Appendix H

Fish, Fish Habitat, and Fisheries Baseline Study

Fish, Fish Habitat and Fisheries Baseline Study

Kami Iron Ore Mine and Infrastructure

Labrador West, NL

Prepared by:

AMEC Environment and Infrastructure

A division of AMEC Americas Limited

133 Crosbie Road

St. John's, NL

A1B 4A5

Prepared for:

Alderon Iron Ore Corporation

10 Fort William Place

St. John's, NL

A1C 5W2

TF1280801

August 2012

Executive Summary

Alderon Iron Ore Corp. (Alderon) is proposing to develop an iron ore mine in western Labrador, and build associated infrastructure at the Pointe-Noire Terminal in the Port of Sept-Îles, Québec. The mine Property is located south of the towns of Wabush and Labrador City in Newfoundland and Labrador and east of Fermont, Québec. The Kami Iron Ore Mine and Rail infrastructure is located entirely within Labrador, and includes construction, operation, and rehabilitation and closure of an open pit, waste rock disposal areas, processing infrastructure, a tailings management facility (TMF), ancillary infrastructure to support the mine and process plant, and a rail transportation component. The mine will have a nominal capacity of 16 million metric tonnes of iron ore concentrate per year. Concentrate will be transported by existing rail to the Pointe-Noire Terminal at the Port of Sept-Îles, where Project-related components will be located on land within the jurisdiction of the Port Authority of Sept-Îles.

The purpose of the sampling program is to characterize baseline conditions of the site prior to any future mine development on the property. Results of the baseline study will be used to support the environmental assessment of the Project and will provide the necessary data to quantify the potential harmful alteration, disruption or destruction (HADD) of fish habitat. As stated in the draft guidelines, baseline surveys should be conducted in accordance with direction as provided by DFO and shall be designed to:

- contribute to the development of mitigation measures and fish habitat compensation plans for the Project;
- contribute to the development of a conceptual reclamation and closure plan;
- provide necessary baseline data into support of on-going monitoring programs that assess the effectiveness of mitigation measures and compensation plan; and
- provide necessary baseline data to support assessment of effects on the recreational, commercial and Aboriginal fisheries and their habitats.

The *Fisheries Act* is currently being amended to provide protection to ongoing aboriginal, commercial and recreational fisheries by protecting the fish and the productivity of the habitat that supports them. The trigger for authorization is being revised from the harmful alteration, disruption or destruction of fish habitat (HADD) to the serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery (Department of Justice Canada 2012) . In this respect, both habitat-based and population-based data required for quantification of potential serious, permanent change in productivity of habitat has been collected. This includes standard lacustrine (lake/pond) and riverine (and stream) habitat quantification as well as population estimates. The available results of these surveys are provided within this baseline report. While the majority of the habitat quantification is completed, portions of the work, particularly with respect to population estimates, are ongoing (August-September of 2012) in response to these incoming changes to the Act. As a result, all data analysis and results are not included in this baseline report but will be available as soon as

the field surveys and analyses are completed. Where additional data is being collected/analyzed has been noted within the text of this report.

Lacustrine/Pond Habitat

A total of 12 ponds and lakes within and near the proposed Project footprint were surveyed, characterized and quantified in terms of fish species presence and fish habitat using DFO guidelines. One pond (RP01) is located within the direct footprint of the Rose Pit and four ponds (SW1, SW2, SW3, SW4) are within the direct footprint of the proposed Tailings Management Facility (TMF). One other pond (SC11) may be affected by the rail route. The others are either in proximity to proposed Project features or are downstream of proposed Project features and/or activities.

Riverine/Stream Habitat

A total of five general areas were surveyed, characterized and quantified in terms of stream habitat and fish species presence using DFO guidelines; the Rose Pit, the Pike Lake outflows, the Tailings Management Facility (TMF), the Rose South Waste Rock Area, and proposed crossing (rail, road, conveyor) locations. The Rose Pit area has a total of seven streams of which two would be within the direct footprint of the proposed pit area. The TMF has a total of three streams which would all have at least a portion within the footprint. The Rose South Waste Rock Area has a total of four streams that would be within the footprint and there are a total of 11 proposed stream crossings associated with rail, road and/or conveyors.

Population Estimates

In order to obtain a reasonable estimate of productivity within the lacustrine and stream habitat of the Project area, representative ponds and streams were selected for population estimate surveys. The results of these surveys are pending and will be provided as an addendum to this baseline report.

Two ponds were selected that were within the direct footprint of the proposed Project; RP01 (the small pond within the direct footprint of the Rose Pit) and SW1 (the largest pond within the TMF direct footprint). Estimates of fish populations involved implementing multiple mark-recapture using fyke nets. The population estimates obtained from these lacustrine habitats will be used as reasonable representative values for ponds of similar nature throughout the project area.

In total, eight streams were sampled (RP02-RP01, RP03-RP02, AD01, AD02-two stations, AD04, TDA01, TDA02-two stations, TDA02East) for population estimates. Estimates of riverine fish populations were completed using quantitative electrofishing stations as per Scruton and Gibson (1995). The population estimates obtained from these lacustrine habitats can be used as reasonable representative values for streams of similar nature throughout the project area.

Water Quality

Water quality sampling was conducted at seven locations during the July 2011 field survey. Sample stations included streams RP01-PLS, PL-OF, M01-ML, SC01, TDA01, TDA02 and the outflow of Long Lake (LL-OF). The results were compared to CCME Guidelines for the *Protection of Aquatic Life* (CCME 2011). The only exceedances that were found included Aluminum (RP01-PLS), Cadmium (RP01-PLS, PL-OF, LL-OF, SC01, and TDA01); and Copper (RP01-PLS). These results can be considered existing baseline conditions.

Benthic Macroinvertebrates

Invertebrate sampling was conducted during the 2011 field surveys within a total of four representative streams; within the TMF area (TDA02), within the Rose Pit areas (RP04-RP02), within the Mills Lake area (M02 to Mills Lake), and within the Pike Lake North area (PLN-OF). Samples were analyzed for species richness, Evenness, and Shannon-Weiner diversity indices. In general, species and individual numbers are low with moderate evenness (no one species dominates).

Winter Ice Observations

Results of the winter ice observation surveys throughout the proposed Rose Pit and TMF areas indicate that within the TMF, the outflow of Pond SW1 and stream TDA02 at its confluence with TDA02East were frozen completely to the bottom. At other sample locations, water was visible.

Table of Contents

1.0 INTRODUCTION 1
- 1.1 Overview of Kami Iron Ore Project 1

2.0 RATIONALE AND OBJECTIVES 4
- 2.1 Rationale 4
- 2.2 Objectives 4

3.0 STUDY AREA 5
- 3.1 Study Area 5
  - 3.1.1 2011 Survey Locations 8
  - 3.1.2 2012 Survey Locations 8
- 3.2 Study Team 9

4.0 METHODS 14
- 4.1 Literature Review and Interviews 14
- 4.2 Aquatic Baseline Study 14
  - 4.2.1 Study Preparation 15
  - 4.2.2 Quality Assurance / Quality Control Procedures 15
  - 4.2.3 Field Sampling Methods 15
    - 4.2.3.1 Lacustrine Habitat Classification 15
    - 4.2.3.2 Stream Habitat Classification 16
    - 4.2.3.3 Fish Sampling in Lacustrine Habitats 17
    - 4.2.3.4 Fish Sampling in Riverine Habitats 20
    - 4.2.3.5 Benthic Invertebrate Sampling in Streams 21
    - 4.2.3.6 Water Quality 21
    - 4.2.3.7 Winter Ice Observations 21

5.0 STUDY RESULTS 23
- 5.1 Existing Knowledge 23
  - 5.1.1 Regional Limnology 23
  - 5.1.2 Regional Hydrology 23

5.1.3 Fish Species 34
5.1.3.1 Burbot (*Lota lota*)........34
5.1.3.2 Lake chub (*Couesius plumbeus*) 34
5.1.3.3 Longnose dace (*Rhinichthys cataractae*) 35
5.1.3.4 Northern pike (*Esox lucius)* 36
5.1.3.5 Atlantic salmon *(Salmo salar*)........36
5.1.3.6 Brook trout (*Salvelinus fontinalis*)........37
5.1.3.7 Lake trout (*Salvelinus namaycush*) 38
5.1.3.8 Lake whitefish (*Coregonus clupeaformis*) 39
5.1.3.9 Round whitefish (*Prosopium cylindraceum*) 39
5.1.3.10 Mottled sculpin (*Cottus bairdi*)........40
5.1.3.11 Slimy sculpin (*Cottus cognatus*) 40
5.1.3.12 Threespine stickleback (*Gasterosteus aculeatus*)........41
5.1.3.13 Longnose sucker (*Catostomus catostomus*) 42
5.1.3.14 White sucker (*Catostomus commersoni*) 42
5.2 Regional Fisheries........43
5.3 Lacustrine Habitat Classification / Quantification 43
5.3.1 Pike Gully 43
5.3.2 Pike Lake South 44
5.3.3 Pond RP01 44
5.3.3.1 Fish Species Present 44
5.3.3.2 Population Estimates........44
5.3.3.3 Bathymetry and Littoral/Profundal Distribution 46
5.3.3.4 Habitat Suitabilities........48
5.3.3.5 Habitat Equivalent Units 48
5.3.4 Pond RP02 51
5.3.4.1 Fish Species Present 51
5.3.4.2 Bathymetry and Littoral/Profundal Distribution 51
5.3.4.3 Habitat Suitabilities........53
5.3.4.4 Habitat Equivalent Units 53
5.3.5 Pond RP03 55
5.3.5.1 Fish Species Present 55

5.3.5.2 Bathymetry and Littoral/Profundal Distribution 56
5.3.5.3 Habitat Suitabilities 56
5.3.5.4 Habitat Equivalent Units 56
5.3.6 Pond RP04 60
5.3.6.1 Fish Species Present 60
5.3.6.2 Bathymetry and Littoral/Profundal Distribution 63
5.3.6.3 Habitat Suitabilities 63
5.3.6.4 Habitat Equivalent Units 63
5.3.7 Pond RP05 68
5.3.7.1 Fish Species Present 68
5.3.7.2 Bathymetry and Littoral/Profundal Distribution 70
5.3.7.3 Habitat Suitabilities 72
5.3.7.4 Habitat Equivalent Units 73
5.3.8 Habitat Classification of Pond Associated with Crossing SC11 76
5.3.8.1 Fish Species Present 76
5.3.8.2 Bathymetry and Littoral/Profundal Distribution 76
5.3.8.3 Habitat Suitabilities 78
5.3.8.4 Habitat Equivalent Units 78
5.3.9 Habitat Classification of Other Small Ponds 78
5.3.9.1 Pond SW1 79
5.3.9.2 Pond SW2 83
5.3.9.3 Pond SW3 87
5.3.9.4 Pond SW4 91
5.4 Riverine Habitat Classification / Quantification 92
5.4.1 Rose Pit Streams 92
5.4.1.1 Stream RP01-PLS 92
5.4.1.2 Stream RP02-RP01 94
5.4.1.3 Stream RP03-RP02 96
5.4.1.4 Stream RP04-RP02 98
5.4.1.5 Stream RP05-RP04 100
5.4.1.6 Stream TRIB 1 101
5.4.1.7 Stream RND 101

5.4.2 Pike Lake Outflow Stream 102
5.4.2.1 Stream PLN-S1 102
5.4.2.2 Stream PLN-S2 103
5.4.2.3 Stream PLN-S3 104
5.4.2.4 Stream PLS-S1 105
5.4.2.5 Stream PLS-S2 106
5.4.3 Tailings Management Facility (TMF) 107
5.4.3.1 Stream TDA01 107
5.4.3.2 Stream TDA02 109
5.4.3.3 Stream TDA02 East 113
5.4.4 Rose South Waste Rock Disposal Area 115
5.4.5 Stream Crossing Locations 116
5.4.5.1 Crossing SC01 116
5.4.5.2 Crossing SC02 117
5.4.5.3 Crossing SC03 118
5.4.5.4 Crossing SC04 119
5.4.5.5 Crossing SC05 121
5.4.5.6 Crossing SC06 122
5.4.5.7 Crossing SC07 124
5.4.5.8 Crossing SC07a 125
5.4.5.9 Crossing SC08 125
5.4.5.10 Crossing SC09 126
5.4.5.11 Crossing SC10 128
5.5 Benthic Invertebrate Sampling in Streams 129
5.6 Water Quality 129
5.7 Winter Ice Observations 132

6.0 REFERENCES 134

6.1 Personal Communications 134
6.2 Cited Literature 134

LIST OF APPENDICES

Appendix A GPS Coordinates for Sampling Locations

Appendix B Survey Photographs

Appendix C Fish Sampling Data

Appendix D Macroinvertebrate Sampling Data

Appendix E Water Quality Laboratory Analysis

Appendix F Winter Ice Observation Photographs

LIST OF FIGURES

Figure 1.1. Site Location Map. 2
Figure 1.2. Kami Iron Ore Mine Site....................3
Figure 3.1. Sample Locations and identifications....................6
Figure 3.2. Kami Iron Ore Mine Site Local Study Area (LSA) and Regional Study Area (RSA) delineations....................7
Figure 4.1. Kami Iron Ore Mine Site winter survey locations, February 2012. 22
Figure 5.1. Alderon Watersheds (based on 1:50,000 topographic mapping)....................24
Figure 5.2. FDC for #1 Outflow, Labrador, NL. Prorated flows from Wabush Lake. 27
Figure 5.3. FDC for #2 Outflow, Labrador, NL. Prorated flows from Wabush Lake. 27
Figure 5.4. FDC for #3 Outflow, Labrador, NL. Prorated flows from Wabush Lake. 28
Figure 5.5. FDC for #4 Outflow, Labrador, NL. Prorated flows from Wabush Lake. 28
Figure 5.6. FDC for TDA01Outflow, Labrador, NL. Prorated flows from Wabush Lake. 29
Figure 5.7. FDC for TDA02 Outflow, Labrador, NL. Prorated flows from Wabush Lake. 29
Figure 5.8. FDC for # 5 Outflow, Labrador, NL. Prorated flows from Wabush Lake. 30
Figure 5.9. #1Outflow Hydrograph. 30
Figure 5.10. #2 Outflow Hydrograph. 31
Figure 5.11. #3 Outflow Hydrograph. 31
Figure 5.12. #4 Outflow Hydrograph. 32
Figure 5.13. TDA01 Outflow Hydrograph. 32
Figure 5.14. TDA02 Outflow Hydrograph. 33
Figure 5.15. #5 Outflow Hydrograph. 33
Figure 5.16. Length-weight relationship for lake chub captured in RP01, 2011. 45
Figure 5.17. Length-weight relationship for white sucker captured in RP01, 2011. 45
Figure 5.18. Bathymetric contours and substrates of Pond RP01. 47
Figure 5.19. Bathymetric Contours and substrate of Pond RP02. 52
Figure 5.20. Bathymetric Contours and substrate of Pond RP03 57
Figure 5.21. Length-weight relationship for burbot captured in RP04, 2011. 61
Figure 5.22. Length-weight relationship for lake chub captured in RP04, 2011. 61
Figure 5.23. Length-weight relationship for pearl dace captured in RP04, 2011. 62
Figure 5.24. Length-weight relationship for white sucker captured in RP04, 2011. 62
Figure 5.25. Bathymetric Contours of Pond RP04 64
Figure 5.26. Length-weight relationship of brook trout captured in RP05, 2011. 68
Figure 5.27. Length-weight relationship of lake chub captured in RP05, 2011. 69
Figure 5.28. Length-weight relationship of pearl dace captured in RP05, 2011. 69
Figure 5.29. Length-weight relationship of white sucker captured in RP05, 2011. 70
Figure 5.30. Bathymetric Contours and substrate of Pond RP05. 71
Figure 5.31. Bathymetric Contours and substrate of Pond SC11. 77
Figure 5.32. Water Sample locations for Alderon Site, 2011. 130

LIST OF TABLES

Table 4.1. Habitat classifications of Beak (1980) 18
Table 4.2. Descriptions of riverine habitat classifications in DFO (2012) and McCarthy et al. (2006). 19
Table 5.1. Summary of Hydrometric Stations within Drainage Division 030A. 25
Table 5.2. Flow Estimates for Delineated Catchments in Labrador West, NL 26
Table 5.3. The calculated total area of each habitat type within Pond RP01. 46
Table 5.4. Summary of Pond RP01 habitat values used to calculate aerial extents. 49
Table 5.5. Habitat suitabilities for all species, Pond RP01. 50
Table 5.6. Habitat equivalent units for all species, Pond RP01. 50
Table 5.7. The calculated total area of each habitat type within Pond RP02. 53
Table 5.8. Summary of Pond RP02 habitat values used to calculate aerial extents. 54
Table 5.9. Habitat suitabilities for all species, Pond RP02. 55
Table 5.10. Habitat equivalent units for all species, Pond RP02. 55
Table 5.11. The calculated total area of each habitat type within Pond RP03. 58
Table 5.12. Summary of Pond RP03 habitat values used to calculate aerial extents. 59
Table 5.13. Habitat suitabilities for all species, Pond RP03. 60
Table 5.14. Habitat equivalent units for all species, Pond RP03. 60
Table 5.15. The calculated total area of each habitat type within Pond RP04. 65
Table 5.16. Summary of Pond RP04 habitat values used to calculate aerial extents. 66
Table 5.17. Habitat suitabilities for all species, Pond RP04. 67
Table 5.18. Habitat equivalent units for all species, Pond RP04. 67
Table 5.19. The calculated total area of each habitat type within Pond RP05. 72
Table 5.20. Summary of Pond RP05 habitat values used to calculate aerial extents. 74
Table 5.21. Habitat suitabilities for all species, Pond RP05. 75
Table 5.22. Habitat equivalent units for all species, Pond RP05. 75
Table 5.23. The calculated total area of each habitat type within PondSC11. 78
Table 5.24. The calculated total area of each habitat type within Pond SW1. 80
Table 5.25. Summary of Pond SW1 habitat values used to calculate aerial extents. 81
Table 5.26. Habitat suitabilities for all species, Pond SW1. 82
Table 5.27. Habitat equivalent units for all species, Pond SW1. 82
Table 5.28. The calculated total area of each habitat type within Pond SW2. 84
Table 5.29. Summary of Pond SW2 habitat values used to calculate aerial extents. 85
Table 5.30. Habitat suitabilities for all species, Pond SW2. 86
Table 5.31. Habitat equivalent units for all species, Pond SW2. 86
Table 5.32. The calculated total area of each habitat type within Pond SW3. 88
Table 5.33. Summary of Pond SW3 habitat values used to calculate aerial extents. 89
Table 5.34. Habitat suitabilities for all species, Pond SW3. 90
Table 5.35. Habitat equivalent units for all species, Pond SW3. 90
Table 5.36. Summary of habitat measurements and classifications for RP01-PLS. 93
Table 5.37. Habitat Equivalent Units for Stream RP01-PLS. 93
Table 5.38. Summary of habitat measurements and classifications for RP02-RP01. 95
Table 5.39. Habitat Equivalent Units for Stream RP02-RP01. 95
Table 5.40. Summary of habitat measurements and classifications for RP03-RP02. 97

Table 5.41. Habitat Equivalent Units for Stream RP03-RP02. 97
Table 5.42. Summary of habitat measurements and classifications for RP04-RP02. 99
Table 5.43. Habitat Equivalent Units for Stream RP04-RP02. 100
Table 5.44. Summary of habitat measurements and classifications for RP05-RP04. 101
Table 5.45. Habitat Equivalent Units for Stream RP05-RP04. 101
Table 5.46. Summary of habitat measurements and classifications for PLN-S1. 102
Table 5.47. Habitat Equivalent Units for Stream PLN-S1. 103
Table 5.48. Summary of habitat measurements and classifications for PLN-S2. 103
Table 5.49. Habitat Equivalent Units for Stream PLN-S2. 104
Table 5.50. Summary of habitat measurements and classifications forPLN-S3. 104
Table 5.51. Habitat Equivalent Units for Stream PLN-S3. 105
Table 5.52. Summary of habitat measurements and classifications for PLS-S1. 105
Table 5.53. Habitat Equivalent Units for Stream PLS-S1.. 106
Table 5.54. Summary of habitat measurements and classifications for PLS-S2. 106
Table 5.55. Habitat Equivalent Units for Stream PLS-S2.. 107
Table 5.56. Summary of habitat measurements and classifications for TDA-01. 108
Table 5.57. Habitat Equivalent Units for Stream TDA01 109
Table 5.58. Summary of habitat measurements and classifications for TDA-02. 111
Table 5.59. Habitat Equivalent Units for Stream TDA02. 112
Table 5.60. Summary of habitat measurements and classifications for TDA02 East. 114
Table 5.61. Habitat Equivalent Units for Stream TDA02E. 114
Table 5.62. Habitat stream summary in the Rose South Waste Rock Disposal Area........ 115
Table 5.63. Summary of habitat measurements and classifications for SC01. 117
Table 5.64. Habitat Equivalent Units for Stream Crossing SC01. 117
Table 5.65. Summary of habitat measurements and classifications for SC02. 118
Table 5.66. Habitat Equivalent Units for Stream Crossing SC02. 118
Table 5.67. Summary of habitat measurements and classifications for SC03. 119
Table 5.68. Habitat Equivalent Units for Stream Crossing SC03. 119
Table 5.69. Summary of habitat measurements and classifications for SC04. 120
Table 5.70. Habitat Equivalent Units for Stream Crossing SC04. 121
Table 5.71. Summary of habitat measurements and classifications for SC05. 122
Table 5.72. Habitat Equivalent Units for Stream Crossing SC05. 122
Table 5.73. Summary of habitat measurements and classifications for SC06. 123
Table 5.74. Habitat Equivalent Units for Stream Crossing SC06. 123
Table 5.75. Summary of habitat measurements and classifications for SC07. 124
Table 5.76. Habitat Equivalent Units for Stream Crossing SC07. 125
Table 5.77. Summary of habitat measurements and classifications for SC08. 126
Table 5.78. Habitat Equivalent Units for Stream Crossing SC08. 126
Table 5.79. Summary of habitat measurements and classifications for SC09. 127
Table 5.80. Habitat Equivalent Units for Stream Crossing SC09. 127
Table 5.81. Summary of habitat measurements and classifications for SC10. 128
Table 5.82. Habitat Equivalency Units for Stream Crossing SC10. 128
Table 5.83. Species Richness for Invertebrate Samples collected during 2011 surveys... 129
Table 5.84. Water Samples collected during 2011 Site Survey. 131
Table 5.85. Winter stream survey results, proposed Kami Mine Site, western Labrador. . 133

LIST OF ACRONYMS

DFO	Fisheries and Oceans Canada
CEAA	Canadian Environmental Assessment Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
HADD	Habitat Alteration, Disruption, or Destruction
LSA	Local Study Area
NLEPA	Newfoundland and Labrador Environmental Protection Act
PDA	Project Development Area
RSA	Regional Study Area
TMF	Tailings Management Facility
TSS	Total Suspended Solids
VEC	Valued Ecosystem Component
YOY	Young of year

1.0 INTRODUCTION

Alderon Iron Ore Corp. (Alderon) is proposing to develop an iron ore mine in western Labrador, and build associated infrastructure at the Pointe-Noire Terminal in the Port of Sept-Îles, Québec. The mine Property is located south of the towns of Wabush and Labrador City in Newfoundland and Labrador and east of Fermont, Québec (Figure 1.1). The Kami Iron Ore Mine and Rail infrastructure is located entirely within Labrador, and includes construction, operation, and rehabilitation and closure of an open pit, waste rock disposal areas, processing infrastructure, a tailings management facility (TMF), ancillary infrastructure to support the mine and process plant, and a rail transportation component. The mine will have a nominal capacity of 16 million metric tonnes of iron ore concentrate per year. Concentrate will be transported by existing rail to the Pointe-Noire Terminal at the Port of Sept-Îles, where Project-related components will be located on land within the jurisdiction of the Port Authority of Sept-Îles.

The Labrador Project components will require approvals from the Government of Newfoundland and Labrador and are subject to Environmental Assessment (EA) under the *Environmental Protection Act* (NLEPA) and associated Environmental Assessment Regulations. Federal approvals will be required, which trigger the requirement for a federal EA under the *Canadian Environment Assessment Act* (CEAA), at the comprehensive study level. The Project was registered in accordance with the NLEPA and CEAA in October 2011.

The Newfoundland and Labrador Minister of Environment and Conservation required an EIS and guidelines are being developed. This Baseline Study Report is being submitted as required by the draft guidelines in support of the provincial and federal environmental assessment processes.

1.1 Overview of Kami Iron Ore Project

The proposed Kami mine site is located wholly within Labrador; no activities associated with the mine will take place in Québec. The Kami Iron Ore Project in Labrador includes construction, operation, and closure / decommissioning of the following primary components (Figure 1.2):

- Open pit (Rose Pit);
- Waste rock disposal areas (Rose North and Rose South);
- Processing infrastructure includes crushing, grinding, spiral concentration, magnetic separation, and tailings thickening areas;
- Tailings management facility (TMF);
- Effluent treatment facility;
- Ancillary infrastructure to support the mine and process plant (gate and guardhouse, reclaim water pumphouse, truck wash bay and shop, electrical substation, explosives magazine storage, administration / office buildings, maintenance offices, warehouse area and employee facilities, conveyors, load-out silo, stockpiles, sewage and water treatment units, mobile equipment, access road and transmission lines);
- A rail transportation component to connect the mine site to the Québec North Shore & Labrador (QNS&L) Railway; and
- Electrical transmission line from terminal to be located by Nalcor Energy to the mine site.

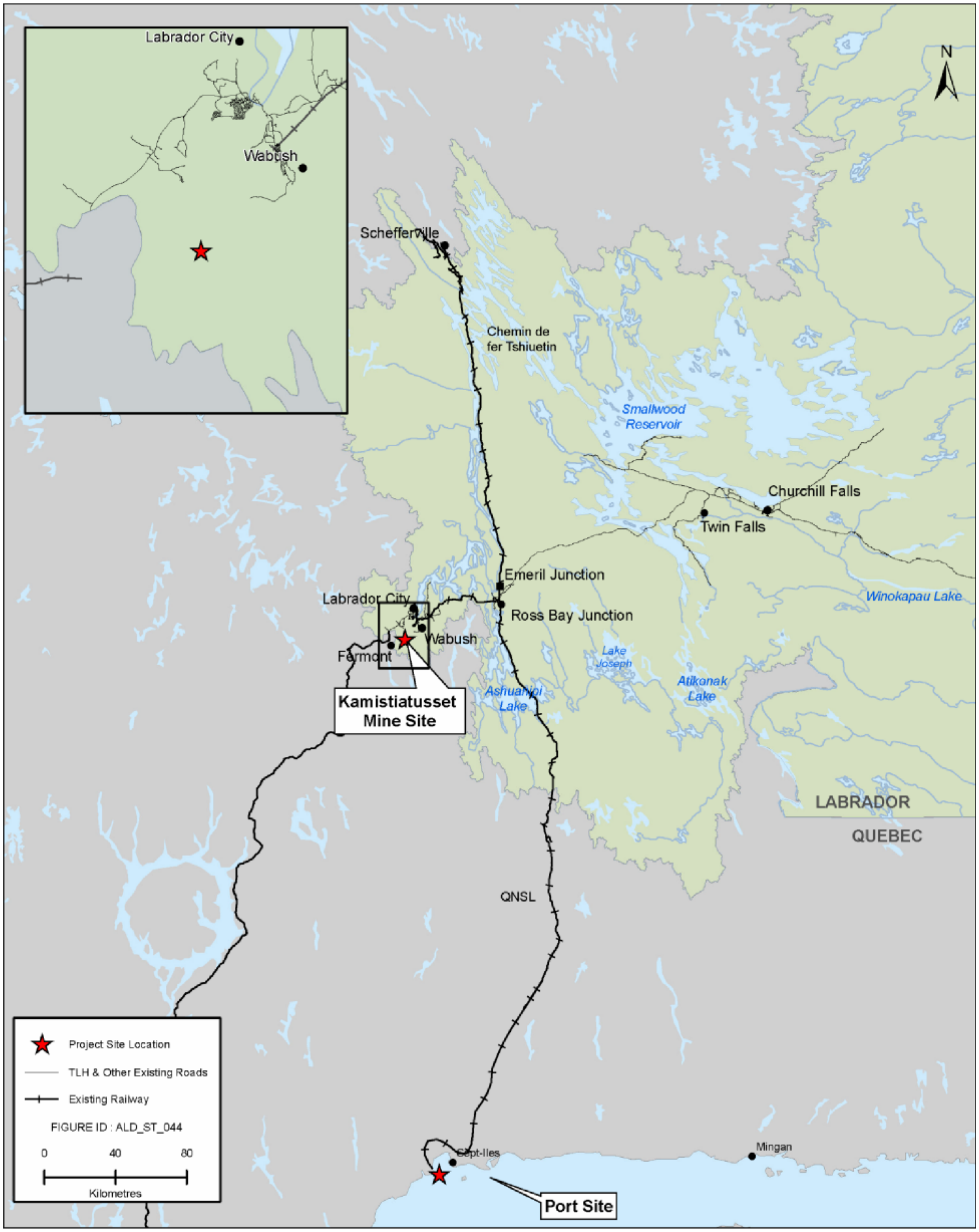
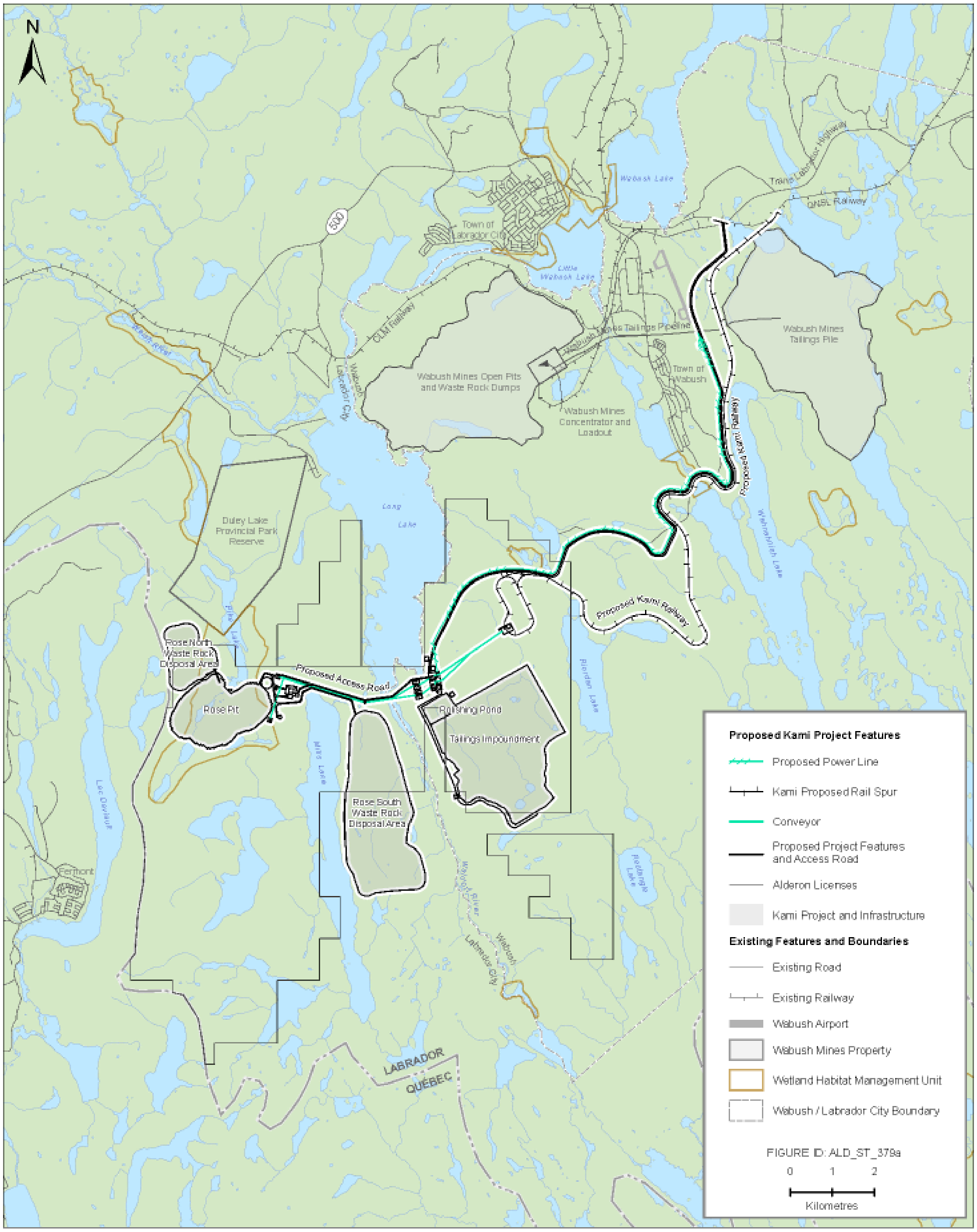


Figure 1.1. Site Location Map.



CLIENT:

ALDERON IRON ORE CORP.

PROJECT TITLE:

KAMI PROJECT - LABRADOR

Figure 1.2. Kami Iron Ore Mine Site.

2.0 RATIONALE AND OBJECTIVES

2.1 Rationale

The purpose of the sampling program is to characterize baseline conditions of the site prior to any future mine development on the property. Results of the baseline study will be used to support the environmental assessment of the Project and will provide the necessary data to quantify the potential harmful alteration, disruption or destruction (HADD) of fish habitat. As stated in the draft guidelines, baseline surveys should be conducted in accordance with direction as provided by DFO and shall be designed to:

- contribute to the development of mitigation measures and fish habitat compensation plans for the Project;
- contribute to the development of a conceptual reclamation and closure plan;
- provide necessary baseline data into support of on-going monitoring programs that assess the effectiveness of mitigation measures and compensation plan; and
- provide necessary baseline data to support assessment of effects on the recreational, commercial and Aboriginal fisheries and their habitats.

2.2 Objectives

In general, Baseline Studies are conducted to obtain additional data for use in determining the potential for significant effects on a VEC due to the proposed undertaking, and to provide the necessary baseline information for monitoring programs.

The objectives of the Aquatic Baseline Study are:

1. Determine fish presence, population estimates, and fish species composition in waterbodies likely to be affected by the Project. Fishing methods include fyke net trapping and gillnetting of lacustrine (lake or pond) habitat and index (qualitative) electrofishing of stream habitat.
2. Conduct bathymetric surveys of lacustrine habitat likely to be affected by the Project. Classify lacustrine habitat and generate habitat maps depicting depth, substrate, presence of aquatic vegetation, and extent of the littoral zone.
3. Classify stream habitat likely to be affected by the Project. Classify stream habitat on the basis of substrate composition, stream velocity, depth and the presence of aquatic and riparian vegetation.
4. Collect baseline water quality data at select locations within the study area. Water quality parameters to be analyzed include metals, mercury and total suspended solids (TSS). In addition, in situ measurements of dissolved oxygen, temperature, conductivity, and pH will be recorded.
5. Determine stream discharge (m^3/second) at select locations.

6. Quantify the aquatic habitat within the Project footprint for the purposes of Fisheries Act Authorization determination by DFO.
7. Collect baseline data regarding fisheries (recreational, commercial, and Aboriginal) within the study area.

3.0 STUDY AREA

3.1 Study Area

The survey area consists of the area of physical disturbance for the Project (PDA) as well as select locations within the Local Study Area (LSA) and Regional Study Area (RSA) identified within the environmental assessment (Figure 3.1). The LSA and RSA are generally described below.

The LSA includes all areas where potential direct Project-related effects are measureable to some degree of confidence. It includes the PDA and associated surrounding area where environmental effects may reasonably be expected to occur. Project components that were considered when defining the LSA are the proposed open pit, the waste rock disposal areas, the concentrator / processing area, all facilities infrastructure, the TMF, on-site roads, the conveyor line, the rail spur, the on-site transmission line, and the various required crossings (Figure 3.1).

The RSA includes all areas where foreseeable effects may result. The RSA was defined to capture the farthest extent of potential effect of the Project on Fish, Fish Habitat and Fisheries, but which are not directly measureable to a specific degree of confidence. The RSA is also the area within which cumulative effects can be assessed. In general, the RSA includes all watercourses, waterbodies and respective watersheds surrounding the PDA that eventually drain into and include Wabush Lake.

The habitats included within the study area are those which are more likely affected by the Project and includes the area planned for the pit, waste rock disposal areas, concentrator/processing area, Tailings Management Facility (TMF), on-site roads, rail spur, and on-site transmission line. The study area is the area represented by the physical Project footprint as defined in the Project Description and includes selected waterbodies adjacent to the footprint that may be affected by Project activities (Figure 3.2).

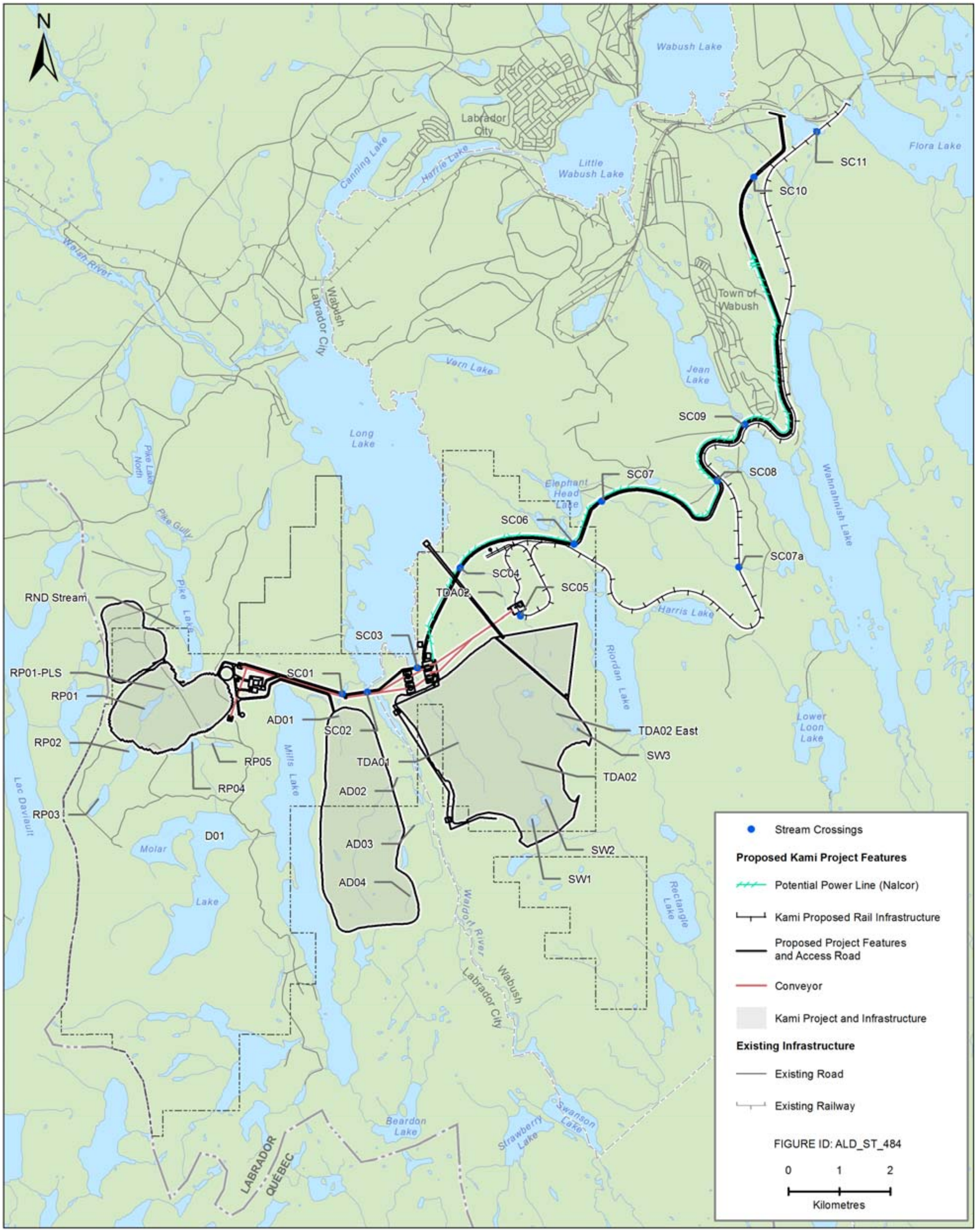


Figure 3.1. Sample Locations and identifications.

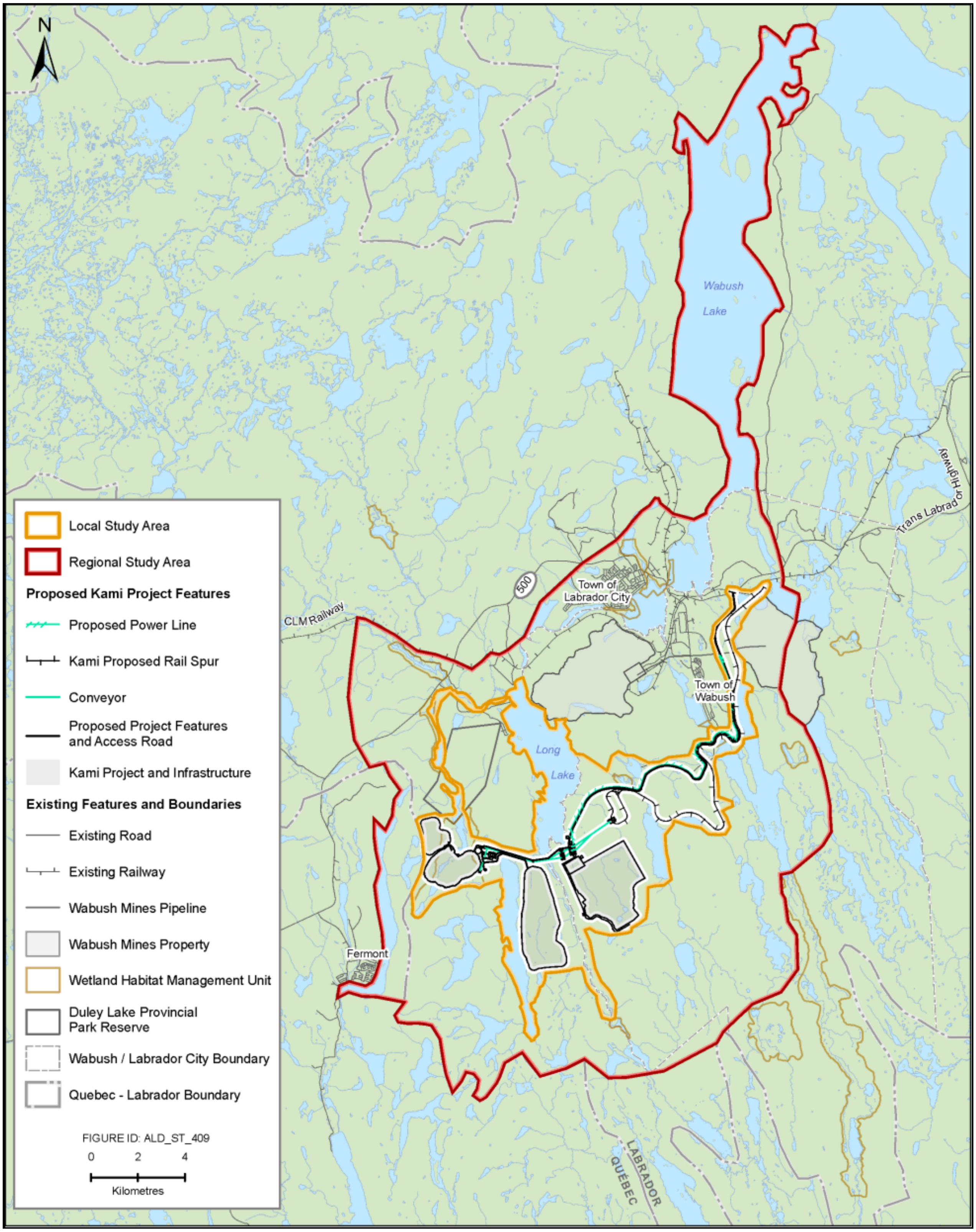


Figure 3.2. Kami Iron Ore Mine Site Local Study Area (LSA) and Regional Study Area (RSA) delineations.

3.1.1 2011 Survey Locations

Specifically, the survey area during initial 2011 surveys included:

- A series of small ponds located in proximity to Rose Pit (RP01 to RP05) and all inflowing and outflowing streams (RP5-RP4, RP4-RP2, RP3-RP2, RP2-RP1, AND RP1-PLS);
- Streams within the footprint of the Rose North rock disposal area (RND stream) and Rose South rock disposal area (RSD stream);
- Stream sections located downstream of Pike Lake South (PLS S1 and PLS S2) and stream sections located downstream of Pike Lake North (PLN S1, PLN S2 and PLN S3);
- Streams associated with the Tailings Management Facility (TDA01, TD02, and TDA02 East), including three small standing water areas (SW1, SW2 and SW3) associated with the headwaters of TDA01 and TDA02 East;
- Stream crossings areas SC01 to SC1 1;
- Lakes D01, D02, Pike Lake South, M01 and M02; and,
- The stream sections between lakes M01 and M02 (M01-M02), and between lake M02 and Mills Lake (M02-MIL).

3.1.2 2012 Survey Locations

There have been alterations to the location and layout of Project features since registration based on public consultation, engineering optimization, and environmental considerations. As a result, the habitat within certain footprint areas required additional survey in 2012. These habitat areas include:

- Stream habitat within the revised Rose South waste rock disposal area (AS01, AD02, AD03, and AD04).
- Stream crossings associated with a revised rail route (SC-07a).

In addition, The *Fisheries Act* is currently being amended to provide protection to ongoing aboriginal, commercial and recreational fisheries by protecting the fish and the productivity of the habitat that supports them. The trigger for authorization is being revised from the harmful alteration, disruption or destruction of fish habitat (HADD) to the serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery (Department of Justice Canada 2012). In this respect, additional data required for quantification of potential serious, permanent change in productivity of habitat is ongoing in 2012 in response to these incoming changes to the Act. As a result, all data analysis and results are not included in this baseline report but will be available as soon as the field surveys and analysis are completed. Where additional data is being collected/analyzed has been noted within the text of this report.

While the trigger for requirement of a Fisheries Act Authorization is being revised, the intention of the Fisheries Act Section 35(2) will be maintained. The Act allows the Minister to issue an Authorization under Section 35 (2) which will permit the work, undertaking or activity to occur that results in serious harm to fish and/or serious, permanent change to ecosystem productivity. The issuance of an Authorization is at the discretion of the Minister; however, the process for issuing an Authorization is well established. A Section 35(2) Authorization will be issued only with the acceptance of an appropriate Compensation Plan which offsets any serious harm to fish or serious, permanent change to ecosystem productivity that support a fishery. An Authorization must be issued before any action can be taken that would result in serious harm.

Therefore, additional survey information is also being collected and analyzed in 2012 such as:

- Quantitative estimate of fish populations in stream and pond habitats;
- Winter ice observations in smaller streams within the TMF area; and
- Habitat classification and quantification of lacustrine habitat further downstream from the Rose Pit area; Pike Lake South and Pike Gully.

The 2012 habitat data has been provided to the assessment team for assessment purposes while productivity data collection is ongoing as is the analysis and Quality Assurance. It should be noted that the absence of productivity data at the assessment stage does not limit the assessment of potential interaction between the Project or Fish, Fish Habitat and Fisheries, nor the determination of residual effects. The productivity data will be used in determining the overall requirements under the Fisheries Act Section 35(2) Authorization as well as the approach to compensation. As a result, most data collected in 2012 will be submitted as an addendum to this baseline report.

3.2 Study Team

The Aquatic Baseline Study completed in 2011 was conducted by Stassinu Stantec Limited Partnership (Stassinu). Brief biographical statements, highlighting project roles and responsibilities and relevant education and employment experience, are provided below.

Field investigations completed in 2012 and the final habitat quantification and analysis were conducted by AMEC Environment & Infrastructure. A brief description of each team member and their role is provided below.

Barry Wicks B.Sc, is the Stassinu Team Lead for Biophysical and Ecological Sciences with Stantec Consulting Ltd (Stantec) in the St. John’s, NL office. He has over 12 years experience with aquatic environment investigation including planning and execution of field sampling programs, data management and reporting. Mr. Wicks has had extensive involvement with environmental effects monitoring, compensation planning/monitoring, habitat/fish population assessments and aquatic baseline studies for the mining and oil and gas sectors. His involvement in this program included 2011 study planning, design, data interpretation, and draft report writing for the 2011 baseline surveys.

Bruce Bennett is a Senior Associate and Environmental Scientist with Stantec in the St. John’s office. Mr. Bennett’s experience extends over 30 years and includes management, design and implementation of freshwater, marine, and other baseline surveys, monitoring programs and component studies for the preparation of environmental assessment documents for clients in the hydroelectric, mining, pulp and paper industries, and for government agencies. He has also assisted clients in permitting, environmental protection planning, environmental effects and compliance monitoring, and closure and rehabilitation planning as projects proceeded through construction, operation or closure.

Bill Tibble, B.Sc, is an Environmental Scientist in the Stantec St. John's, NL office. He has over five years experience in aquatic biology, environment, health and safety, fish habitat services, and site remediation and restoration. Mr. Tibble has experience in the planning and execution of field programs related to fish sampling, habitat classification, water quality and benthic sampling for the power generation, mining, and land development sectors. Mr. Tibble is a Master of Science Candidate in Fish Ecology from the University of New Brunswick. For this project, Mr. Tibble served as the 2011 field team lead and contributed to 2011 data interpretation.

Scott Finlay B.Sc, is an Environmental Biologist based out of the Stantec St. John's office. Mr. Finlay has three years experience in the environmental sector that includes environmental mitigation and monitoring, habitat compensation, and baseline fish and wildlife surveys in terrestrial, marine and freshwater environments. Key skill set experience includes fish habitat classification, benthic substrate sampling and delineation, various forms of water quality surveys, and fish species identifications and related population estimates (presence/absence, mark/recapture, qualitative and quantitative electrofishing, passive and invasive netting procedures). Additional fisheries work has included fish introduction studies, habitat compensation monitoring, and project effects monitoring for various companies in the mining, hydro, and oil and gas sectors (both freshwater and marine environments).

James Harrison Ph.D, is an Aquatic Ecologist in the Stantec St. John's, NL office. Mr. Harrison has more than 15 years of experience in the environmental consulting, scientific research, manufacturing, and construction fields. Areas of expertise include fisheries and freshwater ecosystems, augmented with experience in regulatory evaluations and consultations, effects of linear development, fisheries compensation designs, and aquatic monitoring programs. He has designed, conducted and managed projects for the transportation, oil and gas, mining, and green energy sectors. His involvement in this program included, 2011 data analysis, interpretation, and reporting.

Amber Frickleton, Ad.Dip GIS, B.A., is a GIS Analyst with the Information Management team in Stantec's St. John's office. Her GIS experience includes serving maps on the internet through ArcIMS and ArcServer, relational database design and management, GPS data collection, and post processing and grid modeling and analysis. Complementary skills include data management and statistical analysis. Miss Frickleton's work with Stantec has included work on a variety of projects including Aurora Energy uranium project, Labrador Iron Mine, and this Project. Her work on these projects has involved a variety of tasks such as data analysis, map creation, data organization, and quality control for 2011 data.

James McCarthy, M.Sc. is a Certified Fisheries Professional, Project Manager and Associate Biologist with the St. John's office with over nineteen years experience in fisheries research and environmental assessment. He has been involved in a wide range of projects in Newfoundland and Labrador, Nova Scotia, British Columbia and Alaska working for private organizations and government agencies. Mr. McCarthy's expertise relates to Environmental Assessment of Aquatic Resources, Fish and Fish Habitat Quantification, Fisheries Act determination negotiations and Fisheries Act Compensation Planning. Mr. McCarthy has designed and implemented various projects from simple aquatic assessments of potential road construction/crossing locations to multi-year assessments of remote aquatic communities for potential mining and hydroelectric developments. Mr. McCarthy was Senior Biologist and Project Manager for the 2012 baseline studies and overall baseline reporting.

David Robbins, M. Env. Sc. is Vice President of Atlantic Operations for AMEC Environment & Infrastructure. As a Project Manager he has led the design and delivery of several multi-disciplinary projects including the supply of weather forecasting and oceanographic services for Husky Energy's White Rose Development and the design of a Fish Habitat Compensation program for Newfoundland and Labrador Hydro's Granite Canal Hydroelectric Development. As a scientist Mr. Robbins has experience in fisheries biology and aquatic sciences, public participation, environmental impact assessment, environmental site assessments and biophysical studies throughout Newfoundland and Labrador. He has designed numerous baseline water quality, aquatic and marine biological studies in support of proposed hydroelectric, thermal power generation, oil and gas, mining and forestry projects. Mr. Robbins was senior reviewer for Quality Assurance purposes on the overall 2012 baseline report and backup to Mr. McCarthy.

Justin So, M.Sc. is an AMEC biologist with over four years of experience. He has mainly been involved in fisheries research and fish habitat surveys where he was responsible for data collection, analyzing fisheries data, designing and reporting results to a variety of stakeholders. Mr. So also has over two years of experience in science communication where he has been involved in communicating science to the public and conducting social science research (focus groups, interviews and surveys). Mr. So is also experienced in technical writing and has been involved in writing reports on a variety of topics from biological, physical to socio-environmental studies.

Mr. So recently participated in both the Carino and Hebron Nearshore EEM Baseline programs as well as the Lower Churchill Hydroelectric Generation Project EEM program design (fish physiology). Mr. So assisted in data review and analysis.

Matthew Gosse, B.Sc., is an AMEC environmental biologist with over eight years of experience related to fish habitat studies and compensation planning. Mr. Gosse has been involved in numerous fisheries and water quality projects throughout Newfoundland and Labrador. His efforts on these projects have included the use of a variety of skills, including: collection, consolidation and analysis of data; literature reviews; species identification, classification and description; bathymetric and electrofishing surveys; invertebrate, fish, water, sediment sampling; as well as collecting and assessing data on physical habitats within riverine, lacustrine and marine environments. Along with field data collection, Mr. Gosse has been involved in the preparation of numerous reports for the submission to clients, including data analysis, AutoCAD drafting and report writing. Mr. Gosse was field crew lead for portions of the 2012 sampling program.

Dermot Kenny, NRT, is a senior AMEC field technician with over 15 years of experience collecting and analyzing baseline data from freshwater and marine ecosystems. His efforts on projects have focused on collection, consolidation and analysis of data; literature reviews; species identification, classification and description; snorkel and bathymetric surveys; invertebrate, fish, water, sediment, soil, lead and mercury sampling; as well as collecting and assessing data on physical habitats within riverine, lacustrine and marine environments. Mr. Kenny has been involved in many projects including the 2007 Granite Canal FHCP monitoring, tailings options surveys for Rambler Mines, Lower Churchill Transmission Line freshwater and marine field programs, Defence Construction Canada fish sampling on 5-Wing Goose Bay, and fish habitat surveys for a Direct Shipping Ore Project in northwestern Labrador and Quebec. Mr. Kenny has also been field lead on many of the baseline surveys associated with the Long Harbour Fish Habitat Compensation Plan. Mr. Kenny was field crew lead for portions of the 2012 sampling program.

Kyle Reid Fairhurst is an AMEC fish and wildlife technologist with seven years experience in field data collection and record keeping related to wildlife and fish habitat. Mr. Fairhurst has been involved in fish habitat surveys for various projects including the 2011 Long Harbour Processing Plant Fish Habitat Compensation Construction, IOC's fish habitat surveys associated with proposed expansion, Lower Churchill Hydroelectric Generation Project's ongoing baseline fish habitat data collection, and Vale NL's Fish Habitat Compensation works associated with the Mine/Mill. Mr. Reid Fairhurst has also participated in field identification of water fowl and water fowl nesting habitat, wetland and upland vegetation identification, identifying riparian zones as well as fish and wildlife buffer zones as it applies to forest harvesting and tree removal. He has also assessed culvert placement as it relates to fish movement and stream bank erosion. Mr. Fairhurst was field crew member for a portion of the 2012 field program.

Jesse Noel is an AMEC Biological Technician who has over seven years direct field-related experience in fish and fish habitat data collection. He has assisted on numerous aquatic studies such as the proposed Southern Head Oil Refinery baseline data collection, the ongoing lower Churchill River baseline data collection, the Long Harbour Fish Habitat Compensation construction, the Long Harbour facility fish relocation, the Big Rattling Brook Fish Habitat Rehabilitation associated with the Vale NL Mine/Mill Compensation Plan, the Granite Canal Hydroelectric Development EEM Program since 2005, the Baie Verte Fish Habitat Surveys, the Labrador-Island Transmission Line Surveys, the Island Pond Fish and Fish Habitat Program, the Conche Fish and Fish Habitat Program, the Long Harbour Freshwater Baseline Data Collection Program, the Wabush Mines Hydrographic Instrument Installations and the Trans Labrador Highway Causeway Fish Passage Assessment on the lower Churchill River. Mr. Noel was field team member for a portion of the 2012 field program.

Juanita Abbott, B.A., is an AMEC GIS Specialist with over 14 years applicable work experience with Geographic Information Systems, Databases and Cartography along with its many components and applications. Ms. Abbott has worked on a wide range of projects relating to suitability analysis, environmental impact assessments, time-cost analysis and water related projects. She was extensively involved in GIS based applications for the Lower Churchill Project and is now very actively involved in several project relating to the potential mining expansions in Labrador west, NL. She is experienced in completing GIS projects requiring conceptual planning, database management and performing geographic analysis.

She has developed a wide range of skills and expertise through continued education and work experience. She has gained experience working with ArcMap, Spatial Analyst, Network Analyst, 3D Analyst, Model Builder and GeoHMS/RAS software. Ms. Abbott was lead GIS specialist involved in 2012 habitat mapping and interpretation.

Melissa McComiskey, M.Eng., EIT, holds a master's degree in civil engineering with a research focus on hydrological modeling, remote sensing, and environmental statistics. Her studies have provided a solid foundation in scientific research and technical engineering design. Ms. Tom has also completed field work in various locations within Canada for fish habitat compensation works. As a water resources engineer at AMEC her responsibilities include project management and coordination, report and proposal preparation and review, client and regulatory agency liaison, field work, as well as data and sample collection and analysis. Ms. McComiskey provided specialist support related to hydrology.

4.0 METHODS

The EIS must describe the limnology, hydrology, freshwater biota, presence of fish and other freshwater species, associated habitats and habitat distribution and fisheries in potentially affected surface waters, based on available published information, information resulting from community consultation, and/or results of on-site baseline surveys. Baseline surveys should be conducted in accordance with direction as provided by DFO and shall be designed to:

- contribute to the development of mitigation measures and fish habitat compensation plans for the Project;
- contribute to the development of a conceptual reclamation and closure plan;
- provide necessary baseline data to support on-going monitoring programs that assess the effectiveness of mitigation measures and compensation plan; and
- provide necessary baseline data to support assessment of effects on the recreational, commercial and Aboriginal fisheries and their habitats.

Furthermore, the EIS must:

- characterize fish populations on the basis of species and life stage for affected water bodies (i.e., project footprint, upstream and downstream);
- classify and quantify fish habitat, as per the:
    - Standards methods guide for the classification/quantification of lacustrine habitat in Newfoundland and Labrador; and
    - Standards Methods Guide for the Classification and Quantification of Fish Habitat in Rivers of Newfoundland and Labrador for the Determination of Harmful Alteration, Disruption or Destruction of Fish Habitat (Draft).
- enumerate stream discharge measurements and water quality parameters upstream and downstream of affected water bodies; and
- list any rare fish species that are known to be present.

This draft baseline study provides the results and preliminary habitat quantification of HADD for the purposes of EA development and compensation planning.

4.1 Literature Review and Interviews

Literature reviews of available, published information on regional limnology, regional hydrology, fish and fisheries have been completed and relevant data consolidated. In addition, interviews were carried out with residents of the Labrador City/Wabush and Fermont areas to determine target sport fish species and the areas in which locals fished.

4.2 Aquatic Baseline Study

As stated previously, surveys will be conducted over two years; 2011-2012. Habitat has been classified and quantified using applicable DFO guidance documents. Provided below are methods used to characterize and quantify the habitats surveyed.

4.2.1 Study Preparation

The initial 2011 field plan was prepared and presented/discussed with DFO prior to deployment. Likewise, the results of the 2011 program, and further refinement of the facility footprint and HADD quantification requirements, necessitated additional discussion with DFO prior to the implementation of the 2012 survey program.

4.2.2 Quality Assurance / Quality Control Procedures

Quality control procedures used for the Aquatic Baseline Study include:

- a study design was prepared, submitted/discussed and reviewed by DFO in advance of program execution in both 2011 and 2012;
- an experimental license was obtained from DFO Licensing Division for fishing activity associated with the study. All fishing activity was conducted under DFO experimental license numbers NL 693-11 (2011) and NL-1351-12 (2012).
- all survey equipment was inspected and confirmed to be in good working order prior to program commencement. Duplicate survey equipment was available, where practical, in case of equipment malfunction;
- fishing and habitat classification activities were conducted according to DFO standard methods guides;
- field activities were conducted in accordance with company standard operating procedures (SOPs), work instructions (WI), and safe work practices (SWPs);
- during program execution, photos and GPS coordinates were downloaded to a laptop computer on a regular basis;
- all field data were quality reviewed by field staff prior to and following entry into the Project database;
- Project database files were spot checked for accuracy and errors, and all outliers reviewed prior to finalization;
- all report evaluations and tables were generated from reviewed data;
- water quality samples were analyzed by a certified analytical laboratory; and,
- the baseline report was senior reviewed by a senior environmental scientists.

4.2.3 Field Sampling Methods

Fish and fish habitat sampling methods are described separately for lacustrine (includes both pond and lake standing water) and riverine (includes both stream and river) habitats.

4.2.3.1 Lacustrine Habitat Classification

The approach used for the quantification of lacustrine habitat was conducted as per the Standard Methods Guide for the Classification / Quantification of Lacustrine Habitat in Newfoundland and Labrador (Bradbury *et al*. 2001). The approach involved the completion of both littoral and profundal habitat mapping and sampling for species presence and habitat utilization. Substrate compositions were estimated visually and eckman grabs were used to collect samples in deeper areas. The substrate is mapped and quantified using an established size classification that is used in the DFO guidelines. Secchi disc depth was used to discriminate between littoral and profundal habitat types. The specific sampling details on fish species presence is provided below.

The data collected from each pond/lake is used within a DFO spreadsheet to determine the Habitat Equivalent Units (HEU) of each waterbody. This value is generated for each species within the habitat to determine the habitat quantification to be included in the HADD determination.

4.2.3.2 Stream Habitat Classification

Riverine habitat classification involved an aerial survey of all fish habitat as well as ground surveying of habitats present within the identified streams using several standard DFO guidelines (see Scruton *et al*. 1992, Sooley *et al*. 1999 and DFO 2012). Each stream was sub-divided into habitat reaches based on visible and measured changes in habitat characteristics (eg. streambed slope, water velocity, stream width and/or water depth). Each stream reach was surveyed for numerous parameters such as channel width, wetted perimeter, mean water column velocity, mean water depth, streambed slope and substrate composition. Based on these measurements, each reach was classified into various habitat types.

Two habitat classification systems were used to describe the aquatic habitat for quantitative purposes; the Beak (1980) and a new classification system soon to be implemented by DFO (DFO 2012; McCarthy *et al.* 2006). The Beak habitat classification system uses a total of four habitat types based on salmonid life-cycle stages and habitat suitabilities (Table 4.1).

The proposed new classification system outlined in McCarthy et al (2006) takes into account the suitability of the habitat for each species using the habitat by life-cycle stage (spawning, young-of-year, juvenile and adult). Habitat classes should be defined in an ecologically meaningful way (i.e. taking into account how fish utilize their habitat) that can be easily recognized by both field staff and habitat managers. Table 4.2 provides a description of each habitat type along with the range of parameter values associated with each.

Each habitat type has a discrete range of water velocities, substrate types, depths and gradients as possible which have been determined using the described biological ‘preferences’ outlined in Grant and Lee (2004). While not a defined habitat requirement, gradient is listed as a parameter which can be used in various levels of the system to distinguish between habitat types. It should be noted that not all habitat parameter descriptions are exclusive of all others (e.g., water depth); however, the combined parameters should offer a reasonable designation of most habitat types encountered.

Coordinates for stream transect locations are presented in Appendix A.

4.2.3.3 Fish Sampling in Lacustrine Habitats

Species Presence

Fish sampling for species presence in lacustrine habitat during 2011 consisted of tended gillnets sets of short duration (approximately one hour) and overnight fyke trap sets. Fyke traps were set to capture fish in near shore areas, extending to water depths of approximately 1 m. Two overnight fyke trap sets were conducted in each pond that was investigated. Gillnetting was conducted over varying habitat types and allowed investigation of deeper water areas. Standard gangs of experimental gillnets with mesh sizes ranging from 25 to 75 mm were used. Fishing a range of mesh sizes and a variety of habitat types increases the likelihood of capturing the various species and life stages (juvenile or adult) present.

Ponds fished by fyke net trapping and gillnetting include RP01, RP02, RP03, RP04, RP05, PLS, D01, D02, M01, and M02. All fish captured were identified to species, measured, weighed (a representative number) and released alive. All fishing locations were assigned waypoints by a handheld GPS unit and coordinates were recorded for each sample site.

Coordinates for pond fish sampling locations are presented in Appendix A.

Population Estimates

In order to obtain a reasonable estimate of productivity within the lacustrine habitat of the Project area, representative ponds were selected for population estimate surveys. The two ponds selected were RP01 (the small pond within the direct footprint of the Rose Pit) and SW1 (the largest pond within the TMF direct footprint). Estimates of fish populations included the methods outlined above in addition to implementing multiple mark-recapture using fyke nets. Each fish captured was identified, marked and released back into its pond of capture in order to determine a population estimate using Schnabel population estimate. The confidence interval of all fish populations was also generated, where catch numbers allowed. The total number of net-nights at each pond was dependent upon fish density and capture success. The population estimates obtained from these lacustrine habitats will be used as reasonable representative values for ponds of similar nature throughout the project area.

