Appendix G1

2015 Core Receiving Environment Monitoring Program

Final
Project No. AEM-15-02
March 2016

Core Receiving Environment Monitoring Program (CREMP) 2015

Meadowbank Mine









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TABLE OF CONTENTS

TABLE OF CONTENTS I
LIST OF TABLES III
LIST OF FIGURES V
LIST OF APPENDICES XI
ACKNOWLEDGEMENTS XII
PROFESSIONAL LIABILITY STATEMENT XIII
ACRONYMS XIV
EXECUTIVE SUMMARY 1

1. INTRODUCTION 1
1.1. Background 1
1.2. Environmental Setting 2
1.3. Core Monitoring Program (CREMP) Objectives 3
1.4. Meadowbank Mine Development and Operation 9
1.5. Approach 14
2. METHODS 17
2.1. Overview 17
2.2. Routine CREMP 17
2.2.1. Sampling Areas *17*
2.2.2. Sampling Components and Methods *17*
2.2.3. Sampling Effort and Frequency Assessment *18*
2.3. Targeted Program – TPE Chromium Bioavailability 23
2.3.1. Overview *23*
2.3.2. Field Sampling *23*
2.3.3. Laboratory Tests *23*
2.4. Quality Assurance / Quality Control 26
2.4.1. Water *26*
2.4.2. Sediment *28*
2.4.3. Biota *28*
2.5. Data Evaluation Criteria 29
2.5.1. Water Chemistry *29*
2.5.2. Sediment Chemistry *30*
2.5.3. Phytoplankton *30*
2.5.4. Benthic Invertebrates *30*
3. RESULTS AND DISCUSSION 32
3.1. QA/QC 32
3.1.1. Sample Shipping and Handling *32*
3.1.2. Water Chemistry *33*

3.1.3. Sediment Grab Chemistry 34
3.1.4. Sediment Metals Bioavailability 35
3.1.5. Phytoplankton 35
3.1.6. Benthic Invertebrates 36
3.1.7. QA/QC Summary 36
3.2. Meadowbank Study Lakes 59
3.2.1. Limnology 59
3.2.2. Water Chemistry 69
3.2.3. Sediment Chemistry 130
3.2.4. Phytoplankton 158
3.2.5. Benthic Invertebrates 172
3.3. Baker Lake 185
3.3.1. Limnology 185
3.3.2. Water Chemistry 189
3.3.3. Sediment Chemistry 239
3.3.4. Phytoplankton 251
3.3.5. Benthic Invertebrates 261
4. SUMMARY AND IMPLICATIONS FOR MANAGEMENT 271
4.1. Summary of the 2015 CREMP Program 271
4.2. Monitoring Components for 2016 274
5. REFERENCES 277

LIST OF TABLES

Table 1.4–1. Chronology of mine development and operational activities and associated receiving environment overview. 10

Table 1.4–2. Status of all CREMP sampling areas since the beginning of monitoring. 12

Table 2.2–1. CREMP sampling summary, Meadowbank study lakes and Baker Lake, 2015. 20

Table 2.2–2. CREMP sampling location coordinates (GPS, UTM, NAD83), Meadowbank study lakes and Baker Lake, 2015. 21

Table 3.1–1. Laboratory detection limits, equipment blanks, and travel blanks for water parameters, Meadowbank study lakes and Baker Lake, 2015. 38

Table 3.1–2. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015. 41

Table 3.1–3. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015. 44

Table 3.1–4. QA/QC data for metals analysis of sediment grab samples, Meadowbank study lakes and Baker Lake, 2015. 49

Table 3.1–5. QA/QC data for hydrocarbon and PAH analysis of sediment grab samples, Meadowbank study lakes and Baker Lake, 2015. 52

Table 3.1–6. QA/QC data for sequential extraction analysis of sediment grab samples, Third Portage Lake – East Basin, 2015. 53

Table 3.1–7. Field QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2015. 54

Table 3.1–8. Laboratory QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2014. 56

Table 3.1–9. Percent recovery of benthic invertebrate samples, Meadowbank study lakes and Baker Lake, August 2015 58

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes. 74

Table 3.2–2. Screening process for water quality parameters, Meadowbank study lakes 2015. 82

Table 3.2–3. Water variables at Meadowbank areas for which 2015 means exceeded triggers. 83

Table 3.2–4. Results of BACI tests for selected water variables and Meadowbank areas in 2015. ... 84

Table 3.2–5. Water quality data from Third Portage Lake in 2015 compared against predicted concentrations in the FEIS. 85

Table 3.2–6. Water quality data from Second Portage Lake in 2015 compared against predicted concentrations in the FEIS. 88

Table 3.2–7. Water quality data from Wally Lake in 2015 compared against predicted concentrations in the FEIS. 89

Table 3.2–8. Sampling effort and frequency assessment results for the 2016 CREMP. 90

Table 3.2–9. Conventional sediment grab chemistry, particle size, and total metals (mg/kg), Meadowbank study lakes, 2015. 136

Table 3.2–10. Composite sediment grab hydrocarbons and PAHs, Meadowbank study lakes, 2015. 140

Table 3.2–11. Effect size results for survival and growth endpoints from the sediment toxicity tests in 2015. 141

Table 3.2–12. Results from the sequential extraction analysis of sediments used in the toxicity tests. 142

Table 3.2–13. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2015. 160

Table 3.2–14. Results of BACI test for phytoplankton variables at Meadowbank areas..... 166

Table 3.2–15. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Meadowbank study lakes, 2015. 175

Table 3.2–16. Results of BACI tests for benthic invertebrate abundance at Meadowbank areas..... 177

Table 3.2–17. Results of BACI tests for benthic invertebrate taxa richness at Meadowbank areas. . 178

Table 3.3–1. Water quality results from the 2015 CREMP, Baker Lake. 191

Table 3.3–2. Screening process for water quality parameters, Baker Lake, 2015. 192

Table 3.3–3. Conventional sediment grab chemistry, particle size, and total metals (mg/kg), Baker Lake, 2015. 240

Table 3.3–4. Hydrocarbon and PAH results from composite sediment grabs at Baker Lake, 2015. 241

Table 3.3–5. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Baker Lake, 2015. 253

Table 3.3–6. Results of BACI tests for phytoplankton variables at Baker Lake areas. 255

Table 3.3–7. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Baker Lake, 2015. 263

Table 3.3–8. Results of BACI tests for benthic invertebrate abundance at Baker Lake areas..... 264

Table 3.3–9. Results of BACI tests for benthic invertebrate taxa richness at Baker Lake areas..... 264

Table 4.1–1. Summary of key findings from the 2015 CREMP, Meadowbank Mine. 273

Table 4.2–1. Monitoring components planned for 2016 CREMP. 275

LIST OF FIGURES

Figure 1.3–1. Meadowbank water quality monitoring areas and sampling stations, 2015. 6

Figure 1.3–2. Meadowbank sediment and benthic invertebrate sampling areas, 2015. 7

Figure 1.3–3. Baker Lake water, sediment, and benthic invertebrate sampling areas, 2015. 8

Figure 1.4–1. Barge traffic (number of trips/year) arriving in Baker Lake from Chesterfield Inlet since 2008. 13

Figure 1.5–1. Management response plan for the Meadowbank Mine AEMP. 16

Figure 2.2–1. Annual results-based sampling strategy rules for mid-field and far-field sampling areas. 19

Figure 3.2–1. Mean monthly field-measured temperature (°C) at 3 m depth from 2006 – 2015, Meadowbank study lakes. 61

Figure 3.2–2. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for March, 2015. 62

Figure 3.2–3. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for April, 2015. 63

Figure 3.2–4. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for May, 2015. 64

Figure 3.2–5. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for July, 2015. 65

Figure 3.2–6. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for August, 2015. 66

Figure 3.2–7. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for September, 2015. 67

Figure 3.2–8. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for November, 2015. 68

Figure 3.2–9. Flow chart showing sampling effort and frequency assessment results for mid-field and far-field sampling in 2016. 73

Figure 3.2–10. Laboratory-measured conductivity (µS/cm) in water samples from Meadowbank study lakes since 2006. 91

Figure 3.2–11. Hardness (mg/L) in water samples from Meadowbank study lakes since 2006. 92

Figure 3.2–12. Field-measured pH in water samples from Meadowbank study lakes since 2006. 93

Figure 3.2–13. Laboratory-measured pH in water samples from Meadowbank study lakes since 2006. 94

Figure 3.2–14. Total Suspended Solids (TSS; mg/L) in water samples from Meadowbank study lakes since 2006. 95

Figure 3.2–15. Total Dissolved Solids (TDS; mg/L) in water samples from Meadowbank study lakes since 2006. 96

Figure 3.2–16. Bicarbonate Alkalinity (mg/L) in water samples from Meadowbank study lakes since 2006. 97

Figure 3.2–17. Total Alkalinity (mg/L) in water samples from Meadowbank study lakes since 2006. .. 98

Figure 3.2–18. Ammonia-N (mg/L) in water samples from Meadowbank study lakes since 2006..... 99

Figure 3.2–19. Chloride (mg/L) in water samples from Meadowbank study lakes since 2006..... 100

Figure 3.2–20. Nitrate-N (mg/L) in water samples from Meadowbank study lakes since 2006. 101

Figure 3.2–21. Total Kjeldahl Nitrogen (TKN; mg/L) in water samples from Meadowbank study lakes since 2006. 102

Figure 3.2–22. Total Phosphorus (mg/L) in water samples from Meadowbank study lakes since 2006. 103

Figure 3.2–23. Reactive Silica (mg/L) in water samples from Meadowbank study lakes since 2006.. 104

Figure 3.2–24. Sulphate (mg/L) in water samples from Meadowbank study lakes since 2006. 105

Figure 3.2–25. Dissolved Organic Carbon (DOC; mg/L) in water samples from Meadowbank study lakes since 2006. 106

Figure 3.2–26. Total Organic Carbon (TOC; mg/L) in water samples from Meadowbank study lakes since 2006. 107

Figure 3.2–27. Total Aluminum (mg/L) in water samples from Meadowbank study lakes since 2006.108

Figure 3.2–28. Total Arsenic (mg/L) in water samples from Meadowbank study lakes since 2006.... 109

Figure 3.2–29. Total Barium (mg/L) in water samples from Meadowbank study lakes since 2006. ... 110

Figure 3.2–30. Total Calcium (mg/L) in water samples from Meadowbank study lakes since 2006.. 111

Figure 3.2–31. Total Chromium (mg/L) in water samples from Meadowbank study lakes since 2006.112

Figure 3.2–32. Total Copper (mg/L) in water samples from Meadowbank study lakes since 2006.... 113

Figure 3.2–33. Total Iron (mg/L) in water samples from Meadowbank study lakes since 2006. 114

Figure 3.2–34. Total Magnesium (mg/L) in water samples from Meadowbank study lakes since 2006. 115

Figure 3.2–35. Total Manganese (mg/L) in water samples from Meadowbank study lakes since 2006. 116

Figure 3.2–36. Total Molybdenum (mg/L) in water samples from Meadowbank study lakes since 2006. 117

Figure 3.2–37. Total Potassium (mg/L) in water samples from Meadowbank study lakes since 2006.118

Figure 3.2–38. Total Sodium (mg/L) in water samples from Meadowbank study lakes since 2006. .. 119

Figure 3.2–39. Total Strontium (mg/L) in water samples from Meadowbank study lakes since 2006. 120

Figure 3.2–40. Total Uranium (mg/L) in water samples from Meadowbank study lakes since 2006.. 121

Figure 3.2–41. Dissolved Aluminum (mg/L) in water samples from Meadowbank study lakes since 2006. 122

Figure 3.2–42. Dissolved Arsenic (mg/L) in water samples from Meadowbank study lakes since 2006. 123

Figure 3.2–43. Dissolved Barium (mg/L) in water samples from Meadowbank study lakes since 2006. 124

Figure 3.2–44. Dissolved Copper (mg/L) in water samples from Meadowbank study lakes since 2006. 125

Figure 3.2–45. Dissolved Manganese (mg/L) in water samples from Meadowbank study lakes since 2006. 126

Figure 3.2–46. Dissolved Molybdenum (mg/L) in water samples from Meadowbank study lakes since 2006. 127

Figure 3.2–47. Dissolved Strontium (mg/L) in water samples from Meadowbank study lakes since 2006. 128

Figure 3.2–48. Dissolved Uranium (mg/L) in water samples from Meadowbank study lakes since 2006. 129

Figure 3.2–49. Sediment grain size composition in sediment samples from Meadowbank study lakes since 2008. 143

Figure 3.2–50. Metals concentrations in grab samples collected from TPE and TPE-B in Third Portage Lake in 2015. 144

Figure 3.2–51. Total Aluminum (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 145

Figure 3.2–52. Total Arsenic (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 146

Figure 3.2–53. Total Cadmium (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 147

Figure 3.2–54. Total Chromium (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 148

Figure 3.2–55. Total Copper (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 149

Figure 3.2–56. Total Lead (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 150

Figure 3.2–57. Total Mercury (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 151

Figure 3.2–58. Total Zinc (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006. 152

Figure 3.2–59. Total Chromium (mg/kg) in sediment cores (top panel) and grabs (bottom panel) from the East basin of Third Portage Lake since 2006. 153

Figure 3.2–60. Growth and survival results for the *Hyalella azteca* sediment toxicity test. 154

Figure 3.2–61. *Hyalella azteca* growth and survival relative vs. sediment chromium concentrations. 155

Figure 3.2–62. Growth and survival results for the *Chironomus dilutus* sediment toxicity tests. 156

Figure 3.2–63. Sediment chromium bioavailability results from the sequential extraction procedure, Meadowbank study lakes, 2015. 157

Figure 3.2–64. Chlorophyll-*a* (µg/L) in water samples from Meadowbank study lakes since 2006. ... 167

Figure 3.2–65. Total phytoplankton biomass (mg/m^3) from Meadowbank study lakes since 2006. ... 168

Figure 3.2–66. Phytoplankton biomass (mg/m^3) by major taxa group from Meadowbank study lakes since 2006. 169

Figure 3.2–67. Relative phytoplankton biomass by major taxa group from Meadowbank study lakes since 2006. 170

Figure 3.2–68. Phytoplankton species richness from Meadowbank study lakes since 2006. 171

Figure 3.2–69. Benthic invertebrate total abundance (#/m^2) from Meadowbank study lakes since 2006. 179

Figure 3.2–70. Benthic invertebrate abundance (#/m^2) by major taxa group from Meadowbank study lakes since 2006. 180

Figure 3.2–71. Benthic invertebrate relative abundance by major taxa group from Meadowbank study lakes since 2006. 181

Figure 3.2–72. Benthic invertebrate total richness (# taxa) from Meadowbank study lakes since 2006. 182

Figure 3.2–73. Benthic invertebrate richness (# taxa) by major taxa group from Meadowbank study lakes since 2006. 183

Figure 3.2–74. Benthic invertebrate relative richness by major taxa group from Meadowbank study lakes since 2006. 184

Figure 3.3–1. Mean monthly field-measured temperature (°C) at 3 m depth from 2008 – 2015, Baker Lake. 187

Figure 3.3–2. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles in Baker Lake for July and August, 2015. 188

Figure 3.3–3. Laboratory-measured conductivity (µS/cm) in water samples from Baker Lake since 2008. 193

Figure 3.3–4. Hardness (mg/L) in water samples from Baker Lake since 2008. 194

Figure 3.3–5. Field-measured pH in water samples from Baker Lake since 2008. 195

Figure 3.3–6. Laboratory-measured pH in water samples from Baker Lake since 2008. 196

Figure 3.3–7. Total Suspended Solids (TSS; mg/L) in water samples from Baker Lake since 2008. 197

Figure 3.3–8. Total Dissolved Solids (TDS; mg/L) in water samples from Baker Lake since 2008. .. 198

Figure 3.3–9. Bicarbonate Alkalinity (mg/L) in water samples from Baker Lake since 2008. 199

Figure 3.3–10. Total Alkalinity (mg/L) in water samples from Baker Lake since 2008. 200

Figure 3.3–11. Ammonia-N (mg/L) in water samples from Baker Lake since 2008. 201

Figure 3.3–12. Chloride (mg/L) in water samples from Baker Lake since 2008. 202

Figure 3.3–13. Nitrate-N (mg/L) in water samples from Baker Lake since 2008. 203

Figure 3.3–14. Total Kjeldahl Nitrogen (TKN; mg/L) in water samples from Baker Lake since 2008. 204
Figure 3.3–15. Total Phosphorus (mg/L) in water samples from Baker Lake since 2008. 205
Figure 3.3–16. Total Ortho-phosphate (mg/L) in water samples from Baker Lake since 2008. 206
Figure 3.3–17. Reactive Silica (mg/L) in water samples from Baker Lake since 2008. 207
Figure 3.3–18. Sulphate (mg/L) in water samples from Baker Lake since 2008. 208
Figure 3.3–19. Dissolved Organic Carbon (DOC; mg/L) in water samples from Baker Lake since 2008. 209
Figure 3.3–20. Total Organic Carbon (TOC; mg/L) in water samples from Baker Lake since 2008.... 210
Figure 3.3–21. Total Aluminum (mg/L) in water samples from Baker Lake since 2008. 211
Figure 3.3–22. Total Arsenic (mg/L) in water samples from Baker Lake since 2008. 212
Figure 3.3–23. Total Barium (mg/L) in water samples from Baker Lake since 2008. 213
Figure 3.3–24. Total (mg/L) Boron in water samples from Baker Lake since 2008. 214
Figure 3.3–25. Total Calcium (mg/L) in water samples from Baker Lake since 2008. 215
Figure 3.3–26. Total Chromium (mg/L) in water samples from Baker Lake since 2008..... 216
Figure 3.3–27. Total Copper (mg/L) in water samples from Baker Lake since 2008. 217
Figure 3.3–28. Total Iron (mg/L) in water samples from Baker Lake since 2008. 218
Figure 3.3–29. Total Lead (mg/L) in water samples from Baker Lake since 2008. 219
Figure 3.3–30. Total Lithium (mg/L) in water samples from Baker Lake since 2008. 220
Figure 3.3–31. Total Magnesium (mg/L) in water samples from Baker Lake since 2008. 221
Figure 3.3–32. Total Manganese (mg/L) in water samples from Baker Lake since 2008. 222
Figure 3.3–33. Total Molybdenum (mg/L) in water samples from Baker Lake since 2008. 223
Figure 3.3–34. Total Potassium (mg/L) in water samples from Baker Lake since 2008. 224
Figure 3.3–35. Total Sodium (mg/L) in water samples from Baker Lake since 2008..... 225
Figure 3.3–36. Total Strontium (mg/L) in water samples from Baker Lake since 2008. 226
Figure 3.3–37. Total Titanium (mg/L) in water samples from Baker Lake since 2008. 227
Figure 3.3–38. Total Uranium (mg/L) in water samples from Baker Lake since 2008. 228
Figure 3.3–39. Dissolved Aluminum (mg/L) in water samples from Baker Lake since 2008..... 229
Figure 3.3–40. Dissolved Arsenic (mg/L) in water samples from Baker Lake since 2008..... 230
Figure 3.3–41. Dissolved Barium (mg/L) in water samples from Baker Lake since 2008. 231
Figure 3.3–42. Dissolved Boron (mg/L) in water samples from Baker Lake since 2008..... 232
Figure 3.3–43. Dissolved Copper (mg/L) in water samples from Baker Lake since 2008. 233
Figure 3.3–44. Dissolved Lithium (mg/L) in water samples from Baker Lake since 2008. 234
Figure 3.3–45. Dissolved Manganese (mg/L) in water samples from Baker Lake since 2008. 235

Figure 3.3–46. Dissolved Molybdenum (mg/L) in water samples from Baker Lake since 2008..... 236

Figure 3.3–47. Dissolved Strontium (mg/L) in water samples from Baker Lake since 2008. 237

Figure 3.3–48. Dissolved Uranium (mg/L) in water samples from Baker Lake since 2008. 238

Figure 3.3–49. Sediment grain size composition in sediment samples from Baker Lake since 2008. . 242

Figure 3.3–50. Total Aluminum (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 243

Figure 3.3–51. Total Arsenic (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 244

Figure 3.3–52. Total Cadmium (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 245

Figure 3.3–53. Total Chromium (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 246

Figure 3.3–54. Total Copper (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 247

Figure 3.3–55. Total Lead (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 248

Figure 3.3–56. Total Mercury (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 249

Figure 3.3–57. Total Zinc (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008. 250

Figure 3.3–58. Chlorophyll-*a* (µg/L) in water samples from Baker Lake since 2008..... 256

Figure 3.3–59. Total phytoplankton biomass (mg/m^3) from Baker Lake since 2008. 257

Figure 3.3–60. Phytoplankton biomass (mg/m^3) by major taxa group from Baker Lake since 2008. . 258

Figure 3.3–61. Phytoplankton relative biomass by major taxa group from Baker Lake since 2008.... 259

Figure 3.3–62. Phytoplankton species richness from Baker Lake since 2008. 260

Figure 3.3–63. Benthic invertebrate total abundance (#/m^2) from Baker Lake since 2008..... 265

Figure 3.3–64. Benthic invertebrate abundance (#/m^2) by major taxa group from Baker Lake since 2008. 266

Figure 3.3–65. Benthic Invertebrate relative abundance by major taxa group from Baker Lake since 2008. 267

Figure 3.3–66. Benthic invertebrate total richness (# taxa) from Baker Lake since 2008..... 268

Figure 3.3–67. Benthic invertebrate richness (# taxa) by major taxa group from Baker Lake since 2008. 269

Figure 3.3–68. Benthic invertebrate relative richness by major taxa group from Baker Lake since 2008. 270

LIST OF APPENDICES

Appendix A Water Quality Parameter Plots

Appendix A1 Meadowbank Water Quality Plots 2006 – 2015

Appendix A2 Baker Lake Water Quality Plots 2008 – 2015

Appendix B Phytoplankton Raw Data, Meadowbank Study Lakes and Baker Lake, 2015

Appendix C Phytoplankton Plots

Appendix C1 Meadowbank Phytoplankton Plots 2006 – 2015

Appendix C2 Baker Lake Phytoplankton Plots 2008 – 2015

Appendix D Benthic Invertebrate Raw Data, Meadowbank Study Lakes and Baker Lake, 2015

Appendix E Benthic Invertebrate Plots

Appendix E1 Meadowbank Benthic Invertebrate Plots 2006 – 2015

Appendix E2 Baker Lake Benthic Invertebrate Plots 2006 – 2015

Appendix F ALS Laboratory Reports, 2015

Appendix G Sediment Toxicity Test Results – Maxxam Analytics

Appendix H Sequential Extraction Laboratory Data – Maxxam Analytics

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- Gary Mann (Azimuth) – Gary was responsible for overall management of this project. He also provided oversight and logistical support for the field crew; collaborated on the trends assessment interpretation and management response recommendations; and reviewed the report.
- Eric Franz (Azimuth) – Eric was responsible for overall coordination and implementation (sampling, analysis/interpretation and reporting) of the CREMP.
- Maggie McConnell (Azimuth) – Maggie provided assistance on CREMP coordination, data management, analysis, and reporting.
- Brian Pyper (Azimuth Associate) – Brian conducted the statistical analyses and plotting for the trends assessment.

PROFESSIONAL LIABILITY STATEMENT

This report has been prepared by Azimuth Consulting Group Partnership (Azimuth; managing partner Azimuth Consulting Group Inc.), for the use of Agnico Eagle Mines Ltd. (AEM), who has been party to the development of the scope of work for this project and understands its limitations. The extent to which previous investigations were relied on is detailed in the report.

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ACRONYMS

AEM	Agnico Eagle Mines Ltd.
AEMP	Aquatic Effects Monitoring Program
ANOVA	Analysis of variance
AWAR	All weather access road
BACI	Before/after control/impact
BACIP	Before/after control/impact Paired
BAP	Baker Lake – Akilahaarjuk Point
BBD	Baker Lake – barge dock
BES	Baker Lake – east shore
BPJ	Baker Lake – proposed jetty
CCME	Canadian Council of Ministers of the Environment
COC	Chain of custody
CREMP	Core Receiving Environment Monitoring Program
CRM	Certified reference material
DFO	Department of Fisheries and Oceans
DOC	Dissolved organic carbon
DQO	Data quality objective
EAS	Effects assessment strategy
EEM	Environmental effects monitoring
EIA	Environmental impact assessment
FEIS	Final Environmental Impact Statement
FF	Far-field
GPS	Global positioning system
HEPH	Heavy extractable petroleum hydrocarbons
ICP-MS	Inductively coupled plasma mass spectrometry
INUG	Inuggugayualik Lake
ISQG	Interim sediment Quality Guidelines
LCS	Laboratory control sample
LEPH	Light Extractable Petroleum Hydrocarbons
MDL	Method detection limit
MF	Mid-field
MMER	Metal Mining Effluent Regulations
NF	Near-field
NWB	Nunavut Water Board
PAG	Potentially acid Generating
PAHs	Polycyclic aromatic hydrocarbons
PDL	Pipedream Lake
PEL	Probable effect level

QA/QC	Quality assurance / quality control
REF	Reference
RPD	Relative percent difference
SEP	Sequential extraction procedure
SOP	Standard operating procedure
SQG	Sediment quality guidelines
SP	Second Portage Lake
TDS	Total dissolved solids
TE	Tehek Lake
TEFF	Tehek Lake Far-field
TIA	Tailings impoundment area
TKN	Total Kjeldahl nitrogen
TOC	Total organic carbon
TSF	Tailings Storage Facility (North and South Cells)
TSS	Total suspended solids
TPE, TPN, TPS	Third Portage Lake
UTM	Universal Transverse Mercator
WAL	Wally Lake

EXECUTIVE SUMMARY

The CREMP focuses on identifying changes in limnological parameters, water and sediment chemistry, or changes to primary (phytoplankton) and secondary (benthic invertebrate community) aquatic producers that may be associated with mine development activities. This is accomplished through the application of a temporal/spatial trend assessment that includes application of quantitative decision criteria (i.e., early warning "triggers" and action "thresholds") to facilitate immediate and objective decision-making regarding appropriate management actions. This information is integrated annually into the Aquatic Ecosystem Monitoring Program (AEMP) for holistic environmental management and decision making.

