (m²)	210			
Catch	0	74	0	74
Population Estimate (#/100m²)	0	38.6	0	38.6
Biomass (g/100m²)	0	240.6	0	240.6
95% Confidence Interval	NA	33.8 to 43.3	-	33.8 to 43.3
Outlet of VALP2*				
Area (m²)	248			
Catch	0	0	32	32
Population Estimate (#/100m²)	0	0	33.9	33.9
Biomass (g/100m²)	0	0	29.6	29.6
95% Confidence Interval	-	-	-58.1 to 125.8	-58.1 to 125.8
Outlet of V1				
Area (m²)	200			
Catch	0	47	111	158
Population Estimate (#/100m²)	0	23.5	131	107
Biomass (g/100m²)	0	443.3	89.9	652.0
95% Confidence Interval	-	22.5 to 24.5	5.5 to 256.5	82.5 to 131.5

Note:
* Cannot estimate maximum-liklihood estimate as non-descending removal pattern. Population estimate and confidence intervals determined based on R software (R 2019).

4.4 FISH HABITAT CHARACTERIZATION

The following sections describe fish habitat classification results for ponds and streams potentially affected by the development of the Victory Pit (not previously assessed) and describe water quality and sediment quality data to provide supplemental information on ponds, lakes and streams previously assessed in 2011 and 2018.

4.4.1 Fish Habitat Classification near Victory Pit

Pond V1 (see Figure 3.1) was estimated to be a maximum of 1.5 m in depth, contained a high proportion of fines (100%) and moderate amounts of aquatic vegetation (40%) (Photo 4). Given the shallow nature of the pond each habitat type can be considered to occur within the littoral zone.

Photo 4 Pond V1 during August 2019

The stream associated with V1 was generally narrow (<5 m), shallow (<0.5 m), slow flowing (<0.2 m/s) and intermittent in parts. The downstream most section of the outlet of V1 (0 to 400 m) is a wide (approximately 15 m) slow moving section which appears to be an old side channel of the Victoria River. The upstream portion of V1 outflow is narrow and flows through a forested area and wetlands. Approximately 60 m upstream of V1 is a waterfall, which is a barrier to fish passage (no fish captured upstream of the waterfall). Upstream of the waterfall the stream was small and became intermittent. The intermittent portion of the stream continued until it reached the Marathon Camp access road where it crossed through a culvert under the road. The inlet to V1 did not follow the mapped location of the stream. Instead it flowed through the existing ditch on the northern side of the road and dissipated into a wetland upstream of a berm. The eastern tributary of V1 (23) was dry approximately 10 m upstream from the confluence with the mainstem of the stream at the time of sampling.

A summary of habitat attributes for the ground survey is provided in Table 4.8 summarizing the average wetted and channel stream width, average velocity, depth, slope, overhead and instream cover, and dominant habitat type, substrate and riparian vegetation. The complete habitat classification data set is included in Appendix D, Table D.1, and photos are provided in Appendix D (Photos D1 to D12).

Table 4.8 Summary of Habitat Characteristics for Inlet and Outlet of V1

Location	Assessment Method	Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m)	Mean Velocity (m/s)	Average Slope (%)	Dominant Habitat Type	Dominant Substrate Type	Dominant Riparian Vegetation	Average Overhead Cover	Average Instream Cover	Comments
Inlet and Outlet of V1 (22 and 24)	Ground	4.05	5.82	0.22	0.03	4	Flat (44%)	Fines (68%)	Shrubs (71%)	54	21	Stream is intermittent in upper reaches, slow flowing and low gradient, with a high gradient waterfall upstream of V1.

4.4.2 *In Situ* Water Quality

A thermocline was apparent in Valentine Lake (VAL01) at a depth of 10 to 11 m from the water's surface on August 3, 2019 (Figure 4.5), however the lake was no longer stratified on September 25 and November 3, 2019 (Appendix D, Figures D.1 and D.2). When the thermocline was present on August 3, 2019, the water temperature in the epilimnion averaged 20.1°C and dissolved oxygen concentrations averaged 8.5 mg/L. Below the thermocline in the hypolimnion, water temperatures averaged 16.7°C and dissolved oxygen concentrations averaged 8.3 mg/L (Figure 4.5). On September 25 and November 3, 2019, water temperatures averaged 12.6 and 7.5 °C, respectively, and dissolved oxygen concentrations averaged 9.8 and 11.9 mg/L throughout the water column.

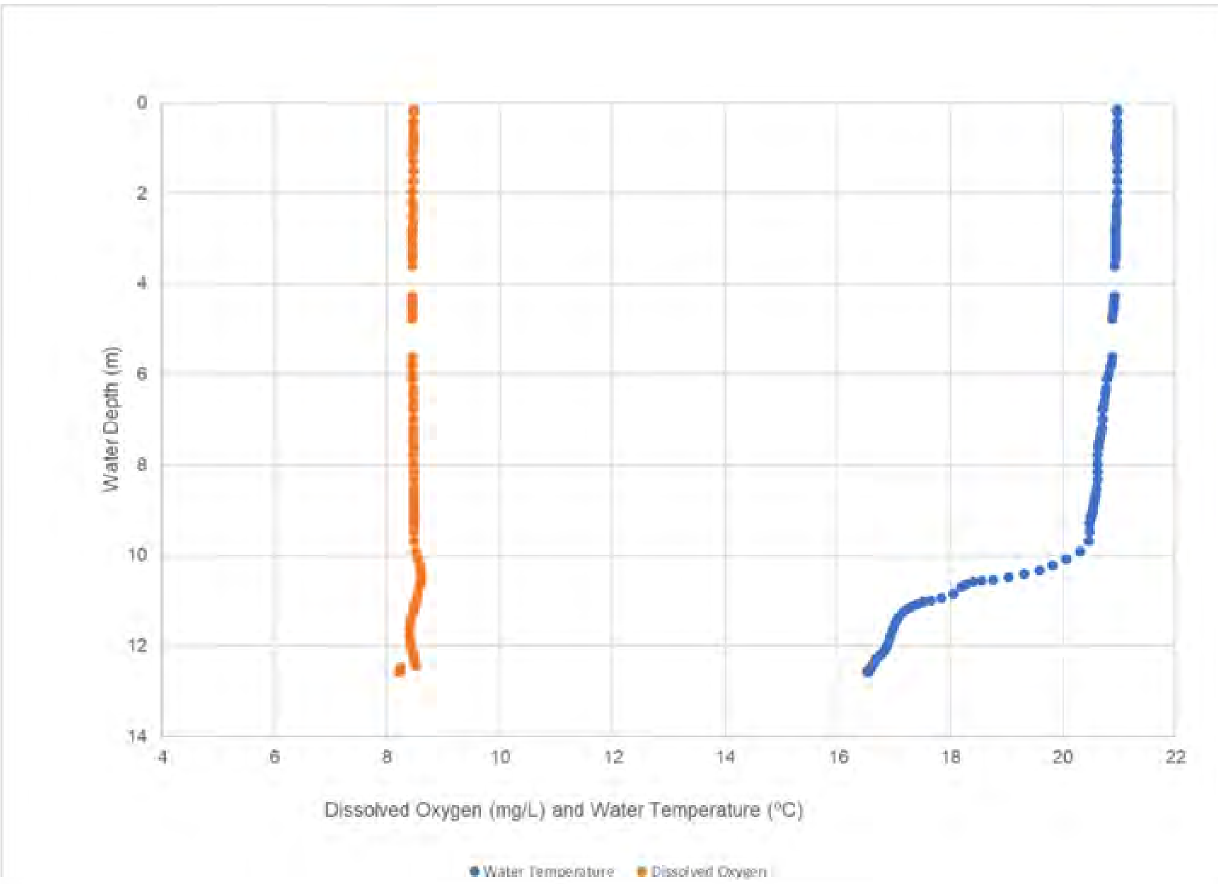

Figure 4.3 Dissolved Oxygen and Water Temperature Profiles at VAL01 in Valentine Lake, NL on August 3, 2019

Conductivity levels for Valentine Lake varied between 24-27 µs/cm. The pH in Valentine Lake ranged from 6.04 to 7.79. The *in situ* pH within the water column was generally within or slightly below the recommended guideline CWQG PAL of 6.5. Secchi depth ranged from 6 to 7.12 m on Valentine Lake in August and September 2019, respectively.

A thermocline was apparent in Victoria Lake (VIC01) at a depth of 16 to 20 m from the water's surface on August 3, 2019 (Figure 4.6) and at 21 to 25 m on September 25, 2019, however the lake was no longer stratified on November 3, 2019 (Appendix D, Figures D.3 and D.4). When the thermocline was present on August 3, 2019, the water temperature in the epilimnion averaged 19.1 ºC and dissolved oxygen concentrations averaged 8.8 mg/L. Below the thermocline in the hypolimnion, water temperatures averaged 7.2ºC and dissolved oxygen concentrations averaged 10.3 mg/L (Figure 4.6). When the thermocline was present on Sept 25, 2019, the water temperature in the epilimnion averaged 11.3 ºC and dissolved oxygen concentrations averaged 10.3 mg/L. Below the thermocline in the hypolimnion, water temperatures averaged 8.8 ºC and dissolved oxygen concentrations averaged 9.8 mg/L (Appendix D, Figure D.3). On November 3, 2019, the water temperature averaged 8.3 ºC and dissolved oxygen concentrations averaged 11.6 mg/L throughout the water column. (Appendix D, Figure D.4).

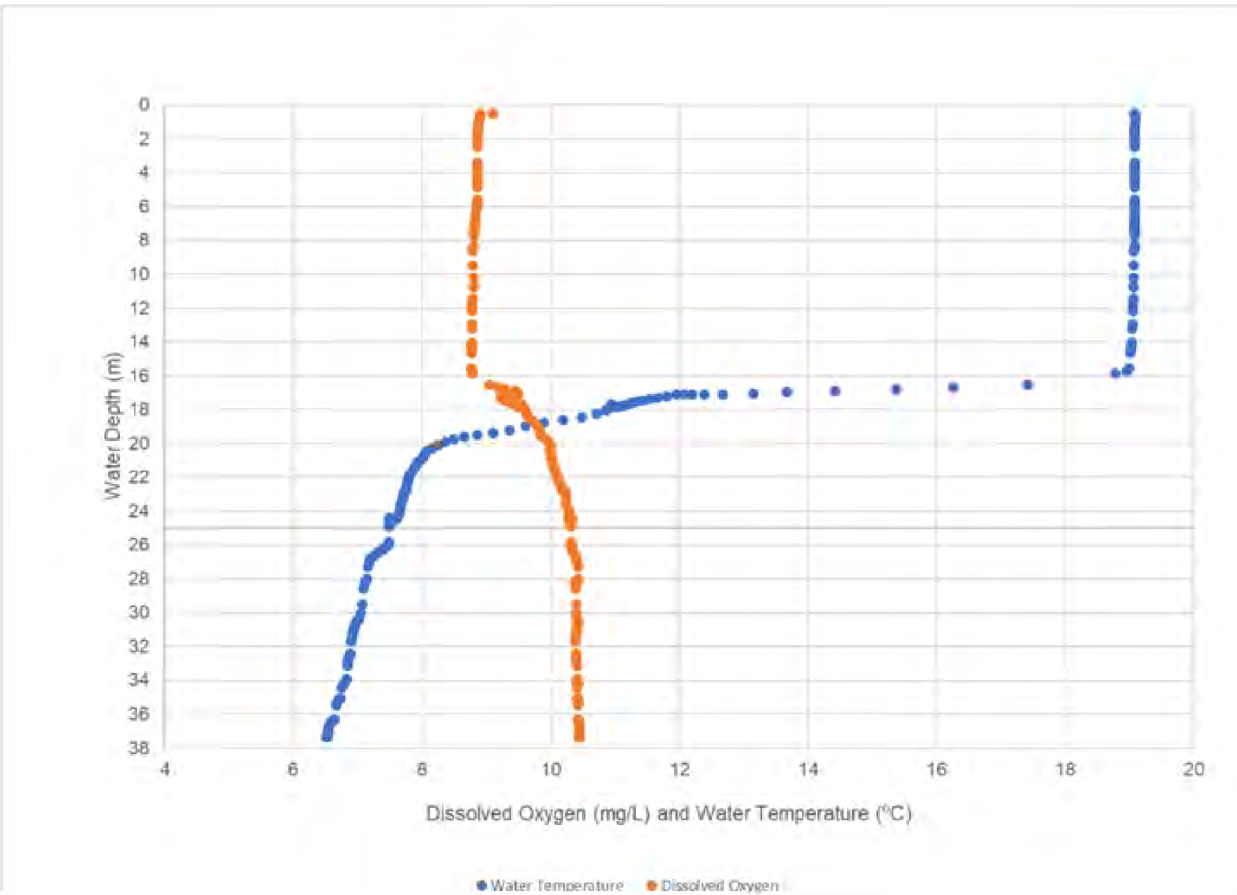

Figure 4.4 Dissolved Oxygen and Water Temperature Profiles at VIC01 in Victoria Lake, NL on August 3, 2019

Conductivity levels for Victoria Lake varied between 20-23 µs/cm. The pH in Victoria Lake ranged from 5.57 to 7.37. The in situ pH within the water column was frequently below the recommended guideline CWQG PAL of 6.5. The pH probe did not appear to be functioning on Victoria Lake on August 3, 2019 and was excluded from the data set. Secchi depth ranged from 3.9 to 4.9 m on Victoria Lake in August and September 2019, respectively.

Analytical water chemistry associated with Valentine Lake and Victoria Lake is provided in the Valentine Gold Project Hydrology and Surface Water Quality Monitoring Baseline Report (Stantec 2020).

In ponds, average water temperature ranged from 10.2 to 16.7°C (Table 4.9). Average dissolved oxygen concentrations in ponds ranged from 8.3 to 9.5 mg/L. Four of six stations were below the CWQG PAL recommended minimum value of 9.5 mg/L for early life stages, however all stations were above the guideline (6.5 mg/L) for all life stages (CCME 2014). The pH ranged from 6.1 to 7.1 and was below the CWQG PAL recommended range (6.5 – 9.0) at two of six sampling locations (Table 4.9).

Table 4.9 In Situ Water Quality Parameters for Ponds and Streams in September 2019

Station	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µs/cm)	pH	# Samples
Ponds					
V1	13.1	8.3	47.9	6.8	2
L1	13.5	9.7	63.3	6.1	1
VALP2	14.3	9.5	55.3	6.4	1
VALP3	10.2	9.3	52.9	6.8	1
VICP2	15.7	9.1	52.3	6.8	3
M7	16.7	8.6	103.1	7.1	1
Streams					
(14) Unnamed Tributary to Victoria River	15.1	8.9	39.4	6.5	2
(22 and 24) V1 inlet and outlet	12.8	7.8	59.0	6.7	6
(8) M1 to M7	12.2	9.4	74.7	6.7	3
(20) VALP2 to waterfall	12.9	8.8	98.0	6.1	2
(1) Outlet of VALP3	13.6	9.0	42.5	6.9	3
(16) Waterfall to Victoria Lake	22.3	7.9	70.7	6.6	2

In streams, average water temperature ranged from 12.2 to 22.3°C (Table 4.9). Average dissolved oxygen concentrations in streams ranged from 7.8 to 9.4 mg/L. All stations were below the CWQG PAL recommended minimum value of 9.5 mg/L for early life stages; however, were above the guideline (6.5 mg/L) for all life stages (CCME 2014). The pH ranged from 6.1 to 6.9 and was below the CWQG PAL recommended range (6.5 – 9.0) at one of six sampling locations (Table 4.9).

4.4.3 Sediment Quality

No exceedances of the CSQG PEL were identified for cadmium, chromium, copper, lead, mercury and zinc in pond and lake sediments. Arsenic was above the CSQG PEL guidelines in the 12 sediment samples collected from ponds and lakes and ranged from 18 to 290 mg/kg. The laboratory results are compiled in Appendix D; Table D.4.