Table 4.1. Habitat classifications of Beak (1980)

Habitat Classification	Habitat Description
Type I	Good salmonid spawning and rearing habitat: often with some feeding pools for larger age classes: **flows:** moderate riffles; **current:** 0.1-0.3 m/s; **depth:** relatively shallow, 0.3-1.0 m; **substrate:** gravel to small cobble, some large rocks, boulders; **general habitat types:** primarily riffle, pool.
Type II	Good salmonid rearing habitat with limited spawning usually only in isolated gravel pockets, good feeding and holding areas for larger fish in deeper pools, pockets or backwater eddies: **flows:** heavier riffles to light rapids; **current:** 0.3-1.0 m/s; **depth:** variable from 0.3-1.5 m; **substrate:** Larger cobble/rubble size rock to boulders, bedrock, some gravel pockets between larger rocks; **general habitat types:** run, riffle, pocketwater, pool.
Type III	Poor rearing habitat with no spawning capabilities, used for migratory purposes: **flows:** very fast, turbulent, heavy rapids, chutes, small falls; **current:** 1.0 m/s or greater; **depth:** variable, 0.3-1.5 m; **substrate:** Large rock and boulders, bedrock; **general habitat types:** run, pocketwater, cascades.
Type IV	Poor juvenile salmonid rearing habitat with no spawning capability, provides shelter and feeding habitat for larger, older salmonid (especially brook trout): **flows:** sluggish; **current:** 0.15 m/s; **depth:** variable but often 1 m; **substrate:** Soft sediment or sand, occasionally large boulders or bedrock, aquatic macrophytes present in many locations; **general habitat types:** flat, pool, glide.

Table 4.2. Descriptions of riverine habitat classifications in DFO (2012) and McCarthy et al. (2006).

Habitat Type	Habitat Parameter	Description
Fast Water	**Mean Water Velocity Stream Gradient**	**> 0.5m/s Generally > 4%.**
Rapid	General Description	Considerable white water[1] present.
	Mean Water Velocity	> 0.5 m/s
	Mean Water Depth	< 0.6 m
	Substrate	Usually dominated by boulder (Coarse[2]) and rubble (Medium[2]) with finer substrates (Medium and Fine[2]) possibly present in smaller amounts. Larger boulders typically break the surface.
	Stream Gradient	Generally 4-7%
Falls/ Chute/ Cascade	General Description	Mainly white water present. The dominating feature is a rapid change in stream gradient with most water free-falling over a vertical drop or series of drops.
	Mean Water Velocity	> 0.5 m/s
	Mean Water Depth	Variable and will depend on degree of constriction of stream banks.
	Substrate	Dominated by bedrock and/or large boulders (Coarse).
	Stream Gradient	> 7% and can be as high as 100%.
Run	General Description	Relatively swift flowing, laminar[3] and non-turbulent.
	Mean Water Velocity	> 0.5 m/s
	Mean Water Depth	> 0.3 m
	Substrate	Predominantly gravel, cobble and rubble (Medium) with some boulder (Coarse) and sand (Fine) in smaller amounts.
	Stream Gradient	Typically < 4% (exception to gradient rule of thumb)
Moderate Water	**Mean Water Velocity Stream Gradient**	**0.2-0.5m/s >1 and < 4%**
Riffle	General Description	Relatively shallow and characterized by a turbulent surface[4] with little or no white water.
	Mean Water Velocity	0.2 – 0.5 m/s
	Mean Water Depth	< 0.3 m
	Substrate	Typically dominated by gravel and cobble (Medium) with some finer substrates present, such as sand (Fine). A small amount of larger substrates (Coarse) may be present, which may break the surface.[5]
	Stream Gradient	Generally >1 and < 4%
Steady/ Flat	General Description	Relatively slow-flowing, width is usually wider than stream average and generally has a flat bottom.
	Mean Water Velocity	0.2 - 0.5 m/s
	Mean Water Depth	>0.2 m
	Substrate	Predominantly sand and finer substrates (Fine) with some gravel and cobble (Medium).
	Stream Gradient	> 1 and < 4%
Slow Water	**Mean Water Velocity Stream Gradient**	**Generally < 0.2m/s (some eddies can be up to 0.4m/s). < 1%.**
Plunge / Trench / Debris Pools	General Description	Generally caused by increased erosion near or around a larger, embedded object in the stream such as a rock or log or created by upstream water impoundment resulting from a complete, or near complete, channel blockage. These pool types may be classified as an entire reach (e.g., pools greater than 60% of the stream width) or as sub-divisions of a fast water habitat.
	Mean Water Velocity	< 0.2 m/s
	Mean Water Depth	> 0.5 m depending on stream size (e.g., may be shallower in smaller systems).
	Substrate	Highly variable (i.e., coarse, medium or fine substrates)
	Stream Gradient	Generally < 1%

Habitat Type	Habitat Parameter	Description
Eddy	General Description	Relatively small pools caused by a combination of damming and scour: however scour is the dominant forming action. Formation is due to a partial obstruction to stream flow from boulders, roots and/or logs. Partial blockage of flow creates erosion near obstruction. It is typically < 60% of the stream width and hence will be a sub-division of a faster-water habitat type (e.g., Run with 20% eddies).
	Mean Water Velocity	Typically < 0.4 m/s, but can be variable.
	Mean Water Depth	> 0.3 m. May vary depending on obstruction type, orientation, streambed and bank material and flows experienced.
	Substrate	Predominantly sand, silt and organics (Fine) with some gravels (Medium) in smaller amounts.
	Stream Gradient	Variable

[1] White water is present when hydraulic jumps are sufficient to entrain air bubbles which disturb the water surface and reduces visibility of objects in the water.

[2] Coarse, Medium and Fine substrate types are classified according to the Standard Methods Guide for the Classification/Quantification of Lacustrine Habitat in Newfoundland and Labrador (Bradbury *et al*. 2001).

[3] Laminar describes the surface of the water as smooth and glass-like with no reduced visibility of objects in the water.

[4] Turbulence is present if there are local patches of white water or if water movement disturbs a portion of the surface**.**

[5] Pocket water often constitutes an important component of riffles in Newfoundland and Labrador and is characterized by a predominance of larger substrates (e.g., boulders) breaking the surface. The result is a riffle with many eddies around the boulders.

4.2.3.4 Fish Sampling in Riverine Habitats

Species Presence

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.

In most instances, entire stream sections were electrofished to determine fish presence and species composition, with the exception that stream crossing locations were investigated to a maximum distance of 400 m.

Coordinates for fish stream sampling locations are presented in Appendix A.

Population Estimates

In order to obtain a reasonable estimate of productivity in riverine habitat within and near the Project area, representative stream reaches were selected for population estimate surveys. In total, eight streams were surveyed (RP02-RP01, RP03-RP02, AD01, AD02-two stations, AD04, TDA01, TDA02-two stations, TDA02East). Estimates of riverine fish populations were completed using quantitative electrofishing stations as per Scruton and Gibson (1995). A portion of the stream is isolated using barrier nets and electrofished using the removal method. The software Microfish™ 3.0 was used to generate population estimates with confidence intervals for each station. The estimates are then standardized to one habitat unit (one habitat unit = 100m^2). The population estimates were used as a reasonable representative of productivity. The population estimates obtained from these lacustrine habitats will be used as reasonable representative values for streams of similar nature throughout the project area.

4.2.3.5 Benthic Invertebrate Sampling in Streams

Benthic macroinvertebrates have been shown to be good indicators of habitat health (Reice and Wohlenberg 1993) and are typically involved in long-term Environmental Effects Monitoring (EEM) Programs. Benthic invertebrates were collected during the 2011 program. Each sample had all organisms identified to the lowest possible level (typically to the family) and enumerated. Baseline diversity was conducted using standard methods with calculations of richness (total number of families), Shannon-Weiner Diversity Indices (H) and an estimation of Species Evenness (D). A brief description of each is provided below.

4.2.3.6 Water Quality

Surface water quality samples were collected from water courses within the project area in clean, pre-labelled sampling containers supplied by the analytical lab and stored in coolers (with ice) to maintain the recommended storage temperature. Samples were shipped for analysis to Maxxam Analytics (an accredited lab in Bedford, Nova Scotia). Chain of custody records were completed and shipped with the samples as official documentation of sample integrity. Samples were analyzed for general chemistry, metals, TSS and mercury. In addition, in situ measurements of dissolved oxygen, temperature, conductivity, and pH were recorded at each sample station. To determine potential water quality issues, water quality results were compared to CCME Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment (CCME) 2011).

4.2.3.7 Winter Ice Observations

On February 28, 2012 surveys at selected pond and stream locations throughout the proposed Kami Mine site were completed. Surveys were conducted to determine the winter condition of smaller tributaries and waterbodies within the project area to assist in the determination of their habitat/production. Smaller tributaries and ponds were sampled during mid-winter when flows and air temperatures are lowest to measure overall ice thickness and water depth (if any). Selected survey locations are presented in Figure 4.1.

The sample locations were accessed by snowmobile. A hand held GPS was pre-loaded with selected sample locations from GIS mapping of the area and used to approximate the position of the sample locations. Due to snow depths (usually over one meter) each site was first cleared of snow to verify the location of each waterbody or watercourse. Once located, an axe or ice auger was used to determine ice thickness. Water depth was measured between the bottom of the ice and the substrate. If possible, substrate type was also recorded.

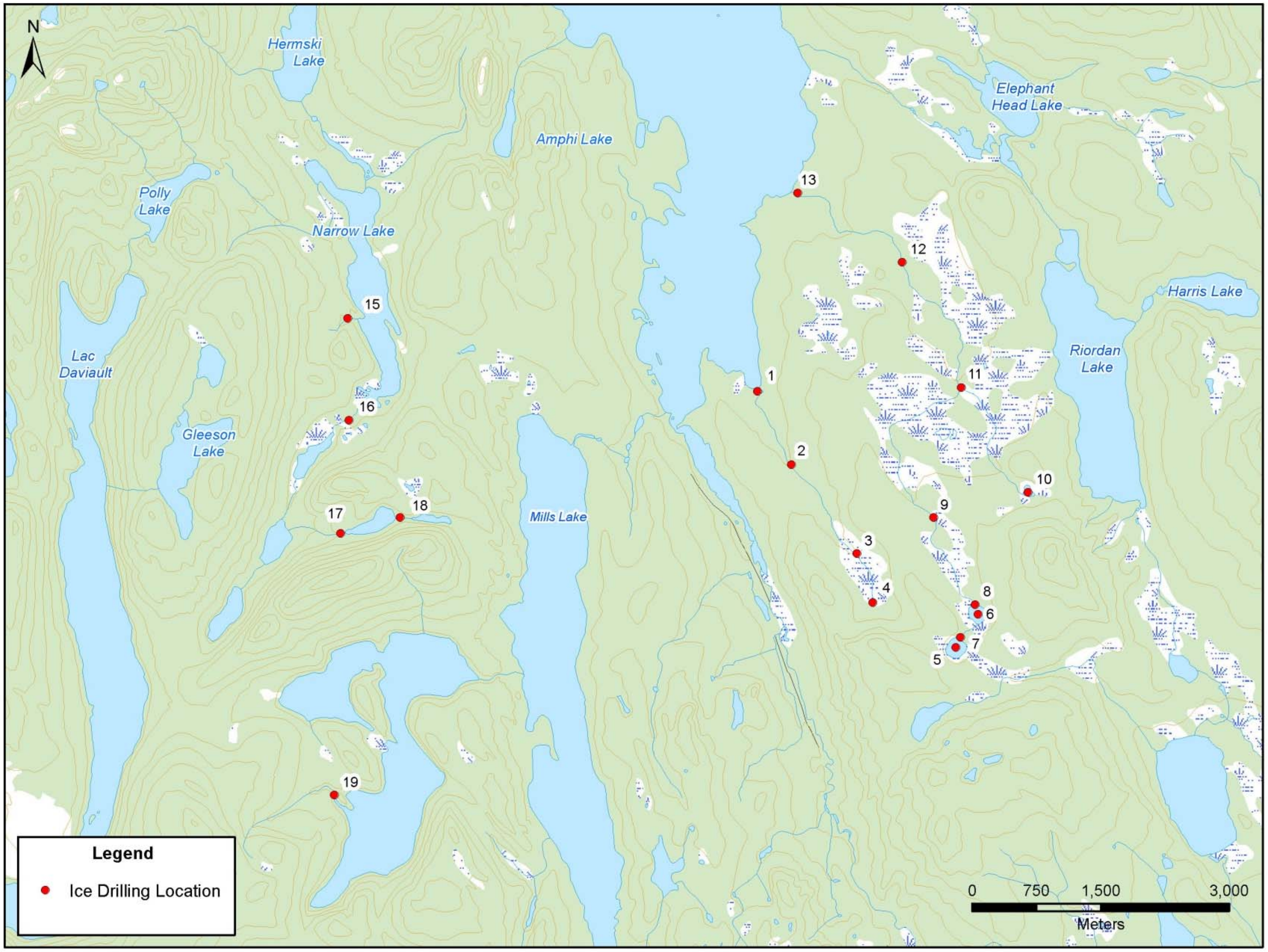


Figure 4.1. Kami Iron Ore Mine Site winter survey locations, February 2012.

5.0 STUDY RESULTS

5.1 Existing Knowledge

5.1.1 Regional Limnology

The general area of the Project is within the headwaters of the Churchill River. The area that extends to the Quebec-Newfoundland border consists of a mineral rich belt where several mining companies are currently mining iron ore. Vegetation in the area contrasts from mature evergreen forest stands to scrub growth separating stands of stunted black spruce. Low water velocities and few natural fish barriers, in most rivers, can be attributed to their flow over a flat topography on the Labrador plateau (Anderson 1985). There is limited existing literature addressing Long Lake and the subwatersheds in the Project area; however, what is available provides some insight to the limnology of the area. There are several studies that have been conducted on Wabush Lake by IOC, some of which are in the public domain as provided by IOC or posted on the provincial government website. The relevant information has been provided below.

Dissolved oxygen levels for Wabush Lake and upstream drainage areas have historically approached saturation throughout the water column, which does not strongly stratify (Hicks 1974 and IOC 1996). The pH of these waters is slightly alkaline (pH 8.1). Although suspended solids in Wabush Lake are not notably elevated historically, turbidity was high due to red water, which has been mitigated by flocculation of the tailings effluent from IOC. There are no regulatory requirements related to the colour of effluent discharged to the receiving environment, as there is no evidence that red water adversely affects fish or fish habitat. Aesthetics are the primary concern for red water from the tailings effluents, however it is reported that red water caused a slight discolouration of the tissue of whitefish, and this may have contributed to a reduction of recreational fishing in Wabush Lake (Canada Gazette 2009).

5.1.2 Regional Hydrology

Available flow records for the Labrador West area were obtained from Water Survey Canada (a division of Environment Canada). All flow data are adjusted under quality management controls by Environment Canada. There are seven watersheds of interest within the Alderon mining area (see Figure 5.1). The drainage basins consist of the following areas:

- #1 Outflow: 3.8 km^2,
- #2 Outflow: 6.1 km^2,
- #3 Outflow: 16.7 km^2,
- #4 Outflow: 28.5 km^2,
- TDA01 Outflow: 3.6 km^2,
- TDA02 Outflow: 4.9 km^2, and
- #5 Outflow: 11.8 km^2.

There are currently no active hydrometric stations at these drainage outlets, therefore these areas are referred to as ungauged basins. The available flows from gauged stations as well as the drainages within the Project area are all located in the drainage division 030A, as delineated by Water Survey Canada. In total, four hydrometric stations with data available to the public are within this drainage division.

A review of the data available from the gauging stations was conducted. A summary of the four public hydrometric stations is provided in Table 5.1, information provided by Water Survey Canada. Of the four gauge stations, three were located either on streams where flow is regulated, or the flow is only measured seasonally. The remaining gauge station, Wabush Lake, provides the most complete and applicable flows, but the available flow data are only available for two years. It should also be noted that the drainage area of Wabush Lake (030A005) is quite large compared to the drainage basins of interest. This station was chosen as the representative gauge because of its similar watershed characteristics and its proximity to the Project catchments.

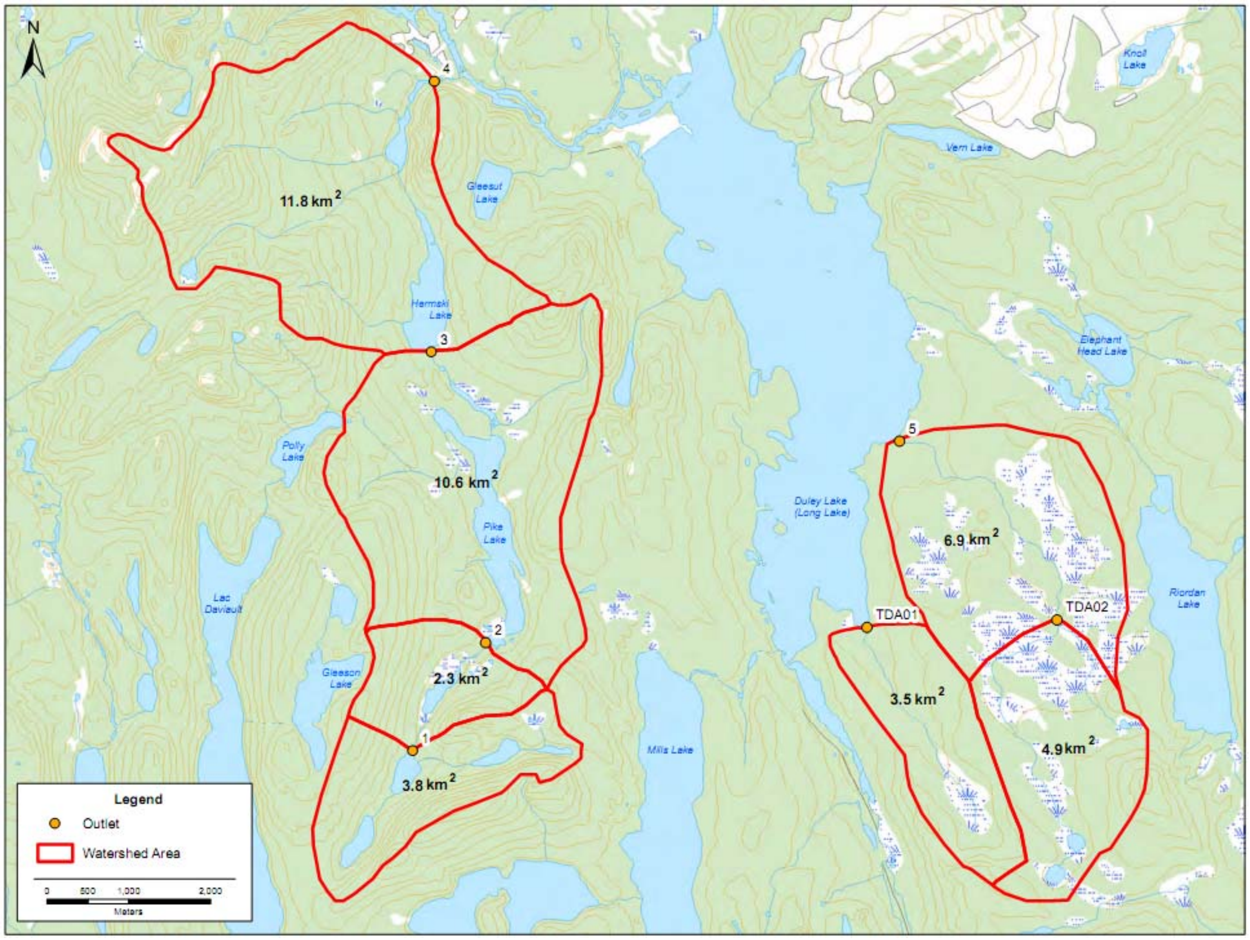


Figure 5.1. Alderon Watersheds (based on 1:50,000 topographic mapping).

Table 5.1. Summary of Hydrometric Stations within Drainage Division 030A.

Station Name	Station ID	Drainage Area (km^2)	Flow Records
Wabush Lake at Lake Outlet	030A005 (active)	1596.7	2007-2008 (2 years)
Ashuanipi River below Wightman Lake	030A004 (active)	8,310	1972-1983 Seasonal/Continuous (0 complete years)
McPhadyen River near the mouth	030A003 (discontinued)	3,610	1972-1985 Seasonal/Continuous (3 full years)
Ashuanipi River at Menihek Rapids	030A001 (active)	19,000	1952-2003 (52 years; regulated flow)

Existing data from the Wabush Lake gauge station was used to generate a prorated flow for the ungauged stations. While prorate data is considered suitable to assist in general fish habitat characteristics, it should be noted that the available data in this tertiary drainage division is not adequate to provide substantial and or accurate flow data for the watersheds of interest for detailed design or engineering. It is suggested that these prorated flows be updated when more information is recorded and becomes available.

Flow duration curves (FDCs) and hydrographs were derived for each ungauged drainage basin. Table 5.2 tabulates various flow estimates for each catchment; maximum daily flow estimates, mean annual flow estimates, and the upper limit flow in which 90 percent of the time the flow within the stream is below.

Figures 5.2 to 5.8 present the seven FDCs for the areas of interest derived from prorated Wabush Lake flows. The hydrographs for the five catchments depict the monthly flow variations for mean, maximum, and minimum flow rates, see Figures 5.9 to 5.15. For Labrador West, the lowest flows are observed in winter from January to April and the highest flows are observed in the late spring months May and June. These high flows are presumably high from spring snowmelt runoff and large amounts of rainfall.

Table 5.2. Flow Estimates for Delineated Catchments in Labrador West, NL

Catchment	Max. Average Daily Flow Estimate (m^3/s)	Mean Daily Flow Estimate (m^3/s)	Median Daily Flow Estimate (m^3/s)	90% of the time, the flow is less than: (m^3/s)
#1 Outflow	0.30	0.08	0.07	0.15
#2 Outflow	0.48	0.13	0.11	0.25
#3 Outflow	1.35	0.35	0.30	0.67
#4 Outflow	2.27	0.60	0.52	1.10
TDA01 Outflow	0.28	0.08	0.06	0.15
TDA02 Outflow	0.39	0.10	0.09	0.20
#5 Outflow	0.99	0.25	0.22	0.48

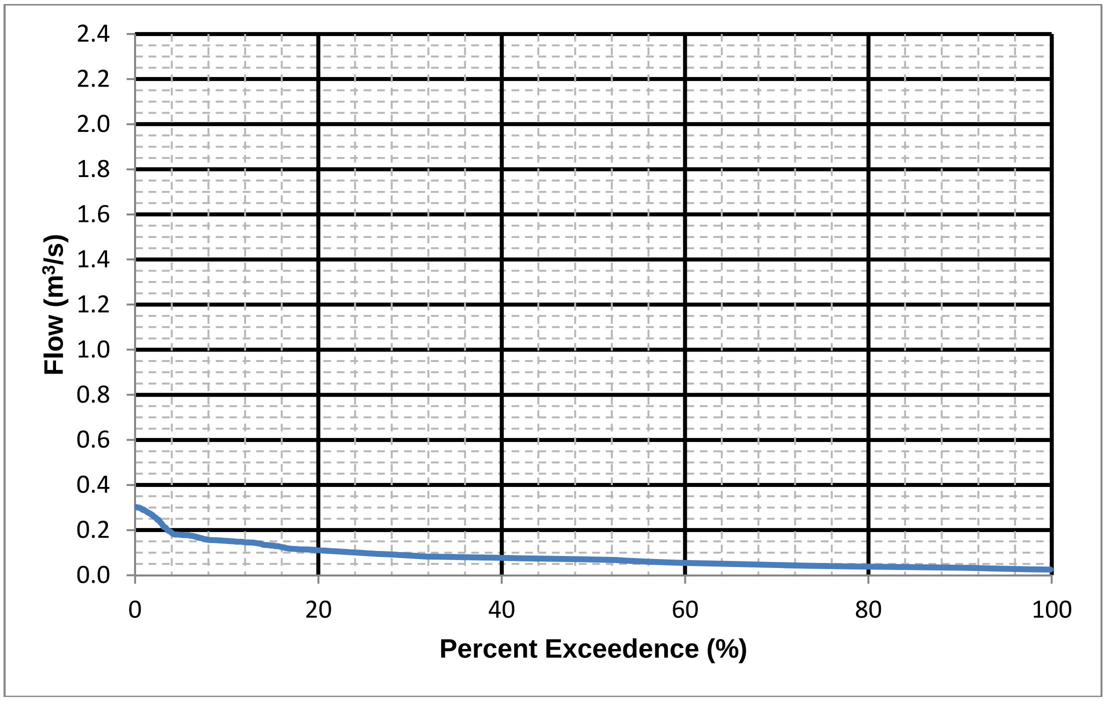


Figure 5.2. FDC for #1 Outflow, Labrador, NL. Prorated flows from Wabush Lake.

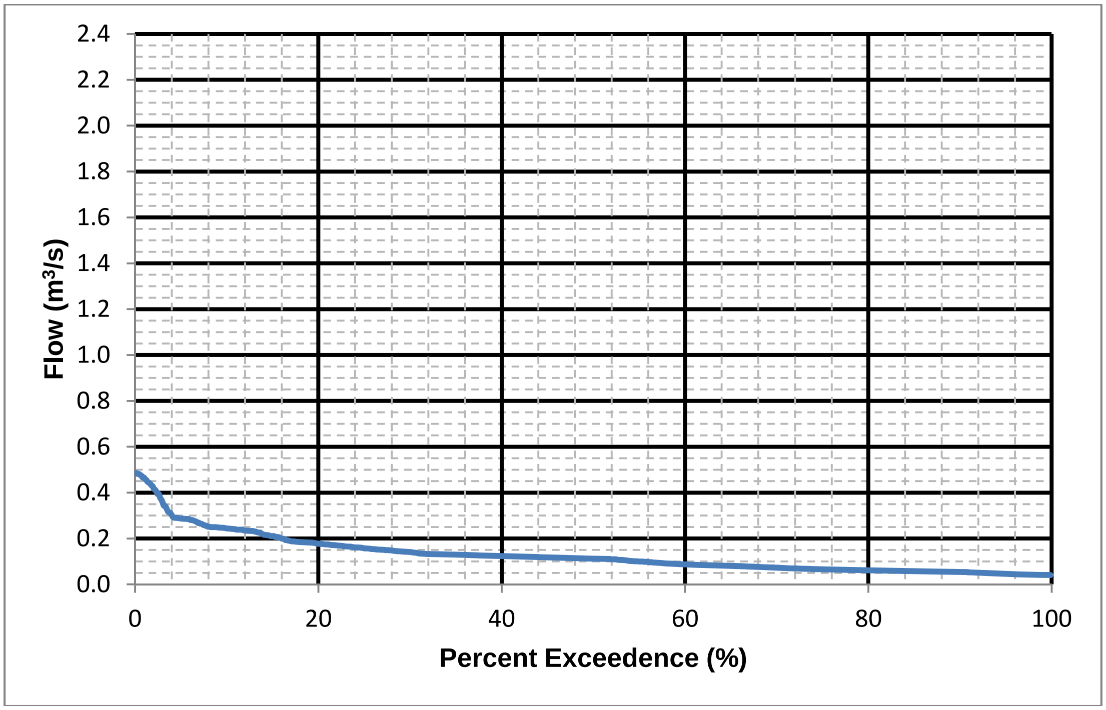


Figure 5.3. FDC for #2 Outflow, Labrador, NL. Prorated flows from Wabush Lake.

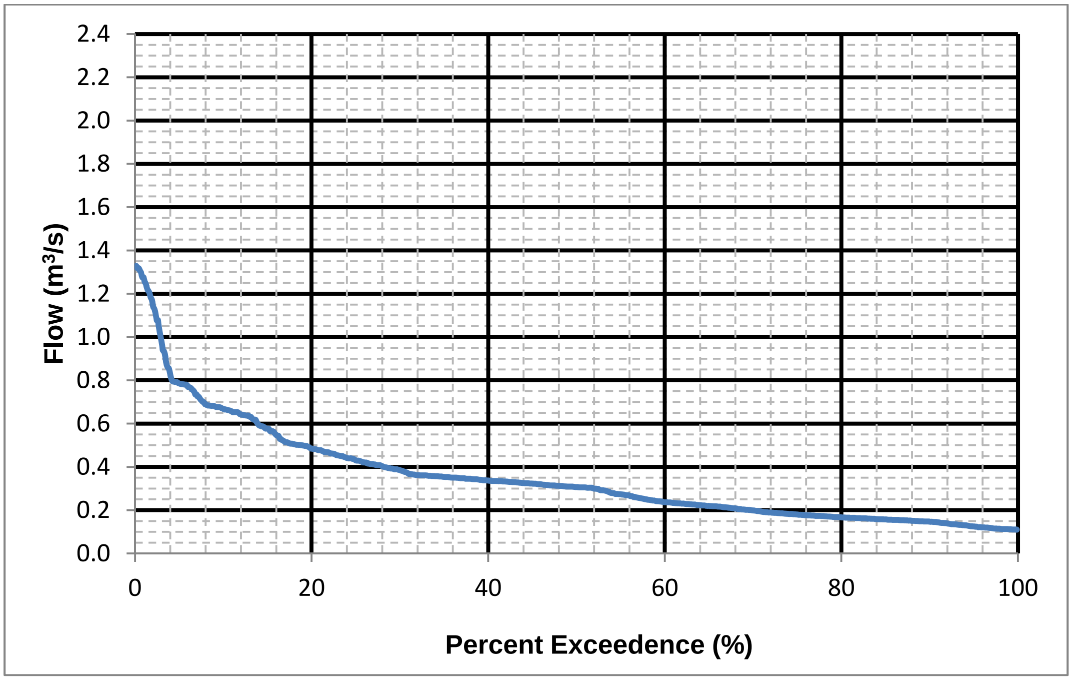


Figure 5.4. FDC for #3 Outflow, Labrador, NL. Prorated flows from Wabush Lake.

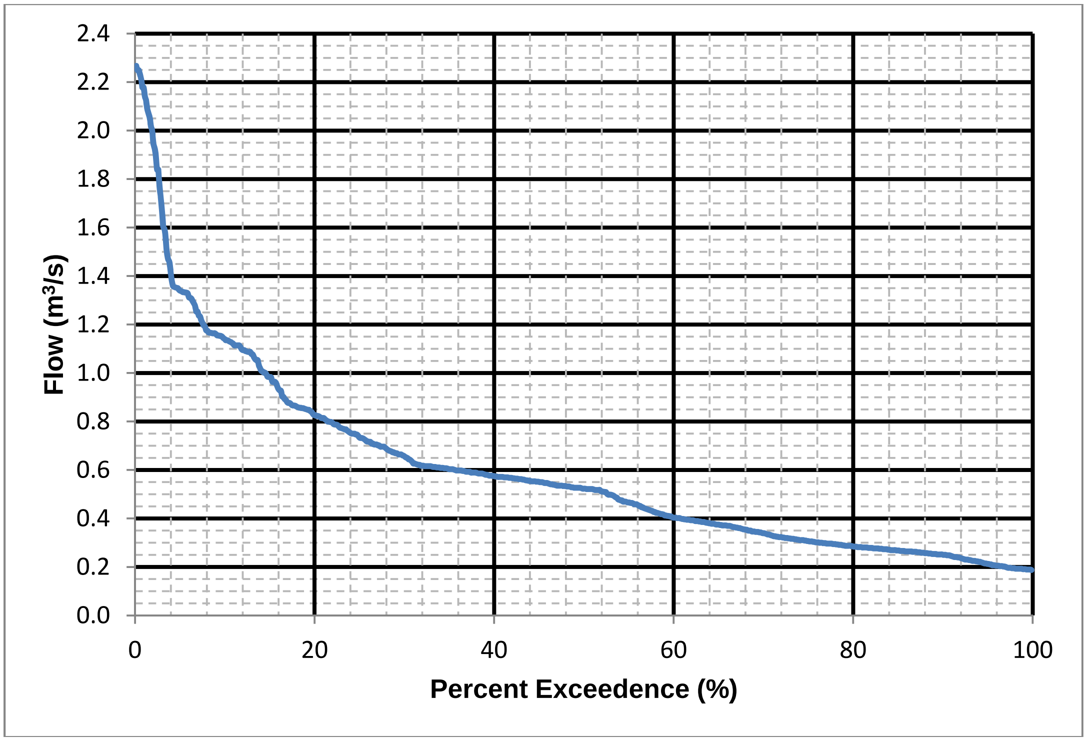


Figure 5.5. FDC for #4 Outflow, Labrador, NL. Prorated flows from Wabush Lake.

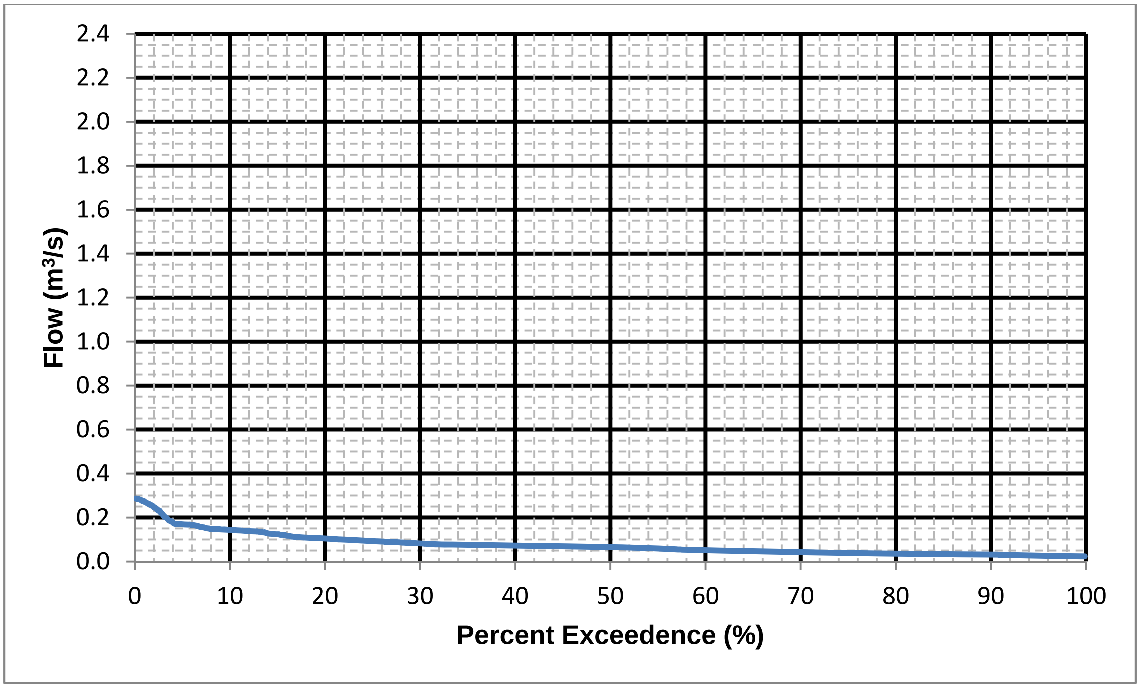


Figure 5.6. FDC for TDA01Outflow, Labrador, NL. Prorated flows from Wabush Lake.

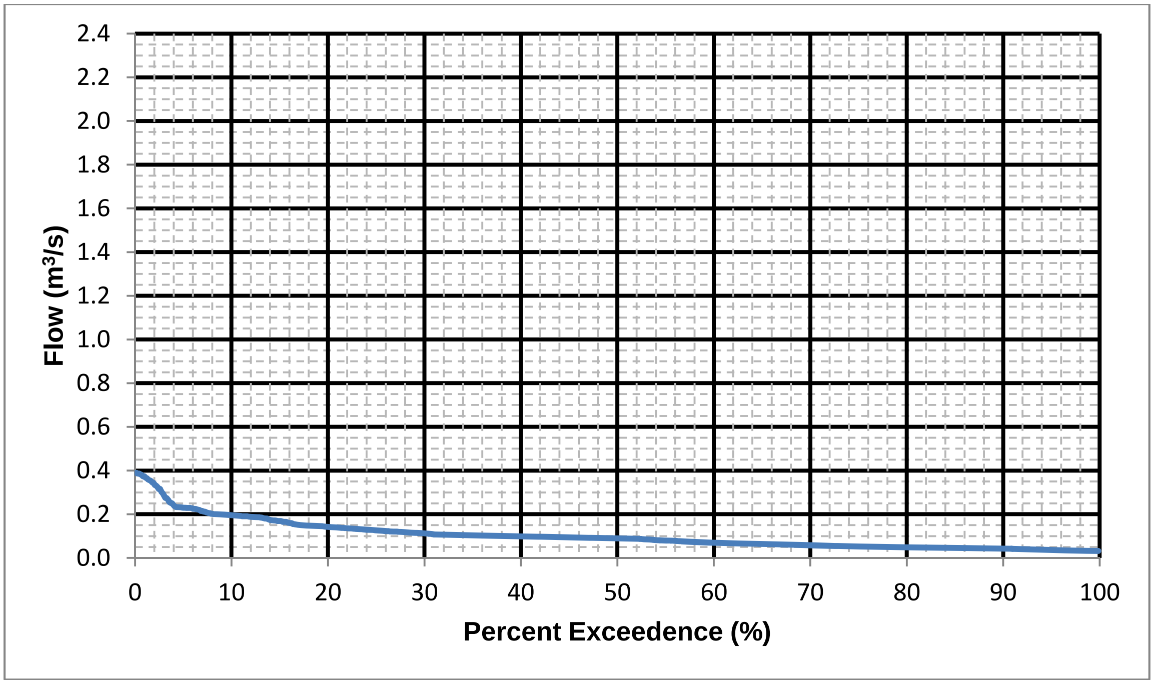


Figure 5.7. FDC for TDA02 Outflow, Labrador, NL. Prorated flows from Wabush Lake.

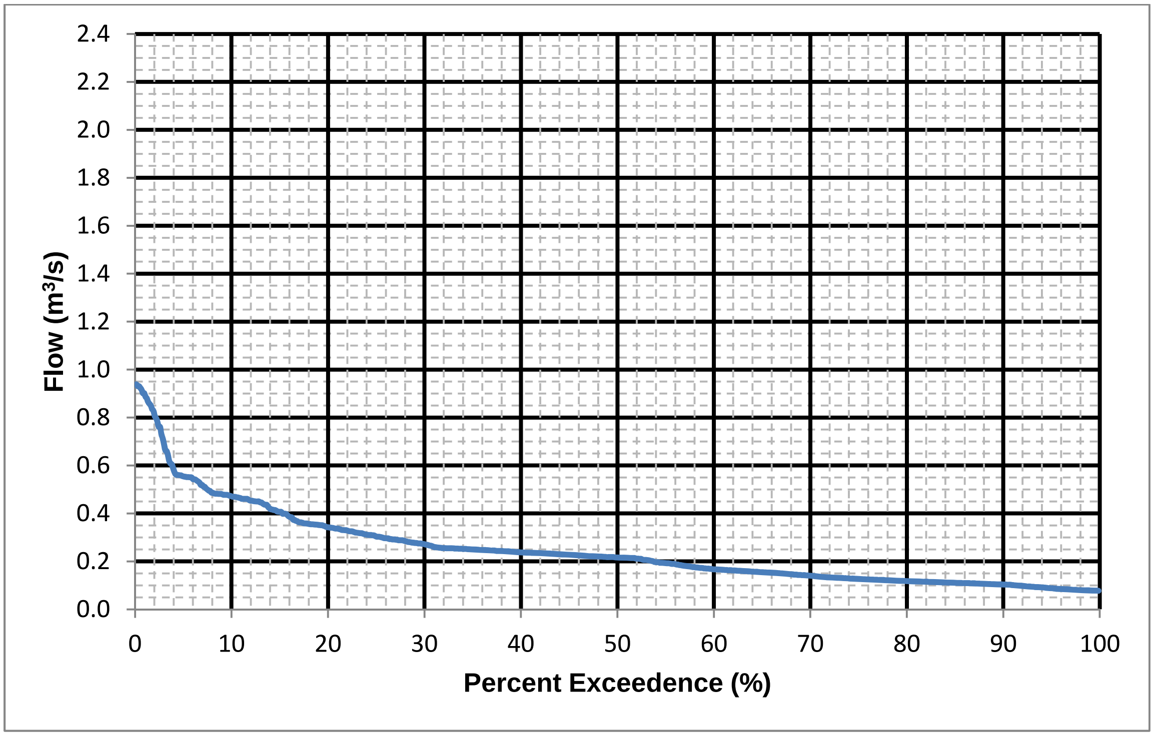


Figure 5.8. FDC for # 5 Outflow, Labrador, NL. Prorated flows from Wabush Lake.

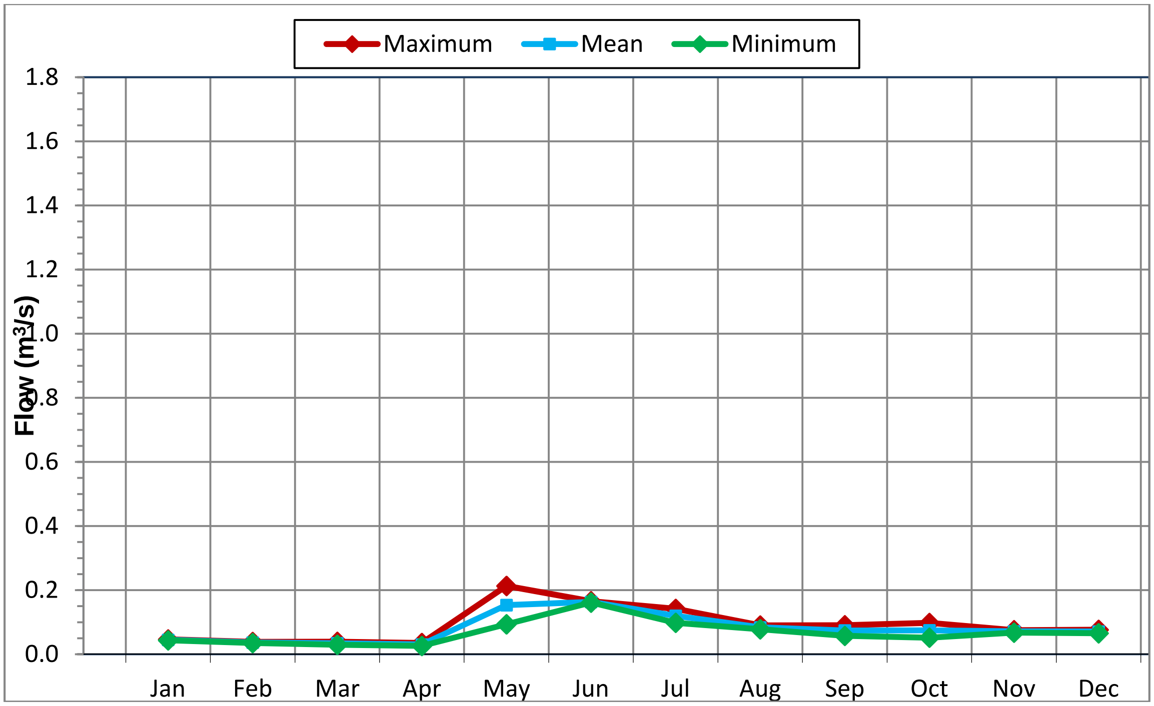


Figure 5.9. #1Outflow Hydrograph.

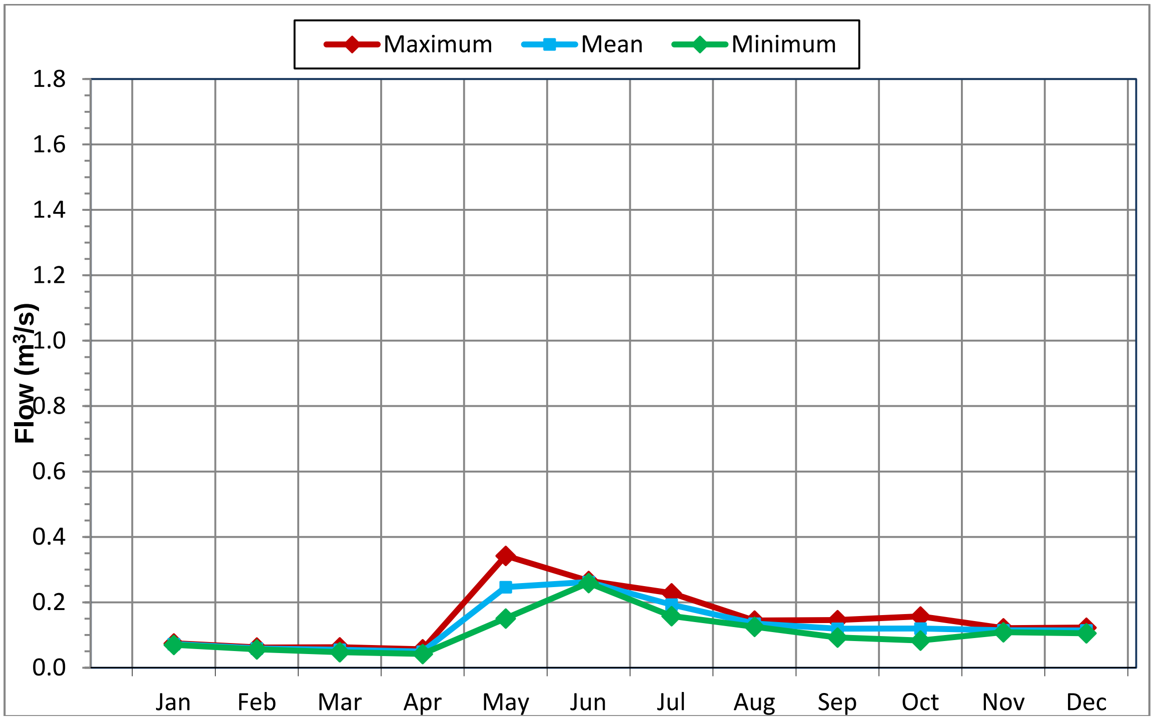


Figure 5.10. #2 Outflow Hydrograph.

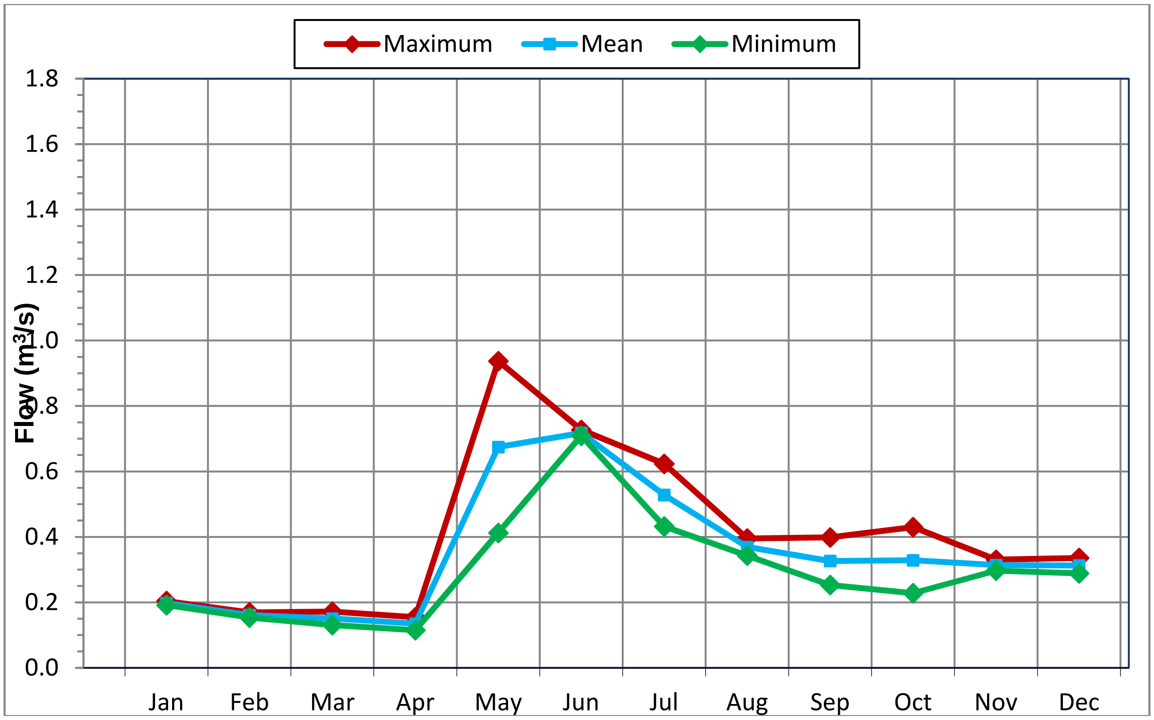


Figure 5.11. #3 Outflow Hydrograph.

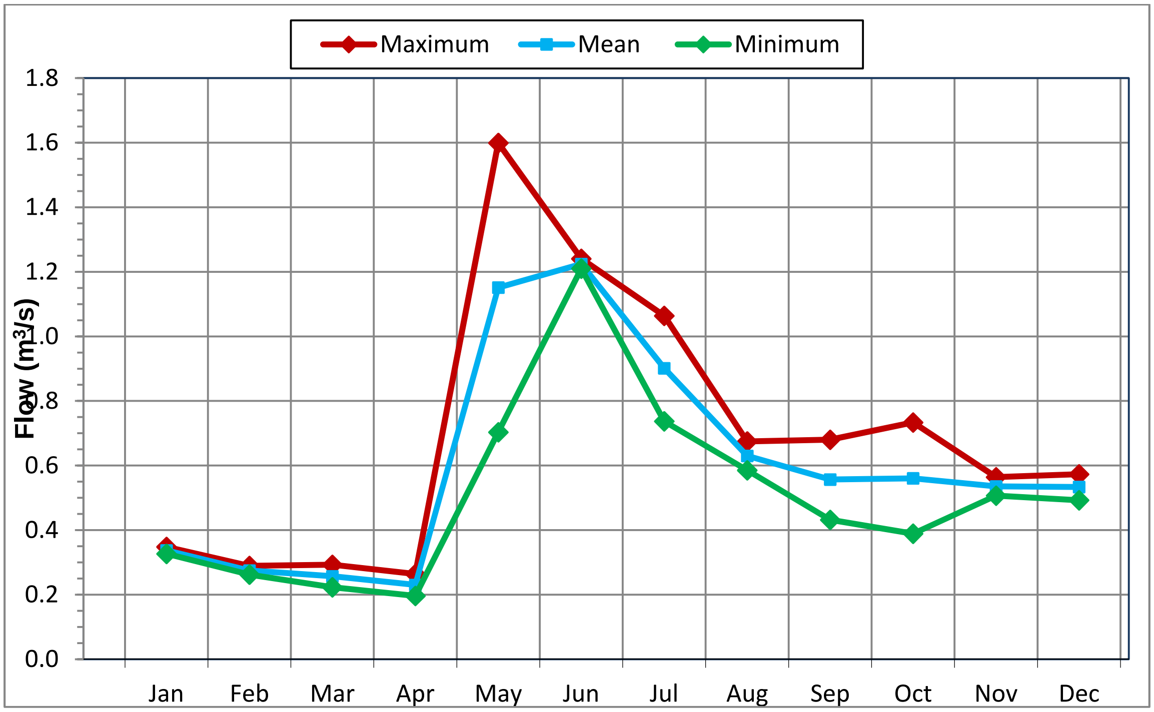


Figure 5.12. #4 Outflow Hydrograph.

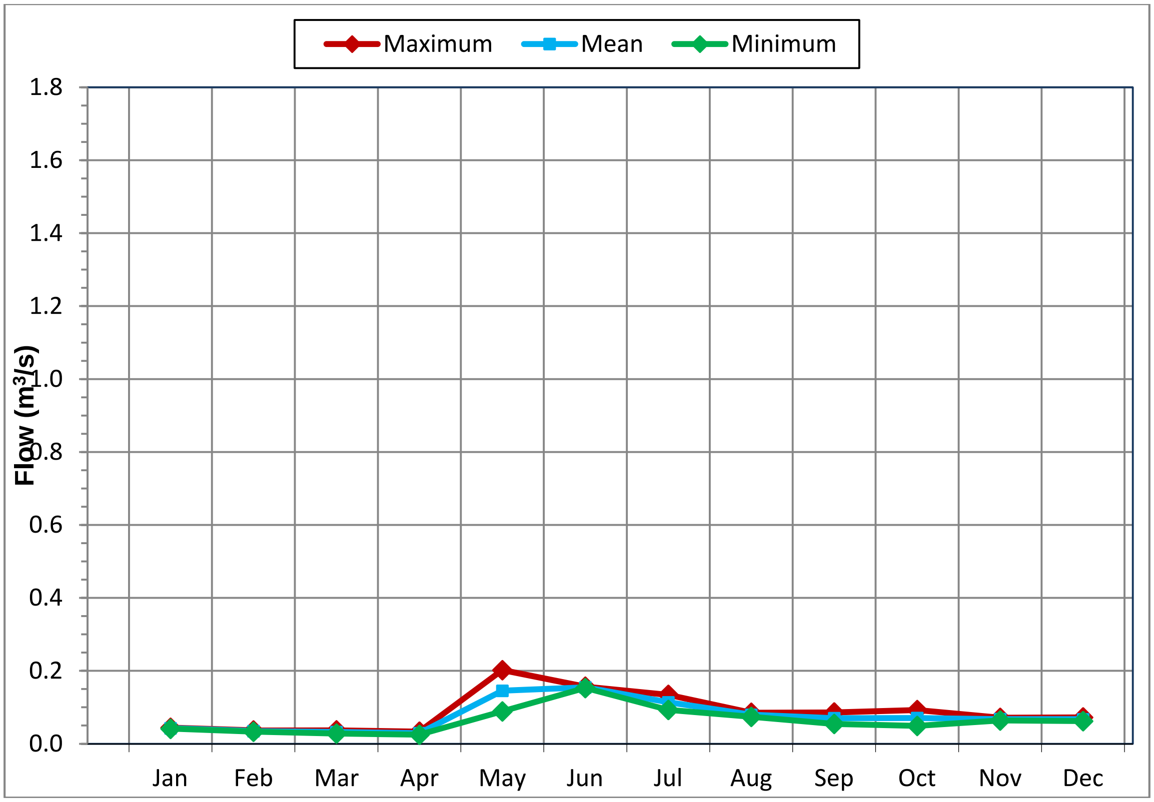


Figure 5.13. TDA01 Outflow Hydrograph.

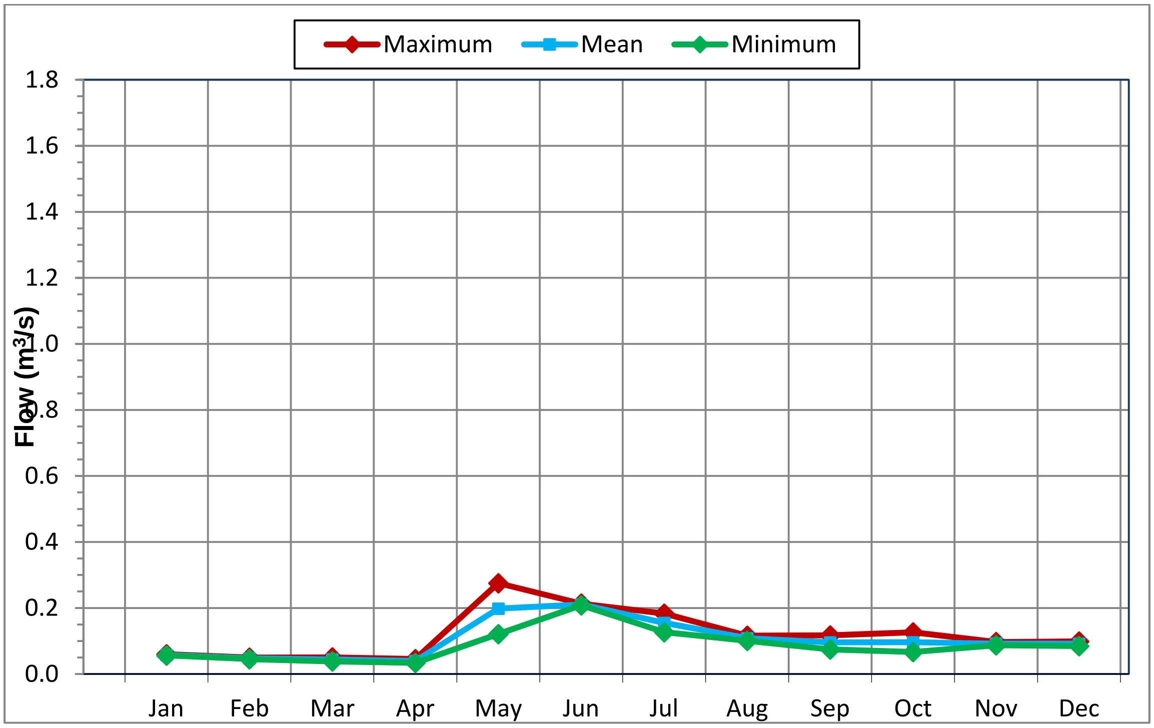


Figure 5.14. TDA02 Outflow Hydrograph.

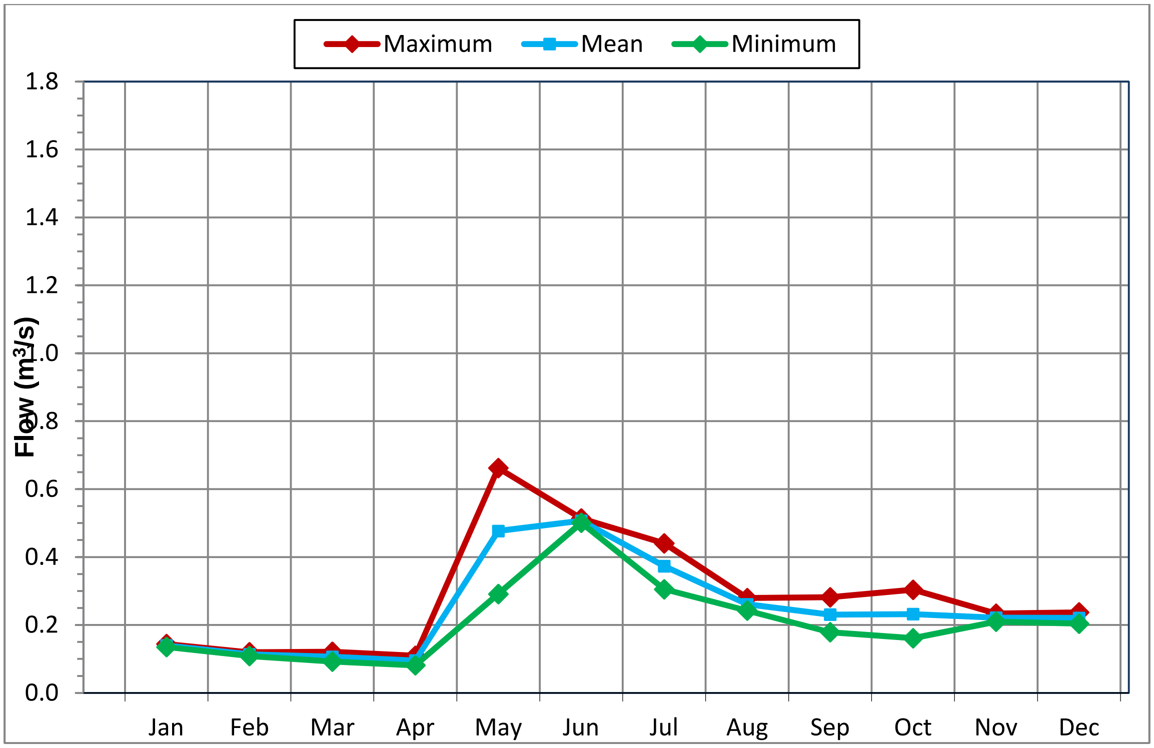


Figure 5.15. #5 Outflow Hydrograph.

5.1.3 Fish Species

The fish species captured within the Study Area are described below. Much of the life history information is provided from DFO documents which summarize existing information on each species within the province (e.g., Bradbury et al. 1999 and Grant and Lee 2004).

5.1.3.1 Burbot (*Lota lota*)

Burbot is the only member of the Gadidae family that resides in freshwater. They occur in continental Eurasia and North America, southward to about 40° N, where they frequent cool waters of large rivers, lower reaches of tributaries, and large lakes. Burbot have been reported within the Churchill River (Beak Consultants Limited 1979; Black et al. 1986; Ryan 1980) and within the Atikonak Lake watershed of southern Labrador (Bradbury et al. 1999).

Burbot spawn in both lakes and rivers. Spawning usually takes place in mid-winter (January to March) under the ice in lakes or rivers (Grant and Lee 2004). Eggs typically hatch from late February to June. Those that spawn in rivers reside in lakes but migrate into rivers to spawn. They tend to utilize areas with little accumulation of silt or detritus, usually at depths of 0.3 to 3.0 m, but have been reported at depths of 18 to 20 m. The semi-buoyant eggs are broadcast into the water column well above the substrate, then become demersal and settle into interstices in the substrate.

Typically by early summer larval burbot attain a length of approximately 30 mm at which point they undergo a habitat shift from pelagic to a mainly benthic existence. Young-of-Year (YOY) are typically found in the littoral regions of lakes over gravel, cobble or rubble bottoms where they have been observed in shallow water (0.5 to 3.0 m) during the day, sheltering under rocks and debris and are mainly active at night. Juveniles have been shown to occupy essentially the same habitat as YOY and feed mainly on benthic invertebrates. In streams, young typically use undercut banks, submerged logs and vegetation for cover in sandy areas if rocky habitat is limited. Throughout its geographical range in Canada, burbot generally reach sexual maturity between 2 to 8 years of age.

Adults tend to congregate over gravel, rock, or cobble substrates and often utilize undercut banks, roots of trees and dense vegetation as cover. They have been observed inhabiting deep sections of rivers and deep eddies in large northern rivers, mostly at depths greater than 1.5 m. Adult burbot tend to move offshore to deeper waters (i.e., hypolimnion zone) and return to littoral regions during the autumnal decline in water temperatures. In shallow water, especially where the bottom is brightly illuminated, burbot may seek overhead cover during the day and are sometimes found amongst aquatic plants. The loft habitat provided by the tops of boulders is also a preferred resting area for adults. Burbot feed on benthic invertebrates initially, moving to an exclusively fish diet once they reach a size greater than 500 mm (AGRA 1999).

5.1.3.2 Lake chub (*Couesius plumbeus*)

Lake chub occur throughout the Churchill River system in Labrador. Specimens have been caught in the river’s main stem and in several of its tributaries including Lower Brook, Elizabeth

River, Cache River, Pinus River and Dominion Lake. They are apparently absent from rivers in southern Labrador and insular Newfoundland. In north-western Canada and Alaska, the lake chub has been found in both clear and turbid waters of lakes and streams, while in Labrador they have been reported to occur mostly in streams and lake-like expansions of rivers. In central Canada, lake chub appear to be common in tributary streams only during spring spawning migrations, returning to the lake once water temperatures exceed 16°C. They have been known to tolerate a wide variety of conditions, ranging from clear to turbid waters and from cool northern lakes to the outlets of hot springs.

Lake chub usually undergo spawning migrations from lakes to tributary streams in May or June, shortly after ice-out. In rivers and small streams, spawning has been observed in shallow water over rocky or gravel bottoms as well as amongst large rocks. In lakes, spawning typically takes place along shallow rocky shores and may be observed over a variety of substrates including silt, leaves, gravel, cobble and rubble. Fry have been observed utilizing submergent vegetation for cover, while YOY and juveniles are generally found over silty, sandy or gravel/cobble substrates.

Adults are commonly found in lakes in the southern portion of their range, with more northern populations preferring large lake-like expanses of rivers. Within the Churchill River system, adults are more prevalent in the upper stretches of rivers with shallow gradients and more pools, lakes and ponds (AGRA 1999). Along shores, lake chub have been observed over a mainly sand bottom interspersed with large boulders. Although it is essentially a shallow-water species, lake chub have been reported to move into deeper and cooler regions of lakes during thermal summer stratification. In Labrador, lake chub were found to feed mainly on benthic invertebrates.

5.1.3.3 Longnose dace (*Rhinichthys cataractae*)

The longnose dace is widely distributed throughout north-central North America, yet in the Canadian Atlantic provinces, it has only been reported along the Churchill, Pinus and Naskaupi river systems in south-western Labrador. Although the longnose dace is typically a stream inhabitant in Labrador, it has also been reported in lakes throughout its geographical range.

Spawning normally occurs in riffles over a gravel substrate in spring, but may also occur in lakes. In lakes, spawning occurs along wave-swept inshore areas over a cobble/rubble/boulder substrate. Nests are not built however; territories are often established with one parent guarding the demersal and adhesive eggs which are deposited in groups among the substrate. Young are pelagic upon hatching and occupy still, shallow waters close to shore with overhanging vegetation for approximately their first four months of life. They feed primarily on algae, diatoms, zooplankton and fish scales. YOY move to deeper areas of rivers predominated by swift currents upon attaining a size of 30 mm (total length).

In streams, adults seem to prefer areas with aquatic vegetation and overhead cover and may exhibit similar preferences in lake habitats. However, field surveys by AGRA (1999) in the Churchill River found they generally inhabited clear, fast flowing, streams with limited cover. Adults have been found in turbulent, inshore regions of lakes over boulder or gravel bottoms throughout the summer, but generally move into deeper, cooler waters as water temperatures increase. Adult longnose dace feed primarily on terrestrial insects that are presumably washed into the surge zone of the lake by wind and turbulent wave action, as well as benthic organisms and fish eggs.

5.1.3.4 Northern pike (*Esox lucius)*

The northern pike has a circumpolar distribution in the northern hemisphere above 40° N latitude. Its native North American range includes Alaska, most of Canada south of the Arctic Circle, the drainages of the Missouri and Ohio Rivers, and the Great Lakes. In Labrador pike occur throughout the Churchill River system. Beak (1980) gill netted specimens on Minipi Lake and Dominion Lake and speculated that the species probably occurs on most lakes and ponds in headwater systems of the Churchill River tributaries.

Northern pike are not adapted to strong currents and occur most frequently in lakes where they inhabit backwaters and pools. In Canada, pike generally inhabit clear, cool to moderately warm, slow, meandering, heavily vegetated rivers or warm, weedy bays of lakes. Pike inhabit areas containing aquatic vegetation throughout all stages of their life cycle and have been found within a wide range of turbid waters, although they are much more common in clear and only slightly turbid water.