Meadowbank Study Lakes

CREMP monitoring started in 2006 and in-water mine development started in 2008. Key mine development activities that could result in changes to the aquatic receiving environment include: East Dike construction (2008), Bay-Goose Dike construction (2009-10), dewatering of lakes and impoundments (2009-11, 2013, 2014), effluent discharge (2012 to present), and general site-related mining activities that mostly generate dust (e.g., rock crushing, blasting, ore and waste hauling; 2008 to present). Key findings for 2015 are summarized in **Table ES-1**:

- *Water Chemistry* – As in the past, there were some statistically significant mine-related changes relative to baseline/reference conditions identified in 2014 at one or more near-field (NF) areas that exceeded their respective triggers: alkalinity (SP); conductivity (TPN, TPE, TPS, SP, WAL, TE); hardness (TPN, TPE, TPS, SP, WAL, TE); major cations (i.e., calcium, potassium, magnesium, and sodium [TPN, TPE, SP, WAL]); TDS (TPN, TPE, TPS, SP, WAL, TE); and TKN (WAL). In the absence of effects-based thresholds (e.g., CCME water quality criteria) for these parameters, their triggers were set at the 95th percentile of baseline data. While these results represent mine-related changes, the observed concentrations are still relatively low and unlikely to adversely affect aquatic life. **These trends need to be reviewed again in 2016**.
- *Sediment Chemistry* – Quantitative trigger analysis for sediment is based on coring results, which are conducted on a three-year cycle to coincide with MMER EEM field studies. This program was last conducted in 2014 and will be conducted next in 2017. Grab samples submitted for analysis in 2015 showed similar concentrations to previous years based on visual comparison of the data. With the exception of chromium at TPE, none of the grab samples exceeded the trigger values in 2015. The 2014 CREMP report provided a thorough examination of the temporal and spatial trend of chromium at TPE, with an overall conclusion that ultramafic rock used to construct the Bay-Goose Dike is the likely source of increased sediment chromium concentrations at TPE relative to baseline conditions. As per the recommendations in last year's CREMP (Azimuth, 2015b), the 2015 program incorporated bioavailability and toxicity testing to evaluate whether sediment chromium concentrations pose a risk to the benthic invertebrate community at TPE. Sequential extraction tests on sediment show the majority of sediment chromium is sequestered in the sediment matrix, which is largely non-bioavailable. Furthermore, the fractions that are bioavailable occur at concentrations below effects-based threshold concentrations (i.e., ISQG and PEL). Toxicity tests on amphipod (*Hyalella*) and midge larvae (*Chironomus*) survival and growth provided no evidence of contaminant-related effects to the test organisms exposed to sediments from TPE compared to the field control treatment (INUG and PDL). These results provide effects-based evidence that chromium concentrations at TPE are unlikely to adversely affect the benthic invertebrate community. No targeted follow-up studies are proposed for TPE beyond **continued evaluation of the temporal trend in sediment chromium concentrations in 2016**.

- *Phytoplankton Community* – TPE and TPS both had slightly reduced biomass relative to reference in 2015, but in both cases the results were not statistically significant. Overall, the phytoplankton results from 2015 were within the range of reference/baseline conditions in each area.
- *Benthic Invertebrate Community* – A few locations had particularly high abundance in 2015 relative to previous years, notably INUG and TPS. There was an "apparent" reduction (>20%) in total abundance at TPE, TEFF, and WAL when compared to INUG, but none of the results were statistically significant. Furthermore, when compared to previous years the results are well within the range of natural variability. In summary, there were no statistically significant short-term (i.e., past year) or longer-term (i.e., past two to four years) trends in reduced abundance or richness at the NF, MF, or FF locations in 2015.

Baker Lake

CREMP monitoring at Baker Lake started in 2008. Key mine-related activities include barge/shipping traffic and general land-based activities associated with the tank farm area. No spills of fuels, hydrocarbons or any other materials were reported in the vicinity of the barge dock and jetty in 2015. There were no cases where water quality parameters exceeded the triggers in 2015. A minor decrease in phytoplankton biomass was noted at BBD in 2015, but the result is considered representative of the variability in this endpoint given there were no instances of trigger exceedances in water quality parameters in 2015. Overall, there were no changes in the aquatic receiving environment that were attributable to AEM's activities in Baker Lake, and as such, no follow-up management actions are required for 2016.

Table ES–1. Summary of key findings from the 2015 CREMP, Meadowbank Mine.

Variable Type & Variable	Magnitude[1]	Spatial Scale[2]	Causation[3]	Permanence[4]	Uncertainty[5]	Comments	Management Action[6]
Exposure - Limnology							
Oxygen	**0**	n/a	n/a	n/a	?		**0**
Temperature	**0**	n/a	n/a	n/a	?		**0**
Conductivity	**0**	n/a	n/a	n/a	?		**0**
Exposure - Water Chemistry							
Conventionals	**1**	Large	High	Low	?	The following parameters (conventionals and nutrients) were elevated relative to reference/baseline conditions. However, concentrations suggest low potential for adverse effects. **Alkalinity** (SP); **Conductivity** (TPN, TPE, TPS, SP, WAL, TE); **Hardness** (TPN, TPE, TPS, SP, WAL, TE); **Ca/K/Mg/Na** (TPN, TPE, SP, WAL [not Na]); **TDS** (TPN, TPE, TPS, SP, WAL, TE)	**1**
Nutrients	**1**	Small	Moderate	Low	?	**TKN** (WAL)	**1**
Total Metals	**0**	n/a	n/a	n/a	?		**0**
Dissolved Metals	**0**	n/a	n/a	n/a	?		**0**
Total Suspended Solids	**0**	n/a	n/a	n/a	?		**0**
Exposure - Sediment Chemistry							
Physical	**0**	n/a	n/a	n/a	?		**0**
Total Metals	**1**	Large	High	Moderate	??	Sediment chromium concentrations exceed the trigger at TPE, but appear to have stabilized. Results of a targeted chromium bioavailability study showed low potential for adverse effects (toxicity testing) and that the majority of chromium in the sediments is associated with the least bioavailable fraction (sequential extraction). These results are consistent with benthic invertebrate community results at TPE (see text for details) and indicate that the changes in sediment chromium concentrations observed at TPE over the past few years are not affecting biota	**1**
Organics	**0**	n/a	n/a	n/a	?		**0**
Effects - Phytoplankton							
Chlorophyll-*a* *	**0**	n/a	n/a	n/a	?	Continued data quality issue for chlorophyll-*a* (temperature control in transit)	**0**
Total Biomass	**0**	n/a	n/a	n/a	?		**0**
Taxa Richness	**1**	Moderate	Low	Low	?	>20% lower at BBD than reference conditions. Result is attributed to natural variability given no trigger exceedances were reported in 2015.	**1**
Effects - Benthic Invertebrates							
Total Abundance	**0**	n/a	n/a	n/a	?		**0**
Total Richness	**0**	n/a	n/a	n/a	?		**0**

Notes:

[1] **Magnitude Ratings (narrative in brackets used in the absence of specific triggers/thresholds):**

- **0** – no exceedances of triggers or thresholds (or no apparent changes from baseline of concern)
- **1** – early warning trigger exceeded (or change from baseline warranting concern)
- **2** – threshold exceeded (or change from baseline exceeding magnitude of concern)

[2] **Spatial Scale Ratings:**

- n/a – no magnitude of effect, therefore not evaluated
- Small – localized scale
- Moderate – sub-basin to basin scale
- Large – basin to whole lake scale

[3] **Causation Ratings:**

- n/a – no magnitude of effect, therefore not evaluated
- Low – no evidence for a mine-related source
- Moderate – some likelihood of a mine-related source
- High – the source of the problem is very likely to be mine-related

[4] **Permanence Ratings:**

- n/a – no magnitude of effect, therefore not evaluated
- Low – rapidly reversible (e.g., months to years)
- Moderate – slowly reversible (e.g., years to decades)
- High – largely irreversible (e.g., decades +)

[5] **Uncertainty Ratings:**

- ? – low uncertainty
- ?? – moderate uncertainty
- ??? – high uncertainty

[6] **Management Actions:**

- **0** – no action
- **1** – continued trend monitoring in 2015
- **2** – active follow-up with more detailed quantitative assessment in 2015

1. INTRODUCTION

1.1. Background

Agnico Eagle Mines (AEM) Ltd.'s Meadowbank Mine is situated approximately 75 km north of the hamlet of Baker Lake, Nunavut. The Aquatic Effects Management Program (AEMP; Azimuth, 2005a) was developed to address issues identified during the Environmental Impact Assessment (EIA) process that could potentially impact the aquatic receiving environments surrounding the development. Building from earlier baseline monitoring (Azimuth, 2005b), the 2005 AEMP described the general monitoring strategy designed to detect impacts to the aquatic environment. This strategy relied on two primary components (discussed further in **Section 1.3**): the core monitoring program and targeted studies. Monitoring following the 2005 AEMP strategy has been implemented as follows:

- 2006 and 2007 – The core monitoring program was implemented over two complete cycles (Azimuth, 2008a, 2008b) prior to construction of the mine (i.e., baseline conditions).
- 2008 – 2015 – Mine construction started in 2008, with dike construction activities occurring directly in the receiving environment. Core receiving environment monitoring (Azimuth, 2009c, 2010a, 2011b, 2012a, 2013, 2014, 2015b, this report) was complemented by targeted studies on dike construction monitoring (Azimuth, 2009a, 2010b; AEM, 2011) and on the potential effects of total suspended solids (Azimuth, 2009a, 2010c, 2011a, 2012b) on water quality and benthic invertebrate communities in affected waterbodies.

AEM, in consultation with regulators, completed two ongoing initiatives in 2012:

- The restructured Aquatic Effects Management Program (AEMP) (Azimuth, 2012c), now serves as an overarching 'umbrella' strategy that conceptually provides an opportunity to integrate results of individual, but related, monitoring programs in accordance with the original NWB Type A water license requirements. In 2012, AEM completed the AEMP synthesis document which

"AEMP" Terminology

The term "AEMP" was first used in the 2005 report *Aquatic Effects Management Program* (Azimuth, 2005a), which described the rationale, framework, strategy, methods, and scope of receiving environment monitoring for the Meadowbank Mine. Receiving environment monitoring conducted in 2006 and 2007 use this term in the annual report titles.

The Nunavut Water Board A License, issued in 2008, defines "AEMP" as the "Aquatic Effects Monitoring Program"; annual receiving environment monitoring reports since 2008 reflect this subtle change.

AEM has a number of monitoring programs (e.g., effluent monitoring, ground water monitoring, air quality monitoring) relevant to tracking potential changes to the aquatic receiving environment surrounding the Meadowbank Mine. One of the requirements of the original Nunavut Water Board (NWB) A License was to revise the AEMP to consider the results of all these programs; a restructured AEMP was submitted in December 2012 (Azimuth, 2012c). Previously, the term "AEMP" was essentially synonymous with receiving environment monitoring. However, given the AEMP's broadened scope, more specific terminology is needed to minimize confusion. To that end, we use the following terms in this report:

CREMP – refers to the "core receiving environment monitoring program"; this is synonymous with "core monitoring program". While this term was first used for the 2009 annual report, it is meant to encompass the entire core receiving environment monitoring program since 2006. Program details were recently documented in the *CREMP: 2015 Plan Update* (Azimuth, 2015a).

2005 AEMP – refers to the original AEMP, which served as the plan for the CREMP until the *CREMP Design Document 2012* (Azimuth, 2012d).

systematically evaluated the results of individual monitoring programs, developed a site specific conceptual model to evaluate stressors, transport medias and receptors of concern (see Section 2.4 for more details), and integrated the results of numerous monitoring programs into a management response framework.

- The Core Receiving Environment Monitoring Program (CREMP): Design Document 2012 (Azimuth, 2012d). This document reviewed all historic monitoring CREMP data, presented the trigger/threshold derivation process (see Section 1.5 for description of triggers/thresholds), determined trigger/threshold values for individual parameters and established the experimental design to optimize the program. The resulting triggers/thresholds and experimental design changes have been integrated into this 2012 CREMP report.

As per the recommendations of the 2012 CREMP (Azimuth, 2013), water quality triggers/thresholds were updated in 2013, with minor updates in 2014 to include more recent monitoring data (i.e., in the case of triggers based on the 95th percentile of reference/baseline conditions), to reflect new thresholds (e.g., adopted from other jurisdictions where not covered by CCME), or to add field pH triggers. Current program details were recently documented in the *CREMP: 2015 Plan Update* (Azimuth, 2015a)

This CREMP monitoring report documents the methods and results of aquatic receiving environment monitoring activities undertaken during 2015. As in previous years, this report integrates accumulated results since 2006 to facilitate the identification of changes in limnology or water chemistry parameters, sediment chemistry, phytoplankton biomass and benthic community structure associated with mine-related activities at Meadowbank Mine or in Baker Lake.

1.2. Environmental Setting

Understanding the environmental setting of the project lakes is integral to understanding the design of the CREMP. The Meadowbank project lakes are situated in the barren-ground central Arctic region of Nunavut within an area of continuous permafrost. These are headwater ultra-oligotrophic/oligotrophic (nutrient poor and unproductive) lakes, situated on the watershed boundary that separates two main drainages – the Arctic and Hudson Bay drainages. Only a few hundred meters to the north of Second and Third Portage lakes is the divide between water that flows north to the Arctic Ocean (via the Meadowbank and Back River system) or to Chesterfield Inlet and Hudson Bay (via the Quoich River system).

The landscape consists of rolling hills and relief with low-growing vegetative cover and poor soil development. Numerous lakes are interspersed among boulder fields, eskers and bedrock outcrops, with indistinct and complex drainages. The main lakes in the Meadowbank project area include: Third Portage Lake (TP), Second Portage Lake (SP), Tehek Lake (TE), and the Vault Lake system – Vault, Wally (WAL) and Drilltrail lakes. As is common of headwater lakes, all of the project lakes have small drainage areas relative to the surface area of the lakes themselves. Local inflow from surrounding terrain is the predominant influence on water movement within the system. Small channels connect the project area lakes, although there is little flow between lakes except during freshet and possibly none during winter months. Movement by fish between lakes is also rare, as populations remain quite isolated from one another. The ice-free season on these lakes is short, with ice break-up in late-June to mid-July and ice-up beginning in late September or early October. Maximum ice thickness is at least 2 m by March/April.

Overall, the Meadowbank project lakes support healthy communities of plankton, benthos and fish that are typical of oligotrophic Arctic lakes (Azimuth, 2005b). Biological productivity of the lakes is limited by nutrient availability, cold water and a short growing season.

1.3. Core Monitoring Program (CREMP) Objectives

The 2005 AEMP framework (Azimuth, 2005a) presented a receiving environment monitoring strategy consisting of two components:

- *Core Monitoring Program (CREMP)* - was tailored based on our understanding of mine construction, operation and infrastructure (e.g., dikes, effluents, stream crossings, roads, etc.) and has been developed to detect mine-related effects at temporal and spatial scales that are ecologically relevant. The program was expanded to include Baker Lake in 2008. The program was updated based on the recommendations of the *CREMP: Design Document 2012* (Azimuth, 2012d) and more recently, described in detail in the *CREMP: 2015 Plan Update* (Azimuth, 2015a).
- *Targeted Monitoring Program* – targeted studies are specific studies that typically have narrower temporal or spatial bounds or are designed to address specific questions related to particular components of mine development during construction or operation (i.e., they are not routinely conducted). These are integrated with and are complementary to the core monitoring design. Examples include dike construction monitoring (e.g., Azimuth, 2009a) and the total suspended solids (TSS) effects assessment studies (EAS) (e.g., Azimuth, 2009b). Following a recommendation from the 2014 CREMP report (Azimuth, 2015b), a targeted study was conducted in 2015 to investigate the toxicity and bioavailability of chromium in sediments from TPE (results reported herein).

CREMP Sampling Area Categorization

Tracking spatial and temporal differences related to mining activities relied on categorizing areas using two factors:

• *Area Type* – this concept relates to an area's spatial proximity to the planned mine development, whether built or not; categories include near-field, mid-field, far-field, and reference (see text for more details).

• *Area Status* – this concept is temporal and has two levels: control (not exposed to mine-related activity) or impact (exposed to mine-related activity. The term "impact" is taken from the BACI statistical study design approach and does not mean that an actual impact has taken place; rather, it designates a time period when potential mine-related impacts may occur for an area.

For example, the status of baseline (i.e., pre-construction) monitoring conducted at all areas, regardless of category, would be "control". This status would change to "impact" once construction activities started that had the potential to affect an area (e.g., SP changed from control to impact status in August 2008 with the onset of construction for the East Dike; TE followed suit based on actual exposure to TSS from that event). WAL (a near-field lake) was still "control" status in early 2013, but changed to "impact" in July when construction activities were initiated for the Vault deposit.

Together, area categorization by type and status provide a logical framework to facilitate the identification of real mining-related changes (as opposed to natural regional changes due to climate or other factors) to the aquatic receiving environment (described in **Section 1.5**).

The study design is based on a before-after-control-impact (BACI) approach (see text box), but has also incorporated the concept of gradients in exposure. To this end, the 2015 program consisted of 13

sampling areas (see **Figure 1.3–1** to **Figure 1.3–3**), each categorized into one of the four[1] main types of areas described below:

- *Near-field (NF) areas* – Areas are situated in close proximity to the development (planned or constructed), in particular, near dikes, dewatering discharge, and proposed effluent sources (**Figure 1.3–1** to **Figure 1.3–3**). These areas provide the first line of early-warning for introductions of stressors into the receiving environment. In the Meadowbank study lakes, these areas include: Third Portage Lake North (TPN), Third Portage Lake East (TPE), Second Portage (SP), and Wally Lake (WAL; note that planned mining activity started there in July 2013). For Baker Lake, there are two NF areas, one targeting the hamlet's barge landing area (Baker Barge Dock [BBD]) and the other AEM's fuel storage facility (Baker Proposed Jetty [BPJ]).
- *Mid-field (MF) area* – This area designation was added in 2011 to be consistent with the area categorizations used in the *CREMP: Design Document 2012* (Azimuth, 2012d) and includes Tehek Lake (TE) and Third Portage Lake South (TPS). TE is adjacent to the inlet from Second Portage Lake (**Figure 1.3–1**) and was exposed to elevated TSS during construction of the East Dike in 2008, prompting the addition of a new far-field area (Tehek far-field) in 2009. Consequently, MF designation is more accurate for TE. TPS was initially envisioned as an internal reference area in the 2005 AEMP. However, given the connectivity to TPN and the slight changes in hardness-related parameters, it is more appropriately considered a MF area. That said, given the degree (i.e., relatively minor) and nature (i.e., limited to certain non-metal parameters only) of the observed changes and the termination of discharges to TPN, TPS should still be appropriate as a reference area for EEM water quality monitoring.
- *Far-field (FF) area* – The intent of this area is to monitor water and sediment quality downstream of project infrastructure to provide insights into the spatial extent of any effects observed at the near-field areas. The Tehek far-field (TEFF) area is a key location that will ultimately determine whether or not contaminants are detectable downstream of the entire mine development. Lake waters from Second and Third Portage Lakes and the Vault Lakes (Vault, Wally, Drilltrail) meet at the southern end of Second Portage Lake and discharge via a single channel into Tehek Lake (**Figure 1.3–1**). Monitoring the water and sediment quality and the health of the benthic invertebrate community in the basin adjoining the discharge point from Second Portage Lake will help determine if any effects identified at SP are extending into TE and beyond into TEFF.
- *Reference (Ref) areas* – By definition, reference areas are sufficiently removed from the mine that they are presumed to be unaffected by any infrastructure (roads, dikes, runways) and point sources (aerial and aquatic) associated with mine development. Inuggugayualik Lake (INUG) and Pipedream Lake (PDL) are external reference areas chosen for the purposes of making comparisons with the project lakes (EVS, 1999; Azimuth, 2005b). Monitoring of reference areas is important in order to distinguish between possible mine-related changes in water quality or ecological parameters and natural changes, unrelated to the mine. The reference areas are situated about 16 km west at INUG and 12 km northwest at PDL of the mine site (**Figure 1.3–1** and **Figure 1.3–2**). They are both headwater lakes and flow north into the Arctic Ocean. Despite the different drainage basin, both these lakes satisfy the requirements of an external reference

[1] Note that three main area types were initially envisioned in the 2005 AEMP: NF, FF and Ref. However, area designations were modified during the CREMP design review (Azimuth, 2012d) to more accurately reflect the realities of potential exposure to mine-related activities following dike construction; a mid-field (MF) category was added that includes Tehek Lake (TE) and Third Portage Lake South (TPS).

lake from a physical/chemical perspective because they are at similar in latitude, have similar geology, relief and climate, do not have any significant inflows and has generally similar limnological features, water chemistry and aquatic biological community structure to the project lakes (Azimuth, 2005b). Pipedream Lake, added to the CREMP in 2009, was originally investigated as a candidate reference area in 1998 (EVS, 1999) from a fisheries perspective. For Baker Lake, an internal reference area is located several kilometers to the east of the hamlet along the north shore of the lake (Baker Akilahaarjuk Point [BAP]) and a second reference area was added in 2011 based on a recommendation from additional analysis and interpretation of the historical Baker Lake data, which is located on the same shoreline, east of BPJ and west of BAP (Baker East Shore [BES]; see **Figure 1.3–3**).

Thus, the core monitoring program is intended to detect changes and help define the extent (both spatially and temporally) of any adverse effects. Information on the status of each site (i.e., control or impact designation as per the text box) is provided in Section 1.4.

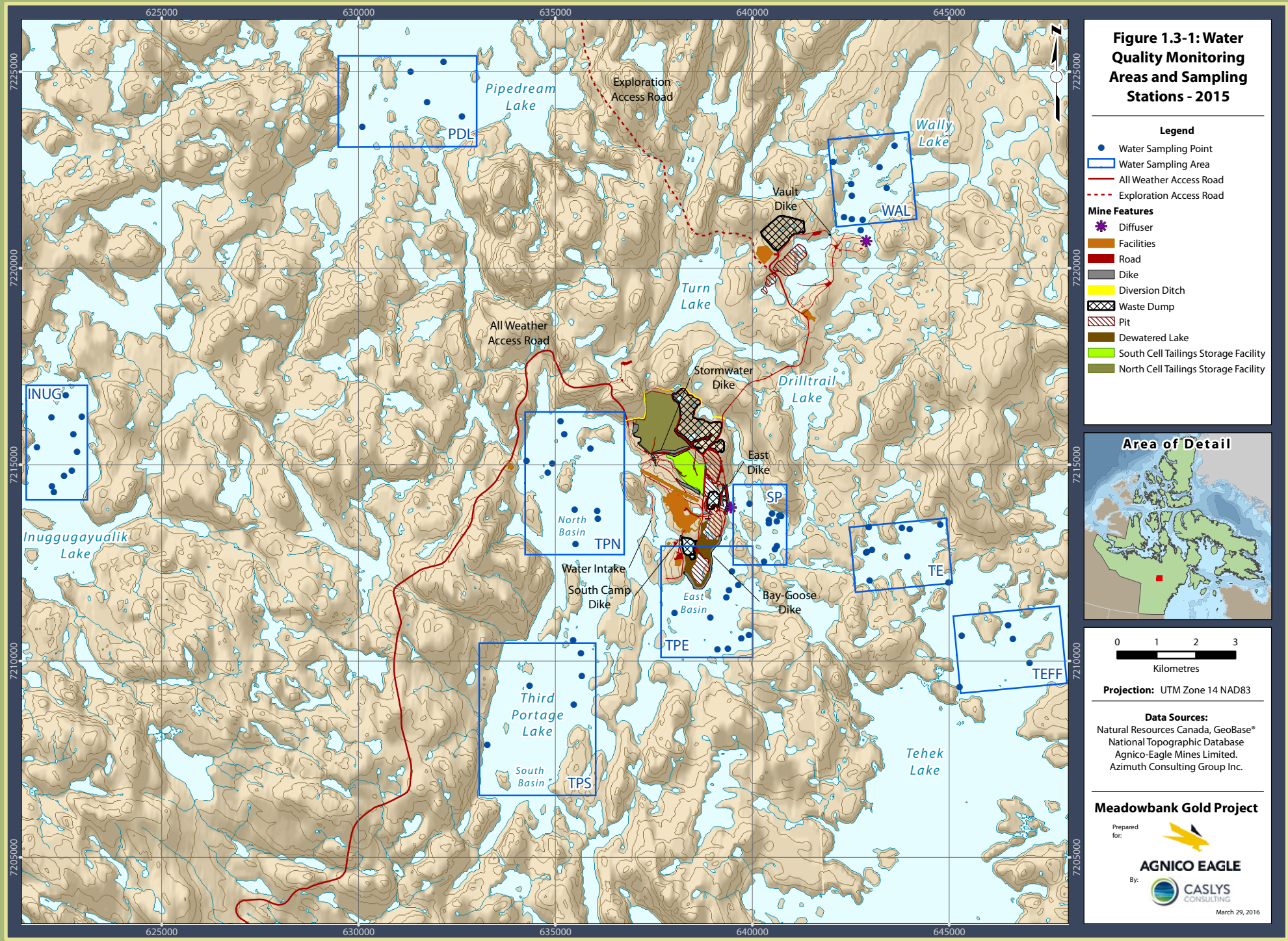


Figure 1.3-1: Water Quality Monitoring Areas and Sampling Stations - 2015

Legend

- Water Sampling Point
- Water Sampling Area
- All Weather Access Road
- Exploration Access Road

Mine Features

- Diffuser
- Facilities
- Road
- Dike
- Diversion Ditch
- Waste Dump
- Pit
- Dewatered Lake
- South Cell Tailings Storage Facility
- North Cell Tailings Storage Facility

0 1 2 3

Kilometres

Projection: UTM Zone 14 NAD83

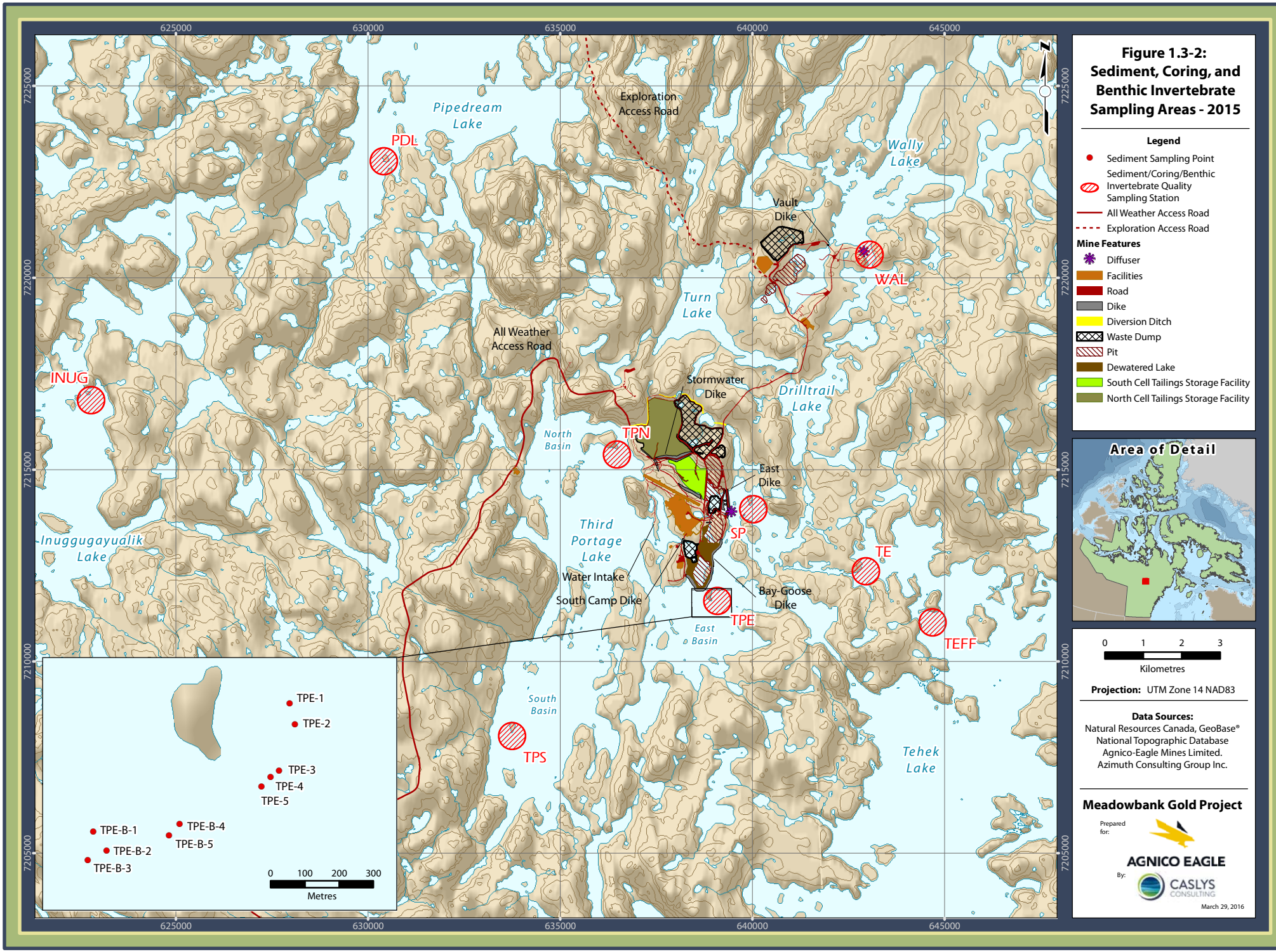
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Agnico-Eagle Mines Limited.
Azimuth Consulting Group Inc.