Grain size distribution in samples were highly variable. In ponds, grain size classes were distributed relatively equally between sand, silt, and clay (Figure 4.7). In lakes, silt was the predominant grain size class, except within the littoral area of Valentine Lake (VAL03-LT) which was sand.

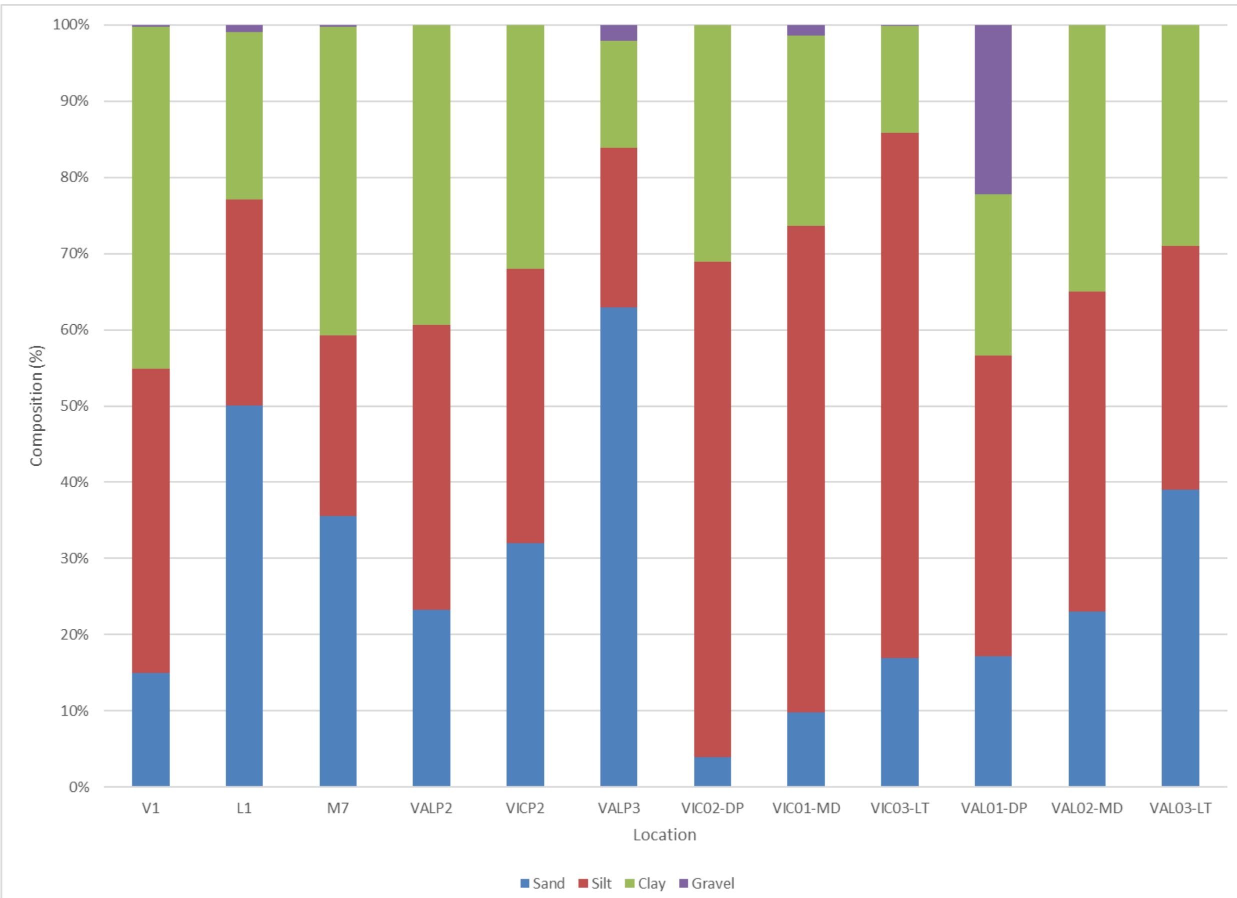

Figure 4.5 Grain Size Composition for Sediment from Ponds and Lakes

No exceedances of the CSQG PEL were identified for cadmium, chromium, copper, lead, mercury and zinc. Arsenic was above the CSQG PEL guidelines in the five sediment samples collected from soft sediments in streams and ranged from 43 to 240 mg/kg. The laboratory results are compiled in Appendix D; Table D.4.

Grain size distribution sampled from soft sediments in streams was highly variable. Sand was the predominant grain size at stations C001-02 (14), V1in-02 (24) and VICP2out-02 (16), while silt was the predominant grain size at M1out-02 (8) and VALP2out-02 (2) (Figure 4.8).

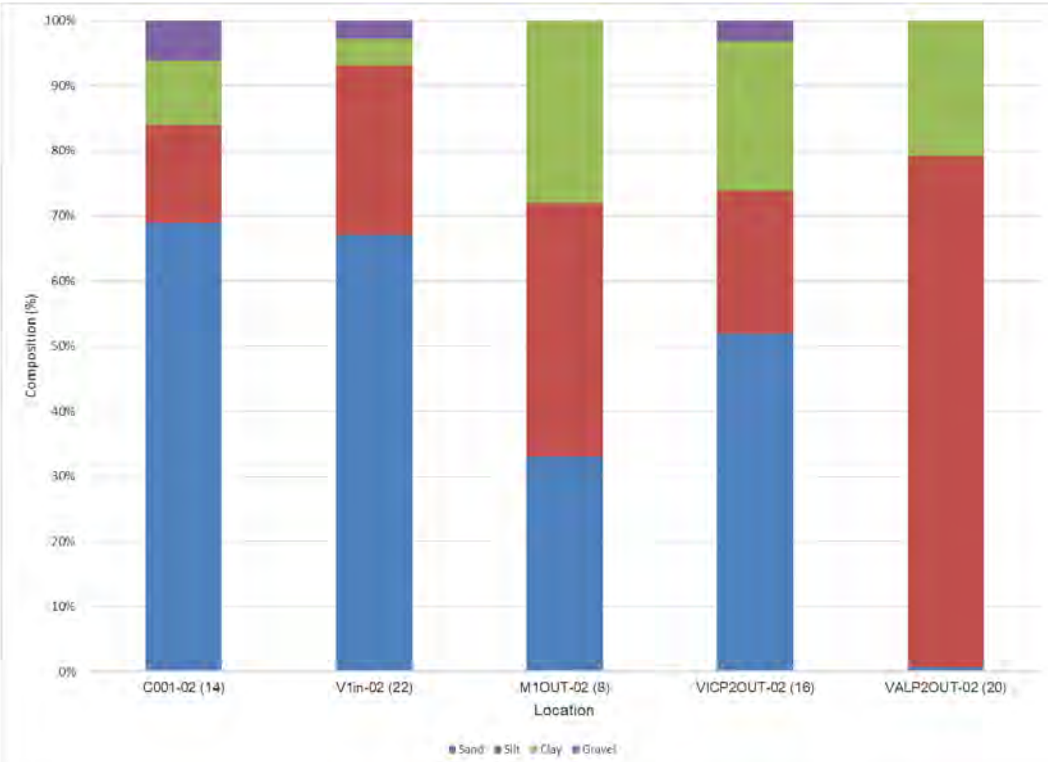

Figure 4.6 Grain Size Composition for Sediment from Streams

5.0 SUMMARY

The 2019 aquatic study indicated that primary productivity in the Study Area is generally low. This is based on chlorophyll “a” concentration in the surface water of ponds and lakes and in periphyton attached to rocks, in streams.

Secondary productivity was assessed by sampling BIC in ponds, lakes, and streams and by comparing the community descriptors (density, richness, evenness, similarity and EPT index. For secondary productivity, amphipods were the predominant taxa in ponds, Chironomids were the predominant taxa in lakes and soft substrates in streams and Ephemeroptera (mayflies) were the predominant taxa in streams. BIC density was variable even within similar habitat types. Generally, ponds had low evenness and moderate diversity, lakes and streams with soft substrates had moderate evenness and diversity and streams with hard substrates had low evenness and high diversity. Overall, the BICs were representative of unimpacted ponds, lakes and streams.

The population estimate for all fish ranged from 33.9 to 107 fish per 100 m^2 and biomass for all fish ranged from 29.6 to 652 g/100 m^2. Streams containing salmonids (e.g., brook trout and juvenile Atlantic salmon) had higher fisheries productivity than streams only containing threespine sticklebacks. Population estimates in streams indicated a range of 0 to 5.8 juvenile Atlantic salmon per 100 m^2 and a range of 0 to 38.6 brook trout per 100 m^2. Brook trout were confirmed to be present in Pond M2.

V1 was estimated to be 1.5 m in depth, contain a high proportion of fines and moderate amounts of aquatic vegetation. The fish habitat characterization indicated that the stream associated with V1 was generally small (<5 m), shallow (<0.5 m), slow flowing (<0.2 m/s) and intermittent in parts. A waterfall which is a barrier to fish passage was observed on the inlet to V1.

Water temperatures in the Study Area are generally suitable for cold water fish species. Dissolved oxygen concentrations are generally above the CWQG PAL for all life stages of fish. The pH is the study area is generally slightly acidic and conductivity is low. A Thermocline was present in Valentine Lake August 03 2019, but was not present September 25 and November 3, 2019. A thermocline was present in Victoria Lake August 3 and September 25, 2019 but was not present November 03, 2019.

No exceedances of the CSQG PEL were identified for cadmium, chromium, copper, lead, mercury and zinc in pond and lake sediments, however arsenic was above the CSQG PEL in all samples. In ponds, grain size class were distributed relatively, equally between sand, silt and clay, while in lakes, silt was generally the predominant grain size class. Grain size distribution was highly variable in streams.

Overall the ponds, lakes and streams in the Study Area provide food and habitat for brook trout, Atlantic salmon and threespine stickleback and are generally representative of unimpacted ponds, lakes, and streams in central Newfoundland.

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APPENDIX A

Primary Productivity

A.1

Ponds and Lakes

Table A.1. Location of Primary Productivity Sampling for Chlorphyll a in Lakes and Ponds, Summer (August) and Fall (September), 2019
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Waterbody Type	Sample Location	Coordinates		Sampling Date	Chlorophyll "a" Concentration (µg/L)
		Latitude	Longitude		
Lakes	VAL01-SR	48.389313	57.149122	3-Aug-19	< 0.5
	VAL01-MD	48.389313	57.149122	3-Aug-19	1.4
	VAL03-SR	48.376227	57.169292	3-Aug-19	0.8
	VIC01-SR	48.33676	-57.193901	3-Aug-19	0.9
	VIC01-MD	48.33676	-57.193901	3-Aug-19	< 0.5
	VIC03-SR	48.340416	-57.157215	3-Aug-19	0.7
Ponds	L1-SR	48.362702	-57.156949	7-Aug-19	1
	M7-SR	48.405971	-57.087055	5-Aug-19	1
	VICP2-SR	48.355573	-57.185713	6-Aug-19	1.7
	VALP2-SR	48.368031	57.160545	6-Aug-19	1.8
	VALP3-SR	48.388742	-57.128701	5-Aug-19	1.5
	V1-SR	48.438531	-57.049758	-	-
Lakes	VAL01-SR	48.389313	57.149122	25-Sep-19	0.7
	VAL01-MD	48.389313	57.149122	25-Sep-19	0.8
	VAL03-SR	48.376227	57.169292	25-Sep-19	0.8
	VIC01-SR	48.33676	-57.193901	24-Sep-19	0.7
	VIC01-MD	48.33676	-57.193901	24-Sep-19	0.6
	VIC03-SR	48.340416	-57.157215	24-Sep-19	0.9
Ponds	L1-SR	48.362702	-57.156949	23-Sep-19	1.3
	M7-SR	48.405971	-57.087055	24-Sep-19	0.6
	VICP2-SR	48.355573	-57.185713	23-Sep-19	1.4
	VALP2-SR	48.368031	57.160545	23-Sep-19	1.7
	VALP3-SR	48.388742	-57.128701	27-Sep-19	1.3
	V1-SR	48.438531	-57.049758	27-Sep-19	0.5

Notes: SR = Surface; MD = Mid

A.2

Streams

Table A.2. Location of Primary Productivity Sampling for Periphton in Streams, Summer (August) and Fall (September) 2019

Valentine Lake Project: 2019 Aquatic Data Baseline Report

Stantec Project No: 121416288.600

Stream Name	Site	Latitude	Longitude	Date	Concentration (µg/L)	Area of Rocks (cm^2)	Density (µg/cm^2)
(14) Unnamed Tributary to Victoria River	C001	48.369641	-57.119825	7-Aug-19	348	373	0.9
(24) Outlet of V1	V1out	48.438695	-57.046713	4-Aug-19	610	446	1.4
(8) M1 to M7	M1out	48.404491	-57.0915	5-Aug-19	568	411	1.4
(20) ValP2 to Falls	ValP2out	48.368703	-57.160112	6-Aug-19	545	353	1.5
(16) Falls to Victoria Lake	VICP2out	48.34843	-57.179278	6-Aug-19	789	428	1.8
(1) Outlet of ValP3	ValP3out	48.389427	-57.136765	5-Aug-19	387	475	0.8
(14) Unnamed Tributary to Victoria River	C001	48.369641	-57.119825	24-Sep-19	398	486	0.8
(24) Outlet of V1	V1out	48.438695	-57.046713	24-Sep-19	783	607	1.3
(8) M1 to M7	M1out	48.404491	-57.0915	25-Sep-19	756	405	1.9
(20) ValP2 to Falls	ValP2out	48.368703	-57.160112	23-Sep-19	881	381	2.3
(16) Falls to Victoria Lake	VICP2out	48.34843	-57.179278	28-Sep-19	519	391	1.3
(1) Outlet of ValP3	ValP3out	48.389427	-57.136765	27-Sep-19	980	389	2.5

Note: Summer and fall locations the same with the exception of outlet of V1 which was moved ~100m downstream for fall sampling because of substrate and flow

A.3

Photos

Primary Productivity in Streams - Periphyton

Photo A1 Periphyton Collected from C001 Stream (14) in Summer 2019

Photo A2 Periphyton Collected from C007 Stream (22) in Summer 2019

Photo A3 Periphyton Collected from Outlet of M1 Stream (8) in Summer 2019

Photo A4 Periphyton Collected from Outlet of ValP2 Stream (20) in Summer 2019

Primary Productivity in Streams - Periphyton

Photo A2 **Periphyton Collected from Outlet of VicP2 Stream (16) in Summer 2019**