Northern pike are early spring spawners, with males and females moving into flooded vegetated areas immediately after spring thawing. They generally spawn during daylight hours in shallow, heavily vegetated floodplains of rivers, marshes, and lakes. Spawning occurs over a variety of substrates, but rubble beds covered with a layer of silt and decaying vegetation are commonly utilized. The preferred spawning substrate is well oxygenated detritus and elaborate root systems of emergent vegetation, but spawning has also been reported to occur over sand and mud substrates. Adhesive eggs are attached to vegetation where they incubate for only twelve to fourteen days. The newly hatched young (6 to 8 mm in length) remain attached to the vegetation and feed on the yolk sac. After 6 to 10 days, the yolk is absorbed and the free swimming young feed heavily on zooplankton and immature aquatic insects.

Within 7 to 10 days the juveniles begin to feed on small fish and by the time pike reach 50 mm in length, fish have become the primary diet. Juveniles are typically found over a mud or silt bottom at depths less than 2.0 m with abundant submerged vegetation. Adult pike require cover to enable their ‘ambush’ style of foraging, usually in the form of aquatic vegetation, tree stumps or fallen logs. However, complete vegetative cover is considered to be sub-optimal for adult pike foraging efficiency, with most adults preferring areas containing open water interspersed with moderately abundant vegetation. Typically, large pike inhabit deeper unvegetated waters more often than smaller ones. Outside of vegetation, the preferred habitat of large pike is a ‘broken bottom’. Both juvenile and adult pike have been shown to avoid habitat predominated by sand.

5.1.3.5 Atlantic salmon *(Salmo salar*)

Atlantic salmon are distributed throughout the northern portion of the Atlantic Ocean from Portugal to Norway in the east, throughout southern Iceland and Greenland, and from Hudson Bay to the Connecticut River in the west. In Canada, the anadromous form is distributed throughout eastern Quebec, the Maritimes and Newfoundland and Labrador. Atlantic salmon are found throughout Newfoundland and southern Labrador and have been reported in coastal rivers as far north as the Fraser River. Throughout Newfoundland and Labrador, Atlantic salmon occur in both anadromous and landlocked populations. Anadromous salmon have been captured at sea up to the northern tip of Labrador.

Landlocked salmon, commonly called ouananiche, are the dominant species in some Newfoundland lakes where they may exist as either normal or dwarf forms. Ouananiche are the predominant form of the species which occupies the Churchill River watershed.

Ouananiche spawning typically occurs between late September and early November, depending on water temperature, with females ascending tributaries to prepare redds (nests). In Newfoundland, lake spawning has been reported to occur over a gravel substrate at depths of 0.5 to 1.3 m. Lake spawning has also been observed along shorelines as well as near areas of moving water, usually above outlet streams and near the mouths of inlet streams. Milt and eggs (1,500 eggs per kg of female) are deposited in the redd and the female then covers the eggs, which range in size from 5 to 7 mm, with a layer of gravel. When spawning is complete, the adults return to the lake. Incubation lasts for about 110 days (depending on temperature), with hatching generally occurring in April. The larvae, or sac fry, remain in the redds until the yolk sac is absorbed, after which they emerge in May or June.

For the next 2 or 3 years, the parr remain in stream habitat, preferring rapid water. They then move to a lacustrine habitat and continue to grow rapidly. Juveniles can utilize the littoral zone throughout the entire ice free season with smaller individuals occupying areas closer to the bottom than larger ones. Ouananiche mature at 2 to 3 years of age and may live for up to 10 years in Newfoundland. Adults are generally pelagic and feed heavily on pelagic and surface organisms during June and July, but as water temperatures increase during the summer, they move to deeper, cooler water and appear to feed more on benthic organisms. Ouananiche will overwinter in deep warmer waters of reservoir systems as well as fast to flowing ice free waters of inlets, outlets and canals.

5.1.3.6 Brook trout (*Salvelinus fontinalis*)

The brook trout is widely distributed throughout Newfoundland and Labrador, at least as far north as the Hebron Fiord, where they have been reported to make extensive use of clear, cool (less than 20^{o}C) lake habitats.

Within Newfoundland and Labrador, lakes and ponds are utilized for spawning, overwintering and feeding. Optimal brook trout riverine habitat has been characterized as clear, cold spring-fed streams with a silt-free rocky substrate in riffle to run areas; an approximate 1 to 1 pool to riffle ratio with areas of slow, deep water, well vegetated stream banks, abundant instream cover, and relatively stable water flow, temperature regimes and stream banks. Brook trout spawning has been observed in a variety of habitats and substrates, including: lake shorelines, sandy and heavily silted substrates and over aggregations of waterlogged sticks, woodchips and debris. This generalist spawning behaviour appears to be less dependent on substrate and more strongly correlated to the presence of groundwater upwelling, particularly for mainland populations. Groundwater upwelling is beneficial in that it protects eggs from freezing and carries dissolved oxygen to and metabolic wastes away from, developing embryos.

Alevins remain in the nest until the yolk sac is absorbed and upon emergence disperse over gravel/cobble substrates in the shallow (less than 2 m) littoral zone, usually residing within 0.5 m of the bottom. YOY and small juveniles (less than 15 cm in length) were associated more with instream cover (mostly rubble substrate) than overhead stream bank cover, and that an area of cover at least 15 percent of the total stream width is required. Aquatic vegetation is an important form of cover for young salmonids. In two Avalon Peninsula streams, YOY and juveniles showed a strong preference for cover (where available), but that the presence of competing species and/or lack of available cover can result in shifts of habitat utilization. In Newfoundland, juvenile brook trout typically move into lakes at 1 to 3 years of age and move to deeper, cooler, waters during the warmer summer months.

In an Avalon Peninsula stream, brook trout biomass had a negative relationship to maximum flood height, indicating that habitats with more stable flows had higher production. Adults are often found in association with cover, which is sometimes considered a factor limiting to production. Cover can be provided by overhanging vegetation, submerged vegetation, undercut banks, instream objects (woody debris, roots, and large boulders), rocky substrates, depth, and water surface turbidity. In two Michigan streams, trout biomass and number of adults were significantly correlated with bank cover. In two Avalon Peninsula streams, as brook trout increase in size they tend to move from shallow stream margins to deeper water (pools) with undercut banks and other forms of cover.

5.1.3.7 Lake trout (*Salvelinus namaycush*)

Lake trout, the largest of the charr, are widely distributed in northern North America. They are found throughout southern Labrador, except for the south-eastern corner, but do not occur in insular Newfoundland. In the south, lake trout prefer cool (less than 10°C), deep lakes, but in the north where temperatures are lower, they may inhabit shallow lakes and large rivers. In Labrador lake trout occur throughout the Churchill River watershed, but are more prevalent in the upper reaches.

Lake trout usually spawn in shallow inshore areas of lakes, rarely in streams. In most areas of Canada, spawning occurs in late summer to early fall, mainly in September or October in Labrador. Lake trout have been reported to spawn over a great variety of depths, ranging from 0.1 to 5 m in shallower lakes, to 5 to 10 m in larger lakes. There are also reports of spawning occurring at depths up to 100 m as well. The spawning substrate is usually composed of large gravel (greater than 2 cm in diameter), cobble and rubble interspersed with boulders and is generally free of sand, mud, detritus and vegetation.

Newly hatched larvae typically undergo early development within the protection of rocky substrate on the spawning grounds. Within a month of emergence, fry begin moving from the spawning area towards their nursery lake. In lake spawning populations, they may remain in shallow areas for several weeks to three months before moving to deeper water when temperatures exceed 15°C. Juveniles and adults generally have similar habitat, generally preferring boulders in shallower waters until temperatures exceed 10°C when they retreat to depth. Diet consists primarily of fish, supplemented by insects and small mammals. Sexual maturity is thought to occur at a relatively old age. When Parsons (1975) sampled the Ossokmanuan Reservoir in western Labrador they found no sexually mature lake trout less than nine years of age.

5.1.3.8 Lake whitefish (*Coregonus clupeaformis*)

Lake whitefish are widely distributed throughout North America from the Atlantic coast, across Canada and the northern United States, to British Columbia, the Yukon Territory, and Alaska. They are distributed throughout southern Labrador. Although they are primarily found in lakes, they are relatively abundant in the main stem of the Churchill River, as well as the adjoining lakes and ponds within its watershed.

Lake whitefish undertake migrations to spawning grounds, ascending rivers or moving into the shallows of lakes when water temperatures cool to 4.5 to 10°C. Optimal growth and development occurs at 0.6°C, with 99 percent mortality at temperatures of 10°C and greater. There is some evidence that lake whitefish return to the same spawning grounds year after year. In Labrador, spawning migrations are reported from early September to mid-October. River spawners generally utilize shallow (0.1 to 1.0 m), riffles or rapids with a gravel/cobble substrate, while lake spawners tend to utilize sandy substrates. Spawning occurs in schools, with eggs being randomly deposited and remaining in the spawning area until hatching in mid May to mid June. More northerly populations tend to produce fewer eggs. In the extreme northern limits of the range, individuals may only spawn once every two or three years. Egg counts can vary greatly depending on a fish's size, with specimens from the Ossokmanuan Reservoir in western Labrador yielding anywhere from 967 to 20,963 eggs per fish.

Upon hatching, whitefish larvae tend to aggregate along steep shorelines, although they have been observed at depths of 0.3 to 1 m near aquatic vegetation. Whitefish growth is relatively rapid, with the young feeding mainly on cladocerans and copepods. By early summer, young leave the shallow inshore waters and enter deeper lake waters. The diet of adult whitefish consist of aquatic insects and larvae, supplemented by other fish and even their own eggs. Outside of spawning, adult whitefish appear to have no preference for substrate type. In Labrador, the Churchill River watershed lake whitefish reach maturity over a range of 3 to 9 years old and, as a species, tend to be long lived, with individuals reaching ages of 28 years.

5.1.3.9 Round whitefish (*Prosopium cylindraceum*)

Round whitefish are widely distributed in lakes and ponds throughout their southern range, rivers in their northern range as well as brackish waters, from northern North America to eastern Asia. Its range encompasses northern New Brunswick, Labrador, and Ungava west through Quebec, Ontario, and north westward from northern Manitoba through the Northwest Territories and northern British Columbia. Round whitefish have been reported in Labrador in the Churchill River system residing in cool ponds, streams and rivers. However, they are considered rare in the Churchill River system.

Round whitefish are fall spawners (October to December). Spawning can take place in the inshore areas of lakes, at river mouths, or occasionally in rivers. In a Yukon Territory stream, spawning occurred over a variety of substrates ranging from mud to gravel and boulders, with a preference for gravel substrates. In contrast to the lake whitefish, spawning is conducted in pairs, not in schools. Normandeau (1969) indicated that females of the species can produce up to 20,000 eggs. The eggs remain in the spawning substrate until hatching occurs the following April.

Upon hatching the young remain on the bottom and disperse from the spawning area within 2 to 3 weeks. In Alaska, young seek cobble or boulders, debris and overhanging vegetation at water depths ranging from 5 to 30 cm (optimal 5 to 15 cm) in relatively calm areas. Gillnet catches of mature specimens in the Churchill River system in Labrador were higher in fast-flowing sections than in steadies or backwaters. These distributions possibly indicate that juveniles prefer slow steadies and backwater habitat until they reach maturity, after which they prefer faster flowing sections of the main channel. Round whitefish tend to move into deeper and faster water as they grow. Optimal water velocity for adults was 0.6 to 0.9 m/s, with them utilizing the following cover types in order of most to least preferred: cobble and boulder, undercut banks, overhanging vegetation, debris/deadfall, submergent and emergent vegetation, rubble and large boulders.

Round whitefish are benthic and their diet consists mainly of benthic invertebrate larvae, insects and molluscs. The species has been noted to live up to 14 years. The growth rates for round whitefish in the Churchill River are at an intermediate level when compared to results from other regions of North America.

5.1.3.10 Mottled sculpin (*Cottus bairdi*)

In eastern Canada, the mottled sculpin is confined to northern areas, occurring throughout the Churchill and Atikonak river systems of Labrador, north through Ungava Bay, Quebec. DFO surveys have identified sculpin from stomach contents of several species of fish (burbot, brook trout, lake whitefish, northern pike, lake trout) taken in the Churchill River main stem.

Mottled sculpin occur in cool, headwaters and, although typically a stream-dwelling species, they also inhabit large lakes. Mottled sculpin are intolerant of high water temperatures and tend to occur in the coldest streams during the summer, usually with water temperatures between 11 and 16°C. Spawning typically takes place in the spring, around April or mid-May, in the littoral zone (less than 1 m) of lakes under rocks and logs. Nesting is peculiar, with females depositing adhesive eggs on the ceilings of rocks, ledges or burrowed nesting sites (usually consists of small gravel) while in an inverted position, with the male subsequently guarding and aerating the eggs.

Substrate preference tends to vary from study to study, possibly illustrating a generalistic or place-dependent, habitat utilization strategy. A study in the Mad River, Ontario, documents the occurrence of YOY on a mud bottom at depths of 5 to 25 cm. Studies in eastern Ontario and Wisconsin suggest that mottled sculpin prefer sandy substrates in both lakes and streams. Mottled sculpin have also been observed foraging at night in open, sandy areas. They may also utilize substrates comprised of a mixture of cobble, rubble and sand. Additional studies found that small sculpin were largely associated with cover, being located under rocks and logs.

5.1.3.11 Slimy sculpin (*Cottus cognatus*)

In eastern Canada, the slimy sculpin occurs in the Churchill and Fraser River systems of Labrador through most of Quebec and Ungava Bay. The species typically inhabits deep oligotrophic lakes, swift rocky-bottomed streams, areas of groundwater upwelling and headwater pools and riffles. In eastern Canada, the slimy sculpin frequents rocky or gravel streams and lake bottoms, and have been captured at depths ranging from 0.5 to 150 m. However, the habitat utilized varies greatly depending upon on substrate and temperature. The slimy sculpin has been shown to have a very small home range and they do not migrate great distances.

Spawning occurs in May, shortly after ice-out over sand and gravel substrate in shallow sections of streams and lakes. The male selects the spawning site, which can be found under rocks, submerged logs, tree roots, or amongst large gravel or other foreign debris and is most common at depths less than 30 cm. In rivers, juveniles and adults are generally found in areas with cobble/rubble bottoms at velocities of less than 0.3 m/s. In shallow lakes (0.5 to 1.5 m) they have been found over gravel and sand bottoms interspersed with rocks and boulders. Generally, as young slimy sculpin grow and mature, they shift from a shallow water habitat and nocturnal feeding to continuous activity in deeper water. Diet mainly consists of benthic organisms.

5.1.3.12 Threespine stickleback (*Gasterosteus aculeatus*)

Threespine stickleback are almost circumpolar in distribution (it is absent from the cold Arctic, but have been observed in northern seas of Siberia and North America) and are widely distributed in the northern hemisphere. It is an euryhaline species and exists as both freshwater resident and anadromous marine-dwelling form in Newfoundland and Labrador. Its presence has been noted in Labrador in the Churchill River system.

Spawning generally occurs in the summer months, but timing can vary from April to September depending on local conditions. Freshwater resident populations spawn in both lakes and rivers, with anadromous populations spawning in brackish or fresh waters. River spawning populations undergo a spring migration from lakes or larger rivers into smaller, slower tributaries and backwaters. The males build nests over sandy/muddy substrates in areas of low flow and are usually found in the vicinity of submergent vegetation. Lake spawning populations utilize two distinct habitat types, either open-water or in association with aquatic vegetation. Anadromous populations spawning in marine or brackish water build nests in rock crevices, eelgrass beds, algal mats and sometimes over sand near vegetative cover. Nesting in the vicinity of aquatic vegetation or rock/boulder cover, whether in rivers, lakes or brackish water, is thought to increase the structural complexity of the habitat and reduce the risk of predation.

Males construct the nest from small twigs, algae or plant debris typically over a sandy or mud bottom. However, nests have been found on a wide variety of substrates including silt, algal tufts and rock. Females deposit adhesive eggs in clusters in the nest. The males subsequently guard and fan the nests, protecting the young for up to 2 weeks after hatching or until they are able to fend for themselves.

Outside the breeding season threespine sticklebacks return to the sea (anadromous) or into deeper waters or large rivers (freshwater resident) in the fall. Threespine stickleback typically inhabit vegetated areas, usually over mud or sand. Threespine sticklebacks have been observed at a variety of depths (less than 1 m up to 17 m) in lakes along the Avalon Peninsula, Newfoundland and have been shown to feed mainly on pelagic zooplankton and benthic organisms. Newfoundland populations normally mature in their second or third year and generally have a life expectancy of 2.5 years or less.

5.1.3.13 Longnose sucker (*Catostomus catostomus*)

The longnose sucker can be found throughout northern North America from Alaska to western Labrador, and from the northern United States to the southern portion of the Northwest Territories. Longnose suckers are primarily bottom dwellers and inhabit lakes, rivers and reservoirs. They have also been reported in brackish waters near the vicinity of river mouths. They are abundant in Labrador in the Churchill River system and can be found in the main stem and also throughout the adjoining lakes and tributaries.

Longnose suckers which inhabit lacustrine habitats migrate into rivers to spawn. Spawning generally occurs in the spring (mid April or May), however spawning has been observed in June in the Labrador region. During spawning, the female moves into the faster riffle or midstream waters of rivers and inlet streams, but may also utilize the outlet streams of lakes, or shallow lake margins. Longnose suckers are broadcast spawners, which repeatedly broadcast their adhesive eggs over a clean substrate comprised of cobble, or rubble in riffle areas where velocities range from 0.3 to 1.0 m/s and depth are between 15 and 60 cm. The young spend 1 to 2 weeks in the spawning area and then move to lentic habitat.

YOY in Alaska were most abundant over silt and sand substrate in shallow (less than 0.2 m) backwaters having velocities less than 0.1 m/s. However, the same study found them to occur over gravel, cobble and rubble substrates at varying densities depending on depth and velocity. Juveniles (23 to 89 mm in length) live in lentic waters and are frequently found in shallow reedy areas (Edwards 1983). Juveniles have a preference for sand/gravel substrate but have also been found over silt, sand, gravel, cobble and rubble. Juveniles have been observed seeking areas with some current, and may enter the lower reaches of streams. Adults were captured in tributaries of Atikonak Lake, south western Labrador, at temperatures ranging from 13.9 to 19.6°C and depths between 17 and 75 cm over a gravel, cobble, or boulder substrate. Adults are well adapted to high current velocities (Walton 1980) and are often found in swift rivers with stony bottoms.

The diet of the longnose sucker consists entirely of invertebrates and algae. Longnose suckers grow at a rate of approximately 15 to 20 mm per year and reach an average size of 305 to 356 mm in length, living for up to 19 years. In the Churchill River, longnose suckers exhibit linear growth at a rate near the lower limits exhibited by the species as a whole. Sexual maturity of the Churchill River system occurs at 6 to 7 years of age.

5.1.3.14 White sucker (*Catostomus commersoni*)

White suckers are restricted to North America, occurring from central Ungava, Labrador, south-western Georgia in the United States and west to Alberta, British Columbia and the Mackenzie River delta. They can be found in Nova Scotia and New Brunswick in the south, through to northern Labrador and northern Quebec, but are not found on the Island of Newfoundland. White suckers occur throughout the Churchill River system.

Spawning, similar to the longnose sucker, takes place in the spring as stream temperatures rise, with females moving from the lakes into streams. Spawning generally takes place in pond/lake inlets and outlets, small creeks, and rivers with relatively swift, shallow waters running over gravel or coarse sand bottoms, but has been reported over boulder substrates as well. Demersal, adhesive, eggs are scattered over a period of 10 to 14 days and adhere to the immediate, or downstream, substrate. Adults that move into tributary streams to spawn, generally return to the lake after spawning is complete. The incubation period required is variable and has been linked with temperature and geographical location.

YOY have been found over a range of substrates, including: sand/gravel substrate in areas with moderate currents, shallow-pool areas having velocities less than 0.3 m/s, depths less than 0.6 m, and along channel margins where boulders, vegetation, woody debris, undercut banks were the primary cover types. YOY school during the first year; either remaining in their natal streams or migrating from them approximately one month after spawning. Juveniles (less than 150 mm in length) were reported in shallow backwaters and riffles with moderate water velocities (approximately 0.50 m/s) and a predominantly sand/rubble substrate. Adults occur mainly over gravel, sand, silt and rubble substrates and tend to be closely associated with riparian (overhanging trees, grass, shrubs, etc.) and instream cover such as submerged logs, roots, macrophytes, undercut banks and large boulders. Adults are known to increasingly seek cover as water velocities increase.

The diet of the white sucker consists mainly of aquatic insect larvae. While growth rates can vary widely, the growth rate for the Churchill River lies near the middle of the range described for the species as a whole. Growth may cease when sexual maturity is reached, which requires five to six years in the Churchill River system, with white suckers able to live up to 17 years.

5.2 Regional Fisheries

There are no commercial fisheries and no reported Aboriginal or subsistence fisheries. Therefore Fisheries is defined as the recreational fishery. Details regarding the results of land use surveys are provided in the Land and Resource Use Baseline Study. Based on interviews with residents of Labrador City/Wabush and Fermont the target fish species angled includes lake trout, brook trout, whitefish, burbot, northern pike, and ouananiche.

Recreational fisheries are pursued throughout the region with activity tending to be centered in accessible streams, ponds and lakes near the towns of Labrador City and Wabush, cabins in the area, and along the highway and rail lines. Specifically the main areas that are fished include Long Lake, Shabogamo Lake, Waldorf River, Mills Lake, Ossokmanuan Reservoir, Panchia Lake, Lobstick Lake, Ashuanipi Lake, unnamed lakes, ponds and rivers south of Wabush. Fermont fishers reported use of Lac Daviault and Lac Carheil.

5.3 Lacustrine Habitat Classification / Quantification

Lacustrine habitat surveys were completed in 2011 and 2012 on select ponds within and near the Project site. Aerial and shoreline photographs of each sampled water body are presented in Appendix B. Figure 3.1 presents an overview location of each waterbody.

5.3.1 Pike Gully

Pike Gully is a small waterbody, within the Pike Lake watershed, located downstream of the Rose Pit. While not directly within the Project footprint, any potential for reduced flows as a result of the project may affect this waterbody (and Pike Lake South). This quantification data will be provided as an addendum to this baseline report.

5.3.2 Pike Lake South

Similar to Pike Gully, Pike Lake South is located downstream of the Rose Pit area. Any large reduction in water flow from the Rose Pit area into Pike Lake may have the potential to affect this waterbody, therefore the habitat and species within this lake were collected and used in quantification. This quantification data will be provided as an addendum to this baseline report.

5.3.3 Pond RP01

Pond RP01 is located directly within the Rose Pit area. Its drainage flows from the Rose Pit area into Pike Lake South.

5.3.3.1 Fish Species Present

For habitat quantification purposes, a total of two fyke nets (two net-nights) and four hours of tended gillnets were deployed/completed throughout the pond in 2011 over a period of one day. Burbot, lake chub, northern pike, and white sucker were captured. The only burbot captured measured 188 mm, lake chub ranged 57-88 mm, both northern pike measured 248 mm, and white suckers ranged from 112-262 mm in length. The length-weight relationship for lake chub and white sucker is presented in Figures 5.16 and 5.17. Burbot and northern pike were not analyzed due to small sample size.

5.3.3.2 Population Estimates

RP01 was selected as a representative waterbody for population estimates within the Project area. These efforts are continuing and results will be presented as an addendum to this baseline report. The habitat has been quantified using DFO guidelines and it is recognized that this pond is within the boundary of the pit and will therefore be removed. As a result, it is included in the habitat to be considered for compensation. The population estimates will allow the revised Fisheries Act Compensation requirements to be determined but their absence does not limit the ability to assess the effects of the project on the fish and fish habitat of the area.

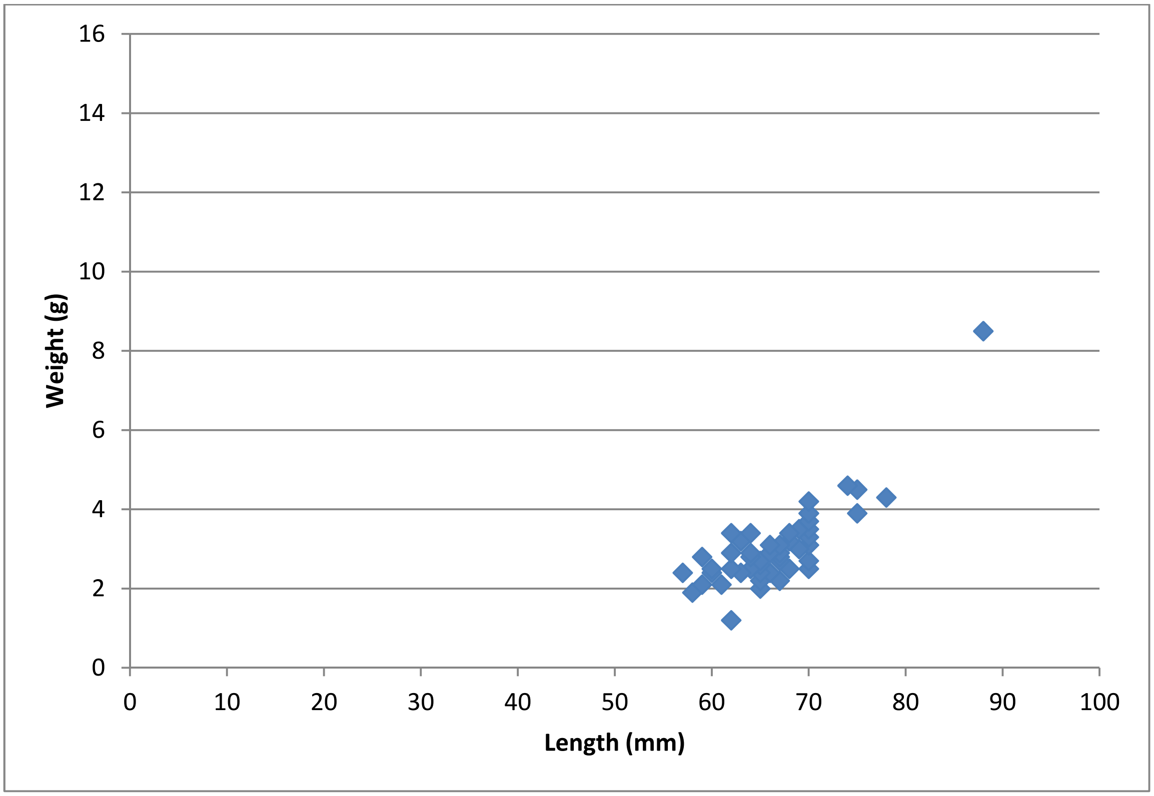


Figure 5.16. Length-weight relationship for lake chub captured in RP01, 2011.

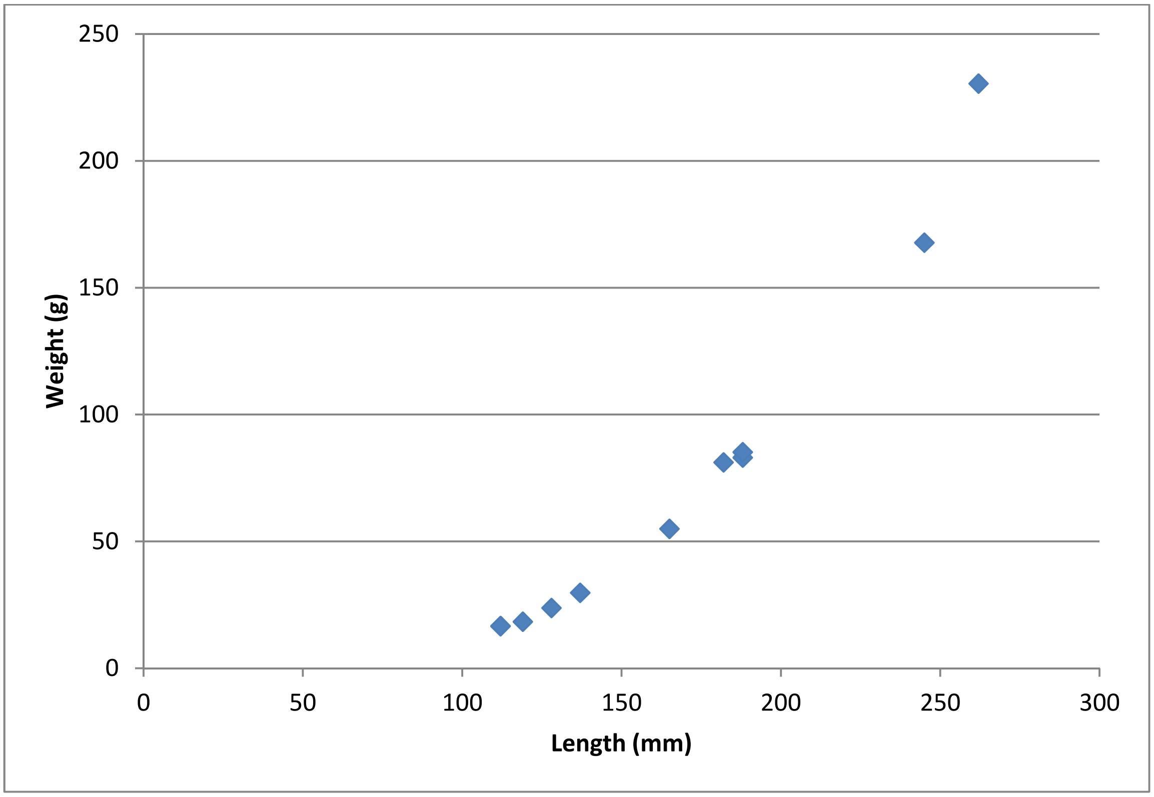


Figure 5.17. Length-weight relationship for white sucker captured in RP01, 2011.

5.3.3.3 Bathymetry and Littoral/Profundal Distribution

Secchi depth and maximum depth were determined to be 1.4m. Pond RP01 comprises 87,388 m^2; of which all 87,388 m^2 is classified as littoral. Figure 5.18 presents the bathymetric contours of Pond RP01 as modeled from the data.

Substrate composition of the littoral zone was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond has small areas comprised of boulder, and rubble but most of the pond is comprised of muck (organics and detritus). The overall composition of each substrate type (m^2) is outlined below:

	Littoral	Profundal
o Bedrock		
o Boulder	1,017	
o Rubble	1,016	
o Cobble		
o Gravel		
o Sand		
o Muck/Detritus (organic)	85,355	
o **Total**	**87,388**	

The pond has vegetation present/visible, primarily in the north and south end of the pond. Estimated coverage of the littoral zone was 11,181 m^2. Table 5.3 presents the calculated area of each habitat type in Pond RP01.

Table 5.3. The calculated total area of each habitat type within Pond RP01.

HABITAT TYPE	**AREA (m^2)**
P - Profundal Zone	**0**
Lc - Littoral Zone - Coarse	1,017
Lm - Littoral Zone - Medium	1,016
Lf - Littoral Zone – Fine, no aquatic vegetation	74,174
Lf – Littoral Zone – Fine, with aquatic vegetation	11,181
Sub Total, Littoral Zone	**87,388**
Total Habitat	**87,388**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

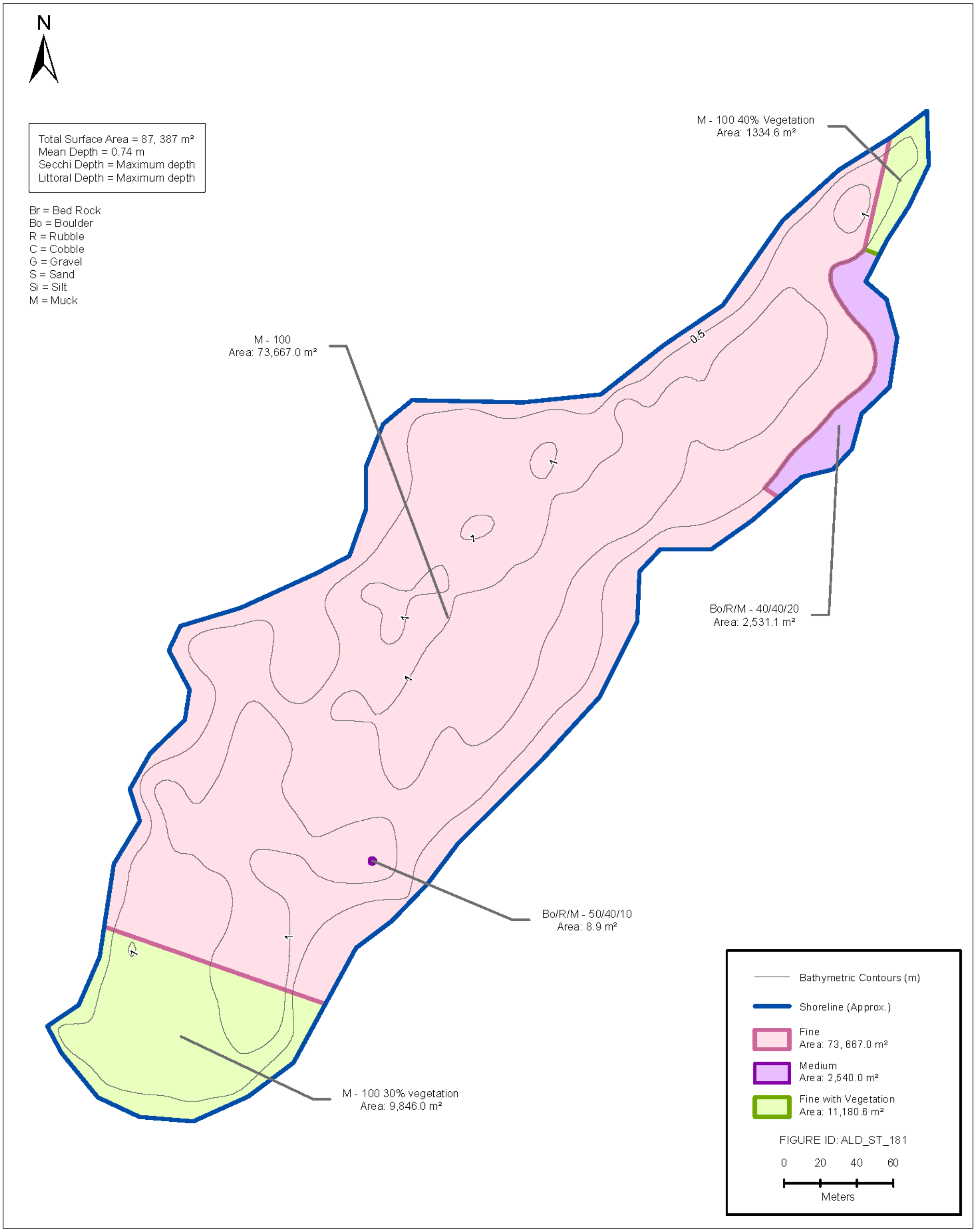


Figure 5.18. Bathymetric contours and substrates of Pond RP01.

5.3.3.4 Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.4 presents an overview of the habitat information used to determine habitat areas. Table 5.5 shows the habitat suitabilities of each habitat type for the species present; burbot, lake chub, northern pike, and white sucker.

5.3.3.5 Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units (HEU) of each habitat type present. Table 5.6 presents the results for burbot, lake chub, northern pike, and white sucker. The HEU values for the recreational species present (burbot and northern pike) are 0.20ha and 8.59ha respectively.

Table 5.4. Summary of Pond RP01 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated

Enter Lake name: RP01

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			**IF Lake Depth is greater than 10 m:**	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	1		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	1		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued...)

IF Lake Depth is greater than 10 m:			
	Mean depth of Non-Littoral Zone:		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m²	**Medium**	m²	**Fine**	m²
	Bedrock:	**0.00**	Rubble:	**1,016.00**	Sand:	**0.00**
	Boulder:	**1,016.89**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**74,174.11**
					Clay:	**0.00**
	SubTotals:	1,017		1,016		74,174

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m²	**Medium**	m²	**Fine**	m²
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**11,180.60**
					Clay:	**0.00**
	SubTotals:	0		0		11,181

Non-Littoral Zone

Substrate:	**Coarse**	m²	**Medium**	m²	**Fine**	m²
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**0.00**
					Clay:	**0.00**
	SubTotals:	0		0		0

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m²)**
Littoral Coarse/No vegetation	1,017
Littoral Medium/No vegetation	1,016
Littoral Fine/No vegetation	74,174
subtotal Littoral/No vegetation	**76,207**
Littoral Coarse/Vegetation	0
Littoral Medium/Vegetation	0
Littoral Fine/Vegetation	11,181
Subtotal Littoral/Vegetation	**11,181**
Subtotal Littoral	**87,388**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	0
Subtotal nonlittoral	**0**
Total Available Habitat	**87,388**

Table 5.5. Habitat suitabilities for all species, Pond RP01.

Part 1

Table 1: Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake

			Littoral Zone						Non-Littoral Zone		
	Species	Life Stage	Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic
1	Burbot	Spawning	0.00	0.67	0.00	0.00	0.67	0.00	NA	NA	0.00
		YOY	1.00	1.00	0.00	0.89	0.89	0.00	NA	NA	0.00
		Juvenile	1.00	1.00	0.00	0.89	0.89	0.00	NA	NA	0.00
		Adult	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
2	Lake Chub	Spawning	0.00	1.00	0.84	0.00	1.00	0.84	NA	NA	0.00
		YOY	0.00	1.00	0.84	0.00	1.00	0.84	NA	NA	0.00
		Juvenile	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
		Adult	1.00	0.00	0.00	1.00	0.00	0.00	NA	NA	0.00
3	Northern Pike	Spawning	0.00	0.50	0.84	0.00	0.67	0.89	NA	NA	0.00
		YOY	0.00	0.00	1.00	0.00	0.00	1.00	NA	NA	0.00
		Juvenile	0.00	0.00	1.00	0.00	0.00	1.00	NA	NA	0.00
		Adult	0.00	0.00	1.00	0.00	0.00	0.89	NA	NA	0.00
4	Longnose sucker	Spawning	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
		YOY	0.50	0.50	0.00	0.50	0.50	0.00	NA	NA	0.00
		Juvenile	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
		Adult	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00

Table 5.6. Habitat equivalent units for all species, Pond RP01.

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

		Littoral Zone						Non-Littoral Zone			
	Species	Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic	Total Available Habitat
☐ 1	Burbot	1017	1016	0	0	0	0	0	0	0	2032.9
☐ 2	Lake Chub	1017	1016	62306	0	0	9392	0	0	0	73730.9
☐ 3	Northern Pike	0	508	74174	0	0	11181	0	0	0	85863.0
☐ 4	Longnose sucker	508	508	0	0	0	0	0	0	0	1016.4

5.3.4 Pond RP02

Pond RP02 is just upstream of Pond RP01 but is outside the Rose Pit area. The ponds upstream of the Rose Pit (RP02, RP03, RP04 and RP05) all flow into Pond RP01.

5.3.4.1 Fish Species Present

A total of two fyke nets (two net-nights) and four hours of tended gillnets were deployed/completed throughout the pond in 2011 over a period of one day. Lake chub, northern pike, and slimy sculpin were captured. The lake chub ranged 63-90 mm, northern pike ranged from 181-561 mm, and slimy sculpin ranged from 46-58 mm in length. The length-weight relationship for fish captured in RP02 was not analyzed due to small sample size.

5.3.4.2 Bathymetry and Littoral/Profundal Distribution

Secchi depth was determined to be 2.5 m. Pond RP02 comprises 106,825 m^2; of which 65,794 m^2 is littoral and 41,032 m^2 is classified as profundal. Figure 5.19 presents the bathymetric contours of Pond RP02 as modeled from the data.

Substrate composition within the littoral and profundal zones was used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond has small areas comprised of sand, boulder, rubble, and cobble but most of the pond is comprised of muck (organics and detritus). The overall composition of each substrate type (m^2) is outlined below:

	Littoral	**Profundal**
o Bedrock		
o Boulder	5,860	
o Rubble	3,107	
o Cobble	2,719	
o Gravel		
o Sand	9,534	
o Muck/Detritus (organic)	44,574	41,032
o **Total**	**65,794**	**41,032**

The pond has vegetation present/visible, in small areas primarily in the north and south end of the pond. Estimated coverage of the littoral zone was 1,935 m^2 Table 5.7 presents the calculated area of each habitat type in Pond RP02.

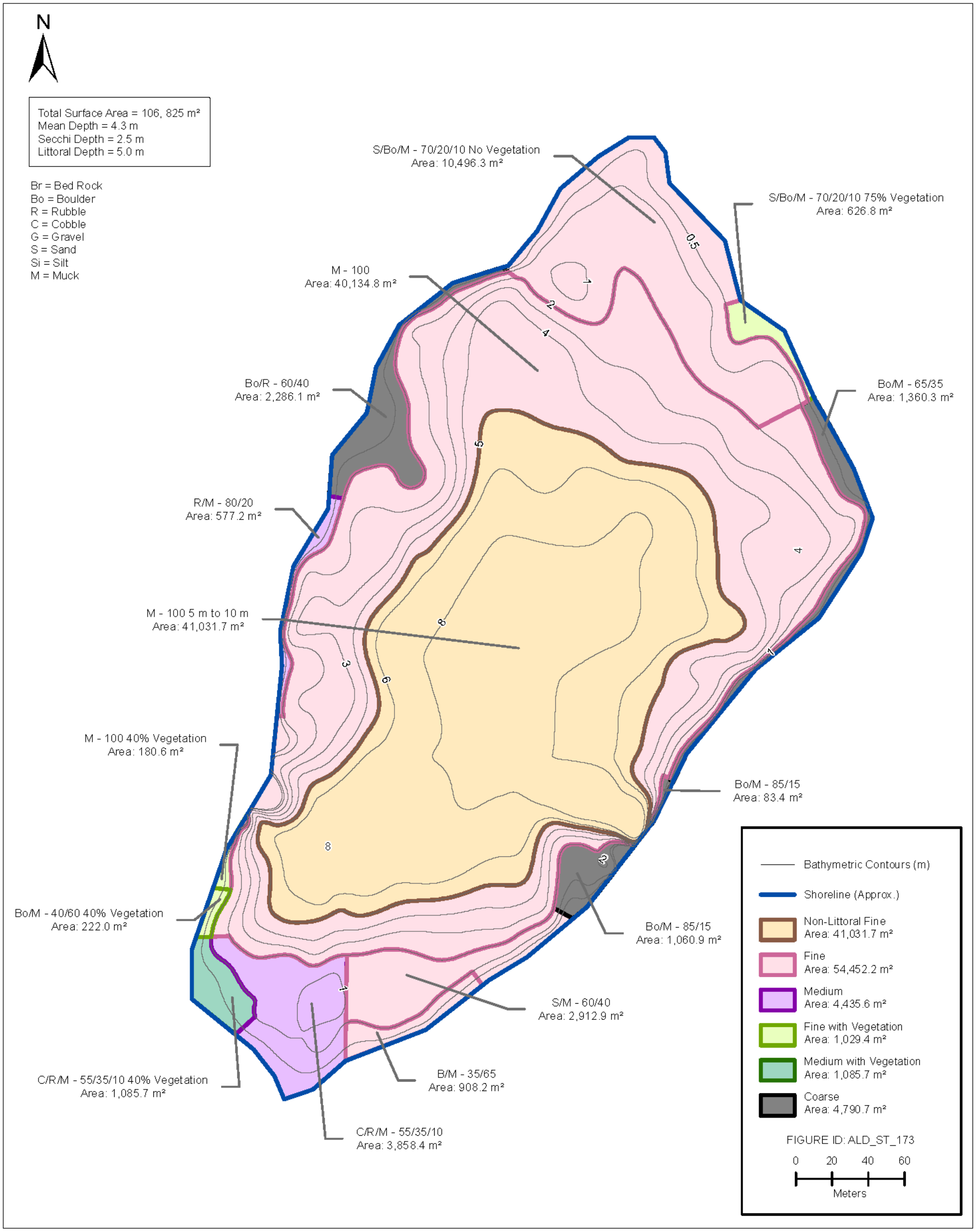


Figure 5.19. Bathymetric Contours and substrate of Pond RP02.

Table 5.7. The calculated total area of each habitat type within Pond RP02**.**

HABITAT TYPE	AREA (m^2)
P - Profundal Zone	**41,032**
Lc - Littoral Zone – Coarse, no aquatic vegetation	5,646
Lc - Littoral Zone – Coarse, with aquatic vegetation	214
Lm - Littoral Zone – Medium, no aquatic vegetation	4,849
Lm - Littoral Zone – Medium, with aquatic vegetation	977
Lf - Littoral Zone – Fine, no aquatic vegetation	53,365
Lf – Littoral Zone – Fine, with aquatic vegetation	743
Sub Total, Littoral Zone	**65,794**
Total Habitat	**106,825**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

5.3.4.3 Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.8 presents an overview of the habitat information used to determine habitat areas. Table 5.9 shows the habitat suitabilities of each habitat type for the species present; lake chub, northern pike, and slimy sculpin.

5.3.4.4 Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units (HEU) of each habitat type present. Table 5.10 presents the results for lake chub, northern pike, and slimy sculpin. The HEU value for the recreational species present (northern pike) is 7.87ha.

Table 5.8. Summary of Pond RP02 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated

Enter Lake name: RP02

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			**IF Lake Depth is greater than 10 m:**	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	5		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	4		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued…)

IF Lake Depth is greater than 10 m:	**Mean depth of Non-Littoral Zone:**		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**2,726.64**	Sand:	**9,095.15**
	Boulder:	**5,645.64**	Cobble:	**2,122.12**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**44,269.55**
					Clay:	**0.00**
	SubTotals:	5,646		4,849		53,365

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**380.00**	Sand:	**438.76**
	Boulder:	**214.16**	Cobble:	**597.14**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**304.45**
					Clay:	**0.00**
	SubTotals:	214		977		743

Non-Littoral Zone

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**41,031.70**
					Clay:	**0.00**
	SubTotals:	0		0		41,032

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m^2)**
Littoral Coarse/No vegetation	5,646
Littoral Medium/No vegetation	4,849
Littoral Fine/No vegetation	53,365
subtotal Littoral/No vegetation	**63,859**
Littoral Coarse/Vegetation	214
Littoral Medium/Vegetation	977
Littoral Fine/Vegetation	743
Subtotal Littoral/Vegetation	**1,935**
Subtotal Littoral	**65,794**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	41,032
Subtotal nonlittoral	**41,032**
Total Available Habitat	**106,825**

Table 5.9. Habitat suitabilities for all species, Pond RP02.

STEP 4 **Lake name:** RP02

Part 1

Tal Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake

			Littoral Zone						**Non-Littoral Zone**		
	Species	**Life Stage**	**Coarse/No Vegetation**	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**
1	Lake Chub	Spawning	0.00	0.67	0.56	0.00	0.67	0.56	NA	NA	0.00
		YOY	0.00	0.67	0.56	0.00	0.67	0.56	NA	NA	0.00
		Juvenile	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
		Adult	1.00	0.00	0.42	1.00	0.00	0.42	NA	NA	0.00
2	Northern Pike	Spawning	0.00	0.22	0.61	0.00	0.31	0.74	NA	NA	0.13
		YOY	0.00	0.00	0.72	0.00	0.00	0.82	NA	NA	0.00
		Juvenile	0.00	0.00	0.45	0.00	0.00	0.46	NA	NA	0.00
		Adult	0.00	0.00	0.50	0.00	0.00	0.45	NA	NA	0.92
3	Slimy Sculpin	Spawning	0.67	0.67	0.33	0.67	0.67	0.33	NA	NA	0.00
		YOY	1.00	1.00	0.50	1.00	1.00	0.50	NA	NA	1.50
		Juvenile	0.00	1.00	0.00	0.00	1.00	0.00	NA	NA	0.00
		Adult	0.00	1.00	0.00	0.00	1.00	0.00	NA	NA	0.00

Table 5.10. Habitat equivalent units for all species, Pond RP02.

STEP 5 **Lake name:** RP02

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

	Species	**Littoral Zone**						**Non-Littoral Zone**			
		Coarse/No Vegetation	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**	**Total Available Habitat**
☐ 1	Lake Chub	5646	3249	29884	214	655	416	0	0	0	40063.1
☐ 2	Northern Pike	0	1115	38956	0	313	609	0	0	37749	78741.9
☑ 3	Slimy Sculpin	5646	4849	26682	214	977	372	0	0	61548	100287.7

5.3.5 Pond RP03

As stated above, Pond RP03 is upstream of RP01 (and RP02) and flows north through RP02 to RP01 and into Pike Lake South. The pond is located at the headwater of the drainage.

5.3.5.1 Fish Species Present

A total of two fyke nets (two net-nights) and four hours of tended gillnets were deployed/completed throughout the pond in 2011 over a period of one day. Northern pike was the only species captured whose size ranged from 460-640mm. The length-weight relationship for northern pike in RP03 was not compared due to small sample size.

5.3.5.2 Bathymetry and Littoral/Profundal Distribution

Secchi depth and maximum depth were determined to be 2.1 m. Pond RP03 comprises 117,146 m^2; of which all is classified as littoral habitat. Figure 5.20 presents the bathymetric contours of Pond RP03 as modeled from the data.

Substrate composition of the littoral zone was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond has small areas comprised of sand, boulder, and rubble, but most of the pond is comprised of muck (organics and detritus). The overall composition of each substrate type (m^2) is outlined below:

	Littoral	**Profundal**
Bedrock		
Boulder	11,327	
Rubble	1,210	
Cobble		
Gravel		
Sand	831	
Muck/Detritus (organic)	103,778	
Total	**117,146**	

The pond has no vegetation present/visible with no coverage of the littoral zone. Table 5.11 presents the calculated area of each habitat type in Pond RP03

5.3.5.3 Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.12 presents an overview of the habitat information used to determine habitat areas. Table 5.13 shows the habitat suitabilities of each habitat type for the species present; northern pike.

5.3.5.4 Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units of each habitat type present. Table 5.14 presents the results for the only species present; northern pike (0.94ha).

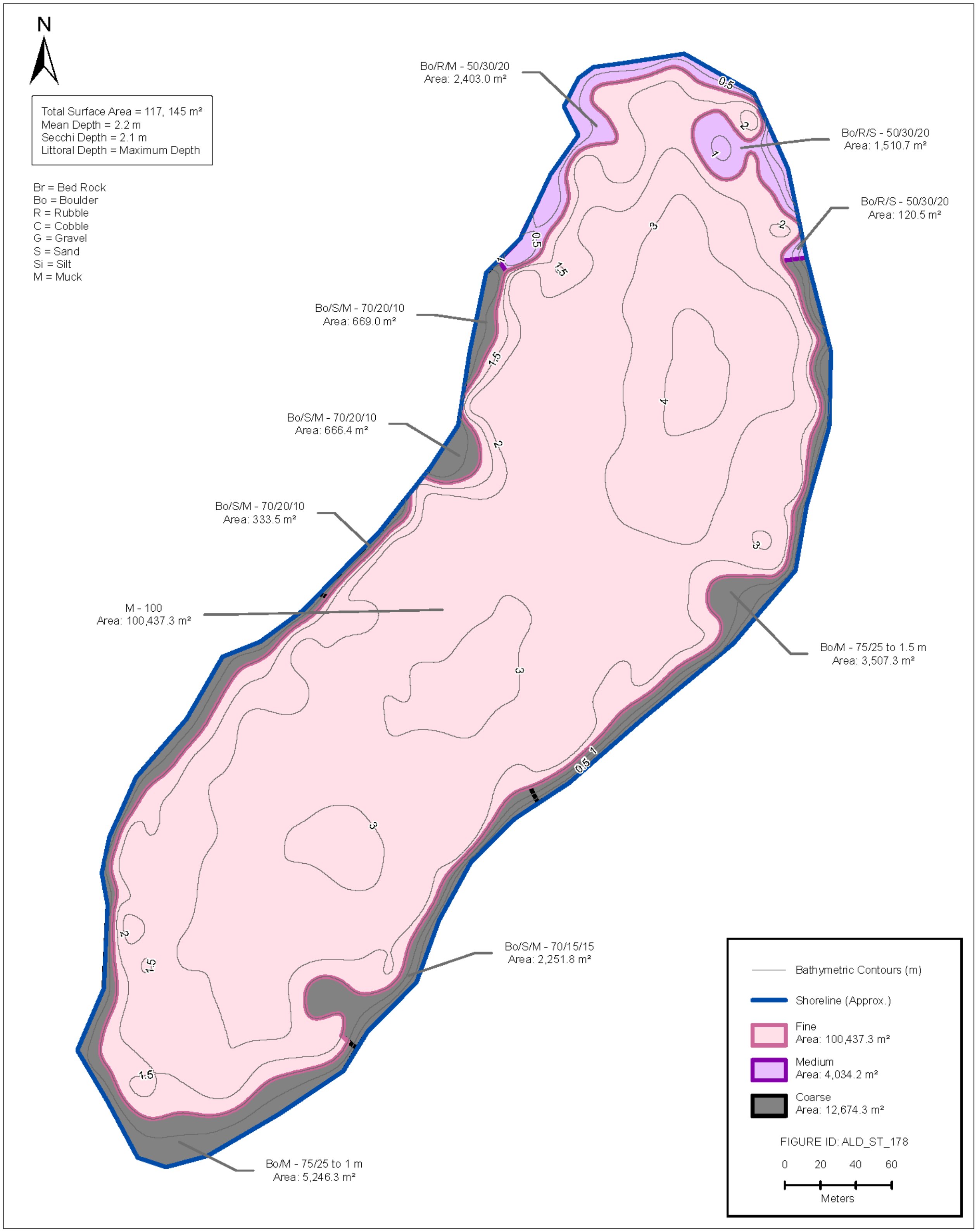


Figure 5.20. Bathymetric Contours and substrate of Pond RP03

Table 5.11. The calculated total area of each habitat type within Pond RP03.

HABITAT TYPE	**AREA (m^2)**
P - Profundal Zone	**0**
Lc - Littoral Zone – Coarse, no aquatic vegetation	11,327
Lm - Littoral Zone – Medium, no aquatic vegetation	1,210
Lf - Littoral Zone – Fine, no aquatic vegetation	104,609
Sub Total, Littoral Zone	**117,146**
Total Habitat	**117,146**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

Table 5.12. Summary of Pond RP03 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated

Enter Lake name: RP03

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			IF Lake Depth is greater than 10 m:	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	5		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	2		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued…)

IF Lake Depth is greater than 10 m:			
	Mean depth of Non-Littoral Zone:		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**1,210.26**	Sand:	**831.00**
	Boulder:	**11,326.79**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**103,778.10**
					Clay:	**0.00**
	SubTotals:	11,327		1,210		104,609

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**0.00**
					Clay:	**0.00**
	SubTotals:	0		0		0

Non-Littoral Zone

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**0.00**
					Clay:	**0.00**
	SubTotals:	0		0		0

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m^2)**
Littoral Coarse/No vegetation	11,327
Littoral Medium/No vegetation	1,210
Littoral Fine/No vegetation	104,609
subtotal Littoral/No vegetation	**117,146**
Littoral Coarse/Vegetation	0
Littoral Medium/Vegetation	0
Littoral Fine/Vegetation	0
Subtotal Littoral/Vegetation	**0**
Subtotal Littoral	**117,146**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	0
Subtotal nonlittoral	**0**
Total Available Habitat	**117,146**

Table 5.13. Habitat suitabilities for all species, Pond RP03.

STEP 4 **Lake name:** RP03

Part 1

Tal Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake

			Littoral Zone						**Non-Littoral Zone**		
	Species	**Life Stage**	**Coarse/No Vegetation**	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**
1	Northern Pike	Spawning	0.00	0.67	0.78	NA	NA	NA	NA	NA	0.00
		YOY	0.00	0.00	0.89	NA	NA	NA	NA	NA	0.00
		Juvenile	0.00	0.00	0.67	NA	NA	NA	NA	NA	0.00
		Adult	0.00	0.00	0.67	NA	NA	NA	NA	NA	0.00

Table 5.14. Habitat equivalent units for all species, Pond RP03.

STEP 5 **Lake name:** RP03

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

		Littoral Zone						**Non-Littoral Zone**			
	Species	**Coarse/No Vegetation**	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**	**Total Available Habitat**
☑ 1	Northern Pike	0	811	93102	0	0	0	0	0	0	93912.9

5.3.6 Pond RP04

Pond RP04 is a small pond south of the Rose Pit which flows from the east into Pond RP02.

5.3.6.1 Fish Species Present

A total of two fyke nets (two net-nights) and four hours of tended gillnets were deployed/completed throughout the pond in 2011 over a period of one day. Burbot, brook trout, lake chub, pearl dace, slimy sculpin, and white sucker were captured. The burbot ranged from 151-252 mm, brook trout ranged from 182-220 mm, lake chub ranged from 35-120 mm, pearl dace ranged from 45-120 mm, the lone slimy sculpin was 36 mm, and the white suckers ranged from 44-425 mm. The length-weight relationships for burbot, lake chub, pearl dace, and white sucker are presented in Figures 5.21 to 5.24. Brook trout and slimy sculpin were not analysed due to small sample size.

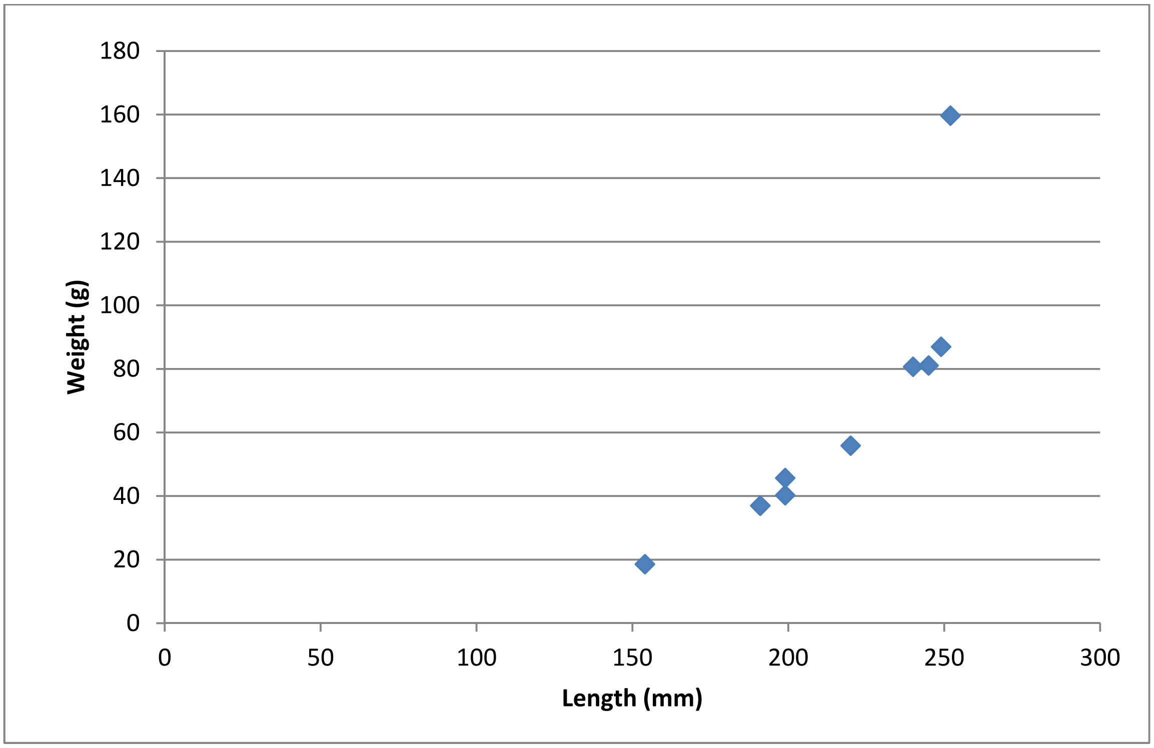


Figure 5.21. Length-weight relationship for burbot captured in RP04, 2011.

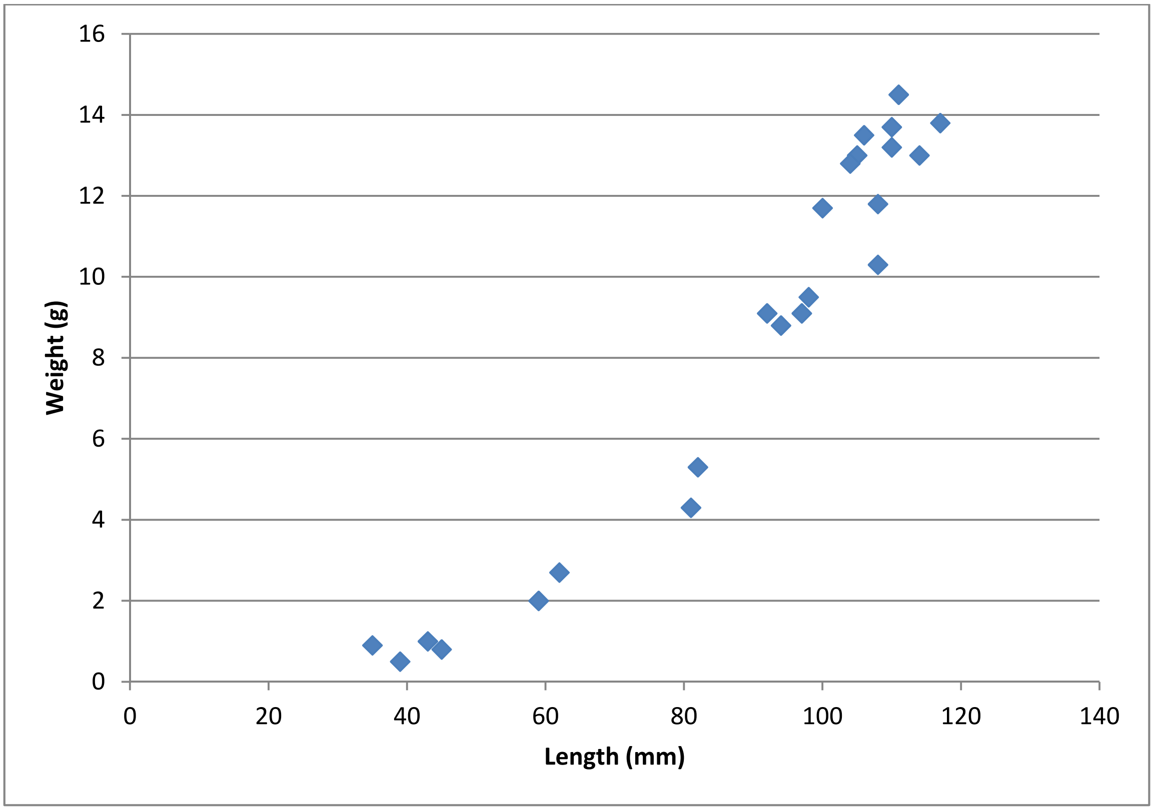


Figure 5.22. Length-weight relationship for lake chub captured in RP04, 2011.

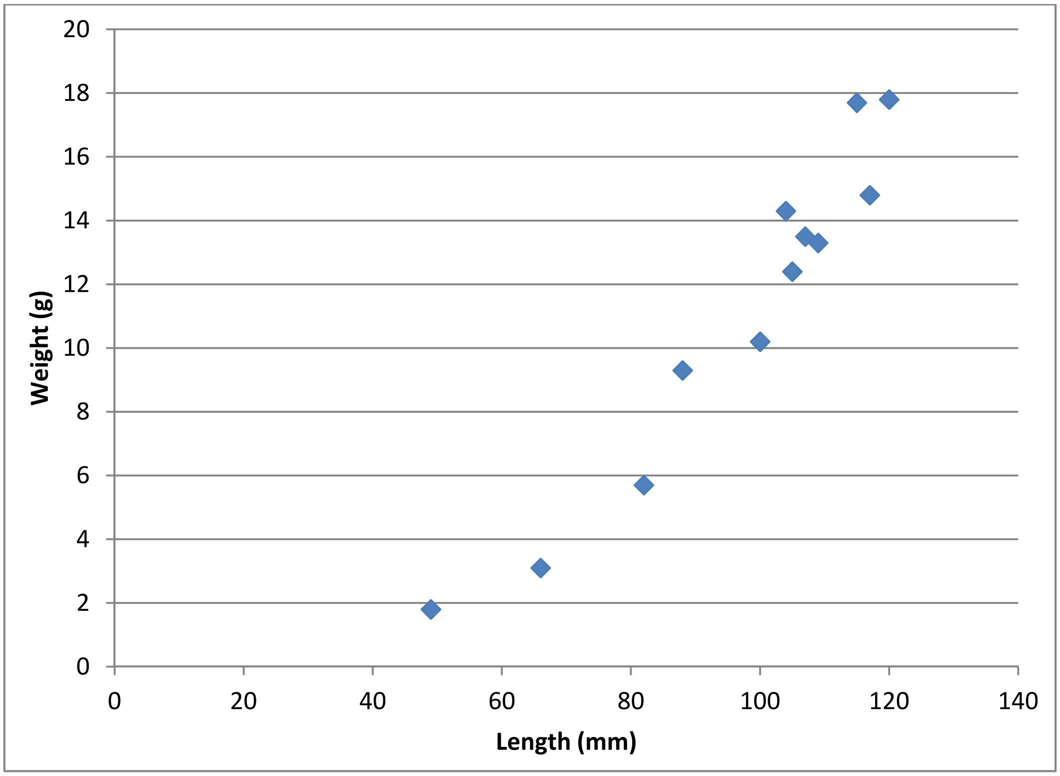


Figure 5.23. Length-weight relationship for pearl dace captured in RP04, 2011.