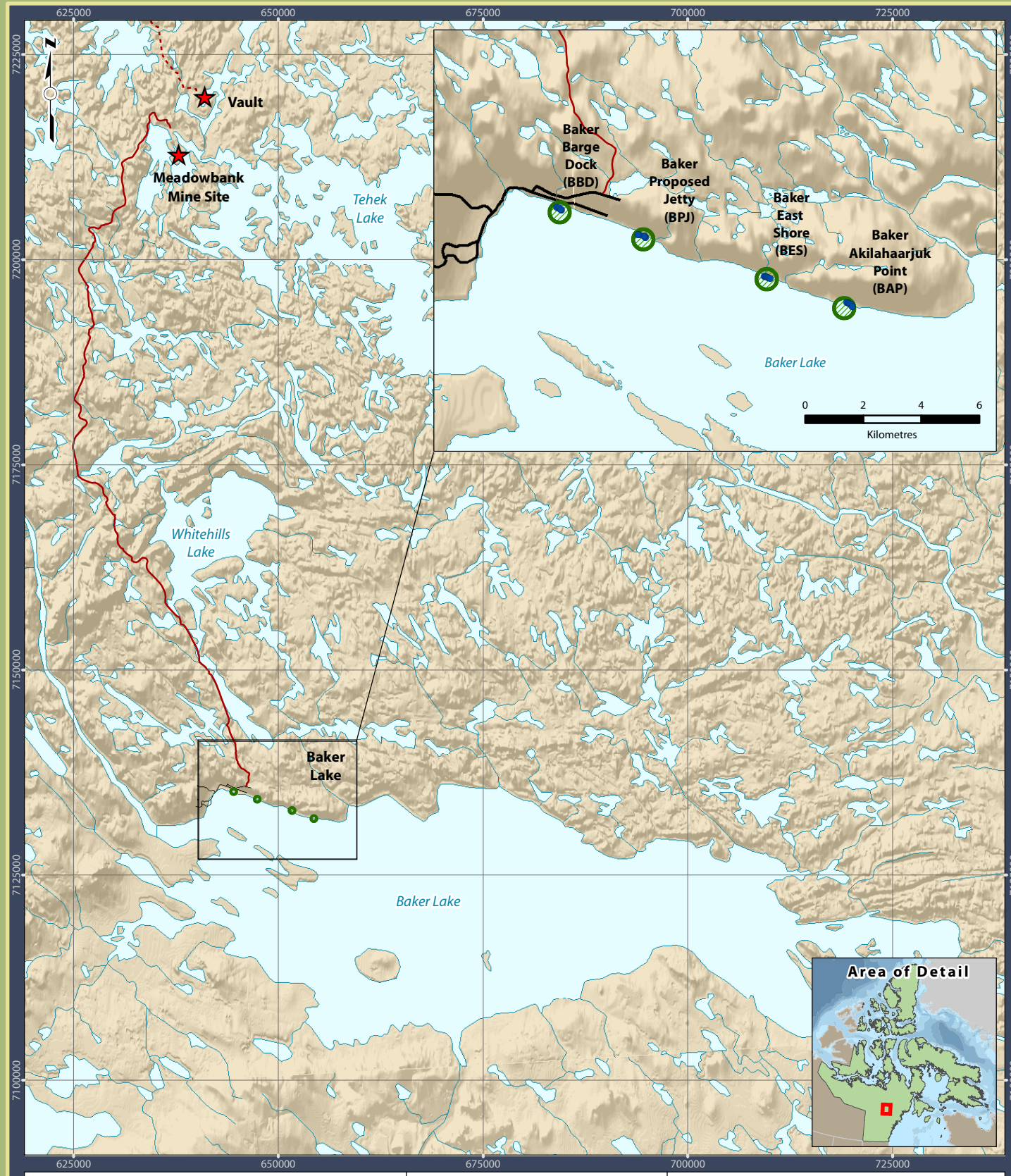
Meadowbank Gold Project

Prepared for: AGNICO EAGLE

By: CASLYS CONSULTING

March 29, 2016


625000
630000
635000
640000
645000
7225000
7220000
7215000
7210000
7205000
Pipedream Lake
Exploration Access Road
PDL
Wally Lake
Vault Dike
WAL
Turn Lake
All Weather Access Road
INUG
Stormwater Dike
Drilltrail Lake
North Basin
TPN
East Dike
SP
Third Portage Lake
Inuggugayualik Lake
Water Intake
South Camp Dike
Bay-Goose Dike
TE
TPE
East Basin
TEFF
South Basin
TPS
Tehek Lake
TPE-1
TPE-2
TPE-3
TPE-4
TPE-5
TPE-B-1
TPE-B-2
TPE-B-3
TPE-B-4
TPE-B-5
0 100 200 300
Metres
N
Figure 1.3-2: Sediment, Coring, and Benthic Invertebrate Sampling Areas - 2015
Legend
Sediment Sampling Point
Sediment/Coring/Benthic Invertebrate Quality Sampling Station
All Weather Access Road
Exploration Access Road
Mine Features
Diffuser
Facilities
Road
Dike
Diversion Ditch
Waste Dump
Pit
Dewatered Lake
South Cell Tailings Storage Facility
North Cell Tailings Storage Facility
Area of Detail
0 1 2 3
Kilometres
Projection: UTM Zone 14 NAD83
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Agnico-Eagle Mines Limited.
Azimuth Consulting Group Inc.
Meadowbank Gold Project
Prepared for:
AGNICO EAGLE
By:
CASLYS CONSULTING
March 29, 2016



Legend

- Water Sampling Point
- Sediment/Coring/Benthic Invertebrate Quality Sampling Station
- All Weather Access Road
- Exploration Access Road

0 5 10 15
Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Agnico-Eagle Mines Limited.
Azimuth Consulting Group Inc.

Figure 1.3-3: Baker Lake Water, Sediment, Coring, and Benthic Invertebrate Sampling Area - 2015

Meadowbank Gold Project

Prepared for: AGNICO EAGLE

By: CASLYS CONSULTING

February 24, 2016

1.4. Meadowbank Mine Development and Operation

The construction phase of the Meadowbank Mine officially started in June 2008, upon receipt of the NWB A Water License (2AM-MEA0815; renewed to 2AM-MEA1525 in 2015) for the project. The Fisheries and Oceans Canada (DFO) *Fisheries Act* Authorization (NU-03-0191) for the project was issued on July 30, 2008, thus allowing the start of in-water construction activities. Key mine-related activities (e.g., site construction, dike construction, dewatering, effluent discharge, general site-related activity, barge traffic in Baker Lake (**Figure 1.4–1**; information provided by AEM), and related changes observed in the receiving environment are described by year in **Table 1.4–1**.

The onset of construction activities in proximity to a CREMP monitoring area formally ends the baseline phase and changes the status of that area from "control" to "impact" (not necessarily meaning that there is an impact or effect [i.e., either positive or negative]; only that there is the potential for mining-related changes that may occur at that area after that time). Status changes are also important for any statistical analyses, as they dictate how data are grouped when assessing potential trends (see **Section 1.5**). Note that the end of the baseline phase is specific to each area. For example, TPE would have still be in the baseline phase in August 2008 (it is up gradient of Second Portage Lake), but not in August 2009 due to dike construction activities. The lack of baseline monitoring at the Baker Lake areas means that the status of areas does not change over time (i.e., near-field areas are "impact" and reference areas are "control"). The status of all CREMP areas since monitoring started is provided in **Table 1.4–2**.

Table 1.4–1. Chronology of mine development and operational activities and associated receiving environment overview.

Year	Major Mine-Related Activities	Receiving Environment Overview
2008	● Major in-water construction activities included the East Dike (located in Second Portage Lake) and the Western Channel Dike (located between Third Portage Lake and Second Portage Lake); the closest CREMP sampling area to these activities was the Second Portage Lake area (SP). ● Other site-related activities included rock crushing, road building, pit blasting, ground preparation, and infrastructure construction. ● Barge traffic increases in Baker Lake to support construction.	● As described in detail elsewhere (Azimuth, 2009a; 2009b), East Dike construction led to a sedimentation event that extended through Second Portage Lake (SP) to Tehek Lake (TE). The potential impact of construction-related sediment releases to the aquatic environment was the focus of the four-year EAS study (Azimuth, 2009b, 2010d, 2011a, 2012c).
2009	● Dewatering discharges (i.e., impounded Second Portage Lake water with TSS) were directed primarily into the north basin of Third Portage Lake (TPN), but also into Second Portage Lake (March to July and Oct to Dec, 2009). ● Bay-Goose Dike construction started in late July 2009. ● Most of the site preparation and road infrastructure was completed in 2009. ● North Portage Pit was the primary focus of blasting and mine operations. ● Barge traffic increases in Baker Lake.	● Despite a number of precautions, storm winds broke the Bay-Goose Dike turbidity barrier containment system, leading to another sedimentation event in late August. ● Elevated TSS (and other parameters) was primarily restricted to east basin of Third Portage Lake (TPE) and to a minor extent into SP and TE. The implications of the release were assessed in the EAS study (see above).
2010	● Bay-Goose Dike construction completed using additional mitigation measures. ● Mine officially opened on 27 Feb 2010, marking the start of the operations period. ● Pit development focused on North Portage and South Portage pits. ● Waste rock to rock storage facility (RSF). Tailings to impoundment area (TIA). Contact water from operations not discharged to receiving environment. ● Dewatering of SP impoundment to TPN continued, with discharge now subject to MMER. ● Barge traffic increases in Baker Lake.	● Bay-Goose Dike construction leads to less-pronounced sedimentation event in TPE and extends through SP to TE; EAS studies continue. ● TPN (dewatering) TSS concentrations generally consistent with baseline conditions.
2011	● Mining operations focus on North Portage and South Portage pits. ● Waste rock to rock storage facility (RSF). Tailings to impoundment area (TIA). ● Construction activities limited to mine footprint. ● Dewatering of SP and TPE to TPN continued, with treatment added to reduce fine sediment and turbidity. ● Barge traffic stabilizes in Baker Lake.	● TPN focus of routine EEM study - no mine-related effects detected (Azimuth, 2012e). ● TPN TSS concentrations consistent with baseline. ● The TSS EAS targeting dike construction sedimentation events completed.
2012	● SP and TPE dewatering discharges to TPN finished by spring. Diffuser installed and effluent (mix of residual Bay-Goose water, contact water, East Dike seepage and run-off) discharge to TPN commences; treatment (for fine sediment, turbidity) continues. ● North cell non-contact water diversion ditches completed in August (intercepting run-off prior to the tailings and waste rock areas and diverting to NP2 and Dogleg ponds). ● Vault access road constructed and site preparation activities for the Vault Pit and Vault Dike commence. ● Barge traffic remains stable in Baker Lake; 200-L diesel spill occurs, but cleaned up successfully.	● TPN TSS concentrations generally consistent with baseline. ● Minor mine-related trends identified for a number of water chemistry parameters at near-field areas: conductivity, sulphate and total dissolved solids. ● Spill-related monitoring show no traces of hydrocarbons in Baker Lake.
2013	● Effluent discharge to TPN continued. ● Fishout activity in Vault lake was completed. ● Vault lake was dewatered into Wally Lake (ongoing) and did not require TSS treatment. ● Minor construction modifications to north cell diversion ditches completed. ● Completion of the Airstrip extension (18m) into Third Portage Lake in March. ● Seepage from Rock Storage Facility (ST-16) through the road into NP2 identified (additional monitoring in NP2 to evaluate near-shore water quality).	● TPN TSS concentrations consistent with baseline. ● Minor mine-related trends identified for a number of water chemistry parameters at near-field areas: alkalinity, conductivity, calcium and total dissolved solids. ● TPE sediment chromium concentrations were elevated above trigger value; better spatial coverage needed to reduce uncertainty in 2014.

Table 1.4–1. Chronology of mine development and operational activities and associated receiving environment overview.

Year	Major Mine-Related Activities	Receiving Environment Overview
2014	● Effluent discharge to TPN from the Portage Attenuation Pond occurred only from June 10 to July 5. Discharge to TPN is now complete. The former Portage Attenuation Pond has now become the South Cell for tailings deposition. ● EEM Cycle 2 Study Design was conducted at the end of August through the beginning of September (no TPN discharge at this time). ● Vault Dewatering into Wally Lake from June 20 to 29 (now complete); discharge from Vault Attenuation Pond into Wally Lake from July 24 to August 14. No TSS treatment for Vault Discharge. ● New discharge into Second Portage Lake during all of 2014 (except from May 3 to July 28): two seepage collection points (North and South) are situated on west side of the East Dike to collect seepage through dike from SP. Water is pumped from both collection points, which are connected together before discharging back into Second Portage Lake through a diffuser. No TSS treatment for East Dike Discharge. ● No seepage water from Rock Storage Facility (ST-16) reaching the NP2 Lake in 2014. ● Commercial mining in Vault Pit started at the beginning of 2014. No major construction or modifications in 2014.	● Minor mine-related trends identified for a number of water chemistry parameters at near-field areas: conductivity, hardness, Ca/Mg/K/Na and total dissolved solids. ● Temporal trend in TPE sediment chromium confirmed in coring study; targeted study recommended for 2015.
2015	● No discharge to TPN was done in 2015 ● Vault discharge to Wally from July 7th to September 10th. No TSS treatement needed. ● East dike (North-South) discharge to SP all year except from June 16th to August 10th. Discharge was stopped for increasing TSS levels as no treatment is available for this location. The discharge from East Dike that was not directed to 2PL was discharged in the Portage Pit and then pumped to the South Cell TSF (Tailings Storage Facility). ● No seepage water from Rock Storage Facility to NP-2. Monitoring ongoing. ● HCMP work completed for TP, SP and Dogleg lakes and at water crossing R02 along the AWAR. ● One incident of elevated TSS from Vault road culverts to NP-1, early june, during freshet. Barriers installed. No impacts observed to Dogleg Lake.	● CREMP monitoring results reported herein. ● See Summary in **Table 4.1-1**.

Table 1.4–2. Status of all CREMP sampling areas since the beginning of monitoring.

	Meadowbank Areas									Baker Lake Areas			
	REF	REF	NF	NF	NF	NF	MF	MF	FF	REF	REF	NF	NF
Year	INUG	PDL	TPN	SP	TPE	WAL	TPS	TE	TEFF	BAP	BES	BBD	BPJ
2006	C		C	C	C	C	C	C					
2007	C		C	C	C	C	C	C					
2008	C		C	I (Aug)	C	C	C	I (Aug)		C		I	I
2009	C	C	I (Mar)	I	I (Aug)	C	C	I	C	C		I	I
2010	C	C	I	I	I	C	C	I	C	C		I	I
2011	C	C	I	I	I	C	C	I	C	C	C	I	I
2012	C	C	I	I	I	C	C	I	C	C	C	I	I
2013	C	C	I	I	I	I (Jul)	C	I	C	C	C	I	I
2014	C	C	I	I	I	I	C	I	C	C	C	I	I
2015	C	C	I	I	I	I	C	I	C	C	C	I	I

Notes:

Area designations:

C=Control; I=Impact; REF=reference (in grey shading); NF=near-field (in blue shading); MF=mid-field (in pink shading); FF=far-field (in teal shading); Blank denotes that the area was not part of the monitoring program that year.

Area IDs:

INUG=Inuggugayualik Lake;

PDL=Pipedream Lake

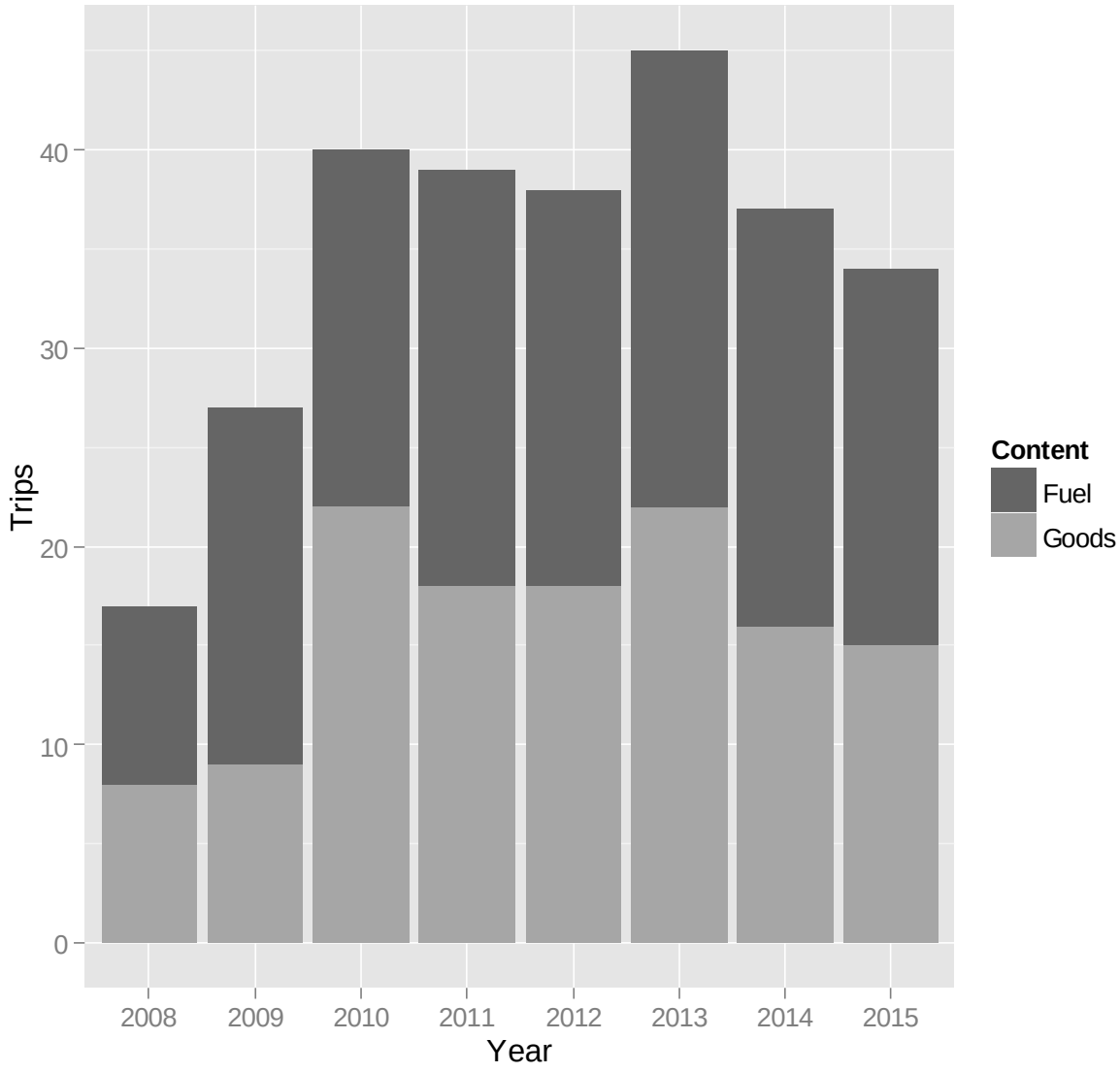
TPN, TPE, TPS=Third Portage Lake - North, East, South basins

SP=Second Portage Lake; WAL=Wally Lake;

TE, TEFF=Tehek Lake – Mid-field and Far-field;

BAP, BES, BBD, BPJ=Baker Lake - Akilahaarjuk Point, East Shore, Barge Dock, Proposed Jetty.

Figure 1.4–1. Barge traffic (number of trips/year) arriving in Baker Lake from Chesterfield Inlet since 2008.



1.5. Approach

CREMP reporting changed substantially starting in 2011 with a stronger focus on assessing potential temporal and spatial trends in the data related to mining activity. To this end, greater emphasis is placed on identifying changes to support the AEMP and ultimately the environmental management process, rather than on providing a detailed description of the 2015 results in isolation. To that end, this CREMP report applies numerical decision criteria (i.e., triggers and thresholds) to assess the magnitude of change in CREMP monitoring variables.

The 2012 AEMP (Azimuth, 2012c) described a two-tiered approach for decision criteria at Meadowbank based on 'trigger' and 'threshold' level concentrations (**Figure 1.5–1**). Trigger values are typically lower or more conservative than threshold values. These are defined as:

- *Triggers* are early warning criteria that may lead to action. Exceedance of a trigger value does not necessarily imply that an adverse effect may be expected. The triggers may be based on absolute numbers (e.g., an increases half-way from baseline to an identified effects threshold) or statistical criteria (e.g., statistically significant trend that predicts exceedances of a threshold within 3 years).
- *Thresholds* are legal requirements, regulatory guidelines (e.g., CCME), or other discrete benchmarks, below which unacceptable adverse effects are not expected and above which adverse effects may occur. If effects-based thresholds do not exist or are not warranted for a particular variable, then early warning triggers will be developed *without* thresholds. In such cases, if triggers are exceeded then the implications of such exceedances can only be understood through the integration of results from other AEMP monitoring programs, or, if important information gaps still exist, through focused studies (e.g., risk assessment).

Thus, comparison of the data to trigger values is the initial analytical focus; only if trigger values are exceeded, are data then compared to the applicable thresholds.

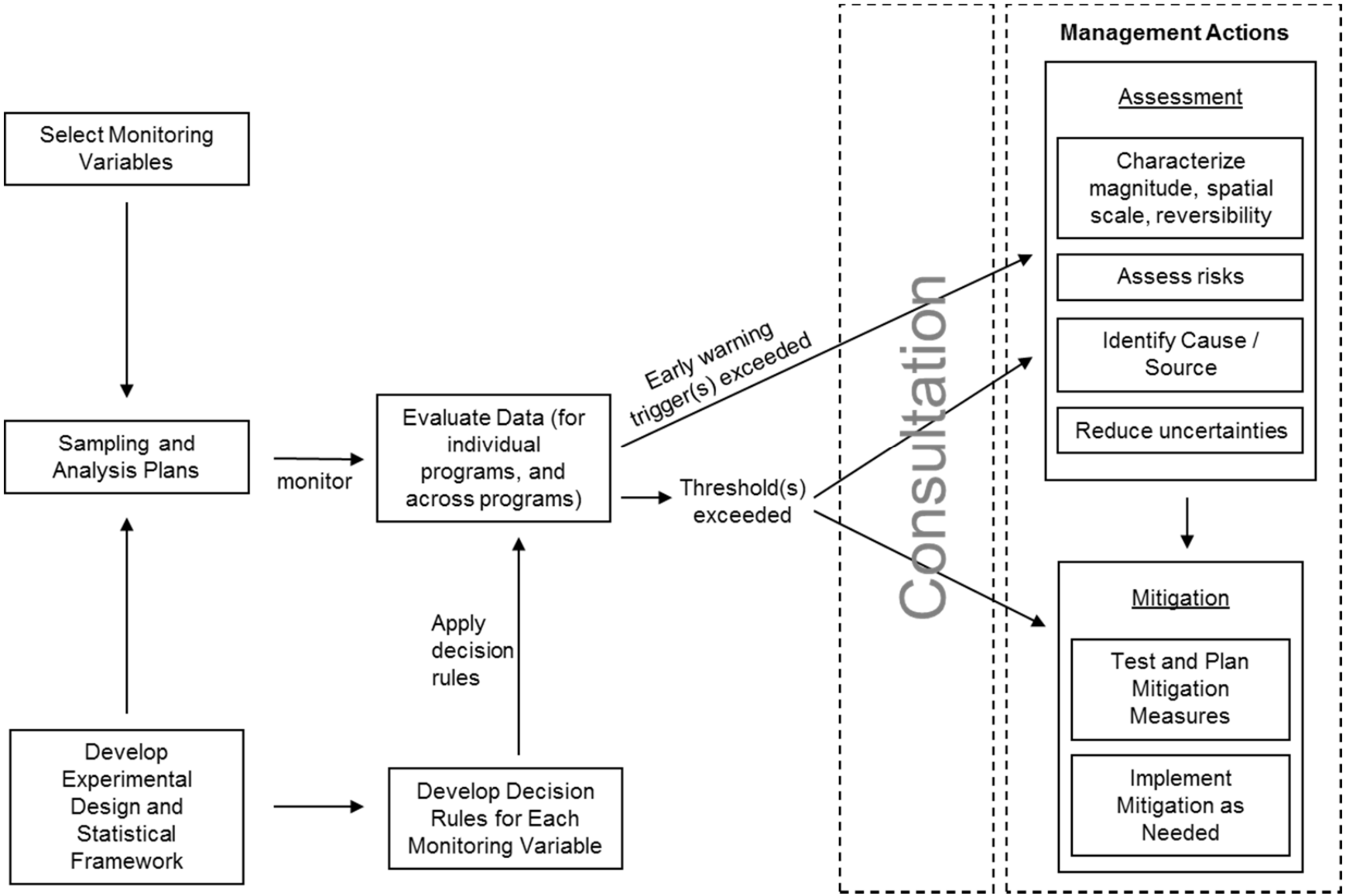
Details regarding the derivation of trigger and threshold values for the CREMP are presented in the *CREMP: Design Document 2012* (Azimuth, 2012d). The application of trigger/threshold values complements the spatial-temporal trends assessment initiated in the 2011 CREMP (Azimuth, 2012a), which used trend plots (each showing monitoring results since 2006) to identify patterns of change consistent with one or more of the mining activities described in **Section 1.4**.

The general rationale for conducting the trend assessment followed these principles:

1. *Establish Expected Conditions* – Control data (i.e., combination of baseline (i.e., pre-mining) data from impact areas and data from remote reference or control areas; see **Table 1.4–2**) were examined to set expectations for a parameter (e.g., water or sediment metal concentration, etc.) in the absence of mining activity. Baseline data were used to infer relative spatial differences (e.g., between a NF and Ref area) and reference data were used to infer regional temporal changes (e.g., the regional decrease in benthic community abundance between 2009 and 2010).
2. *Compare Patterns of Change* – With expected conditions in mind, impact data (i.e., data collected at NF and MF areas after the onset of mining-related activity in proximity to an area; see **Table 1.4–2**) were assessed visually for spatial-temporal patterns (e.g., short-term [in any year] spikes [rapid rises that return to baseline] or longer-term trends [gradual or rapid increases that persist]) matching mining activity (e.g., rise in TSS concentrations at SP in August 2008). Where observed, the spatial and temporal extent and magnitude of the changes were characterized (i.e., do they extend to MF or FF areas, and if so, at what magnitude/duration?).

3. *Provide Context for Magnitude of Change* – As discussed above, site-specific triggers and thresholds were used to provide some context for observed changes to CREMP monitoring parameters. In addition, where applicable and available, results of target studies (e.g., TSS EAS studies) were used to help interpret changes in biological parameters and endpoints.
4. *Identify Parameters for Management* – Identify parameters requiring management action on one of two levels: continued trend monitoring (i.e., to follow low magnitude or weak trends), or active follow-up with more detailed quantitative assessment (i.e., a targeted study to address a potential concern). This process will emphasize issues or concerns present in this year's CREMP results.