Photo A6 **Periphyton Collected from Outlet of VALP3 Stream (1) in Summer 2019**

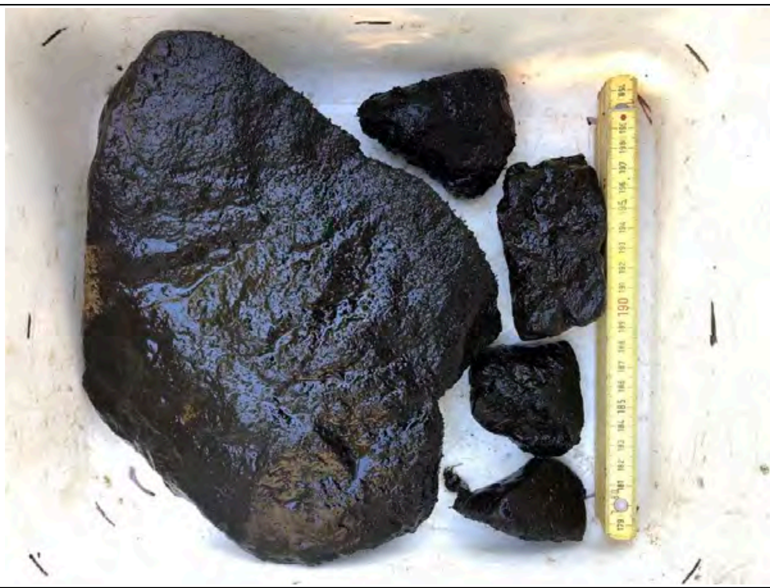


Photo A3 **Periphyton Collected from C001 Stream (14) in Fall 2019**

Photo A8 **Periphyton Collected from C007 Stream (22) in Fall 2019**

Primary Productivity in Streams - Periphyton

Photo A9 **Periphyton Collected from Outlet of M1 (8) Stream in Fall 2019**

Photo A4 **Periphyton Collected from Outlet of ValP2 Stream (20) in Fall 2019**

Photo A11 **Periphyton Collected from Outlet of VicP2 Stream (16) in Fall 2019**

Photo A12 **Periphyton Collected from Outlet of VALP3 Stream (1) in Fall 2019**

APPENDIX B

Secondary Productivity

B.1

Benthic Invertebrate Community Raw Data

Table B.1. Raw Benthic Invertebrate Community Counts for Streams and Lakes
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Habitat	**Stream (Hard Substrates)**						**Stream (Soft Substrates)**					**Ponds**						**Lakes**					
Site	C001-01 (14)	V1out-01 (24)	M1out-01 (8)	VALP2out-01 (20)	VALP3out-01 (1)	VICP2out-01 (16)	C001-02 (14)	V1in-02 (22)	M1out-02 (8)	VICP2out-02 (16)	VALP2out-02 (20)	V1	L1	M7	VALP2	VICP2	VALP3	VAL01-BT	VAL02-MD	VAL03-LT	VIC02-DP	VIC01-MD	VIC03-LT
DATE	19.09.24	19.09.27	19.09.25	19.09.22	19.09.27	19.09.23	19.09.24	19.09.27	19.09.24	19.09.23	19.09.22	19.09.27	19.09.25	19.09.24	19.09.22	19.09.23	19.09.25	19.09.25	19.09.25	19.09.25	19.09.24	19.09.24	19.09.24
Original % Subsampled	100	100	100	100	100	100	50	100	50	50	100/10	33.3	100	100	100	100	50	100	100	100	100	50	50
Area	0.27	0.27	0.27	0.27	0.27	0.27	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.045	0.0675	0.0675	0.0675	0.0675	0.0675
ANNELIDA:HIRUDINEA																							
ERPOBDELLIDAE(juveniles)				3	3										1								
Erpobdella punctata					1																		
Nephelopsis obscura				1																			
GLOSSIPHONIIDAE:																							
Glossiphonia complanata																		1					
Helobdella stagnalis							16	1								1							
ANNELIDA:OLIGOCHAETA:																							
ENCHYTRAEIDAE																1							
LUMBRICIDAE:																							
Eiseniella tetraedra	3	1			2			1															
LUMBRICULIDAE																							
Lumbriculus variegatus		1					10					6	2	2					4	1			
Stylodrilus heringianus	2	1	1	9	2	1																	
TUBIFICIDAE			1			3				2	8					1							2
Rhyacodrilus coccineus																					1		4
ACARINA																							
HYDRODROMIDAE:																							
Hydrodroma despeciens																			1				
CRUSTACEA:AMPHIPODA																							
CRANGONYCTIDAE:																							
Crangonyx																							2
HYALELLIDAE																							
Hyalella azteca	1		3	19	2	6	92	7		62		192	83	128	21	32	106	4		77			
CRUSTACEA:CLADOCERA:																							
CHYDORIDAE:																							
Eurycercus																	2						
INSECTA :																							
COLEOPTERA:																							
DYTISCIDAE:																							
Ilybius								1		2													
ELMIDAE																							
Oulimnius latisculus						5																	
Promoresia tardella			5	24	6	7																	
Stenelmis crenata				13	6																		

Table B.1. Raw Benthic Invertebrate Community Counts for Streams and Lakes
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Habitat	**Stream (Hard Substrates)**						**Stream (Soft Substrates)**					**Ponds**						**Lakes**					
Site	C001-01 (14)	V1out-01 (24)	M1out-01 (8)	VALP2out-01 (20)	VALP3out-01 (1)	VICP2out-01 (16)	C001-02 (14)	V1in-02 (22)	M1out-02 (8)	VICP2out-02 (16)	VALP2out-02 (20)	V1	L1	M7	VALP2	VICP2	VALP3	VAL01-BT	VAL02-MD	VAL03-LT	VIC02-DP	VIC01-MD	VIC03-LT
DATE	19.09.24	19.09.27	19.09.25	19.09.22	19.09.27	19.09.23	19.09.24	19.09.27	19.09.24	19.09.23	19.09.22	19.09.27	19.09.25	19.09.24	19.09.22	19.09.23	19.09.25	19.09.25	19.09.25	19.09.25	19.09.24	19.09.24	19.09.24
Original % Subsampled	100	100	100	100	100	100	50	100	50	50	100/10	33.3	100	100	100	100	50	100	100	100	100	50	50
Area	0.27	0.27	0.27	0.27	0.27	0.27	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.045	0.0675	0.0675	0.0675	0.0675	0.0675
DIPTERA																							
CERATOPOGONIDAE																							
Bezzia/Palpomyia																3							
Dasyhelea																22							
Sphaeromias	3					2		2		4			3		1	3				2			
CHIRONOMIDAE:CHIRONOMINAE:																							
Chironomus							6	110		4	13								4			2	
Cladopelma										6	8												
Cladotanytarsus												6				3							
Cryptochironomus								2		2	1		2	2		4	2		3	3			4
Dicrotendipes							28			18	1		5	2		3		1	7	10			
Endochironomus							4																
Microtendipes		36		35	3	1	14			6	9						10	2	39	5			
Nilothauma											2								1				
Pagastiella ostansa							20		2	14			12	1					10	8			4
Polypedilum					1		8			4	21		6			8	4						2
Pseudochironomus														3		16		1	18	48			
Stenochironomus																2					1		
Stictochironomus								161											9	67	2		
Tanytarsus				20			82	13		66	5	27	4			1	4		7	1			
Tribelos							22																
CHIRONOMIDAE:ORTHOCLADIINAE																							
Bryophaenocladius				1																			
Cricotopus				1												2			1	1			
Parametriocnemus	1																	1	2				
CHIRONOMIDAE:TANYPODINAE																							
Ablabesmyia		2	1	12			10	4		4	1								1	2			
Clinotanypus pinguis											1		2		1	3				1			
Conchapelopia				43	1	1	4															2	
Procladius							42	13		18	9	3	18	2	6	6	10		13	9	1	6	6
DIXIDAE:																							
Dixa			1																				
EPHYDRIDAE:																1							
SIMULIDAE																							
Simulium		1																					
TABANIDAE:																							
Chrysops												12	3	1									
TIPULIDAE																							
Antocha				103	1																		
Dicranota			2																				
Hexatoma						1																	
Pilaria			1			9																	
Tipula						1																	

Table B.1. Raw Benthic Invertebrate Community Counts for Streams and Lakes
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Habitat	**Stream (Hard Substrates)**						**Stream (Soft Substrates)**					**Ponds**						**Lakes**					
Site	C001-01 (14)	V1out-01 (24)	M1out-01 (8)	VALP2out-01 (20)	VALP3out-01 (1)	VICP2out-01 (16)	C001-02 (14)	V1in-02 (22)	M1out-02 (8)	VICP2out-02 (16)	VALP2out-02 (20)	V1	L1	M7	VALP2	VICP2	VALP3	VAL01-BT	VAL02-MD	VAL03-LT	VIC02-DP	VIC01-MD	VIC03-LT
DATE	19.09.24	19.09.27	19.09.25	19.09.22	19.09.27	19.09.23	19.09.24	19.09.27	19.09.24	19.09.23	19.09.22	19.09.27	19.09.25	19.09.24	19.09.22	19.09.23	19.09.25	19.09.25	19.09.25	19.09.25	19.09.24	19.09.24	19.09.24
Original % Subsampled	100	100	100	100	100	100	50	100	50	50	100/10	33.3	100	100	100	100	50	100	100	100	100	50	50
Area	0.27	0.27	0.27	0.27	0.27	0.27	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.045	0.0675	0.0675	0.0675	0.0675	0.0675
EPHEMEROPTERA																							
BAETIDAE																							
Acentrella	1																						
Acerpenna pygmaeus		1	1																				
Callibaetis																	2						
CAENIDAE:																							
Caenis youngi										4			3		1								
EPHEMERELLIDAE																							
Ephemerella	11	1	9																				
Eurylophella		20		3	9	9				2													
HEPTAGENIIDAE																							
Stenonema vicarium		1			25																		
LEPTOPHLEBIIDAE																							
Habrophlebia vibrans	36	4	4	627	2	48	4									1							
Leptophlebia	36	20	7	2	6	15	2			2			4				16						
ODONATA																							
AESHNIDAE:																							
Aeshna				2			2																
COENAGRIONIDAE:																							
Enallagma													1										
CORDULIIDAE:																							
Cordulia shurtleffi																	2						
Somatochlora					4		2																
Tetragoneuria							2																
GOMPHIDAE																							
Ophiogomphus colubrinus					3																		
LIBELLULIDAE:																							
Leucorrhinia													1										
PLECOPTERA																							
CAPNIIDAE:																							
Paracapnia	1		1	61		1																	
CHLOROPERLIDAE																							
Haploperla brevis	14		3																				
LEUCTRIDAE																							
Leuctra	27	13	12	77	6	3																	

Table B.1. Raw Benthic Invertebrate Community Counts for Streams and Lakes

Valentine Lake Project: 2019 Aquatic Data Baseline Report

Stantec Project No: 121416288.600

Habitat	**Stream (Hard Substrates)**						**Stream (Soft Substrates)**					**Ponds**						**Lakes**					
Site	C001-01 (14)	V1out-01 (24)	M1out-01 (8)	VALP2out-01 (20)	VALP3out-01 (1)	VICP2out-01 (16)	C001-02 (14)	V1in-02 (22)	M1out-02 (8)	VICP2out-02 (16)	VALP2out-02 (20)	V1	L1	M7	VALP2	VICP2	VALP3	VAL01-BT	VAL02-MD	VAL03-LT	VIC02-DP	VIC01-MD	VIC03-LT
DATE	19.09.24	19.09.27	19.09.25	19.09.22	19.09.27	19.09.23	19.09.24	19.09.27	19.09.24	19.09.23	19.09.22	19.09.27	19.09.25	19.09.24	19.09.22	19.09.23	19.09.25	19.09.25	19.09.25	19.09.25	19.09.24	19.09.24	19.09.24
Original % Subsampled	100	100	100	100	100	100	50	100	50	50	100/10	33.3	100	100	100	100	50	100	100	100	100	50	50
Area	0.27	0.27	0.27	0.27	0.27	0.27	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.0675	0.045	0.0675	0.0675	0.0675	0.0675	0.0675
TRICHOPTERA																							
HYDROPSYCHIDAE																							
Hydropsyche	20		1																				
HYDROPTILIDAE																							
Hydroptila										8													
LEPTOCERIDAE																							
Mystacides sepulchralis														1									
Oecetis							2			2			1			4							
PHILOPOTAMIDAE																							
Dolophilodes	9	2	15																				
PHRYGANAEIDAE:																							
Fabria inornata													2									2	
Oligostomis				1																			
Ptilostomis														1									
POLYCENTROPODIDAE																							
Nyctiophylax				1																			
Polycentropus		1	1								2									2			
PHYACOPHILIDAE																							
Rhyacophila	9	6	6	11		7																	
MOLLUSCA:BIVALVIA																							
SPHAERIIDAE																							
Musculium securis				2			78				1												2
Pisidium		17		248	106	55	162	54		24	10	6	7	1	9	4		2	8	5		10	14
MOLLUSCA:GASTROPODA																							
HYDROBIIDAE:																							
Amnicola limosa																			7				
PLANORBIDAE																							
Gyraulus parvus		3		12	1	2	2			4	1			1	1	3							
Planorbella campanulata																2	4						
TOTAL NUMBERS	174	131	75	1331	190	177	614	369	2	258	93	252	159	145	41	126	162	12	135	242	5	22	40
TOTAL TAXA	15	18	19	25	20	19	23	12	1	21	16	7	18	12	8	23	11	7	17	16	4	5	9

B.2

Habitat Characteristics at Sample Locations

Table B.2. Location and Habitat Characterisitcs of Secondary Productivity Sampling for Benthic Invertebrate Communties in Lakes, Ponds and Streams, Fall 2019
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Stream/Waterbody Type	Substrate Type	Location	Station	Latitude	Longitude	Number of Replicates	Average Channel Width	Number of Replicates	Depth Range (m)	Water Velocity (m/s)	Macrophytes	Algae	Sediment Description	Comment
Stream	Hard	(14) Unnamed Tributary to Vic	C001-01	48.368581	57.119724	3	2.05	3	0.07 to 0.08	-	0	0 to 1	Large gravel/small boulder	
Stream	Hard	(24) Outlet of V1	V1out-01	48.438148	57.045188	3	2.73	3	0.23 to 0.4	0.2 to 0.3	0, 2	0, 2	Large gravel/cobble	
Stream	Hard	(8) M1 to M7	M1out-01	48.404669	57.091521	3	1.3	3	0.09 to 0.15	-	0	1	Cobble	
Stream	Hard	(1) Outlet of ValP3	VALP3out-01	48.389298	57.138201	3	4.1	3	0.16 to 0.32	0.30 to 0.94	0, 1	1	Cobble/small boulder	
Stream	Hard	(20) ValP2 to Falls	VALP2out-01	48.368626	57.160009	3	1.36	3	0.06 to 0.12	0.05 to 0.18	0	1	Cobble	
Stream	Hard	(16) Falls to Victoria Lake	VICP2out-01	48.348416	57.179259	3	1.2	3	0.18	0.23 to 0.64	1	1	Cobble/small boulder	
Stream	Soft	(14) Unnamed Tributary to Vic	C001-02	48.369823	57.12028	3	25	3	1.20 to 1.21	0.01	0, 1,2	0	Muck with sand underneath	old beaver pond
Stream	Soft	(24) Outlet of V1	V1in-02	48.438846	57.050582	3	1.71	3	0.55 to 0.63	0.1 to 0.2	2,3	0	Cobble, lots of organic debris	
Stream	Soft	(8) M1 to M7	M1out-02	48.398631	57.102095	3	17	3	0.57 to 0.65	0	1 and 2	0	Brown muck	
Stream	Soft	(3) M3 to M2	VALP3out-02	48.394293	57.116418	Sample collection not feasible due to intermittent nature of channel and appropriate substrate								
Stream	Soft	(20) ValP2 to Falls	VALP2out-02	48.368927	57.160609	3	2	3	0.39 to 0.56	0.00 to 0.02	2	1	Clay	Small depositional pool
Stream	Soft	(16) Falls to Victoria Lake	VICP2out-02	48.348911	57.180086	3	4	3	0.32 to 0.4	0.02	1 to 2	0	Brown, organics with decomposing smell	
Pond	Soft	V1	V1	48.43833	57.050342	3	NA	3	0.3 to 0.35	NA	sparse	none	Muck with organics, dark brown and decomposing smell	-
Pond	Soft	L1	L1	48.362672	57.157159	3	NA	3	0.51 to 0.59	NA	sparse	none	Chunky sediment	-
Pond	Soft	M7	M7	48.405864	57.087297	3	NA	3	0.3 to 0.37	NA	common	sparse	No odour, slightly clumpy loan and organics	-
Pond	Soft	VALP2	VALP2	48.368	57.160322	3	NA	3	0.89 to 1.18	NA	sparse	none	Silky, organics, one replicate smelled of decomposition other others had no smell	-
Pond	Soft	VICP2	VICP2	48.354978	57.186229	3	NA	3	0.55 to 0.67	NA	sparse	none	Clumpy loam (balls) with no ordour	-
Pond	Soft	VALP3	VALP3	48.38886	57.128527	3	NA	3	0.5 to 1.3	NA	none to abundant	none	Brown muck with organics, no odour	-
Lake	Soft	Valentine Lake	VAL01-DP	48.387915	57.144411	2	NA	3	13.3 to 22	NA	none	none	hard balls of black sediment	Could not get third replicate because of waves and water depths with Eckman Grab
Lake	Soft	Valentine Lake	VAL02-MD	48.387868	57.14441	3	NA	3	4 to 6	NA	none	none	brown muck	-
Lake	Soft	Valentine Lake	VAL03-LT	48.377136	57.17584	2	NA	3	2.3 to 2.8	NA	none	none	brown	-
Lake	Soft	Victoria Lake	VIC02-DP	48.341136	57.197405	3	NA	3	12 to 12.5	NA	none	none	Decomposition, organics containing coniferous vegetation	-
Lake	Soft	Victoria Lake	VIC01-MD	48.342266	57.164619	3	NA	3	5.5 to 5.6	NA	none	none	Muck no odour	-
Lake	Soft	Victoria Lake	VIC03-LT	48.34174	57.150393	3	NA	3	2.4 to 3.1	NA	none	none	Brown, layer of organic wood chips then silt	-