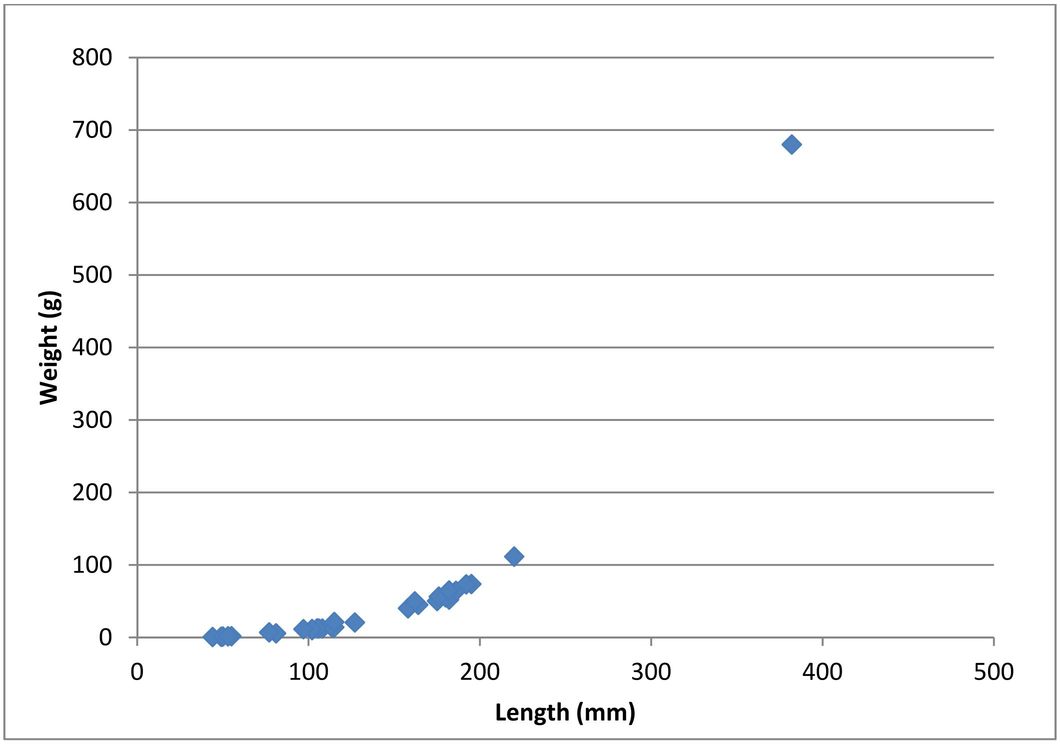


Figure 5.24. Length-weight relationship for white sucker captured in RP04, 2011.

5.3.6.2 Bathymetry and Littoral/Profundal Distribution

Secchi depth was determined to be 4.8 m while the maximum depth was 9 m. Pond RP04 comprises 92,221 m^2; of which 50,235 m^2 is classified as littoral and 41,968 m^2 is classified as profundal habitat. Figure 5.25 presents the bathymetric contours of Pond RP04 as modeled from the data.

Substrate composition of the littoral zone was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond has large areas comprised of sand and muck (organics and detritus) with smaller areas of boulder and rubble. The overall composition of each substrate type (m^2) is outlined below:

	Littoral	**Profundal**
Bedrock		
Boulder	6,372	
Rubble	4,547	
Cobble		
Gravel		
Sand	27,913	22,692
Muck/Detritus (organic)	11,402	19,293
Total	**50,235**	**41,986**

The pond has vegetation present/visible on the western end of the pond with 9,278 m^2 coverage of the littoral zone. Table 5.15 presents the calculated area of each habitat type in Pond RP04.

5.3.6.3 Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.16 presents an overview of the habitat information used to determine habitat areas. Table 5.17 shows the habitat suitabilities of each habitat type for the species present; burbot, brook trout, lake chub, pearl dace, slimy sculpin, and white sucker.

5.3.6.4 Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units of each habitat type present. Table 5.18 presents the results for burbot, brook trout, lake chub, pearl dace, slimy sculpin, and white sucker. The HEU values for the recreational species present (burbot, and brook trout) are 3.74ha and 4.82ha respectively.

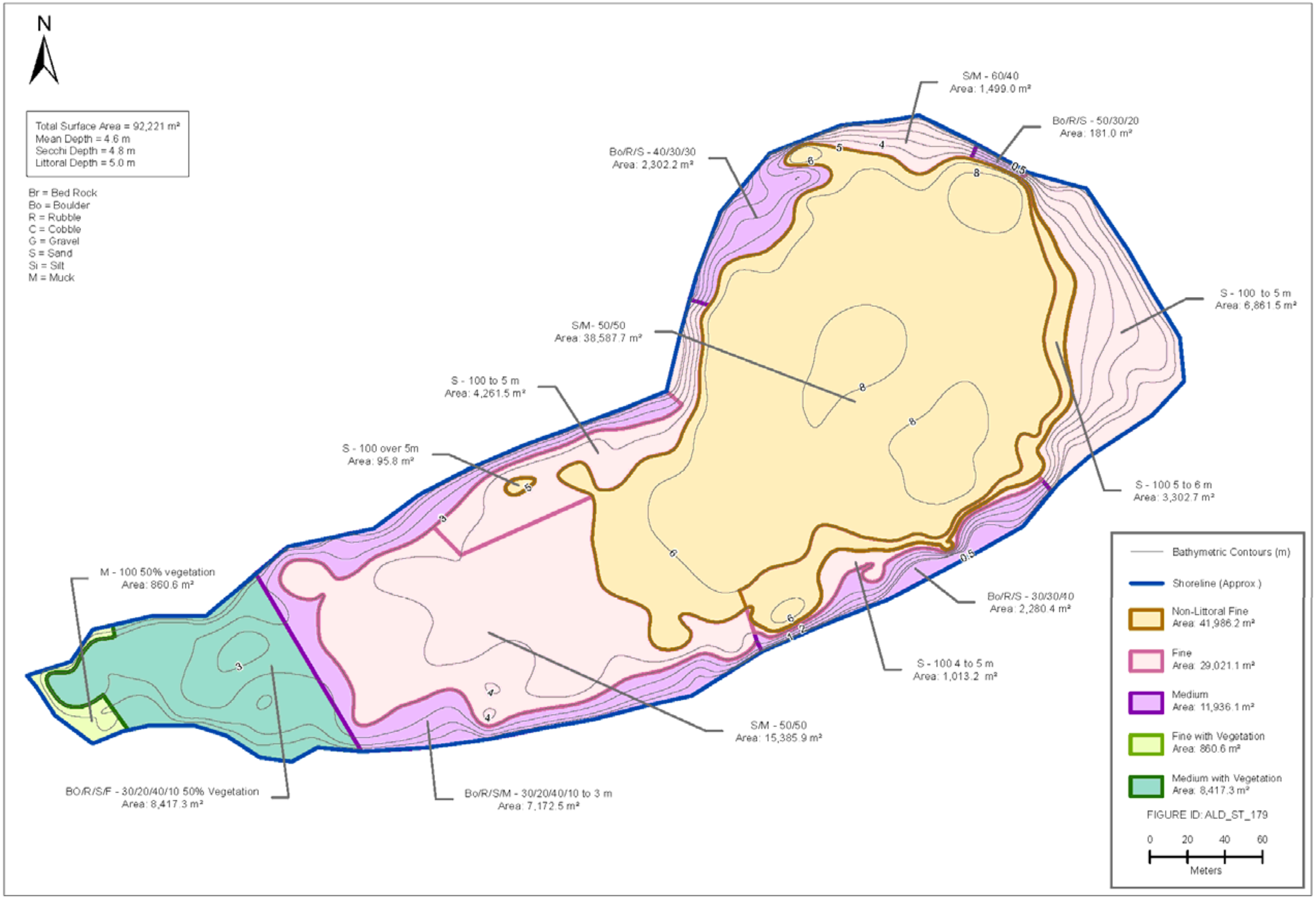


Figure 5.25. Bathymetric Contours of Pond RP04

Table 5.15. The calculated total area of each habitat type within Pond RP04.

HABITAT TYPE	AREA (m^2)
P - Profundal Zone	**41,986**
Lc - Littoral Zone – Coarse, no aquatic vegetation	3,847
Lc - Littoral Zone – Coarse, with aquatic vegetation	2,525
Lm - Littoral Zone – Medium, no aquatic vegetation	2,864
Lm - Littoral Zone – Medium, with aquatic vegetation	1,683
Lf - Littoral Zone – Fine, no aquatic vegetation	34,246
Lf - Littoral Zone – Fine, with aquatic vegetation	5,069
Sub Total, Littoral Zone	**50,235**
Total Habitat	**92,221**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

Table 5.16. Summary of Pond RP04 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated a

Enter Lake name: RP04

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			**IF Lake Depth is greater than 10 m:**	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	5		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	5		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued…)

IF Lake Depth is greater than 10 m:			
	Mean depth of Non-Littoral Zone:		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**2,863.58**	Sand:	**24,545.91**
	Boulder:	**3,847.25**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**9,700.46**
					Clay:	**0.00**
	SubTotals:	3,847		2,864		34,246

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**1,683.46**	Sand:	**3,366.92**
	Boulder:	**2,525.19**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**1,702.33**
					Clay:	**0.00**
	SubTotals:	2,525		1,683		5,069

Non-Littoral Zone

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**22,692.35**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**19,293.85**
					Clay:	**0.00**
	SubTotals:	0		0		41,986

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m^2)**
Littoral Coarse/No vegetation	3,847
Littoral Medium/No vegetation	2,864
Littoral Fine/No vegetation	34,246
subtotal Littoral/No vegetation	**40,957**
Littoral Coarse/Vegetation	2,525
Littoral Medium/Vegetation	1,683
Littoral Fine/Vegetation	5,069
Subtotal Littoral/Vegetation	**9,278**
Subtotal Littoral	**50,235**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	41,986
Subtotal nonlittoral	**41,986**
Total Available Habitat	**92,221**

Table 5.17. Habitat suitabilities for all species, Pond RP04.

STEP 4 **Lake name:** RP04

Part 1

Tal Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake

			Littoral Zone						Non-Littoral Zone		
	Species	**Life Stage**	**Coarse/No Vegetation**	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**
1	Burbot	Spawning	0.00	0.56	0.45	0.00	0.56	0.45	NA	NA	0.11
		YOY	1.00	1.00	0.34	0.89	0.89	0.34	NA	NA	0.22
		Juvenile	1.00	1.00	0.34	0.89	0.89	0.34	NA	NA	0.00
		Adult	0.22	0.22	0.06	0.22	0.22	0.07	NA	NA	0.11
2	Lake Chub	Spawning	0.00	0.67	0.56	0.00	0.67	0.56	NA	NA	0.00
		YOY	0.00	0.67	0.56	0.00	0.67	0.56	NA	NA	0.00
		Juvenile	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
		Adult	1.00	0.00	0.42	1.00	0.00	0.42	NA	NA	0.22
3	Pearl dace	Spawning	0.00	0.00	0.33	0.00	0.00	0.33	NA	NA	0.00
		YOY	0.00	0.00	0.47	0.00	0.00	0.48	NA	NA	0.95
		Juvenile	0.00	0.00	0.33	0.00	0.00	0.33	NA	NA	0.33
		Adult	0.00	0.00	0.17	0.00	0.00	0.17	NA	NA	0.33
4	Brook Trout (freshwater resident)	Spawning	0.00	0.56	0.64	0.00	0.56	0.64	NA	NA	0.14
		YOY	1.00	1.00	0.00	1.00	1.00	0.00	NA	NA	0.00
		Juvenile	1.00	1.00	0.00	1.00	1.00	0.00	NA	NA	0.11
		Adult	0.00	0.00	0.34	0.00	0.00	0.39	NA	NA	0.28
5	Slimy Sculpin	Spawning	0.67	0.67	0.33	0.67	0.67	0.33	NA	0.00	0.00
		YOY	1.00	1.00	0.50	1.00	1.00	0.50	NA	1.00	0.33
		Juvenile	0.00	1.00	0.00	0.00	1.00	0.00	NA	0.00	0.00
		Adult	0.00	1.00	0.00	0.00	1.00	0.00	NA	0.00	0.00
6	White sucker	Spawning	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
		YOY	0.00	0.00	0.42	0.00	0.00	0.42	NA	NA	0.28
		Juvenile	0.00	0.00	0.42	0.00	0.00	0.42	NA	NA	0.39
		Adult	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.22

Table 5.18. Habitat equivalent units for all species, Pond RP04.

STEP 5 **Lake name:** RP04

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

		Littoral Zone						Non-Littoral Zone			
	Species	**Coarse/No Vegetation**	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**	**Total Available Habitat**
☐ 1	Burbot	3847	2864	15411	2247	1498	2281	0	0	9237	37385.5
☐ 2	Lake Chub	3847	1919	19178	2525	1128	2839	0	0	9657	41093.0
☐ 3	Pearl dace	0	0	16438	0	0	2484	0	0	39887	58809.0
☐ 4	Brook Trout (freshwater resident)	3847	2864	22260	2525	1683	3295	0	0	11756	48230.5
☐ 5	Slimy Sculpin	3847	2864	17123	2525	1683	2535	0	0	14275	44852.5
☐ 6	White sucker	0	0	14383	0	0	2129	0	0	16375	32887.0

5.3.7 Pond RP05

Pond RP05 is to the east of and drains into Pond RP04. It is a small headwater pond with no further inflows identified.

5.3.7.1 Fish Species Present

A total of two fyke nets (two net-nights) and two hours of tended gillnets were deployed/completed throughout the pond over a period of one day. Burbot, brook trout, lake chub, pearl dace, slimy sculpin, and white sucker were captured. The burbot ranged from 156-165 mm, brook trout ranged from 119-401 mm, lake chub ranged from 44-132 mm, pearl dace ranged from 45-125 mm, the lone slimy sculpin was 61 mm, and the white suckers ranged from 90-412 mm. The length-weight relationships for brook trout, lake chub, pearl dace, and white sucker are presented in Figures 5.26 to 5.29. Burbot and slimy sculpin were not analyzed due to small sample size.

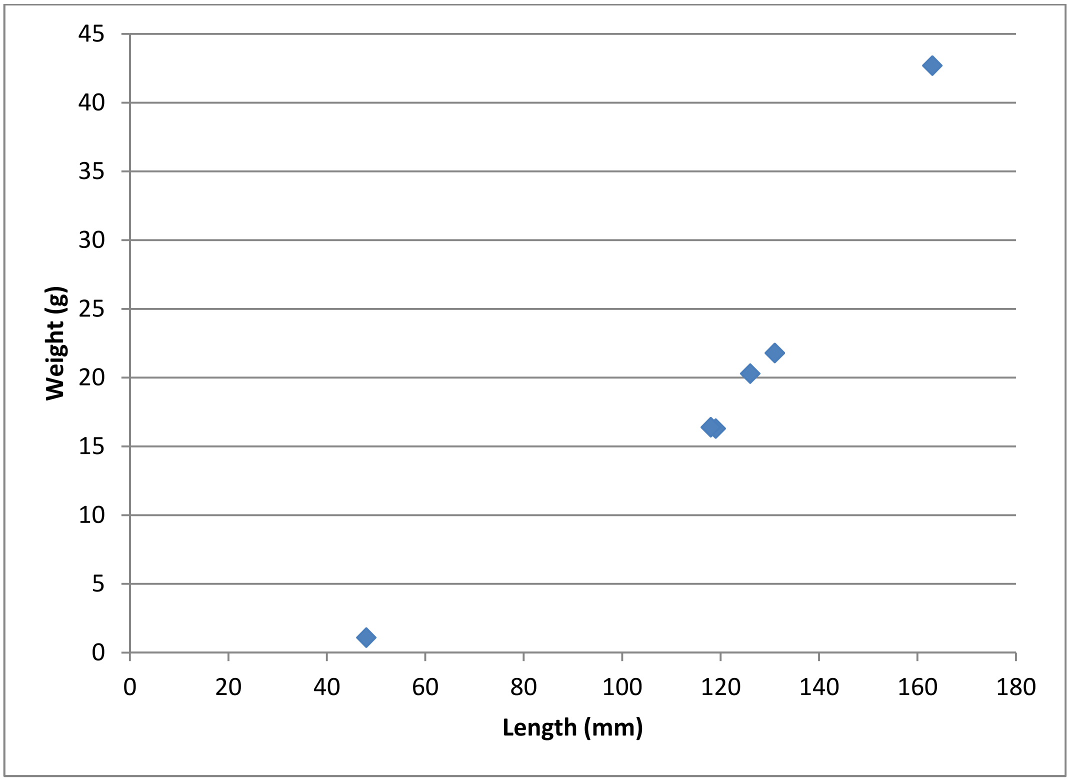


Figure 5.26. Length-weight relationship of brook trout captured in RP05, 2011.

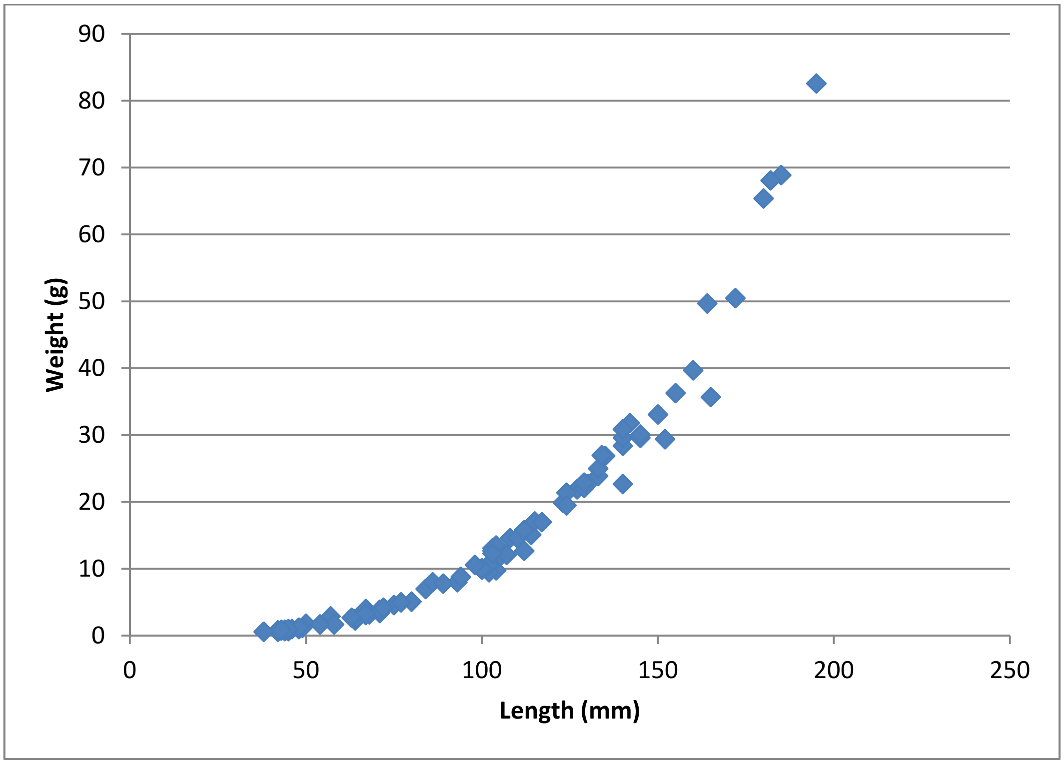


Figure 5.27. Length-weight relationship of lake chub captured in RP05, 2011.

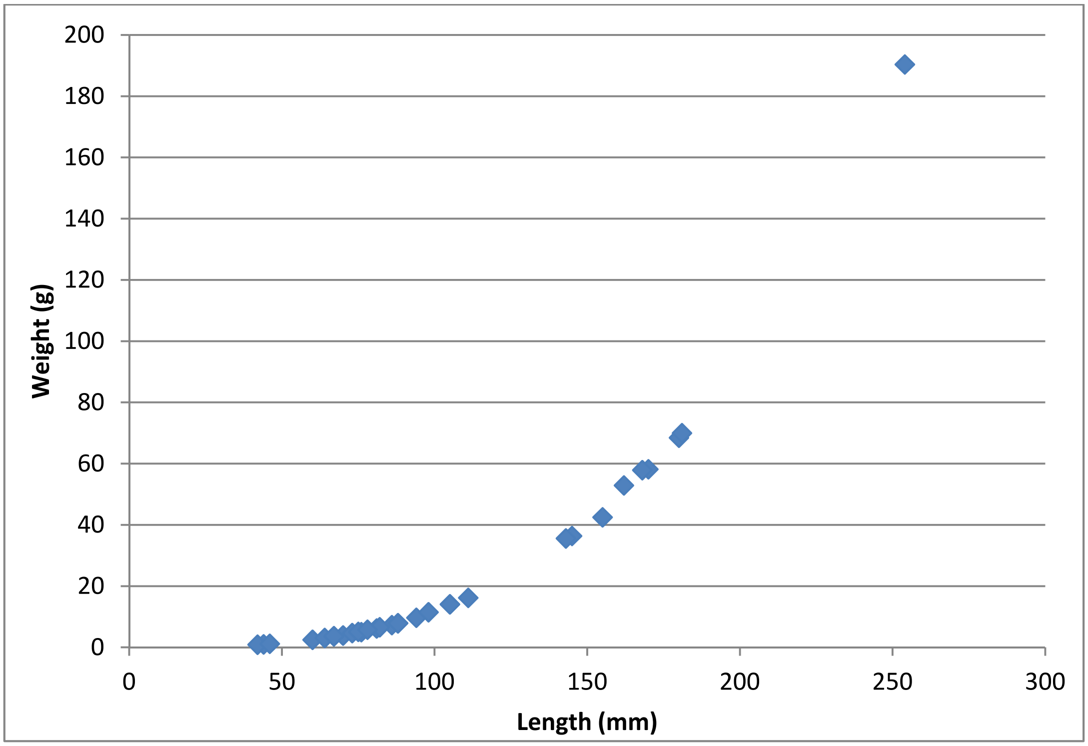


Figure 5.28. Length-weight relationship of pearl dace captured in RP05, 2011.

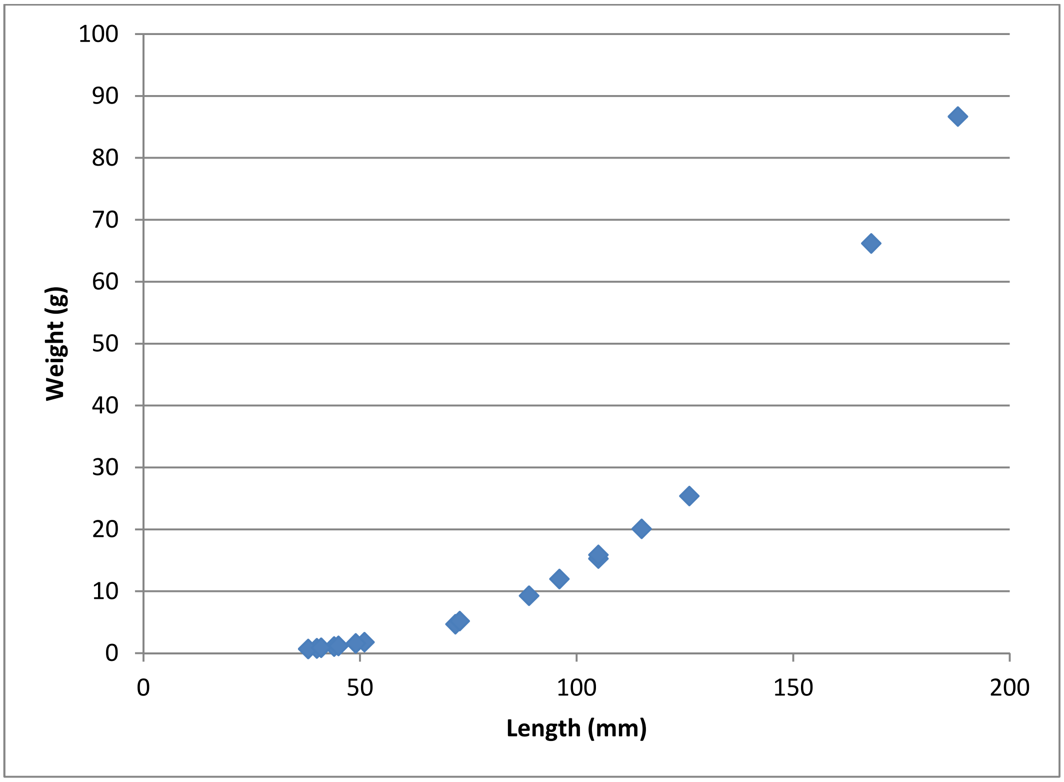


Figure 5.29. Length-weight relationship of white sucker captured in RP05, 2011.

5.3.7.2 Bathymetry and Littoral/Profundal Distribution

Secchi depth was determined to be 2.6 m while the maximum depth was 3.7 m. Pond RP05 comprises 25,296 m^2; of which all is classified as littoral habitat. Figure 5.30 presents the bathymetric contours of Pond RP05 as modeled from the data.

Substrate composition of the littoral zone was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond has large areas comprised of sand and muck (organics and detritus) with smaller areas of boulder and rubble.

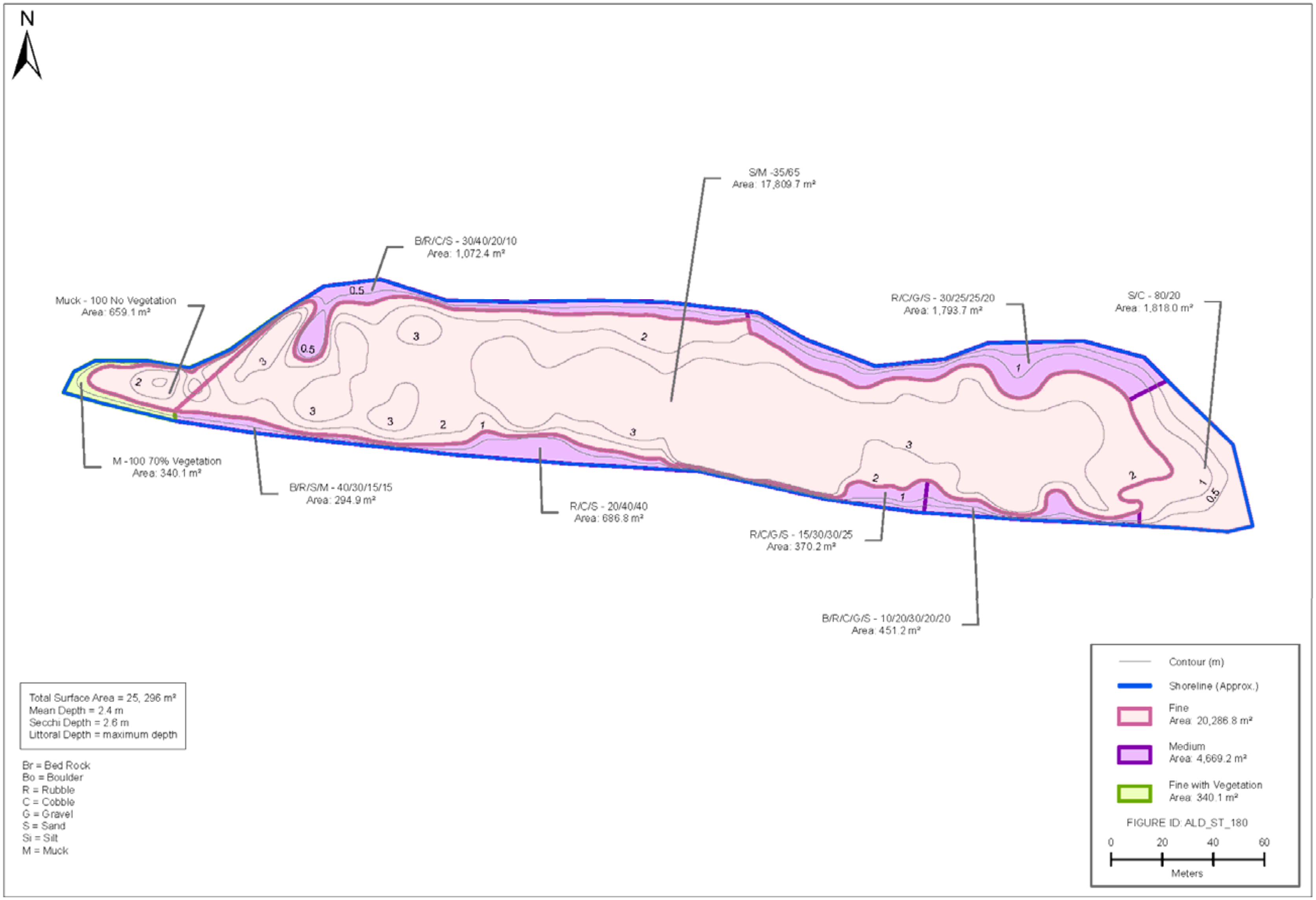


Figure 5.30. Bathymetric Contours and substrate of Pond RP05.

The overall composition of each substrate type (m^2) is outlined below:

	Littoral	**Profundal**
o Bedrock		
o Boulder	484	
o Rubble	1,339	
o Cobble	1,547	
o Gravel	650	
o Sand	8,656	
o Muck/Detritus (organic)	12,620	
Total	**25,296**	

The pond has vegetation present/visible on the western end of the pond with 2,328 m^2 coverage of the littoral zone. Table 5.19 presents the calculated area of each habitat type in Pond RP05.

Table 5.19. The calculated total area of each habitat type within Pond RP05.

HABITAT TYPE	**AREA (m^2)**
P - Profundal Zone	**0**
Lc - Littoral Zone – Coarse, no aquatic vegetation	485
Lc - Littoral Zone – Coarse, with aquatic vegetation	0
Lm - Littoral Zone – Medium, no aquatic vegetation	1,548
Lm - Littoral Zone – Medium, with aquatic vegetation	1,988
Lf - Littoral Zone – Fine, no aquatic vegetation	20,935
Lf - Littoral Zone – Fine, with aquatic vegetation	340
Sub Total, Littoral Zone	**25,296**
Total Habitat	**25,296**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

5.3.7.3 Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.20 presents an overview of the habitat information used to determine habitat areas. Table 5.21 shows the habitat suitabilities of each habitat type for the species present; burbot, brook trout, lake chub, pearl dace, slimy sculpin, and white sucker.

5.3.7.4 Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units of each habitat type present. Table 5.22 presents the results for burbot, brook trout, lake chub, pearl dace, slimy sculpin, and white sucker. The HEU values for the recreational species present within Pond RP05 (burbot, and brook trout) are 1.34ha and 1.78ha respectively.

Table 5.20. Summary of Pond RP05 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated

Enter Lake name: RP05

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			**IF Lake Depth is greater than 10 m:**	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	4		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	2		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued…)

IF Lake Depth is greater than 10 m:			
	Mean depth of Non-Littoral Zone:		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	0.00	Rubble:	0.00	Sand:	8,655.52
	Boulder:	484.80	Cobble:	1,547.65	Silt:	0.00
			Gravel:	0.00	Muck:	12,279.64
					Clay:	0.00
	SubTotals:	485		1,548		20,935

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	0.00	Rubble:	1,338.67	Sand:	0.00
	Boulder:	0.00	Cobble:	0.00	Silt:	0.00
			Gravel:	649.73	Muck:	340.10
					Clay:	0.00
	SubTotals:	0		1,988		340

Non-Littoral Zone

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	0.00	Rubble:	0.00	Sand:	0.00
	Boulder:	0.00	Cobble:	0.00	Silt:	0.00
			Gravel:	0.00	Muck:	0.00
					Clay:	0.00
	SubTotals:	0		0		0

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m^2)**
Littoral Coarse/No vegetation	485
Littoral Medium/No vegetation	1,548
Littoral Fine/No vegetation	20,935
subtotal Littoral/No vegetation	**22,968**
Littoral Coarse/Vegetation	0
Littoral Medium/Vegetation	1,988
Littoral Fine/Vegetation	340
Subtotal Littoral/Vegetation	**2,328**
Subtotal Littoral	**25,296**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	0
Subtotal nonlittoral	**0**
Total Available Habitat	**25,296**

Table 5.21. Habitat suitabilities for all species, Pond RP05.

STEP 4 **Lake name:** RP05

Part 1

Tal **Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake**

			Littoral Zone						Non-Littoral Zone		
	Species	Life Stage	Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic
1	Burbot	Spawning	0.00	0.78	0.45	0.00	0.78	0.45	NA	NA	0.00
		YOY	1.00	1.00	0.34	0.89	0.89	0.34	NA	NA	0.00
		Juvenile	1.00	1.00	0.34	0.89	0.89	0.34	NA	NA	0.00
		Adult	0.22	0.22	0.06	0.22	0.22	0.07	NA	NA	0.00
2	Lake Chub	Spawning	0.00	0.67	0.56	0.00	0.67	0.56	NA	NA	0.00
		YOY	0.00	0.67	0.56	0.00	0.67	0.56	NA	NA	0.00
		Juvenile	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00
		Adult	1.00	0.00	0.42	1.00	0.00	0.42	NA	NA	0.00
3	Pearl dace	Spawning	0.00	0.11	0.33	0.00	0.11	0.33	NA	NA	0.00
		YOY	0.00	0.00	0.47	0.00	0.00	0.48	NA	NA	2.84
		Juvenile	0.00	0.00	0.33	0.00	0.00	0.33	NA	NA	0.00
		Adult	0.00	0.00	0.17	0.00	0.00	0.17	NA	NA	0.00
4	Brook Trout (freshwater resident)	Spawning	0.00	0.72	0.64	0.00	0.72	0.64	NA	NA	0.00
		YOY	1.00	1.00	0.00	1.00	1.00	0.00	NA	NA	0.00
		Juvenile	1.00	1.00	0.00	1.00	1.00	0.00	NA	NA	0.00
		Adult	0.00	0.67	0.34	0.00	0.67	0.39	NA	NA	0.00
5	Slimy Sculpin	Spawning	0.67	0.67	0.33	0.67	0.67	0.33	NA	NA	0.00
		YOY	1.00	1.00	0.50	1.00	1.00	0.50	NA	NA	0.00
		Juvenile	0.00	1.00	0.00	0.00	1.00	0.00	NA	NA	0.00
		Adult	0.00	1.00	0.00	0.00	1.00	0.00	NA	NA	0.00
6	White sucker	Spawning	0.00	0.22	0.00	0.00	0.22	0.00	NA	NA	0.00
		YOY	0.00	0.00	0.42	0.00	0.00	0.42	NA	NA	0.00
		Juvenile	0.00	0.00	0.42	0.00	0.00	0.42	NA	NA	0.00
		Adult	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00

Table 5.22. Habitat equivalent units for all species, Pond RP05.

STEP 5 **Lake name:** RP05

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

		Littoral Zone						Non-Littoral Zone			
	Species	Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic	Total Available Habitat
☑ 1	Burbot	485	1548	9421	0	1770	153	0	0	0	13376.1
☑ 2	Lake Chub	485	1037	11724	0	1332	190	0	0	0	14767.9
☑ 3	Pearl dace	0	186	10049	0	239	167	0	0	0	10640.3
☑ 4	Brook Trout (freshwater resident)	485	1548	13608	0	1988	221	0	0	0	17849.8
☑ 5	Slimy Sculpin	485	1548	10468	0	1988	170	0	0	0	14658.8
☑ 6	White sucker	0	356	8793	0	457	143	0	0	0	9749.3

5.3.8 Habitat Classification of Pond Associated with Crossing SC11

The pond located at the identified crossing SC11 was included within the potential project footprint late in 2011 and therefore no detailed sampling was completed on fish species present. It should also be noted that since this area is currently near/within a portion of Wabush Mines Fish Habitat Compensation for the Flora Lake area, the layout and design is ongoing. Any additional survey information will be submitted as an addendum to this baseline report.

5.3.8.1 Fish Species Present

No fishing was conducted at SC11 but it was formerly contiguous with Flora Lake North, which is known to have lake trout, lake whitefish, longnose sucker, and northern pike (B. Wicks, pers. comm.)

5.3.8.2 Bathymetry and Littoral/Profundal Distribution

Secchi depth was determined to be 4.8 m while the maximum depth was 9.8 m. Pond SC11 comprises 258,625 m^2; of which 187,521 is classified as littoral and 71,104 is classified as profundal habitat. Figure 5.31 presents the bathymetric contours of Pond SC11 as modeled from the data.

Substrate composition of the pond was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond has large areas comprised of sand and muck (organics and detritus) with smaller areas of boulder and rubble. The overall composition of each substrate type (m^2) is outlined below:

	Littoral	**Profundal**
Bedrock		
Boulder	5,867	
Rubble		
Cobble	3,370	
Gravel	5,598	
Sand	27,717	
Silt	32,082	7,110
Muck/Detritus (organic)	103,772	58,883
Clay	9,114	7,110
Total	**187,521**	**71,104**

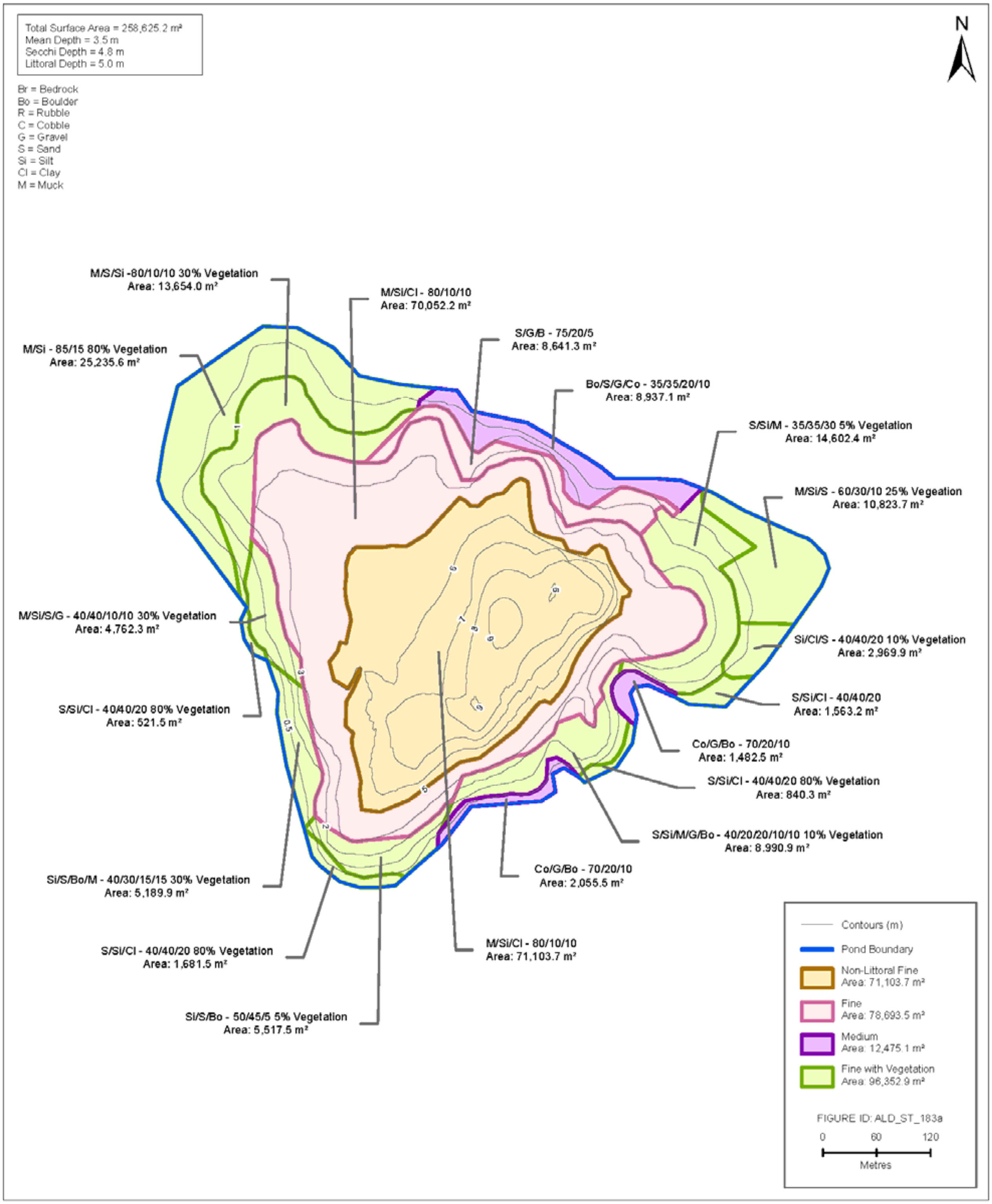


Figure 5.31. Bathymetric Contours and substrate of Pond SC11.

The pond has vegetation present/visible along most of the pond shoreline with 96,353 m^2 coverage of the littoral zone. Table 5.23 presents the calculated area of each habitat type in Pond SC11.

Table 5.23. The calculated total area of each habitat type within PondSC11.

HABITAT TYPE	AREA (m^2)
P - Profundal Zone	**0**
Lc - Littoral Zone – Coarse, no aquatic vegetation	3,914
Lc - Littoral Zone – Coarse, with aquatic vegetation	1,953
Lm - Littoral Zone – Medium, no aquatic vegetation	7,594
Lm - Littoral Zone – Medium, with aquatic vegetation	1,375
Lf - Littoral Zone – Fine, no aquatic vegetation	79,661
Lf - Littoral Zone – Fine, with aquatic vegetation	93,024
Sub Total, Littoral Zone	**187,521**
Total Habitat	**258,625**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

5.3.8.3 Habitat Suitabilities

No sampling was conducted at this site in 2011. This site will be incorporated into the 2012 program if required upon final design.

5.3.8.4 Habitat Equivalent Units

No sampling was conducted at this site in 2011. This site will be incorporated into the 2012 program if required upon final design.

5.3.9 Habitat Classification of Other Small Ponds

As indicated on Figure 3.1, there are four small standing waterbodies within the TMF that appear as small ponds on 1:50,000 topographic mapping. These waterbodies are shallow headwater depression areas associated with the wetland complex with substrate comprised of fines and organics. Three are located on the streams within the TMF and the fourth has no connecting stream. The following descriptions are based on helicopter overflights, air photos, 1:50,000 topographic mapping and ground surveys. The surface areas of these waterbodies were determined from the topographic map.

5.3.9.1 Pond SW1

Pond SW1, which is shown on Figure 3.1, is within the TMF at its southern extension. It is the headwater of stream TDA02.

Fish Species Present

No fishing has been conducted at SW1 to date (population estimates are pending) but sampling of its outflow stream (TDA02) was completed. Results indicate that brook trout, pearl dace and slimy sculpin are present within the system. These species have been used to generate reasonable habitat quantification based on DFO guidelines.

Population Estimates

SW1 was selected as a representative waterbody for population estimates within the Project area. These efforts are continuing and results will be presented as an addendum to this baseline report. The habitat has been quantified using DFO guidelines and it is recognized that this pond is within the boundary of the TMF and will therefore be removed. As a result, it is included in the habitat to be considered for compensation. The population estimates will allow the revised Fisheries Act Compensation requirements to be determined but their absence does not limit the ability to assess the effects of the project on the fish and fish habitat of the area.

Bathymetry and Littoral/Profundal Distribution

The pond is less than 1m in depth with visibility (Secchi depth) to the bottom. Pond SW1 comprises 41,550 m^2; of which all is classified as littoral habitat.

Substrate composition of the littoral zone was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond is comprised entirely of fines and organics (muck). Table 5.24 presents the calculated area of each habitat type in Pond SW1.

Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.25 presents an overview of the habitat information used to determine habitat areas. Table 5.26 shows the habitat suitabilities of each habitat type for the species present; brook trout, pearl dace, and slimy sculpin.

Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units of each habitat type present. Table 5.27 presents the results for brook trout, pearl dace, and slimy sculpin. The HEU values for the recreational species present within Pond SW1 (brook trout) are 2.78ha.

Table 5.24. The calculated total area of each habitat type within Pond SW1.

HABITAT TYPE	AREA (m^2)
P - Profundal Zone	**0**
Lc - Littoral Zone – Coarse, no aquatic vegetation	0
Lc - Littoral Zone – Coarse, with aquatic vegetation	0
Lm - Littoral Zone – Medium, no aquatic vegetation	0
Lm - Littoral Zone – Medium, with aquatic vegetation	0
Lf - Littoral Zone – Fine, no aquatic vegetation	41,550
Lf - Littoral Zone – Fine, with aquatic vegetation	0
Sub Total, Littoral Zone	**41,550**
Total Habitat	**41,550**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

Table 5.25. Summary of Pond SW1 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated

Enter Lake name: Pond SW1

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			**IF Lake Depth is greater than 10 m:**	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	1		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	1		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued...)

IF Lake Depth is greater than 10 m:	**Mean depth of Non-Littoral Zone:**		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	0.00	Rubble:	0.00	Sand:	0.00
	Boulder:	0.00	Cobble:	0.00	Silt:	0.00
			Gravel:	0.00	Muck:	41,550.00
					Clay:	0.00
	SubTotals:	0		0		41,550

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	0.00	Rubble:	0.00	Sand:	0.00
	Boulder:	0.00	Cobble:	0.00	Silt:	0.00
			Gravel:	0.00	Muck:	0.00
					Clay:	0.00
	SubTotals:	0		0		0

Non-Littoral Zone

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	0.00	Rubble:	0.00	Sand:	0.00
	Boulder:	0.00	Cobble:	0.00	Silt:	0.00
			Gravel:	0.00	Muck:	0.00
					Clay:	0.00
	SubTotals:	0		0		0

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m^2)**
Littoral Coarse/No vegetation	0
Littoral Medium/No vegetation	0
Littoral Fine/No vegetation	41,550
subtotal Littoral/No vegetation	**41,550**
Littoral Coarse/Vegetation	0
Littoral Medium/Vegetation	0
Littoral Fine/Vegetation	0
Subtotal Littoral/Vegetation	**0**
Subtotal Littoral	**41,550**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	0
Subtotal nonlittoral	**0**
Total Available Habitat	**41,550**

Table 5.26. Habitat suitabilities for all species, Pond SW1.

STEP 4 **Lake name:** Pond SW1

Part 1

Tal **Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake**

			Littoral Zone						**Non-Littoral Zone**		
	Species	**Life Stage**	**Coarse/No Vegetation**	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**
1	Pearl dace	Spawning	NA	NA	0.50	NA	NA	0.50	NA	NA	0.00
		YOY	NA	NA	1.00	NA	NA	1.00	NA	NA	0.00
		Juvenile	NA	NA	0.50	NA	NA	0.50	NA	NA	0.00
		Adult	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
2	Brook Trout (freshwater resident)	Spawning	NA	NA	0.67	NA	NA	0.67	NA	NA	0.00
		YOY	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Juvenile	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Adult	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
3	Slimy Sculpin	Spawning	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		YOY	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Juvenile	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Adult	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00

Table 5.27. Habitat equivalent units for all species, Pond SW1.

STEP 5 **Lake name:** Pond SW1

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

		Littoral Zone						**Non-Littoral Zone**			
	Species	**Coarse/No Vegetation**	**Medium/No Vegetation**	**Fine/No Vegetation**	**Coarse/Vegetation**	**Medium/Vegetation**	**Fine/Vegetation**	**Coarse/Pelagic**	**Medium/Pelagic**	**Fine/Pelagic**	**Total Available Habitat**
☐ 1	Pearl dace	0	0	41550	0	0	0	0	0	0	41550.0
☐ 2	Brook Trout (freshwater resident)	0	0	27839	0	0	0	0	0	0	27839.0
☐ 3	Slimy Sculpin	0	0	0	0	0	0	0	0	0	0.0

5.3.9.2 Pond SW2

Pond SW2 is located within the TMF, just downstream from SW1 and within stream TDA02.

Fish Species Present

No fishing has been conducted at SW2 but sampling of its outflow stream (TDA02) was completed. Results indicate that brook trout, pearl dace and slimy sculpin are present within the system. These species have been used to generate reasonable habitat quantification based on DFO guidelines.

Bathymetry and Littoral/Profundal Distribution

The pond is less than 1m in depth with visibility (Secchi depth) to the bottom. Pond SW2 comprises 34,940 m^2; of which all is classified as littoral habitat.

Substrate composition of the littoral zone was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond is comprised entirely of fines and organics (muck). Table 5.28 presents the calculated area of each habitat type in Pond SW2.

Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.29 presents an overview of the habitat information used to determine habitat areas. Table 5.30 shows the habitat suitabilities of each habitat type for the species present; brook trout, pearl dace, and slimy sculpin.

Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units of each habitat type present. Table 5.31 presents the results for brook trout, pearl dace, and slimy sculpin. The HEU values for the recreational species present within Pond SW2 (brook trout) are 2.34ha.

Table 5.28. The calculated total area of each habitat type within Pond SW2.

HABITAT TYPE	**AREA (m^2)**
P - Profundal Zone	**0**
Lc - Littoral Zone – Coarse, no aquatic vegetation	0
Lc - Littoral Zone – Coarse, with aquatic vegetation	0
Lm - Littoral Zone – Medium, no aquatic vegetation	0
Lm - Littoral Zone – Medium, with aquatic vegetation	0
Lf - Littoral Zone – Fine, no aquatic vegetation	34,940
Lf - Littoral Zone – Fine, with aquatic vegetation	0
Sub Total, Littoral Zone	**34,940**
Total Habitat	**34,940**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

Table 5.29. Summary of Pond SW2 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated

Enter Lake name: Pond SW2

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			**IF Lake Depth is greater than 10 m:**	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	1		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	1		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued...)

IF Lake Depth is greater than 10 m:	**Mean depth of Non-Littoral Zone:**		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**34,940.00**
					Clay:	**0.00**
	SubTotals:	0		0		34,940

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**0.00**
					Clay:	**0.00**
	SubTotals:	0		0		0

Non-Littoral Zone

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**0.00**
					Clay:	**0.00**
	SubTotals:	0		0		0

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m^2)**
Littoral Coarse/No vegetation	0
Littoral Medium/No vegetation	0
Littoral Fine/No vegetation	34,940
subtotal Littoral/No vegetation	**34,940**
Littoral Coarse/Vegetation	0
Littoral Medium/Vegetation	0
Littoral Fine/Vegetation	0
Subtotal Littoral/Vegetation	**0**
Subtotal Littoral	**34,940**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	0
Subtotal nonlittoral	**0**
Total Available Habitat	**34,940**

Table 5.30. Habitat suitabilities for all species, Pond SW2.

STEP 4 **Lake name:** Pond SW2

Part 1

Tal Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake

	Species	Life Stage	Littoral Zone						Non-Littoral Zone		
			Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic
1	Pearl dace	Spawning	NA	NA	0.50	NA	NA	0.50	NA	NA	0.00
		YOY	NA	NA	1.00	NA	NA	1.00	NA	NA	0.00
		Juvenile	NA	NA	0.50	NA	NA	0.50	NA	NA	0.00
		Adult	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
2	Brook Trout (freshwater resident)	Spawning	NA	NA	0.67	NA	NA	0.67	NA	NA	0.00
		YOY	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Juvenile	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Adult	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
3	Slimy Sculpin	Spawning	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		YOY	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Juvenile	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00
		Adult	NA	NA	0.00	NA	NA	0.00	NA	NA	0.00

Table 5.31. Habitat equivalent units for all species, Pond SW2.

STEP 5 **Lake name:** Pond SW2

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

	Species	Littoral Zone						Non-Littoral Zone			
		Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic	Total Available Habitat
☐ 1	Pearl dace	0	0	34940	0	0	0	0	0	0	34940.0
☐ 2	Brook Trout (freshwater resident)	0	0	23410	0	0	0	0	0	0	23410.0
☐ 3	Slimy Sculpin	0	0	0	0	0	0	0	0	0	0.0

5.3.9.3 Pond SW3

Pond SW3 is a small waterbody at the headwater of stream TDA02East. It is located within the eastern portion of the TMF.

Fish Species Present

No fishing has been conducted at Pond SW3 but sampling of its main stem stream (TDA02) was completed. Results indicate that brook trout, pearl dace and slimy sculpin are present within the system. These species have been used to generate reasonable habitat quantification based on DFO guidelines.

Bathymetry and Littoral/Profundal Distribution

The pond is less than 1m in depth with visibility (Secchi depth) to the bottom. Pond SW3 comprises 11,585 m^2; of which all is classified as littoral habitat.

Substrate composition of the littoral zone was conducted and used in the DFO spreadsheet to calculate aerial extents and habitat equivalent units. These calculations are provided later in this section. The pond is comprised entirely of fines and organics (muck). Table 5.32 presents the calculated area of each habitat type in Pond SW3.

Habitat Suitabilities

The DFO spreadsheet for calculating lacustrine habitat suitabilities and habitat equivalent units was used with the field habitat and species presence data collected. Table 5.33 presents an overview of the habitat information used to determine habitat areas. Table 5.34 shows the habitat suitabilities of each habitat type for the species present; brook trout, pearl dace, and slimy sculpin.

Habitat Equivalent Units

DFO spreadsheet calculations were used to determine final habitat equivalent units of each habitat type present. Table 5.35 presents the results for brook trout, pearl dace, and slimy sculpin. The HEU values for the recreational species present within Pond SW3 (brook trout) are 0.83ha.

Table 5.32. The calculated total area of each habitat type within Pond SW3.

HABITAT TYPE	AREA (m^2)
P - Profundal Zone	**0**
Lc - Littoral Zone – Coarse, no aquatic vegetation	0
Lc - Littoral Zone – Coarse, with aquatic vegetation	0
Lm - Littoral Zone – Medium, no aquatic vegetation	0
Lm - Littoral Zone – Medium, with aquatic vegetation	0
Lf - Littoral Zone – Fine, no aquatic vegetation	11,585
Lf - Littoral Zone – Fine, with aquatic vegetation	0
Sub Total, Littoral Zone	**11,585**
Total Habitat	**11,585**

Littoral Coarse (comprising a majority of bedrock, boulder);
Littoral Medium (comprising a majority of rubble, cobble and gravel);
Littoral Fine (comprising a majority of sand and organics/detritus); and
Profundal (comprising a majority of organics/detritus).

Table 5.33. Summary of Pond SW3 habitat values used to calculate aerial extents.

Step 1

Note: Only enter the values in the cells shaded blue, the subtotals, totals and ratios will be calculated

Enter Lake name: Pond SW3

Part 1 Entering Lake depth(s):

IF Lake Depth is less than or equal to 10 m:			**IF Lake Depth is greater than 10 m:**	
Path 1		**OR**	**Path 2**	
A Enter Depth of Littoral Zone:	1		**A-1 Enter mean depth of Non-Littoral Zone**	0
B Enter Mean Depth of Lake:	1		**B-1 Enter depth of Benthic Zone:**	0

Path 2 (Continued...)			
IF Lake Depth is greater than 10 m:	**Mean depth of Non-Littoral Zone:**		*(Reduced Value)*
	Depth of the Benthic Zone:		*(Reduced Value)*
	Benthic Pelagic ratio:		

Part 2 Enter the values for the estimated bottom surface area:

Littoral Zone (No vegetation):

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**11,585.00**
					Clay:	**0.00**
	SubTotals:	0		0		11,585

Littoral Zone (Vegetation)

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**0.00**
					Clay:	**0.00**
	SubTotals:	0		0		0

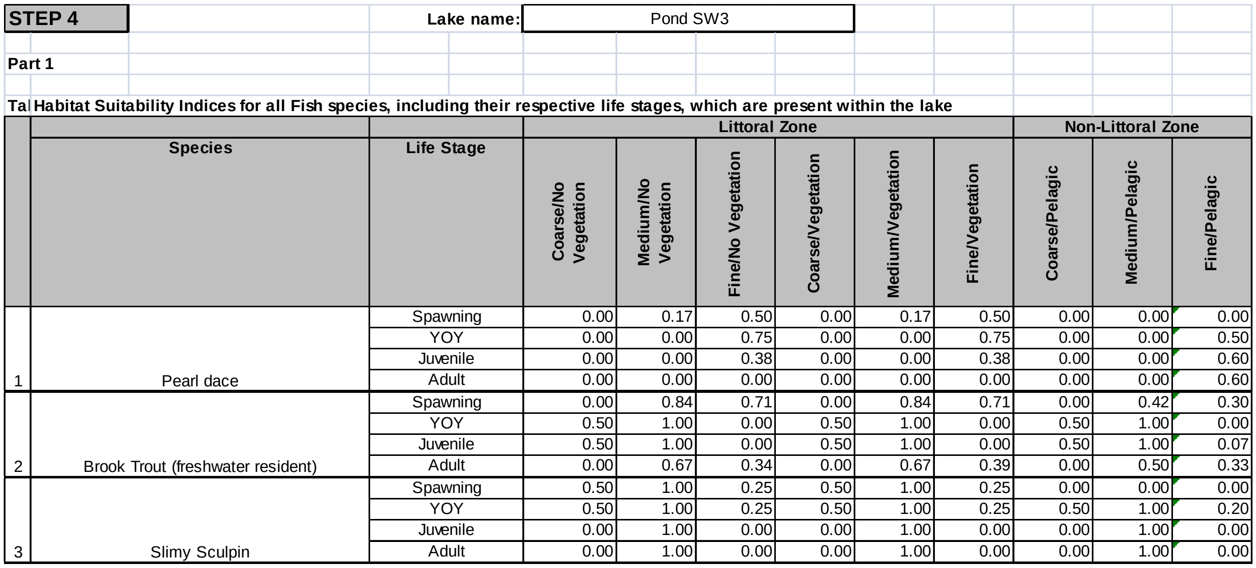
Non-Littoral Zone

Substrate:	**Coarse**	m^2	**Medium**	m^2	**Fine**	m^2
	Bedrock:	**0.00**	Rubble:	**0.00**	Sand:	**0.00**
	Boulder:	**0.00**	Cobble:	**0.00**	Silt:	**0.00**
			Gravel:	**0.00**	Muck:	**0.00**
					Clay:	**0.00**
	SubTotals:	0		0		0

Part 3 Summary Table for Bottom Surface Area Totals:

Habitat Types	**Bottom Surface area (m^2)**
Littoral Coarse/No vegetation	0
Littoral Medium/No vegetation	0
Littoral Fine/No vegetation	11,585
subtotal Littoral/No vegetation	**11,585**
Littoral Coarse/Vegetation	0
Littoral Medium/Vegetation	0
Littoral Fine/Vegetation	0
Subtotal Littoral/Vegetation	**0**
Subtotal Littoral	**11,585**
Non-littoral Coarse/Pelagic	0
Non-littoral Medium/Pelagic	0
Non-littoral Fine/Pelagic	0
Subtotal nonlittoral	**0**
Total Available Habitat	**11,585**

Table 5.34. Habitat suitabilities for all species, Pond SW3.



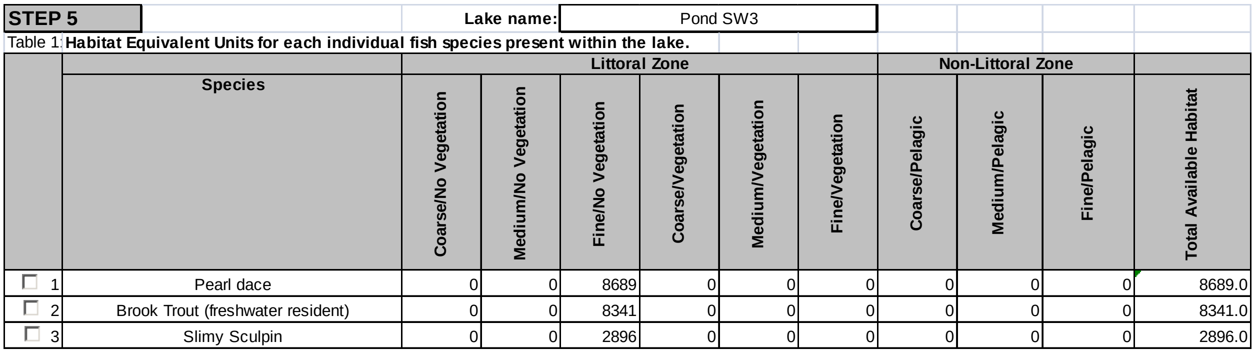
STEP 4 **Lake name:** Pond SW3

Part 1

Tal **Habitat Suitability Indices for all Fish species, including their respective life stages, which are present within the lake**

	Species	Life Stage	Littoral Zone						Non-Littoral Zone		
			Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic
1	Pearl dace	Spawning	0.00	0.17	0.50	0.00	0.17	0.50	0.00	0.00	0.00
		YOY	0.00	0.00	0.75	0.00	0.00	0.75	0.00	0.00	0.50
		Juvenile	0.00	0.00	0.38	0.00	0.00	0.38	0.00	0.00	0.60
		Adult	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
2	Brook Trout (freshwater resident)	Spawning	0.00	0.84	0.71	0.00	0.84	0.71	0.00	0.42	0.30
		YOY	0.50	1.00	0.00	0.50	1.00	0.00	0.50	1.00	0.00
		Juvenile	0.50	1.00	0.00	0.50	1.00	0.00	0.50	1.00	0.07
		Adult	0.00	0.67	0.34	0.00	0.67	0.39	0.00	0.50	0.33
3	Slimy Sculpin	Spawning	0.50	1.00	0.25	0.50	1.00	0.25	0.00	0.00	0.00
		YOY	0.50	1.00	0.25	0.50	1.00	0.25	0.50	1.00	0.20
		Juvenile	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
		Adult	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00

Table 5.35. Habitat equivalent units for all species, Pond SW3.



STEP 5 **Lake name:** Pond SW3

Table 1: **Habitat Equivalent Units for each individual fish species present within the lake.**

	Species	Littoral Zone						Non-Littoral Zone			
		Coarse/No Vegetation	Medium/No Vegetation	Fine/No Vegetation	Coarse/Vegetation	Medium/Vegetation	Fine/Vegetation	Coarse/Pelagic	Medium/Pelagic	Fine/Pelagic	Total Available Habitat
☐ 1	Pearl dace	0	0	8689	0	0	0	0	0	0	8689.0
☐ 2	Brook Trout (freshwater resident)	0	0	8341	0	0	0	0	0	0	8341.0
☐ 3	Slimy Sculpin	0	0	2896	0	0	0	0	0	0	2896.0

5.3.9.4 Pond SW4

Pond SW4 is a small waterbody within the TMF that is not connected directly to any stream in the area (Figure 3.1). It has a surface area of 15,000 m^2 (1.5 ha), is less than 1 m deep, and has a substrate comprised of fines and organics, as determined from overflights and air photos. The topographic map indicates no streams flow into or out of Pond SW4; this was also confirmed by helicopter overflights and air photos. Based on the absence of connectivity to any identified fish habitat, SW4 is not productive or sustained fish habitat.

A second smaller waterbody, indicated on the topographic map as being adjacent to Pond SW4 was determined from air photos not to be a waterbody. No name was assigned to this feature and no further information was obtained for it.

5.4 Riverine Habitat Classification / Quantification

The stream classification data has been organized by associated watershed and/or Project footprint/infrastructure that may interact with it.

5.4.1 Rose Pit Streams

The streams within the Rose Pit footprint area includes eight streams or stream sections The Rose Pit streams are classified as second order tributaries that drain into Pike Lake South which in turn drains into Walsh River and eventually into Long Lake. Subsequent sub-divisions of the tributary are RP01-PLS, RP02-RP-01, RP03-RP02, RP04-RP02, RP05-RP04, RND, and TRIB1. Each is described below. Photos of each stream survey reach are provided in Appendix B.

5.4.1.1 Stream RP01-PLS

Stream RP01-PLS is the lower portion of the Rose Pit drainage and consists of stream habitat between Pond RP01 and Pike Lake South (PLS). It is approximately 450 m in length and contains 53.65 units of riverine fish habitat. Channel widths range from 2-35 m and water depths between 0.18-0.95 m. Water velocities during surveys ranged between 0-0.29 m/s. Table 5.36 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream RP01-PLS was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. In order to remain conservative, if no electrofishing was completed within a specific reach, nearby electrofishing results (or fyke net results from ponds within the same drainage) were used to calculate HEU values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.37 summarizes the species suitability for each reach of RP01-PLS (i.e. highest life-cycle stage value) for all species found in the stream section, as well as the calculations of the HEUs. The HEU values for the recreational species present within stream RP01-PLS based solely on fish presence (burbot) is 25.21 units.

Table 5.36. Summary of habitat measurements and classifications for RP01-PLS.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	0	4.0	0.00	-	-	0	30	15	10	0	0	45	IV	Pool
2	25	25	2.4	0.60	-	-	0	30	15	10	0	0	45	IV	Pool
3	50	25	2.4	0.60	0.34	0.29	0	30	15	10	0	0	45	IV	Pool
4	75	25	4.1	1.03	0.18	0.26	0	30	50	20	0	0	0	II	Rapids
5	100	25	2.5	0.63	0.25	0.28	0	30	50	20	0	0	0	II	Rapids
6	125	25	2.5	0.63	-	-	0	0	15	15	10	0	60	IV	Pool
7	150	25	7.0	1.75	0.80	0.00	0	0	15	15	10	0	60	IV	Pool
8	175	25	30.0	7.50	-	-	0	0	0	0	0	0	100	IV	Pool
9	200	25	35.0	8.75	0.90	0.01	0	0	0	0	0	0	100	IV	Pool
10	225	25	35.0	8.75	-	-	0	0	0	0	0	0	100	IV	Pool
11	250	25	35.0	8.75	0.95	0.00	0	0	0	0	0	0	100	IV	Pool
12	275	25	12.0	3.00	-	-	0	0	0	0	0	0	100	IV	Pool
13	300	25	2.5	0.63	0.85	0.09	0	0	0	0	0	0	100	IV	Pool
14	325	25	3.0	0.75	-	-	0	30	10	0	0	0	60	IV	Pool
15	350	25	3.0	0.75	0.80	0.03	0	30	10	0	0	0	60	IV	Pool
16	375	25	2.0	0.50	-	-	0	30	10	0	0	0	60	IV	Pool
17	400	25	2.0	0.50	0.65	0.03	0	30	10	0	0	0	60	IV	Pool
18	425	25	30.0	7.50	-	-	0	30	10	0	0	0	60	IV	Pool
19	450	25	4.2	1.05	0.77	0.05	0	30	10	0	0	0	60	IV	Pool

Orange cells were estimated based on field observations and photos (Appendix B).

Table 5.37. Habitat Equivalent Units for Stream RP01-PLS.