Figure 1.5–1. Management response plan for the Meadowbank Mine AEMP.



2. METHODS

2.1. Overview

The *CREMP: 2015 Plan Update* (Azimuth, 2015a) provides detailed documentation of the Meadowbank CREMP. The document describes the CREMP study design and methods, and integrates a number of changes from the previous CREMP plan (Azimuth, 2010d), including those stemming from the recent NWB Type A Water Licence renewal process. In an effort to streamline the annual report and reduce redundancy, aspects of the CREMP study design presented in the *CREMP: 2015 Plan Update* are not repeated herein. Readers looking for detailed information on the aspects of the study design such as sampling methods, QA/QC protocols and procedures, and data evaluation criteria are referred to Azimuth (2015a). An overview of the routine CREMP study is provided below, along with a detailed description of the methods used in the target study of chromium bioavailability at TPE.

2.2. Routine CREMP

2.2.1. Sampling Areas

A summary of monitoring events for 2015 CREMP is presented in **Table 2.2–1**. Sampling locations for water and phytoplankton were selected randomly[2] from within their respective lake basins (**Figure 1.3–1**). Sediment grab samples for chemistry and benthic invertebrate community analyses were collected from the established areas (i.e., depositional zones between 6.5 m and 9 m) in each basin/lake (**Figure 1.3–2**). Global Positioning System (GPS) Universal Transverse Mercator (UTM) coordinates (in NAD 83) for all monitoring components are shown in **Table 2.2–2** for each sampling area.

2.2.2. Sampling Components and Methods

Water quality, sediment quality (grabs only), phytoplankton community, and benthic invertebrate community were monitored in the 2015 program. Sampling was undertaken according to established SOPs included in the *CREMP: 2015 Plan Update* (Azimuth, 2015a).

Samples from the 2015 CREMP were sent to the laboratories listed below for analysis.

- Water and sediment chemistry – ALS Laboratories (Burnaby, British Columbia)
- Phytoplankton taxonomy – Plankton R Us Inc. (Winnipeg, Manitoba)
- Benthic invertebrate taxonomy – ZEAS Inc. (Nobleton, Ontario)
- Sediment toxicity testing and sequential analysis – Maxxam Analytics (Burnaby, British Columbia)

The only notable change to the CREMP in 2015 was ALS resumed analysis of water quality parameters that were contracted to Multilab (Val d'Or, Quebec) in 2014[3].

[2] Target locations for sampling were randomly pre-determined by bounding the sample areas and using a random number generator to select coordinates within those bounds. Coordinates were then recorded in MapSource and in the hand-held GPS units (NAD 83) before going out into the field.

[3] Parameters with short hold-times were analyzed by Multilab in 2014 provided they could meet the MDL's reported by ALS (i.e., conductivity, pH, TSS, TDS, turbidity, alkalinity, and TKN). The results for TSS, turbidity, total and bicarbonate alkalinity, and TKN were inconsistent throughout 2014, even among sampling areas and months; consequently, these parameters were deemed unreliable for trend analysis.

2.2.3. Sampling Effort and Frequency Assessment

A new results-driven strategy was developed as part of the *CREMP: 2015 Plan Update* (Azimuth, 2015a). The objective of this new strategy is to increase the overall efficiency of the CREMP by maintaining monitoring intensity in the areas most likely to be affected by mining-related activities (i.e., NF areas), while potentially reducing monitoring intensity at MF and FF areas depending on the water quality results observed at up-gradient areas. Thus, monitoring intensity at MF and/or FF areas would only be reduced if the results at corresponding up-gradient areas suggested that changes were unlikely. The annual decision framework presented in the *CREMP: 2015 Plan Update* (Azimuth, 2015a; **Figure 2.2–1** [below]) applies to MF and FF areas at Meadowbank[4] (i.e., MF area TE (which is paired with upstream NF areas TPE, SP, and WAL), MF area TPS (which is paired with NF area TPN), and to FF area TEFF (paired with upstream MF area TE). As per the normal CREMP data analysis process, NF results are evaluated on an annual basis (i.e., with CREMP reporting due at the end of March following each monitoring year), with the NF results (i.e., for "Year") dictating the monitoring requirements for the MF area in the subsequent year (i.e., "Year +1"). The Year +1 NF and MF results are used as the basis to determine the MF and FF monitoring requirements for Year +2, and so on. While the full CREMP program will be conducted at each NF area each year, the specific monitoring requirements for the MF and FF areas vary based on the NF and MF results, respectively, as follows (see Azimuth, 2015a for more details, including a worked example of the strategy):

- *No changes identified* – no statistical changes above any trigger values. No further sampling required.
- *Minor changes identified* – statistically significant changes exceeding the early warning trigger values for parameters without effects-based threshold values (i.e., trigger values are based on the 95th percentile of the baseline distribution). Spot sampling through-ice is required to determine if changes extend to MF area (or to FF if such changes are seen at an MF area).
- *Moderate changes identified* – statistically significant changes exceeding the early warning trigger values for parameters with effects-based thresholds (e.g., CCME water quality guidelines for water chemistry parameters). Full CREMP water sampling (all events) is required to determine if changes extend to MF area (or to FF if such changes are seen at an MF area).
- *Major changes identified* – statistically significant changes exceeding the effects-based threshold values. Full CREMP program (i.e., including sediment and biological components) is required to determine if changes extend to MF area (or to FF if such changes are seen at an MF area).

[4] This framework does not apply to the Baker Lake areas as there are no MF or FF areas in Baker Lake.

Figure 2.2–1. Annual results-based sampling strategy rules for mid-field and far-field sampling areas.

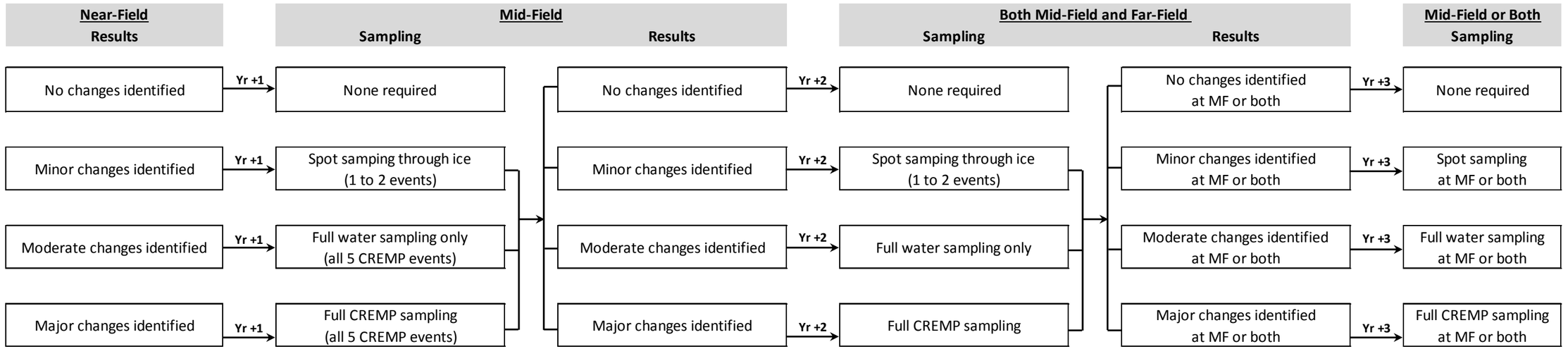


Table 2.2–1. CREMP sampling summary, Meadowbank study lakes and Baker Lake, 2015.

Sampling Month	Sampling Crew	Monitoring Conditions	Monitoring Components	Meadowbank Areas									Baker Areas			
				INUG	PDL	TPN	SP	TPE	WAL	TPS	TE	TEFF	BAP	BES	BBD	BPJ
				REF	REF	NF	NF	NF	NF	MF	MF	FF	REF	REF	NF	NF
January	AEM	Ice	L													
February	AEM	Ice	L			x	x	x	x							
March	AEM	Ice	L			✓	✓	✓	✓							
April	AEM	Ice	L			✓	✓	✓	✓							
May	AEM	Ice	L,W,P	✓		✓	✓	✓	✓		✓					
June		***Ice not safe***														
July	AEM	Open-water	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
August	Azimuth	Open-water	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
			B,S,C*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
September	AEM	Open-water	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	x		x	x
October		***Ice not safe***														
November	AEM	Ice	L,W,P	✓		✓	✓	✓	✓		✓					
December	AEM	Ice	L													

Notes:

Components:

L=Limnology; W=Water chemistry; P=Phytoplankton; B=Benthic invertebrates; S=Sediment grab chemistry; C=Sediment coring chemistry. *Sediment coring is conducted to match the timing of EEM field studies program (i.e., in 2014, 2017, 2020…).

✓ = monitoring components were collected.

x = monitoring components were scheduled but not collected due to H&S concerns. Refer to **Section 3.1.7** for more details.

Area designations:

C=Control; I=Impact; REF=reference (in grey shading); NF=near-field (in blue shading); MF=mid-field (in pink shading); FF=far-field (in teal shading); Blank denotes that the area was not part of the monitoring program that year.

Area IDs:

INUG=Inuggugayualik Lake;
PDL=Pipedream Lake
TPN, TPE, TPS=Third Portage Lake - North, East, South basins
SP=Second Portage Lake; WAL=Wally Lake;
TE, TEFF=Tehek Lake – Mid-field and Far-field;
BAP, BES, BBD, BPJ=Baker Lake - Akilahaarjuk Point, East Shore, Barge Dock, Proposed Jetty.

Table 2.2–2. CREMP sampling location coordinates (GPS, UTM, NAD83), Meadowbank study lakes and Baker Lake, 2015.

Lake	Area-Replicate ID[1]	Area Type[2]	Water & Phytoplankton (monthly)			Benthos & Sediment Grabs (August)				
			Date	Zone & Easting	Northing	Area-Replicate	Sample Type[3]	Depth (m)[4]	Zone & Easting	Northing
Third Portage	TPE-80	NF	May	14W 638933	7211107	TPE-1	B, C & T	8.5	14W 639138	7211767
	TPE-81		May	14W 639723	7210585	TPE-2	B, C & T	9.0	14W 639153	7211707
	TPE-82		July	14W 639409	7211803	TPE-3	B, C & T	6.8	14W 639107	7211569
	TPE-83		July	14W 639917	7210659	TPE-4	B, C & T	6.8	14W 639082	7211552
	TPE-84		August	14W 638023	7211219	TPE-5	B, C & T	7.1	14W 639056	7211523
	TPE-85		August	14W 639340	7211623	TPE-COMP	C			
	TPE-86		September	14W 639382	7210317	TPE-B-1	C & T	7.2	14W 638565	7211392
	TPE-87		September	14W 639644	7211933	TPE-B-2	C & T	7.9	14W 638604	7211336
	TPE-88		November	14W 639490	7212286	TPE-B-3	C & T	9.2	14W 638549	7211308
	TPE-89		November	14W 639118	7210295	TPE-B-4	C & T	8.8	14W 638817	7211414
						TPE-B-5	C & T	7.8	14W 638786	7211381
	TPN-80	NF	May	14W 635225	7215778	TPN-1	B & C	8.6	14W 636374	7215536
	TPN-81		May	14W 634265	7215092	TPN-2	B & C	8.7	14W 636395	7215539
	TPN-82		July	14W 634922	7215031	TPN-3	B & C	8.3	14W 636415	7215522
	TPN-83		July	14W 635485	7213850	TPN-4	B & C	8.4	14W 636534	7215440
	TPN-84		August	14W 636081	7213627	TPN-5	B & C	10.5	14W 636381	7215519
	TPN-85		August	14W 635890	7215404	TPN-COMP	C			
	TPN-86		September	14W 635511	7212988					
	TPN-87		September	14W 635126	7216105					
	TPN-88		November	14W 634806	7214790					
	TPN-89		November	14W 636062	7213828					
	TPS-49	MF	July	14W 635464	7208899	TPS-1	B & C	8.3	14W 633722	7207997
	TPS-50		July	14W 635452	7210533	TPS-2	B & C	9.0	14W 633682	7207982
	TPS-51		August	14W 633272	7207861	TPS-3	B & C	7.0	14W 633706	7208018
	TPS-52		August	14W 635674	7209618	TPS-4	B & C	9.5	14W 633648	7208022
	TPS-53		September	14W 634344	7209381	TPS-5	B & C	8.2	14W 633687	7208013
	TPS-54		September	14W 635647	7210194	TPS-COMP	C			
Second Portage	SP-80	NF	May	14W 640505	7213762	SP-1	B & C	8.9	14W 640166	7213877
	SP-81		May	14W 640423	7213594	SP-2	B & C	9.1	14W 640146	7213896
	SP-82		July	14W 640417	7213508	SP-3	B & C	8.3	14W 640113	7213905
	SP-83		July	14W 640736	7213699	SP-4	B & C	7.6	14W 640086	7213976
	SP-84		August	14W 640624	7212928	SP-5	B & C	7.8	14W 640097	7213925
	SP-85		August	14W 640305	7212530	SP-COMP	C			
	SP-86		September	14W 640688	7213701					
	SP-87		September	14W 640624	7213565					
	SP-88		November	14W 639932	7214006					
	SP-89		November	14W 640577	7212837					
Tehek	TE-80	MF	May	15W 360120	7212627	TE-1	B & C	7.7	15W 359987	7212195
	TE-81		May	15W 360246	7213261	TE-2	B & C	7.4	15W 360014	7212229
	TE-82		July	15W 360138	7212637	TE-3	B & C	7.9	15W 360047	7212229
	TE-83		July	15W 360139	7211901	TE-4	B & C	7.2	15W 360066	7212262
	TE-84		August	15W 361152	7212429	TE-5	B & C	7.2	15W 360093	7212278
	TE-85		August	15W 361282	7213108	TE-COMP	C			
	TE-86		September	15W 360269	7212666					
	TE-87		September	15W 361085	7213162					
	TE-88		November	15W 362124	7211660					
	TE-89		November	15W 362062	7213155					
	TEFF-37	FF	July	15W 363530	7210435	TEFF-1	B & C	8.2	15W 361868	7210763
	TEFF-38		July	15W 362327	7210279	TEFF-2	B & C	7.9	15W 361823	7210708
	TEFF-39		August	15W 363615	7210073	TEFF-3	B & C	7.7	15W 361715	7210663
	TEFF-40		August	15W 363980	7209439	TEFF-4	B & C	7.8	15W 361605	7210568
	TEFF-41		September	15W 362152	7208985	TEFF-5	B & C	7.4	15W 361673	7210639
	TEFF-42		September	15W 364623	7209116	TEFF-COMP	C			
Innugugayualik	INUG-68	Ref	May	14W 622198	7216199	INUG-1	B, C & T	6.9	14W 622831	7216847
	INUG-69		May	14W 622850	7215321	INUG-2	B, C & T	7.1	14W 622753	7216851
	INUG-70		July	14W 622965	7216215	INUG-3	B, C & T	7.6	14W 622705	7216847
	INUG-71		July	14W 622256	7214295	INUG-4	B, C & T	8.9	14W 622681	7216796
	INUG-72		August	14W 621832	7215439	INUG-5	B, C & T	8.1	14W 622745	7216790
	INUG-73		August	14W 622718	7214853	INUG-COMP	C			
	INUG-74		September	14W 622518	7214715					
	INUG-75		September	14W 622756	7215766					
	INUG-76		November	14W 622210	7214461					
	INUG-77		November	14W 622560	7216758					

Table 2.2–2. CREMP sampling location coordinates (GPS, UTM, NAD83), Meadowbank study lakes and Baker Lake, 2015.

Lake	Area-Replicate ID[1]	Area Type[2]	Water & Phytoplankton (monthly)			Benthos & Sediment Grabs (August)				
			Date	Zone & Easting	Northing	Area-Replicate	Sample Type[3]	Depth (m)[4]	Zone & Easting	Northing
Wally	WAL-49	NF	May	15W 360612	7221692	WAL-1	B & C	8.7	15W 360912	7220495
	WAL-50		May	15W 360369	7221162	WAL-2	B & C	8.3	15W 360917	7220446
	WAL-51		July	15W 361393	7222361	WAL-3	B & C	8.8	15W 360928	7220475
	WAL-52		July	15W 360558	7221104	WAL-4	B & C	8.9	15W 360934	7220431
	WAL-53		August	15W 360830	7221066	WAL-5	B & C	8.4	15W 360958	7220398
	WAL-54		August	15W 360626	7221994	WAL-COMP	C			
	WAL-55		September	15W 361814	7222869					
	WAL-56		September	15W 360226	7222604					
	WAL-57		November	15W 361521	7221815					
	WAL-58		November	15W 360756	7220797					
Pipedream	PDL-37	Ref	July	14W 631323	7224998	PDL-1	B, C & T	6.8	14W 630587	7223034
	PDL-38		July	14W 632161	7225256	PDL-2	B, C & T	6.6	14W 630641	7223019
	PDL-39		August	14W 631743	7224224	PDL-3	B, C & T	8.0	14W 630685	7223053
	PDL-40		August	14W 632623	7223870	PDL-4	B, C & T	7.8	14W 630687	7223002
	PDL-41		September	14W 630089	7223596	PDL-5	B, C & T	8.7	14W 630718	7222759
	PDL-42		September	NA	NA	PDL-COMP	C			
Baker	BBD-37	NF	July	14W 644580	7135182	BBD-1	B & C	8.5	14W 644540	7135318
	BBD-38		July	14W 644222	7135223	BBD-2	B & C	9.4	14W 644594	7135276
	BBD-39		August	14W 644164	7135126	BBD-3	B & C	8.6	14W 644427	7135349
	BBD-40		August	14W 644181	7135422	BBD-4	B & C	8.4	14W 644516	7135324
	BBD-41		September	NA	NA	BBD-5	B & C	8.2	14W 644575	7135300
	BBD-42		September	NA	NA	BBD-COMP	C			
	BPJ-37	NF	July	15W 356627	7134324	BPJ-1	B & C	9.3	15W 357281	7134081
	BPJ-38		July	15W 356964	7134093	BPJ-2	B & C	7.8	15W 357263	7134131
	BPJ-39		August	15W 356698	7134050	BPJ-3	B & C	8.0	15W 357240	7134136
	BPJ-40		August	15W 357053	7134019	BPJ-4	B & C	8.8	15W 357076	7134210
	BPJ-41		September	NA	NA	BPJ-5	B & C	8.3	15W 357036	7134217
	BPJ-42		September	NA	NA	BPJ-COMP	C			
		Ref	NA			BES-1	B & C	9.5	15W 361227	7132376
						BES-2	B & C	9.3	15W 361271	7132367
						BES-3	B & C	9.3	15W 361311	7132344
						BES-4	B & C	9.4	15W 361362	7132312
						BES-5	B & C	9.2	15W 361422	7132289
						BES-COMP	C			
	BAP-37	Ref	July	363506	7131171	BAP-1	B & C	7.9	15W 363983	7131206
	BAP-38		July	362998	7131023	BAP-2	B & C	8.0	15W 364039	7131182
	BAP-39		August	363422	7131027	BAP-3	B & C	8.1	15W 364069	7131156
	BAP-40		August	364158	7130957	BAP-4	B & C	8.7	15W 364132	7131139
	BAP-41		September	NA	NA	BAP-5	B & C	9.1	15W 364151	7131041
	BAP-42		September	NA	NA	BAP-COMP	C			

Notes:

[1] Area IDs are as follows: TPE,TPN,TPS=Third Portage Lake - East, North, South basins; SP=Second Portage Lake; TE,TEFF=Tehek Lake - Farfield; INUG=Inuggugayualik Lake; WAL=Wally Lake; PDL=Pipedream Lake; BBD,BPJ,BES,BAP=Baker Lake - Barge Dock, Proposed Jetty, East Shore, Akilahaarjuk Point.

[2] Area types: NF=near-field; MF=mid-field; FF=far-field; Ref=reference.

[3] Sample types: B=Benthos; C=chemistry, T=toxicity (including sequential extraction).

[4] Comp = composite sample of all 5 replicate samples from each area.

2.3. Targeted Program – TPE Chromium Bioavailability

2.3.1. Overview

The increasing trend in sediment chromium concentrations at TPE has been followed since 2012 (Azimuth, 2013), leading to a targeted coring study in 2014 that confirmed the trend as temporal (Azimuth, 2015b). Based on available evidence, this trend appears to be due to sediments originating from ultramafic rock (high in chromium) used in construction of the Bay-Goose Dike. While no adverse effects have been observed in the benthic invertebrate community at TPE, bioavailability studies were recommended in the 2014 CREMP report (Azimuth, 2015b) to verify the ecological significance of the observed change in sediment chromium concentrations. These same studies were conducted in 2010 to characterize metals bioavailability in SP as part of the EAS studies in Second Portage Lake.

Two sediment toxicity tests (described below) were used to assess whether the changes observed in sediment chromium concentrations cause toxicity (i.e., whether the chromium is present in a form that affects biota). In addition, and as a complement to the sediment toxicity testing, sequential extraction analysis (described below) was also conducted on the 2015 sediments. This is a geochemical analysis that subjects a sample to progressively more aggressive digestion methods that provide insights into their "availability" to biota (i.e., "high" = metals weakly bound in the sediment; "low" = metals strongly sequestered by the sediment matrix). Combined, results from the TPE toxicity testing, sequential extraction procedure and benthic community surveys provide a robust means of assessing the ecological significance of the elevated chromium at TPE.

2.3.2. Field Sampling

Sediment was collected at the same time as CREMP sampling in August 2015 according to the SOP (Azimuth, 2015a). The top 2 cm were collected from several grabs and composited until there was enough volume to fill 1 x 1L container at each of 5 replicates per sampling area. Four areas were tested: two "exposure" areas (i.e., the depositional areas adjacent to the Bay-Goose Dike: TPE and TPE-B) and two reference areas (i.e., INUG and PDL). Sampling areas and replicates are shown in **Figure 1.3–2**; UTM coordinates for each sample are presented in **Table 2.2–2**.

The 1-L sediment containers were placed in a cooler with ice packs and transported to Maxxam Analytics Inc. (Burnaby, BC) for both analyses. Sediment samples were analyzed as described in the tests below.

2.3.3. Laboratory Tests

2.3.3.1. Sediment Toxicity

Two benthic invertebrate species were used to assess whether the elevated metals have the potential to cause sediment toxicity: an amphipod (*Hyalella azteca*) and a midge larva (*Chironomus dilutus*). The endpoints for both species were survival and growth.

The *Hyalella* test is a static test using juvenile (7-9 days old) amphipods, exposed to whole sediment for 14-days. This test was conducted at 23°C, using the 5 replicates per treatment including a laboratory control, with 10 organisms per replicate.

The *Chironomus* test is a static, non-renewal test using 3rd instar midge larvae exposed to whole sediment for 10-days. This test was conducted at 23°C, using the 5 replicates per treatment including a laboratory control, with 10 organisms per replicate.

2.3.3.2. Sequential Extraction

The five replicates for each sampling area were composited and homogenized in the laboratory to form one sample from each area for the sequential extraction analysis. There are many sequential extraction procedures (SEP) that can be used for understanding the behavior of metals in sediments, but most SEPs follow similar fractional degradation with minor variations (Zimmerman and Weindorf, 2010). The SEP followed in this study was a standard European Union method (BCR 701) that was developed to provide suitable reference materials for enabling the validation of the methodologies, and to control the quality of the measurements (Pueyo et al., 2001).

The theory behind sequential extraction is that the solid material (sediment in this case) can be partitioned into specific fractions that can be extracted selectively by using appropriate reagents (Tessier et al., 1979). The most mobile trace metals will be removed in the first fraction and continue in order of decreasing of mobility (Zimmerman and Weindorf, 2010). Typically, metals of anthropogenic inputs tend to reside in the first three fractions and metals found in the residual fraction occur as a geological matrix in the parent rock (Ratuzny et al., 2009). The BCR method follows an optimized three-step sequential extraction procedure that allows for characterization of metals availability into these four groups or fractions (Pueyo et al., 2001) as follows:

- **Step 1 (Carbonate-bound Fraction)**: step 1 uses acetic acid to remove metals that are weakly adsorbed to the surface of sediment particles and associated with carbonate coatings, otherwise readily available. Metals in this fraction will desorb with changes in pH.
- **Step 2 (Fe / Mn oxide-bound Fraction)**: step 2 uses hydroxylamine hydrochloride to remove metals that are associated with iron and manganese oxide coatings on the surface of sediment grains. Metals in this fraction will only be released under anoxic conditions.
- **Step 3 (Organic matter or Sulphide-bound Fraction)**: step 3 uses hydrogen peroxide (H_2O_2) / ammonium acetate to remove metals that are associated with organic matter (e.g., living organisms, detritus, coatings on mineral particles, etc.) and with sulphide mineral coatings. Metals in this fraction will be released under oxidizing conditions, as organic material is degraded.
- **Residual Fraction**: this fraction is what remains once the first three fractions have been removed. This fraction will only contain primary and secondary minerals that are essentially part of the sediment matrix. Metals in this fraction are not expected to be released under natural conditions (Tessier et al., 1979).

The fraction resulting from each step is then analyzed for dissolved metals by inductively coupled plasma mass spectrometry (ICP-MS) and dissolved hardness ($CaCO_3$). Dissolved metals concentrations (mg/L) are then converted into mass-based concentration estimates (mg/kg dw) by:

$$Sediment = Fraction \; x \; \frac{Final\ volume}{1000} x \; \frac{Moisture\ Conv}{0.001}$$

Where:

Sediment = estimated sediment concentration (mg/kg dw) from fraction 1, 2, or 3

Fraction = dissolved metal concentration (mg/L) in sequential analysis fraction

Final volume = volume of solution (mL) used in the extraction (e.g., acetic acid in step 1)

Moisture Conv = grams wet weight / grams dry weight

The calculated sediment concentrations from fractions 1 (carbonate-bound), 2 (Fe/Mn oxide-bound), and 3 (organic matter-bound/sulphide-bound) are then subtracted from the mean total metal concentration for a given parameter to obtain an estimate of the 'residual' metal concentration associated with the sediment matrix.

2.4. Quality Assurance / Quality Control

The objective of quality assurance and quality control (QA/QC) is to assure that the chemical and biological data collected are representative of the material or populations being sampled, are of known quality, have sufficient laboratory precision to be highly repeatable, are properly documented, and are scientifically defensible. Data quality was assured throughout the collection and analysis of samples using specified standardized procedures, by the employment of laboratories that have been certified for all applicable methods, and by staffing the program with experienced technicians.

An overview of the QA/QC program for each component is provided below; refer to the 2015 CREMP plan (Azimuth, 2015a) update for a complete description.