Notes:
DP = Profundal
MD = Sublittoral
LT = Littoral

B.3

Benthic Community Descriptors in Ponds and Lakes

Table B.3. Taxon Richness, Simpson's Evenness and Diversity, Density and EPT Index for Ponds and Lakes by Species
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Station	Taxon Richness	Simpson's Evenness	Simpson's Diversity	Density (#/m^2)	EPT Index
V1	7	0.24	0.40	3733	0.00
L1	18	0.19	0.70	2356	0.06
M7	12	0.11	0.22	2148	0.01
VALP2	8	0.37	0.67	607	0.02
VICP2	23	0.35	0.88	1867	0.04
VALP3	10	0.22	0.54	2370	0.11
VAL01-DP	7	0.73	0.81	267	0.00
VAL02-MD	17	0.44	0.87	2000	0.00
VAL03-LT	16	0.28	0.78	3585	0.01
VIC02-DP	4	0.89	0.72	74	0.00
VIC01-MD	5	0.65	0.69	326	0.09
VIC03-LT	9	0.60	0.82	593	0.00

Notes:
DP = Profundal
MD = Sublittoral
LT = Littoral

B.4

Benthic Community Descriptors in Streams

Table B.4. Taxon Richness, Simpson's Evenness and Diversity, Density, and EPT Index for Hard (-01) and Soft (-02) Substrates in Streams by Species
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Station	Station	Taxon Richness	Simpson's Evenness	mpson's Diversi	ensity (# /m	EPT Index
(14) Unnamed Tributary to Victoria River	C001-01	15	0.48	0.86	644	0.94
(24) Outlet of V1	C007-01	18	0.36	0.85	485	0.53
(8) M1 to M7	M1out-01	19	0.49	0.89	278	0.80
(20) ValP2 to Falls	VALP2out-01	25	0.15	0.73	4930	0.59
(1) Outlet of ValP3	VALP3out-01	20	0.15	0.66	704	0.25
(16) Falls to Victoria Lake	VICP2out-01	19	0.28	0.81	656	0.47
(14) Unnamed Tributary to Victoria River	C001-02	23	0.32	0.86	9096	0.01
(22) Inlet of V1	C007-02	12	0.27	0.70	5467	0.00
(8) M1 to M7	M1out-02	1	1.00	0.00	30	0.00
(16) Falls to Victoria Lake	VICP2out-02	21	0.32	0.85	3822	0.07
(20) ValP2 to Falls	VALP2out-02	16	0.52	0.88	1378	0.02

APPENDIX C

Fish Data

APPENDIX C: Fish Data

Legend

Method:	Gillnet (GN) and Electrofishing (EF)
Site:	Unique identifier assigned to each water body or stream fished.
Coordinates:	Area of fish sampling in decimal degrees
Location:	Fishing location described as stream segment electrofished or gillnet number (GN#)
Date:	Date fishing was conducted
Fishing Time:	Number of seconds electrofishing was conducted, number of minutes gill netting was conducted.
Pass/Sweep	Successive fishing passes/sweeps associated with quantitative electrofishing (1, 2 or 3 passes)
Species	Species captured brook trout, Atlantic salmon and threespine stickleback
Count:	Number of fish associated with line entry
Length:	Fork length in mm
Weight:	Total weight in grams

(K) Condition: Condition factor calculated as: $K = W \times 10^5 / L^3$

Where:
K = condition,
W = Weight in g,
L = Length in mm.

Table C.1 Raw Fish Sampling Data 2019

Valentine Lake Project: 2019 Aquatic Data Baseline Report

Stantec Project No: 121416288.600

Fishing Method	Site	Coordinates	Location	Survey Date	Pass / Sweep	Fishing Time	Species	Count	Fork Length (mm)	Weight (g)	Condition (K)
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	235	141.2	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	222	105.5	1.0
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	226	125.3	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	167	57.6	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	144	38.4	1.3
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	234	140.6	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	228	137.7	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	296	311.4	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	170	61.6	1.3
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	211	110.9	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	156	47.4	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	198	96.1	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	226	129.8	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	220	132.2	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	256	179.4	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	179	65.8	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	216	101.1	1.0
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	180	70	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	262	212.4	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	156	44.1	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	139	34.4	1.3
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	194	83.9	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	219	128.5	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	218	109.4	1.1
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	221	125.9	1.2
GN	M2	N48.393516 W57.11266	GN1	8/7/2019	-	5 minutes	Brook Trout	1	160	46	1.1
GN	Valentine Lake	N48.37719 W57.167041	GN2	8/3/2019	-	55 minutes	Atlantic salmon	1	321	-	-
GN	Valentine Lake	N48.37719 W57.167041	GN2	8/3/2019	-	55 minutes	Atlantic salmon	1	322	-	-
GN	Valentine Lake	N48.385462 W57.148043	GN1	8/3/2019	-	60 minutes	-	0	-	-	-
GN	Victoria Lake	N48.342727 W57.196336	GN2	8/3/2019	-	50 minutes	Brook Trout	1	180	-	-
GN	Victoria Lake	N48.342727 W57.196336	GN2	8/3/2019	-	50 minutes	Atlantic salmon	1	322	-	-
GN	Victoria Lake	N48.342727 W57.196336	GN2	8/3/2019	-	50 minutes	Atlantic salmon	1	285	-	-
GN	Victoria Lake	N48.342727 W57.196336	GN2	8/3/2019	-	50 minutes	Atlantic salmon	1	227	-	-
GN	Victoria Lake	N48.342727 W57.196336	GN2	8/3/2019	-	50 minutes	Atlantic salmon	1	204	-	-
GN	Victoria Lake	N48.343918 W57.19722	GN1	8/3/2019	-	50 minutes	Atlantic salmon	1	126	-	-
GN	Victoria Lake	N48.343918 W57.19722	GN1	8/3/2019	-	50 minutes	Atlantic salmon	1	40	-	-

Table C.1 Raw Fish Sampling Data 2019

Valentine Lake Project: 2019 Aquatic Data Baseline Report

Stantec Project No: 121416288.600

Fishing Method	Site	Coordinates	Location	Survey Date	Pass / Sweep	Fishing Time	Species	Count	Fork Length (mm)	Weight (g)	Condition (K)
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	43	0.7	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	44	0.9	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	45	0.6	0.7
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	93	7.7	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	39	0.6	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	75	4.3	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	45	0.9	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	43	0.7	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	83	6.1	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	136	25	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	94	8.4	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	82	5.5	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	39	0.6	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	39	0.5	0.8
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	77	4.9	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	118	16.2	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	45	0.8	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	41	0.6	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	86	6.7	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	74	4.6	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	38	0.4	0.7
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	50	1.2	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	41	0.7	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	34	0.3	0.8
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	77	4	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	147	32.8	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	45	0.8	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	50	1.3	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	91	7.3	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	76	4.7	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	83	5.7	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	42	0.7	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	114	10	0.7
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	44	0.8	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	105	11.7	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	115	15.8	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	45	0.8	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	80	5.4	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	79	5.4	1.1
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	41	0.7	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	47	1	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	85	5.7	0.9
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	79	4.8	1.0

Table C.1 Raw Fish Sampling Data 2019

Valentine Lake Project: 2019 Aquatic Data Baseline Report

Stantec Project No: 121416288.600

Fishing Method	Site	Coordinates	Location	Survey Date	Pass / Sweep	Fishing Time	Species	Count	Fork Length (mm)	Weight (g)	Condition (K)
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	42	0.6	0.8
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	90	7.2	1.0
EF	(8) M1 to M7	N48.40458 W57.091663	1100 m downstream of M1	8/7/2019	1	1682 seconds	Brook Trout	1	-	-	-
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	46	0.9	0.9
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	74	4	1.0
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	156	44.1	1.2
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	130	18.5	0.8
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	43	0.8	1.0
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	44	0.8	0.9
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	44	0.8	0.9
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	92	7.2	0.9
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	124	18.3	1.0
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	112	13.4	1.0
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	82	5.6	1.0
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	39	0.5	0.8
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	44	0.7	0.8
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	151	29.1	0.8
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	48	0.9	0.8
EF	(8) M1 to M7	N48.40426 W57.093076	1100 m downstream of M1	8/7/2019	2	1249 seconds	Brook Trout	1	86	6.9	1.1
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	78	4.7	1.0
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	74	3.9	1.0
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	46	1.2	1.2
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	116	15.3	1.0
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	45	0.9	1.0
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	71	3.9	1.1
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	102	10.8	1.0
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	39	0.5	0.8
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	127	20.3	1.0
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	82	5.9	1.1
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	115	15	1.0
EF	(8) M1 to M7	N48.404314 W57.09306	1100 m downstream of M1	8/7/2019	3	802 seconds	Brook Trout	1	40	0.5	0.8
EF	(20) ValP2 to Falls	N48.36866 W57.159226	75 m downstream of VALP2	8/6/2019	1	896 seconds	Threespine Stickleback	6	-	3.8	-
EF	(20) ValP2 to Falls	N48.36866 W57.159226	75 m downstream of VALP2	8/6/2019	2	640 seconds	Threespine Stickleback	12	-	11.1	-
EF	(20) ValP2 to Falls	N48.36866 W57.159226	75 m downstream of VALP2	8/6/2019	3	685 seconds	Threespine Stickleback	11	-	10.2	-
EF	(20) ValP2 to Falls	N48.36866 W57.159226	75 m downstream of VALP2	8/6/2019	4	677 seconds	Threespine Stickleback	3	-	2.9	-
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	52	1.7	1.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	87	6.9	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	83	5.9	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	51	1.4	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	50	1.3	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	76	5	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	48	1.2	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	45	0.8	0.9

Table C.1 Raw Fish Sampling Data 2019

Valentine Lake Project: 2019 Aquatic Data Baseline Report

Stantec Project No: 121416288.600

Fishing Method	Site	Coordinates	Location	Survey Date	Pass / Sweep	Fishing Time	Species	Count	Fork Length (mm)	Weight (g)	Condition (K)
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	54	1.6	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	57	1.9	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	48	1	0.9
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	108	13.7	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	55	2	1.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	94	8.5	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	45	0.7	0.8
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	51	1.2	0.9
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	52	1.5	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	82	5.8	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	45	0.9	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	57	2.1	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	104	11.3	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	112	16.2	1.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	57	2.4	1.3
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	82	5.9	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	52	1.3	0.9
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	50	1.3	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	51	1.5	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	129	25.8	1.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	81	5.2	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	143	31.9	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	39	0.4	0.7
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	48	2.4	2.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	53	1.4	0.9
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	50	1.1	0.9
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	52	1.7	1.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	58	1.7	0.9
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	119	17.9	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	120	18.5	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	45	1.1	1.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	49	1.4	1.2
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	104	12.2	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	49	1.1	0.9
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	100	9.6	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	48	1.1	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	105	12.3	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	50	1.3	1.0
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Brook Trout	1	40	0.4	0.6
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	87	7.1	1.1
EF	(1) Outlet of ValP3	N48.389456 W57.137364	50 m downstream of VALP3	8/5/2019	1	1083 seconds	Atlantic salmon	1	87	6.3	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Atlantic salmon	1	95	8.6	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	50	1.3	1.0

Table C.1 Raw Fish Sampling Data 2019

Valentine Lake Project: 2019 Aquatic Data Baseline Report

Stantec Project No: 121416288.600

Fishing Method	Site	Coordinates	Location	Survey Date	Pass / Sweep	Fishing Time	Species	Count	Fork Length (mm)	Weight (g)	Condition (K)
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	41	0.9	1.3
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	49	1.4	1.2
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	53	1.9	1.3
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	91	7.8	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	50	1.3	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	129	21.6	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	118	18.6	1.1
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	100	11.1	1.1
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	52	1.6	1.1
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	51	1.3	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	53	1.9	1.3
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	49	0.9	0.8
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	50	1.3	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	80	5.7	1.1
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	62	2.4	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	159	41.9	1.0
EF	(1) Outlet of ValP3	N48.389418 W57.136926	50 m downstream of VALP3	8/5/2019	2	719 seconds	Brook Trout	1	50	1.3	1.0
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Atlantic salmon	1	96	9.1	1.0
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Brook Trout	1	59	2.4	1.2
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Atlantic salmon	1	82	6.1	1.1
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Atlantic salmon	1	84	6.4	1.1
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Brook Trout	1	50	1.6	1.3
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Brook Trout	1	61	2.1	0.9
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Brook Trout	1	101	10.3	1.0
EF	(1) Outlet of ValP3	N48.389375 W57.13692	50 m downstream of VALP3	8/5/2019	3	570 seconds	Brook Trout	1	41	0.7	1.0
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	119	4.8	0.3
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	116	4.6	0.3
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	139	4.6	0.2
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	130	9.6	0.4
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	122	6.9	0.4
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	99	4.3	0.4
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	158	19.7	0.5
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	154	12.4	0.3
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	103	12.3	1.1
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	140	12	0.4
EF	(24) Outlet of V1	N48.43861 W57.046274	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	117	2.7	0.2
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	145	33.8	1.1
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	137	24.7	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	159	40.4	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	145	28.7	0.9
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	137	24.2	0.9
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	111	12.9	0.9
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	106	11.6	1.0

Table C.1 Raw Fish Sampling Data 2019
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Fishing Method	Site	Coordinates	Location	Survey Date	Pass / Sweep	Fishing Time	Species	Count	Fork Length (mm)	Weight (g)	Condition (K)
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	103	10.2	0.9
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	126	19.6	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	103	10.8	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	141	29.4	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	94	7.9	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	142	27	0.9
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	102	10.2	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	127	20.3	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	125	18.8	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	153	35.2	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	121	17.1	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	116	15.2	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	149	34.4	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	119	17.4	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	117	11.1	0.7
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	133	23.7	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	99	9.1	0.9
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	158	39.7	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	140	27.5	1.0
EF	(24) Outlet of V1	N48.438616 W57.04627	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Brook Trout	1	113	13.1	0.9
EF	(24) Outlet of V1	N48.438156 W57.043246	225 m downstream of C007 Pond	8/4/2019	1	1620 seconds	Threespine Stickleback	45	-	41.5	-
EF	(24) Outlet of V1	N48.43862 W57.046241	225 m downstream of C007 Pond	8/4/2019	2	1356 seconds	Brook Trout	1	148	35.4	1.1
EF	(24) Outlet of V1	N48.43862 W57.046241	225 m downstream of C007 Pond	8/4/2019	2	1356 seconds	Brook Trout	1	173	54.4	1.1
EF	(24) Outlet of V1	N48.43862 W57.046241	225 m downstream of C007 Pond	8/4/2019	2	1356 seconds	Brook Trout	1	170	51.5	1.0
EF	(24) Outlet of V1	N48.438156 W57.043246	225 m downstream of C007 Pond	8/4/2019	2	1356 seconds	Threespine Stickleback	33	-	21.7	-
EF	(24) Outlet of V1	N48.438709 W57.047609	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Brook Trout	1	92	7.8	1.0
EF	(24) Outlet of V1	N48.438709 W57.047609	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Brook Trout	1	130	22.3	1.0
EF	(24) Outlet of V1	N48.438709 W57.047609	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Brook Trout	1	99	9.2	0.9
EF	(24) Outlet of V1	N48.438709 W57.047609	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Brook Trout	1	83	5.4	0.9
EF	(24) Outlet of V1	N48.438709 W57.047609	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Brook Trout	1	130	24.2	1.1
EF	(24) Outlet of V1	N48.438709 W57.047609	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Brook Trout	1	97	8.5	0.9
EF	(24) Outlet of V1	N48.438156 W57.043246	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Threespine Stickleback	12	-	6.1	-
EF	(24) Outlet of V1	N48.438156 W57.043246	225 m downstream of C007 Pond	8/4/2019	3	1125 seconds	Threespine Stickleback	21	-	6.9	-
EF	(22) Inlet of V1	N48.438903 W57.054675	1380 m upstream of confluence with C007 and Victoria River	8/9/2019	1	212 seconds	-	0	-	-	-