Reach	**Area (Units)**	**Burbot**		**White sucker**		**Lake chub**		**Sculpin**	
		HSI	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**
1	0.60	0.32	0.19	0.45	0.27	0.55	0.33	0.00	0.00
2	0.60	0.63	0.38	0.48	0.29	0.63	0.38	0.00	0.00
3	1.03	0.85	0.87	0.57	0.58	0.85	0.87	0.00	0.00
4	0.63	0.85	0.53	0.57	0.35	0.85	0.53	0.00	0.00
5	0.63	0.50	0.31	0.15	0.09	0.40	0.25	0.10	0.06
6	1.75	0.75	1.31	0.55	0.96	0.70	1.23	0.55	0.96
7	7.50	0.33	2.48	0.00	0.00	0.00	0.00	0.00	0.00
8	8.75	0.67	5.82	0.00	0.00	0.00	0.00	0.00	0.00
9	8.75	0.33	2.89	0.00	0.00	0.00	0.00	0.00	0.00
10	8.75	0.67	5.82	0.00	0.00	0.00	0.00	0.00	0.00
11	3.00	0.33	0.99	0.00	0.00	0.00	0.00	0.00	0.00
12	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.75	0.27	0.20	0.40	0.30	0.40	0.30	0.00	0.00
14	0.75	0.55	0.41	0.65	0.49	0.63	0.48	0.00	0.00
15	0.50	0.27	0.13	0.40	0.20	0.40	0.20	0.00	0.00
16	0.50	0.63	0.32	0.65	0.33	0.63	0.32	0.00	0.00
17	7.50	0.27	1.99	0.40	3.00	0.40	3.00	0.00	0.00
18	1.05	0.55	0.58	0.65	0.68	0.63	0.67	0.00	0.00
Total	53.65		25.21		7.55		8.54		1.03

5.4.1.2 Stream RP02-RP01

Stream section RP02-RP01 is located between Pond RP02 and RP01 and is approximately 300 m in length and contains 7.33 units of fish habitat. Stream RP02-RP01 drains from Pond RP02 in a general northeast direction into Pond RP01. There are four ponds located upstream of this section of stream (RP02, RP03, RP04 and RP05) and their associated interconnecting stream sections. Channel widths ranged from 0.8-4.9 m and depths ranged from 0.02-0.74 m. mean water velocities were low and ranged from 0.00-0.14 m/s. Table 5.38 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream RP02-RP01 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. In order to remain conservative, if no electrofishing was completed within a specific reach, nearby electrofishing results (or fyke net results from ponds within the same drainage) were used to calculate HEU values. Fish species present have been incorporated into the table of generated HEUs.

Population Estimate

RP02-RP01 was selected as a representative stream for population estimates within the Project area. These efforts are continuing and results will be presented as an addendum to this baseline report. The habitat has been quantified using DFO guidelines and it is recognized that this stream is within the boundary of the pit and will therefore be removed. As a result, it is included in the habitat to be considered for compensation. The population estimates will allow the revised Fisheries Act Compensation requirements to be determined but their absence does not limit the ability to assess the effects of the project on the fish and fish habitat of the area.

Habitat Equivalent Units

Table 5.39 summarizes the species suitability for each reach of stream RP02-RP01 for all species found in the watershed, as well as the calculations of the HEU. The HEU values for the recreational species present within stream RP02-RP01 based solely on fish presence (brook trout) is 5.07 units.

Table 5.38. Summary of habitat measurements and classifications for RP02-RP01.

		Section	Wetted	Area	Average	Average	Substrate (%)							Classification	
Transect #	Distance	Length	Width (m)	(Units)	Depth (m)	Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	4.9	-	0.44	0.04	0	0	0	0	0	0	100	IV	Pool
2	25	25	3.2	0.80	0.67	0.05	0	0	0	0	0	0	100	IV	Pool
3	50	25	3.6	0.90	0.74	0.02	0	0	0	0	0	0	100	IV	Pool
4	75	25	2.7	0.68	0.49	0.03	0	0	15	15	0	0	70	IV	Pool
5	100	25	2.0	0.50	0.19	0.14	0	0	15	15	0	0	70	IV	Steady
6	125	25	1.4	0.35	0.25	0.11	0	15	15	0	0	0	70	IV	Pool
7	150	25	1.9	0.48	0.53	0.08	0	15	15	0	0	0	70	IV	Pool
8	175	25	3.7	0.93	0.27	0.10	0	0	5	20	0	0	75	IV	Pool
9	200	25	2.1	0.53	0.27	0.05	0	0	5	20	0	0	75	IV	Pool
10	225	25	2.0	0.50	0.27	0.07	0	0	30	20	0	0	50	IV	Pool
11	250	25	1.0	0.25	0.02	-	0	0	30	20	0	0	50	IV	Steady
12	275	25	0.8	0.20	0.02	-	0	5	5	0	0	0	90	IV	Steady
13	300	25	1.5	0.38	0.02	-	0	5	5	0	0	0	90	IV	Steady

Table 5.39. Habitat Equivalent Units for Stream RP02-RP01.

		Brook trout		Lake chub		Sculpin	
Reach	**Area (Units)**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**
1	1.23	0.67	0.81	0.00	0.00	0.00	0.00
2	0.80	0.67	0.53	0.00	0.00	0.00	0.00
3	0.90	0.60	0.54	0.65	0.59	0.00	0.00
4	0.68	0.77	0.52	0.65	0.44	0.00	0.00
5	0.50	0.77	0.38	0.60	0.30	0.00	0.00
6	0.35	0.60	0.21	0.60	0.21	0.00	0.00
7	0.48	0.75	0.36	0.63	0.30	0.00	0.00
8	0.93	0.75	0.69	0.63	0.58	0.00	0.00
9	0.53	0.83	0.44	0.75	0.39	0.00	0.00
10	0.50	0.83	0.42	0.75	0.38	0.00	0.00
11	0.25	0.40	0.10	0.10	0.03	0.00	0.00
12	0.20	0.40	0.08	0.10	0.02	0.00	0.00
Total	7.33		5.07		3.22		0.00

5.4.1.3 Stream RP03-RP02

Stream section RP03-RP02 is located between Pond RP03 and RP02 and is approximately 300 m in length and contains 5.60 units of fish habitat. Stream RP03-RP02 drains from Pond RP03 in a general northeast direction into Pond RP02. RP03 is a headwater pond for the southern portion of the watershed and contains no inflow. Channel widths ranged from 0.8-3.9 m and depths ranged from 0.04-0.58 m. Mean water velocities were low and ranged from 0.00-0.24 m/s. Table 5.40 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream RP03-RP02 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. In order to remain conservative, if no electrofishing was completed within a specific reach, nearby electrofishing results (or fyke net results from ponds within the same drainage) were used to calculate HEU values. Fish species present have been incorporated into the table of generated HEUs.

Population Estimate

RP03-RP02 was selected as a representative stream for population estimates near the Project area. These efforts are continuing and results will be presented as an addendum to this baseline report. The habitat has been quantified using DFO guidelines.

Habitat Equivalent Units

Table 5.41 summarizes the species suitability for each reach of stream RP03-RP02 for all species found in the watershed, as well as the calculations of the HEU. The HEU values for the recreational species present within stream RP03-RP02 based solely on fish presence (brook trout and burbot) is 3.56 and 1.89 units respectively.

Table 5.40. Summary of habitat measurements and classifications for RP03-RP02.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	N/A	-	-	-	0	0	0	0	0	0	100	IV	Steady
2	25	25	3.9	0.98	0.46	0.02	0	0	0	0	0	0	100	IV	Pool
3	50	25	1.1	0.28	0.23	0.04	0	0	0	0	0	0	100	IV	Pool
4	75	25	0.9	0.23	0.10	0.24	0	0	20	30	40	0	10	I	Riffle
5	100	25	2.6	0.65	0.18	0.05	0	0	20	30	40	0	10	I	Riffle
6	125	25	1.1	0.28	0.07	0.16	0	0	10	50	20	0	20	I	Riffle
7	150	25	1.8	0.45	0.10	0.07	0	0	10	50	20	0	20	I	Riffle
8	175	25	0.9	0.23	0.17	0.04	0	40	30	0	10	20	0	I	Run
9	200	25	0.8	0.20	0.07	0.10	0	40	30	0	10	20	0	I	Run
10	225	25	1.9	0.48	0.19	0.13	0	10	10	0	0	0	80	IV	Steady
11	250	25	2.0	0.50	0.13	0.02	0	10	10	0	0	0	80	IV	Steady
12	275	25	2.0	-	-	-	0	10	10	0	0	0	80	IV	Steady
13	300	25	3.4	0.85	0.44	0.20	0	10	10	0	0	0	80	IV	Pool

Orange cells were estimated based on field observations and photos (Appendix B).

Table 5.41. Habitat Equivalent Units for Stream RP03-RP02.

Reach	Area (Units)	Brook trout		Burbot		Lake chub		Pearl dace		Sculpin	
		HSI	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**
1	0.98	0.33	0.32	0.33	0.32	0.00	0.00	0.00	0.00	0.00	0.00
2	0.28	0.50	0.14	0.50	0.14	0.00	0.00	0.00	0.00	0.00	0.00
3	0.23	0.97	0.22	0.55	0.12	0.95	0.21	0.70	0.16	0.70	0.16
4	0.65	0.97	0.63	0.00	0.00	0.95	0.62	0.70	0.46	0.70	0.46
5	0.28	0.93	0.26	0.50	0.14	0.90	0.25	0.60	0.17	0.60	0.17
6	0.45	0.77	0.34	0.50	0.23	0.90	0.41	0.60	0.27	0.60	0.27
7	0.23	1.00	0.23	0.42	0.09	0.80	0.18	0.65	0.15	0.65	0.15
8	0.20	1.00	0.20	0.00	0.00	0.80	0.16	0.65	0.13	0.65	0.13
9	0.48	0.57	0.27	0.33	0.16	0.55	0.26	0.00	0.00	0.00	0.00
10	0.50	0.57	0.28	0.33	0.17	0.55	0.28	0.00	0.00	0.00	0.00
11	0.50	0.57	0.28	0.50	0.25	0.57	0.28	0.00	0.00	0.00	0.00
12	0.85	0.46	0.39	0.33	0.28	0.20	0.17	0.00	0.00	0.00	0.00
Total	5.60		3.56		1.89		2.81		1.32		1.32

5.4.1.4 Stream RP04-RP02

Stream section RP04-RP02 is located between Pond RP04 and RP02 and is approximately 550 m in length and contains 8.44 units of fish habitat. Stream RP04-RP02 drains from Pond RP04 in a westerly direction into Pond RP02. There is a single stream section (RP05-RP04) and a single pond (RP05) located upstream of RP04. Channel widths ranged from 0.4-4.9 m and depths ranged from 0.09-0.42 m. Mean water velocities were low and ranged from 0.00-0.35 m/s. Table 5.42 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream RP04-RP02 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. In order to remain conservative, if no electrofishing was completed within a specific reach, nearby electrofishing results (or fyke net results from ponds within the same drainage) were used to calculate HEU values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.43 summarizes the species suitability for each reach of stream RP04-RP02 for all species found in the watershed, as well as the calculations of the HEU. The HEU value for the recreational species present within stream RP04-RP02 based solely on fish presence (brook trout) is 4.58 units.

Table 5.42. Summary of habitat measurements and classifications for RP04-RP02.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	1.1	-	0.13	0.06	0	0	0	0	15	50	35	IV	Pool
2	25	25	0.9	0.23	0.20	0.17	0	0	0	0	15	50	35	IV	Steady
3	50	25	0.7	0.18	0.28	0.15	0	0	0	0	15	50	35	IV	Steady
4	75	25	1.1	0.28	0.13	0.21	0	0	10	10	0	80	0	IV	Pool
5	100	25	0.5	0.13	0.09	0.18	0	0	10	10	0	80	0	IV	Steady
6	125	25	1.4	0.35	0.19	0.00	0	0	40	45	15	0	0	I	Run
7	150	25	0.8	0.20	0.08	0.25	0	0	40	45	15	0	0	I	Run
8	175	25	0.9	0.23	0.31	0.14	0	0	20	40	20	20	0	I	Riffle
9	200	25	0.5	0.13	0.17	0.17	0	0	20	40	20	20	0	I	Riffle
10	225	25	1.4	0.35	0.21	0.10	0	0	40	30	20	0	10	I	Riffle
11	250	25	0.8	0.20	0.25	0.20	0	0	40	30	20	0	10	I	Riffle
12	275	25	1.1	0.28	0.23	0.04	0	0	30	35	20	15	0	II	Riffle
13	300	25	2.0	0.50	0.22	0.05	0	0	30	35	20	15	0	II	Riffle
14	325	25	1.1	0.28	0.15	0.02	0	0	25	55	10	10	0	II	Riffle
15	350	25	1.3	0.33	0.09	0.35	0	0	25	55	10	10	0	II	Riffle
16	375	25	0.4	0.10	0.14	0.21	0	0	40	60	0	0	0	I	Riffle
17	400	25	1.4	0.35	0.20	0.06	0	0	40	60	0	0	0	IV	Steady
18	425	25	0.9	0.23	0.19	0.04	-	-	-	-	-	-	-	IV	Steady
19	450	25	3.0	-	-	-	-	-	-	-	-	-	-	-	-
20	475	25	4.9	1.23	0.42	0.00	0	0	0	0	0	0	100	IV	Pool
21	500	25	2.0	0.49	0.12	0.07	0	0	0	0	0	0	100	IV	Steady
22	525	25	4.2	1.05	0.39	0.00	0	0	0	0	0	0	100	IV	Pool
23	550	25	2.5	0.63	0.42	0.01	0	0	0	0	0	0	100	IV	Pool

Orange cells were estimated based on field observations and photos (Appendix B).

Table 5.43. Habitat Equivalent Units for Stream RP04-RP02.

Reach	Area (Units)	Brook trout		White sucker	
		HSI	HEU	HSI	HEU
1	0.23	0.88	0.20	0.83	0.19
2	0.18	0.88	0.15	0.83	0.14
3	0.28	1.00	0.28	0.73	0.20
4	0.13	0.83	0.10	0.73	0.09
5	0.35	1.00	0.35	0.41	0.14
6	0.20	0.00	0.00	0.58	0.12
7	0.23	0.83	0.19	0.53	0.12
8	0.13	0.83	0.10	0.53	0.07
9	0.35	0.80	0.28	0.43	0.15
10	0.20	0.80	0.16	0.60	0.12
11	0.28	1.00	0.28	0.68	0.19
12	0.50	1.00	0.50	0.68	0.34
13	0.28	1.00	0.28	0.60	0.17
14	0.33	0.67	0.22	0.60	0.20
15	0.10	1.00	0.10	0.53	0.05
16	0.35	1.00	0.35	0.37	0.13
17	0.23	0.00	0.00	0.00	0.00
18	0.75	0.00	0.00	0.00	0.00
19	1.23	0.33	0.40	0.00	0.00
20	0.49	0.00	0.00	0.00	0.00
21	1.05	0.42	0.44	0.00	0.00
22	0.63	0.33	0.21	0.00	0.00
Total	8.44		4.58		2.40

5.4.1.5 Stream RP05-RP04

Stream section RP05-RP04 is located between Pond RP05 and RP04 and is approximately 100 m in length and contains 1.83 units of fish habitat. Stream RP05-RP04 drains from Pond RP05 in a westerly direction into Pond RP04. RP05 is a headwater pond for the eastern portion of the watershed and based upon mapping contains a small inflow from the north (TRIB1). Field surveys indicated that TRIB 1 is only comprised pockets of standing water with no interconnecting flow. Channel widths in stream RP05-RP04 ranged from 1.4-2.6 m and mean depths ranged from 0.09-0.52 m. Mean water velocities were low and ranged from 0.01-0.08 m/s. Table 5.44 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach

Fish Presence

Fish species presence within Stream RP05-RP04 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. In order to remain conservative, if no electrofishing was completed within a specific reach, nearby electrofishing results (or fyke net results from ponds within the same drainage) were used to calculate HEU values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.45 summarizes the species suitability for each reach of stream RP05-RP04 for all species found in the watershed, as well as the calculations of the HEU. The HEU value for the recreational species present within stream RP04-RP02 based solely on fish presence (brook trout) is 1.19 units.

Table 5.44. Summary of habitat measurements and classifications for RP05-RP04.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	2.6	-	0.52	0.02	0	0	0	0	0	0	100	IV	Pool
2	25	25	1.4	0.35	0.25	0.08	0	0	0	0	0	0	100	IV	Steady
3	50	25	2.1	0.53	0.09	0.08	0	0	0	0	0	0	100	IV	Pool
4	75	25	1.9	0.48	0.11	0.03	0	20	25	50	0	0	5	I	Run
5	100	25	1.9	0.48	0.13	0.01	0	20	25	50	0	0	5	I	Run

Table 5.45. Habitat Equivalent Units for Stream RP05-RP04.

Reach	Area (Units)	Brook trout		Lake chub		Pearl dace	
		HSI	HEU	HSI	HEU	HSI	HEU
1	0.35	0.67	0.23	0.00	0.00	0.00	0.00
2	0.53	0.50	0.26	0.00	0.00	0.00	0.00
3	0.48	0.65	0.31	0.88	0.42	0.00	0.00
4	0.48	0.82	0.39	0.90	0.43	0.00	0.00
Total	1.83		1.19		0.84		0.00

5.4.1.6 Stream TRIB 1

Stream section TRIB 1 was identified from topographical mapping as draining a small bog pond into pond RP05. However, when TRIB 1 was field surveyed no stream was identified. Instead, it consisted of a series of pockets of standing water.

5.4.1.7 Stream RND

Stream section RND was identified from topographical mapping as a stream that drained into Pike Lake South. Upon field investigation it was discovered that the stream was dry and appeared to be intermittent (only flows during high rain events).

5.4.2 Pike Lake Outflow Stream

The streams within this area drain into Pike Lake North (PLN) and Pike Lake South (PLS). They are divided into five sections consisting of PLN-S1, PLN-S2, PLN-S3, PLS-S1, and PLS-S2. Each is described below. Photos of each stream survey reach are provided in Appendix B.

5.4.2.1 Stream PLN-S1

This stream is the main outflow of Pike Lake North. It flows north and empties into the Walsh River. It is approximately 425 m in length and has 22.68 units of riverine habitat. Channel widths ranged from 3.1 to 11.8m and mean depths ranged from 0.18 to 0.47 m. Mean water velocities ranged from 0.07-0.68 m/s. Table 5.46 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream PLN-S1 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. In order to remain conservative, if no electrofishing was completed within a specific reach, nearby electrofishing results (or fyke net results from ponds within the same drainage) were used to calculate HEU values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.47 summarizes the species suitability for each reach of PLN-S1 (i.e. highest life-cycle stage value) for brook trout, burbot, white sucker, lake chub, longnose dace, and pearl dace as well as the calculations of the HEUs. The HEU value for the recreational species present within stream PLN-S1 based solely on fish presence (brook trout and burbot) are 20.0 and 4.02 units respectively.

Table 5.46. Summary of habitat measurements and classifications for PLN-S1.

		Section	Wetted	Area	Average	Average	Substrate (%)							Classification	
Transect #	Distance	Length	Width (m)	(Units)	Depth (m)	Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	4.9	-	0.25	0.49	0	60	30	0	5	5	0	II	Run
2	50	50	3.1	1.55	0.18	0.68	0	40	30	0	20	10	0	II	Run
3	100	50	0.4	0.20	0.47	0.31	0	40	30	10	10	10	0	II	Run
4	150	50	11.8	5.90	0.23	0.07	0	30	20	0	10	15	25	I	Riffle
5	200	50	7.0	3.50	0.25	0.40	0	50	30	15	5	0	0	II	Run
6	250	50	6.1	3.05	0.27	0.40	0	70	30	0	0	0	0	II	Run
7	300	50	3.5	1.75	0.23	0.36	0	65	20	0	10	5	0	II	Run
8	350	50	6.9	3.45	0.19	0.31	0	60	30	0	5	5	0	II	Run
9	400	50	4.1	2.05	0.27	0.18	0	60	25	0	5	10	0	I	Run
10	425	25	4.5	1.13	0.23	0.25	0	60	25	0	5	10	0	I	Run

Table 5.47. Habitat Equivalent Units for Stream PLN-S1.

		Brook trout		Burbot		White sucker		Lake chub		Longnose dace		Pearl dace	
Reach	Area (Units)	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU
1	1.55	1.00	1.55	0.00	0.00	0.57	0.88	0.83	1.29	0.68	1.06	0.32	0.49
2	0.20	0.83	0.17	0.40	0.08	0.47	0.09	0.67	0.13	0.73	0.15	0.27	0.05
3	5.90	0.89	5.26	0.00	0.00	0.66	3.88	0.73	4.28	0.79	4.67	0.63	3.69
4	3.50	0.85	2.98	0.43	1.49	0.73	2.54	0.77	2.69	0.55	1.93	0.53	1.84
5	3.05	0.83	2.54	0.27	0.81	0.68	2.08	0.59	1.78	0.67	2.03	0.00	0.00
6	1.75	0.83	1.46	0.31	0.54	0.73	1.28	0.68	1.18	0.59	1.04	0.49	0.86
7	3.45	0.83	2.88	0.32	1.09	0.68	2.36	0.66	2.28	0.66	2.27	0.38	1.32
8	2.05	1.00	2.05	0.00	0.00	0.79	1.62	0.70	1.44	0.82	1.67	0.49	1.01
9	1.13	1.00	1.13	0.00	0.00	0.71	0.80	0.70	0.79	0.67	0.75	0.58	0.65
Total	22.58		20.00		4.02		15.54		15.85		15.57		9.91

5.4.2.2 Stream PLN-S2

This stream runs in a northerly direction between two small waterbodies north of Pike Lake North. It is approximately 50 m in length and has 5.10 units of riverine habitat. Channel widths ranged from 6.4 to 14 m and mean depths ranged from 0.15 to 0.24 m. Mean water velocities ranged from 0.08 to 0.27 m/s. Table 5.48 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream PLN-S2 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.49 summarizes the species suitability for each reach of PLN-S2 (i.e. highest life-cycle stage value) for brook trout, burbot, lake chub, and longnose dace as well as the calculations of the HEUs. The HEU value for the recreational species present within stream PLN-S2 based solely on fish presence (brook trout and burbot) are 5.10 and 3.27 units respectively.

Table 5.48. Summary of habitat measurements and classifications for PLN-S2.

							Substrate (%)							Classification	
Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	6.4	-	0.24	0.27	0	50	40	0	5	5	0	I	Run
2	50	50	14.0	5.10	0.15	0.08	0	50	40	0	5	5	0	I	Run

Table 5.49. Habitat Equivalent Units for Stream PLN-S2.

Reach	Area (Units)	Brook trout		Burbot		Lake chub		Longnose dace	
		HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU
1	5.10	1.00	5.10	0.64	3.27	0.75	3.83	0.70	3.57

5.4.2.3 Stream PLN-S3

This stream runs in a northerly direction and into Walsh River. It is approximately 385 m in length and has 24.65 units of riverine habitat. Channel widths ranged from 4.1 to 14.2 m and mean depths along transects ranged from 0.21 to 0.35 m. Mean water velocities ranged from 0.02 to 0.64 m/s. Table 5.50 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream PLN-S3 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.51 summarizes the species suitability for each reach of PLN-S3 (i.e. highest life-cycle stage value) for brook trout, longnose dace, and sculpin as well as the calculations of the HEUs. The HEU value for the recreational species present within stream PLN-S2 based solely on fish presence (brook trout) is 18.25 units.

Table 5.50. Summary of habitat measurements and classifications forPLN-S3.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	4.1	-	0.32	0.64	0	10	5	40	30	15	0	II	Run
2	50	50	5.4	2.70	0.31	0.53	0	10	5	40	30	15	0	II	Run
3	100	50	5.5	2.75	0.21	0.49	0	20	25	30	20	5	0	II	Riffle
4	125	25	6.9	1.73	0.23	0.49	0	15	25	25	25	10	0	II	Riffle
5	225	100	4.3	4.30	0.35	0.55	-	-	-	-	-	-	-	II	Run
6	275	50	7.1	3.55	0.25	0.16	0	60	20	0	15	5	0	I	Rapids
7	350	75	6.2	4.65	0.35	0.15	-	-	-	-	-	-	-	IV	Steady
8	365	15	14.2	2.13	0.34	0.02	0	25	30	20	15	10	0	IV	Pool

Table 5.51. Habitat Equivalent Units for Stream PLN-S3.

Reach	Area (Units)	Brook trout		Longnose dace		Sculpin	
		HSI	HEU	HSI	HEU	HSI	HEU
1	2.70	0.75	2.03	0.68	1.82	0.38	1.01
2	2.75	0.80	2.20	0.68	1.86	0.23	0.62
3	1.73	0.93	1.60	0.79	1.37	0.30	0.52
4	4.30	1.00	4.30	1.00	4.30	0.33	1.43
5	3.55	0.76	2.69	0.44	1.57	0.53	1.86
6	4.65	0.50	2.33	0.33	1.55	1.00	4.65
7	4.97	0.63	3.11	0.00	0.00	0.55	2.73
	24.65		18.25		12.46		12.83

5.4.2.4 Stream PLS-S1

This stream section runs northerly between Pike Lake North and Pike Lake South. It is approximately 100 m in length and has 7.45 units of riverine habitat. Channel widths ranged from 3.1 to 11.8 m and mean depths at measured transects ranged from 0.13 to 0.63 m. Mean water velocities ranged from 0.12 to 0.32 m/s. Table 5.52 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream PLS-S1 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.53 summarizes the species suitability for each reach of PLS-S1 (i.e. highest life-cycle stage value) for brook trout, burbot, white sucker, lake chub, longnose dace, and pearl dace as well as the calculations of the HEUs. The HEU value for the recreational species present within stream PLN-S2 based solely on fish presence (brook trout and burbot) are 64.51 and 1.47 units respectively.

Table 5.52. Summary of habitat measurements and classifications for PLS-S1.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	7.4	-	0.13	0.12	0	10	40	40	0	10	0	I	Run
2	50	50	3.1	1.55	0.19	0.32	0	10	40	40	0	10	0	II	Run
3	100	50	11.8	5.90	0.63	0.03	0	20	30	0	0	0	50	IV	Pool

Table 5.53. Habitat Equivalent Units for Stream PLS-S1.

		Brook trout		Burbot		White sucker		Lake chub		Longnose dace		Pearl dace	
Transect	**Area (Units)**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**
1	1.55	0.90	1.40	0.00	0.00	0.73	1.14	0.75	1.16	0.77	1.19	0.75	1.16
2	3.70	0.84	3.11	0.40	1.47	0.68	2.51	0.75	2.78	0.54	1.99	0.55	2.04
Total	5.25		4.51		1.47		3.65		3.94		3.18		3.20

5.4.2.5 Stream PLS-S2

This stream section runs northerly between Pike Lake North and Pike Lake South. It is approximately 420 m in length and has 17.57 units of riverine habitat. Channel widths ranged from 2.7 to 6.7 m and mean depths measured at transects ranged from 0.18 to 0.45 m. Mean water velocities ranged from 0.0 to 0.32 m/s. Table 5.54 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream PLS-S2 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. Fish species present have been incorporated into the table of generated HEUs.

Habitat Equivalent Units

Table 5.55 summarizes the species suitability for each reach of PLS-S2 (i.e. highest life-cycle stage value) for brook trout, burbot, white sucker, lake chub, longnose dace, pearl dace and sculpin as well as the calculations of the HEUs. The HEU value for the recreational species present within stream PLN-S2 based solely on fish presence (brook trout and burbot) are 10.21 and 4.84 units respectively.

Table 5.54. Summary of habitat measurements and classifications for PLS-S2.

		Section	Wetted	Area	Average	Average	Substrate (%)							Classification	
Transect #	Distance	Length	Width (m)	(Units)	Depth (m)	Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	4.1	-	0.20	0.19	0	40	30	30	0	0	0	I	Run
2	50	50	3.5	1.75	0.31	0.26	0	40	30	30	0	0	0	I	Run
3	100	50	4.6	2.30	0.23	0.32	0	60	40	0	0	0	0	II	Rapids
4	150	50	5.0	2.50	0.28	0.17	0	45	45	0	5	5	0	II	Rapids
5	200	50	6.7	3.35	0.33	0.13	0	50	25	25	0	0	0	II	Run
6	290	90	3.2	2.88	0.27	0.00	-	-	-	-	-	-	-	IV	Pool
7	340	50	4.0	2.00	0.51	0.03	0	80	20	0	0	0	0	II	Run
8	390	50	2.7	1.35	0.18	0.05	0	80	20	0	0	0	0	II	Run
9	420	30	4.8	1.44	0.45	0.00	0	50	20	0	0	0	30	I	Run

Table 5.55. Habitat Equivalent Units for Stream PLS-S2.

		Brook trout		Burbot		White sucker		Lake chub		Longnose dace		Pearl dace		Sculpin	
Transect	Area (Units)	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU
1	1.75	0.63	1.11	0.27	0.47	0.48	0.85	0.65	1.14	0.47	0.82	0.00	0.00	0.00	0.00
2	2.30	0.57	1.31	0.00	0.00	0.37	0.84	0.37	0.84	0.53	1.23	0.00	0.00	0.00	0.00
3	2.50	0.93	2.31	0.00	0.00	0.75	1.88	0.55	1.38	0.61	1.52	0.53	1.31	0.53	1.31
4	3.35	0.83	2.79	0.17	0.56	0.63	2.09	0.63	2.09	0.42	1.40	0.00	0.00	0.00	0.00
5	2.88	0.00	0.00	1.00	2.88	1.00	2.88	1.00	2.88	0.00	0.00	1.00	2.88	1.00	2.88
6	2.00	0.87	1.74	0.00	0.00	0.60	1.20	0.57	1.13	0.00	0.00	0.00	0.00	0.00	0.00
7	1.35	0.70	0.95	0.00	0.00	0.60	0.81	0.57	0.77	0.00	0.00	0.00	0.00	0.00	0.00
8	1.44	0.00	0.00	0.65	0.94	0.75	1.08	0.65	0.94	0.00	0.00	0.65	0.94	0.65	0.94
Total	17.57		10.21		4.84		11.63		11.17		4.96		5.13		5.13

5.4.3 Tailings Management Facility (TMF)

The drainages within the Tailings Management Area all drain into Long Lake. It has been given the tributary label T9 (Figure 3.1). Sub-divided drainages are TDA01, TDA02 and TDA02 East. Each is described below.

5.4.3.1 Stream TDA01

Stream TDA01 is the most westerly of the stream sections within the TMA. It flows in a north-northwest direction into Long Lake. TDA01 does not have a headwater pond, nor are there any ponds located along its length. It is approximately 2,800 m in length and contains 28.25 units of riverine fish habitat. Channel widths ranged from 0.5-2.2 m and depths ranged from 0.10-0.96 m. Water velocities ranged from 0.0-0.78 m/s. Table 5.56 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream TDA01 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. Fish species present have been incorporated into the table of generated HEUs.

Population Estimate

TDA01 was selected as a representative stream for population estimates within the Project area. These efforts are continuing and results will be presented as an addendum to this baseline report. The habitat has been quantified using DFO guidelines and it is recognized that this stream is within the boundary of the TMF and will therefore be removed. As a result, it is included in the habitat to be considered for compensation. The population estimates will allow the revised Fisheries Act Compensation requirements to be determined but their absence does not limit the ability to assess the effects of the project on the fish and fish habitat of the area.

Habitat Equivalent Units

Table 5.57 summarizes the species suitability for each reach of TDA01 (i.e. highest life-cycle stage value) for brook trout, as well as the calculations of the HEUs. Brook trout give an overall HEU value of 20.88 units.

Table 5.56. Summary of habitat measurements and classifications for TDA-01.

							Substrate (%)							Classification	
Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	-	-	0.00	0.00	0	20	30	0	10	10	30	IV	Steady
2	150	150	0.6	0.90	0.66	0.47	0	20	30	0	10	10	30	II	Riffle
3	200	50	1.8	0.90	0.23	0.07	10	30	30	0	5	10	15	IV	Rapids
4	300	100	1.4	1.40	0.17	0.06	10	35	10	0	20	25	0	I	Riffle
5	400	100	0.9	0.90	0.18	0.18	0	25	30	0	30	15	0	I	Rapids
6	550	150	0.5	0.75	-	-	0	0	0	0	0	0	100	IV	Steady
7	700	150	0.8	1.20	0.16	0.17	0	0	10	15	40	30	5	I	Riffle
8	850	150	0.6	0.90	0.43	0.06	0	15	15	0	30	30	10	IV	Pool
9	1000	150	1.4	2.10	0.47	0.07	0	10	0	0	40	30	20	IV	Pool
10	1150	150	0.5	0.75	0.51	0.04	0	15	0	0	20	20	45	IV	Pool
11	1300	150	1.2	1.80	0.40	0.06	0	10	0	0	20	20	50	IV	Pool
12	1450	150	0.7	1.05	0.95	0.05	0	5	0	0	15	15	65	IV	Pool
13	1600	150	0.7	1.05	0.28	0.07	0	10	0	0	10	10	70	IV	Pool
14	1750	150	1.3	1.95	0.61	0.03	0	0	0	0	10	10	80	IV	Pool
15	1900	150	1.0	1.50	0.17	0.10	0	5	0	0	10	10	75	IV	Steady
16	2050	150	2.2	3.30	0.75	0.01	0	5	0	0	5	5	85	IV	Pool
17	2200	150	1.5	2.25	0.34	0.06	0	0	0	0	10	10	80	IV	Pool
18	2350	150	1.3	1.95	0.22	0.05	0	0	10	0	20	20	50	IV	Pool
19	2500	150	0.6	0.90	0.32	0.06	0	20	0	0	20	15	45	IV	Pool
20	2650	150	0.7	1.05	0.16	0.06	0	10	0	0	10	20	60	IV	Steady
21	2800	150	1.1	1.65	0.11	0.09	10	10	0	0	30	10	40	IV	Steady

Table 5.57. Habitat Equivalent Units for Stream TDA01

Reach	Area (Units)	Brook trout	
		HSI	HEU
1	0.90	0.85	0.77
2	0.90	0.75	0.68
3	1.40	0.95	1.33
4	0.90	1.00	0.90
5	0.75	0.33	0.25
6	1.20	0.98	1.17
7	0.90	0.95	0.86
8	2.10	0.90	1.89
9	0.75	0.82	0.61
10	1.80	0.80	1.44
11	1.05	0.76	0.80
12	1.05	0.58	0.61
13	1.95	0.73	1.43
14	1.50	0.57	0.85
15	3.30	0.54	1.78
16	2.25	0.73	1.65
17	1.95	0.63	1.23
18	0.90	0.82	0.74
19	1.05	0.77	0.80
20	1.65	0.67	1.10
Total	28.25		20.88

5.4.3.2 Stream TDA02

Stream TDA02 is located to the east of TDA02 and is the longest stream section within the TMA which flows in a general northwest direction into Long Lake. TDA02 has a headwater pond (SW1) and has an additional pond (SW2) located a short distance downstream of SW1. It is approximately 6,800 m in length and contains 172.15 units of riverine fish habitat. Channel widths ranged from 0.7-5.5 m and mean depths measured at transects ranged from 0.01-0.67 m. Mean water velocities ranged from 0.0-0.51 m/s. Table 5.58 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream TDA02 was determined by index electrofishing. Species captured within each stream were used to calculate Habitat Equivalent Unit (HEU) values. Fish species present have been incorporated into the table of generated HEUs.

Population Estimate

TDA02 was selected as a representative stream for population estimates within and near the Project area. An electrofishing station was located on the stream within the TMF as well as downstream of the TMF footprint. These efforts are continuing and results will be presented as an addendum to this baseline report. The habitat has been quantified using DFO guidelines and it is recognized that this stream is within the boundary of the TMF and will therefore be removed. The habitat downstream of the TMF has also been conservatively included the habitat to be lost. As a result, it is included in the habitat to be considered for compensation. The population estimates will allow the revised Fisheries Act Compensation requirements to be determined but their absence does not limit the ability to assess the effects of the project on the fish and fish habitat of the area.

Habitat Equivalent Units

Table 5.59 summarizes the species suitability for each section of TDA02 (i.e. highest life-cycle stage value) for brook trout, pearl dace and slimy sculpin as well as the calculations of the HEUs. The HEU value for the recreational species present within stream TDA02 based solely on fish presence (brook trout) is 158.77 units.

Table 5.58. Summary of habitat measurements and classifications for TDA-02.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	3.4	-	0.41	0.12	0	50	30	20	0	0	0	I	Run
2	150	150	3.5	5.25	0.23	0.41	0	60	35	5	0	0	0	II	Run
3	250	100	4.7	4.70	0.32	0.29	0	30	20	20	10	20	0	I	Riffle
4	350	100	3.1	3.10	0.38	0.33	0	25	25	20	12	18	0	II	Riffle
5	450	100	3.3	3.30	0.33	0.33	0	18	25	22	15	20	0	II	Riffle
6	550	100	4.1	4.10	0.45	0.24	0	10	30	20	20	20	0	I	Riffle
7	650	100	3.1	3.10	0.48	0.26	5	15	25	25	15	15	0	I	Riffle
8	800	150	3.7	5.55	0.24	0.51	0	25	25	20	20	10	0	II	Run
9	950	150	3.9	5.85	0.40	0.29	10	50	35	0	0	5	0	I	Run
10	1100	150	4.7	7.05	0.17	0.38	0	30	30	20	10	10	0	II	Riffle
11	1250	150	3.2	4.80	0.27	0.37	0	40	30	0	15	15	0	II	Riffle
12	1400	150	4.2	6.30	0.67	0.15	0	30	30	20	15	5	0	I	Run
13	1550	150	1.6	2.40	0.65	0.26	0	60	20	0	0	15	5	I	Run
14	1700	150	3.5	5.25	0.36	0.18	0	60	20	0	10	10	0	I	Run
15	1850	150	3.2	4.80	0.24	0.35	0	30	20	25	20	5	0	II	Rapids
16	2000	150	5.5	8.25	0.14	0.49	0	40	30	10	20	0	0	II	Rapids
17	2150	150	3.8	5.70	0.38	0.12	0	20	20	35	15	10	0	I	Riffle
18	2300	150	4.7	7.05	0.46	0.09	0	0	0	5	60	35	0	I	Riffle
19	2450	150	3.4	5.10	0.43	0.09	0	10	0	0	50	40	0	I	Riffle
20	2600	150	3.2	4.80	0.44	0.09	0	20	30	0	10	10	30	I	Riffle
21	2750	150	3.4	5.10	0.41	0.12	0	0	0	0	50	50	0	I	Pool
22	2850	100	2.9	2.90	0.25	0.04	0	30	23	22	25	0	0	I	Run
23	2950	100	2.7	2.70	0.16	0.08	0	30	30	22	18	0	0	I	Run
24	3050	100	-	-	-	-	0	15	15	25	40	5	0	I	Run
25	3200	150	2.0	3.00	0.07	0.12	0	0	0	30	60	10	0	I	Riffle
26	3350	150	2.1	3.15	0.29	0.02	0	20	20	20	20	20	0	I	Riffle
27	3500	150	1.5	2.25	0.09	0.06	0	10	30	20	20	20	0	I	Riffle
28	3650	150	1.7	2.55	0.21	0.03	0	0	0	20	30	40	10	IV	Steady
29	3800	150	1.4	2.10	0.28	0.05	0	0	0	0	0	40	60	IV	Steady
30	3950	150	1.2	1.80	0.19	0.04	0	5	0	0	0	50	45	IV	Pool
31	4100	150	0.7	1.05	0.42	0.03	0	0	20	20	20	30	10	I	Steady
32	4250	150	1.6	2.40	0.19	0.03	0	20	15	15	20	30	0	I	Riffle
33	4400	150	2.4	3.60	0.01	0.00	0	5	0	0	15	40	40	IV	Steady
34	4550	150	0.9	1.35	0.20	0.07	0	0	0	0	30	40	30	IV	Steady
35	4700	150	2.2	3.30	0.55	0.01	0	0	0	0	30	40	30	IV	Pool
36	4850	150	1.9	2.85	0.15	0.06	0	0	0	0	30	40	30	IV	Steady
37	5000	150	1.2	1.80	0.07	0.12	0	30	0	0	30	40	0	I	Riffle
38	5150	150	1.6	2.40	0.17	0.01	0	30	20	30	20	0	0	I	Run
39	5300	150	2.1	3.15	0.16	0.03	0	30	30	30	10	0	0	I	Run
40	5450	150	1.5	2.25	0.09	0.05	0	20	20	10	10	20	20	I	Riffle
41	5600	150	1.7	2.55	0.17	0.02	0	20	30	30	20	0	0	IV	Steady
42	5750	150	1.5	2.25	0.15	0.05	0	5	30	0	15	50	0	IV	Steady
43	5900	150	1.1	1.65	0.16	0.05	0	20	20	0	40	0	20	IV	Steady
44	6050	150	1.8	2.70	0.08	0.05	0	0	20	20	40	20	0	I	Riffle
45	6200	150	1.7	2.55	0.17	0.05	0	0	50	30	20	0	0	I	Run
46	6350	150	1.5	2.25	0.18	0.07	0	0	30	30	40	0	0	I	Run
47	6500	150	1.3	1.95	0.20	0.05	0	50	30	10	5	5	0	I	Run
48	6650	150	1.5	2.25	0.18	0.08	0	0	0	0	0	0	100	IV	Pool
49	6800	150	1.5	2.25	0.16	0.05	0	0	0	0	0	0	100	IV	Pool

Table 5.59. Habitat Equivalent Units for Stream TDA02.

		Brook trout		Pearl dace		Sculpin	
Reach	Area (Units)	HSI	HEU	HSI	HEU	HSI	HEU
1	5.25	0.83	4.38	0.00	0.00	0.00	0.00
2	7.05	1.00	7.05	0.48	3.41	0.48	3.41
3	4.65	1.00	4.65	0.65	3.02	0.65	3.02
4	4.95	1.00	4.95	0.51	2.52	0.51	2.52
5	6.15	1.00	6.15	0.70	4.31	0.70	4.31
6	4.65	0.98	4.53	0.65	3.02	0.65	3.02
7	5.55	1.00	5.55	0.65	3.61	0.65	3.61
8	5.85	0.95	5.56	0.36	2.10	0.36	2.10
9	7.05	1.00	7.05	0.60	4.23	0.60	4.23
10	4.80	1.00	4.80	0.65	3.12	0.65	3.12
11	6.30	1.00	6.30	0.27	1.68	0.27	1.68
12	2.40	0.98	2.34	0.58	1.38	0.58	1.38
13	5.25	1.00	5.25	0.60	3.15	0.60	3.15
14	4.80	1.00	4.80	0.63	3.00	0.63	3.00
15	8.25	1.00	8.25	0.60	4.95	0.60	4.95
16	5.70	1.00	5.70	0.53	2.99	0.53	2.99
17	7.05	1.00	7.05	0.98	6.87	0.98	6.87
18	5.10	1.00	5.10	0.95	4.85	0.95	4.85
19	4.80	0.88	4.24	0.60	2.88	0.60	2.88
20	5.10	1.00	5.10	1.00	5.10	1.00	5.10
21	4.35	0.83	3.63	0.63	2.72	0.63	2.72
22	4.05	1.00	4.05	0.59	2.39	0.59	2.39
23	0.00	1.00	0.00	0.73	0.00	0.73	0.00
24	3.00	1.00	3.00	0.70	2.10	0.70	2.10
25	2.10	1.00	2.10	0.70	1.47	0.70	1.47
26	1.50	0.67	1.00	0.70	1.05	0.70	1.05
27	1.70	0.80	1.36	0.85	1.45	0.85	1.45
28	2.10	0.80	1.68	0.70	1.47	0.70	1.47
29	1.80	0.82	1.48	0.75	1.35	0.75	1.35
30	1.05	0.62	0.65	0.75	0.79	0.75	0.79
31	2.40	1.00	2.40	0.75	1.80	0.75	1.80
32	3.60	0.51	1.83	0.78	2.79	0.78	2.79
33	1.35	0.00	0.00	0.85	1.15	0.85	1.15
34	3.30	0.90	2.97	0.85	2.81	0.85	2.81
35	2.85	0.73	2.09	0.85	2.42	0.85	2.42
36	1.80	0.83	1.50	0.85	1.53	0.85	1.53
37	2.40	1.00	2.40	0.60	1.44	0.60	1.44
38	3.15	0.83	2.63	0.55	1.73	0.55	1.73
39	2.25	0.90	2.03	0.65	1.46	0.65	1.46
40	2.55	0.83	2.13	0.60	1.53	0.60	1.53
41	2.25	0.83	1.88	0.83	1.86	0.83	1.86
42	1.10	0.93	1.03	0.70	0.77	0.70	0.77
43	1.80	1.00	1.80	0.80	1.44	0.80	1.44
44	1.70	0.83	1.42	0.60	1.02	0.60	1.02
45	1.50	0.83	1.25	0.70	1.05	0.70	1.05
46	1.30	0.83	1.08	0.55	0.72	0.55	0.72
47	2.25	0.50	1.12	0.00	0.00	0.00	0.00
48	2.25	0.67	1.50	0.00	0.00	0.00	0.00
Total	172.15		158.77		106.47		106.47

5.4.3.3 Stream TDA02 East

Stream TDA02 East is the most easterly of the stream sections within the TMA. It flows in a north-northwest direction into TDA02 which flows into Long Lake. TDA02 East does have a small headwater pond (SW3) and there are no other ponds located along its length. It is approximately 1,650 m in length and contains 12.15 units of riverine fish habitat. Channel widths ranged from 0.4-1.3 m and mean depths measured at transects ranged from 0.09-0.48 m. Mean water velocities ranged from 0.01-0.26 m/s. Table 5.60 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream TDA02 East was determined by index electrofishing within nearby stream TDA02. Species captured were used to calculate Habitat Equivalent Unit (HEU) values. Fish species present have been incorporated into the table of generated HEUs.

Population Estimate

TDA02East was selected as a representative stream for population estimates within the Project area. These efforts are continuing and results will be presented as an addendum to this baseline report. The habitat has been quantified using DFO guidelines and it is recognized that this stream is within the boundary of the TMF and will therefore be removed. As a result, it is included in the habitat to be considered for compensation. The population estimates will allow the revised Fisheries Act Compensation requirements to be determined but their absence does not limit the ability to assess the effects of the project on the fish and fish habitat of the area.

Habitat Equivalent Units

Table 5.61 summarizes the species suitability for each section of TDA02 East (i.e. highest life-cycle stage value) for brook trout, pearl dace and slimy sculpin as well as the calculations of the HEUs. The HEU value for the recreational species present within stream TDA02 based solely on fish presence (brook trout) is 10.33 units.

Table 5.60. Summary of habitat measurements and classifications for TDA02 East.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	150	0.6		0.21	0.01	0	0	0	0	0	0	100	IV	Steady
2	150	150	0.8	1.20	0.17	0.01	0	0	0	0	0	0	100	IV	Steady
3	300	150	0.4	0.60	0.09	0.12	0	20	0	0	0	0	80	IV	Steady
4	450	150	0.4	0.60	-	-	-	-	-	-	-	-	-	-	-
5	600	150	0.5	0.75	0.10	0.07	0	0	0	0	0	100	0	IV	Steady
6	750	150	0.7	1.05	0.26	0.15	0	0	0	0	0	90	10	IV	Steady
7	900	150	0.7	1.05	0.28	0.20	0	0	0	0	50	50	0	I	Riffle
8	1050	150	1.3	1.95	0.17	0.22	0	0	0	0	50	50	0	I	Riffle
9	1200	150	1.0	1.50	0.48	0.12	0	0	0	0	50	50	0	I	Riffle
10	1350	150	1.0	1.50	0.21	0.26	0	0	0	0	30	70	0	I	Riffle
11	1500	150	1.3	1.95	0.20	0.19	0	30	0	20	0	50	0	I	Steady

Orange cells were estimated based on field observations and photos (Appendix B).

Table 5.61. Habitat Equivalent Units for Stream TDA02E.

Reach	Area (Units)	Brook trout		Pearl dace		Sculpin	
		HSI	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**
1	1.20	0.50	0.60	0.00	0.00	0.00	0.00
2	0.60	0.57	0.34	0.00	0.00	0.00	0.00
3	0.60	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-
4	0.75	1.00	0.75	1.00	0.75	1.00	0.75
5	1.05	0.97	1.01	0.95	1.00	0.95	1.00
6	1.05	1.00	1.05	1.00	1.05	1.00	1.05
7	1.95	0.83	1.63	0.83	1.63	0.83	1.63
8	1.50	1.00	1.50	1.00	1.50	1.00	1.50
9	1.50	1.00	1.50	1.00	1.50	1.00	1.50
10	1.95	1.00	1.95	0.75	1.46	0.75	1.46
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	12.15		10.33		8.89		8.89

5.4.4 Rose South Waste Rock Disposal Area

The Rose South Waste Rock Disposal Area was relocated based on public consultation, engineering optimization, and environmental considerations. As a result, the stream habitat within its footprint required additional survey in 2012.

There are a total of four streams identified within the South Waste Rock Disposal area (AD01, AD02, AD03, AD04). Of the four streams present, only one has a mean width near 1m. AD01 drains from the northern most portion of the waste rock area and empties into the outflow of Mills Lake. This outflow empties into Long Lake. AD02, AD03 and AD04 drain the remainder of the waste rock area to the east, into Waldorf River. Table 5.62 is a brief summary of the habitat characteristics of each. The majority of the habitat is characterized as shallow, boggy drainage; however, AD02 is characterized as rearing habitat. The habitat is being quantified using DFO guidelines and it is recognized that these stream are within the boundary of the Waste Rock Disposal Area and will therefore be removed. As a result, it is included in the habitat to be considered for compensation. Additional habitat detail and quantification values will be provided in the baseline addendum.

Table 5.62. Habitat stream summary in the Rose South Waste Rock Disposal Area.

Stream	Length (m)	Minimum, Mean, Maximum			Substrate (% composition)						
		Width (m)	Velocity (m3/s)	Depth (m)	Bo	R	C	G	S	F	Veg
AD01	500	0.27 0.69 1.20	0.00 0.52 2.06	0.00 0.21 0.62	31	20	12	4	5	28	0
AD02	3,915	0.42 0.96 1.70	0.00 0.10 0.79	0.00 0.11 0.39	4	11	9	10	25	38	3
AD03	320	0.41 0.50 0.58	0.00 0.08 0.17	0.02 0.11 0.17				2	37	61	0
AD04	763	0.18 0.56 0.88	0.00 0.07 0.43	0.00 0.05 0.13		4	8	7	47	34	0

Notes:
Substrate: boulder (Bo), rubble (R), cobble (C), gravel (G), sand (S), fines (F) (totalling 100%)
Aquatic vegetation (Veg) – percent occurrence of stream area

Population Estimates

All streams within the Rose South Waste Rock Disposal Area were selected as representative streams for population estimates within the Project area. These efforts are continuing and results will be presented as an addendum to this baseline report. The population estimates will allow the revised Fisheries Act Compensation requirements to be determined but their absence does not limit the ability to assess the effects of the project on the fish and fish habitat of the area.

5.4.5 Stream Crossing Locations

There were 11 stream crossings identified within the 2011 project area which will require culvert installation for roads, rails, conveyors, or utility corridor. Additional stream crossings have been identified during redesign of the railway route which have been included in the 2012 field surveys. Each crossing is discussed below. The habitat throughout the proposed crossing location has been classified and quantified; however, the exact quantity of habitat that will be included within the HADD determination will be finalized upon completion of the engineered crossing designs for each location.

5.4.5.1 Crossing SC01

Crossing location SC01 is located between Mills Lake and Long Lake. The surrounding area is comprised of an upland bog area that drains into a series of small ponds prior to flowing northwest into Long Lake. The stream section between these two ponds is 150 m in length and contains 24.23 units of riverine fish habitat. Channel widths ranged from 6.0-18.5 m and mean water depths measured at transects ranging from 0.16-0.64 m. Mean water velocities at transects ranged from 0.13-0.77 m/s. Table 5.63 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Stream SC01 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.64 summarizes the species suitability for each section of SC01 (i.e. highest life-cycle stage value) for brook trout, lake chub, longnose dace and sculpin as well as the calculations of the HEUs. The HEU value for the recreational species present within stream SC01 based solely on fish presence (brook trout) is 23.70 units.

Table 5.63. Summary of habitat measurements and classifications for SC01.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	15.4	-	0.16	0.69	0	10	50	30	10	0	0	II	Rapids
2	25	25	6.0	1.50	0.33	0.77	0	10	50	30	10	0	0	II	Rapids
3	50	25	6.6	1.65	0.25	0.70	0	10	50	30	10	0	0	II	Rapids
4	75	25	6.6	1.65	0.25	0.70	0	20	35	15	5	25	0	II	Rapids
5	100	25	6.7	1.68	0.44	0.55	0	20	35	15	5	25	0	II	Rapids
6	125	25	17.0	4.25	0.48	0.14	0	20	35	15	5	25	0	II	Rapids
7	150	25	17.0	4.25	0.48	0.14	0	15	5	5	5	70	0	IV	Pool
8	175	25	18.5	4.63	0.64	0.13	0	15	5	5	5	70	0	IV	Pool
9	200	25	18.5	4.63	-	-	0	15	5	5	5	70	0	IV	Steady

Orange cells were estimated based on field observations and photos (Appendix B).

Table 5.64. Habitat Equivalent Units for Stream Crossing SC01.

Reach	Area (Units)	Brook trout		Lake chub		Longnose dace		Sculpin	
		HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU
1	1.50	1.00	1.50	0.75	1.13	0.75	1.13	0.25	0.38
2	1.65	0.92	1.51	0.78	1.29	0.67	1.10	0.38	0.63
3	1.65	0.92	1.51	0.73	1.21	0.63	1.03	0.48	0.80
4	1.68	1.00	1.68	0.82	1.37	0.71	1.19	0.48	0.81
5	4.25	0.97	4.13	0.90	3.83	0.64	2.70	0.65	2.76
6	4.25	0.97	4.13	0.93	3.93	0.56	2.38	0.88	3.72
7	4.63	1.00	4.63	0.93	4.28	0.00	0.00	0.88	4.05
7	4.63	1.00	4.63	1.00	4.63	1.00	4.63	0.75	3.47
Total	24.23		23.70		21.65		14.15		16.61

5.4.5.2 Crossing SC02

Crossing location SC02 is located at a constriction point between the main body of Long Lake and the inflow of the Waldorf River. Field surveys were conducted from the southern perimeter of the constriction, downstream and along western shore of Long Lake. The section surveyed is 100 m in length and contains 25 units of riverine fish habitat. Channel widths ranged from 21.0-33.0 m and mean depths measured at transects ranged from 0.67-1.11 m. Mean water velocities measured at transects ranged from 0.01-0.16 m/s. Table 5.65 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish presence was not determined during the survey. Due to the proximity of SC1, SC3, and SC4, fish caught at these sites were used to determine HEUs.

Habitat Quantification

Table 5.66 summarizes the species suitability for each section of SC02 (i.e. highest life-cycle stage value) for brook trout, burbot, lake chub, longnose dace and sculpin as well as the calculations of the HEUs. The HEU value for the recreational species assumed present within stream SC01 based solely on fish presence within nearby streams (brook trout) is 18.89 units.

Table 5.65. Summary of habitat measurements and classifications for SC02.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	33.0	-	0.73	0.05	0	5	0	10	10	70	5	IV	Pool
2	25	25	33.0	8.25	0.68	0.11	0	5	0	10	10	70	5	IV	Pool
3	50	25	23.0	5.75	0.67	0.01	0	5	0	10	10	70	5	IV	Pool
4	50	0	23.0	-	0.67	0.01	0	5	0	5	15	70	5	IV	Pool
5	75	25	21.0	5.25	1.11	0.09	0	5	0	5	15	70	5	IV	Pool
6	100	25	23.0	5.75	0.87	0.16	0	5	0	5	15	70	5	IV	Pool

Table 5.66. Habitat Equivalent Units for Stream Crossing SC02.

Reach	Area (Units)	Brook trout		Burbot		Lake chub		Longnose dace		Sculpin	
		HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU
1	8.25	0.85	7.01	0.66	5.43	0.95	7.84	0.00	0.00	0.90	7.43
2	5.75	0.62	3.55	0.95	5.46	0.95	5.46	0.00	0.00	0.90	5.18
3	5.25	0.62	3.24	0.95	4.99	0.95	4.99	0.00	0.00	0.93	4.86
4	5.75	0.88	5.08	0.72	4.16	0.95	5.46	0.47	2.69	0.93	5.32
Total	25.00		18.89		20.04		23.75		2.69		22.78

5.4.5.3 Crossing SC03

Crossing location SC03 is located directly south of Long Lake on stream TDA01. The crossing location is approximately 400 m upstream of the inflow of stream TDA01 to Long Lake. The stream section is 200 m in length and contains 2.13 units of riverine fish habitat. It should be noted that this section of stream has been included in the classification of the TDA01 above. Channel widths at the crossing ranged from 0.4-2.1 m and mean water depths at transects ranged from 0.11-0.28 m. Mean water velocities within transects at the crossing ranged from 0.01-0.33 m/s. Table 5.67 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach in TDA01 within the crossing location.

Fish Presence

Fish species presence within Crossing SC03 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.68 summarizes the species suitability for each section of SC03 (i.e. highest life-cycle stage value) for brook trout, and burbot as well as the calculations of the HEUs. The HEU value for the recreational species assumed present within stream SC03 based solely on fish presence within nearby streams (brook trout and burbot) is 1.77 and 1.03 units respectively.

Table 5.67. Summary of habitat measurements and classifications for SC03.

		Section	Wetted	Area	Average	Average	Substrate (%)							Classification	
Transect #	Distance	Length	Width (m)	(Units)	Depth (m)	Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	1.8	-	0.23	0.07	20	30	20	0	10	20	0	IV	Pool
2	25	25	0.8	0.20	0.19	0.06	20	30	20	0	10	20	0	IV	Pool
3	50	25	1.2	0.30	0.11	0.07	20	30	20	0	10	20	0	IV	Pool
4	75	25	2.1	0.53	0.15	0.06	0	40	0	0	30	30	0	IV	Pool
5	100	25	1.5	0.38	0.25	0.02	0	40	0	0	30	30	0	IV	Pool
6	125	25	0.4	0.10	0.12	0.33	0	30	20	0	30	20	0	II	Rapids
7	150	25	0.7	0.18	0.12	0.32	0	30	20	0	30	20	0	II	Rapids
8	175	25	0.8	0.20	0.18	0.16	0	20	40	0	30	10	0	I	Riffle
9	200	25	1.0	0.25	0.28	0.01	0	20	40	0	30	10	0	I	Riffle

Table 5.68. Habitat Equivalent Units for Stream Crossing SC03.

		Brook trout		Burbot	
Reach	Area (Units)	HSI	HEU	HSI	HEU
1	0.20	0.93	0.19	0.38	0.08
2	0.30	0.77	0.23	0.38	0.12
3	0.53	1.00	0.53	0.47	0.25
4	0.38	0.67	0.25	0.63	0.24
5	0.10	0.67	0.07	0.65	0.07
6	0.18	0.83	0.15	0.48	0.08
7	0.20	1.00	0.20	0.00	0.00
8	0.25	0.67	0.17	0.83	0.21
Total	2.13		1.77		1.03

5.4.5.4 Crossing SC04

Crossing location SC04 is located west of Long Lake on stream TDA02. The crossing location is approximately 600 m upstream of the outflow of stream TDA02 to Long Lake. The stream section surveyed was 400 m in length and contains 13.8 units of riverine fish habitat. Channel widths ranged from 2.4-5.2 m with measured mean water depths at transects ranging from 0.31-0.88 m. Mean water velocities at transects ranged from 0.14-0.40 m/s. Table 5.69 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Crossing SC04 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.70 summarizes the species suitability for each section of SC04 (i.e. highest life-cycle stage value) for brook trout, and sculpin as well as the calculations of the HEUs. The HEU value for the recreational species assumed present within stream SC04 based solely on fish presence (brook trout) is 13.76 units.

Table 5.69. Summary of habitat measurements and classifications for SC04.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	3.1	-	0.62	0.18	0	30	20	20	10	20	0	I	Pool
2	25	25	3.3	0.83	0.34	0.34	0	30	20	20	10	20	0	II	Rapids
3	50	25	3.2	0.80	0.33	0.40	0	30	20	20	10	20	0	II	Rapids
4	75	25	3.4	0.85	0.34	0.28	0	20	30	20	15	15	0	II	Rapids
5	100	25	2.7	0.68	0.33	0.38	0	20	30	20	15	15	0	II	Rapids
6	125	25	3.9	0.98	0.23	0.36	0	25	30	15	10	20	0	II	Rapids
7	150	25	3.4	0.85	0.33	0.36	0	25	30	15	10	20	0	II	Rapids
8	175	25	2.9	0.73	0.38	0.27	0	10	20	30	20	20	0	I	Riffle/Run
9	200	25	3.6	0.90	0.37	0.26	0	10	20	30	20	20	0	I	Riffle/Run
10	225	25	5.2	1.30	0.45	0.20	0	10	25	25	20	20	0	I	Riffle/Run
11	250	25	2.5	0.63	0.58	0.27	0	10	25	25	20	20	0	I	Riffle/Run
12	275	25	3.4	0.85	0.31	0.29	0	10	30	20	20	20	0	I	Riffle/Run
13	300	25	3.1	0.78	0.88	0.14	0	10	30	20	20	20	0	I	Pool
14	325	25	2.4	0.60	0.42	0.30	10	10	30	30	10	10	0	II	Run/Riffle
15	350	25	2.4	0.60	0.39	0.28	10	10	30	30	10	10	0	II	Run/Riffle
16	375	25	4.9	1.23	0.46	0.22	0	20	20	20	20	20	0	I	Riffle/Run
17	400	25	4.9	1.23	-	-	0	20	20	20	20	20	0	I	Riffle/Run

Orange cells were estimated based on field observations and photos (Appendix B).

Table 5.70. Habitat Equivalent Units for Stream Crossing SC04.

Reach	Area (Units)	Brook trout		Sculpin	
		HSI	HEU	HSI	HEU
1	0.83	1.00	0.83	0.48	0.40
2	0.80	1.00	0.80	0.48	0.39
3	0.85	1.00	0.85	0.65	0.55
4	0.68	1.00	0.68	0.48	0.33
5	0.98	1.00	0.98	0.65	0.63
6	0.85	1.00	0.85	0.65	0.55
7	0.73	1.00	0.73	0.70	0.51
8	0.90	1.00	0.90	0.70	0.63
9	1.30	1.00	1.30	0.70	0.91
10	0.63	1.00	0.63	0.70	0.44
11	0.85	1.00	0.85	0.70	0.60
12	0.78	1.00	0.78	0.70	0.54
13	0.60	0.97	0.58	0.60	0.36
14	0.60	0.97	0.58	0.60	0.36
15	1.23	1.00	1.23	0.70	0.86
16	1.23	1.00	1.23	0.40	0.49
Total	13.80		13.76		8.54

5.4.5.5 Crossing SC05

Crossing location SC05 is located west of Long Lake on stream TDA02. The crossing location is approximately 3 km upstream of the outflow of stream TDA02 to Long Lake, and 400 m downstream of the confluence of stream TDA02 East with TDA02. As stated previously for Crossing SC03, this section of stream has also been included in the habitat classification and quantification of Stream TDA02. The stream section surveyed for the crossing is 200 m in length and contains 5.70 units of riverine fish habitat. Channel widths ranged from 2.1-3.6 m and mean water depths within the surveyed habitat at the crossing ranged from 0.11-0.36 m. Mean water velocities along transects within the crossing location ranged from 001-0.27 m/s. Table 5.71 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Crossing SC05 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.72 summarizes the species suitability for each section of SC05 (i.e. highest life-cycle stage value) for brook trout, and sculpin as well as the calculations of the HEUs. The HEU value for the recreational species present within stream SC05 based solely on fish presence (brook trout) is 4.82 units.

Table 5.71. Summary of habitat measurements and classifications for SC05.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	2.9	-	0.25	0.03	0	35	20	20	25	0	0	IV	Pool
2	25	25	2.7	0.68	0.18	0.04	0	35	20	20	25	0	0	IV	Pool
3	50	25	3.6	0.90	0.36	0.01	0	35	20	20	25	0	0	IV	Pool
4	75	25	2.2	0.55	0.13	0.10	0	25	25	25	25	0	0	I	Pool
5	100	25	2.4	0.60	0.20	0.01	0	25	25	25	25	0	0	IV	Pool
6	125	25	3.5	0.88	0.26	0.02	0	30	30	25	15	0	0	IV	Pool
7	150	25	2.1	0.53	0.18	0.02	0	30	30	25	15	0	0	IV	Pool
8	175	25	2.7	0.68	0.05	0.27	0	30	30	20	20	0	0	I	Rapids/Riffle
9	200	25	3.6	0.90	0.11	0.15	0	30	30	20	20	0	0	I	Rapids/Riffle

Table 5.72. Habitat Equivalent Units for Stream Crossing SC05.

Reach	Area (Units)	Brook trout		Sculpin	
		HSI	HEU	HSI	HEU
1	0.68	1.00	0.68	0.63	0.42
2	0.90	0.83	0.75	0.63	0.56
3	0.55	1.00	0.55	0.63	0.34
4	0.60	0.67	0.40	0.63	0.38
5	0.88	0.83	0.73	0.58	0.50
6	0.53	0.83	0.44	0.58	0.30
7	0.68	1.00	0.68	0.60	0.41
8	0.90	0.67	0.60	0.60	0.54
50	0.00	0.00	0.00	0.00	0.00
Total	5.70		4.82		3.45

5.4.5.6 Crossing SC06

Crossing location SC06 is located on the stream that connects Riordan Lake with Elephant Head Lake. The stream section is 400 m in length and contains 12.83 units of riverine fish habitat. Channel widths ranged from 1.0-5.0 m and mean water depths at transects ranged from 0.11-0.57 m. Mean water velocities at transects ranged from 0.13-0.88 m/s. Table 5.73 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Crossing SC06 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.74 summarizes the species suitability for each section of SC06 (i.e. highest life-cycle stage value) for brook trout, northern pike, lake chub, longnose dace and sculpin as well as the calculations of the HEUs. The HEU value for the recreational species present within stream SC05 based solely on fish presence (brook trout and northern pike) is 12.45 and 1.81 units respectively.

Table 5.73. Summary of habitat measurements and classifications for SC06.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	3.0	-	0.57	0.13	0	5	50	20	10	0	0	I	Pool
2	25	25	3.2	0.80	0.22	0.50	0	5	50	20	10	0	0	II	Rapids
3	50	25	3.0	0.75	0.20	0.47	0	5	50	20	10	0	0	II	Rapids
4	75	25	3.1	0.78	0.17	0.41	0	5	40	35	5	0	0	II	Rapids
5	100	25	3.8	0.95	0.13	0.65	0	5	40	35	5	0	0	II	Rapids
6	125	25	2.8	0.70	0.21	0.20	0	90	5	5	0	0	0	I	Rapids
7	150	25	3.0	0.75	0.11	0.52	0	90	5	5	0	0	0	II	Rapids
8	175	25	2.2	0.55	0.33	0.36	0	50	25	15	10	0	0	II	Rapids
9	200	25	1.0	0.25	0.35	0.65	0	50	25	15	10	0	0	II	Rapids
10	225	25	3.4	0.85	0.23	0.28	0	60	30	10	0	0	0	I	Rapids
11	250	25	1.5	0.38	0.30	0.88	0	60	30	10	0	0	0	II	Rapids
12	275	25	4.0	1.00	0.49	0.10	0	100	0	0	0	0	0	I	Rapids
13	300	25	3.0	0.75	0.19	0.35	0	100	0	0	0	0	0	II	Rapids
14	325	25	3.8	0.95	0.16	0.39	0	100	0	0	0	0	0	II	Rapids
15	350	25	3.5	0.88	0.21	0.21	0	100	0	0	0	0	0	I	Rapids
16	375	25	5.0	1.25	0.23	0.17	0	95	0	5	0	0	0	I	Rapids
17	400	25	5.0	1.25	0.13	0.34	0	95	0	5	0	0	0	II	Rapids

Table 5.74. Habitat Equivalent Units for Stream Crossing SC06.