2.4.1. Water

Laboratory QC

There are five main components of the water chemistry laboratory QC program to assess analytical precision, bias, and completeness:

- *Sample Integrity* – documentation of any abnormal conditions for a sample/batch of samples. This represents the first step in the QC assessment where samples may be flagged for reliability/usability. Results are flagged as potentially unreliable for one of three reasons: (1) samples were damaged during transport, (2) the temperature inside the cooler was above 10°C when received by the laboratory, or (3) the recommend hold-time was exceeded prior to analysis.
- *Laboratory Duplicate* – a new aliquot from the same sample is analyzed from the start in the same manner as the original aliquot taken from the bottle/jar. The difference between the two analyses is a measure of the variability associated with duplicate analyses of the same sample in the laboratory.
- *Laboratory Control Sample (LCS)*[5] – a well-characterized sample of known analytes and concentration. A reference material (i.e., certified reference material) containing certified amounts of target analytes, may be used as an LCS. Percent recovery of the target analytes in the LCS is compared to established control limits and assists in determining whether the methodology is in control and whether the laboratory is capable of making accurate and precise measurements at the required reporting limit.
- *Method Blank (MB)* – an analyte-free matrix (e.g., water) subjected to the entire analytical process to demonstrate that the analytical system itself does not introduce contamination.
- *Matrix Spike (MS) / Matrix Duplicate (MD)* – a known amount of a compound similar chemically to the target analyte is added to samples to ascertain any matrix effects on recoveries and to determine the accuracy and precision of the method in this matrix.

A summary of the laboratory QC results are included in each laboratory report. The laboratory duplicate results are included herein; the other laboratory QC results are presented in reports issued by ALS (**Appendix F**).

[5] Descriptions of the various QC sample types are found on the ALS Environmental website (Link)

Field QA/QC

The standard QA procedures included thoroughly flushing the flexible tubing and pump to prevent cross-contamination between areas and thoroughly rinsing the sample containers with site water prior to sample collection. Field QC procedures include collection and/or analysis of field duplicates, travel blanks, and equipment blanks. Data quality objectives (DQOs) for each QA/QC sample type are discussed below.

Data Quality Objectives

Duplicate Samples – Quality control results of the laboratory and field duplicates are assessed by measuring the relative percent difference (RPD) between original and duplicate measurements as measure of precision by the laboratory and the magnitude of variability between original and field duplicate samples, respectively. The equation used to calculate a RPD is:

$$RPD = \frac{(A - B)}{(\frac{A + B}{2})} x\ 100$$

where: A = analytical result; B = duplicate result[6].

Laboratory duplicate DQOs are parameter-specific and depend on the concentration in the sample[7]. For most parameters including metals, anions, and nutrients, the DQO is an RPD of less than 20% when the concentration is greater than 10-times the MDL. For parameters with concentrations less than 10-times the MDL, the DQO is a difference in concentration between the original and duplicate samples of less than 2-times the MDL. The DQOs for field duplicates is RPDs less than 50% when concentrations exceed 10-times the MDL. RPD values may be either positive or negative, and ideally should provide a mix of the two, clustered around zero. RPDs are not calculated for cases where one of the samples (i.e., either A or B above) is below detection and the other is not.

Blanks (Travel, Field, Equipment) – Results from both the equipment and travel blanks are examined for detectable concentrations of any of the parameters measured; no parameter in either blank should exceed laboratory method detection limits (MDLs). If an analyte is detected in a blank, the results for the batch of samples submitted with the blank are compared with the measured concentration in the blank; results that are less than 5-times the detected analyte concentration in the equipment blank are flagged to examine the potential for cross-contamination to affect the results[8]. Results carried forward in the QA/QC assessment are given either a cautionary flag or an unreliable flag. Cautionary flags are applied to sample results if the analyte was detected in the blank, but the effect of potential cross-contamination is considered minor (e.g., the concentration in the equipment blank is a small percentage of the concentration in the samples). Unreliable data flags are applied to water quality results that are anomalous or unrepresentative of the water quality (e.g., elevated metals concentrations in a sample that are not observed in other replicate sample(s) collected during the same event). The "cautionary" and "unreliable" data flags are provided for clarity on which results should be excluded from decision making.

[6] RPD values are not calculated when one of the analytical results is below the MDL.

[7] The list of DQOs for each water quality parameter is provided in Azimuth (2015a; Appendix A, Table 2).

[8] This approach is consistent with how ALS flags unreliable results for the laboratory method blanks.

2.4.2. Sediment

Laboratory QC

Laboratory duplicates were analyzed for sediment chemistry parameters similar to water chemistry parameters. The full list of laboratory DQOs for each parameter are presented in the SOP appended to the *CREMP: 2015 Plan Update* (Azimuth, 2015a).

Field QA/QC

Field QA consisted of taking care between sampling areas, by rinsing and cleaning the sampling gear for sediment grabs (Petite Ponar grab, stainless steel compositing bowls and spoons) and sediment cores (corer and spatula) using site water and phosphate-free cleaning detergent, avoids the possibility of cross-contamination. Field QC measures included collection and analysis of the following:

- *Filter Swipe* – Metals analysis of an ashless filter (QA/QC Filter) that was swiped over the pre-cleaned bowl at four sampling areas to assess the cleaning procedures. The significance of any metal detected on this filter was evaluated by comparing this amount to the measured concentrations in the sediment samples. Where comparisons were required, the concentration of metals originating from any equipment was estimated by dividing the amount detected on the filter (weight) by: the surface area of 2 Petite Ponar grabs (assuming a thickness of 3 cm was collected from each), that was multiplied by the density of sediment (assumed to be 2 g/cm^3). New for the 2015 program was analysis of "blank" filters (clean and new and otherwise not handled or used in the field) to determine if any metals detected on the filters originate from the filters themselves.
- *Field Duplicate* – Ten duplicate sediment grab samples were collected for the 2015 program. The DQO for field duplicate samples is based on an RPD of 50% for concentrations that are greater than 10-times the MDL.

2.4.3. Biota

Standard procedures were used to collect phytoplankton and benthic invertebrate samples (Azimuth, 2015a). Sampling gear was thoroughly rinsed between sampling areas to ensure that there was no inadvertent introduction (i.e., cross-contamination) of biota from one area to another.

Laboratory QC

Phytoplankton – As a measure of laboratory QA/QC on the enumeration method replicate counts were performed on 10% of the samples. Replicate samples were chosen at random and processed at different times from the original analysis to reduce biases. The laboratory replicate is a new aliquot (10 mL) from the sample jar and is counted from the start in the same manner as the original aliquot (10 mL) taken from the jar.

Benthic Invertebrates – ZEAS re-sorts and re-counts approximately 10% of the samples, targeting greater than 90% recovery between the original and re-sorted sample.

Field QA/QC

Phytoplankton – Field duplicates were collected for phytoplankton during each sampling event (i.e., monthly) in coordination with water sample duplicates and were taken in order to assess sampling variability and sample homogeneity. A RPD of 50% for total density and biomass concentrations is considered acceptable.

Benthic Invertebrates – Field replicates (5 per area) were collected for benthos to determine natural variability and heterogeneity. Replicates were collected at least 20 m apart from one another, within the defined sampling areas.

2.5. Data Evaluation Criteria

The specific methods used to apply triggers/thresholds in the evaluation of CREMP monitoring parameters varied by study component; details are presented in the following sections. As discussed in **Section 1.5**, the evaluation process focused on comparisons to early warning triggers; only when triggers were exceeded were monitoring results compared to thresholds. Consequently, methods for applying numerical decision criteria focus on triggers only, but apply equally to threshold values.

A comprehensive review of the data evaluation methods/approach was completed in the *CREMP: 2015 Plan Update* (Azimuth, 2015a). The data evaluation process is summarized by component in the following sections.

2.5.1. Water Chemistry

Water quality data collected in 2015 were evaluated against triggers and thresholds consistent with the existing framework outlined in the *CREMP: 2015 Plan Update* (Azimuth, 2015a). Formal comparison of the water quality data for decision-making purposes was done by comparing the yearly mean[9] parameter concentrations to the trigger values developed separately for the Meadowbank projects lakes, Wally Lake, and Baker Lake areas. Those parameters where the yearly mean was equal to or exceeded the trigger value were formally tested using a one-tailed test of the null hypothesis[10] (significance level of p=0.05) according to the framework outlined below for Meadowbank and Baker Lake areas.

- *Meadowbank Project Lakes* – A Before-After-Control-Impact (BACI) statistical framework was applied. The BACI model is "paired" (i.e., BACIP) when multiple "before" and "after" events are available. In the BACI model, INUG is used as the reference ("control") area, and the other areas are tested as exposure ("impact") areas. Both PDL and TEFF are excluded as control areas in the BACI analysis because neither area was sampled in the "before" period between 2006 and 2008. True "pre-impact" data (i.e., when both INUG and the test area had "control" ("C") status; see **Table 1.4–2**) were used for the "before" data. Only events when both INUG and the test area were sampled in 2015 were used as the "after" data.
- *Baker Lake* – Baker Lake areas were designated as "control" (BAP) or "impact" (BPJ and BBD) when sampling started in 2008 (i.e., there was no detailed baseline sampling was conducted for Baker Lake; see **Table 1.4–2**), so there are no true "pre-impact" "before" data. While a spatial "CI" design could be used to test for differences between reference "control" and exposure "impact" areas, the design does not allow for distinguishing natural differences between areas from development-related changes. Given that no development-related changes had been identified to date, all years of data up to and including 2014 were considered in the "before" period while the 2015 results were considered "after" period data (i.e., allowing the more robust

[9] Yearly means were calculated by first calculating the monthly mean for each parameter per area, then calculating the yearly mean on an area-specific basis. Values that were less than the MDL were conservatively set to the MDL.

[10] The null hypothesis is "test" area concentrations either did not change or decreased. The alternative hypothesis is that they increased.

BACI analysis). Thus, the BACI analyses specifically looked at changes in 2015 at the two "impact" areas relative to previous years.

In addition to the trigger/threshold evaluation, annual CREMP water chemistry data were also compared to the maximum whole-lake average water quality modelling predictions for Third Portage, Second Portage, and Wally Lakes made during the environmental assessment process (Cumberland, 2005). While direct comparisons were made, the difference in spatial focus (i.e., the CREMP at the basin scale and the water quality model at the lake scale) warrants caution interpreting any differences. To that end, the assessment criteria outlined in the Final Environmental Impact Statement (FEIS; Cumberland, 2005) for defining the predicted magnitude of impacts to water quality will be used to provide the appropriate context for interpreting the screening results as follows:

- *Negligible*: water quality concentrations are similar to baseline
- *Low*: concentrations are > 1x the CCME WQG
- *Medium*: concentrations are between 1 and 10-times the CCME guidelines
- *High*: concentrations are less than MMER but greater than 10-times the CCME guidelines
- *Very High*: concentrations exceed MMER standards

2.5.2. Sediment Chemistry

Statistical comparison of sediment chemistry data against trigger values is completed in years when sediment cores are collected. In years when only sediment grabs are collected, such as 2015, the approach to describing trends is purely visual.

2.5.3. Phytoplankton

Phytoplankton triggers and thresholds are set to relative changes (increases or decreases of 20% and 50%, respectively) in total biomass and species richness at test areas using the BACI framework[11] (Azimuth, 2012d). The evaluation procedure was analogous to that used for water chemistry, except that area means for 2015 were not directly comparable to triggers (i.e., since the triggers/thresholds are based on the relative change over time in a parameter rather than on a finite value), so the process started with the BACI testing. Two-tailed tests of the null hypothesis (i.e., that test areas experienced no relative change up or down) were conducted with a significance level of p=0.1.

2.5.4. Benthic Invertebrates

Similar to phytoplankton, triggers and thresholds were set to relative changes (decreases of 20% and 50%, respectively) in total biomass and species richness at test areas using the BACI framework. Statistical power increases with consideration of more "after" period years (Note: benthic invertebrates are sampled yearly in August); consequently, BACI analyses were conducted on four "after" data period lengths: one year (2015 only), two years (2014-2015), three years (2013-2015), and four years (2012-2015). One-tailed tests of the null hypothesis were conducted with a significance level of p=0.1[12].

[11] BACI framework involves paired monthly sampling events at "control" [INUG or BAP] and "impact" [i.e., NF or MF areas] areas over two periods ["before" and "after"], with "months" as the unit for temporal replication).

[12] The null hypothesis is "test" area measures (total biomass and species richness) either did not change or increased. The alternative hypothesis is that they decreased. Despite this BACI being conducted as a one-tailed test, the p value was left at 0.1 to help improve statistical power for the benthic invertebrate endpoints.

Similar to water chemistry (**Section 2.5.1**), there is no baseline benthic community data for Baker Lake, so there are no true "pre-impact" "before" data. While a spatial "CI" design could be used to test for differences between reference "control" and exposure "impact" areas, the design does not allow for distinguishing natural differences between areas from development-related changes. Rather, since no development-related changes had been identified to date, the temporal scenarios for Baker Lake used all the data (i.e., 2015 was compared to 2008 – 2014; 2014/2015 was compared to 2008 – 2013…and so on). Thus, the series of comparisons provides a more robust means to identify temporal changes due to mining-related activities in Baker Lake.

3. RESULTS AND DISCUSSION

The QA/QC results for the 2015 CREMP program are presented and discussed in **Section 3.1**. Results of the 2015 CREMP program are presented and discussed separately for the Meadowbank project lakes (**Section 3.2**) and Baker Lake (**Section 3.3**). The Meadowbank and Baker Lake sections are subdivided by study component (e.g., limnology, water chemistry, etc.) with the discussion organized into the following sub-headings:

- *General Observations* – This provides a synopsis of expected conditions in the absence of mining-related activities (i.e., based on baseline and reference data [i.e., "control" status data; see textbox in **Section 1.3** and text in **Section 1.4**]).
- *Temporal and Spatial Trend Interpretation* – This (1) describes the types of changes that could be expected in relation to mining activity, specific to the parameters in question; (2) identifies trends in parameters that are associated with mining-related activities; (3) provides context for the magnitude of observed changes relative to trigger and threshold value; and (4) identifies parameters requiring management action on two levels: a) continued trend monitoring in 2015 (i.e., to follow low magnitude or weak trends), or b) active follow-up with more detailed quantitative assessment in 2016 (i.e., a targeted study to address a potential concern).

3.1. QA/QC

QA/QC procedures consisted of a combination of careful field collection and sample handling, the collection of field duplicate samples and the analysis of laboratory replicates and standard reference materials. A discussion sample shipping and handling procedures is provided upfront, followed by a discussion of the results pertaining to the various CREMP components.

3.1.1. Sample Shipping and Handling

Refinement of the shipping and handling protocols implemented in 2014 has resulted in a marked improvement in the frequency of 1) water samples exceeding the recommended hold-times for analysis and 2) sample temperatures outside the optimal range during transport. Unpreserved samples with short hold-time analyses (e.g., TDS, turbidity, nitrate) are now couriered "express" (i.e., by air) from Val d'Or to ALS in Vancouver. Exceedances continue to persist for analytes with 3-day and 7-day recommended hold-times, but the number days between sample collection and analysis has been reduced relative to past years. The remainder of the sample bottles (i.e., metals, TOC, DOC, and cyanides) were shipped "ground" at the conclusion of the sampling event because hold-times for these analyses are less restrictive. Chlorophyll-a samples were shipped separately from the water samples at the end of each sampling event with the exception of the May CREMP samples. Chlorophyll-*a* samples were packaged with extra ice packs and sent "express" with the goal of keeping the internal cooler temperature less than 10°C during transport to ALS. Despite these changes, temperatures exceeded 10°C for every shipment, and were typically in the range of between 13°C and 20°C. Based on a review of the COCs, transit time between leaving Meadowbank and arriving at ALS (with routing through Val d'Or) took approximately a week with the "express" option. As an example, the May CREMP samples left Meadowbank on May 18th and were received by ALS on May 25th, a transit time of 8 days. The internal temperature measured in the coolers was between 16°C and 17°C for this event. Overall, sample temperature integrity has improved relative to past years, but the logistical challenges of shipping from Nunavut to Vancouver continue result in higher-than-recommended transport temperatures.

3.1.2. Water Chemistry

Field duplicates, laboratory duplicates, and blank samples were analyzed as part of the QA/QC program in each of the five sampling events in 2015. Results of the QA/QC analysis are discussed below, along with a discussion on the implications of the QA/QC assessment on the sample results from 2015.

- **Travel Blanks** – Travel blanks were analyzed for the August, September, and November sampling events. The full suite of parameters (excluding dissolved metals) was analyzed in the August and September events. Anions and nutrients were analyzed in the November event. All analytes in the travel blanks were below the MDL in 2015 (**Table 3.1–1**). Travel blanks were not submitted with the May and July events; however, de-ionized (DI) water blanks were analyzed for each event and provide a measure of DI water quality and laboratory analytical variability.
- **Deionized Blanks** – The goal of these blanks is to test the quality of the DI water batch and/or variability in laboratory analytical methods. One or two DI blanks were submitted for each event, depending on the scale of the water sampling program. Turbidity was detected in the May DI blank, and total dissolved phosphorus, total barium, and total chromium were detected in the August DI blanks at slightly above their respective MDLs (**Table 3.1–1**). In the case of the August detections, none of the parameters were measured in their corresponding equipment blank (EB). The rest of the DI blanks had no instance of analytes detected above the MDLs (**Table 3.1–1**).
- **Equipment Blanks** – As recommended in the 2014 CREMP report (Azimuth, 2015b), an EB was submitted in April prior to the start of routine CREMP water sampling to assess whether the pump and tubing are a potential source of cross-contamination. Several parameters were again detected in at least one of the equipment blanks submitted in 2015 (**Table 3.1–1**). With the exception of dissolved lead[13] in August, all the analytes listed below were detected at concentrations less than 10-times the MDL. The implication of these detectable concentrations on interpretation of the water quality data are discussed at the end of this section.
    - April: Total aluminum and barium
    - May: Total lead
    - July: Total aluminum, barium, chromium, copper, iron, lead, manganese, and dissolved iron.
    - August: Total aluminum, barium and manganese and dissolved aluminum, barium, lead, and manganese.
    - September: Total aluminum, barium, calcium, chromium, copper, iron, lead, manganese, and strontium and dissolved barium.
    - November: Total barium, lead, and manganese.
- **Field Duplicates** – Between one and three field duplicate samples were collected in each event (frequency of approximately 10% of the total number of samples) (**Table 3.1–2**). The field duplicate samples showed a high level of consistency with the original samples. Of the over 800 paired RPD comparisons in 2015, there were only 5 instances where the RPD exceeded 50%, and none of these samples had original and duplicate concentrations greater than 10-times the MDL.

[13] Measured 0.00169 mg/L, corresponding to 33-fold higher than the MDL for dissolved lead of 0.00005 mg/L. Importantly, total lead in the same equipment blank was less than the MDL.

- **Laboratory Duplicates** – These samples, conducted randomly as part of the laboratory's internal QA/QC program, showed a high degree of consistency and precision. There were no instances where the laboratory DQOs was exceeded in 2015 (**Table 3.1–3**).

Summary

The field and laboratory duplicate analyses showed a high degree of similarity in 2015. The few exceedances of the established DQOs represent much less than 1% of the total for QA samples and parameters measured. When comparing results for a large number of parameters, many of which are near detection limits, simple odds dictate that a few parameters will exceed DQOs due to laboratory variability (i.e., a false positive). Overall, there was no pattern in the nature of the exceedances that indicates a bias of specific parameters one way or another.

Results from blank samples analyzed in 2015 suggest that the water pumps and/or tubing currently being used by Azimuth and AEM for water sampling is the cause of detectable concentrations of some analytes in the equipment blanks. The implication of possible cross-contamination on interpretation of the 2015 water quality data was evaluated by comparing the sample concentrations with the equipment blank results from the same event[14]. Sample results in **Table 3.2–1** (Meadowbank) and **Table 3.3–1** (Baker) were flagged using a strikethrough symbol (e.g., ~~0.001~~) to indicate that the measured concentration was less than 5-times the concentration detected in the equipment blank. Of the analytes detected in the equipment blanks, aluminum (total and dissolved) was routinely given a "cautionary" flag because the concentrations were consistently within 5 to 10-times the MDL, meaning there is potential for cross-contamination to bias the sample results higher. Cautionary flags were also applied to some samples with detectable concentrations of chromium, manganese, copper, lead and uranium. Analysis of the water quality data relative to the triggers and thresholds was done on the entire data set, including the cautionary flagged data. Importantly, none of the aforementioned parameters exceeded the triggers values in 2015, indicating that any potential cross-contamination is unlikely to bias interpretation of the water quality analysis.

A new pump option is currently being explored to address the recurring issue of detectable concentrations of some metals in the equipment blanks. It's anticipated that this issue will be addressed prior to beginning sampling in 2016. The same approach of collecting and analyzing DI blanks and EB will be applied in the 2016 program to monitor the potential for cross-contamination during sample collection.

3.1.3. Sediment Grab Chemistry

Sediment QA/QC results for the grab samples are presented in **Table 3.1–4** (metals) and **Table 3.1–5** (hydrocarbons and PAHs) discussed below:

- **Field Duplicates** – The ten sediment grab field homogenization duplicates showed a high level of consistency with the original samples in 2015. One case of clay exceeding the RPD DQO was noted in the field duplicate from INUG, which was attributed to small spatial-scale differences in the sediment particle size distribution in the sediment. All other duplicate/analyte pairings met the DQOs for this project.

[14] If more than one equipment blank was submitted for a given event, the maximum detected concentration was compared against the samples results.

- **Laboratory Duplicates** – There were no cases where the RPD value exceeded the parameter-specific DQOs listed in **Table 3.1–4**. These results confirm that sediments were well homogenized in the field and that the laboratory processing methods were consistent between sub-samples.
- **Filter Swipes** – 10 filter swipes were conducted on sediment grab equipment and were analyzed for total metals in units of µg/filter. A number of parameters were detected on the filters in 2015, namely aluminum, barium, calcium, chromium, iron, magnesium, manganese, nickel, sodium, strontium, tin, titanium, and zinc. In the case of iron, the measured concentration was greater than 10-times the MDL (**Table 3.1–4**). After reviewing the results, two additional 'blank' filters were submitted for analysis in October. Fewer metals were detected on the blank filters, but iron, magnesium and zinc were still detected above the MDL. The implications of these detected parameters was evaluated by determining the incremental influence of the swipe concentrations relative to the sediment chemistry results; all parameters were estimated to contribute less than 0.01% to actual measured sediment metals concentrations. The potential for meaningful cross-contamination is considered negligible and DQOs were considered to be fully met.

3.1.4. Sediment Metals Bioavailability

Sediment Toxicity – Results of QA/QC for sediment toxicity testing showed that all the tests met the acceptability criteria for test validity specified in their respective protocols. The *Hyalella* tests performed met the survival and dry weight validity criteria. The *Chironomus* tests performed met the survival and dry weight validity criteria. All statistical and raw data for these tests are included in the report prepared by Maxxam (**Appendix G**).

Sediment Sequential Extraction – The sediment sequential extraction analyses that were conducted at Maxxam followed a three-step procedure that was performed on the aliquots of each of the sediment samples and the standard reference material BCR-701. Laboratory duplicates were analyzed for two of the three steps. These samples showed a high degree of consistency and precision (**Table 3.1–6**). In only two cases out of a possible 82 cases did the RPD slightly exceed 25% (i.e., cadmium and cobalt in step 1). Based on these results, DQOs were considered met for the sequential extraction analysis.

3.1.5. Phytoplankton

Between one and three field duplicate samples were collected for each sampling event. The field duplicates and laboratory QC duplicates were analyzed for the RPD in total density and total biomass between the original sample and the duplicate. RPD values were also calculated for the major taxa groups, but these results are not relied on for QC purposes because of the tendency for small differences in abundance/biomass between the original and the duplicate to cause large differences in the RPD. Thus, we evaluate the quality of these data based on total density and total biomass both for field and laboratory duplicates.

Results of the RPD analysis for all these parameters are presented in **Table 3.1–7** (field) and **Table 3.1–8** (laboratory) and are discussed below:

- **Field Duplicates** – The duplicate sample collected from INUG-69 exceeded the DQO of 50% for total biomass in May. The original sample had total biomass of 41 mg/m^3 compared to 75 mg/m^3 in the field duplicate. The differences between the two samples was mainly due to higher abundance (and biomass) of dinoflagellates in the field duplicate relative to the original sample. Other metrics, including total density, richness, and Simpson's diversity were well within the DQOs for this sample.

- **Laboratory Duplicates** – Duplicate re-counts were conducted on approximately 10% of the samples. No DQO exceedances were observed for the total density and total biomass endpoints. Similar to field duplicates, laboratory duplicates showed high within-taxa variability between the original sample and the laboratory duplicate.
- **Overall** – The 2015 results largely met the DQOs for this project, but illustrate the inherent difficulty homogenizing the samples (i.e., the effects of incomplete homogenization are exacerbated because of the relatively small number of plankters enumerated relative to the very large number of plankters present in the sample). However, total density and biomass did not differ in one direction or another for laboratory duplicates, indicating a lack of bias.

3.1.6. Benthic Invertebrates

Laboratory replicate counts were performed on 10% of all benthic samples. Replicate samples were chosen at random and processed at different times from the original analysis to reduce bias. Percent recovery was above 93% in all re-sorted samples, with an average percent recovery of approximately 97% (**Table 3.1–9**). These results suggest that the majority of individual are recovered by the taxonomist during enumeration. As in previous years, a reference collection of benthic taxa has been compiled.

3.1.7. QA/QC Summary

Below is a summary of field and sample QA/QC results for the 2015 CREMP program:

- Deviations from the proposed sampling plan:
    - Through-ice limnology profiling was not completed at TPE, TPN, WAL, and SP in February due to safety concerns around using the ice-auger at ice thickness greater than 5 feet. These safety concerns were largely addressed by AEM with the purchase of a new auguring system with a smaller diameter bit.
    - Only one of the two planned water chemistry and phytoplankton samples was collected at PDL in September due to deteriorating weather conditions (i.e., PDL-42-S was dropped).
    - Similarly, the Baker Lake areas were not sampled (water chemistry and phytoplankton) in the September event due to consistently bad weather conditions.
- Field duplicate samples collected for at least every 10 samples collected for each sampling event, with the exception of September for water chemistry and phytoplankton where two field duplicates were collected instead of three.
- Laboratory duplicates performed on 10% of samples received by the laboratory and reported for each dataset.
- De-ionized water (DI) blanks were submitted with the equipment blank samples collected in every sampling event. Results suggest there the water pumps as the likely source of some metals that are being detected periodically in the equipment blanks.
- Travel blanks were submitted for the August, September, and November sampling events. Multiple sampling programs were being conducted in tandem with routine CREMP sampling in 2015. No travel blanks were analyzed in May or July, but DI blanks were submitted in both events and all analytes were below the MDL.
- Lost, damaged, and or compromised data:

- Some specific conductance measurements collected by AEM in July and September were anomalous when compared to profiles taken at the replicate station/event (e.g., WAL-51-S and INUG-74-S) (**Table 3.2–1**). The data were not included in the depth profiles.
- Cooler temperatures continue exceed 10°C upon arrival at ALS. The effect on preserved samples is considered negligible, but for chlorophyll-*a* samples, the increase in temperature above 10°C means samples may arrive thawed. Keeping the chlorophyll-*a* samples frozen is a recurring challenge for this program given the logistics of shipping samples from Nunavut to Vancouver in a timely fashion.
- Several parameters were detected in the equipment blanks in 2015. Cross-contamination from the pump is likely cause, but the effect (bias) on interpretation of the data was considered negligible. A new pump set-up is being researched for use in the 2016 CREMP.
- Two phytoplankton samples collected from BAP in July were received by Plankton R Us with identical station names and IDs (BAP-38-S). The taxonomist was instructed to analyze the samples, one as BAP-38S1 and the other as BAP-38S2. Results for BAP-38S1 and BAP-38S2 were renamed as BAP-37 and BAP-38, respectively, to match with the correct sample names/locations for the July event.