APPENDIX D

Fish Habitat Characterization Data

D.1

Stream Habitat Classification Data

Table D.1. Habitat Classification Data From Streams Surveyed by Ground
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Location	Sub-Section	Lat	Long	Wetted Stream Width (m)	Channel Stream Width (m)	Mean Depth (m)			Velocity (m/s)[1]			Slope	Habitat Type (%)				Substrate (%)					Riparian Vegetation (%)			Overhead Over (%)	Instream Cover (%)	Comment
						1/4	1/2	3/4	1/4	1/2	3/4		Riffle	Pool	Run	Flat	Fines	Gravel	Cobble / Rubble	Boulder	Bedrock	Grass	Shrub	Trees			
(24) Outlet of V1	0 to 100m US	48.441165	-57.03921	23	24	0.7	0.8	0.4	-	-	-	0.5	0	0	0	0	95	0	0	5	0	20	75	5	10	80	No discharge collected unsafe
(24) Outlet of V1	100 to 200m US	48.440752	-57.04045	21	21.5	0.8	1	0.45	-	-	-	0.5	0	0	0	100	95	0	0	5	0	20	75	5	10	80	No discharge unsafe, aquatic plants are potamogedodon, valissinaria,
(24) Outlet of V1	200 to 300m US	48.439985	-57.04121	9	25	0.1	0.14	0.12	-	-	-	0.5	0	100	0	0	85	0	10	5	0	20	80	0	10	80	Not safe to do velocity
(24) Outlet of V1	300 to 400m US	48.439437	-57.04227	4.9	6.9	0.2	0.23	0.22	-	-	-	0.5	0	60	0	40	75	0	20	5	0	0	65	35	5	40	Brook trout and stickleback observed
(24) Outlet of V1	400 to 500m US	48.438705	-57.04326	1.22	1.1	0.49	0.44	0.32	-	-	-	0.5	0	5	0	95	20	10	40	30	0	5	85	10	45	10	Undercut banks
(24) Outlet of V1	500 to 600m US	48.438547	-57.04426	2.09	2.73	0.19	0.21	0.14	-	-	-	0.5	10	5	0	85	50	5	30	15	0	15	65	20	90	5	
(24) Outlet of V1	600 to 700m US	48.438273	-57.04534	3.5	4.5	0.29	0.58	0.7	-	-	-	1	5	25	0	70	70	0	15	15	0	0	70	30	45	30	
(24) Outlet of V1	700 to 800m US	48.438633	-57.04653	0.49	5.5	0.49	0.48	0.51	0.07	0.01	0.04	0.5	0	60	0	40	90	0	0	10	0	0	75	25	15	25	
(24) Outlet of V1	800 to 850m US	48.438808	-57.04782	0.82	10	0.29	0.31	0.13	0.003	0.05	0.02	0.5	0	0	0	100	100	0	0	0	0	0	85	15	95	10	
(24) Outlet of V1	850 to 900m US	48.439053	-57.04875	0.81	1.42	0.14	0.14	0.3	0.007	0.05	0.005	0.5	0	0	10	90	80	15	0	5	0	0	90	10	85	5	Sticklebacks and brook trout observed. Freshwater sponge noted.
(24) Outlet of V1	900 to 1000m US	48.439036	-57.04993	7	0.2	0.3	0.2	0.4	-	-		0.5	0	100	0	0	100	0	0	0	0	0	60	40	0	10	
(22) Inlet of V1	1000 to 1100m US	48.438527	-57.05037	1.18	1.63	0.08	0.04	0.08	-	-	-	0.5	10	10	0	80	80	5	5	10	0	10	55	35	120	10	Could not find a good spot to do discharge to shallow or to many alders
(22) Inlet of V1	1100 to 1200m US	48.439125	-57.05111	1.21	1.55	0.06	0.06	0.04	-	-	-	60	50	5	45	0	20	0	10	50	20	10	65	25	70	30	Fish passage barrier partway up. Not enough water depth to get velocity.
(22) Inlet of V1	1200 to 1300m US	48.439394	-57.05266	0.97	1.8	0.09	0	0.09	-	-	-	2	30	5	0	65	60	5	0	35	0	15	70	15	55	10	
(22) Inlet of V1	1300 to 1400m US	48.438753	-57.05377	0.66	1.26	0.07	0.09	0.01	-	-	-	1	95	5	0	0	70	0	0	30	0	0	80	20	85	10	To shallow to get velocity measurements
(22) Inlet of V1	1400 to 1500m US	48.438945	-57.05514	0.29	1.75	0.01	0.02	0.02	-	-	-	2	0	0	100	0	50	40	0	10	0	0	80	20	85	10	Channel is intermittent in middle. Poorly defined.
(22) Inlet of V1	1500 to 1600m US	48.439432	-57.05746	0.8	1.4	0.02	0.05	0.03	-	-	-	1	25	0	75	0	30	20	35	15	0	35	55	10	75	0	Section is a ditch along forestry access road
(22) Inlet of V1	1600 to 1700m US	48.439912	-57.05621	0.8	1.4	0.02	0.05	0.03	-	-	-	2	50	0	50	0	35	0	25	40	0	50	50	0	50	0	Section is a ditch along forestry access road
(22) Inlet of V1	1700 to 1800m US	48.43884	-57.05863	0.8	1.4	0.02	0.05	0.03	-	-	-	1	25	0	75	0	30	20	35	15	0	35	55	10	50	0	Section is a ditch along forestry access road
(22) Inlet of V1	1800 to 1900m US	48.43833	-57.05985	0.5	1.4	0.02	0.04	0.03	-	-	-	1	0	0	100	0	50	25	15	10	0	35	55	10	25	0	Stream not visble upstream of road
(23) Trib to Outlet of V1	0 to 10 m US of confluence with C007	48.439046	-57.04875	0.82	10	0.29	0.31	0.13	-	-	-	0.5	0	0	0	100	100	0	0	0	0	0	85	15	95	10	
(23) Trib to Outlet of V1	10 to 90 m US of confluence with C007	48.439095	-57.04877	-	-	-	-	-	-	-	-	0.5	0	0	0	20	100	0	0	0	0	0	85	15	70	0	Barely defined channel, stream is intermittent dry holes at upstream end of reach. Not fish habitat. No visible flow, pools through wetland.
Average				**4.05**	**5.82**	**0.22**	**0.25**	**0.20**	**0.03**	**0.04**	**0.02**	**3.8**	**15**	**19**	**23**	**44**	**68**	**7**	**11**	**14**	**1**	**12**	**71**	**17**	**54**	**21**	

Note: [1]- indicates insufficient depth to collect sample or unsafe substrates to wade

D.2

Stream Photos

Fish Habitat Classification

Photo D1 **Outlet of V1 at Confluence with Victoria River Facing Upstream**

Photo D2 **Outlet of V1 Facing Downstream 200m Upstream From Confluence**

Photo D3 **Outlet of V1 Facing Upstream 400m Upstream From Confluence**

Photo D4 **Outlet of V1 Facing Upstream 600m Upstream From Confluence**

Fish Habitat Classification

Photo D5 **Outlet of V1 Facing Downstream 800m Upstream From Confluence**

Photo D6 **Outlet of V1 Facing Upstream 1000m Upstream From Confluence**

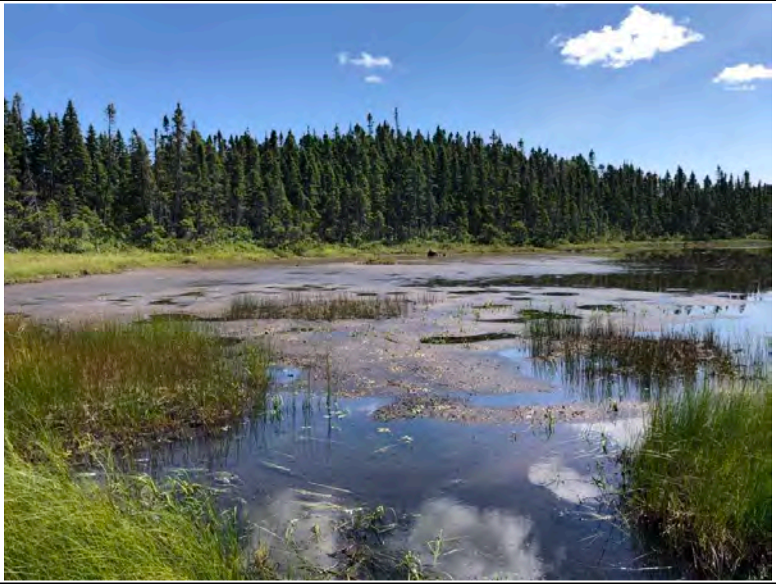


Photo D7 **V1 Facing Upstream from Confluence**

Photo D8 **Very Steep Gradient Located 1060 m Upstream from Confluence**

Fish Habitat Classification

Photo D9 Inlet to V1 (24) Facing Upstream 1200m Upstream From Confluence

Photo D10 Inlet to V1 (24) Facing Upstream 1400m Upstream From Confluence

Photo D11 Inlet to V1 (24) Facing Upstream 1600m Upstream From Confluence Running Through Ditch

Photo D12 Inlet to V1 (24) Facing Upstream 1800m Upstream From Confluence Running Through Ditch

Fish Habitat Classification

Photo D13 **Representative Fish Habitat In Victoria Lake Reservoir**

Photo D14 **Low Water Levels in Victoria Lake Reservoir**

Photo D15 **Representative Fish Habitat In Valentine Lake**

Photo D16 **Representative Fish Habitat In Valentine Lake**

D.3

In situ Water Data

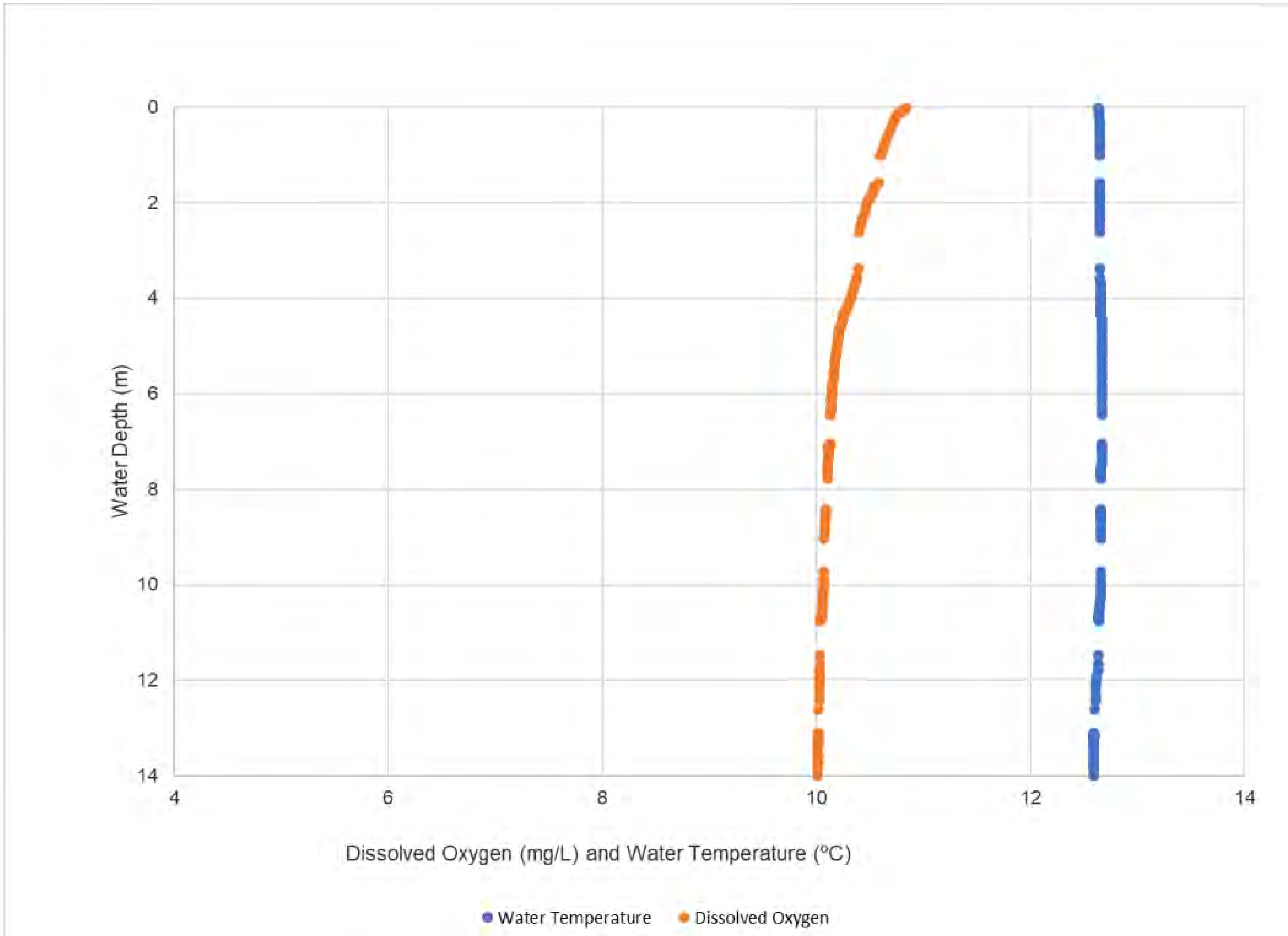


Figure D.1 Dissolved Oxygen and Water Temperature Profiles at VAL-01 in Valentine Lake, NL on September 25, 2019.