Reach	Area (Units)	Brook trout		Northern pike		Lake chub		Longnose dace		Sculpin	
		HSI	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**	**HSI**	**HEU**
1	0.80	0.93	0.74	0.00	0.00	0.90	0.72	0.88	0.70	0.38	0.31
2	0.75	0.93	0.69	0.33	0.25	0.90	0.68	0.71	0.53	0.22	0.16
3	0.78	0.76	0.59	0.47	0.36	0.73	0.57	0.59	0.46	0.36	0.28
4	0.95	0.93	0.88	0.47	0.44	0.73	0.70	0.59	0.56	0.36	0.34
5	0.70	1.00	0.70	0.35	0.25	0.68	0.47	0.67	0.47	0.00	0.00
6	0.75	1.00	0.75	0.00	0.00	0.83	0.63	0.83	0.63	0.00	0.00
7	0.55	1.00	0.55	0.25	0.14	0.75	0.41	0.67	0.37	0.38	0.21
8	0.25	1.00	0.25	0.00	0.00	1.00	0.25	0.95	0.24	0.00	0.00
9	0.85	1.00	0.85	0.43	0.37	0.70	0.60	0.67	0.57	0.00	0.00
10	0.38	1.00	0.38	0.00	0.00	0.67	0.25	1.00	0.38	0.00	0.00
11	1.00	1.00	1.00	0.00	0.00	0.84	0.84	0.67	0.67	0.00	0.00
12	0.75	1.00	0.75	0.00	0.00	0.67	0.50	0.83	0.63	0.00	0.00
13	0.95	1.00	0.95	0.00	0.00	0.67	0.63	0.83	0.79	0.00	0.00
14	0.88	1.00	0.88	0.00	0.00	0.67	0.58	0.67	0.58	0.00	0.00
15	1.25	1.00	1.25	0.00	0.00	0.68	0.85	0.83	1.04	0.00	0.00
16	1.25	1.00	1.25	0.00	0.00	0.67	0.83	0.83	1.04	0.00	0.00
Total	12.83		12.45		1.81		9.50		9.64		1.30

5.4.5.7 Crossing SC07

Crossing location SC07 is located approximately 500 m upstream of the inflow into Elephant Head Lake. The stream section is 350 m in length and contains 5.55 units of riverine fish habitat. Channel widths ranged from 0.8-2.5 m and mean depths ranging from 0.09-0.39 m. Mean water velocities at transects ranged from 0.02-0.16 m/s. Table 5.75 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Crossing SC07 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.76 summarizes the species suitability for each section of SC07 (i.e. highest life-cycle stage value) for brook trout as well as the calculations of the HEUs. The HEU value for the recreational species present within stream SC07 based solely on fish presence (brook trout) is 4.88 units.

Table 5.75. Summary of habitat measurements and classifications for SC07.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	2.1	-	0.22	0.03	0	10	30	20	20	20	0	IV	Pool
2	25	25	2.0	0.50	0.10	0.06	0	10	30	20	20	20	0	IV	Steady
3	50	25	0.8	0.20	0.12	0.11	0	10	30	20	20	20	0	I	Riffle
4	75	25	2.3	0.58	0.17	0.10	0	30	20	30	15	5	0	I	Riffle
5	100	25	1.1	0.28	0.09	0.16	0	30	20	30	15	5	0	I	Riffle
6	125	25	2.5	0.63	0.09	0.09	0	20	30	20	10	20	0	I	Riffle
7	150	25	1.3	0.33	0.13	0.13	0	20	30	20	10	20	0	I	Riffle
8	175	25	1.7	0.43	0.22	0.13	0	15	30	20	10	25	0	I	Riffle
9	200	25	2.0	0.50	0.12	0.12	0	15	30	20	10	25	0	I	Riffle
10	225	25	1.3	0.33	0.27	0.05	0	30	10	0	0	60	0	IV	Steady
11	250	25	1.9	0.48	0.26	0.02	0	30	10	0	0	60	0	IV	Steady
12	275	25	1.6	0.40	0.39	0.03	0	10	20	20	0	0	50	IV	Pool
13	300	25	1.5	0.38	0.34	0.08	0	10	20	20	0	0	50	IV	Pool
14	325	25	2.2	0.55	0.27	0.04	0	20	10	0	0	0	70	IV	Pool
15	350	25	1.4	0.35	0.15	0.06	0	20	10	0	0	0	70	IV	Pool

Table 5.76. Habitat Equivalent Units for Stream Crossing SC07.

		Brook trout	
Reach	**Area (Units)**	**HSI**	**HEU**
1	0.50	1.00	0.50
2	0.20	1.00	0.20
3	0.58	1.00	0.58
4	0.28	1.00	0.28
5	0.63	0.83	0.52
6	0.33	0.83	0.27
7	0.43	1.00	0.43
8	0.50	1.00	0.50
9	0.33	1.00	0.33
10	0.48	0.67	0.32
11	0.40	0.83	0.33
12	0.38	0.83	0.31
13	0.55	0.60	0.33
Total	5.55		4.88

5.4.5.8 Crossing SC07a

Crossing location SC07a is identified on mapping approximately 1,200 m upstream of Wahnahnish Lake on a small tributary. The area was surveyed however no stream was located in the vicinity of the crossing. The entire valley area was traversed to ensure that the stream was not missed by the crew due to inaccurate mapping or interpretation. No stream habitat was located therefore no characterization or quantification was completed or required.

5.4.5.9 Crossing SC08

Crossing location SC08 is located approximately 600 m upstream on a stream that flows from a highland pond into northwestern Wahnahnish Lake. The stream section is 400 m in length and contains 2.65 units of riverine fish habitat. Channel widths ranged from 0.2-1.2 m and mean water depths at transects ranged from 0.04-0.27 m. Mean water velocities at transects ranged from 004-0.22 m/s. Table 5.77 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Crossing SC08 was determined by index electrofishing at a nearby crossing site within the same drainage basin; SC09. While SC09 is much larger, it is assumed that all species captured there are present in SC08 in order to remain conservative. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.78 summarizes the species suitability for each section of SC08 (i.e. highest life-cycle stage value) for all species as well as the calculations of the HEUs. The HEU value for the recreational species assumed to be present within stream SC08 based solely on fish presence (brook trout and burbot) are 2.40 and 0.42 units respectively.

Table 5.77. Summary of habitat measurements and classifications for SC08.

		Section	Wetted	Area	Average	Average	Substrate (%)							Classification	
Transect #	Distance	Length	Width (m)	(Units)	Depth (m)	Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	0.5	-	0.11	0.18	0	0	0	60	10	30	0	I	Riffle
2	25	25	0.6	0.15	0.27	0.09	0	0	0	60	10	30	0	I	Riffle
3	50	25	0.7	0.18	0.20	0.12	0	0	0	60	10	30	0	I	Riffle
4	75	25	0.9	0.23	0.13	0.11	0	10	0	0	0	70	20	IV	Pool
5	100	25	1.2	0.30	0.19	0.06	0	10	0	0	0	70	20	IV	Pool
6	125	25	0.8	0.20	0.15	0.16	0	0	0	0	0	90	10	IV	Pool
7	150	25	0.6	0.15	0.24	0.08	0	0	0	0	0	90	10	IV	Steady
8	175	25	0.6	0.15	0.13	0.10	0	60	0	0	0	40	0	I	Cascade
9	200	25	0.7	0.18	0.04	0.15	0	60	0	0	0	40	0	I	Cascade
10	225	25	0.5	0.13	0.11	0.13	0	60	0	0	0	40	0	I	Cascade
11	250	25	0.6	0.15	0.11	0.04	0	60	0	0	0	40	0	I	Cascade
12	275	25	0.2	0.05	0.13	0.10	0	0	0	0	0	50	50	IV	Pool
13	300	25	0.7	0.18	0.14	0.19	0	0	0	0	0	50	50	IV	Pool
14	325	25	1.0	0.25	0.12	0.17	0	0	0	0	0	80	20	IV	Pool
15	350	25	0.6	0.15	0.11	0.08	0	0	0	0	0	80	20	IV	Pool
16	375	25	0.5	0.13	0.17	0.13	0	0	0	0	0	60	40	IV	Pool
17	400	25	0.4	0.10	0.09	0.22	0	0	0	0	0	60	40	IV	Steady

Table 5.78. Habitat Equivalent Units for Stream Crossing SC08.

		Brook trout		Burbot		Longnose sucker		White sucker		Lake chub		Longnose dace		Pearl dace		Sculpin	
Reach	Area (Units)	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU
1	0.15	1.00	0.15	0.57	0.09	0.72	0.11	0.53	0.08	1.00	0.15	0.67	0.10	0.70	0.11	0.70	0.11
2	0.18	1.00	0.18	0.00	0.00	0.72	0.13	0.70	0.12	1.00	0.18	0.00	0.00	0.70	0.12	0.70	0.12
3	0.23	1.00	0.23	0.00	0.00	0.72	0.16	0.70	0.16	1.00	0.23	0.62	0.14	0.70	0.16	0.70	0.16
4	0.30	0.90	0.27	0.00	0.00	0.88	0.27	0.90	0.27	0.85	0.26	0.52	0.16	0.85	0.26	0.85	0.26
5	0.20	0.90	0.18	0.00	0.00	0.88	0.18	0.90	0.18	0.85	0.17	0.00	0.00	0.85	0.17	0.85	0.17
6	0.15	0.97	0.14	0.00	0.00	0.85	0.13	0.95	0.14	0.95	0.14	0.50	0.08	0.95	0.14	0.95	0.14
7	0.15	0.80	0.12	0.63	0.09	0.85	0.13	0.95	0.14	0.95	0.14	0.00	0.00	0.95	0.14	0.95	0.14
8	0.18	1.00	0.18	0.37	0.06	0.93	0.16	1.00	0.18	0.70	0.12	0.60	0.11	0.70	0.12	0.70	0.12
9	0.13	1.00	0.13	0.00	0.00	0.93	0.12	1.00	0.13	0.70	0.09	0.60	0.08	0.70	0.09	0.70	0.09
10	0.15	1.00	0.15	0.00	0.00	0.93	0.14	1.00	0.15	0.70	0.11	0.60	0.09	0.70	0.11	0.70	0.11
11	0.05	0.83	0.04	0.37	0.02	0.93	0.05	1.00	0.05	0.70	0.04	0.00	0.00	0.70	0.04	0.70	0.04
12	0.18	0.67	0.12	0.50	0.09	0.92	0.16	0.75	0.13	0.75	0.13	0.50	0.09	0.75	0.13	0.75	0.13
13	0.25	0.83	0.21	0.00	0.00	0.92	0.23	0.75	0.19	0.75	0.19	0.67	0.17	0.75	0.19	0.75	0.19
14	0.15	0.93	0.14	0.00	0.00	0.87	0.13	0.73	0.11	0.90	0.14	0.63	0.10	0.90	0.14	0.90	0.14
15	0.13	0.77	0.10	0.60	0.07	0.87	0.11	0.90	0.11	0.90	0.11	0.00	0.00	0.90	0.11	0.90	0.11
16	0.10	0.87	0.09	0.00	0.00	0.90	0.09	0.80	0.08	0.80	0.08	0.00	0.00	0.80	0.08	0.80	0.08
Total	2.65		2.40		0.42		2.28		2.22		2.26		1.09		2.09		2.09

5.4.5.10 Crossing SC09

Crossing location SC09 is located on a section of stream that connects Wahnahnish Lake to Jean Lake. SC09 is approximately 100 m downstream from the outflow from Wahnahnish Lake and 500 m upstream of Jean Lake. The stream section is 200 m in length and contains 30.85 units of riverine fish habitat. Channel widths ranged from 10-23 m and depths ranged from 0.12-0.80 m. Water velocities ranged from 0-1.45 m/s. Table 5.79 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Crossing SC09 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.80 summarizes the species suitability for each section of SC09 (i.e. highest life-cycle stage value) for burbot, brook trout, lake chub, longnose dace, longnose sucker, pearl dace, slimy sculpin and white sucker as well as the calculations of the HEUs. The HEU value for the recreational species assumed to be present within stream SC09 based solely on fish presence (brook trout and burbot) are 30.85 and 16.82 units respectively.

Table 5.79. Summary of habitat measurements and classifications for SC09.

		Section	Wetted	Area	Average	Average	Substrate (%)							Classification	
Transect #	Distance	Length	Width (m)	(Units)	Depth (m)	Velocity	Be	B	R	C	G	S	F	Beak	New
1	0	-	N/A	-	-	-	0	30	30	25	15	0	0	I	Rapids
2	25	25	23.0	5.75	0.31	0.31	0	30	30	25	15	0	0	II	Rapids
3	50	25	11.9	2.98	0.47	0.44	0	30	30	25	15	0	0	II	Rapids
4	75	25	10.0	2.50	0.37	0.63	0	35	25	25	15	0	0	II	Rapids
5	100	25	10.8	2.70	0.45	1.02	0	35	25	25	15	0	0	III	Rapids
6	125	25	15.1	3.78	0.25	0.81	0	40	30	30	0	0	0	II	Rapids
7	150	25	15.0	3.75	-	-	0	40	30	30	0	0	0	I	Rapids
8	175	25	22.5	5.63	0.60	0.30	0	15	20	20	15	30	0	II	Run
9	200	25	15.1	3.78	0.51	0.74	0	15	20	20	15	30	0	II	Run

Orange cells were estimated based on field observations and photos (Appendix B).

Table 5.80. Habitat Equivalent Units for Stream Crossing SC09.

		Brook trout		Burbot		Longnose sucker		White sucker		Lake chub		Longnose dace		Pearl dace		Sculpin	
Reach	Area (Units)	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU	HSI	HEU
1	5.75	1.00	5.75	0.52	2.98	1.00	5.75	0.60	3.45	1.00	5.75	1.00	5.75	0.15	0.86	0.15	0.86
2	2.98	1.00	2.98	0.52	1.54	1.00	2.98	0.60	1.79	1.00	2.98	1.00	2.98	0.15	0.45	0.15	0.45
3	2.50	1.00	2.50	0.49	1.21	1.00	2.50	0.60	1.50	1.00	2.50	1.00	2.50	0.15	0.38	0.15	0.38
4	2.70	1.00	2.70	0.49	1.31	1.00	2.70	0.60	1.62	1.00	2.70	1.00	2.70	0.15	0.41	0.15	0.41
5	3.78	1.00	3.78	0.40	1.52	1.00	3.78	0.70	2.64	1.00	3.78	1.00	3.78	0.00	0.00	0.00	0.00
6	3.75	1.00	3.75	0.40	1.51	1.00	3.75	0.70	2.63	1.00	3.75	1.00	3.75	0.00	0.00	0.00	0.00
7	5.63	1.00	5.63	0.72	4.04	0.72	4.04	0.65	3.66	1.00	5.63	1.00	5.63	0.45	2.53	0.45	2.53
8	3.78	1.00	3.78	0.72	2.71	0.72	2.71	0.65	2.45	1.00	3.78	1.00	3.78	0.45	1.70	0.45	1.70
Total	30.85		30.85		16.82		28.20		19.73		30.85		30.85		6.32		6.32

5.4.5.11 Crossing SC10

Crossing location SC10 is located approximately 1.2 km upstream (southeast) of Wabush Lake on a section of stream that drains an upland area, flowing northwest into Wabush Lake. The stream section is 200 m in length and contains 4.53 units of riverine fish habitat. Channel widths ranged from 1.7-2.8 m and mean water depths at transects ranged from 0.33-0.89 m. Mean water velocities at transects ranged from 0.0-0.07 m/s. Table 5.81 presents a summary of habitat characteristics as well as the habitat classification in both the Beak and proposed new riverine classifications for each stream reach.

Fish Presence

Fish species presence within Crossing SC10 was determined by index electrofishing. Species captured were used to calculate Habitat Equivalent Unit (HEU) values.

Habitat Equivalent Units

Table 5.82 summarizes the species suitability for each section of SC10 (i.e. highest life-cycle stage value) for all species captured as well as the calculations of the HEUs. The HEU value for the recreational species present within stream SC10 based solely on fish presence (brook trout) is 2.70 units.

Table 5.81. Summary of habitat measurements and classifications for SC10.

Transect #	Distance	Section Length	Wetted Width (m)	Area (Units)	Average Depth (m)	Average Velocity	Substrate (%)							Classification	
							Be	B	R	C	G	S	F	Beak	New
1	0	-	1.8	-	0.88	0.03	0	0	0	0	0	0	100	IV	Pool
2	25	25	2.1	0.53	0.33	0.03	0	0	0	0	0	0	100	IV	Pool
3	50	25	2.3	0.58	0.89	0.04	0	0	0	0	0	0	100	IV	Pool
4	75	25	2.6	0.65	0.64	0.00	0	0	0	0	0	0	100	IV	Pool
5	100	25	2.3	0.58	0.89	0.04	0	0	0	0	0	0	100	IV	Pool
6	125	25	1.7	0.43	0.73	0.07	0	0	0	0	0	0	100	IV	Pool
7	150	25	2.5	0.63	0.79	0.04	0	0	0	0	0	0	100	IV	Pool
8	175	25	1.8	0.45	0.89	0.07	0	0	0	0	0	0	100	IV	Pool
9	200	25	2.8	0.70	0.64	0.05	0	0	0	0	0	0	100	IV	Pool

Table 5.82. Habitat Equivalency Units for Stream Crossing SC10.

Reach	Area (Units)	Brook trout		Pearl dace	
		HSI	HEU	HSI	HEU
1	0.53	0.54	0.28	0.00	0.00
2	0.58	0.67	0.38	0.00	0.00
3	0.65	0.29	0.19	0.00	0.00
4	0.58	0.67	0.38	0.00	0.00
5	0.43	0.67	0.28	0.00	0.00
6	0.63	0.67	0.42	0.00	0.00
7	0.45	0.67	0.30	0.00	0.00
8	0.70	0.67	0.47	0.00	0.00
Total	4.53		2.70		0.00

5.5 Benthic Invertebrate Sampling in Streams

Invertebrate sampling was conducted during the 2011 field surveys within a total of four representative streams; within the TMF area (TDA02), within the Rose Pit areas (RP04-RP02), within the Mills Lake area (M02 to Mills Lake), and within the Pike Lake North area (PLN-OF). Appendix D presents the detailed macroinvertebrate results from each location. Table 5.83 presents a summary of species richness, Evenness, and Shannon-Weiner diversity indices generated from each area sampled.

Table 5.83. Species Richness for Invertebrate Samples collected during 2011 surveys.

Sample ID	Number of Species (Richness - S)	Number of Individuals (n)	Shannon-Weiner (H)	H_{max}	Evenness (E) %
TDA02	23	419	2.25	4.52	46.9
RP04 to RP02	24	36	2.44	4.58	53.1
M02 to Mills	14	206	2.29	3.81	60.0
PLN to OF	19	327	2.10	4.25	49.4

5.6 Water Quality

Water quality sampling was conducted at seven locations during the July 2011 field survey. Sample stations included streams RP01-PLS, PL-OF, M01-ML, SC01, TDA01, TDA02 and the outflow of Long Lake (LL-OF) (Figure 5.32). Results of all analysis (including nutrients, metals, mercury, and TSS) are presented in Table 5.84. The complete analytical results are provided in Appendix E.

The results were compared to CCME Guidelines for the *Protection of Aquatic Life* (CCME 2011). The only exceedances that were found included:

- Aluminum (RP01-PLS);
- Cadmium (RP01-PLS, PL-OF, LL-OF, SC01, and TDA01); and
- Copper (RP01-PLS).

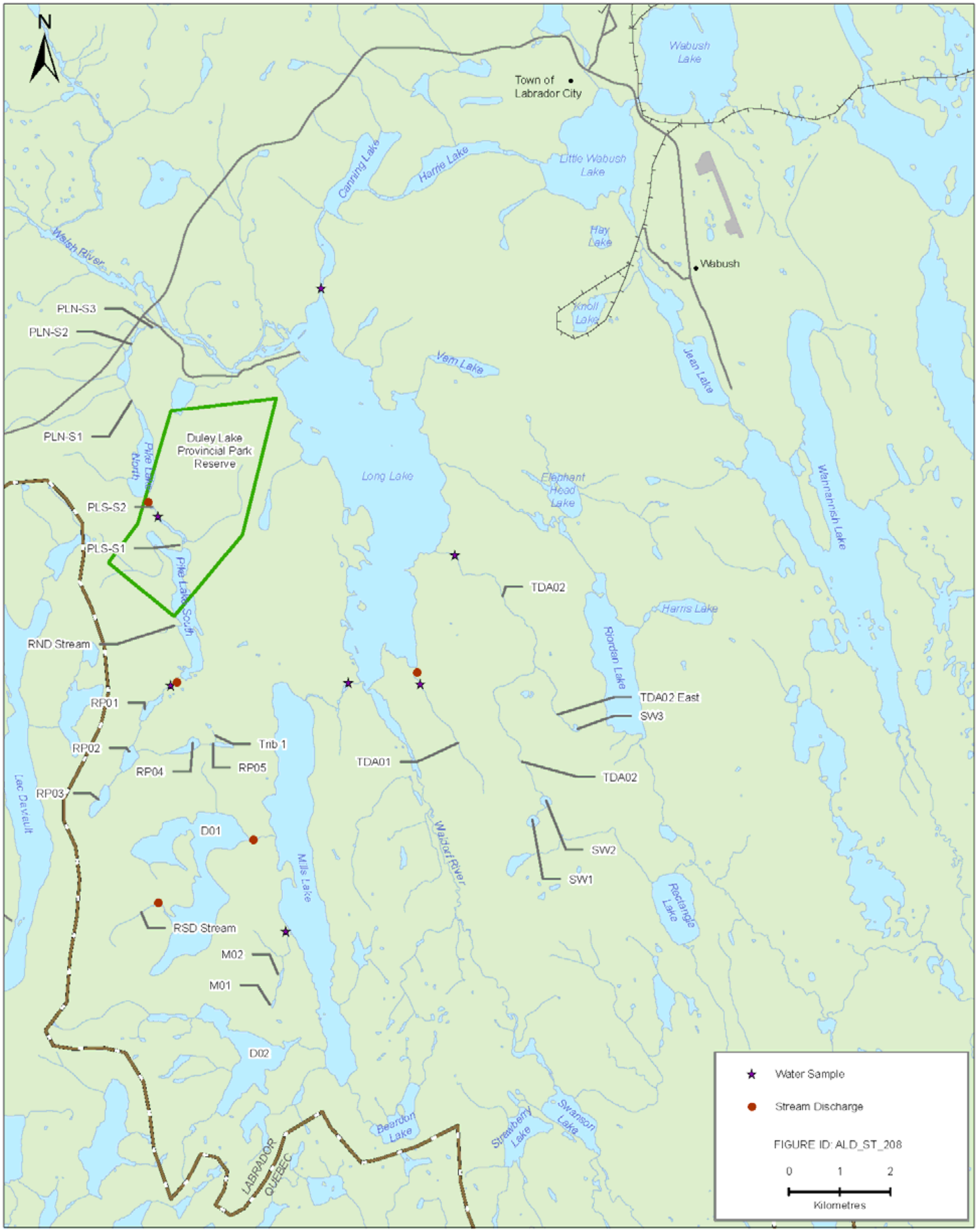


Figure 5.32. Water Sample locations for Alderon Site, 2011.

Table 5.84. Water Samples collected during 2011 Site Survey.

Calculated Parameters	**Units**	**RDL**	**CCME**	**M01-ML**	**RP01-PLS**	**PL-OF**	**LL-OF**	**SC01**	**TDA01**	**TDA02**
Calculated TDS	mg/L	1		39	61	35	18	37	76	64
Hardness (CaCO3)	mg/L	1		35	49	29	15	33	70	59
Nitrate (N)	mg/L	0.05	1.3	ND	ND	ND	ND	ND	ND	ND
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	5		35	52	32	15	35	77	67
Dissolved Chloride	mg/L	1		ND	ND	ND	ND	ND	ND	ND
Colour	TCU	5		42	17	27	38	13	16	30
Nitrate + Nitrite	mg/L	0.05		ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	0.01	0.6	ND	ND	ND	ND	ND	ND	ND
Nitrogen (Ammonia Nitrogen)	mg/L	0.05		ND	0.06	ND	ND	ND	0.06	0.05
Total Organic Carbon	mg/L	0.5		5.4	3.6	5.0	5.0	2.9	2.7	5.7
Orthophosphate	mg/L	0.01		ND	ND	ND	ND	ND	ND	ND
pH	pH	N/A	6.5-9.0	7.83	7.45	7.48	7.33	7.51	7.72	7.75
Reactive Silica	mg/L	0.5		4.9	5.6	3.8	2.3	3.4	4.1	2.9
Total Suspended Solids	mg/L	2		ND	3	3	4	ND	3	2
Dissolved Sulphate	mg/L	2		ND	3	ND	ND	ND	ND	ND
Turbidity	NTU	0.1		0.3	0.4	0.6	0.6	0.4	0.4	0.6
Conductivity	µS/cm	1		67	96	58	32	64	130	100
Metals										
Total Aluminum	µg/L	5.0	100	59.6	**119**	26.2	89.2	30.7	15.3	13.7
Total Antimony	µg/L	1.0		ND	ND	ND	ND	ND	ND	ND
Total Arsenic	µg/L	1.0	5	ND	ND	ND	ND	ND	ND	ND
Total Barium	µg/L	1.0		16.3	14.4	11.7	9.4	9.6	20.0	14.4
Total Beryllium	µg/L	1.0		ND	ND	ND	ND	ND	ND	ND
Total Bismuth	µg/L	2.0		ND	ND	ND	ND	ND	ND	ND
Total Boron	µg/L	50	1500	ND	ND	ND	ND	ND	ND	ND
Total Cadmium	µg/L	0.02		ND	**0.821**	**0.028**	**0.043**	**1.17**	**0.146**	ND
Total Calcium	µg/L	100		7900	12400	7190	3950	7640	15800	13300
Total Chromium	µg/L	1.0		2.3	101	ND	2.9	ND	ND	ND
Total Cobalt	µg/L	0.40		ND	ND	ND	ND	ND	ND	ND
Total Copper	µg/L	2.0	2	ND	**2.4**	ND	ND	ND	2.0	ND
Total Iron	µg/L	50	300	93	287	66	263	ND	249	151
Total Lead	µg/L	0.50	1	ND	0.65	ND	ND	ND	ND	ND
Total Magnesium	µg/L	100		3680	4370	2620	1190	3380	7520	6350
Total Manganese	µg/L	2.0		19.1	73.6	28.2	138	11.9	133	17.6
Total Mercury	µg/L	0.01	0.026	ND	ND	ND	ND	ND	ND	ND
Total Molybdenum	µg/L	2.0	73	ND	ND	ND	ND	ND	ND	ND
Total Nickel (Ni)	µg/L	2.0	25	ND	ND	ND	ND	ND	ND	ND
Total Phosphorus	µg/L	100		ND	ND	ND	ND	ND	ND	ND
Total Potassium	µg/L	100		770	2380	1180	823	983	902	323

Calculated Parameters	Units	RDL	CCME	M01-ML	RP01-PLS	PL-OF	LL-OF	SC01	TDA01	TDA02
Total Selenium	µg/L	1.0		ND	ND	ND	ND	ND	ND	ND
Total Silver	µg/L	0.10		ND	ND	ND	ND	ND	ND	ND
Total Sodium	µg/L	100		672	1430	794	607	751	660	430
Total Strontium	µg/L	2.0		13.5	21.6	15.5	12.2	11.6	17.2	12.9
Total Thallium	µg/L	0.10	0.8	ND	ND	ND	ND	ND	ND	ND
Total Tin	µg/L	2.0		ND	ND	ND	ND	ND	ND	ND
Total Titanium	µg/L	2.0		3.0	5.5	ND	2.9	2.7	ND	2.0
Total Uranium	µg/L	0.10		0.10	ND	ND	ND	ND	0.35	0.13
Total Vanadium	µg/L	2.0		ND	ND	ND	ND	ND	ND	ND
Total Zinc	µg/L	5.0	30	ND	14.3	ND	ND	15.4	ND	ND

5.7 Winter Ice Observations

Results of the winter ice observation surveys are presented in Table 5.85. As shown, Site 7 (outflow of Pond SW1) and Site 11 (confluence of streams TDA02 and TDA02East) were frozen completely to the bottom and Sites 12 and 13 (stream TDA02 downstream of the TMF) were the only two locations in which water was recorded as flowing. Standing water was visible, but not flowing at all other sites. Appendix F provides as series of photos at each sample site.

Table 5.85. Winter stream survey results, proposed Kami Mine Site, western Labrador.

Site ID	Site #	UTM			Photo	Measurements			
		Zone	Easting	Northing		Snow Depth (cm)	Ice Thickness (cm)	Water Depth (cm)	Substrate
Tailings Area	1	19	0637478	5856430	1	60	20	5	Mud/Organics
	2	19	0637873	5855576	2	121	0	61	Mud/Organics
	3	19	0638637	5854536	3	120	0	8	Mud/Organics
	4	19	0638824	5853963	4	120	8	15	Mud/Organics
	5	19	0639796	5853439	5, 6	15	91	15	Mud/Organics
	6	19	0640052	5853826	7,8	15	76	5	Mud/Organics
	7	19	0639846	5853558	9	91	15	0	Mud
	8	19	0640018	5853941	10	120	0	12	Mud/Organics
	9	19	0639535	5854958	11	120	0	15	Mud/Cobble
	10	19	0640636	5855253	12	15	8	2	Mud/Organics
	11	19	0639856	5856477	13	15	8	0	Mud
	12	19	0639169	5857939	14	120	3	10	Mud
	13	19	0637948	5858743	15	10	5	91	Cobble/Rubble
Rose Pit Area	15	19	0632700	5857280	16	9	3	61	Mud
	16	19	0632714	5856095	17	25	0	61	Mud
	17	19	0632616	5854773	18	91	0	36	Mud/Organics
	18	19	0633311	5854958	19	91	0	8	Mud/Organics
	19	19	0632543	5851718	20	95	6	15	Mud/Organics

6.0 REFERENCES

6.1 Personal Communications

Wicks, B. Team Lead for Biophysical and Ecological Sciences with Stantec Consulting Ltd (Stantec), St. John's, NL

6.2 Cited Literature

Anderson, T.C. 1985. The Rivers of Labrador. Fisheries and Oceans Canada, St. John's, NL. 389pp

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 Canada, St. John's, NL. 60 p + app

Bradbury, C., M.M. Roberge and C.K Kimms. 1999. Life history characteristics of freshwater fishes occurring in Newfoundland and Labrador, with Major emphasis on Lake Habitat Requirements. Can. MS Rep. Fish. Aquat. Sci. 2485: vii + 150pp.

Bruce, W.J., K.O. Spencer and E. Arsenault. 1979. Mercury content data for Labrador Fisheries 1977-1978. Fish. Man. Serv. Data Rep. 142: iv + 263 pp.

CCME (Canadian Council of Ministers of Environment). 2011 (Website). Canadian Water Quality Guidelines for the Protection of Aquatic Life. http://st-ts.ccme.ca/?chems=all&chapters=1

Canada Gazette. SOR/2009-27. Regulations Amending the Metal Mining Effluent Regulations. P.C. 2009-160 February 5, 2009.

Department of Justice Canada. 2012. The Fisheries Act (R.S.C. 1985, s.F-14), Ottawa, Canada. Published by the Minister of Justice at the following address: http://laws-lois.justice,gc.ca.

Hicks. FJ. 1974. The Iron Ore Industry of Western Labrador and Some Effects of its Waste Disposal Practices on the Aquatic Environment. Surveillance Report EPS-5-AR-74-2. Environment Canada.

Iron Ore Company of Canada. 1996. Registration Pursuant to Section 6 of the Environmental Assessment Act for Silica Flotation Plant at the Iron Ore Company of Canada Carol Mine Site. Labrador City. NL.

McCarthy, J.H., C. Grant and D. Scruton. (2007) Standard Methods Guide for the Classification and Quantification of Fish Habitat in Rivers of Newfoundland and Labrador. Draft Report, Fisheries and Oceans Canada, 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 Canada, St. John's, NL. iii + 50pp.

Appendix A
GPS Coordinates for Sampling Locations

Fishing Locations

Pond	Co-ordinates			
	Lat	Long	Y_PROJ	X_PROJ
PLS-FN01	52.84895730	-67.02722240	5863069.24574662	228849.76238206
PLS-FN02	52.84291780	-67.02057840	5862372.79607334	229259.28813944
PLS-GN01	52.84913510	-67.02574400	5863083.42857802	228950.36636102
PLS-GN02	52.84844310	-67.02308140	5862996.45428553	229125.24452575
PLS-GN03	52.84871040	-67.02269440	5863024.70863381	229152.95523725
RP01-FN01	52.83280630	-67.03738020	5861312.24585222	228065.15621017
RP01-FN02	52.83655650	-67.03319230	5861713.28340451	228370.52731709
RP01-GN01	52.83498420	-67.03496360	5861545.20180484	228241.46102943
RP01-GN02	52.83270170	-67.03914150	5861307.28906959	227945.92401241
RP01-GN03	52.83432590	-67.03823810	5861484.41946056	228016.90228058
RP01-GN04	52.83559650	-67.03411970	5861610.07429444	228302.09846902
RP02-FN01	52.82647590	-67.04023830	5860619.36119726	227833.13010750
RP02-FN02	52.82385530	-67.04572020	5860348.83442215	227447.59544517
RP02-GN01	52.82759880	-67.04136090	5860748.44174984	227764.56845322
RP02-GN02	52.82464500	-67.04245220	5860424.22376840	227672.59874229
RP02-GN03	52.82598500	-67.04159390	5860569.92899732	227738.78006125
RP02-GN04	52.82504910	-67.04495810	5860478.64969073	227506.39102081
RP03-FN01	52.82035290	-67.04905380	5859972.15154993	227201.15923576
RP03-FN02	52.81580110	-67.05491630	5859488.44187553	226777.78200308
RP03-GN01	52.81631970	-67.05252210	5859536.98673441	226942.28565224
RP03-GN02	52.82074770	-67.04952210	5860017.81760772	227172.09795517
RP03-GN03	52.81750700	-67.05065300	5859661.86708621	227075.61480119
RP03-GN04	52.82005320	-67.05112570	5859946.70726520	227059.75104380
RP04-FN01	52.82781990	-67.02195890	5860699.65137639	229072.32694152
RP04-FN02	52.82620290	-67.02955190	5860548.56973195	228550.98446194
RP04-GN01	52.82613450	-67.02794560	5860534.89617412	228658.71730156
RP04-GN02	52.82775620	-67.02482680	5860703.39289153	228878.82804944
RP04-GN03	52.82682290	-67.02424690	5860597.45418506	228912.05800169
RP04-GN04	52.82687710	-67.02928650	5860622.51354385	228573.06165701
RP05-FN01	52.82802890	-67.01648940	5860702.26579347	229441.90056349
RP05-FN02	52.82713060	-67.01244510	5860587.17831094	229708.63000928
RP05-GN01	52.82724140	-67.01258390	5860600.01774785	229699.97258599
RP05-GN02	52.82764390	-67.01626570	5860658.62469301	229454.56829086
M01-FN01	52.78496810	-67.00174940	5855859.98558367	230167.61330939
M01-FN02	52.78751110	-66.99909300	5856132.70652043	230362.39160112
M01-GN01	52.78488480	-67.00118230	5855848.59626674	230205.31951912
M01-GN02	52.78644300	-67.00005470	5856017.58042748	230290.96524483
M02-FN01	52.78106790	-67.00355550	5855433.20442552	230021.71860095
M02-FN02	52.78229170	-67.00284690	5855566.58595557	230077.06292247
M02-GN01	52.78134780	-67.00344420	5855463.90129252	230030.95493038
D01-FN01	52.81246800	-67.02536210	5859005.91257981	228747.49697262
D01-FN02	52.80363680	-67.02463640	5858021.45955878	228741.35294217
D01-GN01	52.80096500	-67.02316520	5857718.89723167	228823.82746743

D01-GN02	52.80244770	-67.01743490	5857862.10699390	229219.12087399
D02-FN01	52.77817240	-67.01697340	5855161.82165734	229099.28594166
D02-FN02	52.77524950	-66.99575690	5854757.13316114	230511.40726531
D02-GN01	52.77722510	-67.01363360	5855043.93151884	229318.53589214
D02-GN02	52.77569620	-67.01550580	5854881.02573085	229182.82894627

Stream Survey

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
RP01-PLS 0m	52.83699140	-67.03247530	5861758.91679612	228421.51063994
RP01-PLS 50m	52.83744660	-67.03251070	5861809.65259626	228421.97045508
RP01-PLS 100m	52.83757270	-67.03178040	5861820.90869672	228471.91946534
RP01-PLS 150m	52.83785080	-67.03121460	5861849.68417867	228511.74360197
RP01-PLS 200m	52.83808240	-67.03035060	5861872.16363272	228571.35063939
RP01-PLS 250m	52.83816940	-67.02952700	5861878.72212578	228627.33510782
RP01-PLS 300m	52.83851470	-67.02908080	5861915.42100692	228659.52618647
RP01-PLS 350m	52.83878020	-67.02855630	5861942.95334199	228696.48966207
RP01-PLS 375m	52.83900830	-67.02827490	5861967.24678141	228716.85519804
RP01-PLS 400m	52.83924280	-67.02802940	5861992.38736981	228734.84388288

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
RP02-RP01 0m	52.82872290	-67.04072510	5860870.99103634	227814.41202712
RP02-RP01 25m	52.82901260	-67.04069580	5860903.08413209	227818.19754922
RP02-RP01 50m	52.82912280	-67.04031870	5860913.90525782	227844.27715330
RP02-RP01 75m	52.82938710	-67.04028130	5860943.14411526	227848.44893135
RP02-RP01 100m	52.82966470	-67.04018240	5860973.62840134	227856.84462634
RP02-RP01 125m	52.82996270	-67.04016250	5861006.67980141	227860.04892679
RP02-RP01 150m	52.83022360	-67.04011170	5861035.48993482	227865.10153425
RP02-RP01 175m	52.83039600	-67.03977920	5861053.39466736	227888.56664632
RP02-RP01 200m	52.83059190	-67.03961350	5861074.54382907	227900.94836517
RP02-RP01 225m	52.83083520	-67.03942020	5861100.85761681	227915.48472775
RP02-RP01 250m	52.83109180	-67.03946800	5861129.56335511	227913.87167337
RP02-RP01 275m	52.83135950	-67.03960070	5861159.82468222	227906.61209821
RP02-RP01 300m	52.83164850	-67.03960710	5861191.97527703	227907.98914763

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
RP03-RP02 0m	52.82081350	-67.04920130	5860023.91363058	227194.11399683
RP03-RP02 25m	52.82098530	-67.04887230	5860041.76192724	227217.34673228
RP03-RP02 50m	52.82115930	-67.04852810	5860059.79716595	227241.61668589
RP03-RP02 75m	52.82137870	-67.04833270	5860083.44438383	227256.15061178
RP03-RP02 100m	52.82156620	-67.04802680	5860103.12594130	227277.92566593
RP03-RP02 125m	52.82173570	-67.04766360	5860120.58909320	227303.44637193
RP03-RP02 150m	52.82197130	-67.04738910	5860145.73702395	227323.40802066
RP03-RP02 175m	52.82216020	-67.04703780	5860165.40214915	227348.24856233
RP03-RP02 200m	52.82241740	-67.04682800	5860193.19697964	227363.98826488
RP03-RP02 225m	52.82270420	-67.04665750	5860224.43146889	227377.26683467
RP03-RP02 250m	52.82293790	-67.04643210	5860249.55483058	227393.90946859
RP03-RP02 275m	52.82317080	-67.04612300	5860274.27164659	227416.18319439

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
RP04-RP02 0m	52.82637900	-67.03163090	5860576.00550200	228412.09543757
RP04-RP02 25m	52.82636440	-67.03214210	5860576.31574603	228377.58303669
RP04-RP02 50m	52.82629880	-67.03252750	5860570.48104046	228351.22279848
RP04-RP02 75m	52.82609630	-67.03289780	5860549.37100200	228325.02429651
RP04-RP02 100m	52.82609110	-67.03330150	5860550.32011296	228297.80883839
RP04-RP02 125m	52.82617670	-67.03366040	5860561.19356895	228274.17711977
RP04-RP02 150m	52.82617030	-67.03418700	5860562.47461012	228238.67881029

RP04-RP02 175m	52.82627750	-67.03458430	5860575.89481932	228212.59657133
RP04-RP02 200m	52.82640180	-67.03495980	5860591.13357167	228188.08919709
RP04-RP02 225m	52.82655880	-67.03529500	5860609.85497925	228166.49986159
RP04-RP02 250m	52.82669450	-67.03565640	5860626.30787153	228143.01344364
RP04-RP02 275m	52.82685280	-67.03598710	5860645.15696916	228121.73556410
RP04-RP02 300m	52.82702390	-67.03638100	5860665.66833517	228096.28240458
RP04-RP02 325m	52.82707380	-67.03678150	5860672.73176845	228069.62743123
RP04-RP02 350m	52.82717270	-67.03716550	5860685.17990032	228044.38984966
RP04-RP02 375m	52.82727350	-67.03758150	5860697.96056565	228017.00962365
RP04-RP02 400m	52.82716060	-67.03805710	5860687.21141196	227984.28023112
RP04-RP02 425m	52.82715020	-67.03844990	5860687.54312522	227957.76685325
RP04-RP02 450m	52.82717530	-67.03889570	5860692.02207911	227927.90685496
RP04-RP02 475m	52.82710300	-67.03935390	5860685.72084572	227896.60272455
RP04-RP02 500m	52.82708030	-67.03982330	5860684.97597452	227864.85465475
RP04-RP02 525m	52.82725840	-67.04023030	5860706.31652304	227838.56442734
RP04-RP02 550m	52.82714950	-67.04069580	5860695.97494046	227806.53967819

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
RP05-RP04 0m	52.82781660	-67.02009950	5860692.27178807	229197.50389810
RP05-RP04 25m	52.82785190	-67.02055520	5860697.91427142	229167.04038014
RP05-RP04 50m	52.82780770	-67.02099410	5860694.65601143	229137.21307703
RP05-RP04 75m	52.82781160	-67.02146170	5860696.85319837	229105.75281848
RP05-RP04 100m	52.82775170	-67.02182250	5860691.55541638	229081.08630630

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
RSD 0m DS	52.79465870	-67.04959040	5857117.93953099	227003.93758329
RSD 25m DS	52.79494520	-67.04942270	5857149.15058605	227017.03349668
RSD 50m DS	52.79519220	-67.04929630	5857176.12763831	227027.09880708
RSD 75m DS	52.79547820	-67.04898960	5857206.75509741	227049.55739372
RSD 100m DS	52.79571850	-67.04876200	5857232.60297577	227066.39945110
RSD 125m DS	52.79586010	-67.04850430	5857247.36476790	227084.65099272
RSD 150m DS	52.79605180	-67.04836880	5857268.16005577	227094.98242242
RSD 175m DS	52.79620350	-67.04794430	5857283.41118077	227124.53612954
RSD 200m DS	52.79634130	-67.04743770	5857296.80553388	227159.53449117
RSD 225m DS	52.79646840	-67.04699280	5857309.24496494	227190.30825397
RSD 250m DS	52.79658760	-67.04659750	5857320.99471199	227217.69031196
RSD 275m DS	52.79671700	-67.04620310	5857333.88189145	227245.07547092
RSD 300m DS	52.79675740	-67.04575060	5857336.65514706	227275.81787650
RSD 325m DS	52.79686980	-67.04537700	5857347.73181851	227301.69482202
RSD 350m DS	52.79695310	-67.04494220	5857355.34150870	227331.51306519
RSD 375m DS	52.79698660	-67.04451470	5857357.44314763	227360.52755427
RSD 400m DS	52.79714320	-67.04412540	5857373.37410952	227387.73871093
RSD 425m DS	52.79729850	-67.04370280	5857389.03436717	227417.18526882
RSD 450m DS	52.79739430	-67.04329790	5857398.14772346	227445.06663013
RSD 475m DS	52.79750030	-67.04290460	5857408.43910433	227472.23011474
RSD 500m DS	52.79766730	-67.04254510	5857425.63979887	227497.49779004
RSD 525m DS	52.79783870	-67.04231310	5857443.81329075	227514.20209002
RSD 550m DS	52.79791560	-67.04188110	5857450.72343146	227543.79061984
RSD 575m DS	52.79812270	-67.04163770	5857472.82238088	227561.48611517
RSD 600m DS	52.79825940	-67.04129950	5857486.73603027	227585.12844460
RSD 625m DS	52.79837340	-67.04098710	5857498.22419695	227606.89030430
RSD 650m DS	52.79852220	-67.04058540	5857513.24240913	227634.88650711
RSD 675m DS	52.79868280	-67.04028110	5857529.94171503	227656.39380994

RSD 700m DS	52.79874020	-67.03988720	5857534.82942270	227683.29255437
RSD 725m DS	52.79890580	-67.03952370	5857551.86038537	227708.81955076
RSD 750m DS	52.79909790	-67.03925320	5857572.18974892	227728.24605466
RSD 775m DS	52.79910220	-67.03886500	5857571.19666055	227754.42843961
RSD 800m DS	52.79913630	-67.03841300	5857573.27465364	227785.09572271
RSD 825m DS	52.79927190	-67.03806500	5857587.02995058	227809.39028278
RSD 850m DS	52.79937280	-67.03766130	5857596.71698443	227837.22065868
RSD 875m DS	52.79930850	-67.03722720	5857587.92479717	227866.06672468
RSD 900m DS	52.79944830	-67.03684240	5857602.00799984	227892.86663086
RSD 925m DS	52.79960410	-67.03652580	5857618.12824350	227915.17132999
RSD 950m DS	52.79984860	-67.03633430	5857644.58253883	227929.60142724
RSD 975m DS	52.80003200	-67.03599330	5857663.67866557	227953.72220031
RSD 1000m DS	52.79999630	-67.03561300	5857658.27014511	227979.12188668

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
TDA01 0m US	52.84022220	-66.95852310	5861840.96251570	233419.67171686
TDA01 150m US	52.83888600	-66.95881310	5861693.49794035	233391.95813055
TDA01 200m US	52.83828450	-66.95862750	5861625.94201310	233400.76439980
TDA01 400m US	52.83682640	-66.95705760	5861458.02244324	233497.51034103
TDA01 550m US	52.83586010	-66.95547330	5861344.72353764	233598.24563632
TDA01 700m US	52.83443720	-66.95500040	5861184.78987603	233621.36676195
TDA01 850m US	52.83323300	-66.95399500	5861047.19380021	233681.68017289
TDA01 1000m US	52.83192220	-66.95306320	5860898.02106504	233736.38963821
TDA01 1150m US	52.83104670	-66.95137890	5860794.45110023	233844.43198829
TDA01 1300m US	52.83005950	-66.94982960	5860678.96643578	233942.70626515
TDA01 1450m US	52.82904010	-66.94842700	5860560.44759778	234030.91095792
TDA01 1600m US	52.82777550	-66.94770060	5860417.17580327	234072.09038950
TDA01 1750m US	52.82665810	-66.94641870	5860288.21196948	234151.57741420
TDA01 1900m US	52.82532930	-66.94596940	5860138.83001413	234173.71222290
TDA01 2050m US	52.82403910	-66.94480490	5859991.09278500	234244.24624053
TDA01 2200m US	52.82314110	-66.94309190	5859884.92780514	234354.11659383
TDA01 2350m US	52.82208320	-66.94167490	5859762.08413529	234443.08254404
TDA01 2500m US	52.82105490	-66.94025590	5859642.52541737	234532.36855407
TDA01 2650m US	52.81975310	-66.93952120	5859495.09261916	234573.90603710
TDA01 2800m US	52.81835590	-66.93963610	5859340.19414896	234557.64539962

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
TDA02 0 m DS	52.81714070	-66.92192840	5859139.81371668	235742.86037255
TDA02 150 m DS	52.81796050	-66.92369990	5859237.46760163	235628.52835714
TDA02 300 m DS	52.81903760	-66.92505110	5859362.18036073	235544.07111266
TDA02 450 m DS	52.82036710	-66.92539070	5859511.22841511	235529.28001171
TDA02 600 m DS	52.82156900	-66.92636310	5859648.42181096	235471.09957375
TDA02 750 m DS	52.82268830	-66.92758000	5859777.33424092	235395.95543758
TDA02 900 m DS	52.82358540	-66.92924600	5859883.20151243	235289.22119880
TDA02 1050 m DS	52.82492870	-66.92933250	5860032.85200862	235291.56906311
TDA02 1200 m DS	52.82624590	-66.92884370	5860177.48094132	235332.49742288
TDA02 1350 m DS	52.82728570	-66.93029260	5860298.41330167	235241.26138292
TDA02 1500 m DS	52.82799830	-66.93218300	5860384.60161428	235118.31017240
TDA02 1650 m DS	52.82916360	-66.93338510	5860518.57936890	235044.46571168
TDA02 1800 m DS	52.83034290	-66.93449240	5860653.76491550	234977.09394204
TDA02 1950 m DS	52.83170020	-66.93435770	5860804.15576698	234994.43266956
TDA02 2100 m DS	52.83303260	-66.93397010	5860950.84548421	235028.64603397
TDA02 2250 m DS	52.83413700	-66.93525820	5861078.37230459	234948.65370032

TDA02 2400 m DS	52.83536150	-66.93620800	5861218.00293010	234892.17323615
TDA02 2550 m DS	52.83645050	-66.93489370	5861334.21360790	234987.29113240
TDA02 2700 m DS	52.83663250	-66.93270110	5861346.35715645	235136.00705076
TDA02 2850 m DS	52.83712500	-66.93062290	5861393.44457626	235278.91047340
TDA02 3000 m DS	52.83799650	-66.92891480	5861484.03238736	235399.20211983
TDA02 3150 m DS	52.83835380	-66.92676110	5861515.81942460	235546.35877362
TDA02 3300 m DS	52.83875930	-66.92463650	5861553.07628311	235691.84717547
TDA02 3450 m DS	52.83998860	-66.92365540	5861686.12477906	235765.36218167
TDA02 3600 m DS	52.84132370	-66.92401160	5861835.85610533	235749.49811529
TDA02 3700m DS	52.84217690	-66.92339980	5861928.45364629	235795.86481350
TDA02 3900m DS	52.84396230	-66.92320180	5862126.20489520	235820.04099447
TDA02 4050 m DS	52.84532140	-66.92310500	5862276.93751265	235834.81462309
TDA02 4200m DS	52.84666790	-66.92422910	5862430.76149252	235767.33861704
TDA02 4350m DS	52.84740070	-66.92538330	5862516.47345246	235694.11041202
TDA02 4500m DS	52.84869240	-66.92636640	5862663.68851356	235635.79936570
TDA02 4650m DS	52.84900820	-66.92857690	5862706.93630181	235488.95017223
TDA02 4800m DS	52.84995050	-66.93023080	5862817.78395369	235383.37679464
TDA02 4950m DS	52.85098050	-66.93174330	5862937.86218437	235287.85847502
TDA02 5100m DS	52.85231940	-66.93214890	5863088.20041166	235268.71720652
TDA02 5250m DS	52.85359670	-66.93294160	5863233.11830080	235223.15296316
TDA02 5400m DS	52.85492190	-66.93349010	5863382.46096546	235194.31661366
TDA02 5550m DS	52.85604390	-66.93485520	5863512.22708832	235109.29507765
TDA02 5700m DS	52.85656820	-66.93693690	5863578.19487043	234972.41433836
TDA02 5850m DS	52.85619860	-66.93919340	5863545.43939803	234818.32040568
TDA02 6000m DS	52.85667770	-66.94139050	5863606.81725919	234673.40276815
TDA02 6100m DS	52.85640700	-66.94357410	5863584.79618998	234524.81646867
TDA02 6500m DS	52.86036350	-66.94666870	5864036.07779869	234340.77164071
TDA02 6650m DS	52.86042110	-66.94893480	5864050.86903844	234188.65325408
TDA02 6800m DS	52.86078170	-66.95109360	5864098.95129744	234045.60948601

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
TDA02E 150m US	52.82937824	-60.91267857	5855333.725	640624.092
TDA02E 300m US	52.82976256	-60.9149156	5855372.088	640472.16 0
TDA02E 450m US	52.83067436	-60.9166402	5855470.122	640353.048
TDA02E 600m US	52.83161999	-60.91806619	5855572.506	640253.946
TDA02E 750m US	52.83285342	-60.91913334	5855707.602	640178.092
TDA02E 900m US	52.83406348	-60.91874877	5855842.934	640200.098
TDA02E 1050m US	52.83535001	-60.91736001	5855988.735	640289.492
TDA02E 1200m US	52.83670173	-60.91848658	5856136.87 0	640209.259
TDA02E 1350m US	52.83810181	-60.91998348	5856289.661	640103.934
TDA02E 1500m US	52.83949194	-60.92268499	5856438.999	639917.521
TDA02E 1650m US	52.84054519	-60.92375651	5856554.051	639841.973

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
PLS-S1 0m	52.86273530	-67.02561930	5864594.81836582	229043.57161616
PLS-S1 50m DS	52.86331270	-67.02553000	5864658.66777480	229053.18055424
PLS-S1 100m DS	52.86361530	-67.02543850	5864691.96084537	229061.22356878
PLS-S2 0m	52.87208040	-67.03663200	5865675.28439727	228361.10772495
PLS-S2 50m US	52.87173030	-67.03613140	5865634.47134547	228392.59020672
PLS-S2 100m US	52.87128740	-67.03580250	5865583.99212530	228411.94367239
PLS-S2 150m US	52.87092160	-67.03536790	5865541.68386113	228438.88960136
PLS-S2 200m US	52.87062870	-67.03481310	5865507.02493892	228474.37710574
PLS-S2 290m US	52.87016880	-67.03372830	5865451.79731807	228544.47232993

PLS-S2 340m US	52.86983990	-67.03324110	5865413.39292143	228575.18907160
PLS-S2 390m US	52.86939310	-67.03313290	5865363.31550842	228579.67529355
PLS-S2 420m US	52.86913160	-67.03299910	5865333.74007421	228587.04163139
PLN-S1 0m	52.88803590	-67.03824050	5867455.05567301	228352.76066833
PLN-S1 50m DS	52.88835050	-67.03877170	5867492.03895079	228319.01282480
PLN-S1 100m DS	52.88878970	-67.03902240	5867541.81151362	228304.90554990
PLN-S1 150m DS	52.88920110	-67.03942180	5867589.05680193	228280.62653329
PLN-S1 200m DS	52.88957970	-67.03988930	5867632.91392569	228251.56391781
PLN-S1 250m DS	52.88999630	-67.04020530	5867680.42171512	228232.92596166
PLN-S1 300m DS	52.89047710	-67.04035290	5867734.42854175	228226.01275331
PLN-S1 350m DS	52.89088010	-67.04070110	5867780.54658090	228205.12547196
PLN-S1 400m DS	52.89131170	-67.04102210	5867829.74099317	228186.24650914
PLN-S1 425m DS	52.89152460	-67.04110780	5867853.73251063	228181.81805058
PLN-S2 0m	52.89904680	-67.03938170	5868683.39662068	228344.96372315
PLN-S2 50m	52.89943110	-67.03882050	5868723.99252852	228385.09409402
PLN-S3 0m	52.90229750	-67.02880440	5869004.76616968	229076.28407272
PLN-S3 50m US	52.90198870	-67.02936060	5868972.53883383	229036.96960167
PLN-S3 100m US	52.90208310	-67.03007850	5868985.74424307	228989.30431704
PLN-S3 125m US	52.90196260	-67.03041800	5868973.63130912	228965.73142612
PLN-S3 225m US	52.90199070	-67.03194580	5868982.52750885	228863.21309570
PLN-S3 275m US	52.90196910	-67.03271280	5868983.02512305	228811.52278018
PLN-S3 350m US	52.90211080	-67.03371270	5869002.55698143	228745.19866477
PLN-S3 385m US	52.90219450	-67.03421860	5869013.77422297	228711.71719884

Name	Co-ordinates			
	Lat.	Long.	Y_PROJ	X_PROJ
SC01 start	52.83612780	-66.97974710	5861464.80589090	231965.76105800
SC01 end	52.83512320	-66.98087600	5861357.34260771	231883.56985123
SC02 start	52.83660019	-66.97306378	5974535.03683762	-572077.62753861
SC02 end	52.83604883	-66.97218594	5974461.05706426	-572032.99192970
SC03 start	52.83828450	-66.95862750	5861625.94201310	233400.76439980
SC03 end	52.83682640	-66.95705760	5861458.02244324	233497.51034103
SC04 start	52.85954650	-66.94557540	5863941.20875961	234409.33883262
SC04 end	52.85640700	-66.94357410	5863584.79618998	234524.81646867
SC05 start	52.84396230	-66.92320180	5862126.20489520	235820.04099447
SC05 end	52.84217690	-66.92339980	5861928.45364629	235795.86481350
SC06 start	52.86172220	-66.91159290	5864057.90458085	236685.49299405
SC06 end	52.85812299	-60.90803342	5858539.794	640843.929
SC07 start	52.86899620	-66.90382190	5864838.07747947	236751.60886163
SC07 end	52.86847340	-66.89854750	5864760.66749308	237627.53365384
SC08 start	52.87164355	-60.86936793	5860120.149	643402.2 00
SC08 end	52.87073922	-60.87212883	5860014.054	643219.381
SC09 start	52.88203830	-66.86131200	5866133.24488527	240213.60343474
SC09 end	52.88079840	-66.85967260	5865989.47156727	240316.44029410
SC10 start	52.92574820	-66.85564390	5870972.02896707	240856.01058150
SC10 end	52.92413710	-66.85491420	5870790.28468587	240895.40553860