Table 3.1–1. Laboratory detection limits, equipment blanks, and travel blanks for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Analyte	Month	Method Detection Limits											
		April		May		July		August		September		November	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Physical Tests													
Conductivity (µS/cm)		2	2	2	2	2	2	2	2	2	2	2	2
Hardness (mg/L)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
pH (Laboratory)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Suspended Solids (mg/L)		1	1	1	1	1	1	1	1	1	1	1	1
Total Dissolved Solids (mg/L)		3	3	3	10	3	10	3	10	3	3	3	3
Turbidity (NTU)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients (mg/L)													
Alkalinity, Bicarbonate (as $CaCO_3$)		2	2	2	2	1	2	1	1	1	1	1	1
Alkalinity, Carbonate (as $CaCO_3$)		2	2	2	2	1	2	1	1	1	1	1	1
Alkalinity, Hydroxide (as CaCO3)		2	2	2	2	1	2	1	1	1	1	1	1
Alkalinity, Total (as $CaCO_3$)		2	2	2	2	1	2	1	1	1	1	1	1
Ammonia, Total (as N)		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bromide (Br)		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.5
Fluoride (F)		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nitrate (as N)		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Orthophosphate-Dissolved (as P)		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Phosphorus (P)-Total Dissolved		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Phosphorus (P)-Total		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Silicate (as SiO_2)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sulfate (SO_4)		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Cyanides (mg/L)													
Total Cyanide		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Free Cyanide		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Organic / Inorganic Carbon (mg/L)													
Dissolved Organic Carbon		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Organic Carbon		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Plant Pigments (µg/L)													
Chlorophyll-a				0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Metals (mg/L)													
Aluminum		0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Antimony		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium		0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Bismuth		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium		0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Calcium		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chromium		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Cobalt		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Iron		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Lead		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Magnesium		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Mercury		0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Molybdenum		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Potassium		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Selenium		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Silicon		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Strontium		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Sulfur		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Thallium		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium		0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0009	0.0003	0.0003
Uranium		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc		0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Zirconium		-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Dissolved Metals (mg/L)													
Aluminum		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium		0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Bismuth		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Boron		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium		0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Calcium		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chromium		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Cobalt		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Iron		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Lead		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Magnesium		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manganese		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Mercury		0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Molybdenum		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Potassium		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Selenium		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Silicon		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Strontium		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Sulfur		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Thallium		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium		0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Uranium		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Zinc		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zirconium		-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003

Notes:

Bolded Equipment or Travel Blank values concentrations exceeds laboratory MDLs but < 10 x MDL.

Shaded Equipment or Travel Blank values concentrations is > 10 x MDL.

Italicized numbers are below detection limits.

Table 3.1–1. Laboratory detection limits, equipment blanks, and travel blanks for water parameters, Meadowbank study lakes and Baker Lake, 2015.

	Equipment & Deionized Water Blanks												
Month	APR DI-1	APR EB-1	MAY DI-1	MAY EB-1	JUL DI-1	JUL DI-2	JUL EB-1	JUL EB-2	AUG DI-1	AUG DI-2	AUG EB-1	AUG EB-2	SEP EB-1
Analyte	26-Apr-15	26-Apr-15	16-May-15	16-May-15	15-Jul-15	21-Jul-15	15-Jul-15	21-Jul-15	18-Aug-15	30-Aug-15	18-Aug-15	30-Aug-15	5-Sep-15
Physical Tests													
Conductivity (µS/cm)	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Hardness (mg/L)	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
pH (Laboratory)	5.52	5.62	5.71	6.18	5.46	5.35	5.77	5.41	5.5	5.42	5.32	5.36	5.63
Total Suspended Solids (mg/L)	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids (mg/L)	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*
Turbidity (NTU)	*<0.10*	**0.12**	**0.16**	**0.14**	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Anions and Nutrients (mg/L)													
Alkalinity, Bicarbonate (as $CaCO_3$)	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	**1.0**	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity, Carbonate (as $CaCO_3$)	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity, Hydroxide (as CaCO3)	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity, Total (as $CaCO_3$)	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	**1.0**	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Ammonia, Total (as N)	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	**0.0052**	*<0.0050*
Bromide (Br)	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride (Cl)	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Fluoride (F)	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*
Nitrate (as N)	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	**0.0058**
Nitrite (as N)	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Orthophosphate-Dissolved (as P)	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Dissolved	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	**0.0033**	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	**0.002**	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Silicate (as SiO_2)	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Sulfate (SO_4)	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*
Cyanides (mg/L)													
Total Cyanide	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)													
Dissolved Organic Carbon	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Total Organic Carbon	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Plant Pigments (µg/L)													
Chlorophyll-a	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals (mg/L)													
Aluminum	*<0.0030*	**0.0053**	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	**0.0077**	*<0.0030*	*<0.0030*	*<0.0030*	**0.0041**	*<0.0030*	**0.0057**
Antimony	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Barium	*<0.000050*	**0.00007**	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	**0.00009**	**0.000153**	*<0.000050*	**0.000063**	**0.000396**	*<0.000050*	**0.000115**
Beryllium	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	**0.116**
Chromium	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	**0.00011**	*<0.00010*	**0.00023**	*<0.00010*	*<0.00010*	*<0.00010*	**0.00013**
Cobalt	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	**0.00074**	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	**0.0006**
Iron	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	**0.012**	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead	*<0.000050*	*<0.000050*	*<0.000050*	**0.00006**	*<0.000050*	*<0.000050*	**0.00018**	**0.000059**	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	**0.000243**
Lithium	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Manganese	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	**0.00025**	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	**0.00011**	**0.00018**
Mercury	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Nickel	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Selenium	*<0.000050*	*<0.00020*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon	*<0.050*	*<0.000050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Silver	*<0.000010*	*<0.050*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium	*<0.050*	*<0.000010*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Strontium	*<0.00020*	*<0.050*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	**0.00045**
Sulfur	*<0.50*	*<0.00020*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Thallium	*<0.000010*	*<0.50*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin	*<0.00010*	*<0.000010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium	*<0.00030*	*<0.00010*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	*<0.000010*	*<0.00030*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Vanadium	*<0.00050*	*<0.000010*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc	*<0.0030*	*<0.00050*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium		*<0.0030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)													
Aluminum	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	**0.0016**	*<0.0010*	*<0.0010*
Antimony	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Barium	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	**0.000076**	**0.000246**	*<0.000050*	**0.000064**
Beryllium	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chromium	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	**0.00033**	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*
Iron	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.00169	*<0.000050*	*<0.000050*
Lithium	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Manganese	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	**0.00015**	*<0.00010*	*<0.00010*
Mercury	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Nickel	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Selenium	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Silver	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Strontium	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*
Sulfur	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Thallium	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Vanadium	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	**0.0019**	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium	-	-	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

Bolded Equipment or Travel Blank values concentrations exceeds laboratory MDLs but < 10 x MDL.

Shaded Equipment or Travel Blank values concentrations is > 10 x MDL.

Italicized numbers are below detection limits.

Table 3.1–1. Laboratory detection limits, equipment blanks, and travel blanks for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Analyte \ Month	Equipment & Deionized Water Blanks				Travel Blanks		
	SEP DI-1	SEP EB-3	NOV DI-1	NOV EB-1	AUG TRAV-1	SEPT TRAV-1	NOV TRAV-1
	5-Sep-15	30-Sep-15	1-Nov-15	1-Nov-15			
Physical Tests							
Conductivity (µS/cm)	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Hardness (mg/L)	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	
pH (Laboratory)	5.42	5.58	5.42	5.35	5.95	5.34	5.44
Total Suspended Solids (mg/L)	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids (mg/L)	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*	*<3.0*
Turbidity (NTU)	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Anions and Nutrients (mg/L)							
Alkalinity, Bicarbonate (as $CaCO_3$)	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity, Carbonate (as $CaCO_3$)	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity, Hydroxide (as CaCO3)	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity, Total (as $CaCO_3$)	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Ammonia, Total (as N)	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	
Bromide (Br)	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride (Cl)	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Fluoride (F)	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*
Nitrate (as N)	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Nitrite (as N)	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	
Orthophosphate-Dissolved (as P)	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Dissolved	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	
Silicate (as SiO_2)	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Sulfate (SO_4)	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*
Cyanides (mg/L)							
Total Cyanide	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	
Free Cyanide	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)							
Dissolved Organic Carbon	*<0.50*	*<0.50*	*<0.50*	*<0.50*	-	-	
Total Organic Carbon	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	
Plant Pigments (µg/L)							
Chlorophyll-a	-	-	-	-	-	-	
Total Metals (mg/L)							
Aluminum	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	
Antimony	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	
Arsenic	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	
Barium	*<0.000050*	**0.000107**	*<0.000050*	**0.000059**	*<0.000050*	*<0.000050*	
Beryllium	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	
Bismuth	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	
Boron	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	
Cadmium	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	
Calcium	*<0.050*	**0.089**	*<0.050*	*<0.050*	*<0.050*	*<0.050*	
Chromium	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	
Cobalt	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	
Copper	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	
Iron	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	
Lead	*<0.000050*	**0.000088**	*<0.000050*	**0.000107**	*<0.000050*	*<0.000050*	
Lithium	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	
Magnesium	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	
Manganese	*<0.00010*	*<0.00010*	*<0.00010*	**0.00017**	*<0.00010*	*<0.00010*	
Mercury	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	
Molybdenum	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	
Nickel	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	
Phosphorus	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	
Potassium	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	
Selenium	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	
Silicon	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	
Silver	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	
Sodium	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	
Strontium	*<0.00020*	**0.00027**	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*	
Sulfur	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	
Thallium	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	
Tin	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	
Titanium	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	
Uranium	*<0.000010*	**0.000012**	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	
Vanadium	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	
Zinc	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	
Zirconium	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	
Dissolved Metals (mg/L)							
Aluminum	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*			
Antimony	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*			
Arsenic	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*			
Barium	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*			
Beryllium	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*			
Bismuth	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*			
Boron	*<0.010*	*<0.010*	*<0.010*	*<0.010*			
Cadmium	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*			
Calcium	*<0.050*	*<0.050*	*<0.050*	*<0.050*			
Chromium	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*			
Cobalt	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*			
Copper	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*			
Iron	*<0.010*	*<0.010*	*<0.010*	*<0.010*			
Lead	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*			
Lithium	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*			
Magnesium	*<0.10*	*<0.10*	*<0.10*	*<0.10*			
Manganese	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*			
Mercury	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*			
Molybdenum	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*			
Nickel	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*			
Phosphorus	*<0.050*	*<0.050*	*<0.050*	*<0.050*			
Potassium	*<0.10*	*<0.10*	*<0.10*	*<0.10*			
Selenium	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*			
Silicon	*<0.050*	*<0.050*	*<0.050*	*<0.050*			
Silver	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*			
Sodium	*<0.050*	*<0.050*	*<0.050*	*<0.050*			
Strontium	*<0.00020*	*<0.00020*	*<0.00020*	*<0.00020*			
Sulfur	*<0.50*	*<0.50*	*<0.50*	*<0.50*			
Thallium	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*			
Tin	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*			
Titanium	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*			
Uranium	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*			
Vanadium	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*			
Zinc	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*			
Zirconium	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*			

Notes:

Bolded Equipment or Travel Blank values concentrations exceeds laboratory MDLs but < 10 x MDL.

Shaded Equipment or Travel Blank values concentrations is > 10 x MDL.

Italicized numbers are below detection limits.

Table 3.1–2. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month	May				July						
	May MDLs	Inuggugayualik Lake			July MDLs	Wally Lake			Baker Lake - Akilahaarjuk Point		
Analyte		INUG-69-S	May DUP-1	RPD		WAL-51-S	Jul DUP-1	RPD	BAP-37-S	Jul DUP-2	RPD
Physical Tests											
Conductivity (µS/cm)	2	21.4	21.9	-2.3	2	33.1	32.8	0.9	56.4	56.6	-0.4
Hardness (mg/L)	0.5	7.67	7.84	-2.2	0.5	15.00	13.90	7.6	12.90	13.00	-0.8
pH (Laboratory)	0.1	6.83	6.86	-0.4	0.1	7.48	7.30	2.4	7.12	7.13	-0.1
Total Suspended Solids (mg/L)	1	*<1.0*	*<1.0*		1	*<1.0*	*<1.0*		1.1	*<1.0*	
Total Dissolved Solids (mg/L)	3	19.8	19.3	2.6	3	23.7	22.6	4.8	39.0	41.0	-5.0
Turbidity (NTU)	0.1	0.14	0.16	-13	0.1	0.35	0.24	37	0.30	0.26	14
Anions and Nutrients (mg/L)											
Alkalinity, Bicarbonate (as $CaCO_3$)	2	7	7	-7.3	1	12	11	1.8	9	9	1.1
Alkalinity, Carbonate (as $CaCO_3$)	2	*<2.0*	*<2.0*		1	*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Alkalinity, Hydroxide (as CaCO3)	2	*<2.0*	*<2.0*		1	*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Alkalinity, Total (as $CaCO_3$)	2	7	7	-7.3	1	12	11	1.8	9	9	1.1
Ammonia, Total (as N)	0.005	0.0180	0.0168	6.9	0.005	0.0115	*<0.0050*		0.0074	*<0.0050*	
Bromide (Br)	0.05	*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Chloride (Cl)	0.1	1.02	1.04	-1.9	0.1	0.60	0.60	0	9.58	9.56	0.2
Fluoride (F)	0.02	0.075	0.077	-2.6	0.02	0.039	0.039	0	0.052	0.053	-1.9
Nitrate (as N)	0.005	0.0061	*<0.0050*		0.005	*<0.0050*	*<0.0050*		0.0276	0.0275	0.4
Nitrite (as N)	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Total Kjeldahl Nitrogen	0.05	0.169	0.161	4.8	0.05	0.2	0.16	8.5	0.19	0.20	-8.2
Orthophosphate-Dissolved (as P)	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		*<0.0010*	0.0012	
Phosphorus (P)-Total Dissolved	0.002	*<0.0020*	0.0032		0.002	*<0.0020*	*<0.0020*		0.0024	0.0045	**-61**
Phosphorus (P)-Total	0.002	*<0.0020*	*<0.0020*		0.002	0.0026	0.0032	-21	0.0038	0.004	-5.1
Silicate (as SiO_2)	0.5	*<0.50*	*<0.50*		0.5	0.87	0.83	4.7	*<0.50*	*<0.50*	
Sulfate (SO_4)	0.3	1.28	1.30	-1.6	0.3	2.98	3.00	-0.7	1.85	1.84	0.5
Cyanides (mg/L)											
Total Cyanide	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Free Cyanide	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)											
Dissolved Organic Carbon	0.5	1.95	2.07	-6.0	0.5	1.97	1.86	5.7	3.10	3.00	3.3
Total Organic Carbon	0.5	2.35	2.01	16	0.5	1.94	2.08	-7.0	3.09	3.07	0.6
Plant Pigments (µg/L)											
Chlorophyll-a	0	0.201	0.303	-40	0.01	0.258	0.416	-47	0.489	0.413	17
Total Metals (mg/L)											
Aluminum	0.003	*<0.0030*	*<0.0030*		0.003	0.0086	0.0123	-35	0.0126	0.0136	-7.6
Antimony	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	0.0001	0.00010	*<0.00010*		0.0001	0.00024	0.00024	0	0.00011	0.00012	-8.7
Barium	0.00005	0.00231	0.00244	-5.5	0.00005	0.00236	0.00252	-6.6	0.01740	0.01710	1.7
Beryllium	0.00002	*<0.000020*	*<0.000020*		0.00002	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	0.01	*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	0.0000051		*<0.0000050*	*<0.0000050*	
Calcium	0.05	1.56	1.60	-2.5	0.05	4.06	3.82	6.1	2.59	2.57	0.8
Chromium	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Cobalt	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	0.0005	0.00057	0.00056	1.8	0.0005	0.00091	0.00092	-1.1	*<0.00050*	*<0.00050*	
Iron	0.01	*<0.010*	*<0.010*		0.01	0.019	0.028	-38	0.021	0.02	4.9
Lead	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		0.00100	0.00100	0
Magnesium	0.1	0.95	0.96	-1.0	0.1	1.13	1.10	2.7	1.53	1.50	2.0
Manganese	0.0001	0.00043	0.00043	0	0.0001	0.00232	0.00299	-25	0.00421	0.00428	-1.6
Mercury	0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Molybdenum	0.00005	*<0.000050*	*<0.000050*		0.00005	0.000152	0.000136	11	*<0.000050*	*<0.000050*	
Nickel	0.0005	*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Phosphorus	0.05	*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	0.1	0.51	0.52	-1.9	0.1	0.45	0.42	6.9	0.59	0.63	-6.6
Selenium	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	0.05	0.144	0.147	-2.1	0.05	0.347	0.364	-4.8	0.181	0.179	1.1
Silver	0.00001	*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	0.05	0.72	0.72	-0.6	0.05	0.54	0.54	0.4	5.06	4.92	2.8
Strontium	0.0002	0.0095	0.0094	0.4	0.0002	0.0201	0.0187	7.2	0.0201	0.0200	0.5
Sulfur	0.5	*<0.50*	0.51		0.5	1.14	1.00	13	0.62	0.65	-4.7
Thallium	0.00001	*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	0.0003	*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	0.00001	0.000050	0.000045	11	0.00001	0.000059	0.000051	15	0.000036	0.000034	5.7
Vanadium	0.0005	*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	0.003	*<0.0030*	*<0.0030*		0.003	*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*	
Zirconium	0.0003	*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Dissolved Metals (mg/L)											
Aluminum	0.001	*<0.0010*	0.0012		0.001	0.0029	0.0030	-3.4	0.0050	0.0035	35
Antimony	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	0.0001	*<0.00010*	*<0.00010*		0.0001	0.00022	0.00021	4.7	*<0.00010*	*<0.00010*	
Barium	0.00005	0.00239	0.00243	-1.7	0.00005	0.00226	0.00211	6.9	0.01740	0.01710	1.7
Beryllium	0.00002	*<0.000020*	*<0.000020*		0.00002	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	0.01	*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	0.05	1.55	1.59	-2.5	0.05	4.10	3.80	7.6	2.61	2.62	-0.4
Chromium	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Cobalt	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	0.0002	0.00047	0.00044	6.6	0.0002	0.00080	0.00084	-4.9	0.00022	*<0.00020*	
Iron	0.01	*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Lead	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Magnesium	0.1	0.92	0.94	-2.2	0.1	1.15	1.08	6.3	1.55	1.56	-0.6
Manganese	0.0001	*<0.00010*	0.00010		0.0001	0.00129	0.00165	-24	0.00264	0.00254	3.9
Mercury	0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Molybdenum	0.00005	*<0.000050*	*<0.000050*		0.00005	0.000142	0.000092	43	*<0.000050*	*<0.000050*	
Nickel	0.0005	*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Phosphorus	0.05	*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	0.1	0.49	0.49	0	0.1	0.42	0.40	4.9	0.57	0.57	0
Selenium	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	0.05	0.147	0.137	7.0	0.05	0.343	0.354	-3.2	0.160	0.161	-0.6
Silver	0.00001	*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	0.05	0.70	0.71	-0.3	0.05	0.53	0.53	0.2	5.09	5.13	-0.8
Strontium	0.0002	0.0091	0.00914	-0.7	0.0002	0.0194	0.01810	6.9	0.0199	0.01990	0
Sulfur	0.5	*<0.50*	*<0.50*		0.5	1.11	1.00	10	0.63	0.63	0
Thallium	0.00001	*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	0.0003	*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	0.00001	0.000040	0.000039	2.5	0.00001	0.000054	0.000043	23	0.000031	0.000031	0
Vanadium	0.0005	*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Zirconium	0.0003	*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs are calculated when both samples are above detection.

The data quality objective (DQO) for field duplicates is an RPD < 50%.

Bolded RPDs	RPD values exceed 50% but < 10 x MDL.
Shaded RPD	RPD values exceed 50% and > 10 x MDL.

- = no measurement

Italicized numbers are below detection limits.

Table 3.1–2. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month		August								
	Aug MDLs	Baker Lake - Akilahaarjuk Point			Third Portage Lake - East Basin			Third Portage Lake - North Basin		
Analyte		BAP-40	Aug DUP-1	RPD	TPE-84	Aug DUP-2	RPD	TPN-84	Aug DUP-3	RPD
Physical Tests										
Conductivity (µS/cm)	2	138.0	136.0	1.5	29.6	29.4	0.7	27.6	27.7	-0.4
Hardness (mg/L)	0.5	19.40	19.50	-0.5	10.8	10.6	1.9	9.12	9.20	-0.9
pH (Laboratory)	0.1	7.02	6.95	1.0	7.08	7.05	0.4	6.97	6.98	-0.1
Total Suspended Solids (mg/L)	1	*<1.0*	*<1.0*		*<1.0*	*<1.0*		*<1.0*	*<1.0*	
Total Dissolved Solids (mg/L)	3	82.0	75.0	8.9	21.7	18.7	15	14.3	20.7	-37
Turbidity (NTU)	0.1	0.31	0.28	10	0.26	0.23	12	0.24	0.24	0
Anions and Nutrients (mg/L)										
Alkalinity, Bicarbonate (as $CaCO_3$)	1	8	8	0	7.1	7.0	1.4	5.8	5.4	7.1
Alkalinity, Carbonate (as $CaCO_3$)	1	*<1.0*	*<1.0*		*<1.0*	*<1.0*		*<1.0*	*<1.0*	
Alkalinity, Hydroxide (as CaCO3)	1	*<1.0*	*<1.0*		*<1.0*	*<1.0*		*<1.0*	*<1.0*	
Alkalinity, Total (as $CaCO_3$)	1	8	8	0	7.1	7.0	1.4	5.8	5.4	7.1
Ammonia, Total (as N)	0.005	0.0069	*<0.0050*		*<0.0050*	0.007		*<0.0050*	*<0.0050*	
Bromide (Br)	0.05	0.117	0.116	0.9	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Chloride (Cl)	0.1	32.00	32.10	-0.3	0.71	0.71	0	0.75	0.75	0
Fluoride (F)	0.02	0.054	0.054	0	0.070	0.071	-1.4	0.062	0.063	-1.6
Nitrate (as N)	0.005	0.0108	0.0103	4.7	0.0144	0.0111	26	0.0522	0.0522	0
Nitrite (as N)	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Total Kjeldahl Nitrogen	0.05	0.14	0.15	-0.7	0.11	0.11	-1.9	0.09	0.10	-5.2
Orthophosphate-Dissolved (as P)	0.001	*<0.0010*	0.0012		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Phosphorus (P)-Total Dissolved	0.002	0.0020	0.0021	-4.9	*<0.0020*	*<0.0020*		0.0021	*<0.0020*	
Phosphorus (P)-Total	0.002	*<0.0020*	*<0.0020*		*<0.0020*	*<0.0020*		*<0.0020*	*<0.0020*	
Silicate (as SiO_2)	0.5	*<0.50*	*<0.50*		*<0.50*	*<0.50*		*<0.50*	*<0.50*	
Sulfate (SO_4)	0.3	5.12	5.14	-0.4	4.61	4.58	0.7	4.86	4.88	-0.4
Cyanides (mg/L)										
Total Cyanide	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Free Cyanide	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)										
Dissolved Organic Carbon	0.5	2.99	2.84	5.1	1.38	1.16	17	1.19	1.15	3.4
Total Organic Carbon	0.5	3.07	2.72	12	1.39	1.38	0.7	1.23	1.38	-11
Plant Pigments (µg/L)										
Chlorophyll-a	0.01	0.847	0.869	-2.6	0.503	0.478	5.1	0.450	0.461	-2.4
Total Metals (mg/L)										
Aluminum	0.003	0.0125	0.014	-11	0.0069	0.0076	-9.7	0.0067	0.0066	1.5
Antimony	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	0.0001	0.00012	0.00013	-8.0	0.00042	0.00045	-6.9	0.00018	0.00015	18
Barium	0.00005	0.01770	0.01750	1.1	0.00310	0.00296	4.6	0.00307	0.00300	2.3
Beryllium	0.00002	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	0.01	0.012	0.012	0	*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	0.05	3.05	3.01	1.3	2.69	2.60	3.4	2.19	2.16	1.4
Chromium	0.0001	0.00024	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	0.00015	
Cobalt	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Iron	0.01	0.041	0.019	**73**	*<0.010*	*<0.010*		*<0.010*	0.014	
Lead	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	0.001	0.00110	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Magnesium	0.1	2.97	2.88	3.1	0.97	0.94	3.1	0.88	0.86	2.3
Manganese	0.0001	0.00380	0.00375	1.3	0.00112	0.00115	-2.6	0.00149	0.00143	4.1
Mercury	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Molybdenum	0.00005	0.000069	0.000061	12	0.00019	0.00018	2.2	0.000192	0.000175	9.3
Nickel	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Phosphorus	0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	0.1	1.05	1.01	3.9	0.51	0.49	4.0	0.50	0.47	6.2
Selenium	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	0.05	0.143	0.143	0	0.059	0.062	-5.0	0.059	0.051	15
Silver	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	0.05	17.10	16.00	6.6	1.05	1.01	3.9	1.14	1.14	0
Strontium	0.0002	0.0276	0.0275	0.4	0.0116	0.0112	3.5	0.0109	0.0109	0
Sulfur	0.5	1.92	1.77	8.1	1.59	1.59	0	1.70	1.64	3.6
Thallium	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	0.00001	0.000041	0.000038	7.6	0.000058	0.000056	3.5	0.000044	0.000046	-4.4
Vanadium	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	0.003	*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*	
Zirconium	0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Dissolved Metals (mg/L)										
Aluminum	0.001	0.0059	0.0036	48	0.0032	0.0034	-6.1	0.0030	0.0029	3.4
Antimony	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	0.0001	0.00011	0.00011	0	0.00046	0.00047	-2.2	0.00016	0.00018	-12
Barium	0.00005	0.01740	0.01730	0.6	0.00298	0.00294	1.4	0.00322	0.00297	8.1
Beryllium	0.00002	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	0.05	3.02	3.03	-0.3	2.69	2.67	0.7	2.21	2.23	-0.9
Chromium	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Cobalt	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	0.0002	0.00028	0.00026	7.4	0.00036	0.00036	0	0.00033	0.00035	-5.9
Iron	0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Lead	0.00005	*<0.000050*	0.000085		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	0.001	0.00120	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Magnesium	0.1	2.89	2.90	-0.3	0.98	0.95	3.1	0.87	0.88	-1.1
Manganese	0.0001	0.00049	0.00046	6.3	0.00057	0.00055	3.6	0.00090	0.00100	-11
Mercury	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Molybdenum	0.00005	0.000053	*<0.000050*		0.000177	0.000189	-6.6	0.000179	0.000174	2.8
Nickel	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Phosphorus	0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	0.1	1.00	1.01	-1.0	0.52	0.49	5.9	0.47	0.47	0
Selenium	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	0.05	0.122	0.124	-1.6	*<0.050*	0.051		*<0.050*	0.055	
Silver	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	0.05	16.00	15.90	0.6	1.01	0.99	1.8	1.11	1.05	5.6
Strontium	0.0002	0.0271	0.02690	0.7	0.01130	0.01110	1.8	0.0107	0.01060	0.9
Sulfur	0.5	1.80	1.68	6.9	1.58	1.56	1.3	1.63	1.63	0
Thallium	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	0.00001	0.000034	0.000034	0	0.000049	0.000049	0	0.000039	0.000041	-5.0
Vanadium	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Zirconium	0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs are calculated when both samples are above detection.

The data quality objective (DQO) for field duplicates is an RPD < 50%.

Bolded RPDs RPD values exceed 50% but < 10 x MDL.