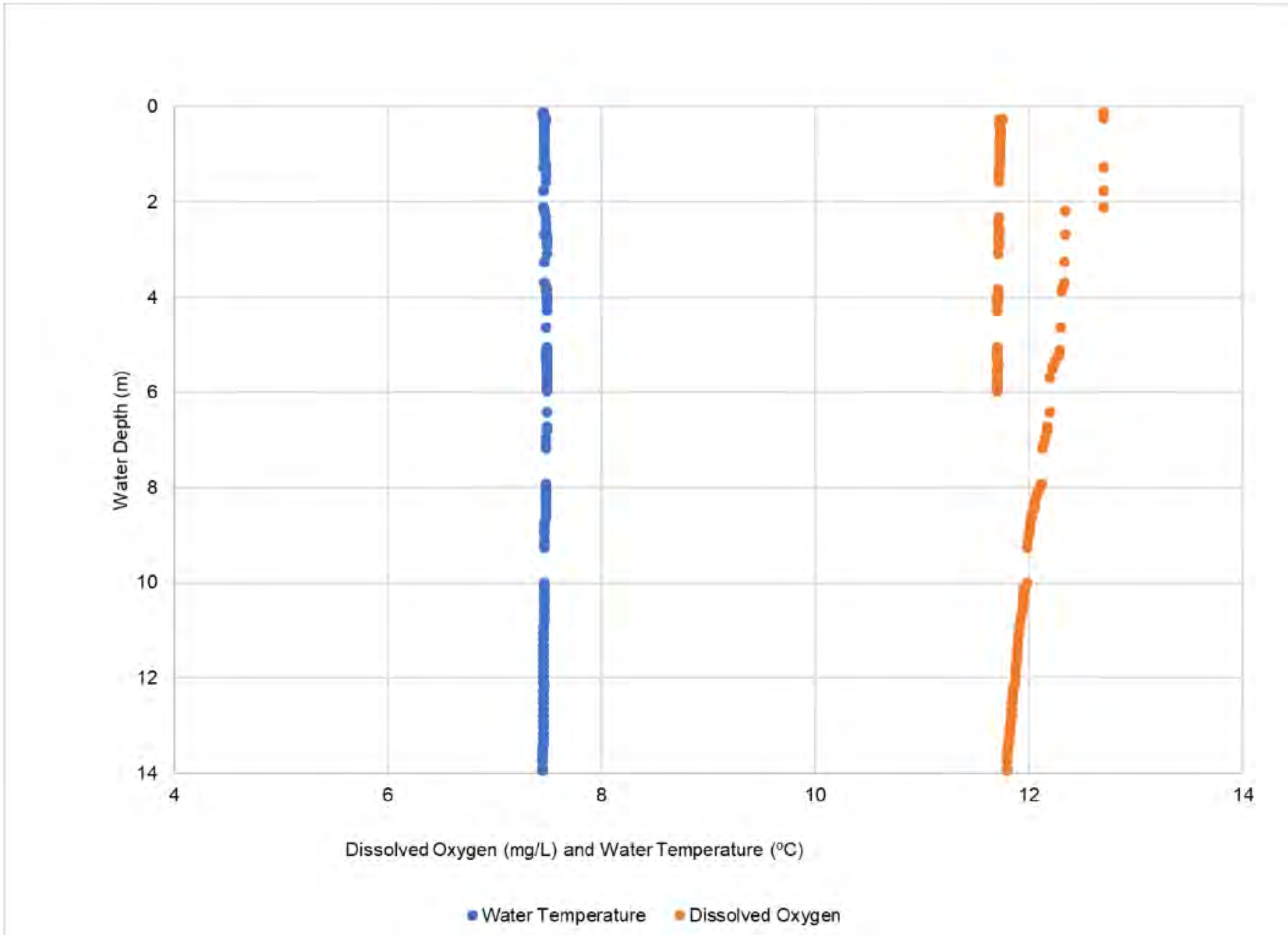


Figure D.2 Dissolved Oxygen and Water Temperature Profiles at VAL-01 in Valentine Lake, NL on November 3, 2019.

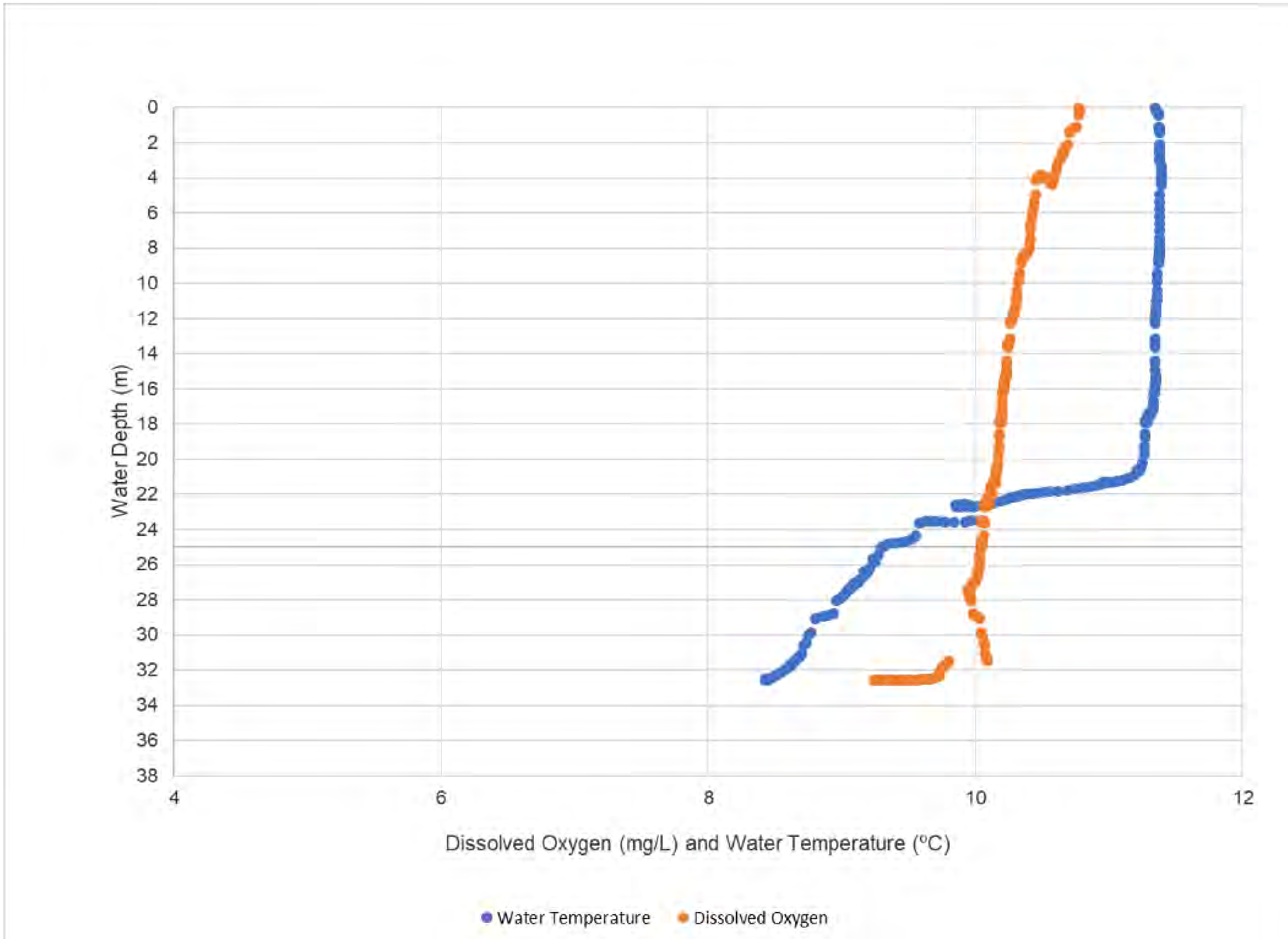


Figure D.3 Dissolved Oxygen and Water Temperature Profiles at VIC-01 in Victoria Lake, NL on September 25, 2019.

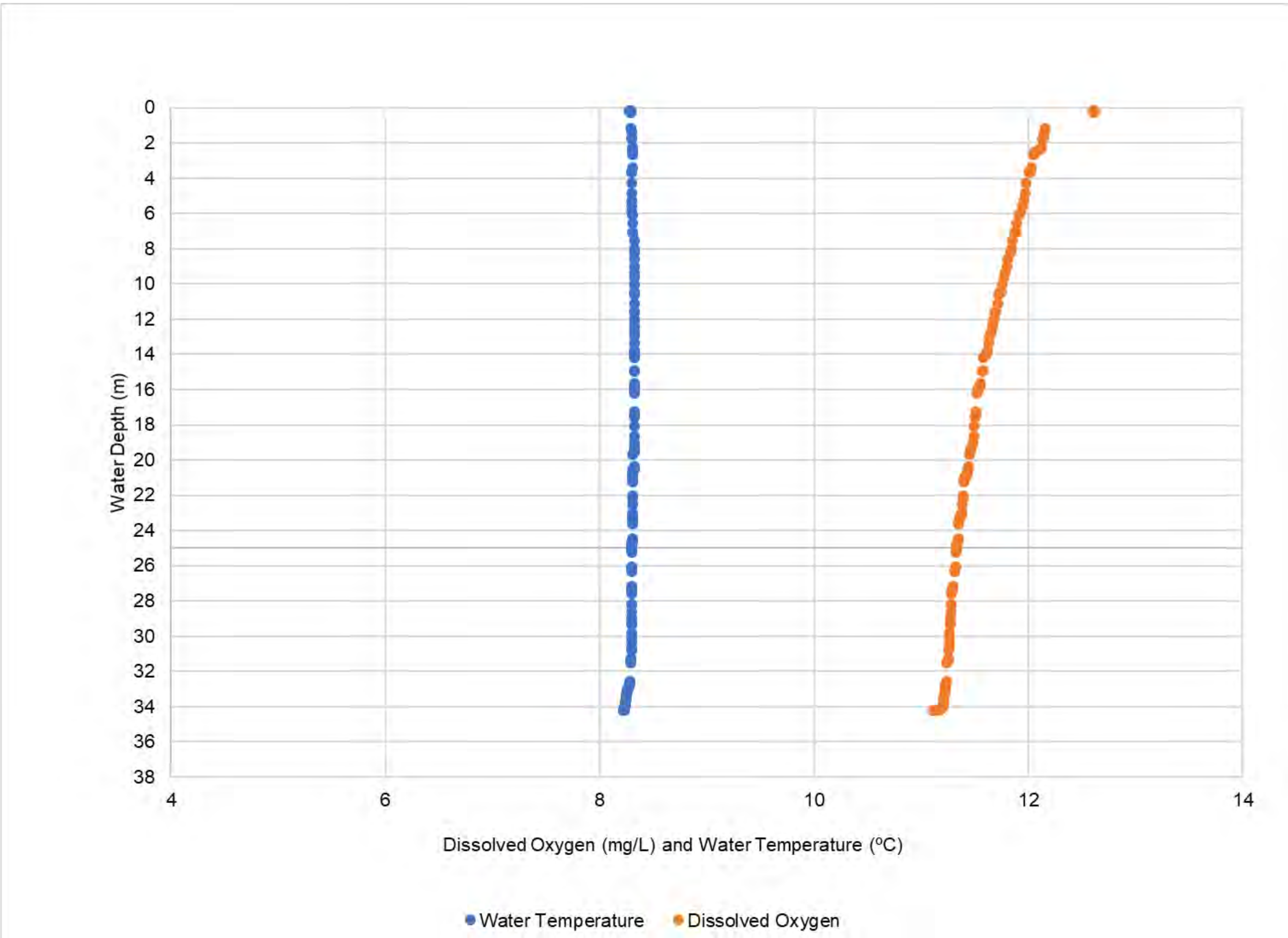


Figure D.4 Dissolved Oxygen and Water Temperature Profiles at VIC-01 in Victoria Lake, NL on November 3, 2019.

D.4

Sediment Data

Table D.4 Sediment Chemistry Sample Results from Ponds, Lakes and Streams
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Sampling Date			**9/24/2019 11:01:00 AM**	**9/27/2019 2:17:00 PM**	**9/24/2019 12:19:00 PM**	**9/29/2019 9:28:00 AM**	**9/23/2019 11:20:00 AM**	**9/27/2019 1:40:00 PM**	**9/23/2019 5:13:00 PM**	**9/24/2019 1:25:00 PM**	**9/23/2019 2:45:00 PM**	**9/23/2019 5:10:00 PM**	**9/27/2019 8:55:00 AM**
Habitat			**Streams (Soft Sediment)**					**Ponds**					
Metals	**UNITS**	**CSQG PEL**	**C001-02 (14)**	**V1in-02 (22)**	**M1OUT-02 (8)**	**VICP2OUT-02 (16)**	**VALP2OUT-02 (20)**	**V1**	**L1**	**M7**	**VALP2**	**VICP2**	**VALP3**
Acid Extractable Aluminum (Al)	mg/kg		14000	20000	12000	18000	22000	14000	19000	18000	22000	29000	21000
Acid Extractable Antimony (Sb)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Arsenic (As)	mg/kg	17	**240**	**43**	**80**	**110**	**72**	**18**	**290**	**120**	**56**	**86**	**170**
Acid Extractable Barium (Ba)	mg/kg		110	220	63	86	63	91	310	88	48	270	77
Acid Extractable Beryllium (Be)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Bismuth (Bi)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Boron (B)	mg/kg		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Acid Extractable Cadmium (Cd)	mg/kg	3.5	0.33	1.6	0.78	0.75	<0.30	1.6	1.1	1.5	1.1	1.1	0.93
Acid Extractable Chromium (Cr)	mg/kg	90	24	24	17	21	32	14	17	15	17	17	18
Acid Extractable Cobalt (Co)	mg/kg		30	33	16	18	17	16	43	15	14	16	19
Acid Extractable Copper (Cu)	mg/kg	197	20	33	31	13	59	28	16	23	19	20	16
Acid Extractable Iron (Fe)	mg/kg		45000	50000	19000	36000	40000	22000	47000	25000	22000	35000	36000
Acid Extractable Lead (Pb)	mg/kg	91.3	6.6	9.4	8.2	8.6	8.9	9.3	18	7.1	21	26	5.4
Acid Extractable Lithium (Li)	mg/kg		11	8.1	8.2	12	12	4.4	6.4	7.5	2	4.3	21
Acid Extractable Manganese (Mn)	mg/kg		7400	19000	4600	4400	1500	7100	28000	3700	850	1600	1500
Acid Extractable Mercury (Hg)	mg/kg	0.486	<0.10	0.14	0.18	0.14	<0.10	0.18	0.2	0.21	0.23	0.17	<0.10
Acid Extractable Molybdenum	mg/kg		<2.0	7.2	5.1	2.9	<2.0	3	5.3	7.2	2.5	5.6	2.8
Acid Extractable Nickel (Ni)	mg/kg		23	24	18	17	24	15	21	19	14	15	22
Acid Extractable Rubidium (Rb)	mg/kg		5.4	3.9	2.3	2.8	8.3	2.5	2.4	2.5	<2.0	2.6	7.9
Acid Extractable Selenium (Se)	mg/kg		<1.0	<1.0	1.8	<1.0	<1.0	1.3	1.3	1.9	1.7	1.5	<1.0
Acid Extractable Silver (Ag)	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Acid Extractable Strontium (Sr)	mg/kg		15	37	24	21	13	34	37	37	23	200	21
Acid Extractable Thallium (Tl)	mg/kg		<0.10	0.12	0.12	0.1	<0.10	<0.10	0.2	0.13	<0.10	0.17	0.18
Acid Extractable Tin (Sn)	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0
Acid Extractable Uranium (U)	mg/kg		0.95	2.7	7.6	2	0.84	4.3	10	9.5	5.1	6.5	6.2
Acid Extractable Vanadium (V)	mg/kg		54	70	36	56	78	28	41	27	37	48	41
Acid Extractable Zinc (Zn)	mg/kg	315	110	170	88	130	76	110	250	170	140	190	200
Grain Size													
Gravel	%		6.2	2.7	<0.10	3.2	<0.10	0.28	0.88	0.19	<0.10	<0.10	2.1
Sand	%		69	67	33	52	0.66	15	50	36	23	32	63
Silt	%		15	26	39	22	79	40	27	24	37	36	21
Clay	%		10	4.2	28	23	21	45	22	41	39	32	14

Note: Bold indicates exceedance of Canadian Sediment Quality Guidelines for the Protection of Aquatic Life Probable Effect Level (CSQG PEL)

Table D.4 Sediment Chemistry Sample Results from P
Valentine Lake Project: 2019 Aquatic Data Baseline Report
Stantec Project No: 121416288.600