Appendix B
Survey Photographs

Aerial Photographs

Pond M01

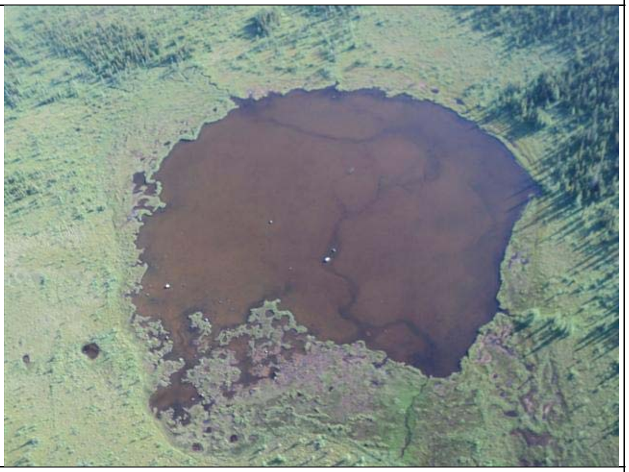
Pond M02

Pond RP01

Pond RP02

Pond RP03

Pond RP04

	
Pond RP05	**Ponds SW1 and SW2**
	
Pond SW01	**Pond SW02**

Pond Shoreline Photographs

Pond RP01

Pond RP02

Pond RP03

Pond RP04

Pond RP05

Stream Survey Photographs


Pike Lake North-S1 Upstream at 25 m


Pike Lake North -S1 Downstream at 25 m


Pike Lake North -S1 Upstream at 375 m


Pike Lake North -S1 Downstream at 375 m


Pike Lake North -S2 Upstream at 0 m


Pike Lake North -S2 Downstream at 0 m

Pike Lake North -S2 Upstream at 50 m

Pike Lake North -S2 Downstream at 50 m

Pike Lake North –S3 Upstream at 0 m

Pike Lake North –S3 Downstream at 0 m

Pike Lake North –S3 Upstream at 50 m

Pike Lake North –S3 Downstream at 50 m


Pike Lake North –S3 Upstream at 100 m


Pike Lake North –S3 Downstream at 100 m


Pike Lake North –S3 Upstream at 125 m


Pike Lake North –S3 Downstream at 125 m


Pike Lake North –S3 Upstream at 225 m


Pike Lake North –S3 Downstream at 225 m

Pike Lake North –S3 Upstream at 275 m

Pike Lake North –S3 Downstream at 275 m

Pike Lake North –S3 Upstream at 350 m

Pike Lake North –S3 Downstream at 350 m

Pike Lake North –S3 Upstream at 385 m

Pike Lake North –S3 Downstream at 385 m


Pike Lake South –S1 Upstream at 0 m


Pike Lake South –S1 Downstream at 0 m


Pike Lake South –S1 Upstream at 50 m


Pike Lake South –S1 Downstream at 50 m


Pike Lake South –S1 Upstream at 100 m


Pike Lake South –S1 Downstream at 100 m

Pike Lake South –S2 Upstream at 0 m

Pike Lake South –S2 Downstream at 0 m

Pike Lake South –S2 Upstream at 50 m

Pike Lake South –S2 Downstream at 50 m

Pike Lake South –S2 Upstream at 100 m

Pike Lake South –S2 Downstream at 100 m


Pike Lake South –S2 Upstream at 150 m


Pike Lake South –S2 Downstream at 150 m


Pike Lake South –S2 Upstream at 200 m


Pike Lake South –S2 Downstream at 200 m


Pike Lake South –S2 Upstream at 290 m

Pike Lake South –S2 Upstream at 340 m

Pike Lake South –S2 Downstream at 340 m

Pike Lake South –S2 Upstream at 390 m

Pike Lake South –S2 Downstream at 390 m

Pike Lake South –S2 Upstream at 420 m

Pike Lake South –S2 Downstream at 420 m

RND Lower Extent 1

RND Lower Extent 2

RND Lower Extent 1

RND Lower Extent 2


Rose Pit 1 – Pike Lake South Upstream at 0 m


Rose Pit 1 – Pike Lake South Downstream at 0 m


Rose Pit 1 – Pike Lake South Upstream at 50 m


Rose Pit 1 – Pike Lake South Downstream at 50 m


Rose Pit 1 – Pike Lake South Upstream at 100 m


Rose Pit 1 – Pike Lake South Downstream at 100 m

Rose Pit 1 – Pike Lake South Upstream at 150 m

Rose Pit 1 – Pike Lake South Downstream at 150 m

Rose Pit 1 – Pike Lake South Upstream at 200 m

Rose Pit 1 – Pike Lake South Downstream at 200 m

Rose Pit 1 – Pike Lake South Upstream at 250 m

Rose Pit 1 – Pike Lake South Downstream at 250 m


Rose Pit 1 – Pike Lake South Upstream at 300 m


Rose Pit 1 – Pike Lake South Downstream at 300 m


Rose Pit 1 – Pike Lake South Upstream at 350 m


Rose Pit 1 – Pike Lake South Downstream at 350 m


Rose Pit 1 – Pike Lake South Upstream at 400 m


Rose Pit 1 – Pike Lake South Downstream at 400 m

Rose Pit 1 – Pike Lake South Upstream at 450 m

Rose Pit 1 – Pike Lake South Downstream at 450 m

Rose Pit 1 – Rose Pit 2 Upstream at 0 m

Rose Pit 1 – Rose Pit 2 Downstream at 0 m

Rose Pit 1 – Rose Pit 2 Upstream at 50 m

Rose Pit 1 – Rose Pit 2 Downstream at 50 m

Rose Pit 1 – Rose Pit 2 Upstream at 100 m

Rose Pit 1 – Rose Pit 2 Downstream at 100 m

Rose Pit 1 – Rose Pit 2 Upstream at 150 m

Rose Pit 1 – Rose Pit 2 Downstream at 150 m

Rose Pit 1 – Rose Pit 2 Upstream at 200 m

Rose Pit 1 – Rose Pit 2 Downstream at 200 m


Rose Pit 1 – Rose Pit 2 Upstream at 250 m


Rose Pit 1 – Rose Pit 2 Downstream at 250 m


Rose Pit 2 – Rose Pit 3 Upstream at 0 m


Rose Pit 2 – Rose Pit 3 Downstream at 0 m


Rose Pit 2 – Rose Pit 3 Upstream at 50 m


Rose Pit 2 – Rose Pit 3 Downstream at 50 m

Rose Pit 2 – Rose Pit 3 Upstream at 100 m

Rose Pit 2 – Rose Pit 3 Downstream at 100 m

Rose Pit 2 – Rose Pit 3 Upstream at 150 m

Rose Pit 2 – Rose Pit 3 Downstream at 150 m

Rose Pit 2 – Rose Pit 3 Upstream at 200 m

Rose Pit 2 – Rose Pit 3 Downstream at 200 m


Rose Pit 2 – Rose Pit 3 Upstream at 250 m


Rose Pit 2 – Rose Pit 3 Downstream at 250 m


Rose Pit 2 – Rose Pit 3 Upstream at 150 m


Rose Pit 2 – Rose Pit 3 Downstream at 150 m


Rose Pit 2 – Rose Pit 4 Upstream at 0 m


Rose Pit 2 – Rose Pit 4 Downstream at 0 m

Rose Pit 2 – Rose Pit 4 Upstream at 50 m

Rose Pit 2 – Rose Pit 4 Downstream at 50 m

Rose Pit 2 – Rose Pit 4 Upstream at 100 m

Rose Pit 2 – Rose Pit 4 Downstream at 100 m

Rose Pit 2 – Rose Pit 4 Upstream at 150 m

Rose Pit 2 – Rose Pit 4 Downstream at 150 m

Rose Pit 2 – Rose Pit 4 Upstream at 200 m

Rose Pit 2 – Rose Pit 4 Downstream at 200 m

Rose Pit 2 – Rose Pit 4 Upstream at 250 m

Rose Pit 2 – Rose Pit 4 Downstream at 250 m

Rose Pit 2 – Rose Pit 4 Upstream at 300 m

Rose Pit 2 – Rose Pit 4 Downstream at 300 m

Rose Pit 2 – Rose Pit 4 Upstream at 400 m

Rose Pit 2 – Rose Pit 4 Downstream at 400 m

Rose Pit 2 – Rose Pit 4 Upstream at 450 m

Rose Pit 2 – Rose Pit 4 Downstream at 450 m

Rose Pit 2 – Rose Pit 4 Upstream at 500 m

Rose Pit 2 – Rose Pit 4 Downstream at 500 m


Rose Pit 2 – Rose Pit 4 Upstream at 550 m


Rose Pit 2 – Rose Pit 4 Downstream at 550 m


Rose Pit 4– Rose Pit 5 Upstream at 0 m


Rose Pit 4– Rose Pit 5 Downstream at 0 m


Rose Pit 4– Rose Pit 5 Upstream at 50 m


Rose Pit 4– Rose Pit 5 Downstream at 50 m

RSD Upstream at 0 m

RSD Downstream at 0 m

RSD Upstream at 50 m

RSD Downstream at 50 m

RSD Upstream at 100 m

RSD Downstream at 100 m

RSD Upstream at 150 m

RSD Downstream at 150 m

RSD Upstream at 200 m

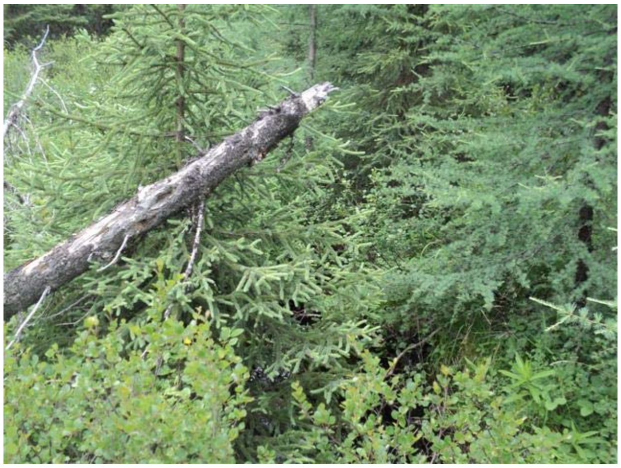
RSD Downstream at 200 m

RSD Upstream at 250 m

RSD Downstream at 250 m

RSD Upstream at 300 m

RSD Downstream at 300 m



RSD Upstream at 350 m

RSD Downstream at 350 m

RSD Upstream at 400 m

RSD Downstream at 400 m

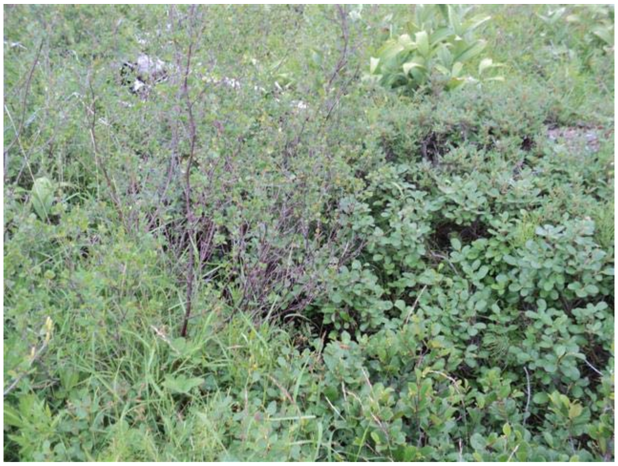

RSD Upstream at 500 m


RSD Downstream at 500 m


RSD Upstream at 550 m

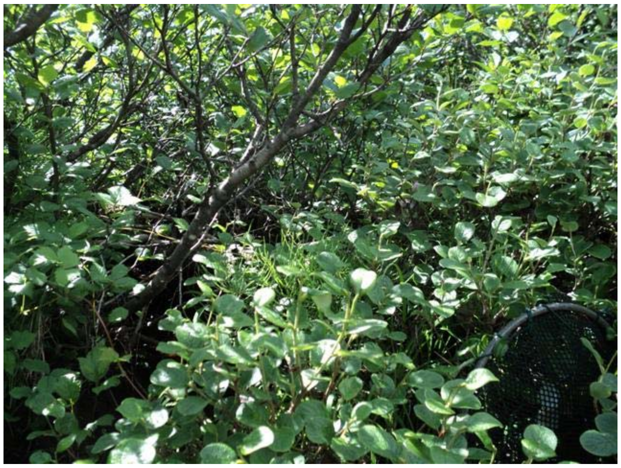

RSD Downstream at 550 m


RSD Upstream at 600 m


RSD Downstream at 600 m

RSD Upstream at 650 m

RSD Downstream at 650 m

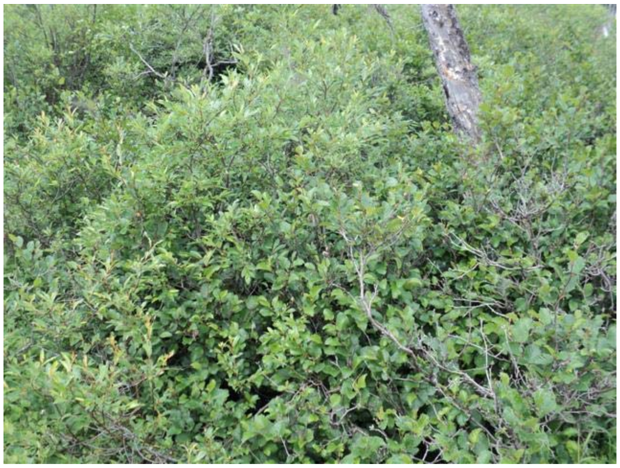


RSD Upstream at 700 m

RSD Downstream at 700 m

RSD Upstream at 750 m

RSD Downstream at 750 m



RSD Upstream at 800 m

RSD Downstream at 800 m

RSD Upstream at 850 m

RSD Downstream at 850 m

RSD Upstream at 900 m

RSD Downstream at 900 m

RSD Upstream at 950 m

RSD Downstream at 950 m

RSD Upstream at 1000 m

RSD Downstream at 1000 m

Stream Crossing Photographs

SC01 Upstream at 0 m

SC01 Downstream at 0 m

SC02 Upstream at 0 m

SC02 Downstream at 0 m

SC02 Upstream at 50 m

SC02 Downstream at 50 m


SC02 Upstream at 100 m


SC02 Downstream at 100 m


SC03 Upstream at 0 m


SC03 Downstream at 0 m


SC03 Upstream at 50 m


SC03 Downstream at 50 m


SC03 Upstream at 100 m


SC03 Downstream at 100 m


SC03 Upstream at 150 m


SC03 Downstream at 150 m


SC03 Upstream at 200 m


SC03 Downstream at 200 m

SC04 Upstream at 0 m

SC04 Downstream at 0 m

SC04 Upstream at 50 m

SC04 Downstream at 50 m

SC04 Upstream at 100 m

SC04 Downstream at 100 m

SC04 Upstream at 150 m

SC04 Downstream at 150 m

SC04 Upstream at 200 m

SC04 Downstream at 200 m

SC04 Upstream at 300 m

SC04 Downstream at 300 m


SC04 Upstream at 350 m


SC04 Downstream at 350 m


SC04 Upstream at 400 m


SC04 Downstream at 400 m


SC05 Upstream at 50 m


SC05 Downstream at 50 m


SC05 Upstream at 100 m


SC05 Downstream at 100 m


SC05 Upstream at 150 m


SC05 Downstream at 150 m


SC05 Upstream at 200 m


SC05 Downstream at 200 m


SC06 Upstream at 50 m


SC06 Downstream at 50 m


SC06 Upstream at 100 m


SC06 Downstream at 100 m


SC06 Upstream at 150 m


SC06 Downstream at 150 m

SC06 Upstream at 200 m

SC06 Downstream at 200 m

SC06 Upstream at 250 m

SC06 Downstream at 250 m

SC06 Upstream at 300 m

SC06 Downstream at 300 m

SC06 Upstream at 350 m

SC06 Downstream at 350 m

SC06 Upstream at 400 m

SC06 Downstream at 400 m

SC07 Upstream at 0 m

SC07 Downstream at 0 m

SC07 Upstream at 50 m

SC07 Downstream at 50 m

SC07 Upstream at 100 m

SC07 Downstream at 100 m

SC07 Upstream at 150 m

SC07 Downstream at 150 m


SC07 Upstream at 200 m


SC07 Downstream at 200 m


SC07 Upstream at 250 m


SC07 Downstream at 250 m


SC07 Upstream at 300 m


SC07 Downstream at 300 m

SC07 Upstream at 350 m

SC07 Downstream at 350 m

SC08 Upstream at 0 m

SC08 Downstream at 0 m

SC08 Upstream at 50 m

SC08 Downstream at 50 m


SC08 Upstream at 100 m


SC08 Downstream at 100 m


SC08 Upstream at 150 m


SC08 Downstream at 150 m


SC08 Upstream at 200 m


SC08 Downstream at 200 m


SC08 Upstream at 300 m


SC08 Downstream at 300 m


SC08 Upstream at 350 m


SC08 Downstream at 350 m


SC08 Upstream at 400 m


SC08 Downstream at 400 m

SC09 Upstream at 50 m

SC09 Downstream at 50 m

SC09 Upstream at 100 m

SC09 Downstream at 100 m

SC09 Upstream at 150 m

SC09 Downstream at 150 m


SC09 Upstream at 200 m


SC09 Downstream at 200 m


SC10 Upstream at 50 m


SC10 Downstream at 50 m


SC10 Upstream at 100 m


SC10 Downstream at 100 m

SC10 Upstream at 150 m

SC10 Downstream at 150 m

SC10 Upstream at 200 m

SC10 Downstream at 200 m

Tailings Management Streams

TDA01 Upstream at 150 m

TDA01 Downstream at 150 m

TDA01 Upstream at 200 m

TDA01 Downstream at 200 m

TDA01 Upstream at 300 m

TDA01 Downstream at 300 m


TDA01 Upstream at 400 m


TDA01 Downstream at 400 m


TDA01 Upstream at 550 m


TDA01 Downstream at 550 m

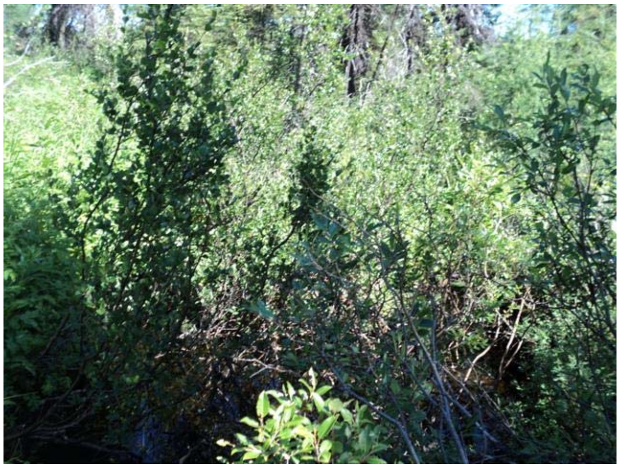

TDA01 Upstream at 700 m


TDA01 Downstream at 700 m

TDA01 Upstream at 850 m

TDA01 Downstream at 850 m

TDA01 Upstream at 1000 m

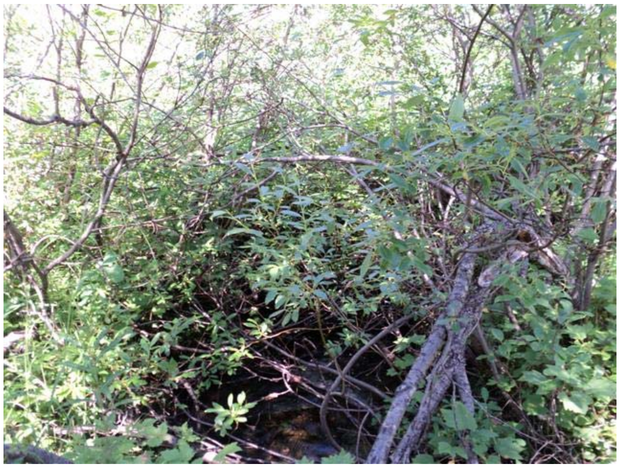


TDA01 Downstream at 1000 m

TDA01 Upstream at 1150 m

TDA01 Downstream at 1150 m


TDA01 Upstream at 1300 m


TDA01 Downstream at 1300 m


TDA01 Upstream at 1450 m


TDA01 Downstream at 1450 m


TDA01 Upstream at 1600 m


TDA01 Downstream at 1600 m

TDA01 Upstream at 1750 m

TDA01 Downstream at 1750 m

TDA01 Upstream at 1900 m

TDA01 Downstream at 1900 m

TDA01 Upstream at 2050 m

TDA01 Downstream at 2050 m

TDA01 Upstream at 2200 m

TDA01 Downstream at 2200 m

TDA01 Upstream at 2350 m

TDA01 Downstream at 2350 m

TDA01 Upstream at 2500 m

TDA01 Downstream at 2500 m

TDA01 Upstream at 2650 m

TDA01 Downstream at 2650 m

TDA01 Upstream at 2800 m

TDA01 Downstream at 2800 m

TDA02 Upstream at 0 m

TDA02 Downstream at 0 m

TDA02 Upstream at 0 m

TDA02 Downstream at 0 m

TDA02 Upstream at 150 m

TDA02 Downstream at 150 m

TDA02 Upstream at 300 m

TDA02 Downstream at 300 m


TDA02 Upstream at 400 m


TDA02 Downstream at 400 m


TDA02 Upstream at 500 m


TDA02 Downstream at 500 m


TDA02 Upstream at 600 m


TDA02 Downstream at 600 m

Appendix C Fish Sampling Data

Sampling Date	Sampling Method	Sampling Site	Site Location	Component Study Location (m)	Set Number	Fish Species	Fish Count	Fish Length (mm)	Fish Weight (g)	K value
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	RWF	1	172	47.1	0.93
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	214	120.3	1.23
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	250	92.4	0.59
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	173	63.1	1.22
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	157	45.6	1.18
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	179	70.2	1.22
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	146	41.9	1.35
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	146	21.2	0.68
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	120	13.4	0.78
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	122	13.8	0.76
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	136	32.5	1.29
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	143	33.7	1.15
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	42	1.1	1.48
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	45	0.5	0.55
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	40	0.4	0.63
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	39	0.3	0.51
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	37	0.3	0.59
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	92	6.7	0.86
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	135	17.1	0.70
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	127	16.9	0.83
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	155	43.3	1.16
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	RWF	1	112	12.2	0.87
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	129	25.3	1.18
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	112	9.8	0.70
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LNS	1	137	28.3	1.10
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	118	12.1	0.74
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	BT	1	135	26.9	1.09
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	BT	1	116	19.8	1.27
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	79	4.7	0.95
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	96	8.6	0.97
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	61	2	0.88
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	43	0.7	0.88
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	45	1.4	1.54
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	LC	1	48	0.7	0.63
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	28	0.3	1.37
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	32	0.2	0.61
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	35	0.3	0.70
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	SS	1	40	0.7	1.09
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	28	0.3	1.37
25-Jul-11	Fyke Net	D01	Wpt 220		FN01	B	1	30	0.3	1.11
25-Jul-11	Fyke Net	D01	Wpt 222		FN02	WS	1	127	22.6	1.10
25-Jul-11	Fyke Net	D01	Wpt 222		FN02	WS	1	147	35.6	1.12
25-Jul-11	Fyke Net	D01	Wpt 222		FN02	PD	1	62	3.6	1.51
25-Jul-11	Fyke Net	D01	Wpt 222		FN02	PD	1	42	1.1	1.48
25-Jul-11	Fyke Net	D01	Wpt 222		FN02	SS	1	48	0.9	0.81
25-Jul-11	Fyke Net	D01	Wpt 222		FN02	SS	1	34	0.4	1.02
25-Jul-11	Gill Net	D01	Wpt 266-267		GN01	LT	1	420	640.2	0.86
25-Jul-11	Gill Net	D01	Wpt 268-269		GN02	RWF	1	332	343.2	0.94
25-Jul-11	Gill Net	D01	Wpt 268-269		GN02	RWF	1	275	218.5	1.05
25-Jul-11	Gill Net	D01	Wpt 268-269		GN02	RWF	1	325	311.5	0.91
25-Jul-11	Gill Net	D01	Wpt 268-269		GN02	RWF	1	221	120.2	1.11
25-Jul-11	Gill Net	D01	Wpt 268-269		GN02	RWF	1	292	265.6	1.07
25-Jul-11	Gill Net	D01	Wpt 268-269		GN02	LT	1	435	823.6	1.00
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	SS	1	138	30	1.14
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	LC	1	96	9	1.02
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	B	1	227	117.9	1.01
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	PD	1	49	1	0.85
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	LC	1	62	2	0.84
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	PD	1	43	0.9	1.13

25-Jul-11	Fyke Net	D02	Wpt 216		FN01	LND	1	36	0.6	1.29
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	PD	1	48	1.2	1.09
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	PD	1	47	1.1	1.06
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	PD	1	42	0.6	0.81
25-Jul-11	Fyke Net	D02	Wpt 216		FN01	PD	1	46	1	1.03
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	115	17.6	1.16
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	164	57.1	1.29
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	195	92.2	1.24
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	PD	1	66	3.1	1.08
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	185	76.9	1.21
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	154	44.4	1.22
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	117	20.1	1.25
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	BT	1	198	88.1	1.13
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	188	87.3	1.31
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	186	83.5	1.30
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	149	40.4	1.22
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	B	1	172	32.9	0.65
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	139	38.1	1.42
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	169	60.3	1.25
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	LNS	1	74	4.8	1.18
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	PD	1	50	1.3	1.04
25-Jul-11	Fyke Net	D02	Wpt 218		FN02	PD	1	48	0.9	0.81
25-Jul-11	Gill Net	D02	Wpt 270-271		GN01	BT	1	399	703.1	1.11
25-Jul-11	Gill Net	D02	Wpt 272-273		GN02	NC	NC	NC	NC	NC
23-Jul-11	Fyke Net	M01	Wpt 719		FN01	BT	1	185	78.7	1.24
23-Jul-11	Fyke Net	M01	Wpt 719		FN01	BT	1	171	51.4	1.03
23-Jul-11	Fyke Net	M01	Wpt 719		FN01	BT	1	205	103	1.20
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	230	126.2	1.04
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	206	95.2	1.09
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	220	115.1	1.08
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	206	87.8	1.00
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	192	77.9	1.10
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	203	85.8	1.03
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	195	83	1.12
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	119	21.1	1.25
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	141	30.2	1.08
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	198	81.1	1.04
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	169	50.4	1.04
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	159	41.3	1.03
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	186	73.5	1.14
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	146	37.6	1.21
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	116	15.6	1.00
23-Jul-11	Fyke Net	M01	Wpt 721		FN02	BT	1	108	16.1	1.28
23-Jul-11	Gill Net	M01	Wpt 126-127		GN01	BT	1	151	36.2	1.05
23-Jul-11	Gill Net	M01	Wpt 126-127		GN01	BT	1	182	67.9	1.13
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	205	39.2	0.46
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	184	31.9	0.51
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	191	28.2	0.40
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	167	31.5	0.68
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	195	39.8	0.54
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	145	16.5	0.54
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	126	18.5	0.92
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	165	46.5	1.04
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	132	24.4	1.06
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	53	2.4	1.61
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	145	32.1	1.05
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	135	25.8	1.05
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	153	17.1	0.48
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	141	29.2	1.04
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	121	19.6	1.11
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	131	21.6	0.96
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	B	1	127	9.6	0.47

22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	75	3.6	0.85
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	78	5	1.05
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	74	3.1	0.77
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	80	4.7	0.92
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	84	6.6	1.11
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	81	6	1.13
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	95	8.1	0.94
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	92	8.5	1.09
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	PD	1	85	5.6	0.91
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	PD	1	69	3.3	1.00
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	64	3.2	1.22
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	72	3.8	1.02
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	90	7.6	1.04
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	88	8.1	1.19
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	71	4.9	1.37
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	85	6.9	1.12
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	73	4.9	1.26
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	62	3.7	1.55
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	75	4.9	1.16
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	59	2.8	1.36
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	53	1.1	0.74
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	70	4.1	1.20
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	82	6.6	1.20
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	67	3.6	1.20
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	70	3.9	1.14
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	63	1.4	0.56
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	115	13.2	0.87
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	PD	1	81	5.2	0.98
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	66	3.2	1.11
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	60	0.9	0.42
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	73	4.3	1.11
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	PD	1	77	3.4	0.74
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	70	3.2	0.93
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	56	1.5	0.85
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	75	5.5	1.30
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	78	5.9	1.24
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	71	3.6	1.01
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	83	5.7	1.00
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	69	4.3	1.31
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	85	6.7	1.09
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	75	4.1	0.97
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	70	4	1.17
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	80	4.4	0.86
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	83	6.1	1.07
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	98	8.9	0.95
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	BT	1	105	14.2	1.23
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	85	7.7	1.25
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	77	7	1.53
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	66	5.4	1.88
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	55	2.4	1.44
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	52	1.4	1.00
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	52	0.7	0.50
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	41	0.8	1.16
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	82	6.1	1.11
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	75	5.5	1.30
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	71	5	1.40
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	70	3.5	1.02
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	81	6	1.13
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	82	5.6	1.02
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	80	6.5	1.27
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	70	5.4	1.57
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	73	5.5	1.41

22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	83	8.5	1.49
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	72	4.9	1.31
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	70	4.4	1.28
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	67	3.3	1.10
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	75	3.7	0.88
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	76	4.2	0.96
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	51	2.2	1.66
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	66	3.6	1.25
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	68	4	1.27
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	69	5	1.52
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	75	3.7	0.88
22-Jul-11	Fyke Net	M02	Wpt 722		FN01	LC	1	65	3	1.09
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LT	1	660		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	54	1.9	1.21
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	95	7.1	0.83
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	48	1.5	1.36
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	74	4.3	1.06
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	53	1.5	1.01
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	55	1.7	1.02
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	53	1.4	0.94
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	52	1.4	1.00
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	82	5.7	1.03
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	39	0.3	0.51
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	28	0.2	0.91
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	53	1.9	1.28
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	82	4.7	0.85
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	37	0.3	0.59
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	64	2.6	0.99
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	154	37.2	1.02
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	155	38.9	1.04
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	83	4.5	0.79
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	73	4.6	1.18
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	81	6.3	1.19
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	83	5.4	0.94
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	84	8.1	1.37
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	54	1.8	1.14
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	78	5.1	1.07
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	41		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	98	7.3	0.78
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	83	7.5	1.31
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	88		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	89		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	40		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	77		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	46		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	53		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	57		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	85		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	72		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	158	44.1	1.12
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	101		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	86		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	66		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	65		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	85	4.9	0.80
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	92		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	53		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	108	13.2	1.05
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	57		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	52		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	88	6.2	0.91
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	101	9.5	0.92

23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	80	5.7	1.11
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	144	28	0.94
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	B	1	156	19.5	0.51
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	82	5.9	1.07
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	81		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	153		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	84	5.1	0.86
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	60		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	183	65.5	1.07
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	80		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	83		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	185	60.6	0.96
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	190	70.8	1.03
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	185	69.2	1.09
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	105		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	95		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	70		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	62		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	67		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	82		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	76		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	84		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	68		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	79		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	80		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	90		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	87		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	171	51.9	1.04
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	BT	1	155	31.8	0.85
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	106		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	83		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	74		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	57		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	92		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	104		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	55		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	B	1	168	23.5	0.50
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	104	12.7	1.13
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	83		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	93		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	113		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	105		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	85		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	92		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	94		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	94		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	88		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	PD	1	87		
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	65	2.6	0.95
23-Jul-11	Fyke Net	M02	Wpt 724		FN02	LC	1	86	5.4	0.85
23-Jul-11	Gill Net	M02	Wpt 001-002		GN01	BT	1	110	14.6	1.10
23-Jul-11	Gill Net	M02	Wpt 001-002		GN01	BT	1	246	139.5	0.94
23-Jul-11	Gill Net	M02	Wpt 001-002		GN01	BT	1	195	79.2	1.07
23-Jul-11	Gill Net	M02	Wpt 001-002		GN01	BT	1	198	82.7	1.07
23-Jul-11	Gill Net	M02	Wpt 001-002		GN01	BT	1	135	24.4	0.99
23-Jul-11	Gill Net	M02	Wpt 003-004		GN02	NC	NC	NC	NC	NC
23-Jul-11	Elec Fish	M01-M02	0-50 m DS		NA	NC	NC	NC	NC	NC
23-Jul-11	Elec Fish	M01-M02	50-100 m DS		NA	BT	1	94	8.6	1.04
23-Jul-11	Elec Fish	M01-M02	100-150 m DS		NA	NC	NC	NC	NC	NC
23-Jul-11	Elec Fish	M01-M02	150-200 DS		NA	BT	1	125	24.8	1.27
23-Jul-11	Elec Fish	M02-ML	0-50 m DS		NA	BT	1	45	1.3	1.43
23-Jul-11	Elec Fish	M02-ML	50-100 m DS		NA	NC	NC	NC	NC	NC

23-Jul-11	Elec Fish	M02-ML	100-150 m DS		NA	BT	1	86	8.6	1.35
23-Jul-11	Elec Fish	M02-ML	150-200 m DS		NA	BT	1	114	8.2	0.55
23-Jul-11	Elec Fish	M02-ML	150-200 m DS		NA	BT	1	65	3	1.09
23-Jul-11	Elec Fish	M02-ML	150-200 m DS		NA	BT	1	104	6.6	0.59
23-Jul-11	Elec Fish	M02-ML	150-200 m DS		NA	BT	1	58	1.7	0.87
23-Jul-11	Elec Fish	M02-ML	200-250 m DS		NA	BT	1	87	8.2	1.25
23-Jul-11	Elec Fish	M02-ML	200-250 m DS		NA	BT	1	89	6.9	0.98
23-Jul-11	Elec Fish	M02-ML	250-300 m DS		NA	BT	1	106	12.1	1.02
23-Jul-11	Elec Fish	M02-ML	300-350 m DS		NA	BT	1	260	216.1	1.23
23-Jul-11	Elec Fish	M02-ML	350-400 m DS		NA	BT	1	76	6.5	1.48
23-Jul-11	Elec Fish	M02-ML	400-450 m DS		NA	NC	NC	NC	NC	NC
23-Jul-11	Elec Fish	M02-ML	450-500 m DS		NA	BT	1	165	65.7	1.46
23-Jul-11	Elec Fish	M02-ML	450-500 m DS		NA	BT	1	49	2.3	1.95
23-Jul-11	Elec Fish	M02-ML	500-550 m DS		NA	LND	1	95	9.6	1.12
23-Jul-11	Elec Fish	M02-ML	550-600 m DS		NA	BT	1	89	9	1.28
23-Jul-11	Elec Fish	M02-ML	550-600 m DS		NA	BT	1	90	9.2	1.26
23-Jul-11	Elec Fish	M02-ML	550-600 m DS		NA	BT	1			
23-Jul-11	Elec Fish	M02-ML	600-650 m DS		NA	BT	1	170	55.5	1.13
23-Jul-11	Elec Fish	M02-ML	600-650 m DS		NA	BT	1	192	89.7	1.27
23-Jul-11	Elec Fish	M02-ML	600-650 m DS		NA	BT	1	82	7.3	1.32
23-Jul-11	Elec Fish	M02-ML	650-700 m DS		NA	LND	1	95	9	1.05
23-Jul-11	Elec Fish	M02-ML	600-650 m DS		NA	LND	1	83	7.8	1.36
23-Jul-11	Elec Fish	M02-ML	650-700 m DS		NA	LND	1	83	6.8	1.19
23-Jul-11	Elec Fish	M02-ML	700-750 m DS		NA	BT	1	115	22.1	1.45
23-Jul-11	Elec Fish	M02-ML	700-750 m DS		NA	BT	1	71	15.1	4.22
23-Jul-11	Elec Fish	M02-ML	750-775 m DS		NA	BT	1	150	36.5	1.08
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	LC	1	65	2.8	1.02
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	LC	1	68	4.9	1.56
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	LC	1	61	2.8	1.23
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	LC	1	80	6.3	1.23
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	LC	1	90	8.1	1.11
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	LND	1	98	11.5	1.22
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	LND	1	108	15.5	1.23
01-Aug-11	Elec Fish	PLN S1	0-50 m DS	375-425 m	NA	SS	1	51	3.7	2.79
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	103	11.1	1.02
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	80	6.3	1.23
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	85	7.2	1.17
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	86	7.8	1.23
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LND	1	98	11.1	1.18
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	89	8.6	1.22
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	79	6.1	1.24
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	92	8	1.03
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	86	7.3	1.15
01-Aug-11	Elec Fish	PLN S1	50-100 m DS	325-375 m	NA	LC	1	106	14	1.18
01-Aug-11	Elec Fish	PLN S1	100-150 m DS	275-325 m	NA	LC	1	67	3.6	1.20
01-Aug-11	Elec Fish	PLN S1	100-150 m DS	275-325 m	NA	BT	1	56	2.5	1.42
01-Aug-11	Elec Fish	PLN S1	150-200 m DS	225-275 m	NA	WS	1	108	15.7	1.25
01-Aug-11	Elec Fish	PLN S1	150-200 m DS	225-275 m	NA	LC	1	100	11.8	1.18
01-Aug-11	Elec Fish	PLN S1	150-200 m DS	225-275 m	NA	LC	1	84	9.5	1.60
01-Aug-11	Elec Fish	PLN S1	150-200 m DS	225-275 m	NA	LC	1	83	6.4	1.12
01-Aug-11	Elec Fish	PLN S1	150-200 m DS	225-275 m	NA	B	1	52	1.1	0.78
01-Aug-11	Elec Fish	PLN S1	200-290 m DS	135-225 m	NA	NA	NA	NA	NA	NA
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	71	4.3	1.20
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	69	3.2	0.97
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	65	3.1	1.13
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	101	13.4	1.30
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	87	7	1.06
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	65	3.7	1.35
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	66	2.8	0.97
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	81	5.4	1.02
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	66	2.7	0.94
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	65	2.6	0.95

01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	LC	1	66	2.6	0.90
01-Aug-11	Elec Fish	PLN S1	290-340 m DS	85-135 m	NA	SS	1	56	2.1	1.20
01-Aug-11	Elec Fish	PLN S1	340-390 m DS	35-85 m	NA	WS	1	145	34.4	1.13
01-Aug-11	Elec Fish	PLN S1	340-390 m DS	35-85 m	NA	LND	1	131	13.9	0.62
01-Aug-11	Elec Fish	PLN S1	340-390 m DS	35-85 m	NA	LC	1	85	7.8	1.27
01-Aug-11	Elec Fish	PLN S1	340-390 m DS	35-85 m	NA	LC	1	95	9.6	1.12
01-Aug-11	Elec Fish	PLN S1	340-390 m DS	35-85 m	NA	LC	1	71	4.6	1.29
01-Aug-11	Elec Fish	PLN S1	340-390 m DS	35-85 m	NA	LC	1	69	3.9	1.19
01-Aug-11	Elec Fish	PLN S1	340-390 m DS	35-85 m	NA	SS	1	54	1.7	1.08
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	WS	1	210	101.8	1.10
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	B	1	163	24.3	0.56
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	B	1	125	10.2	0.52
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	WS	1	89	9.6	1.36
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	LC	1	83	6.6	1.15
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	LC	1	69	2.7	0.82
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	LC	1	64	2.8	1.07
01-Aug-11	Elec Fish	PLN S1	390-425 m DS	0-35	NA	B	1	45	0.6	0.66
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	BT	1	218	126	1.22
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	BT	1	162	39	0.92
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	BT	1	100	10.7	1.07
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	B	1	177	34.4	0.62
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	LND	1	106	14.8	1.24
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	LND	1	77	5.5	1.20
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	LND	1	83	6.6	1.15
02-Aug-11	Elec Fish	PLN S2	0-50 m DS	0-50 m	NA	LC	1	78	5.7	1.20
02-Aug-11	Elec Fish	PLN S3	0-50 m US	0-50 m	NA	BT	1	213	112.3	1.16
02-Aug-11	Elec Fish	PLN S3	0-50 m US	0-50 m	NA	BT	1	216	120.6	1.20
02-Aug-11	Elec Fish	PLN S3	0-50 m US	0-50 m	NA	LND	1	85	7.3	1.19
02-Aug-11	Elec Fish	PLN S3	0-50 m US	0-50 m	NA	LND	1	41	0.7	1.02
02-Aug-11	Elec Fish	PLN S3	0-50 m US	0-50 m	NA	LND	1	48	1.1	0.99
02-Aug-11	Elec Fish	PLN S3	0-50 m US	0-50 m	NA	LND	1	59	2	0.97
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	BT	1			
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	BT	1			
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	BT	1	111	16.8	1.23
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	BT	1	105	12.2	1.05
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	BT	1	58	2.2	1.13
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	SS	1	59	3	1.46
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	LND	1	55	1.5	0.90
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	LND	1	73	5	1.29
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	LND	1	65	3.9	1.42
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	LND	1	52	1.6	1.14
02-Aug-11	Elec Fish	PLN S3	50-100 m US	50-100 m	NA	LND	1	42	0.9	1.21
02-Aug-11	Elec Fish	PLN S3	100-125 m US	100-125 m	NA	BT	1	101	11.7	1.14
02-Aug-11	Elec Fish	PLN S3	100-125 m US	100-125 m	NA	SS	1	84	6.4	1.08
02-Aug-11	Elec Fish	PLN S3	100-125 m US	100-125 m	NA	LND	1	88	8.9	1.31
02-Aug-11	Elec Fish	PLN S3	100-125 m US	100-125 m	NA	LND	1	61	2.4	1.06
02-Aug-11	Elec Fish	PLN S3	100-125 m US	100-125 m	NA	LND	1	99	12.7	1.31
02-Aug-11	Elec Fish	PLN S3	100-125 m US	100-125 m	NA	LND	1	62	2.7	1.13
02-Aug-11	Elec Fish	PLN S3	125-225 m US	125-225 m	NA	NA	NA	NA	NA	NA
02-Aug-11	Elec Fish	PLN S3	225-275 m US	225-275 m	NA	BT	1	122	24.9	1.37
02-Aug-11	Elec Fish	PLN S3	225-275 m US	225-275 m	NA	BT	1	94	12.5	1.50
02-Aug-11	Elec Fish	PLN S3	225-275 m US	225-275 m	NA	BT	1	101	10.7	1.04
02-Aug-11	Elec Fish	PLN S3	225-275 m US	225-275 m	NA	BT	1	65	2.8	1.02
02-Aug-11	Elec Fish	PLN S3	225-275 m US	225-275 m	NA	LND	1	95	10.9	1.27
02-Aug-11	Elec Fish	PLN S3	225-275 m US	225-275 m	NA	SS	1	54	1.8	1.14
02-Aug-11	Elec Fish	PLN S3	275-350 m US	275-350 m	NA	NA	NA	NA	NA	NA
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	79	6.7	1.36
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	84	6.8	1.15
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	101	14.4	1.40
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	85	6.6	1.07
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	94	8.7	1.05
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	100	11.5	1.15

02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	93	9.9	1.23
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	LND	1	74	4.5	1.11
02-Aug-11	Elec Fish	PLN S3	350-385 m US	350-385 m	NA	BT	1	98	12.8	1.36
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	NP	1	680		
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	SS	1	46	0.6	0.62
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	SS	1	51	0.9	0.68
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	SS	1	53	1.7	1.14
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	SS	1	56	1.6	0.91
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	LC	1	65	2.8	1.02
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	LC	1	60	2.1	0.97
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	LC	1	69	3.2	0.97
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	LC	1	68	2.1	0.67
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	LC	1	73	3.7	0.95
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	LC	1	65	2.2	0.80
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	LC	1	66	2.5	0.87
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	SS	1	53	1.3	0.87
17-Jul-11	Fyke Net	PLS	Wpt 177		FN01	SS	1	46	0.9	0.92
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	B	1	37	0.6	1.18
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	SS	1	55	0.9	0.54
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	B	1	37	0.6	1.18
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	SS	1	46	0.7	0.72
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	NP	1	46	0.6	0.62
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	NP	1	71	2.6	0.73
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	SS	1	43	0.7	0.88
17-Jul-11	Fyke Net	PLS	Wpt 179		FN02	SS	1	59	2.3	1.12
17-Jul-11	Gill Net	PLS	Wpt 181-182		GN01	NC	NC	NC	NC	NC
17-Jul-11	Gill Net	PLS	Wpt 183-184		GN02	NP	1	730		
17-Jul-11	Gill Net	PLS	Wpt 183-184		GN02	WS	1	117	17.6	1.10
17-Jul-11	Gill Net	PLS	Wpt 185-186		GN03	NC	NC	NC	NC	NC
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	B	1			
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LND	1	113	17.4	1.21
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	B	1	138	14.4	0.55
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LND	1	103	12.2	1.12
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	B	1	136	14.7	0.58
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LC	1	86	6.2	0.97
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LC	1	86	7.1	1.12
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LC	1	57	2.1	1.13
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LC	1	66	3.6	1.25
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LC	1	84	5.8	0.98
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	BT	1	270	217.9	1.11
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	BT	1	228	111.1	0.94
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LND	1	82	8.2	1.49
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LC	1	88	7.6	1.12
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	LC	1	52	1.6	1.14
01-Aug-11	Elec Fish	PLS S1	0-50 m DS	50-100m	NA	B	1	51	1	0.75
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	BT	1	225	148.7	1.31
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	B	1	178	38.9	0.69
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	BT	1	155	22.7	0.61
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	WS	1	128	33.1	1.58
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	B	1	170	39.9	0.81
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	BT	1	176	51.7	0.95
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	LND	1			
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	LND	1	96	5.5	0.62
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	LND	1	84	5.8	0.98
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	LND	1	72	5	1.34
01-Aug-11	Elec Fish	PLS S1	50-100 m DS	0-50 m	NA	PD	1	85	7.1	1.16
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	SS	1	54	2.3	1.46
01-Aug-11	Elec Fish	PLS S2	400-425 m US	400-425 m	NA	SS	1	57	2.6	1.40
01-Aug-11	Elec Fish	PLS S2	400-425 m US	400-425 m	NA	SS	1	63	3.7	1.48
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	SS	1	59		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	SS	1	62		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	SS	1	54		

01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	SS	1	67		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	SS	1	57		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	SS	1	59		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	B	1	155		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	B	1	109		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	LND	1	93		
01-Aug-11	Elec Fish	PLS S2	350-400 m US	350-400 m	NA	PD	1	59		
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	WS	1	133	29.7	1.26
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	BT	1	127	28.9	1.41
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	WS	1	112	17.7	1.26
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	BT	1	133	26	1.11
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	LND	1	98	11.5	1.22
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	LND	1	94	8.9	1.07
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	LND	1	89	9.3	1.32
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	PD	1	56	2.3	1.31
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	PD	1	96	10.7	1.21
01-Aug-11	Elec Fish	PLS S2	300-350 m US	300-350 m	NA	LND	1	63	3	1.20
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	BT	1	183	78.8	1.29
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	PD	1	69	3.9	1.19
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	LND	1	86	8	1.26
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	LND	1	91	8.8	1.17
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	PD	1	84	8.3	1.40
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	PD	1	82	9.2	1.67
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	PD	1	89	8.9	1.26
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	PD	1	91	11.4	1.51
01-Aug-11	Elec Fish	PLS S2	250-300 m US	250-300 m	NA	BT	1	59	2.1	1.02
01-Aug-11	Elec Fish	PLS S2	200-250 m US	200-250 m	NA	PD	1	69	4.5	1.37
01-Aug-11	Elec Fish	PLS S2	200-250 m US	200-250 m	NA	PD	1	76	5.5	1.25
01-Aug-11	Elec Fish	PLS S2	200-250 m US	200-250 m	NA	BT	1	83	7	1.22
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	80	5	0.98
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	57	2	1.08
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	84	6.4	1.08
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	LND	1	98	11.2	1.19
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	81	5.1	0.96
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	73	4.4	1.13
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	SS	1	56	1.9	1.08
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	LND	1	72	4.4	1.18
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	90	7.6	1.04
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	78	4.9	1.03
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	WS	1	73	4.2	1.08
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	56	1.9	1.08
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	PD	1	56	2	1.14
01-Aug-11	Elec Fish	PLS S2	150-200 m US	150-200 m	NA	LND	1	63	2.5	1.00
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	WS	1	118	20.2	1.23
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	PD	1	92	9.6	1.23
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	LND	1	94	9.6	1.16
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	PD	1	71	5.1	1.42
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	PD	1	66	3.9	1.36
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	WS	1	76	5.7	1.30
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	PD	1	82	6.1	1.11
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	LND	1	83	6.4	1.12
01-Aug-11	Elec Fish	PLS S2	100-150 m US	100-150 m	NA	PD	1	55	1.9	1.14
01-Aug-11	Elec Fish	PLS S2	50-100 m US	50-100 m	NA	PD	1	72	4.1	1.10
01-Aug-11	Elec Fish	PLS S2	50-100 m US	50-100 m	NA	LND	1	76	4.2	0.96
01-Aug-11	Elec Fish	PLS S2	50-100 m US	50-100 m	NA	PD	1	75	4.9	1.16
01-Aug-11	Elec Fish	PLS S2	50-100 m US	50-100 m	NA	LND	1	80	7.4	1.45
01-Aug-11	Elec Fish	PLS S2	50-100 m US	50-100 m	NA	SS	1	65	2.9	1.06
01-Aug-11	Elec Fish	PLS S2	50-100 m US	50-100 m	NA	SS	1	101	12.3	1.19
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	BT	1	190		
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	BT	1	182		
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	BT	1	126	26.4	1.32
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	LND	1	62	2.3	0.97

01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	LND	1	91	10.5	1.39
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	LND	1	72	6	1.61
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	BT	1	109	12.3	0.95
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	SS	1	50	1.8	1.44
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	LC	1	75	2.8	0.66
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	LND	1	80	5.8	1.13
01-Aug-11	Elec Fish	PLS S2	0-50 m US	0-50 m	NA	SS	1	55	2.7	1.62
02-Aug-11	NA	RND	NA		NA	NA	NA	NA	NA	NA
17-Jul-11	Fyke Net	RP01	Wpt 001		FN01	NP	1	248	126.5	0.83
17-Jul-11	Fyke Net	RP01	Wpt 001		FN01	LC	125			
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	3.9	1.14
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	65	2.2	0.80
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	3.3	0.96
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	64	2.9	1.11
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	66	2.9	1.01
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	67	2.9	0.96
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	68	3.2	1.02
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	67	2.8	0.93
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	62	1.2	0.50
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	75	3.9	0.92
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	67	3.1	1.03
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	60	2.5	1.16
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	60	2.4	1.11
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	69	3.5	1.07
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	66	3.1	1.08
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	65	2.4	0.87
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	61	2.1	0.93
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	65	2	0.73
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	64	2.5	0.95
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	3.7	1.08
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	2.7	0.79
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	75	4.5	1.07
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	67	2.2	0.73
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	3.9	1.14
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	3.5	1.02
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	63	3.2	1.28
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	69	3	0.91
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	62	2.5	1.05
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	4.2	1.22
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	63	2.4	0.96
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	88	8.5	1.25
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	3.1	0.90
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	58	1.9	0.97
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	68	2.5	0.80
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	67	2.7	0.90
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	64	3.4	1.30
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	62	2.9	1.22
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	62	3.4	1.43
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	68	3.4	1.08
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	59	2.1	1.02
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	66	2.4	0.83
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	64	2.8	1.07
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	2.5	0.73
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	78	4.3	0.91
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	70	3.1	0.90
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	59	2.8	1.36
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	74	4.6	1.14
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	65	2.6	0.95
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	57	2.4	1.30
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	1	65	2.7	0.98
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	LC	464			
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	NP	1			

17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	262	230.5	1.28
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	245	167.8	1.14
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	188	85.2	1.28
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	182	81.2	1.35
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	165	55	1.22
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	137	29.8	1.16
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	B	1	188	38	0.57
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	188	83.1	1.25
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	128	23.8	1.13
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	119	18.4	1.09
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	112	16.7	1.19
17-Jul-11	Fyke Net	RP01	Wpt 003		FN02	WS	1	112	16.6	1.18
17-Jul-11	Gill Net	RP01	Wpt 353-354		GN01	NC	NC	NC	NC	NC
17-Jul-11	Gill Net	RP01	Wpt 355-356		GN02	NC	NC	NC	NC	NC
17-Jul-11	Gill Net	RP01	Wpt 357-358		GN03	NC	NC	NC	NC	NC
17-Jul-11	Gill Net	RP01	Wpt 359-360		GN04	NC	NC	NC	NC	NC
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	NP	1	534		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	50		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	51		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	55		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	47		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	46		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	55		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	49		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	SS	1	53		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	LC	1	63		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	LC	1	75		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	LC	1	67		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	LC	1	64		
19-Jul-11	Fyke Net	RP02	Wpt 642		FN01	LC	1	69		
19-Jul-11	Fyke Net	RP02	Wpt 644		FN02	NP	1	181		
19-Jul-11	Fyke Net	RP02	Wpt 644		FN02	SS	1	57		
19-Jul-11	Fyke Net	RP02	Wpt 644		FN02	SS	1	55		
19-Jul-11	Fyke Net	RP02	Wpt 644		FN02	SS	1	58		
19-Jul-11	Fyke Net	RP02	Wpt 644		FN02	SS	1	52		
19-Jul-11	Fyke Net	RP02	Wpt 644		FN02	SS	1	56		
19-Jul-11	Fyke Net	RP02	Wpt 644		FN02	LC	1	90		
19-Jul-11	Gill Net	RP02	Wpt 001-002		GN01	NP	1	561		
19-Jul-11	Gill Net	RP02	Wpt 003-004		GN02	NC	NC	NC	NC	NC
19-Jul-11	Gill Net	RP02	Wpt 005-006		GN03	NC	NC	NC	NC	NC
19-Jul-11	Gill Net	RP02	Wpt 007-008		GN04	NC	NC	NC	NC	NC
19-Jul-11	Fyke Net	RP03	Wpt 638		FN01	NP	1	430		
19-Jul-11	Fyke Net	RP03	Wpt 640		FN02	NP	1	640		
19-Jul-11	Gill Net	RP03	Wpt 023-024		GN01	NC	NC	NC	NC	NC
19-Jul-11	Gill Net	RP03	Wpt 025-026		GN02	NC	NC	NC	NC	NC
19-Jul-11	Gill Net	RP03	Wpt 027-028		GN03	NP	1	580		
19-Jul-11	Gill Net	RP03	Wpt 027-028		GN03	NP	1	600		
19-Jul-11	Gill Net	RP03	Wpt 029-030		GN04	NC	NC	NC	NC	NC
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	WS	1	55	1.9	1.14
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	LC	1	62	2.7	1.13
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	WS	1	50	1.4	1.12
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	LC	1	35	0.9	2.10
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	LC	1	92	9.1	1.17
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	LC	1	59	2	0.97
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	WS	1	53	1.8	1.21
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	WS	1	44	0.8	0.94
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	LC	1	39	0.5	0.84
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	WS	1	49	1.1	0.93
20-Jul-11	Fyke Net	RP04	Wpt 344		FN01	SS	1	36	0.5	1.07
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	240	80.7	0.58
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	176	56.5	1.04
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	BT	1	182	64	1.06

20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	245	81.1	0.55
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	183	60.5	0.99
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	249	87	0.56
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	220	55.9	0.52
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	220	111.7	1.05
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	192	73.4	1.04
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	BT	1	220	134.7	1.27
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	164	45.1	1.02
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	199	40.3	0.51
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	252	159.7	1.00
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	182	64.9	1.08
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	182	52.4	0.87
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	180	55.6	0.95
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	199	45.7	0.58
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	186	64.4	1.00
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	195	73.8	1.00
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	158	40.4	1.02
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	175	50.4	0.94
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	154	18.6	0.51
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	162	49.9	1.17
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	B	1	191	37	0.53
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	81	4.3	0.81
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	82	5.3	0.96
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	43	1	1.26
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	114	13	0.88
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1		11.8	
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	115	14.2	0.93
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	108	12.5	0.99
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	117	14.8	0.92
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	115	17.7	1.16
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	97	11.6	1.27
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	115	21.4	1.41
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	105	13	1.12
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	104	14.3	1.27
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	100	11.7	1.17
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	45	0.8	0.88
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	105	12.4	1.07
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	111	14.5	1.06
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	82	5.7	1.03
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	106	12.5	1.05
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	107	13.5	1.10
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	102	11.8	1.11
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	105	12.7	1.10
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	49	1.8	1.53
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	113	15.7	1.09
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	106	13.5	1.13
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	104	12.8	1.14
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	66	3.1	1.08
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	88	9.3	1.36
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	109	13.3	1.03
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	77	7.2	1.58
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	117	13.8	0.86
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	100	10.2	1.02
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	97	9.1	1.00
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	108	11.8	0.94
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	102	10.4	0.98
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	94	8.8	1.06
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	127	20.9	1.02
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	110	13.7	1.03
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	108	10.3	0.82
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	120	17.8	1.03
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	98	9.5	1.01

20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	110	13.2	0.99
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	114	13.7	0.92
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	81	5.9	1.11
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	111		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	96		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	116		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	112		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	106		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	103		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	109		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	120		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	70		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	97		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	101		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	70		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	110		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	100		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	87		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	107		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	92		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	100		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	92		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	98		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	105		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	106		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	102		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	104		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	66		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	69		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	69		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	62		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	48		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	45		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	73		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	99		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	99		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	82		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	96		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	WS	1	61		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	66		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	LC	1	65		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	68		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	68		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	66		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	54		
20-Jul-11	Fyke Net	RP04	Wpt 346		FN02	PD	1	49		
21-Jul-11	Gill Net	RP04	Wpt 473-474		GN01	WS	1	382	680.2	1.22
21-Jul-11	Gill Net	RP04	Wpt 474-476		GN02	NC	NC	NC	NC	NC
21-Jul-11	Gill Net	RP04	Wpt 477-478		GN03	WS	1	395		
21-Jul-11	Gill Net	RP04	Wpt 477-478		GN03	WS	1	425		
21-Jul-11	Gill Net	RP04	Wpt 479-480		GN04	NC	NC	NC	NC	NC
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	96	8.3	0.94
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	86	6.9	1.08
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	110	12.5	0.94
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	105	11.3	0.98
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	WS	1	98	9.5	1.01
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	123	16.1	0.87
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	104	11.4	1.01
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	97	9.1	1.00
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	WS	1	118	17.4	1.06
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	88	6.9	1.01
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	87	6.1	0.93

21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	105	11.2	0.97
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	84	6.4	1.08
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	109	13.3	1.03
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	132	22.7	0.99
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	94	9.7	1.17
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	98	10.5	1.12
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	SS	1	61	1.5	0.66
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	112	14.3	1.02
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	88	6.4	0.94
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	96	8.2	0.93
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	83	5.2	0.91
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	103	8.8	0.81
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	102	9.6	0.90
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	97	8.7	0.95
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	81	5.1	0.96
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	86	7.4	1.16
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	105	11.3	0.98
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	112	14.5	1.03
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	97	8.8	0.96
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	122	19.5	1.07
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	98	11.4	1.21
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	112	14.4	1.02
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	105	11.3	0.98
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	104	11.5	1.02
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	108	13.6	1.08
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	92	8.5	1.09
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	99	9.5	0.98
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	75	4	0.95
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	B	1	165	26.1	0.58
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	69	5.4	1.64
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	120	17.1	0.99
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	93	8.8	1.09
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	106	11.2	0.94
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	98	9	0.96
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	120	17	0.98
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	116	15.6	1.00
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	WS	1	94	7.8	0.94
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	102	9.7	0.91
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	107	12.1	0.99
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	87	6.6	1.00
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	107	11.6	0.95
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	98	9.5	1.01
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	PD	1	95	8.9	1.04
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	90	6.8	0.93
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	100	9.7	0.97
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	126	18.4	0.92
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	112	14.8	1.05
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	102	9.9	0.93
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	104	10.4	0.92
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	103	10.6	0.97
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	97	9.8	1.07
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	64	2.2	0.84
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	113	14	0.97
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	98	10.9	1.16
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	93	8.9	1.11
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	89	8.6	1.22
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	110	14.9	1.12
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	102	11.5	1.08
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	108	12.5	0.99
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	99	8.8	0.91
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	82	6.5	1.18
21-Jul-11	Fyke Net	RP05	Wpt 348		FN01	LC	1	91	8.8	1.17

21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	63	3.4	1.36
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	94	8.1	0.98
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	59	1.9	0.93
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	98	10.3	1.09
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	83	6.2	1.08
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	102	10.1	0.95
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	B	1	156	24.2	0.64
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	120	17.1	0.99
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	WS	1	113	14.4	1.00
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	WS	1	94	7.6	0.92
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	WS	1	126	19.5	0.97
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	100	9.1	0.91
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	107	10.6	0.87
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	93	8.7	1.08
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	71	4.3	1.20
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	102	10.2	0.96
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	83	5	0.87
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	60	1.5	0.69
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	WS	1	120	17.7	1.02
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	67	3.2	1.06
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	60	2	0.93
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	WS	1	94	8.7	1.05
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	102	11.2	1.06
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	85	6.3	1.03
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	83	5.7	1.00
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	103	12.1	1.11
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	79	3.9	0.79
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	95	9.5	1.11
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	82	7.1	1.29
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	60	1.7	0.79
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	125	17.8	0.91
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	63	1.7	0.68
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	WS	1	90	7.8	1.07
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	93	9.2	1.14
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	87	6.2	0.94
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	65	2.5	0.91
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	64	2.1	0.80
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	78	3.6	0.76
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	69	2.4	0.73
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	84	4.9	0.83
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	74	3.8	0.94
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	71	2.8	0.78
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	58	3.2	1.64
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	61	2.4	1.06
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	87	5.7	0.87
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	88	6.4	0.94
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	72	2.6	0.70
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	83	6.5	1.14
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	60	2.4	1.11
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	92	7.5	0.96
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	77	4.7	1.03
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	87	6.5	0.99
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	67	2.8	0.93
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	60	2.2	1.02
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	79	5.3	1.07
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	68	3.6	1.14
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	72	3.5	0.94
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	54	1.5	0.95
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	54	1.3	0.83
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	68	3.1	0.99
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	63	2.5	1.00
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	63	2.8	1.12

21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	63	2.5	1.00
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	LC	1	44	1	1.17
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	64	2.2	0.84
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	50	1.1	0.88
21-Jul-11	Fyke Net	RP05	Wpt 350		FN02	PD	1	45	0.9	0.99
21-Jul-11	Gill Net	RP05	Wpt 464-465		GN01	BT	1	120	20.5	1.19
21-Jul-11	Gill Net	RP05	Wpt 464-465		GN01	BT	1	119	21.4	1.27
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	BT	1	227	-	
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	BT	1	260	191.8	1.09
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	207	109.8	1.24
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	189	90.2	1.34
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	119	20	1.19
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	BT	1	341	415.6	1.05
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	BT	1	401	648.5	1.01
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	BT	1	320	372.5	1.14
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	382	644.9	1.16
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	350	454	1.06
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	295	306.7	1.19
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	340	430	1.09
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	412	735.6	1.05
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	405	676.9	1.02
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	322	444.2	1.33
21-Jul-11	Gill Net	RP05	Wpt 466-467		GN02	WS	1	185	76.5	1.21
26-Jul-11	Elec Fish	RP1-PLS	0-50 m DS	400-450 m	NA	WS	1	119		
26-Jul-11	Elec Fish	RP1-PLS	0-50 m DS	400-450 m	NA	WS	1	107		
26-Jul-11	Elec Fish	RP1-PLS	50-100 m DS	400-350 m	NA	LC	1	67		
26-Jul-11	Elec Fish	RP1-PLS	50-100 m DS	400-350 m	NA	LC	1	89		
26-Jul-11	Elec Fish	RP1-PLS	50-100 m DS	400-350 m	NA	LC	1	65		
26-Jul-11	Elec Fish	RP1-PLS	100-150 m DS	350-300 m	NA	SS	1	75		
26-Jul-11	Elec Fish	RP1-PLS	150-200 m DS	250-300 m	NA	NC	NC	NC	NC	NC
26-Jul-11	Elec Fish	RP1-PLS	200-250 m DS	200-250 m	NA	NC	NC	NC	NC	NC
26-Jul-11	Elec Fish	RP1-PLS	250-300 m DS	150-200 m	NA	NC	NC	NC	NC	NC
26-Jul-11	Elec Fish	RP1-PLS	300-350 m DS	100-150 m	NA	LC	1	59		
26-Jul-11	Elec Fish	RP1-PLS	300-350 m DS	100-150 m	NA	LC	1	71		
26-Jul-11	Elec Fish	RP1-PLS	300-350 m DS	100-150 m	NA	LC	1	63		
26-Jul-11	Elec Fish	RP1-PLS	300-350 m DS	100-150 m	NA	LC	1	63		
26-Jul-11	Elec Fish	RP1-PLS	300-350 m DS	100-150 m	NA	LC	1	72		
26-Jul-11	Elec Fish	RP1-PLS	300-350 m DS	100-150 m	NA	LC	1	65		
26-Jul-11	Elec Fish	RP1-PLS	350-400 m DS	100-150 m	NA	B	1	190		
26-Jul-11	Elec Fish	RP1-PLS	350-400 m DS	100-150 m	NA	LC	1	68		
26-Jul-11	Elec Fish	RP1-PLS	350-400 m DS	100-150 m	NA	LC	1	74		
26-Jul-11	Elec Fish	RP1-PLS	350-400 m DS	100-150 m	NA	LC	1	66		
26-Jul-11	Elec Fish	RP1-PLS	400-450 m DS	0-50 m	NA	NC	NC	NC	NC	NC
19-Jul-11	Elec Fish	RP2-RP1	0-50 m DS	250-300 m	NA	SS	1	62		
19-Jul-11	Elec Fish	RP2-RP1	0-50 m DS	250-300 m	NA	SS	1	66		
19-Jul-11	Elec Fish	RP2-RP1	0-50 m DS	250-300 m	NA	SS	1	54		
19-Jul-11	Elec Fish	RP2-RP1	0-50 m DS	250-300 m	NA	LC	1	70		
19-Jul-11	Elec Fish	RP2-RP1	50-100 m DS	200-250 m	NA	LC	1	65		
19-Jul-11	Elec Fish	RP2-RP1	50-100 m DS	200-250 m	NA	LC	1	70		
19-Jul-11	Elec Fish	RP2-RP1	50-100 m DS	200-250 m	NA	LC	1	63		
19-Jul-11	Elec Fish	RP2-RP1	50-100 m DS	200-250 m	NA	LC	1	63		
19-Jul-11	Elec Fish	RP2-RP1	50-100 m DS	200-250 m	NA	LC	1	72		
19-Jul-11	Elec Fish	RP2-RP1	100-150 m DS	150-200 m	NA	LC	1	62		
19-Jul-11	Elec Fish	RP2-RP1	150-200 m DS	100-150 m	NA	NC	NC	NC	NC	NC
19-Jul-11	Elec Fish	RP2-RP1	200-250 m DS	50-100 m	NA	BT	1	218		
19-Jul-11	Elec Fish	RP2-RP1	200-250 m DS	50-100 m	NA	SS	1	110		
19-Jul-11	Elec Fish	RP2-RP1	250-300 m DS	0-50 m	NA	BT	1	55		
19-Jul-11	Elec Fish	RP2-RP1	250-300 m DS	0-50 m	NA	BT	1	52		
20-Jul-11	Elec Fish	RP3-RP2	0-50 m DS	250-300 m	NA	BT	1	145	46	1.51
20-Jul-11	Elec Fish	RP3-RP2	50-100 m DS	200-250 m	NA	BT	1	100		
20-Jul-11	Elec Fish	RP3-RP2	100-150 m DS	150-200 m	NA	BT	1	156	47.6	1.25
20-Jul-11	Elec Fish	RP3-RP2	100-150 m DS	150-200 m	NA	BT	1	105	13.9	1.20

20-Jul-11	Elec Fish	RP3-RP2	100-150 m DS	150-200 m	NA	B	1	109	13.3	1.03
20-Jul-11	Elec Fish	RP3-RP2	150-200 m DS	100-150 m	NA	LC	1	81	6	1.13
20-Jul-11	Elec Fish	RP3-RP2	150-200 m DS	100-150 m	NA	LC	1	80	5.9	1.15
20-Jul-11	Elec Fish	RP3-RP2	150-200 m DS	100-150 m	NA	LC	1	85	5.9	0.96
20-Jul-11	Elec Fish	RP3-RP2	150-200 m DS	100-150 m	NA	PD	1	98	8.8	0.93
20-Jul-11	Elec Fish	RP3-RP2	150-200 m DS	100-150 m	NA	LC	1	81	5.2	0.98
20-Jul-11	Elec Fish	RP3-RP2	150-200 m DS	100-150 m	NA	BT	1	118	18.6	1.13
20-Jul-11	Elec Fish	RP3-RP2	150-200 m DS	100-150 m	NA	LC	1	77	5.3	1.16
20-Jul-11	Elec Fish	RP3-RP2	200-250 m ds	50-100 m	NA	BT	1	98	12.4	1.32
20-Jul-11	Elec Fish	RP3-RP2	250-275 m DS	25-50 m	NA	BT	1	162	50.2	1.18
20-Jul-11	Elec Fish	RP3-RP2	250-275 m DS	25-50 m	NA	SS	1	52	1.5	1.07
20-Jul-11	Elec Fish	RP3-RP2	250-275 m DS	25-50 m	NA	B	1	125	10.1	0.52
22-Jul-11	Elec Fish	RP4-RP2	0-50 m DS	500-550 m	NA	BT	1	125		
22-Jul-11	Elec Fish	RP4-RP2	0-50 m DS	500-550 m	NA	WS	1	56		
22-Jul-11	Elec Fish	RP4-RP2	50-100 m DS	450-500 m	NA	BT	1	172		
22-Jul-11	Elec Fish	RP4-RP2	100-150 m DS	400-450 m	NA	NC	NC	NC	NC	NC
22-Jul-11	Elec Fish	RP4-RP2	150-200 m DS	350-400 m	NA	NC	NC	NC	NC	NC
22-Jul-11	Elec Fish	RP4-RP2	200-250 m DS	300-350 m	NA	BT	1	44		
22-Jul-11	Elec Fish	RP4-RP2	200-250 m DS	300-350 m	NA	BT	1	40		
22-Jul-11	Elec Fish	RP4-RP2	200-250 m DS	300-350 m	NA	BT	1	78		
22-Jul-11	Elec Fish	RP4-RP2	250-300 m DS	250-300 m	NA	NC	NC	NC	NC	NC
22-Jul-11	Elec Fish	RP4-RP2	300-350 m DS	200-250 m	NA	NC	NC	NC	NC	NC
22-Jul-11	Elec Fish	RP4-RP2	350-400 m DS	150-200 m	NA	NC	NC	NC	NC	NC
22-Jul-11	Elec Fish	RP4-RP2	400-450 m DS	100-150 m	NA	BT	1	79		
22-Jul-11	Elec Fish	RP4-RP2	450-500 m DS	100-150 m	NA	NC	NC	NC	NC	NC
22-Jul-11	Elec Fish	RP4-RP2	500-550 m DS	0-50 m	NA	BT	1	39		
22-Jul-11	Elec Fish	RP4-RP2	500-550 m DS	0-50 m	NA	BT	1	42		
22-Jul-11	Elec Fish	RP4-RP2	500-550 m DS	0-50 m	NA	BT	1	43		
22-Jul-11	Elec Fish	RP4-RP2	500-550 m DS	0-50 m	NA	BT	1	47		
21-Jul-11	Elec Fish	RP5-RP4	0-50 m DS		NA	BT	1	90	9.1	1.25
21-Jul-11	Elec Fish	RP5-RP4	0-50 m DS		NA	LC	1	108	14.3	1.14
21-Jul-11	Elec Fish	RP5-RP4	50-100 m DS		NA	BT	1	48	1.6	1.45
21-Jul-11	Elec Fish	RP5-RP4	50-100 m DS		NA	PD	1	88	8	1.17
25-Jul-11	Elec Fish	RSD	0-50 m DS	950-1000 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	50-100 m DS	900-950 m	NA	BT	1	76	4.9	1.12
25-Jul-11	Elec Fish	RSD	100-150 m DS	850-900 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	150-200 m DS	800-850 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	200-250 m DS	750-800 m	NA	BT	1	72	4.3	1.15
25-Jul-11	Elec Fish	RSD	200-250 m DS	750-800 m	NA	BT	1	85	8.3	1.35
25-Jul-11	Elec Fish	RSD	250-300 m DS	700-750 m	NA	BT	1	82	6.7	1.22
25-Jul-11	Elec Fish	RSD	250-300 m DS	700-750 m	NA	BT	1	54	1.7	1.08
25-Jul-11	Elec Fish	RSD	300-350 m DS	650-700 m	NA	BT	1	74	4.6	1.14
25-Jul-11	Elec Fish	RSD	350-400 m DS	600-650 m	NA	BT	1	74	5.4	1.33
25-Jul-11	Elec Fish	RSD	400-450 m DS	550-600 m	NA	BT	1			
25-Jul-11	Elec Fish	RSD	400-450 m DS	550-600 m	NA	BT	1	69	5	1.52
25-Jul-11	Elec Fish	RSD	400-450 m DS	550-600 m	NA	BT	1	73	4.3	1.11
25-Jul-11	Elec Fish	RSD	450-500 m DS	500-550 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	500 -550 m DS	450-500 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	550-600 m DS	400-450 m	NA	BT	1	72	4.3	1.15
25-Jul-11	Elec Fish	RSD	600-650 m DS	350-400 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	650-700 m DS	300-350 m	NA	BT	1			
25-Jul-11	Elec Fish	RSD	650-700 m DS	300-350 m	NA	BT	1			
25-Jul-11	Elec Fish	RSD	700-750 m DS	250-300 m	NA	BT	1	63	2.6	1.04
25-Jul-11	Elec Fish	RSD	750-800 m DS	200-250 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	800-850 m DS	150-200 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	850-900 m DS	100-150 m	NA	BT	1	56	1.9	1.08
25-Jul-11	Elec Fish	RSD	850-900 m DS	100-150 m	NA	BT	1	42	1	1.35
25-Jul-11	Elec Fish	RSD	900-950 m DS	50-100 m	NA	NC	NC	NC	NC	NC
25-Jul-11	Elec Fish	RSD	950-1000 m DS	0-50 m	NA	NC	NC	NC	NC	NC
27-Jul-11	Elec Fish	SC01	0-50 m US	0-50 m	NA	LND	1	85		
27-Jul-11	Elec Fish	SC01	0-50 m US	0-50 m	NA	BT	1	50		
27-Jul-11	Elec Fish	SC01	0-50 m US	0-50 m	NA	BT	1	54		