Shaded RPD RPD values exceed 50% and > 10 x MDL.

- = no measurement

Italicized numbers are below detection limits.

Table 3.1–2. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month	September							November			
	Sept MDLs	Third Portage Lake - East Basin			Pipedream Lake			Nov MDLs	Tehek Lake		
Analyte		TPE-86	Sept DUP-2	RPD	PDL-41	Sept DUP-3	RPD		TE-88	Nov DUP-1	RPD
Physical Tests											
Conductivity (µS/cm)	2	28.9	29.6	-2.4	23.0	22.2	3.5	2	20.0	19.7	1.5
Hardness (mg/L)	0.5	10.40	10.60	-1.9	8.91	9.07	-1.8	0.5	7.19	7.15	0.6
pH (Laboratory)	0.1	6.98	6.96	0.3	7.07	7.03	0.6	0.1	6.85	6.82	0.4
Total Suspended Solids (mg/L)	1	*<1.0*	*<1.0*		*<1.0*	*<1.0*		1	*<1.0*	*<1.0*	
Total Dissolved Solids (mg/L)	3	27.9	29.9	-6.9	17.8	17.7	0.6	3	14.3	14.8	-3.4
Turbidity (NTU)	0.1	0.40	0.38	5.1	0.23	0.27	-16	0.1	0.24	0.24	0.0
Anions and Nutrients (mg/L)											
Alkalinity, Bicarbonate (as $CaCO_3$)	1	8	7	10	8	8	7.6	1	6	6	-3.5
Alkalinity, Carbonate (as $CaCO_3$)	1	*<1.0*	*<1.0*		*<1.0*	*<1.0*		1	*<1.0*	*<1.0*	
Alkalinity, Hydroxide (as CaCO3)	1	*<1.0*	*<1.0*		*<1.0*	*<1.0*		1	*<1.0*	*<1.0*	
Alkalinity, Total (as $CaCO_3$)	1	8	7	10	8	8	7.6	1	6	6	-3.5
Ammonia, Total (as N)	0.005	*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*		0.005	0.0056	*<0.0050*	
Bromide (Br)	0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*	
Chloride (Cl)	0.1	0.70	0.70	0	0.60	0.60	0	0.1	0.61	0.61	0.0
Fluoride (F)	0.02	0.073	0.073	0	0.035	0.036	-2.8	0.02	0.058	0.058	0.0
Nitrate (as N)	0.005	0.0085	0.0088	-3.5	*<0.0050*	*<0.0050*		0.005	*<0.0050*	*<0.0050*	
Nitrite (as N)	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Total Kjeldahl Nitrogen	0.05	0.11	0.11	-4.6	0.17	0.10	**50**	0.05	0.11	0.10	11.4
Orthophosphate-Dissolved (as P)	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Phosphorus (P)-Total Dissolved	0.002	*<0.0020*	*<0.0020*		*<0.0020*	*<0.0020*		0.002	*<0.0020*	*<0.0020*	
Phosphorus (P)-Total	0.002	0.0021	*<0.0020*		*<0.0020*	*<0.0020*		0.002	*<0.0020*	0.0028	
Silicate (as SiO_2)	0.5	*<0.50*	*<0.50*		*<0.50*	*<0.50*		0.5	*<0.50*	*<0.50*	
Sulfate (SO_4)	0.3	4.59	4.60	-0.2	1.63	1.61	1.2	0.3	2.27	2.27	0.0
Cyanides (mg/L)											
Total Cyanide	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Free Cyanide	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)											
Dissolved Organic Carbon	1	1.53	1.41	8.2	1.45	1.57	-7.9	0.5	1.17	1.13	3.5
Total Organic Carbon	1	1.42	1.37	3.6	1.64	1.50	8.9	0.5	1.72	1.11	43.1
Plant Pigments (µg/L)											
Chlorophyll-a	0.01	0.330	0.322	2.5	0.346	0.316	9.1	0.01	0.782	0.971	-21.6
Total Metals (mg/L)											
Aluminum	0.003	0.0113	0.0099	13	0.0059	0.0049	19	0.003	0.0063	0.0059	6.6
Antimony	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Arsenic	0.0001	0.00044	0.00041	7.1	0.00016	0.00016	0	0.0001	*<0.00010*	*<0.00010*	
Barium	0.00005	0.00301	0.00293	2.7	0.00202	0.00192	5.1	0.00005	0.00219	0.00208	5.2
Beryllium	0.00002	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		0.00002	*<0.000020*	*<0.000020*	
Bismuth	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Boron	0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*	
Cadmium	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*	
Calcium	0.05	2.65	2.62	1.1	2.24	2.23	0.4	0.05	1.81	1.74	3.9
Chromium	0.0001	0.0001	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	0.00024	0.00013	**59.5**
Cobalt	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Copper	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*	
Iron	0.01	0.019	0.017	11	0.012	*<0.010*		0.01	0.014	*<0.010*	
Lead	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Lithium	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Magnesium	0.1	0.98	0.97	1.0	0.80	0.78	2.5	0.1	0.79	0.65	19.4
Manganese	0.0001	0.00136	0.00128	6.1	0.00147	0.00140	4.9	0.0001	0.00086	0.00065	27.8
Mercury	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*	
Molybdenum	0.00005	0.000194	0.000176	9.7	*<0.000050*	*<0.000050*		0.00005	0.000199	0.000058	**109.7**
Nickel	0.0005	*<0.00050*	*<0.00050*		0.00055	0.00058	-5.3	0.0005	*<0.00050*	*<0.00050*	
Phosphorus	0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*	
Potassium	0.1	0.55	0.52	5.6	0.35	0.35	0	0.1	0.40	0.37	7.8
Selenium	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Silicon	0.05	0.062	0.057	8.4	0.118	0.119	-0.8	0.05	0.130	0.122	6.3
Silver	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*	
Sodium	0.05	1.09	1.05	3.7	0.51	0.48	6.7	0.05	0.64	0.61	4.2
Strontium	0.0002	0.0118	0.0113	4.3	0.0095	0.0092	3.1	0.0002	0.0095	0.0084	12.5
Sulfur	0.5	1.54	1.55	-0.6	0.64	0.61	4.8	0.5	0.84	0.83	1.2
Thallium	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*	
Tin	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Titanium	0.0003	0.00039	0.00035	11	*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*	
Uranium	0.00001	0.000050	0.000047	6.2	0.000021	0.000021	0	0.00001	0.000039	0.000040	-2.5
Vanadium	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*	
Zinc	0.003	*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*		0.003	*<0.0030*	*<0.0030*	
Zirconium	0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*	
Dissolved Metals (mg/L)											
Aluminum	0.001	0.0020	0.0018	11	0.0036	0.0019	**62**	0.001	0.0019	0.0022	-14.6
Antimony	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Arsenic	0.0001	0.00038	0.00038	0	0.00014	0.00013	7.4	0.0001	*<0.00010*	*<0.00010*	
Barium	0.00005	0.00281	0.00287	-2.1	0.00194	0.00182	6.4	0.00005	0.00217	0.00209	3.8
Beryllium	0.00002	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		0.00002	*<0.000020*	*<0.000020*	
Bismuth	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Boron	0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*	
Cadmium	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*	
Calcium	0.05	2.59	2.65	-2.3	2.26	2.31	-2.2	0.05	1.78	1.71	4.0
Chromium	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Cobalt	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Copper	0.0002	0.00035	0.00035	0	0.00048	0.00041	16	0.0002	0.00040	0.00028	35.3
Iron	0.01	*<0.010*	*<0.010*		*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*	
Lead	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	0.000076		0.00005	*<0.000050*	*<0.000050*	
Lithium	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Magnesium	0.1	0.95	0.96	-1.0	0.79	0.80	-1.3	0.1	0.67	0.70	-4.4
Manganese	0.0001	0.00029	0.00046	-45	0.00043	0.00037	15	0.0001	*<0.00010*	0.00017	
Mercury	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*	
Molybdenum	0.00005	0.000169	0.000177	-4.6	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Nickel	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	0.00053		0.0005	*<0.00050*	*<0.00050*	
Phosphorus	0.05	*<0.050*	*<0.050*		*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*	
Potassium	0.1	0.51	0.51	0	0.32	0.34	-6.1	0.1	0.37	0.38	-2.7
Selenium	0.00005	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Silicon	0.05	*<0.050*	*<0.050*		0.107	0.106	0.9	0.05	0.116	0.121	-4.2
Silver	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*	
Sodium	0.05	1.03	1.07	-3.8	0.50	0.49	2.2	0.05	0.63	0.60	5.5
Strontium	0.0002	0.0112	0.01140	-1.8	0.0090	0.00908	-0.4	0.0002	0.0089	0.00797	10.9
Sulfur	0.5	1.54	1.53	0.7	0.59	0.57	3.4	0.5	0.82	0.78	5.0
Thallium	0.00001	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*	
Tin	0.0001	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Titanium	0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*	
Uranium	0.00001	0.000039	0.000041	-5.0	0.000018	0.000018	0	0.00001	0.000032	0.000030	6.5
Vanadium	0.0005	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*	
Zinc	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Zirconium	0.0003	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*	

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs are calculated when both samples are above detection.

The data quality objective (DQO) for field duplicates is an RPD < 50%.

Bolded RPDs RPD values exceed 50% but < 10 x MDL.

Shaded RPD RPD values exceed 50% and > 10 x MDL.

- = no measurement

Italicized numbers are below detection limits.

Table 3.1–3. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month		April				May				July			
ALS Report Number			L1606607				L1615889				L1647197		
Analyte	Laboratory DQOs[1]	April MDLs	Original	Lab Dup	RPD[2] or Diff[3]	May MDLs	Original	Lab Dup	RPD[2] or Diff[3]	July MDLs	Original	Lab Dup	RPD[2] or Diff[3]
Physical Tests													
Conductivity (µS/cm)	10	2				2				2	35.0	35.1	-0.3
Hardness (mg/L)	25	0.5				0.5				0.5			
pH (Laboratory)	0.3	0.1				0.1				0.1	7.29	7.31	0.02
Total Suspended Solids (mg/L	20	1				1				1			
Total Dissolved Solids (mg/L)	20	3				3				3	20.9	18.4	12.7
Turbidity (NTU)	15	0.1	0.12	0.13	-8.0	0.1	0.18	0.17	5.7	0.1			
Anions and Nutrients (mg/L)													
Alkalinity, Bicarbonate (as Ca	20	2				2				1			
Alkalinity, Carbonate (as CaC	20	2				2				1			
Alkalinity, Hydroxide (as CaC	20	2				2				1			
Alkalinity, Total (as $CaCO_3$)	20	2				2				1	11.0	11.1	-0.9
Ammonia, Total (as N)	20	0.005	*<0.0050*	*<0.0050*		0.005	0.0212	0.0247	-15.3	0.005			
Bromide (Br)	20	0.05				0.05	*<0.050*	*<0.050*		0.05			
Chloride (Cl)	20	0.1				0.1	*<0.10*	*<0.10*		0.1			
Fluoride (F)	20	0.02				0.02	*<0.020*	*<0.020*		0.02			
Nitrate (as N)	20	0.005				0.005	*<0.0050*	*<0.0050*		0.005			
Nitrite (as N)	20	0.001				0.001	*<0.0010*	*<0.0010*		0.001			
Total Kjeldahl Nitrogen	20	0.05				0.05	0.152	0.158	-3.9	0.05			
Orthophosphate (as P)	20	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Phosphorus (P)-Total Diss.	20	0.002	*<0.0020*	*<0.0020*		0.002	*<0.0020*	*<0.0020*		0.002			
Phosphorus (P)-Total	20	0.002	*<0.0020*	*<0.0020*		0.002				0.002			
Silicate (as SiO_2)	20	0.5	*<0.50*	*<0.50*		0.5	0.54	0.58	-7.1	0.5	0.66	0.63	4.7
Sulfate (SO_4)	20	0.3				0.3	*<0.30*	*<0.30*		0.3			
Cyanides (mg/L)													
Total Cyanide	20	0.001				0.001	*<0.0010*	*<0.0010*		0.001			
Free Cyanide	20	0.001				0.001	*<0.0010*	*<0.0010*		0.001			
Organic / Inorganic Carbon (mg/L)													
Dissolved Organic Carbon	20	0.5				0.5				0.5	1.84	1.88	-2.2
Total Organic Carbon	20	0.5				0.5				0.5	1.84	1.77	3.9
Plant Pigments (µg/L)													
Chlorophyll-a	35	0								0.01			
Total Metals (mg/L)													
Aluminum	20	0.003	0.0053	0.0051	3.8	0.003	*<0.0030*	*<0.0030*		0.003			
Antimony	20	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		0.0001			
Arsenic	20	0.0001	*<0.00010*	*<0.00010*		0.0001	0.00015	0.00015	0.0	0.0001			
Barium	20	0.00005	0.000066	0.000061	7.9	0.00005	0.00377	0.00394	-4.4	0.00005			
Beryllium	20	0.00002	*<0.000020*	*<0.000020*		0.00002	*<0.000020*	*<0.000020*		0.00002			
Bismuth	20	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		0.00005			
Boron	20	0.01	*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*		0.01			
Cadmium	20	0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		0.000005			
Calcium	20	0.05	*<0.050*	*<0.050*		0.05	2.81	2.78	1.1	0.05			
Chromium	20	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		0.0001			
Cobalt	20	0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*		0.0001			
Copper	20	0.0005	*<0.00050*	*<0.00050*		0.0005	0.00063	0.00057	10.0	0.0005			
Iron	20	0.01	*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*		0.01			
Lead	20	0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*		0.00005			
Lithium	20	0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*		0.001			
Magnesium	20	0.1	*<0.10*	*<0.10*		0.1	1.08	1.06	1.9	0.1			
Manganese	20	0.0001	*<0.00010*	*<0.00010*		0.0001	0.00044	0.00053	-18.6	0.0001			
Mercury	20	0.000005				0.000005				0.000005			
Molybdenum	20	0.00005	*<0.000050*	*<0.000050*		0.00005	0.000094	0.000069	0.0	0.00005			
Nickel	20	0.0005	*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*		0.0005			
Phosphorus	20	0.05	*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*		0.05			
Potassium	20	0.1	*<0.10*	*<0.10*		0.1	0.65	0.64	1.6	0.1			
Selenium	20	0.00005	*<0.00020*	*<0.00020*		0.00005	*<0.000050*	*<0.000050*		0.00005			
Silicon	20	0.05	*<0.000050*	*<0.000050*		0.05	0.207	0.203	2.0	0.05			
Silver	20	0.00001	*<0.050*	*<0.050*		0.00001	*<0.000010*	*<0.000010*		0.00001			
Sodium	20	0.05	*<0.000010*	*<0.000010*		0.05	1.01	1.09	-7.6	0.05			
Strontium	20	0.0002	*<0.050*	*<0.050*		0.0002	0.0157	0.0148	5.9	0.0002			
Sulfur	20	0.5	*<0.00020*	*<0.00020*		0.5	1.38	1.38	0.0	0.5			
Thallium	20	0.00001	*<0.50*	*<0.50*		0.00001	*<0.000010*	*<0.000010*		0.00001			
Tin	20	0.0001	*<0.000010*	*<0.000010*		0.0001	*<0.00010*	*<0.00010*		0.0001			
Titanium	20	0.0003	*<0.00010*	*<0.00010*		0.0003	*<0.00030*	*<0.00030*		0.0003			
Uranium	20	0.00001	*<0.00030*	*<0.00030*		0.00001	0.000052	0.000056	-7.4	0.00001			
Vanadium	20	0.0005	*<0.000010*	*<0.000010*		0.0005	*<0.00050*	*<0.00050*		0.0005			
Zinc	20	0.003	*<0.00050*	*<0.00050*		0.003	*<0.0030*	*<0.0030*		0.003			
Zirconium	20	-	*<0.0030*	*<0.0030*		0.0003	*<0.00030*	*<0.00030*		0.0003			
Dissolved Metals (mg/L)													
Aluminum	20	0.001				0.001	*<0.0010*	*<0.0010*		0.001	0.0034	0.0051	0.0
Antimony	20	0.0001				0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Arsenic	20	0.0001				0.0001	0.00013	0.00015	-14.3	0.0001	0.00042	0.00042	0.0
Barium	20	0.00005				0.00005	0.00376	0.00378	-0.5	0.00005	0.0031	0.00312	-0.6
Beryllium	20	0.00002				0.00002	*<0.000020*	*<0.000020*		0.00002	*<0.000020*	*<0.000020*	
Bismuth	20	0.00005				0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Boron	20	0.01				0.01	*<0.010*	*<0.010*		0.01			
Cadmium	20	0.000005				0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*	
Calcium	20	0.05				0.05	2.86	2.87	-0.3	0.05	2.72	2.71	0.4
Chromium	20	0.0001				0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Cobalt	20	0.0001				0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Copper	20	0.0002				0.0002	0.00053	0.00053	0.0	0.0002	0.00063	0.00067	-6.2
Iron	20	0.01				0.01	*<0.010*	*<0.010*		0.01	*<0.010*	*<0.010*	
Lead	20	0.00005				0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Lithium	20	0.001				0.001	*<0.0010*	*<0.0010*		0.001	*<0.0010*	*<0.0010*	
Magnesium	20	0.1				0.1	1.1	1.1	0.0	0.1	0.93	0.94	-1.1
Manganese	20	0.0001				0.0001	0.00023	0.00022	4.4	0.0001	0.00232	0.00217	6.7
Mercury	20	0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*	
Molybdenum	20	0.00005				0.00005	*<0.000050*	*<0.000050*		0.00005	0.000133	0.000146	-9.3
Nickel	20	0.0005				0.0005	*<0.00050*	*<0.00050*		0.0005	0.00056	0.0006	-6.9
Phosphorus	20	0.05				0.05	*<0.050*	*<0.050*		0.05	*<0.050*	*<0.050*	
Potassium	20	0.1				0.1	0.49	0.51	-4.0	0.1	0.51	0.52	-1.9
Selenium	20	0.00005				0.00005	*<0.000050*	*<0.000050*		0.00005	*<0.000050*	*<0.000050*	
Silicon	20	0.05				0.05	0.137	0.14	-2.2	0.05	0.123	0.122	0.8
Silver	20	0.00001				0.00001	*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*	
Sodium	20	0.05				0.05	0.706	0.699	1.0	0.05			
Strontium	20	0.0002				0.0002	0.00914	0.00898	1.8	0.0002	0.01	0.0108	-7.7
Sulfur	20	0.5				0.5	*<0.50*	*<0.50*		0.5	1.42	1.41	0.7
Thallium	20	0.00001				0.00001	*<0.000010*	*<0.000010*		0.00001	*<0.000010*	*<0.000010*	
Tin	20	0.0001				0.0001	*<0.00010*	*<0.00010*		0.0001	*<0.00010*	*<0.00010*	
Titanium	20	0.0003				0.0003	*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*	
Uranium	20	0.00001				0.00001	0.000039	0.000038	2.6	0.00001	0.000042	0.000046	-9.1
Vanadium	20	0.0005				0.0005	*<0.00050*	*<0.00050*		0.0005	*<0.00050*	*<0.00050*	
Zinc	20	0.001				0.001	*<0.0010*	*<0.0010*		0.001	0.001	0.0012	-18.2
Zirconium	20	-				0.0003	*<0.00030*	*<0.00030*		0.0003	*<0.00030*	*<0.00030*	

Notes:

[1] DQO = Data quality objectives (i.e., RPD limits) for laboratory duplicate samples. DQOs shown as percentages except for pH (units).

[2] RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
RPDs are calculated when both samples are above detection.

[3] Diff = The difference between the replicate values in concentration units. Used in cases where the concentration is <10x the MDL.
For low level results, the DQO is a concentration difference between the two measurements of < 2x the MDL (unless the RPD is met).

Bolded RPDs RPD values exceed laboratory DQO but < 10 x MDL.

Shaded RPD RPD values exceed laboratory DQO and > 10 x MDL.

Blank cells indicate no laboratory duplicate analysis was conducted.

Italicized numbers are below detection limits.

Table 3.1–3. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month		July (con't)											
ALS Report Number		L1649792			L1651199 & L1651975			L1651165 & L1653048			L1654049		
Analyte	Laboratory DQOs[1]	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]
Physical Tests													
Conductivity (µS/cm)	10				*<2.0*	*<2.0*		15.2	15.4	-1.3			
Hardness (mg/L)	25												
pH (Laboratory)	0.3				5.41	5.43	0.02	6.89	6.9	0.01			
Total Suspended Solids (mg/L	20												
Total Dissolved Solids (mg/L)	20	23.7	21.7	8.8	12.4	10.5	16.6						
Turbidity (NTU)	15												
Anions and Nutrients (mg/L)													
Alkalinity, Bicarbonate (as Ca	20												
Alkalinity, Carbonate (as CaC	20												
Alkalinity, Hydroxide (as CaC	20												
Alkalinity, Total (as $CaCO_3$)	20	11.5	11.5	0.0	*<1.0*	*<1.0*		4.8	4.7	2.1			
Ammonia, Total (as N)	20	*<0.0050*	*<0.0050*										
Bromide (Br)	20				*<0.050*	*<0.050*		*<0.050*	*<0.050*				
Chloride (Cl)	20				0.59	0.59	0.0	0.7	0.7	0.0			
Fluoride (F)	20				0.035	0.035	0.0	0.061	0.061	0.0			
Nitrate (as N)	20				*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*				
Nitrite (as N)	20				*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*				
Total Kjeldahl Nitrogen	20	0.191	0.195	-2.1							0.079	0.073	7.9
Orthophosphate (as P)	20	*<0.0010*	*<0.0010*										
Phosphorus (P)-Total Diss.	20	0.0045	0.0048	-6.5				*<0.0020*	*<0.0020*				
Phosphorus (P)-Total	20	0.0057	0.0032	56.2									
Silicate (as SiO_2)	20				*<0.50*	*<0.50*		*<0.50*	*<0.50*				
Sulfate (SO_4)	20				1.59	1.59	0.0	3.24	3.24	0.0			
Cyanides (mg/L)													
Total Cyanide	20	*<0.0010*	*<0.0010*								*<0.0010*	*<0.0010*	
Free Cyanide	20	*<0.0010*	*<0.0010*								*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)													
Dissolved Organic Carbon	20	1.97	2.16	-9.2	1.88	1.66	12.4	1.65	1.67	-1.2	1.30	1.27	2.3
Total Organic Carbon	20	1.94	2.08	-7.0	1.76	1.66	5.8	1.79	1.77	1.1	1.44	1.45	-0.7
Plant Pigments (µg/L)													
Chlorophyll-a	35												
Total Metals (mg/L)													
Aluminum	20	0.0121	0.0142	-16.0	0.005	0.0048	4.1	0.0107	0.011	-2.8	0.0076	0.0072	5.4
Antimony	20	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	20	0.00011	0.00012	-8.7	0.00016	0.00016	0.0	0.00013	0.00013	0.0	0.00022	0.00022	0.0
Barium	20	0.0172	0.0174	-1.2	0.00206	0.00197	4.5	0.00233	0.00231	0.9	0.00322	0.00314	2.5
Beryllium	20	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	20	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	20	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	20	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	20	2.52	2.57	-2.0	2.33	2.35	-0.9	1.94	1.9	2.1	2.18	2.28	-4.5
Chromium	20	*<0.00010*	*<0.00010*		0.0001	0.00011	-9.5	*<0.00010*	*<0.00010*		0.00012	*<0.00010*	
Cobalt	20	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	20	*<0.00050*	*<0.00050*		0.00052	0.00052	0.0	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Iron	20	0.019	0.02	-5.1	*<0.010*	*<0.010*		0.019	0.017	11.1	0.011	0.011	0.0
Lead	20	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	20	0.001	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Magnesium	20	1.39	1.41	-1.4	0.79	0.81	-2.5	0.72	0.71	1.4	0.86	0.9	-4.5
Manganese	20	0.00418	0.00433	-3.5	0.00175	0.0018	-2.8	0.00295	0.00301	-2.0	0.00179	0.00176	1.7
Mercury	20												
Molybdenum	20	*<0.000050*	*<0.000050*		0.000051	*<0.000050*		0.000051	0.000053	-3.8	0.000182	0.000184	-1.1
Nickel	20	*<0.00050*	*<0.00050*		0.00074	0.00067	9.9	*<0.00050*	*<0.00050*		0.00054	0.0005	7.7
Phosphorus	20	*<0.050*	*<0.050*		*<0.050*	*<0.050*		*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	20	0.56	0.55	1.8	0.36	0.36	0.0	0.43	0.41	4.8	0.48	0.51	-6.1
Selenium	20	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	20	0.172	0.183	-6.2	0.143	0.146	-2.1	0.194	0.187	3.7	0.073	0.075	-2.7
Silver	20	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	20	3.87	3.86	0.3	0.502	0.511	-1.8	0.609	0.613	-0.7	1.17	1.18	-0.9
Strontium	20	0.0194	0.0195	-0.5	0.00914	0.00901	1.4	0.00926	0.00938	-1.3	0.0103	0.0103	0.0
Sulfur	20	0.53	0.55	-3.7	0.59	0.57	3.4	0.85	0.83	2.4	1.7	1.75	-2.9
Thallium	20	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	20	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	20	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	20	0.000034	0.000036	-5.7	0.000021	0.000023	-9.1	0.000049	0.000049	0.0	0.000044	0.000042	4.7
Vanadium	20	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	20	*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*	
Zirconium	20	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Dissolved Metals (mg/L)													
Aluminum	20	0.003	0.0029	3.4	0.0025	0.0019	27.3	0.0052	0.0049	5.9			
Antimony	20	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*				
Arsenic	20	0.00021	0.00022	-4.7	0.00014	0.00013	7.4	*<0.00010*	*<0.00010*				
Barium	20	0.00211	0.00213	-0.9	0.00198	0.00197	0.5	0.00195	0.00195	0.0			
Beryllium	20	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*				
Bismuth	20	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*				
Boron	20	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*				
Cadmium	20	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*				
Calcium	20	3.8	3.81	-0.3	2.27	2.26	0.4	1.17	1.17	0.0			
Chromium	20	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*				
Cobalt	20	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*				
Copper	20	0.00084	0.00084	0.0	0.00046	0.00041	11.5	0.0003	0.00032	-6.5			
Iron	20	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*				
Lead	20	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*				
Lithium	20	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*				
Magnesium	20	1.08	1.09	-0.9	0.77	0.76	1.3	0.71	0.71	0.0			
Manganese	20	0.00165	0.0016	3.1	0.00106	0.00101	4.8	0.00331	0.00343	-3.6			
Mercury	20	*<0.0000050*	*<0.0000050*					*<0.0000050*	*<0.0000050*				
Molybdenum	20	0.000092	0.000097	-5.3	0.000051	*<0.000050*		*<0.000050*	*<0.000050*				
Nickel	20	*<0.00050*	*<0.00050*		0.00071	0.00065	8.8	*<0.00050*	*<0.00050*				
Phosphorus	20	*<0.050*	*<0.050*		*<0.050*	*<0.050*		*<0.050*	*<0.050*				
Potassium	20	0.4	0.4	0.0	0.35	0.34	2.9	0.41	0.41	0.0			
Selenium	20	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*				
Silicon	20	0.354	0.35	1.1	0.135	0.133	1.5	0.137	0.14	-2.2			
Silver	20	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*				
Sodium	20	0.528	0.534	-1.1	0.483	0.48	0.6	0.538	0.536	0.4			
Strontium	20	0.0181	0.0183	-1.1	0.00873	0.00866	0.8	0.00606	0.0061	-0.7			
Sulfur	20	1	0.97	3.0	0.55	0.55	0.0	*<0.50*	*<0.50*				
Thallium	20	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*				
Tin	20	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*				
Titanium	20	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*				
Uranium	20	0.000043	0.000041	4.8	0.000016	0.000017	-6.1	0.000043	0.000044	-2.3			
Vanadium	20	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*				
Zinc	20	*<0.0010*	*<0.0010*		0.0012	*<0.0010*		*<0.0010*	*<0.0010*				
Zirconium	20	*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*				

Notes:

[1] DQO = Data quality objectives (i.e., RPD limits) for laboratory duplicate samples. DQOs shown as percentages except for pH (units).