Sampling Date			**9/24/2019 11:22:00 AM**	**9/24/2019 9:30:00 AM**	**9/24/2019 1:24:00 PM**	**9/25/2019 11:30:00 AM**	**9/25/2019 12:30:00 PM**	**9/25/2019 1:30:00 PM**	
Habitat			**Lakes**						
Metals	**UNITS**	**CSQG PEL**	**VIC02-DP**	**VIC01-MD**	**VIC03-LT**	**VAL01-DP**	**VAL02-MD**	**VAL03-LT**	**Reporting Detection Limit**
Acid Extractable Aluminum (Al)	mg/kg		26000	19000	21000	29000	23000	18000	10
Acid Extractable Antimony (Sb)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
Acid Extractable Arsenic (As)	mg/kg	17	**79**	**95**	**95**	**280**	**68**	**71**	2.0
Acid Extractable Barium (Ba)	mg/kg		120	67	58	480	76	120	5.0
Acid Extractable Beryllium (Be)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
Acid Extractable Bismuth (Bi)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
Acid Extractable Boron (B)	mg/kg		<50	<50	<50	<50	<50	<50	50
Acid Extractable Cadmium (Cd)	mg/kg	3.5	1.1	0.34	0.3	2.9	1.2	1.3	0.30
Acid Extractable Chromium (Cr)	mg/kg	90	34	29	31	33	22	18	2.0
Acid Extractable Cobalt (Co)	mg/kg		31	17	25	50	11	14	1.0
Acid Extractable Copper (Cu)	mg/kg	197	46	39	43	75	32	23	2.0
Acid Extractable Iron (Fe)	mg/kg		47000	44000	45000	57000	27000	21000	50
Acid Extractable Lead (Pb)	mg/kg	91.3	24	8.9	8.8	19	54	37	0.50
Acid Extractable Lithium (Li)	mg/kg		13	11	15	21	6.6	3.8	2.0
Acid Extractable Manganese (Mn)	mg/kg		5100	1100	1600	29000	1800	3600	2.0
Acid Extractable Mercury (Hg)	mg/kg	0.486	0.26	0.12	0.11	<0.10	0.14	<0.10	0.10
Acid Extractable Molybdenum	mg/kg		3.6	2.6	<2.0	11	3.2	2.5	2.0
Acid Extractable Nickel (Ni)	mg/kg		30	24	28	56	17	16	2.0
Acid Extractable Rubidium (Rb)	mg/kg		9.1	5.7	6.7	7.7	4	3.1	2.0
Acid Extractable Selenium (Se)	mg/kg		1.7	<1.0	<1.0	<1.0	1.8	1.3	1.0
Acid Extractable Silver (Ag)	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50
Acid Extractable Strontium (Sr)	mg/kg		16	12	15	20	26	41	5.0
Acid Extractable Thallium (Tl)	mg/kg		0.33	<0.10	<0.10	0.66	0.12	0.18	0.10
Acid Extractable Tin (Sn)	mg/kg		1.3	<1.0	<1.0	<1.0	2	1	1.0
Acid Extractable Uranium (U)	mg/kg		3.6	1.6	1.3	2.5	1.7	1.7	0.10
Acid Extractable Vanadium (V)	mg/kg		90	74	77	76	45	35	2.0
Acid Extractable Zinc (Zn)	mg/kg	315	130	72	71	220	140	160	5.0
Grain Size									
Gravel	%		<0.10	1.4	0.16	22	<0.10	<0.10	0.10
Sand	%		3.9	9.8	17	17	23	39	0.10
Silt	%		65	64	69	39	42	32	0.10
Clay	%		31	25	14	21	35	29	0.10

Note: Bold indicates exceedance of Canadian Sediment Quality Guidelines for the Protection of Aquatic Life Probable Effect Level (CSQG PEL)

ATTACHMENT 4-D

Ice Thickness Survey (2020)

Stantec

Memo

To:	Jamie Powell Marathon Gold Corporation	From:	Barry Wicks Stantec Consulting Ltd. St. John's NL
File:	121416288 Task 800.001	Date:	April 1, 2020

Reference: Ice Thickness Survey

Marathon Gold Corporation (Marathon) contracted Stantec Consulting Limited (Stantec) to conduct an ice thickness survey of small waterbodies that occur within and in close proximity to the Valentine Gold Project (the Project) footprint. These waterbodies, often referred to as bog holes, are thought to be fishless because LIDAR imagery shows no connectivity between the bog holes and fish bearing waters.

An ice thickness survey was completed March 09 and 10, 2020 to determine if these bog holes freeze to the bottom in winter. If the bog holes freeze to bottom, this would provide additional weight of evidence for the determination that the bog holes are fishless. Sampling locations were identified from LIDAR imagery and the coordinates for the center of the bog hole were selected as target coordinates for the survey. A total of 27 bog holes were surveyed. A figure showing the bog hole locations in relation to the Valentine Gold Project footprint and confirmed or suspected fish habitat is provided in Attachment 1. The coordinates for each bog hole / survey location are provided in the top left corner of the figure in Attachment 1.

A two-person field team consisting of one Stantec and one Marathon employee completed the survey. The field team used a handheld GPS unit to navigate to each target sample location. Bog holes were accessed by snowmobile and/or by foot (snowshoes). The field team used a gas-powered auger, with 8-inch cutting blades, to cut a hole in the center of each bog hole. The ice thickness was determined by inserting an "improvised staff" into the hole, hooking the bottom of the ice with a flat disc attached to the base of the staff and determining the ice thickness by use of a meter stick attached to the staff (see photos 10 and 12 in Attachment 2). The water depth from the bottom of the ice to the bottom of the bog hole was also recorded. Photos were taken of each hole drilled for sampling and are provided in Attachment 2.

Of the 27 bog holes surveyed, eleven (IT01, IT02, IT03, IT07, IT16, IT17, IT18, IT19, IT20, IT21, and IT22) are within the footprint of the Project. The remainder are in close proximity but outside the footprint. Data for the bog holes that occur within the Project footprint are provided in Table 1, and includes ice thickness, water depth below the ice and total bog hole depth. The complete data set for the 27 bog holes surveyed are included in Attachment 3. Only the bog holes within the footprint are discussed further in this memo.

Table 1 Ice Thickness Survey Results for Bog Holes Occurring Within the Valentine Gold Project Footprint

Location	Ice Thickness (cm)	Water Depth Below Ice (cm)	Total Bog Hole Depth (cm)
IT01	54	0	54
IT02	54.5	7	61.5
IT03	56	0	56
IT07	53.5	0	53.5
IT16	58.5	9.5	68
IT17	49	6	55
IT18	53.5	45.5	99
IT19	44.5	7.5	52

Table 1 Ice Thickness Survey Results for Bog Holes Occurring Within the Valentine Gold Project Footprint

Location	Ice Thickness (cm)	Water Depth Below Ice (cm)	Total Bog Hole Depth (cm)
IT20	83.5	0	83.5
IT21	55	16	71
IT22	46.5	0	46.5
Maximum	83.5	45.5	99
Minimum	44.5	0	46.5
Average	55.3	8.3	63.6

The average ice thickness for the 11 bog holes within the Project footprint is 55.3 cm, with thickness ranging from 44.5 cm at IT19 to 83.5 cm at IT20. At many locations, the ice was noted to be poor quality (soft, white ice, with unfrozen water layers; rather than hard, compact, blue ice). Similar ice conditions existed at many locations on the Island of Newfoundland in 2020 and is attributed to the large amount of snow cover that acted as an insulating layer, preventing ponds and lakes from freezing in a typical fashion.

Based on Marathon's past experience with winter drilling activities on the Valentine Gold Property, it was anticipated that maximum ice thickness would occur late February to early March 2020 and that ice thicknesses in excess of 80 cm would be encountered. Only one instance of ice thickness greater than 80 cm was recorded for the survey (IT20) and the difference between the maximum (83.5 cm) and the minimum ice thickness (44.5 cm) is 39 cm. The large range in ice thickness between bog holes was not expected and is most likely attributed to varying amounts of snow cover (insulating factor) at each bog hole location, throughout the winter.

Table 1 shows that the average total bog hole depth for locations within the Project footprint is 63.6 cm, with a range of 46.5 (IT22) to 99 cm (IT18). If the maximum ice thickness measured during the survey (83.5 cm at IT20) occurred at all bog hole locations, as expected during a typical winter, all surveyed bog holes with the possible exception of Bog Hole IT18, would be frozen to the bottom.

Reference: Ice Thickness Survey

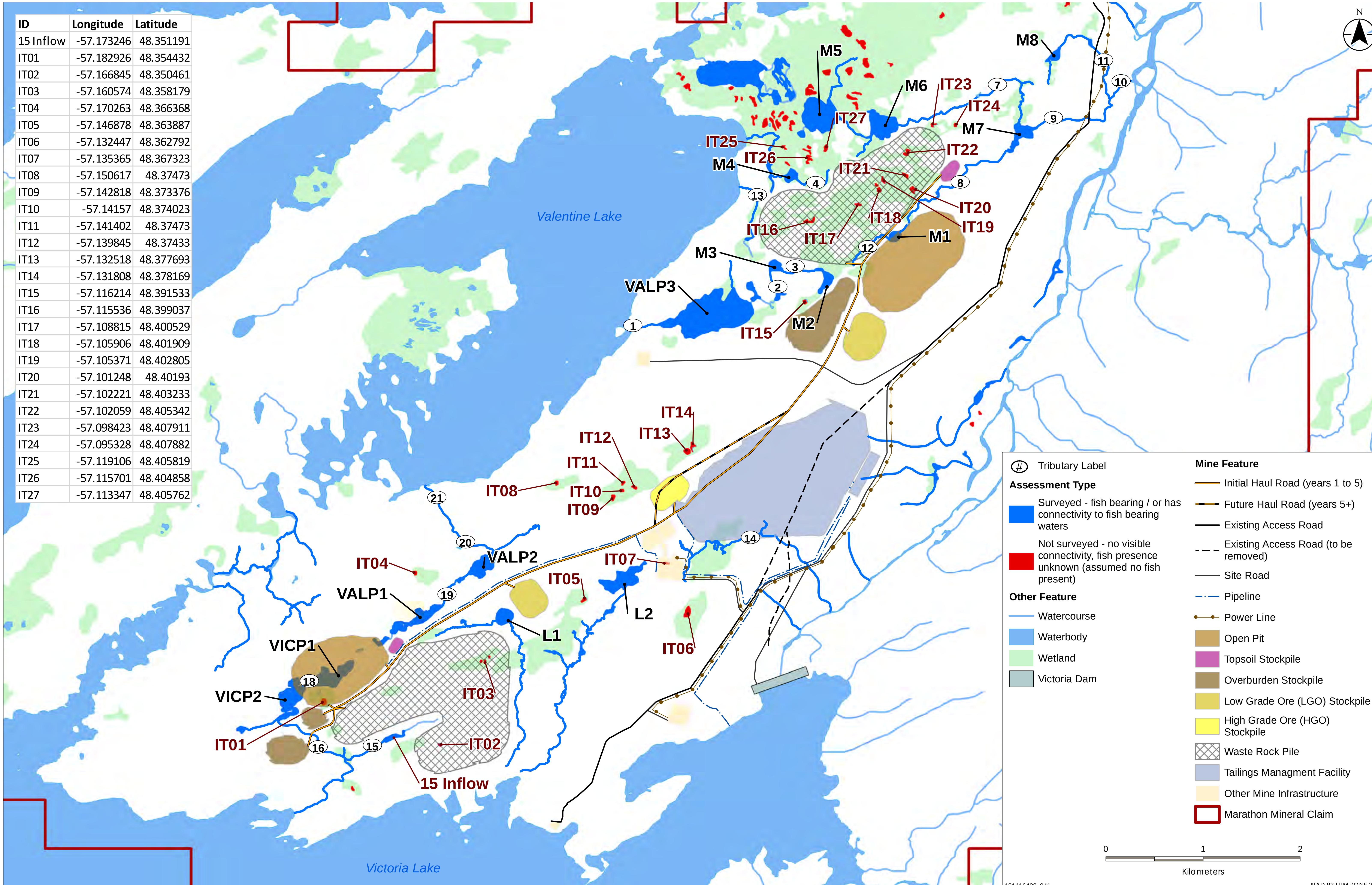
Given the lack of connectivity of bog holes to fish bearing waterbodies and the likelihood that only IT18 would not freeze to the bottom during a typical winter; it is proposed that IT18 be further investigated for fish presence in Summer 2020. Absence of fish at this location will be used as an indicator of fish absence at other bog hole locations within the Project footprint.

Sincerely,

Stantec Consulting Ltd.

Barry Wicks
Team Lead, Environmental Services
Phone: 709 576 1458
Fax: 709 576 2126
Barry.Wicks@stantec.com

Attachment: Attachment 1 - Figure 1: Ice Thickness Survey Locations
Attachment 2 - Photos
Attachment 3 - Complete Data Set for all 27 Bog Holes



ID	Longitude	Latitude
15 Inflow	-57.173246	48.351191
IT01	-57.182926	48.354432
IT02	-57.166845	48.350461
IT03	-57.160574	48.358179
IT04	-57.170263	48.366368
IT05	-57.146878	48.363887
IT06	-57.132447	48.362792
IT07	-57.135365	48.367323
IT08	-57.150617	48.37473
IT09	-57.142818	48.373376
IT10	-57.14157	48.374023
IT11	-57.141402	48.37473
IT12	-57.139845	48.37433
IT13	-57.132518	48.377693
IT14	-57.131808	48.378169
IT15	-57.116214	48.391533
IT16	-57.115536	48.399037
IT17	-57.108815	48.400529
IT18	-57.105906	48.401909
IT19	-57.105371	48.402805
IT20	-57.101248	48.40193
IT21	-57.102221	48.403233
IT22	-57.102059	48.405342
IT23	-57.098423	48.407911
IT24	-57.095328	48.407882
IT25	-57.119106	48.405819
IT26	-57.115701	48.404858
IT27	-57.113347	48.405762

Revised: 2020-04-01 By: mblackwood

ICE THICKNESS SURVEY

Photo 1 IT01

Photo 2 IT02

Photo 3 IT03

Photo 4 IT04

ICE THICKNESS SURVEY

Photo 5 IT05

Photo 6 ITO6

Photo 7 ITO7

Photo 8 IT08

ICE THICKNESS SURVEY

Photo 9 IT09

Photo 10 IT10

Photo 11 IT11

Photo 12 IT12

Photo 13 IT13

Photo 14 IT14

Photo 15 IT15

Photo 16 IT16

ICE THICKNESS SURVEY

Photo 17 IT17

Photo 18 IT18

Photo 19 IT19

Photo 20 IT20

Photo 21 **IT21**

Photo 22 **IT22**

Photo 23 **IT23**

Photo 24 **IT24**

Photo 25 IT25

Photo 26 IT26

Photo 27 IT27

Complete Data Set for all 27 Bog Holes

Location	Ice Thickness (cm)	Water Depth Below Ice (cm)	Total Bog Hole Depth (cm)
IT01	**54**	**0**	**54**
IT02	**54.5**	**7**	**61.5**
IT03	**56**	**0**	**56**
IT04	56.5	12	68.5
IT05	58	32	90
IT06	52	49	101
IT07	**53.5**	**0**	**53.5**
IT08	54.5	35.5	90
IT09	71	18	89
IT10	73	16	89
IT11	64.5	3.5	68
IT12	73.5	31.5	105
IT13	56	32	88
IT14	63	0	63
IT15	64.5	35.5	100
IT16	**58.5**	**9.5**	**68**
IT17	**49**	**6**	**55**
IT18	**53.5**	**45.5**	**99**
IT19	**44.5**	**7.5**	**52**
IT20	**83.5**	**0**	**83.5**
IT21	**55**	**16**	**71**
IT22	**46.5**	**0**	**46.5**
IT23	49.5	0	49.5
IT24	54	29	83
IT25	51	0	51
IT26	54	0	54
IT27	59.5	65	124.5
15 Inflow1	30.5	0	30.5
15 inflow2	28	0	28

Bold/shaded indicates bog holes within the Valentine Gold Project footprint.

ATTACHMENT 4-E

Fisheries Data Report (2020)

VALENTINE GOLD PROJECT: FISHERIES DATA REPORT

Final Report

September 25, 2020

Prepared for:
Marathon Gold Corporation
36 Lombard Street, Suite 600
Toronto, ON M5C 2X3

Prepared by:
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File No: 121416408

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Abbreviations

COSEWIC	Committee on the Status of Endangered Wildlife in Canada
cm	centimeter
DFO	Fisheries and Oceans Canada
EIS	Environmental Impact Statement
km	kilometer
LAA	Local Assessment Area
NL	Newfoundland and Labrador
RAA	Regional Assessment Area
SCNL	Salmonid Council of Newfoundland and Labrador
TMF	Tailings Management Facility

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Marathon Gold Corporation (Marathon) to conduct environmental baseline studies for the Valentine Gold Project (the Project), including a Fisheries Baseline Study. The Fisheries Study was conducted to characterize existing commercial and recreational fisheries activity within the Project Area and surrounding vicinity, describe fisheries management approaches and identify fisheries activities potentially affected by the Project.