27-Jul-11	Elec Fish	SC01	0-50 m US	0-50 m	NA	SS	1	50		
27-Jul-11	Elec Fish	SC01	50-100 m US	50-100 m	NA	LND	1	110		
27-Jul-11	Elec Fish	SC01	50-100 m US	50-100 m	NA	LC	1	57		
27-Jul-11	Elec Fish	SC01	100-150 m US	100-150 m	NA	NC	NC	NC	NC	NC
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	B	1	133	14.2	0.60
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	127	23.7	1.16
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	93	8.9	1.11
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	78	5.4	1.14
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	61	1.8	0.79
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	58	1.6	0.82
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	58	1.7	0.87
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	56	1.5	0.85
27-Jul-11	Elec Fish	SC03	0-50 m US	0-50 m	NA	BT	1	59	1.9	0.93
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	172	49.3	0.97
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	104	14.3	1.27
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	83	6.4	1.12
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	94	9.9	1.19
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	87	8.4	1.28
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	85	5.9	0.96
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	77	5	1.10
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	77	5.8	1.27
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	69	4.1	1.25
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	58	2.2	1.13
27-Jul-11	Elec Fish	SC03	50-100 m US	50-100 m	NA	BT	1	63	2.9	1.16
27-Jul-11	Elec Fish	SC03	100-150 m US	100-150 m	NA	BT	1	138	28.5	1.08
27-Jul-11	Elec Fish	SC03	100-150 m US	100-150 m	NA	BT	1	90	8.6	1.18
27-Jul-11	Elec Fish	SC03	150-200 m US	100-150 m	NA	BT	1	110	15	1.13
27-Jul-11	Elec Fish	SC03	150-200 m US	100-150 m	NA	BT	1	113	16	1.11
30-Jul-11	Elec Fish	SC04	0-50 m US	0-50 m	NA	BT	1	169	53	1.10
30-Jul-11	Elec Fish	SC04	50-100 m US	50-100 m	NA	SS	1	66	4.2	1.46
30-Jul-11	Elec Fish	SC04	100-150 m US	100-150 m	NA	BT	1	125	22.4	1.15
30-Jul-11	Elec Fish	SC04	100-150 m US	100-150 m	NA	BT	1	65	3.8	1.38
30-Jul-11	Elec Fish	SC04	150-200 m US	150-200 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	SC04	200-250 m US	200-250 m	NA	BT	1	149	45.3	1.37
30-Jul-11	Elec Fish	SC04	250-300 m US	250-300 m	NA	BT	1	240	164.1	1.19
30-Jul-11	Elec Fish	SC04	250-300 m US	250-300 m	NA	BT	1	160	43.9	1.07
30-Jul-11	Elec Fish	SC04	250-300 m US	250-300 m	NA	BT	1	220	88.6	0.83
30-Jul-11	Elec Fish	SC04	300-350 m US	300-350 m	NA	NC	NC	NC	NC	NC
29-Jul-11	Elec Fish	SC05	150-200 m US	150-200 m	NA	BT	1	165	39.7	0.88
29-Jul-11	Elec Fish	SC05	150-200 m US	150-200 m	NA	BT	1	104	13.6	1.21
29-Jul-11	Elec Fish	SC05	150-200 m US	150-200 m	NA	BT	1		31.3	
29-Jul-11	Elec Fish	SC05	150-200 m US	150-200 m	NA	BT	1	96	10.3	1.16
29-Jul-11	Elec Fish	SC05	150-200 m US	150-200 m	NA	BT	1	48	1.1	0.99
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	232	132.4	1.06
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	157	43.2	1.12
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	116	18	1.15
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	144	35.8	1.20
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	137	29	1.13
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	142	34.4	1.20
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	103	10.5	0.96
29-Jul-11	Elec Fish	SC05	100-150 m US	100-150 m	NA	BT	1	72	5.8	1.55
29-Jul-11	Elec Fish	SC05	50-100 m US	50-100 m	NA	BT	1	162	50.4	1.19
29-Jul-11	Elec Fish	SC05	50-100 m US	50-100 m	NA	BT	1	74	5.2	1.28
29-Jul-11	Elec Fish	SC05	50-100 m US	50-100 m	NA	BT	1	118	20	1.22
29-Jul-11	Elec Fish	SC05	50-100 m US	50-100 m	NA	BT	1	71	4.5	1.26
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	SS	1	74	4.8	1.18
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	BT	1	144	32.1	1.08
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	BT	1	90	8.6	1.18
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	BT	1	88	8.6	1.26
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	BT	1	82	6.1	1.11
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	BT	1	138	32.4	1.23
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	SS	1	58	2.5	1.28

29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	BT	1	69	4.6	1.40
29-Jul-11	Elec Fish	SC05	0-50 m US	0-50 m	NA	BT	1	85	8.9	1.45
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	BT	1	290	311.4	1.28
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	BT	1	212	129.7	1.36
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	BT	1	254	208.7	1.27
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	BT	1	89	9.3	1.32
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	BT	1	107	13.9	1.13
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	LND	1	61	2.5	1.10
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	PD	1	67	3.9	1.30
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	PD	1	82	6.5	1.18
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	PD	1	83	5.9	1.03
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	LND	1	71	3.9	1.09
28-Jul-11	Elec Fish	SC06	0-50 m US	0-50 m	NA	PD	1	78	4.9	1.03
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	BT	1	131	26.1	1.16
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	BT	1	163	47.3	1.09
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	LND	1	78	6.2	1.31
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	BT	1	112	18.9	1.35
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	LC	1	77	5.1	1.12
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	LND	1	56	2	1.14
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	SS	1	49	2.2	1.87
28-Jul-11	Elec Fish	SC06	50-100 m US	50-100 m	NA	BT	1	47	1.7	1.64
28-Jul-11	Elec Fish	SC07	0-50 m US	0-50 m	NA	BT	1	81	7.3	1.37
28-Jul-11	Elec Fish	SC07	0-50 m US	0-50 m	NA	BT	1	64	2.4	0.92
28-Jul-11	Elec Fish	SC07	0-50 m US	0-50 m	NA	BT	1	88	8.4	1.23
28-Jul-11	Elec Fish	SC07	0-50 m US	0-50 m	NA	BT	1	74	5.5	1.36
28-Jul-11	Elec Fish	SC07	0-50 m US	0-50 m	NA	BT	1	62	2.8	1.17
28-Jul-11	Elec Fish	SC07	50-100 m US	50-100 m	NA	BT	1	123	22.6	1.21
28-Jul-11	Elec Fish	SC07	50-100 m US	50-100 m	NA	BT	1	72	4.5	1.21
28-Jul-11	Elec Fish	SC07	100-150 m US	100-150 m	NA	BT	1	57	2.5	1.35
28-Jul-11	Elec Fish	SC07	100-150 m US	100-150 m	NA	BT	1	111	16.8	1.23
28-Jul-11	Elec Fish	SC07	100-150 m US	100-150 m	NA	BT	1	96	8.2	0.93
28-Jul-11	Elec Fish	SC07	100-150 m US	100-150 m	NA	BT	1	65	3.6	1.31
28-Jul-11	Elec Fish	SC07	100-150 m US	100-150 m	NA	BT	1	66	3.5	1.22
28-Jul-11	Elec Fish	SC07	100-150 m US	100-150 m	NA	BT	1	67	3.8	1.26
28-Jul-11	Elec Fish	SC07	100-150 m US	100-150 m	NA	BT	1	78	5	1.05
28-Jul-11	Elec Fish	SC07	150-200 m US	150-200 m	NA	BT	1	113	17.6	1.22
28-Jul-11	Elec Fish	SC07	150-200 m US	150-200 m	NA	BT	1	82	9.2	1.67
28-Jul-11	Elec Fish	SC07	150-200 m US	150-200 m	NA	BT	1	73	4.6	1.18
28-Jul-11	Elec Fish	SC07	150-200 m US	150-200 m	NA	BT	1	54	1.6	1.02
28-Jul-11	Elec Fish	SC07	150-200 m US	150-200 m	NA	BT	1	67	3.4	1.13
28-Jul-11	Elec Fish	SC07	150-200 m US	150-200 m	NA	BT	1	31	0.4	1.34
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	210	103.7	1.12
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	178	69.4	1.23
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	174	66.4	1.26
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	73	3.8	0.98
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	92	9.2	1.18
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	85	7.5	1.22
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	83	6.5	1.14
28-Jul-11	Elec Fish	SC07	200-250 m US	200-250 m	NA	BT	1	107	12.8	1.04
28-Jul-11	Elec Fish	SC07	250-300 m US	250-300 m	NA	BT	1	230	130.4	1.07
28-Jul-11	Elec Fish	SC07	250-300 m US	250-300 m	NA	BT	1	64	2.5	0.95
28-Jul-11	Elec Fish	SC07	250-300 m US	250-300 m	NA	BT	1	110	15.7	1.18
28-Jul-11	Elec Fish	SC07	300-350 m US	300-350 m	NA	BT	1	150	39.9	1.18
28-Jul-11	Elec Fish	SC07	300-350 m US	300-350 m	NA	BT	1	61	2.5	1.10
28-Jul-11	Elec Fish	SC07	300-350 m US	300-350 m	NA	BT	1	109	13.1	1.01
28-Jul-11	Elec Fish	SC07	300-350 m US	300-350 m	NA	BT	1	122	22.7	1.25
28-Jul-11	Elec Fish	SC07	300-350 m US	300-350 m	NA	BT	1	112	17.8	1.27
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	BT	1	127	25.3	1.24
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	WS	1	152	34	0.97
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	B	1	113	9.8	0.68
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	B	1	109	9.3	0.72
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LC	1	64	2.7	1.03

28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LND	1	73	5.1	1.31
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LND	1	75	4.4	1.04
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LC	1	77	4.1	0.90
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LC	1	63	2.9	1.16
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LC	1	68	3.6	1.14
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LC	1	64	3	1.14
28-Jul-11	Elec Fish	SC09	0-50 m US	0-50 m	NA	LC	1	62	2.5	1.05
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	B	1	185	34.5	0.54
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	B	1	115	17.4	1.14
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	B	1	160	60.1	1.47
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	64	3.2	1.22
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	SS	1	45	1.1	1.21
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LND	1	59	2.2	1.07
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	70	3.6	1.05
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	69	3.4	1.03
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	64	3	1.14
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	62	2.6	1.09
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	72	3.6	0.96
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	66	2.6	0.90
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	65	2.7	0.98
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	66	3	1.04
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	69	3.9	1.19
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	67	3.2	1.06
28-Jul-11	Elec Fish	SC09	50-100 m US	50-100 m	NA	LC	1	58	2.2	1.13
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	BT	1	193	111.8	1.56
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	BT	1	187	101	1.54
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	LC	1	65	2.5	0.91
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	LC	1	68	3.6	1.14
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	LC	1	70	3.6	1.05
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	LC	1	63	3.1	1.24
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	LND	1	100	12.1	1.21
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	SS	1	46	1.2	1.23
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	B	1	150	24.5	0.73
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	B	1	120	9.1	0.53
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	SS	1	62	2.7	1.13
28-Jul-11	Elec Fish	SC09	100-150 m US	100-150 m	NA	LC	1	62	2.9	1.22
28-Jul-11	Elec Fish	SC09	150-200 m US	150-200 m	NA	LNS	1	185	62.7	0.99
28-Jul-11	Elec Fish	SC09	150-200 m US	150-200 m	NA	LNS	1	165	51.4	1.14
28-Jul-11	Elec Fish	SC09	150-200 m US	150-200 m	NA	SS	1	63		
28-Jul-11	Elec Fish	SC09	150-200 m US	150-200 m	NA	PD	1	63	2.9	1.16
28-Jul-11	Elec Fish	SC09	150-200 m US	150-200 m	NA	LC	1	83	6.6	1.15
28-Jul-11	Elec Fish	SC09	150-200 m US	150-200 m	NA	LC	1	61	2.4	1.06
28-Jul-11	Elec Fish	SC09	150-200 m US	150-200 m	NA	SS	1	42	0.9	1.21
28-Jul-11	Elec Fish	SC10	0-50 m US	0-50 m	NA	NC	NC	NC	NC	NC
28-Jul-11	Elec Fish	SC10	50-100 m US	50-100 m	NA	BT	1	220	118.5	1.11
28-Jul-11	Elec Fish	SC10	100-150 m US	100-150 m	NA	NC	NC	NC	NC	NC
28-Jul-11	Elec Fish	SC10	150-200 m US	150-200 m	NA	PD	1	66	3.3	1.15
30-Jul-11	Elec Fish	TDA01	0-150 m US	0-150 m	NA	BT	1	48	1.1	0.99
30-Jul-11	Elec Fish	TDA01	150-300 m US	150-300 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA01	300-450 m US	300-450 m	NA	BT	1	123	19.9	1.07
30-Jul-11	Elec Fish	TDA01	300-450 m US	300-450 m	NA	BT	1	57	2.9	1.57
30-Jul-11	Elec Fish	TDA01	450-600 m US	450-600 m	NA	BT	1	105	11.8	1.02
30-Jul-11	Elec Fish	TDA01	600-700 m US	600-700 m	NA	NA	NA	NA	NA	NA
30-Jul-11	Elec Fish	TDA01	700-850 m US	700-850 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA01	850-1000 m US	850-1000 m	NA	BT	1	103	12.7	1.16
30-Jul-11	Elec Fish	TDA01	850-1000 m US	850-1000 m	NA	BT	1	163	42.7	0.99
30-Jul-11	Elec Fish	TDA01	1000-1150 m US	1000-1150 m	NA	BT	1	104	13.5	1.20
30-Jul-11	Elec Fish	TDA01	1150-1300 m US	1150-1300 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA01	1300-1450 m US	1300-1450 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA01	1450-1600 m US	1450-1600 m	NA	BT	1	115	17.1	1.12
30-Jul-11	Elec Fish	TDA01	1600-1750 m US	1600-1750 m	NA	BT	1	84	7	1.18
30-Jul-11	Elec Fish	TDA01	1750-1900 m US	1750-1900 m	NA	BT	1	124	21.4	1.12

30-Jul-11	Elec Fish	TDA01	1750-1900 m US	1750-1900 m	NA	BT	1	67	4	1.33
30-Jul-11	Elec Fish	TDA01	1900-2050 m US	1900-2050 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA01	2050-2200 m US	2050-2200 m	NA	BT	1	108	14.6	1.16
30-Jul-11	Elec Fish	TDA01	2050-2200 m US	2050-2200 m	NA	BT	1	131	21.8	0.97
30-Jul-11	Elec Fish	TDA01	2050-2200 m US	2050-2200 m	NA	BT	1	119	16.3	0.97
30-Jul-11	Elec Fish	TDA01	2200-2350 m US	2200-2350 m	NA	BT	1	126	20.3	1.01
30-Jul-11	Elec Fish	TDA01	2200-2350 m US	2200-2350 m	NA	BT	1	103	13.1	1.20
30-Jul-11	Elec Fish	TDA01	2200-2350 m US	2200-2350 m	NA	BT	1	98	8.7	0.92
30-Jul-11	Elec Fish	TDA01	2350-2500 m US	2350-2500 m	NA	BT	1	50	1.8	1.44
30-Jul-11	Elec Fish	TDA01	2350-2500 m US	2350-2500 m	NA	BT	1	86	8	1.26
30-Jul-11	Elec Fish	TDA01	2500-2650 m US	2500-2650 m	NA	BT	1	125	17.9	0.92
30-Jul-11	Elec Fish	TDA01	2500-2650 m US	2500-2650 m	NA	BT	1	114	15.1	1.02
30-Jul-11	Elec Fish	TDA01	2500-2650 m US	2500-2650 m	NA	BT	1	127	21.9	1.07
30-Jul-11	Elec Fish	TDA01	2500-2650 m US	2500-2650 m	NA	BT	1	118	16.4	1.00
30-Jul-11	Elec Fish	TDA01	2650-2800 m US	2650-2800 m	NA	NC	NC	NC	NC	NC
29-Jul-11	Elec Fish	TDA02	0-150 m DS	6650-6800 m	NA	SS	1	54	1.7	1.08
29-Jul-11	Elec Fish	TDA02	0-150 m DS	6650-6800 m	NA	PD	1	88	7.9	1.16
29-Jul-11	Elec Fish	TDA02	150-300 m DS	6500-6650 m	NA	BT	1	93	8	0.99
29-Jul-11	Elec Fish	TDA02	150-300 m DS	6500-6650 m	NA	BT	1	43	0.8	1.01
29-Jul-11	Elec Fish	TDA02	150-300 m DS	6500-6650 m	NA	BT	1	48	1	0.90
29-Jul-11	Elec Fish	TDA02	150-300 m DS	6500-6650 m	NA	SS	1	48	1.2	1.09
29-Jul-11	Elec Fish	TDA02	150-300 m DS	6500-6650 m	NA	PD	1	98	10.6	1.13
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	SS	1	89	9.3	1.32
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	72	6	1.61
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	88	8.5	1.25
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	110	14.6	1.10
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	88	7.9	1.16
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	64	3.1	1.18
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	44	1.1	1.29
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	51	1.8	1.36
29-Jul-11	Elec Fish	TDA02	300-450 m DS	6350-6500 m	NA	BT	1	40	0.9	1.41
29-Jul-11	Elec Fish	TDA02	450-600 m DS	6200-6350 m	NA	SS	1	75	4.6	1.09
29-Jul-11	Elec Fish	TDA02	450-600 m DS	6200-6350 m	NA	BT	1	67	3.1	1.03
29-Jul-11	Elec Fish	TDA02	450-600 m DS	6200-6350 m	NA	BT	1	75	5.1	1.21
29-Jul-11	Elec Fish	TDA02	600-750 m DS	6050-6200 m	NA	BT	1	126	25.4	1.27
29-Jul-11	Elec Fish	TDA02	600-750 m DS	6050-6200 m	NA	BT	1	140	22.7	0.83
29-Jul-11	Elec Fish	TDA02	600-750 m DS	6050-6200 m	NA	BT	1	81	6.2	1.17
29-Jul-11	Elec Fish	TDA02	600-750 m DS	6050-6200 m	NA	BT	1	39	0.9	1.52
29-Jul-11	Elec Fish	TDA02	600-750 m DS	6050-6200 m	NA	BT	1	42	0.8	1.08
29-Jul-11	Elec Fish	TDA02	750-900 m DS	5900-6050 m	NA	BT	1	98	11.5	1.22
29-Jul-11	Elec Fish	TDA02	750-900 m DS	5900-6050 m	NA	BT	1	78	5.8	1.22
29-Jul-11	Elec Fish	TDA02	750-900 m DS	5900-6050 m	NA	BT	1	45	1.2	1.32
29-Jul-11	Elec Fish	TDA02	750-900 m DS	5900-6050 m	NA	BT	1	43	0.8	1.01
29-Jul-11	Elec Fish	TDA02	900-1050 m DS	5750-5900 m	NA	BT	1	46	1.2	1.23
29-Jul-11	Elec Fish	TDA02	900-1050 m DS	5750-5900 m	NA	BT	1	41	0.9	1.31
29-Jul-11	Elec Fish	TDA02	900-1050 m DS	5750-5900 m	NA	SS	1	60	2.5	1.16
29-Jul-11	Elec Fish	TDA02	1050-1200 m DS	5600-5750 m	NA	BT	1	142	31.8	1.11
29-Jul-11	Elec Fish	TDA02	1050-1200 m DS	5600-5750 m	NA	BT	1	77	5	1.10
29-Jul-11	Elec Fish	TDA02	1050-1200 m DS	5600-5750 m	NA	BT	1	140	30.9	1.13
29-Jul-11	Elec Fish	TDA02	1050-1200 m DS	5600-5750 m	NA	BT	1	47	1.5	1.44
29-Jul-11	Elec Fish	TDA02	1200-1350 m DS	5450-5600 m	NA	BT	1	96	12	1.36
29-Jul-11	Elec Fish	TDA02	1200-1350 m DS	5450-5600 m	NA	BT	1	46	1	1.03
29-Jul-11	Elec Fish	TDA02	1200-1350 m DS	5450-5600 m	NA	BT	1	44	1.1	1.29
29-Jul-11	Elec Fish	TDA02	1200-1350 m DS	5450-5600 m	NA	BT	1	45	1.2	1.32
29-Jul-11	Elec Fish	TDA02	1200-1350 m DS	5450-5600 m	NA	BT	1	42	0.9	1.21
29-Jul-11	Elec Fish	TDA02	1200-1350 m DS	5450-5600 m	NA	SS	1	50		
29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	SS	1	44	0.7	0.82
29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	BT	1	155	42.5	1.14
29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	BT	1	76	5	1.14
29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	BT	1	68	3.3	1.05
29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	BT	1	38	0.7	1.28
29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	BT	1	43	0.9	1.13

29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	BT	1	43	0.8	1.01
29-Jul-11	Elec Fish	TDA02	1350-1500 m DS	5300-5450 m	NA	BT	1	49	1.6	1.36
29-Jul-11	Elec Fish	TDA02	1500-1650 m DS	5150-5300 m	NA	BT	1	100	10.1	1.01
29-Jul-11	Elec Fish	TDA02	1500-1650 m DS	5150-5300 m	NA	BT	1	44	0.9	1.06
29-Jul-11	Elec Fish	TDA02	1500-1650 m DS	5150-5300 m	NA	BT	1	44	1	1.17
29-Jul-11	Elec Fish	TDA02	1650-1800 m DS	5000-5150 m	NA	SS	1	49	1.2	1.02
29-Jul-11	Elec Fish	TDA02	1650-1800 m DS	5000-5150 m	NA	BT	1	135	26.9	1.09
29-Jul-11	Elec Fish	TDA02	1650-1800 m DS	5000-5150 m	NA	BT	1	107	12.1	0.99
29-Jul-11	Elec Fish	TDA02	1650-1800 m DS	5000-5150 m	NA	BT	1	64	2.3	0.88
29-Jul-11	Elec Fish	TDA02	1650-1800 m DS	5000-5150 m	NA	BT	1	45	1	1.10
29-Jul-11	Elec Fish	TDA02	1650-1800 m DS	5000-5150 m	NA	BT	1	38	0.6	1.09
29-Jul-11	Elec Fish	TDA02	1650-1800 m DS	5000-5150 m	NA	BT	1	42	0.6	0.81
29-Jul-11	Elec Fish	TDA02	1800-1950 m DS	4850-500 m	NA	BT	1	112	12.7	0.90
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	BT	1	105	14.1	1.22
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	BT	1	94	8.8	1.06
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	BT	1	104	9.8	0.87
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	BT	1	100	9.9	0.99
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	BT	1	40	0.8	1.25
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	BT	1	67	3.7	1.23
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	BT	1	70	3.9	1.14
29-Jul-11	Elec Fish	TDA02	1950-2100 m DS	4700-4850 m	NA	SS	1	48	1.2	1.09
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	BT	1	105	14.1	1.22
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	BT	1	94	8.8	1.06
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	BT	1	104	9.8	0.87
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	BT	1	100	9.9	0.99
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	BT	1	40	0.8	1.25
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	BT	1	67	3.7	1.23
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	BT	1	70	3.9	1.14
29-Jul-11	Elec Fish	TDA02	2100-2250 m DS	4550-4700 m	NA	SS	1	48	1.2	1.09
29-Jul-11	Elec Fish	TDA02	2250-2400 m DS	4400-4550 m	NA	BT	1	72	4.2	1.13
29-Jul-11	Elec Fish	TDA02	2250-2400 m DS	4400-4550 m	NA	BT	1	58	1.7	0.87
29-Jul-11	Elec Fish	TDA02	2250-2400 m DS	4400-4550 m	NA	BT	1	102	9.5	0.90
29-Jul-11	Elec Fish	TDA02	2250-2400 m DS	4400-4550 m	NA	BT	1	71	3.9	1.09
29-Jul-11	Elec Fish	TDA02	2250-2400 m DS	4400-4550 m	NA	BT	1	63	2.7	1.08
29-Jul-11	Elec Fish	TDA02	2400-2550 m DS	4250-4400 m	NA	BT	1	180	68.5	1.17
29-Jul-11	Elec Fish	TDA02	2400-2550 m DS	4250-4400 m	NA	BT	1	150	33.1	0.98
29-Jul-11	Elec Fish	TDA02	2400-2550 m DS	4250-4400 m	NA	BT	1	133	25	1.06
29-Jul-11	Elec Fish	TDA02	2400-2550 m DS	4250-4400 m	NA	BT	1	89	7.8	1.11
29-Jul-11	Elec Fish	TDA02	2400-2550 m DS	4250-4400 m	NA	BT	1	86	7.3	1.15
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	BT	1	165	35.7	0.79
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	BT	1	67	3.6	1.20
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	BT	1	73	4.7	1.21
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	BT	1	71	3.4	0.95
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	BT	1	67	3.3	1.10
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	BT	1	80	5.1	1.00
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	BT	1	38	0.9	1.64
29-Jul-11	Elec Fish	TDA02	2550-2700 m DS	4100-4250 m	NA	SS	1	42	0.8	1.08
29-Jul-11	Elec Fish	TDA02	2700-2850 m DS	3950-4100 m	NA	BT	1	68	3.3	1.05
29-Jul-11	Elec Fish	TDA02	2850-3000 m DS	3800-3950 m	NA	NC	NC	NC	NC	NC
29-Jul-11	Elec Fish	TDA02	3000-3150 m DS	3650-3800 m	NA	BT	1	170	58.2	1.18
29-Jul-11	Elec Fish	TDA02	3000-3150 m DS	3650-3800 m	NA	BT	1	105	15.3	1.32
29-Jul-11	Elec Fish	TDA02	3000-3150 m DS	3650-3800 m	NA	BT	1	134	27	1.12
29-Jul-11	Elec Fish	TDA02	3150-3300 m DS	3500-3650 m	NA	BT	1	129	22.1	1.03
29-Jul-11	Elec Fish	TDA02	3150-3300 m DS	3500-3650 m	NA	BT	1	102	10.6	1.00
29-Jul-11	Elec Fish	TDA02	3150-3300 m DS	3500-3650 m	NA	SS	1	72	4.7	1.26
29-Jul-11	Elec Fish	TDA02	3300-3450 m DS	3350-3500 m	NA	BT	1	155	36.3	0.97
29-Jul-11	Elec Fish	TDA02	3300-3450 m DS	3350-3500 m	NA	BT	1	160	39.7	0.97
29-Jul-11	Elec Fish	TDA02	3300-3450 m DS	3350-3500 m	NA	BT	1	102	10.6	1.00
29-Jul-11	Elec Fish	TDA02	3300-3450 m DS	3350-3500 m	NA	BT	1	105	15.9	1.37
29-Jul-11	Elec Fish	TDA02	3300-3450 m DS	3350-3500 m	NA	BT	1	124	19.5	1.02
29-Jul-11	Elec Fish	TDA02	3300-3450 m DS	3350-3500 m	NA	BT	1	82	6.6	1.20
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	254	190.4	1.16

29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	185	68.9	1.09
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	164	49.7	1.13
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	145	36.4	1.19
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	168	66.2	1.40
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	102	10.7	1.01
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	140	29.6	1.08
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	133	23.9	1.02
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	112	15.8	1.12
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	143	35.6	1.22
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	94	9.7	1.17
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	64	2.5	0.95
29-Jul-11	Elec Fish	TDA02	3450-3600 m DS	3200-3350 m	NA	BT	1	117	17	1.06
29-Jul-11	Elec Fish	TDA02	3600-3900 m DS	2900-3200 m	NA	NA	NA	NA	NA	NA
29-Jul-11	Elec Fish	TDA02	3900-4050 m DS	2750-2900 m	NA	BT	1	168	57.9	1.22
30-Jul-11	Elec Fish	TDA02	4050-4200 m DS	2600-2750 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA02	4200-4350 m DS	2450-2600 m	NA	BT	1	145	30.1	0.99
30-Jul-11	Elec Fish	TDA02	4200-4350 m DS	2450-2600 m	NA	BT	1	181	70	1.18
30-Jul-11	Elec Fish	TDA02	4350-4500 m DS	2300-2450 m	NA	BT	1	188	86.7	1.30
30-Jul-11	Elec Fish	TDA02	4500-4650 m DS	2150-2300 m	NA	BT	1	182	68.1	1.13
30-Jul-11	Elec Fish	TDA02	4500-4650 m DS	2150-2300 m	NA	BT	1	195	82.6	1.11
30-Jul-11	Elec Fish	TDA02	4500-4650 m DS	2150-2300 m	NA	BT	1	152	29.4	0.84
30-Jul-11	Elec Fish	TDA02	4500-4650 m DS	2150-2300 m	NA	BT	1	140	28.4	1.03
30-Jul-11	Elec Fish	TDA02	4500-4650 m DS	2150-2300 m	NA	BT	1	130	22.7	1.03
30-Jul-11	Elec Fish	TDA02	4650-4800 m DS	2000-2150 m	NA	BT	1	42	1.3	1.75
30-Jul-11	Elec Fish	TDA02	4800-4950 m DS	1850-2000 m	NA	BT	1	145	29.6	0.97
30-Jul-11	Elec Fish	TDA02	4800-4950 m DS	1850-2000 m	NA	BT	1	115	20.1	1.32
30-Jul-11	Elec Fish	TDA02	4800-4950 m DS	1850-2000 m	NA	BT	1	103	12.3	1.13
30-Jul-11	Elec Fish	TDA02	4950-5100 m DS	1700-1850 m	NA	BT	1	180	65.4	1.12
30-Jul-11	Elec Fish	TDA02	5100-5250 m DS	1550-1700 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA02	5250-5400 m DS	1400-1550 m	NA	BT	1	45	0.7	0.77
30-Jul-11	Elec Fish	TDA02	5400-5550 m DS	1250-1400 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA02	5550-5700 m DS	1100-1250 m	NA	NC	NC	NC	NC	NC
30-Jul-11	Elec Fish	TDA02	5700-5850 m DS	950-1100 m	NA	BT	1	111	16.2	1.18
30-Jul-11	Elec Fish	TDA02	5700-5850 m DS	950-1100 m	NA	BT	1	73	5.2	1.34
30-Jul-11	Elec Fish	TDA02	5850-6000 m DS	800-950m	NA	BT	1	68	3.2	1.02
30-Jul-11	Elec Fish	TDA02	6000-6500 m DS	300-800 m	NA	NA	NA	NA	NA	NA
30-Jul-11	Elec Fish	TDA02	6500-6650 m DS	150-300 m	NA	BT	1	172	50.5	0.99
30-Jul-11	Elec Fish	TDA02	6650-6800 m DS	0-150 m	NA	BT	1	162	52.9	1.24
30-Jul-11	Elec Fish	TDA02	6650-6800 m DS	0-150 m	NA	BT	1	129	22.9	1.07
02-Aug-11	NA	TRIB1	NA		NA	NA	NA	NA	NA	NA

Glossary: NC- fishing done no catch; NA - not fished; NP-northern pike; SS - Slimy sculpin; BT- Brook trout; LC-Lake chub; B- Burbot; WS-White sucker; LT-Lake trout; LNS-Longnose sucker; PD-Pearl dace;LND-Longnose dace; RWF-Round whitefish

Appendix D Macroinvertebrate Analysis

M02-Mills

Phylum	Class	Order	Family	Number of Individuals
Annelida	Hirudinea	-	-	0
Annelida	Oligochaeta	-	Naididae	0
Annelida	Oligochaeta	Haplotaxida	Enchytraeidae	0
Annelida	Arachnida	Acariformes	Hydrachnidia	0
Annelida	Aeolosomata	Aeolosomata	Aeolosomatidae	0
Arthropoda	Arachnida	Acarina	-	5
Arthropoda	Ostracoda	-	-	0
Arthropoda	Entognatha	Collembola	-	0
Arthropoda	Insecta	Coleoptera	Dytiscidae	0
Arthropoda	Insecta	Coleoptera	Elmidae	0
Arthropoda	Insecta	Ephemeroptera	Baetidae	53
Arthropoda	Insecta	Ephemeroptera	Caenidae	0
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	0
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	6
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	0
Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	0
Arthropoda	Insecta	Plecoptera	Chloroperlidae	13
Arthropoda	Insecta	Plecoptera	Leuctridae	1
Arthropoda	Insecta	Plecoptera	Nemouridae	2
Arthropoda	Insecta	Plecoptera	Perlidae	0
Arthropoda	Insecta	Trichoptera	Goeridae	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	0
Arthropoda	Insecta	Trichoptera	Hydroptilidae	0
Arthropoda	Insecta	Trichoptera	Lepidostomatidae	0
Arthropoda	Insecta	Trichoptera	Leotoceridae	0
Arthropoda	Insecta	Trichoptera	Limnephilidae	3
Arthropoda	Insecta	Trichoptera	Philopotamidae	1
Arthropoda	Insecta	Trichoptera	Polycentropodidae	0
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	10
Arthropoda	Insecta	Diptera	-	0
Arthropoda	Insecta	Diptera	Ceratopogonidae	0
Arthropoda	Insecta	Diptera	Chironomidae	17
Arthropoda	Insecta	Diptera	Empididae	3
Arthropoda	Insecta	Diptera	Simuliidae	0
Arthropoda	Insecta	Diptera	Tipulidae	0
Mollusca	Gastropoda	-	Planorbidae	2
Mollusca	Bivalvia	-	Sphaeriidae	85
Nemata	-	-	-	5

RP04-RP02

Phylum	**Class**	**Order**	**Family**	Number of Individuals
Annelida	Hirudinea	-	-	0
Annelida	Oligochaeta	-	Naididae	0
Annelida	Oligochaeta	Haplotaxida	Enchytraeidae	0
Annelida	Arachnida	Acariformes	Hydrachnidia	0
Annelida	Aeolosomata	Aeolosomata	Aeolosomatidae	0
Arthropoda	Arachnida	Acarina	-	7
Arthropoda	Ostracoda	-	-	0
Arthropoda	Entognatha	Collembola	-	0
Arthropoda	Insecta	Coleoptera	Dytiscidae	0
Arthropoda	Insecta	Coleoptera	Elmidae	1
Arthropoda	Insecta	Ephemeroptera	Baetidae	3
Arthropoda	Insecta	Ephemeroptera	Caenidae	0
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	0
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	1
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	0
Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	0
Arthropoda	Insecta	Plecoptera	Chloroperlidae	1
Arthropoda	Insecta	Plecoptera	Leuctridae	0
Arthropoda	Insecta	Plecoptera	Nemouridae	1
Arthropoda	Insecta	Plecoptera	Perlidae	0
Arthropoda	Insecta	Trichoptera	Goeridae	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	0
Arthropoda	Insecta	Trichoptera	Hydroptilidae	0
Arthropoda	Insecta	Trichoptera	Lepidostomatidae	2
Arthropoda	Insecta	Trichoptera	Leotoceridae	0
Arthropoda	Insecta	Trichoptera	Limnephilidae	0
Arthropoda	Insecta	Trichoptera	Philopotamidae	0
Arthropoda	Insecta	Trichoptera	Polycentropodidae	0
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	2
Arthropoda	Insecta	Diptera	-	1
Arthropoda	Insecta	Diptera	Ceratopogonidae	1
Arthropoda	Insecta	Diptera	Chironomidae	10
Arthropoda	Insecta	Diptera	Empididae	0
Arthropoda	Insecta	Diptera	Simuliidae	0
Arthropoda	Insecta	Diptera	Tipulidae	1
Mollusca	Gastropoda	-	Planorbidae	0
Mollusca	Bivalvia	-	Sphaeriidae	4
Nemata	-	-	-	1

TDA02

Phylum	Class	Order	Family	Number of Individuals
Annelida	Hirudinea	-	-	0
Annelida	Oligochaeta	-	Naididae	2
Annelida	Oligochaeta	-	Enchytraeidae	2
Annelida	Arachnida	Acariformes	Hydrachnidia	0
Annelida	Aeolosomata	Aeolosomata	Aeolosomatidae	0
Arthropoda	Arachnida	Acarina	-	22
Arthropoda	Ostracoda	-	-	0
Arthropoda	Entognatha	Collembola	-	4
Arthropoda	Insecta	Coleoptera	Dytiscidae	0
Arthropoda	Insecta	Coleoptera	Elmidae	0
Arthropoda	Insecta	Ephemeroptera	Baetidae	24
Arthropoda	Insecta	Ephemeroptera	Caenidae	0
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	40
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	1
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	0
Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	14
Arthropoda	Insecta	Plecoptera	Chloroperlidae	2
Arthropoda	Insecta	Plecoptera	Leuctridae	4
Arthropoda	Insecta	Plecoptera	Nemouridae	0
Arthropoda	Insecta	Plecoptera	Perlidae	0
Arthropoda	Insecta	Trichoptera	Goeridae	1
Arthropoda	Insecta	Trichoptera	Hydropsychidae	0
Arthropoda	Insecta	Trichoptera	Hydroptilidae	70
Arthropoda	Insecta	Trichoptera	Lepidostomatidae	6
Arthropoda	Insecta	Trichoptera	Leotoceridae	1
Arthropoda	Insecta	Trichoptera	Limnephilidae	6
Arthropoda	Insecta	Trichoptera	Philopotamidae	0
Arthropoda	Insecta	Trichoptera	Polycentropodidae	3
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	2
Arthropoda	Insecta	Diptera	-	0
Arthropoda	Insecta	Diptera	Ceratopogonidae	2
Arthropoda	Insecta	Diptera	Chironomidae	185
Arthropoda	Insecta	Diptera	Empididae	6
Arthropoda	Insecta	Diptera	Simuliidae	2
Arthropoda	Insecta	Diptera	Tipulidae	0
Mollusca	Gastropoda	-	Planorbidae	2
Mollusca	Bivalvia	-	Sphaeriidae	0
Nemata	-	-	-	18

PLN-OF

Phylum	**Class**	**Order**	**Family**	Number of Individuals
Annelida	Hirudinea	-	-	0
Annelida	Oligochaeta	-	Naididae	0
Annelida	Oligochaeta	Haplotaxida	Enchytraeidae	2
Annelida	Arachnida	Acariformes	Hydrachnidia	0
Annelida	Aeolosomata	Aeolosomata	Aeolosomatidae	0
Arthropoda	Arachnida	Acarina	-	12
Arthropoda	Ostracoda	-	-	2
Arthropoda	Entognatha	Collembola	-	0
Arthropoda	Insecta	Coleoptera	Dytiscidae	0
Arthropoda	Insecta	Coleoptera	Elmidae	46
Arthropoda	Insecta	Ephemeroptera	Baetidae	38
Arthropoda	Insecta	Ephemeroptera	Caenidae	4
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	8
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	20
Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	0
Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	6
Arthropoda	Insecta	Plecoptera	Chloroperlidae	2
Arthropoda	Insecta	Plecoptera	Leuctridae	14
Arthropoda	Insecta	Plecoptera	Nemouridae	4
Arthropoda	Insecta	Plecoptera	Perlidae	1
Arthropoda	Insecta	Trichoptera	Goeridae	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	14
Arthropoda	Insecta	Trichoptera	Hydroptilidae	0
Arthropoda	Insecta	Trichoptera	Lepidostomatidae	0
Arthropoda	Insecta	Trichoptera	Leptoceridae	12
Arthropoda	Insecta	Trichoptera	Limnephilidae	0
Arthropoda	Insecta	Trichoptera	Philopotamidae	0
Arthropoda	Insecta	Trichoptera	Polycentropodidae	0
Arthropoda	Insecta	Trichoptera	Rhyacophilidae	3
Arthropoda	Insecta	Diptera	-	0
Arthropoda	Insecta	Diptera	Ceratopogonidae	0
Arthropoda	Insecta	Diptera	Chironomidae	132
Arthropoda	Insecta	Diptera	Empididae	0
Arthropoda	Insecta	Diptera	Simuliidae	0
Arthropoda	Insecta	Diptera	Tipulidae	5
Mollusca	Gastropoda	-	Planorbidae	0
Mollusca	Bivalvia	-	Sphaeriidae	0
Nemata	-	-	-	2

Appendix E Water Quality Laboratory Analysis

	Units	RDL	M01-ML	RP01-PLS	PL-OF	LL-OF	SC01	TDA01	TDA02
Calculated Parameters									
Anion Sum	meq/L	N/A	0.700	1.10	0.630	0.310	0.690	1.54	1.34
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	35	52	31	15	35	77	67
Calculated TDS	mg/L	1	39	61	35	18	37	76	64
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	ND	ND	ND	ND	ND	ND	ND
Cation Sum	meq/L	N/A	0.750	1.12	0.640	0.350	0.720	1.47	1.22
Hardness (CaCO3)	mg/L	1	35	49	29	15	33	70	59
Nitrate (N)	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	5	35	52	32	15	35	77	67
Dissolved Chloride (Cl)	mg/L	1	ND	ND	ND	ND	ND	ND	ND
Colour	TCU	5	42	17	27	38	13	16	30
Nitrate + Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND
Nitrite (N)	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND
Nitrogen (Ammonia Nitrogen)	mg/L	0.05	ND	0.06	ND	ND	ND	0.06	0.05
Total Organic Carbon (C)	mg/L	0.5	5.4	3.6	5.0	5.0	2.9	2.7	5.7
Orthophosphate (P)	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND
pH	pH	N/A	7.83	7.45	7.48	7.33	7.51	7.72	7.75
Reactive Silica (SiO2)	mg/L	0.5	4.9	5.6	3.8	2.3	3.4	4.1	2.9
Total Suspended Solids	mg/L	2	ND	3	3	4	ND	3	2
Dissolved Sulphate (SO4)	mg/L	2	ND	3	ND	ND	ND	ND	ND
Turbidity	NTU	0.1	0.3	0.4	0.6	0.6	0.4	0.4	0.6
Conductivity	µS/cm	1	67	96	58	32	64	130	100
Metals									
Total Aluminum (Al)	µg/L	5.0	59.6	119	26.2	89.2	30.7	15.3	13.7
Total Antimony (Sb)	µg/L	1.0	ND	ND	ND	ND	ND	ND	ND
Total Arsenic (As)	µg/L	1.0	ND	ND	ND	ND	ND	ND	ND
Total Barium (Ba)	µg/L	1.0	16.3	14.4	11.7	9.4	9.6	20.0	14.4
Total Beryllium (Be)	µg/L	1.0	ND	ND	ND	ND	ND	ND	ND
Total Bismuth (Bi)	µg/L	2.0	ND	ND	ND	ND	ND	ND	ND
Total Boron (B)	µg/L	50	ND	ND	ND	ND	ND	ND	ND
Total Cadmium (Cd)	µg/L	0.02	ND	0.821	0.028	0.043	1.17	0.146	ND
Total Calcium (Ca)	µg/L	100	7900	12400	7190	3950	7640	15800	13300
Total Chromium (Cr)	µg/L	1.0	2.3	101	ND	2.9	ND	ND	ND
Total Cobalt (Co)	µg/L	0.40	ND	ND	ND	ND	ND	ND	ND
Total Copper (Cu)	µg/L	2.0	ND	2.4	ND	ND	ND	2.0	ND
Total Iron (Fe)	µg/L	50	93	287	66	263	ND	249	151
Total Lead (Pb)	µg/L	0.50	ND	0.65	ND	ND	ND	ND	ND
Total Magnesium (Mg)	µg/L	100	3680	4370	2620	1190	3380	7520	6350
Total Manganese (Mn)	µg/L	2.0	19.1	73.6	28.2	138	11.9	133	17.6
Total Mercury (Hg)	µg/L	0.01	ND	ND	ND	ND	ND	ND	ND
Total Molybdenum (Mo)	µg/L	2.0	ND	ND	ND	ND	ND	ND	ND
Total Nickel (Ni)	µg/L	2.0	ND	ND	ND	ND	ND	ND	ND
Total Phosphorus (P)	µg/L	100	ND	ND	ND	ND	ND	ND	ND
Total Potassium (K)	µg/L	100	770	2380	1180	823	983	902	323
Total Selenium (Se)	µg/L	1.0	ND	ND	ND	ND	ND	ND	ND
Total Silver (Ag)	µg/L	0.10	ND	ND	ND	ND	ND	ND	ND
Total Sodium (Na)	µg/L	100	672	1430	794	607	751	660	430
Total Strontium (Sr)	µg/L	2.0	13.5	21.6	15.5	12.2	11.6	17.2	12.9
Total Thallium (Tl)	µg/L	0.10	ND	ND	ND	ND	ND	ND	ND
Total Tin (Sn)	µg/L	2.0	ND	ND	ND	ND	ND	ND	ND
Total Titanium (Ti)	µg/L	2.0	3.0	5.5	ND	2.9	2.7	ND	2.0
Total Uranium (U)	µg/L	0.10	0.10	ND	ND	ND	ND	0.35	0.13
Total Vanadium (V)	µg/L	2.0	ND	ND	ND	ND	ND	ND	ND
Total Zinc (Zn)	µg/L	5.0	ND	14.3	ND	ND	15.4	ND	ND

GENERAL COMMENTS

M-01-ML, RP01-PL5, SC-02 and SC-03 received past the recommended 7 day holding time for TSS.

Sample KK8665-01: Total Suspended Solids: Used all of the provided aliquot, raised DL.

Sample KK8668-01: RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample KK8669-01: Total Suspended Solids: Used all sample provided for TSS, DL raised.

Sample KK8671-01: Total Suspended Solids: Sample integrity may have been compromised, the sample exceeded it's hold time prior to being analyzed.

Stantec Consulting Ltd
Attention: Barry Wicks
Client Project #: 121614000
P.O. #: 16400NR
Site Location: ALDERON BASELINE

Quality Assurance Report
Maxxam Job Number: DB1B7399

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2574344	JHR	QC Standard	Total Suspended Solids	08/08/2011		99	%	80 - 120
		Method Blank	Total Suspended Solids	08/08/2011	ND	RDL=1	mg/L	
		RPD	Total Suspended Solids	08/08/2011	2		%	25
2574354	JHR	QC Standard	Total Suspended Solids	09/08/2011		102	%	80 - 120
		Method Blank	Total Suspended Solids	09/08/2011	ND	RDL=1	mg/L	
		RPD	Total Suspended Solids	09/08/2011	15.8		%	25
2574356	MJL	QC Standard	pH	08/08/2011		102	%	80 - 120
		Method Blank	pH	08/08/2011	5.77		pH	
		RPD	pH	08/08/2011	0.2		%	25
2574358	MJL	Spiked Blank	Conductivity	08/08/2011		100	%	80 - 120
		Method Blank	Conductivity	08/08/2011	1	RDL=1	uS/cm	
		RPD	Conductivity	08/08/2011	0		%	25
2575954	JRC	Matrix Spike	Total Mercury (Hg)	09/08/2011		104	%	80 - 120
		QC Standard	Total Mercury (Hg)	09/08/2011		103	%	80 - 120
		Spiked Blank	Total Mercury (Hg)	09/08/2011		104	%	80 - 120
		Method Blank	Total Mercury (Hg)	09/08/2011	ND	RDL=0.013	ug/L	
		RPD	Total Mercury (Hg)	09/08/2011	NC		%	25
2577100	MJL	QC Standard	pH	10/08/2011		102	%	80 - 120
		Method Blank	pH	10/08/2011	5.72		pH	
		RPD	pH	10/08/2011	1.7		%	25
2577101	MJL	Spiked Blank	Conductivity	10/08/2011		99	%	80 - 120
		Method Blank	Conductivity	10/08/2011	1	RDL=1	uS/cm	
		RPD	Conductivity	10/08/2011	4.4		%	25
2577588	DLB	Matrix Spike	Total Aluminum (Al)	11/08/2011		107	%	80 - 120
			Total Antimony (Sb)	11/08/2011		96	%	80 - 120
			Total Arsenic (As)	11/08/2011		NC	%	80 - 120
			Total Barium (Ba)	11/08/2011		100	%	80 - 120
			Total Beryllium (Be)	11/08/2011		104	%	80 - 120
			Total Bismuth (Bi)	11/08/2011		89	%	80 - 120
			Total Boron (B)	11/08/2011		NC	%	80 - 120
			Total Cadmium (Cd)	11/08/2011		100	%	80 - 120
			Total Calcium (Ca)	11/08/2011		NC	%	80 - 120
			Total Chromium (Cr)	11/08/2011		101	%	80 - 120
			Total Cobalt (Co)	11/08/2011		102	%	80 - 120
			Total Copper (Cu)	11/08/2011		97	%	80 - 120
			Total Iron (Fe)	11/08/2011		110	%	80 - 120
			Total Lead (Pb)	11/08/2011		97	%	80 - 120
			Total Magnesium (Mg)	11/08/2011		NC	%	80 - 120
			Total Manganese (Mn)	11/08/2011		101	%	80 - 120
			Total Molybdenum (Mo)	11/08/2011		NC	%	80 - 120
			Total Nickel (Ni)	11/08/2011		97	%	80 - 120
			Total Phosphorus (P)	11/08/2011		108	%	80 - 120
			Total Potassium (K)	11/08/2011		NC	%	80 - 120

	Total Selenium (Se)	11/08/2011		99	%	80 - 120
	Total Silver (Ag)	11/08/2011		101	%	80 - 120
	Total Sodium (Na)	11/08/2011		NC	%	80 - 120
	Total Strontium (Sr)	11/08/2011		NC	%	80 - 120
	Total Thallium (Tl)	11/08/2011		92	%	80 - 120
	Total Tin (Sn)	11/08/2011		97	%	80 - 120
	Total Titanium (Ti)	11/08/2011		102	%	80 - 120
	Total Uranium (U)	11/08/2011		108	%	80 - 120
	Total Vanadium (V)	11/08/2011		105	%	80 - 120
	Total Zinc (Zn)	11/08/2011		97	%	80 - 120
Spiked Blank	Total Aluminum (Al)	11/08/2011		105	%	80 - 120
	Total Antimony (Sb)	11/08/2011		93	%	80 - 120
	Total Arsenic (As)	11/08/2011		98	%	80 - 120
	Total Barium (Ba)	11/08/2011		99	%	80 - 120
	Total Beryllium (Be)	11/08/2011		102	%	80 - 120
	Total Bismuth (Bi)	11/08/2011		91	%	80 - 120
	Total Boron (B)	11/08/2011		91	%	80 - 120
	Total Cadmium (Cd)	11/08/2011		97	%	80 - 120
	Total Calcium (Ca)	11/08/2011		100	%	80 - 120
	Total Chromium (Cr)	11/08/2011		101	%	80 - 120
	Total Cobalt (Co)	11/08/2011		102	%	80 - 120
	Total Copper (Cu)	11/08/2011		99	%	80 - 120
	Total Iron (Fe)	11/08/2011		111	%	80 - 120
	Total Lead (Pb)	11/08/2011		98	%	80 - 120
	Total Magnesium (Mg)	11/08/2011		105	%	80 - 120
	Total Manganese (Mn)	11/08/2011		102	%	80 - 120
	Total Molybdenum (Mo)	11/08/2011		98	%	80 - 120
	Total Nickel (Ni)	11/08/2011		99	%	80 - 120
	Total Phosphorus (P)	11/08/2011		106	%	80 - 120
	Total Potassium (K)	11/08/2011		100	%	80 - 120
	Total Selenium (Se)	11/08/2011		97	%	80 - 120
	Total Silver (Ag)	11/08/2011		100	%	80 - 120
	Total Sodium (Na)	11/08/2011		98	%	80 - 120
	Total Strontium (Sr)	11/08/2011		101	%	80 - 120
	Total Thallium (Tl)	11/08/2011		93	%	80 - 120
	Total Tin (Sn)	11/08/2011		93	%	80 - 120
	Total Titanium (Ti)	11/08/2011		106	%	80 - 120
	Total Uranium (U)	11/08/2011		103	%	80 - 120
	Total Vanadium (V)	11/08/2011		102	%	80 - 120
	Total Zinc (Zn)	11/08/2011		97	%	80 - 120
Method Blank	Total Aluminum (Al)	11/08/2011	8.6 (1)	RDL=5.0	ug/L	
	Total Antimony (Sb)	11/08/2011	ND	RDL=1.0	ug/L	
	Total Arsenic (As)	11/08/2011	ND	RDL=1.0	ug/L	
	Total Barium (Ba)	11/08/2011	ND	RDL=1.0	ug/L	
	Total Beryllium (Be)	11/08/2011	ND	RDL=1.0	ug/L	
	Total Bismuth (Bi)	11/08/2011	ND	RDL=2.0	ug/L	
	Total Boron (B)	11/08/2011	ND	RDL=50	ug/L	
	Total Cadmium (Cd)	11/08/2011	ND	RDL=0.017	ug/L	
	Total Calcium (Ca)	11/08/2011	ND	RDL=100	ug/L	
	Total Chromium (Cr)	11/08/2011	ND	RDL=1.0	ug/L	
	Total Cobalt (Co)	11/08/2011	ND	RDL=0.40	ug/L	
	Total Copper (Cu)	11/08/2011	ND	RDL=2.0	ug/L	
	Total Iron (Fe)	11/08/2011	ND	RDL=50	ug/L	
	Total Lead (Pb)	11/08/2011	ND	RDL=0.50	ug/L	
	Total Magnesium (Mg)	11/08/2011	ND	RDL=100	ug/L	
	Total Manganese (Mn)	11/08/2011	ND	RDL=2.0	ug/L	

			Total Molybdenum (Mo)	11/08/2011	ND	RDL=2.0		ug/L	
			Total Nickel (Ni)	11/08/2011	ND	RDL=2.0		ug/L	
			Total Phosphorus (P)	11/08/2011	ND	RDL=100		ug/L	
			Total Potassium (K)	11/08/2011	ND	RDL=100		ug/L	
			Total Selenium (Se)	11/08/2011	ND	RDL=1.0		ug/L	
			Total Silver (Ag)	11/08/2011	ND	RDL=0.10		ug/L	
			Total Sodium (Na)	11/08/2011	ND	RDL=100		ug/L	
			Total Strontium (Sr)	11/08/2011	ND	RDL=2.0		ug/L	
			Total Thallium (Tl)	11/08/2011	ND	RDL=0.10		ug/L	
			Total Tin (Sn)	11/08/2011	ND	RDL=2.0		ug/L	
			Total Titanium (Ti)	11/08/2011	ND	RDL=2.0		ug/L	
			Total Uranium (U)	11/08/2011	ND	RDL=0.10		ug/L	
			Total Vanadium (V)	11/08/2011	ND	RDL=2.0		ug/L	
			Total Zinc (Zn)	11/08/2011	ND	RDL=5.0		ug/L	
		RPD	Total Aluminum (Al)	11/08/2011	1			%	25
			Total Antimony (Sb)	11/08/2011	NC			%	25
			Total Arsenic (As)	11/08/2011	NC			%	25
			Total Barium (Ba)	11/08/2011	NC			%	25
			Total Beryllium (Be)	11/08/2011	NC			%	25
			Total Bismuth (Bi)	11/08/2011	NC			%	25
			Total Boron (B)	11/08/2011	NC			%	25
			Total Cadmium (Cd)	11/08/2011	NC			%	25
			Total Calcium (Ca)	11/08/2011	1			%	25
			Total Chromium (Cr)	11/08/2011	NC			%	25
			Total Cobalt (Co)	11/08/2011	NC			%	25
			Total Copper (Cu)	11/08/2011	NC			%	25
			Total Iron (Fe)	11/08/2011	NC			%	25
			Total Lead (Pb)	11/08/2011	NC			%	25
			Total Magnesium (Mg)	11/08/2011	0.4			%	25
			Total Manganese (Mn)	11/08/2011	NC			%	25
			Total Molybdenum (Mo)	11/08/2011	NC			%	25
			Total Nickel (Ni)	11/08/2011	NC			%	25
			Total Phosphorus (P)	11/08/2011	NC			%	25
			Total Potassium (K)	11/08/2011	NC			%	25
			Total Selenium (Se)	11/08/2011	NC			%	25
			Total Silver (Ag)	11/08/2011	NC			%	25
			Total Sodium (Na)	11/08/2011	0.8			%	25
			Total Strontium (Sr)	11/08/2011	1.9			%	25
			Total Thallium (Tl)	11/08/2011	NC			%	25
			Total Tin (Sn)	11/08/2011	NC			%	25
			Total Titanium (Ti)	11/08/2011	NC			%	25
			Total Uranium (U)	11/08/2011	NC			%	25
			Total Vanadium (V)	11/08/2011	NC			%	25
			Total Zinc (Zn)	11/08/2011	NC			%	25
2578488	MJL	QC Standard	Turbidity	11/08/2011			100	%	80 - 120
		Method Blank	Turbidity	11/08/2011	ND	RDL=0.1		NTU	
		RPD	Turbidity	11/08/2011	NC			%	25
2578509	MJL	QC Standard	pH	11/08/2011			102	%	80 - 120
		Method Blank	pH	11/08/2011	5.73			pH	
		RPD	pH	11/08/2011	1.8			%	25
2578510	MJL	Spiked Blank	Conductivity	11/08/2011			97	%	80 - 120
		Method Blank	Conductivity	11/08/2011	1	RDL=1		uS/cm	
		RPD	Conductivity	11/08/2011	0.7			%	25
2578626	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	12/08/2011			94	%	80 - 120
		QC Standard	Nitrogen (Ammonia Nitrogen)	11/08/2011			103	%	80 - 120
		Spiked Blank	Nitrogen (Ammonia Nitrogen)	11/08/2011			103	%	80 - 120

		Method Blank	Nitrogen (Ammonia Nitrogen)	11/08/2011	ND	RDL=0.05	mg/L	
		RPD	Nitrogen (Ammonia Nitrogen)	12/08/2011	NC		%	25
2578627	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	12/08/2011		96	%	80 - 120
		QC Standard	Nitrogen (Ammonia Nitrogen)	12/08/2011		100	%	80 - 120
		Spiked Blank	Nitrogen (Ammonia Nitrogen)	12/08/2011		99	%	80 - 120
		Method Blank	Nitrogen (Ammonia Nitrogen)	12/08/2011	ND	RDL=0.05	mg/L	
		RPD	Nitrogen (Ammonia Nitrogen)	12/08/2011	NC		%	25
2578710	SMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	12/08/2011		NC	%	80 - 120
		QC Standard	Total Alkalinity (Total as CaCO3)	12/08/2011		108	%	80 - 120
		Spiked Blank	Total Alkalinity (Total as CaCO3)	12/08/2011		112	%	80 - 120
		Method Blank	Total Alkalinity (Total as CaCO3)	12/08/2011	ND	RDL=5	mg/L	
		RPD	Total Alkalinity (Total as CaCO3)	12/08/2011	0.5		%	25
2578712	SMT	Matrix Spike	Dissolved Chloride (Cl)	12/08/2011		103	%	80 - 120
		QC Standard	Dissolved Chloride (Cl)	12/08/2011		99	%	80 - 120
		Spiked Blank	Dissolved Chloride (Cl)	12/08/2011		103	%	80 - 120
		Method Blank	Dissolved Chloride (Cl)	12/08/2011	ND	RDL=1	mg/L	
		RPD	Dissolved Chloride (Cl)	12/08/2011	NC		%	25
2578713	SMT	Matrix Spike	Dissolved Sulphate (SO4)	12/08/2011		115	%	80 - 120
		QC Standard	Dissolved Sulphate (SO4)	12/08/2011		106	%	80 - 120
		Spiked Blank	Dissolved Sulphate (SO4)	12/08/2011		110	%	80 - 120
		Method Blank	Dissolved Sulphate (SO4)	12/08/2011	ND	RDL=2	mg/L	
		RPD	Dissolved Sulphate (SO4)	12/08/2011	NC		%	25
2578714	ABU	Matrix Spike	Reactive Silica (SiO2)	11/08/2011		NC	%	80 - 120
		QC Standard	Reactive Silica (SiO2)	11/08/2011		98	%	75 - 125
		Spiked Blank	Reactive Silica (SiO2)	11/08/2011		100	%	80 - 120
		Method Blank	Reactive Silica (SiO2)	11/08/2011	ND	RDL=0.5	mg/L	
		RPD	Reactive Silica (SiO2)	11/08/2011	0.3		%	25
2578715	SMT	QC Standard	Colour	12/08/2011		108	%	80 - 120
		Method Blank	Colour	12/08/2011	ND	RDL=5	TCU	
		RPD	Colour	12/08/2011	NC		%	25
2578716	SMT	Matrix Spike	Orthophosphate (P)	12/08/2011		94	%	80 - 120
		QC Standard	Orthophosphate (P)	12/08/2011		100	%	80 - 120
		Spiked Blank	Orthophosphate (P)	12/08/2011		101	%	80 - 120
		Method Blank	Orthophosphate (P)	12/08/2011	ND	RDL=0.01	mg/L	
		RPD	Orthophosphate (P)	12/08/2011	NC		%	25
2578718	SMT	Matrix Spike	Nitrate + Nitrite	12/08/2011		101	%	80 - 120
		QC Standard	Nitrate + Nitrite	12/08/2011		107	%	80 - 120
		Spiked Blank	Nitrate + Nitrite	12/08/2011		100	%	80 - 120
		Method Blank	Nitrate + Nitrite	12/08/2011	ND	RDL=0.05	mg/L	
		RPD	Nitrate + Nitrite	12/08/2011	NC		%	25
2578719	ARS	Matrix Spike	Nitrite (N)	12/08/2011		97	%	80 - 120
		QC Standard	Nitrite (N)	12/08/2011		105	%	80 - 120
		Spiked Blank	Nitrite (N)	12/08/2011		102	%	80 - 120
		Method Blank	Nitrite (N)	12/08/2011	ND	RDL=0.01	mg/L	
		RPD	Nitrite (N)	12/08/2011	NC		%	25
2578720	SMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	12/08/2011		NC	%	80 - 120
		QC Standard	Total Alkalinity (Total as CaCO3)	12/08/2011		108	%	80 - 120
		Spiked Blank	Total Alkalinity (Total as CaCO3)	12/08/2011		112	%	80 - 120
		Method Blank	Total Alkalinity (Total as CaCO3)	12/08/2011	ND	RDL=5	mg/L	
		RPD	Total Alkalinity (Total as CaCO3)	12/08/2011	5		%	25
2578723	SMT	Matrix Spike	Dissolved Chloride (Cl)	12/08/2011		104	%	80 - 120
		QC Standard	Dissolved Chloride (Cl)	12/08/2011		101	%	80 - 120
		Spiked Blank	Dissolved Chloride (Cl)	12/08/2011		104	%	80 - 120
		Method Blank	Dissolved Chloride (Cl)	12/08/2011	ND	RDL=1	mg/L	
		RPD	Dissolved Chloride (Cl)	12/08/2011	NC		%	25
2578731	SMT	Matrix Spike	Dissolved Sulphate (SO4)	12/08/2011		117	%	80 - 120

		QC Standard	Dissolved Sulphate (SO4)	12/08/2011		107		%	80 - 120
		Spiked Blank	Dissolved Sulphate (SO4)	12/08/2011		109		%	80 - 120
		Method Blank	Dissolved Sulphate (SO4)	12/08/2011	ND		RDL=2	mg/L	
		RPD	Dissolved Sulphate (SO4)	12/08/2011	NC			%	25
2578732	ABU	Matrix Spike	Reactive Silica (SiO2)	11/08/2011		100		%	80 - 120
		QC Standard	Reactive Silica (SiO2)	11/08/2011		99		%	75 - 125
		Spiked Blank	Reactive Silica (SiO2)	11/08/2011		101		%	80 - 120
		Method Blank	Reactive Silica (SiO2)	11/08/2011	ND		RDL=0.5	mg/L	
		RPD	Reactive Silica (SiO2)	11/08/2011	2			%	25
2578733	SMT	QC Standard	Colour	12/08/2011		115		%	80 - 120
		Method Blank	Colour	12/08/2011	ND		RDL=5	TCU	
		RPD	Colour	12/08/2011	NC			%	25
2578735	SMT	Matrix Spike	Orthophosphate (P)	12/08/2011		95		%	80 - 120
		QC Standard	Orthophosphate (P)	12/08/2011		101		%	80 - 120
		Spiked Blank	Orthophosphate (P)	12/08/2011		101		%	80 - 120
		Method Blank	Orthophosphate (P)	12/08/2011	ND		RDL=0.01	mg/L	
		RPD	Orthophosphate (P)	12/08/2011	NC			%	25
2578736	SMT	Matrix Spike	Nitrate + Nitrite	12/08/2011		102		%	80 - 120
		QC Standard	Nitrate + Nitrite	12/08/2011		103		%	80 - 120
		Spiked Blank	Nitrate + Nitrite	12/08/2011		102		%	80 - 120
		Method Blank	Nitrate + Nitrite	12/08/2011	ND		RDL=0.05	mg/L	
		RPD	Nitrate + Nitrite	12/08/2011	NC			%	25
2578738	ARS	Matrix Spike	Nitrite (N)	12/08/2011		95		%	80 - 120
		QC Standard	Nitrite (N)	12/08/2011		103		%	80 - 120
		Spiked Blank	Nitrite (N)	12/08/2011		101		%	80 - 120
		Method Blank	Nitrite (N)	12/08/2011	ND		RDL=0.01	mg/L	
		RPD	Nitrite (N)	12/08/2011	NC			%	25
2579474	SSI	Matrix Spike	Total Organic Carbon (C)	11/08/2011		101		%	80 - 120
		QC Standard	Total Organic Carbon (C)	11/08/2011		103		%	80 - 120
		Spiked Blank	Total Organic Carbon (C)	11/08/2011		98		%	80 - 120
		Method Blank	Total Organic Carbon (C)	11/08/2011	ND		RDL=0.5	mg/L	
		RPD	Total Organic Carbon (C)	11/08/2011	NC			%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) Low level lab contamination. Minimal impact on data quality.

Appendix F Winter Ice Observation Photographs

Photo 1: Site 1

Photo 2: Site 2

Photo 3: Site 3

Photo 4: Site 4

Photo 5: Site 5

Photo 6: Site 5

Photo 7: Site 6

Photo 8: Site 6

Photo 9: Site 7

Photo 10: Site 8

Photo 11: Site 9

Photo 12: Site 10

Photo 13: Site 11

Photo 14: Site 12

Photo 15: Site 13

Photo 16: Site 15

Photo 17: Site 16

Photo 18: Site 17

Photo 19: Site 18

Photo 20: Site 19