Marathon is planning development of an open pit gold mine at Valentine Lake, located in the Central Region of the Island of Newfoundland, approximately 60 kilometres (km) southwest of the town of Millertown, Newfoundland and Labrador (NL) (Figure 1-1). The Project will consist primarily of open pits, waste rock piles, crushing and stockpiling areas, conventional milling and processing facilities (the mill), a tailings management facility (TMF), personnel accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities. The mine site is accessed by an existing gravel road, approximately 82 km in length, which extends south from Millertown. Approximately 73 km of this existing site access road will be upgraded and maintained by Marathon as part of the Project.

2.0 METHODS

2.1 Study Area

Spatial boundaries were defined to focus the collection and analysis of data for the study. These include a Local Assessment Area (LAA) and Regional Assessment Area (RAA) (Figure 1-1) reflective of the study areas used for the assessment of potential Project effects on land and resource users in the Valentine Gold Project Environmental Impact Statement (EIS).

The LAA consists of a one km buffer on the mine site and a 500 m buffer on the Project’s site access road. The RAA is a 35 km buffer on the Project Area.

Local jurisdictions and management units relevant to fisheries within the RAA, include:

- Town of Buchans
- Town of Millertown
- Buchans Junction
- Salmon Angling Zone 4
- Trout Angling Zone 1

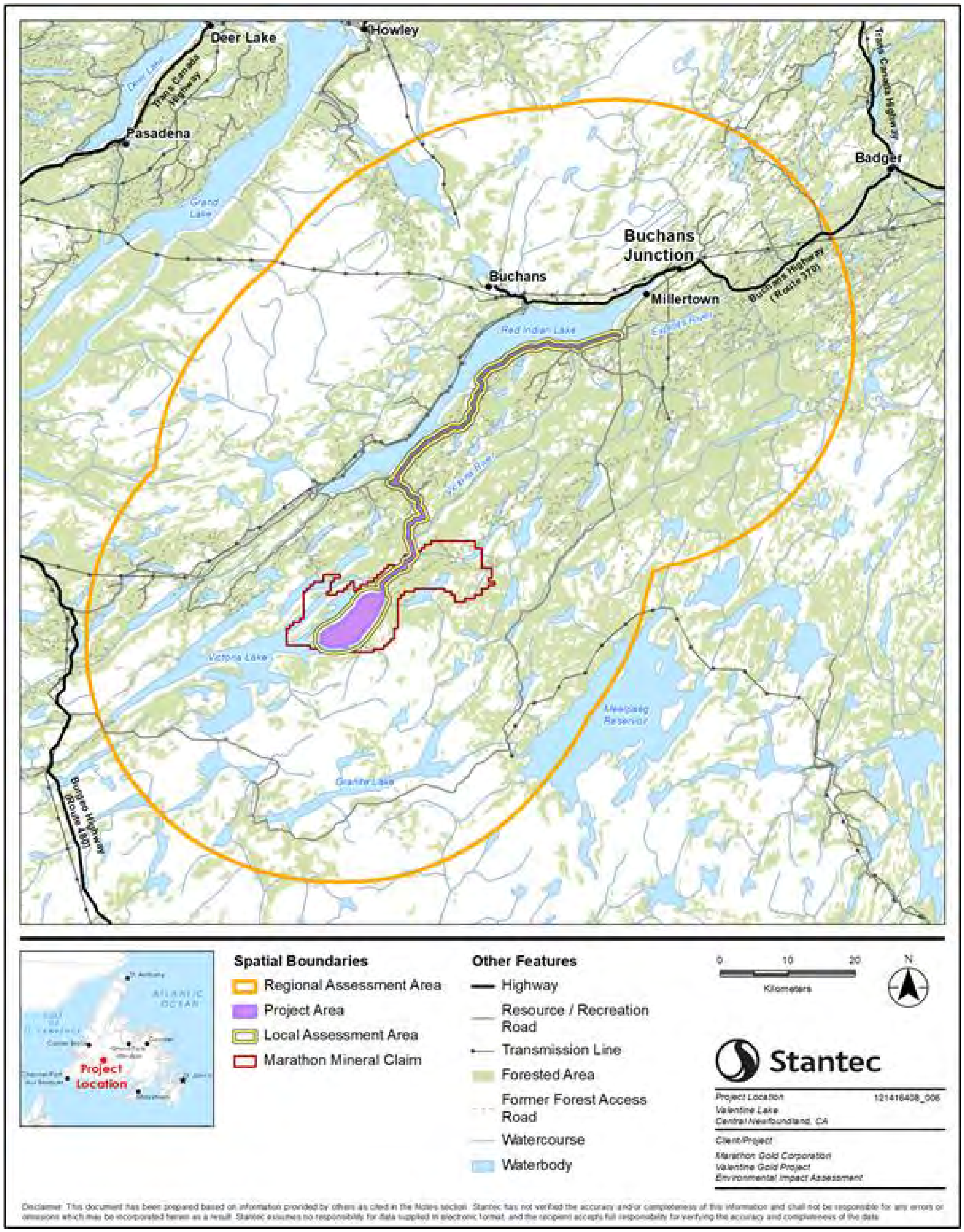

Figure 1-1 Project Area and Study Areas for Fisheries Report

2.2 Data Sources

Baseline information on fisheries was gathered through a review of literature sources, as well as interviews and correspondence with relevant government departments and agencies, local authorities, and residents.

3.0 RESULTS

This section provides a brief description of historical salmon enhancement activities on the Exploit's River, as described by the Salmonid Council of Newfoundland and Labrador (SCNL), the current status of Atlantic salmon populations as described by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Fisheries and Oceans Canada (DFO), current management plans for salmon and trout available from DFO regulations and describes angling activity in the project area as described by outfitters and local town councils. There are no Indigenous commercial fisheries near the Project Area. Fishing activity; however, has been identified within the LAA in areas around Victoria Lake Reservoir, Red Indian Lake, and many of their associated tributaries. Fish typically harvested by the Mi'kmaq and known to be present in the LAA include brook trout and landlocked Atlantic salmon.

3.1 Northeast Newfoundland Atlantic Salmon Population

The North American Atlantic Salmon are assessed by COSEWIC in population segments. The Northeast Newfoundland Population extends from the top of the Northern Peninsula to the southern tip of the Avalon Peninsula, which includes 127 documented salmon rivers with additional transient populations present in a substantial number of small streams (ASF 2019). The primary rivers include Main River, Exploits River, Gander River, Gambo River, and Terra Nova River. The majority of the salmon in this population return to fresh water after a single winter at sea (commonly referred to as grilse). However, zero sea-winter salmon, which only spend a few months in the ocean before returning to spawn, do occur within this population (ASF 2019). In November 2010, the Northeast Newfoundland population were designated as Not at Risk by COSEWIC (COSEWIC 2019). The Northeast Newfoundland population are the targeted population in the active recreational fisheries described in Section 3.3

3.1.1 Fishway Counts

DFO use a variety of sources within the fishing industry to produce statistical reports of fishing activities in Newfoundland and Labrador. The reports are fundamental for the Department's decision-making processes and provide the necessary data for sustainable management of aquatic resources. The Atlantic Salmon Fishway Counts report compiles fishway count data at a variety of counting facilities in Insular Newfoundland, including the Exploits River at Bishop Falls. The Exploits River (Bishops Falls) fishway count for 2019 was 13,356, which has decreased from the previous year (18,323) and from the previous generation, 2014-2018 average (23,482), but remains higher than the pre-moratorium, 1984-1991 average (10,303) (DFO 2019a).

3.1.2 Salmon Enhancement

The Grand Falls fishway, constructed in the late 1980s resulted in an increased range for Atlantic salmon, providing access to habitats within the middle Exploits watershed. Until very recently Grand Falls was impassable for salmon. Access to the upper watershed was also provided at Red Indian Lake Dam. The projects have been successful, making the entire Exploits River watershed accessible to Atlantic salmon (SCNL, pers. comm. 2020). However, SCNL expressed concern about the survival of salmon attempting to return to sea from the mid and upper Exploit's River. The concern stems from the discontinuation of the practice of manually intercepting fish (4,000 to 5,000 annually) at the forebay (above the powerhouse intake at Grand Falls) and safely transferring them downstream. The cessation of this intervention approximately four years ago has resulted in these salmon being forced to continue downstream on their own and pass through the turbines or over the power generation infrastructure (SCNL, pers. comm. 2020).

3.2 Angling

According to the Survey of Recreational Fishing in Canada, 2015, Newfoundland and Labrador have one of the highest resident angler participation rates and the highest overall proportion of fish retained (79%) in Canada (DFO 2019b). The main species caught in Newfoundland and Labrador were cod, brook trout, and smelt (DFO 2019b). The total number of resident anglers in Newfoundland and Labrador in 2015 was 111,003 (DFO 2019b).

Recreational angling / fishing is regulated by DFO through the Newfoundland and Labrador Fishery Regulations. Licenses, issued by the Government of Newfoundland and Labrador, are required by both residents and non-residents for salmon, and non-residents only for trout and other sport fish (such as arctic char and northern pike). Newfoundland and Labrador inland waters are divided into scheduled salmon rivers; scheduled rainbow and brown trout waters; and non-scheduled inland waters (DFO 2019c).

3.2.1 Management of Salmon Angling

Waterbodies used for salmon angling are categorized into classes which determine the daily bag limit (Table 3.1).

Table 3.1 Salmon River Classification and Catch Limits

River Classification	Limit
Class 0	Catch and Release – two fish
Class 2	One fish
Class 4	Two fish
Class 6	Two fish
Unclassified (Zone 1 and 2)	Two fish

Scheduled salmon rivers include: the main stem of a river, including tidal waters at the mouth of a river inside DFO caution signs; the waters of any connected pond or lake within 90 m of the river's entrance and outlet, or as indicated by DFO signs; in many cases, tributary streams; in a few cases, certain lakes and ponds. There are 186 scheduled salmon rivers in Newfoundland and Labrador (DFO 2019c).

Angling occurs on a number of waterbodies in the RAA. The Exploits River is a Scheduled River (#46) for fishing Atlantic salmon, and attracts anglers from throughout the Province, elsewhere in Canada, and the United States.

The Exploits River is located in Zone 4 and includes: tributaries below Grand Falls fishway (Class 4); main stem, from Stoney Brook to Exploits Bay (Class 6); main stem and tributaries of mid-Exploits from Grand Falls fishway to Red Indian Lake dam (Class 2); and all Exploits watershed above Red Indian Lake dam (Class 0 - catch and release only), including Victoria River, Mary March Brook, Lloyds River and all other tributary streams flowing into Red Indian Lake. Closed areas, where no angling is permitted are on the Exploits River, from Stoney Brook up to the Grand Falls dam, and Exploits River main stem below the Bishops Falls dam: on the south side from the dam, downstream 200 metres to the foot of the rapids; on the north side from the dam downstream to the hydro-electric generating station tailrace. The salmon season for Zone 4 in 2019 was from June 1 to September 7 (DFO 2019c), with a fall catch and release season extending from September 08 to October 07 in 2019. Fall catch-and-release angling is permitted on the main stem of the Lower Exploits River, from Stoney Brook to river mouth; however, angling is not permitted on tributaries of the Exploits River.

Other special management measures for the main stem below Red Indian Lake Dam, 25 metres below fishway, downstream to Abitibi-Bowater steel bridge, include (DFO 2019c):

- May 15–July 15: retention angling only for ouananiche. No retention of ouananiche 25 centimeters or less, or 35 centimeters or greater. No retention of Atlantic salmon
- July 16–September 7: catch-and-release angling permitted for salmon and ouananiche only

3.2.2 Reported Salmon Angling Activity

Currently, most salmon anglers fishing on the Exploit's River use the lower river and tributaries from Grand Falls down to the river mouth. The middle river is used less often, and there is little access and angler activity at the upper river above Red Indian Lake Dam (SCNL, pers. comm. 2020).

The area along the Bishop's Falls Town Boundaries was identified as an area commonly used for salmon fishing (Bishop's Falls Town Council, pers. comm. 2020). The area is used by, and important to, local outfitting guides located in Bishop's Falls. Salmon fishing is a major tourist attraction in the Bishop's Falls region (Bishop's Falls Town Council, pers. comm. 2020).

Outfitters in the region reported salmon angling occurring at the Exploits River near Grand Falls-Windsor and Bishop Falls, the mouth of Victoria River near Red Indian Lake and the head of the Exploits River (near Exploits dam). A single outfitter reported occasionally fishing for salmon at the mouth of the Victoria River near Red Indian Lake (Snow Shoe Lake Hunting and Fishing, pers. comm. 2020).

3.2.3 Management of Trout and Other Species

Scheduled trout waters are those waters listed by DFO. Non-scheduled inland waters are not individually listed by name in the regulations. The RAA comprises part of Trout Angling Zone 1, which includes all of insular Newfoundland. Only non-residents are required to have a license for trout angling, however residents are required to have a Parks Canada fishing permit to catch and retain trout in a national park. The 2019-2020 winter fishing season in Zone 1 opens February 1 and closes April 15. The summer season runs from May 15 to September 7. The daily bag limit for trout in insular Newfoundland is 12 fish, which can be a combination of any of the species (speckled, brown, rainbow, ouananiche) or 2.25 kg round weight plus one fish of any of those species, whichever is reached first. Rainbow or ouananiche less than 20 cm long cannot be retained. The daily bag limit for arctic char in insular Newfoundland is 12 fish or 2.25 kg round weight plus one fish of that species, whichever is reached first. There is no limit for smelt. Star Lake is a special Trout Management Area within the RAA. The summer season for this area is July 1 to July 31, 2019 and the winter season is between February 1 and April 15, 2018 (DFO 2019c).

3.2.4 Reported Trout Angling Activity

Select outfitting operations in the area offer fishing packages in spring and summer ranging from May 24th weekend to Labour Day Weekend, targeting land locked salmon and brook trout in Red Indian Lake (Notch Mountain Outfitters 2019). Snowshoe Lake Hunting and Fishing operates within the RAA and offers angling packages in June, and sometimes July and August. Species taken are ouananiche (Landlock salmon), Atlantic salmon, and brook trout. Areas for ouananiche and brook trout angling along the route between Victoria Lake Reservoir and Bay d'Espoir include Victoria River, Granite Lake, Meelpaeg Lake, Cowy Lake, Snowshoe Pond, Hospital Pond, Blizzard Pond, and Wilding Lake (Snow Shoe Lake Hunting and Fishing, pers. comm. 2020).

4.0 SUMMARY

In summary, recreational salmon fishing occurs within the RAA, however only catch-and-release, Class 0 salmon rivers are present within the RAA. The RAA comprises part of the Trout Angling Zone 1 and outfitters operate within the RAA, offering guided, land locked salmon and brook trout fishing tours. One outfitter has a satellite camp on the north east shore of Valentine Lake, approximately 2 km west of the Project footprint.

5.0 REFERENCES

5.1 Personal Communications

Bishop's Falls Town Council. Town Council Survey / Questionnaire [Microsoft Word Document], 2020

SCNL (Salmonid Council of Newfoundland and Labrador). Comments forwarded by Leo White, President, on behalf of the SCNL [Microsoft Word Document], 2020.

Snowshoe Lake Hunting and Fishing, Grand Falls-Windsor, NL, Outfitter Survey / Questionnaire [Microsoft Word Document], 2020.

5.2 Literature References

ASF (Atlantic Salmon Federation) 2019. State of Populations. Available at: https://www.asf.ca/about-atlantic-salmon/state-of-populations

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2019. Atlantic Salmon (Salmo salar), Northeast Newfoundland population. Available at: https://species-registry.canada.ca/index-en.html#/species/1126-0

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