[2] RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
RPDs are calculated when both samples are above detection.

[3] Diff = The difference between the replicate values in concentration units. Used in cases where the concentration is <10x the MDL.
For low level results, the DQO is a concentration difference between the two measurements of < 2x the MDL (unless the RPD is met).

Bolded RPDs RPD values exceed laboratory DQO but < 10 x MDL.

Shaded RPD RPD values exceed laboratory DQO and > 10 x MDL.

Blank cells indicate no laboratory duplicate analysis was conducted.

Italicized numbers are below detection limits.

Table 3.1–3. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month			August											
ALS Report Number			L1663391			L1665565			L1667186			L1667837 & L1669140		
Analyte	Laboratory DQOs[1]	August MDLs	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD Limit[2]	Original	Lab Dup	RPD Limit[2]
Physical Tests														
Conductivity (µS/cm)	10	2	*<2.0*	*<2.0*		39.6	39.5	0.3				*<2.0*	*<2.0*	
Hardness (mg/L)	25	0.5												
pH (Laboratory)	0.3	0.1	5.50	5.53	0.03	7.25	7.27	0.02				5.36	5.41	0.05
Total Suspended Solids (mg/L	20	1												
Total Dissolved Solids (mg/L)	20	3	19.7	17.4	12.4	25.8	24	7.2						
Turbidity (NTU)	15	0.1										0.22	0.2	9.5
Anions and Nutrients (mg/L)														
Alkalinity, Bicarbonate (as Ca	20	1												
Alkalinity, Carbonate (as CaC	20	1												
Alkalinity, Hydroxide (as CaC	20	1												
Alkalinity, Total (as $CaCO_3$)	20	1	*<1.0*	*<1.0*		12.3	12.2	0.8				*<1.0*	*<1.0*	
Ammonia, Total (as N)	20	0.005							0.0057	0.0056	1.8			
Bromide (Br)	20	0.05	*<0.050*	*<0.050*								*<0.050*	*<0.050*	
Chloride (Cl)	20	0.1	*<0.10*	*<0.10*								0.58	0.58	0.0
Fluoride (F)	20	0.02	*<0.020*	*<0.020*								0.055	0.055	0.0
Nitrate (as N)	20	0.005	*<0.0050*	*<0.0050*								*<0.0050*	*<0.0050*	
Nitrite (as N)	20	0.001	*<0.0010*	*<0.0010*								*<0.0010*	*<0.0010*	
Total Kjeldahl Nitrogen	20	0.05							0.094	0.086	8.9	*<0.050*	*<0.050*	
Orthophosphate (as P)	20	0.001										*<0.0010*	*<0.0010*	
Phosphorus (P)-Total Diss.	20	0.002	*<0.0020*	*<0.0020*								0.0021	*<0.0020*	
Phosphorus (P)-Total	20	0.002							0.0031	0.0025	21.4			
Silicate (as SiO_2)	20	0.5										*<0.50*	*<0.50*	
Sulfate (SO_4)	20	0.3	*<0.30*	*<0.30*								2.02	2.04	-1.0
Cyanides (mg/L)														
Total Cyanide	20	0.001										*<0.0010*	*<0.0010*	
Free Cyanide	20	0.001										*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)														
Dissolved Organic Carbon	20	0.5							1.88	1.74	7.7	1.38	1.24	10.7
Total Organic Carbon	20	0.5							1.88	1.81	3.8	1.57	1.54	1.9
Plant Pigments (µg/L)														
Chlorophyll-a	35	0.01												
Total Metals (mg/L)														
Aluminum	20	0.003							0.0159	0.0152	4.5	0.0085	0.0085	0.0
Antimony	20	0.0001							*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	20	0.0001							0.00013	0.00013	0.0	*<0.00010*	*<0.00010*	
Barium	20	0.00005							0.0181	0.0177	2.2	0.0019	0.00192	-1.0
Beryllium	20	0.00002							*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	20	0.00005							*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	20	0.01							0.014	0.014	0.0	*<0.010*	*<0.010*	
Cadmium	20	0.000005							*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	20	0.05							3.25	3.18	2.2	1.14	1.16	-1.7
Chromium	20	0.0001							*<0.00010*	*<0.00010*		0.0001	*<0.00010*	
Cobalt	20	0.0001							*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	20	0.0005							*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Iron	20	0.01							0.027	0.025	7.7	0.015	0.013	14.3
Lead	20	0.00005							*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	20	0.001							0.0012	0.0014	-15.4	*<0.0010*	*<0.0010*	
Magnesium	20	0.1							3.63	3.53	2.8	0.69	0.7	-1.4
Manganese	20	0.0001							0.00609	0.00592	2.8	0.00243	0.00239	1.7
Mercury	20	0.000005										*<0.0000050*	*<0.0000050*	
Molybdenum	20	0.00005							0.000061	0.000074	-19.3	*<0.000050*	*<0.000050*	
Nickel	20	0.0005							*<0.00050*	*<0.00050*		*<0.00050*	0.00071	
Phosphorus	20	0.05							*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	20	0.1							1.27	1.23	3.2	0.4	0.4	0.0
Selenium	20	0.00005							*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	20	0.05							0.17	0.167	1.8	0.123	0.124	-0.8
Silver	20	0.00001							*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	20	0.05							22.2	22.9	-3.1	0.563	0.561	0.4
Strontium	20	0.0002							0.032	0.0318	0.6	0.00663	0.00668	-0.8
Sulfur	20	0.5							2.33	2.28	2.2	*<0.50*	*<0.50*	
Thallium	20	0.00001							*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	20	0.0001							*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	20	0.0003							*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	20	0.00001							0.000042	0.00004	4.9	0.000048	0.000049	-2.1
Vanadium	20	0.0005							*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	20	0.003							*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*	
Zirconium	20	0.0003							*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Dissolved Metals (mg/L)														
Aluminum	20	0.001							0.0016	0.0012	28.6	0.0027	0.0027	0.0
Antimony	20	0.0001							*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	20	0.0001							*<0.00010*	*<0.00010*		0.00014	0.00014	0.0
Barium	20	0.00005							0.000246	0.000269	-8.9	0.00224	0.00222	0.9
Beryllium	20	0.00002							*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	20	0.00005							*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	20	0.01							*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	20	0.000005							*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	20	0.05							*<0.050*	*<0.050*		2.47	2.44	1.2
Chromium	20	0.0001							*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Cobalt	20	0.0001							*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	20	0.0002							*<0.00020*	*<0.00020*		0.00039	0.00038	2.6
Iron	20	0.01							*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Lead	20	0.00005							0.00169	0.00168	0.6	*<0.000050*	*<0.000050*	
Lithium	20	0.001							*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Magnesium	20	0.1							*<0.10*	*<0.10*		0.87	0.85	2.3
Manganese	20	0.0001							0.00015	0.00013	14.3	0.00062	0.00057	8.4
Mercury	20	0.000005							*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Molybdenum	20	0.00005							*<0.000050*	*<0.000050*		0.00011	0.000088	22.2
Nickel	20	0.0005							*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Phosphorus	20	0.05							*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	20	0.1							*<0.10*	*<0.10*		0.42	0.41	2.4
Selenium	20	0.00005							*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	20	0.05							*<0.050*	*<0.050*		0.168	0.168	0.0
Silver	20	0.00001							*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	20	0.05							*<0.050*	*<0.050*		0.675	0.657	2.7
Strontium	20	0.0002							*<0.00020*	*<0.00020*		0.0113	0.0114	-0.9
Sulfur	20	0.5							*<0.50*	*<0.50*		0.98	0.96	2.1
Thallium	20	0.00001							*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	20	0.0001							*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	20	0.0003							*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	20	0.00001							*<0.000010*	*<0.000010*		0.00005	0.000053	-5.8
Vanadium	20	0.0005							*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	20	0.001							*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Zirconium	20	0.0003							*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	

Notes:

[1] DQO = Data quality objectives (i.e., RPD limits) for laboratory duplicate samples. DQOs shown as percentages except for pH (units).

[2] RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
RPDs are calculated when both samples are above detection.

[3] Diff = The difference between the replicate values in concentration units. Used in cases where the concentration is <10x the MDL.
For low level results, the DQO is a concentration difference between the two measurements of < 2x the MDL (unless the RPD is met).

Bolded RPDs RPD values exceed laboratory DQO but < 10 x MDL.

Shaded RPD RPD values exceed laboratory DQO and > 10 x MDL.

Blank cells indicate no laboratory duplicate analysis was conducted.

Italicized numbers are below detection limits.

Table 3.1–3. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month			September								
ALS Report Number			L1674453			L1683184			L1686791		
Analyte	Laboratory DQOs[1]	September MDLs	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]
Physical Tests											
Conductivity (µS/cm)	10	2				38.7	37.7	2.6	24.2	24.4	-0.8
Hardness (mg/L)	25	0.5									
pH (Laboratory)	0.3	0.1				7.21	7.20	0.01	7.04	7.03	0.01
Total Suspended Solids (mg/L	20	1									
Total Dissolved Solids (mg/L)	20	3									
Turbidity (NTU)	15	0.1							0.46	0.46	0.0
Anions and Nutrients (mg/L)											
Alkalinity, Bicarbonate (as Ca	20	1									
Alkalinity, Carbonate (as CaC	20	1									
Alkalinity, Hydroxide (as CaC	20	1									
Alkalinity, Total (as $CaCO_3$)	20	1				13.0	12.3	5.5	7.4	7.4	0.0
Ammonia, Total (as N)	20	0.005	*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*				
Bromide (Br)	20	0.05							*<0.050*	*<0.050*	
Chloride (Cl)	20	0.1							0.56	0.56	0.0
Fluoride (F)	20	0.02							0.054	0.054	0.0
Nitrate (as N)	20	0.005							*<0.0050*	*<0.0050*	
Nitrite (as N)	20	0.001							*<0.0010*	*<0.0010*	
Total Kjeldahl Nitrogen	20	0.05				0.146	0.100	37.4			
Orthophosphate (as P)	20	0.001	*<0.0010*	*<0.0010*							
Phosphorus (P)-Total Diss.	20	0.002				*<0.0020*	*<0.0020*		0.002	*<0.0020*	
Phosphorus (P)-Total	20	0.002	*<0.0020*	*<0.0020*					*<0.0020*	0.0024	
Silicate (as SiO_2)	20	0.5				0.58	0.55	5.3	*<0.50*	*<0.50*	
Sulfate (SO_4)	20	0.3							2.00	1.99	0.5
Cyanides (mg/L)											
Total Cyanide	20	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Free Cyanide	20	0.001	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)											
Dissolved Organic Carbon	20	0.5	*<0.50*	*<0.50*		1.6	1.39	14.0	1.63	1.53	6.3
Total Organic Carbon	20	0.5	*<0.50*	*<0.50*		1.4	1.5	-6.9	1.84	1.73	6.2
Plant Pigments (µg/L)											
Chlorophyll-a	35	0.01									
Total Metals (mg/L)											
Aluminum	20	0.003				0.0089	0.0087	2.3	0.0148	0.0171	-14.4
Antimony	20	0.0001				*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	20	0.0001				0.00021	0.00021	0.0	0.00012	0.00013	-8.0
Barium	20	0.00005				0.00299	0.00302	-1.0	0.00212	0.00214	-0.9
Beryllium	20	0.00002				*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	20	0.00005				*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	20	0.01				*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	20	0.000005				*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	20	0.05				2.21	2.21	0.0	2.28	2.3	-0.9
Chromium	20	0.0001				0.00015	0.00015	0.0	*<0.00010*	*<0.00010*	
Cobalt	20	0.0001				*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	20	0.0005				*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Iron	20	0.01				0.013	0.015	-14.3	0.025	0.026	-3.9
Lead	20	0.00005				*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	20	0.001				*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Magnesium	20	0.1				0.87	0.87	0.0	0.82	0.82	0.0
Manganese	20	0.0001				0.00149	0.00155	-3.9	0.00155	0.00152	2.0
Mercury	20	0.000005									
Molybdenum	20	0.00005				0.00019	0.000187	1.6	0.000074	0.000076	-2.7
Nickel	20	0.0005				*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Phosphorus	20	0.05				*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	20	0.1				0.49	0.51	-4.0	0.43	0.43	0.0
Selenium	20	0.00005				*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	20	0.05				*<0.050*	0.053		0.182	0.19	-4.3
Silver	20	0.00001				*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	20	0.05				1.16	1.18	-1.7	0.67	0.686	-2.4
Strontium	20	0.0002				0.0104	0.0103	1.0	0.0111	0.0112	-0.9
Sulfur	20	0.5				1.64	1.66	-1.2	1.01	1.01	0.0
Thallium	20	0.00001				*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	20	0.0001				*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	20	0.0003				*<0.00030*	*<0.00030*		0.00075	0.00068	9.8
Uranium	20	0.00001				0.000044	0.000045	-2.2	0.000065	0.000065	0.0
Vanadium	20	0.0005				*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	20	0.003				*<0.0030*	*<0.0030*		*<0.0030*	*<0.0030*	
Zirconium	20	0.0003				*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Dissolved Metals (mg/L)											
Aluminum	20	0.001				0.0020	0.0024	-18.2	0.0020	0.0015	28.6
Antimony	20	0.0001				*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Arsenic	20	0.0001				0.00038	0.00039	-2.6	*<0.00010*	*<0.00010*	
Barium	20	0.00005				0.00281	0.00287	-2.1	0.00199	0.00196	1.5
Beryllium	20	0.00002				*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Bismuth	20	0.00005				*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Boron	20	0.01				*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Cadmium	20	0.000005				*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium	20	0.05				2.59	2.58	0.4	1.5	1.5	0.0
Chromium	20	0.0001				*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Cobalt	20	0.0001				*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Copper	20	0.0002				0.00035	0.00035	0.0	*<0.00020*	0.00024	
Iron	20	0.01				*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Lead	20	0.00005				*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Lithium	20	0.001				*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Magnesium	20	0.1				0.95	0.95	0.0	0.61	0.61	0.0
Manganese	20	0.0001				0.00029	0.00031	-6.7	0.00042	0.00045	-6.9
Mercury	20	0.000005							*<0.0000050*	*<0.0000050*	
Molybdenum	20	0.00005				0.000169	0.00017	-0.6	*<0.000050*	*<0.000050*	
Nickel	20	0.0005				*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Phosphorus	20	0.05				*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium	20	0.1				0.51	0.51	0.0	0.37	0.37	0.0
Selenium	20	0.00005				*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Silicon	20	0.05				*<0.050*	*<0.050*		0.104	0.103	1.0
Silver	20	0.00001				*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Sodium	20	0.05				1.03	1.03	0.0	0.557	0.58	-4.0
Strontium	20	0.0002				0.0112	0.0111	0.9	0.00763	0.00761	0.3
Sulfur	20	0.5				1.54	1.55	-0.6	0.68	0.7	-2.9
Thallium	20	0.00001				*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Tin	20	0.0001				*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Titanium	20	0.0003				*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	
Uranium	20	0.00001				0.000039	0.000039	0.0	0.000029	0.00003	-3.4
Vanadium	20	0.0005				*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Zinc	20	0.001				*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Zirconium	20	0.0003				*<0.00030*	*<0.00030*		*<0.00030*	*<0.00030*	

Notes:

[1] DQO = Data quality objectives (i.e., RPD limits) for laboratory duplicate samples. DQOs shown as percentages except for pH (units).

[2] RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
RPDs are calculated when both samples are above detection.

[3] Diff = The difference between the replicate values in concentration units. Used in cases where the concentration is <10x the MDL.
For low level results, the DQO is a concentration difference between the two measurements of < 2x the MDL (unless the RPD is met).

Bolded RPDs RPD values exceed laboratory DQO but < 10 x MDL.

Shaded RPD RPD values exceed laboratory DQO and > 10 x MDL.

Blank cells indicate no laboratory duplicate analysis was conducted.

Italicized numbers are below detection limits.

Table 3.1–3. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2015.

Month			November								
ALS Report Number			L1700051			L1705743 & L1707763			L1709504		
Analyte	Laboratory DQOs[1]	November MDLs	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]	Original	Lab Dup	RPD[2] or Diff[3]
Physical Tests											
Conductivity (µS/cm)	10	2	*<2.0*	*<2.0*		19.7	19.9	-1.0			
Hardness (mg/L)	25	0.5									
pH (Laboratory)	0.3	0.1				6.82	6.87	0.05			
Total Suspended Solids (mg/L	20	1									
Total Dissolved Solids (mg/L)	20	3									
Turbidity (NTU)	15	0.1									
Anions and Nutrients (mg/L)											
Alkalinity, Bicarbonate (as Ca	20	1									
Alkalinity, Carbonate (as CaC	20	1									
Alkalinity, Hydroxide (as CaC	20	1									
Alkalinity, Total (as $CaCO_3$)	20	1									
Ammonia, Total (as N)	20	0.005							0.0065	0.0064	1.6
Bromide (Br)	20	0.05				*<0.050*	*<0.050*				
Chloride (Cl)	20	0.1				0.84	0.84	0.0			
Fluoride (F)	20	0.02				0.054	0.055	-1.8			
Nitrate (as N)	20	0.005				0.0288	0.0286	0.7			
Nitrite (as N)	20	0.001				*<0.0010*	*<0.0010*				
Total Kjeldahl Nitrogen	20	0.05									
Orthophosphate (as P)	20	0.001	*<0.0010*	*<0.0010*							
Phosphorus (P)-Total Diss.	20	0.002									
Phosphorus (P)-Total	20	0.002									
Silicate (as SiO_2)	20	0.5									
Sulfate (SO_4)	20	0.3				4.58	4.58	0.0			
Cyanides (mg/L)											
Total Cyanide	20	0.001				*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Free Cyanide	20	0.001				*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (mg/L)											
Dissolved Organic Carbon	20	0.5	1.71	1.72	-0.6	1.28	1.14	11.6	1.17	1.1	6.2
Total Organic Carbon	20	0.5	1.76	1.66	5.8				1.72	1.35	24.1
Plant Pigments (µg/L)											
Chlorophyll-a	35	0.01									
Total Metals (mg/L)											
Aluminum	20	0.003				0.0056	0.0061	-8.5			
Antimony	20	0.0001				*<0.00010*	*<0.00010*				
Arsenic	20	0.0001				0.00045	0.00046	-2.2			
Barium	20	0.00005				0.00307	0.0031	-1.0			
Beryllium	20	0.00002				*<0.000020*	*<0.000020*				
Bismuth	20	0.00005				*<0.000050*	*<0.000050*				
Boron	20	0.01				*<0.010*	*<0.010*				
Cadmium	20	0.000005				*<0.0000050*	*<0.0000050*				
Calcium	20	0.05				2.69	2.68	0.4			
Chromium	20	0.0001				0.0001	0.00011	-9.5			
Cobalt	20	0.0001				*<0.00010*	*<0.00010*				
Copper	20	0.0005				*<0.00050*	*<0.00050*				
Iron	20	0.01				*<0.010*	*<0.010*				
Lead	20	0.00005				*<0.000050*	*<0.000050*				
Lithium	20	0.001				*<0.0010*	*<0.0010*				
Magnesium	20	0.1				0.96	0.95	1.0			
Manganese	20	0.0001				0.00076	0.00084	-10.0			
Mercury	20	0.000005				*<0.0000050*	*<0.0000050*				
Molybdenum	20	0.00005				0.000173	0.000168	2.9			
Nickel	20	0.0005				0.00096	*<0.00050*				
Phosphorus	20	0.05				*<0.050*	*<0.050*				
Potassium	20	0.1				0.62	0.6	3.3			
Selenium	20	0.00005				*<0.000050*	*<0.000050*				
Silicon	20	0.05				*<0.050*	*<0.050*				
Silver	20	0.00001				*<0.000010*	*<0.000010*				
Sodium	20	0.05				1.01	1	1.0			
Strontium	20	0.0002				0.0115	0.0115	0.0			
Sulfur	20	0.5				1.76	1.75	0.6			
Thallium	20	0.00001				*<0.000010*	*<0.000010*				
Tin	20	0.0001				*<0.00010*	*<0.00010*				
Titanium	20	0.0003				*<0.00030*	*<0.00030*				
Uranium	20	0.00001				0.000044	0.000045	-2.2			
Vanadium	20	0.0005				*<0.00050*	*<0.00050*				
Zinc	20	0.003				*<0.0030*	*<0.0030*				
Zirconium	20	0.0003				*<0.00030*	*<0.00030*				
Dissolved Metals (mg/L)											
Aluminum	20	0.001	0.0015	0.0014	6.9						
Antimony	20	0.0001	*<0.00010*	*<0.00010*							
Arsenic	20	0.0001	0.00021	0.00021	0.0						
Barium	20	0.00005	0.00245	0.00245	0.0						
Beryllium	20	0.00002	*<0.000020*	*<0.000020*							
Bismuth	20	0.00005	*<0.000050*	*<0.000050*							
Boron	20	0.01	*<0.010*	*<0.010*							
Cadmium	20	0.000005	*<0.0000050*	*<0.0000050*							
Calcium	20	0.05	3.78	3.83	-1.3						
Chromium	20	0.0001	*<0.00010*	*<0.00010*							
Cobalt	20	0.0001	*<0.00010*	*<0.00010*							
Copper	20	0.0002	0.00057	0.00056	1.8						
Iron	20	0.01	*<0.010*	*<0.010*							
Lead	20	0.00005	*<0.000050*	*<0.000050*							
Lithium	20	0.001	*<0.0010*	*<0.0010*							
Magnesium	20	0.1	1.18	1.2	-1.7						
Manganese	20	0.0001	0.00028	0.00023	19.6						
Mercury	20	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*				
Molybdenum	20	0.00005	0.000132	0.000136	-3.0						
Nickel	20	0.0005	*<0.00050*	*<0.00050*							
Phosphorus	20	0.05	*<0.050*	*<0.050*							
Potassium	20	0.1	0.5	0.53	-5.8						
Selenium	20	0.00005	*<0.000050*	*<0.000050*							
Silicon	20	0.05	0.161	0.166	-3.1						
Silver	20	0.00001	*<0.000010*	*<0.000010*							
Sodium	20	0.05	0.839	0.824	1.8						
Strontium	20	0.0002	0.0161	0.0162	-0.6						
Sulfur	20	0.5	1.51	1.49	1.3						
Thallium	20	0.00001	*<0.000010*	*<0.000010*							
Tin	20	0.0001	*<0.00010*	*<0.00010*							
Titanium	20	0.0003	*<0.00030*	*<0.00030*							
Uranium	20	0.00001	0.000037	0.000038	-2.7						
Vanadium	20	0.0005	*<0.00050*	*<0.00050*							
Zinc	20	0.001	*<0.0010*	*<0.0010*							
Zirconium	20	0.0003	*<0.00030*	*<0.00030*							

Notes:

[1] DQO = Data quality objectives (i.e., RPD limits) for laboratory duplicate samples. DQOs shown as percentages except for pH (units).

[2] RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
RPDs are calculated when both samples are above detection.

[3] Diff = The difference between the replicate values in concentration units. Used in cases where the concentration is <10x the MDL.
For low level results, the DQO is a concentration difference between the two measurements of < 2x the MDL (unless the RPD is met).

Bolded RPDs RPD values exceed laboratory DQO but < 10 x MDL.

Shaded RPD RPD values exceed laboratory DQO and > 10 x MDL.

Blank cells indicate no laboratory duplicate analysis was conducted.

Italicized numbers are below detection limits.

Table 3.1–4. QA/QC data for metals analysis of sediment grab samples, Meadowbank study lakes and Baker Lake, 2015.

			Field Duplicates[3]																		
			Second Portage Lake			Third Portage Lake			Baker Lake			Baker Lake			Pipedream Lake			Inuggugayualik Lake			Tehek Lake		
Analyte	Laboratory DQOs[1,2]	MDLs (mg/kg)	SP-5 13-Aug-15	Field DUP-1 13-Aug-15	RPD (%)	TPS-1 14-Aug-15	Field DUP-2 14-Aug-15	RPD (%)	BAP-3 16-Aug-15	Field DUP-3 16-Aug-15	RPD (%)	BBD-2 17-Aug-15	Field DUP-4 17-Aug-15	RPD (%)	PDL-3 26-Aug-15	Field DUP-5 26-Aug-15	RPD (%)	INUG-1 27-Aug-15	Field DUP-6 27-Aug-15	RPD (%)	TEFF-2 28-Aug-15	Field DUP-7 28-Aug-15	RPD (%)
Physical & Organic Parameters																						
Moisture (%)	20	*0.25*	77.8	79.5	-2.2	84.2	85.1	-1.1	47.1	47.8	-1.5	NA	37.8		79.0	77.3	2.2	81.9	82.3	-0.5	87.1	86.7	0.5
pH	0.30	*0.10*	6.35	5.64	12	5.96	5.79	2.9	5.87	6.03	-2.7	6.35	6.29	0.9	6.22	5.79	7.2	5.95	5.33	11	5.87	5.84	0.5
Total Organic Carbon (% dw)	30	*0.10*	2.66	2.54	4.6	3.96	3.75	5.4	0.59	0.53	11	0.45	0.49	-8.5	2.35	2.22	5.7	3.81	3.71	2.7	3.81	3.60	5.7
Particle Size																							
% Gravel (>2mm)	5	*0.10*	*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*	
% Sand (2.00mm - 0.063mm)	5	*0.10*	4.89	6.79	-33	15.5	17.6	-13	63.0	60.5	4.0	51.2	55.7	-8.4	5.72	6.84	-18	5.59	6.42	-14	1.89	2.07	-9.1
% Silt (0.063mm - 4µm)	5	*0.10*	62.7	59.6	5.1	67.4	60.9	10	32.6	35.5	-8.5	44.9	39.7	12	75.1	72.9	3.0	84.7	74.7	13	72.8	70.3	3.5
% Clay (<4µm)	5	*0.10*	32.4	33.6	-3.6	17.0	21.5	-23	4.4	4.0	8.1	3.8	4.6	-17	19.2	20.2	-5.1	9.76	18.9	-64	25.3	27.7	-9.1
Total Metals (mg/kg dw)																							
Aluminum	40	*50*	31100	33200	-6.5	20400	19700	3.5	7010	6850	2.3	7410	6340	16	23600	21900	7.5	19300	19000	1.6	24100	23900	0.8
Antimony	30	*0.10*	0.22	0.22	0	0.22	0.22	0	0.17	0.15	13	0.12	0.13	-8.0	0.29	0.28	3.5	0.19	0.18	5.4	0.19	0.17	11
Arsenic	30	*0.100*	25.3	24.4	3.6	14.2	14.4	-1.4	8.0	7.8	2.2	10.6	10.4	1.9	53.4	49.6	7.4	121.0	121.0	0	12.5	12.5	0
Barium	40	*0.50*	142	166	-16	92	105	-14	402	392	2.5	81	78	4.1	109	102	6.6	109	114	-4.5	119	125	-4.9
Beryllium	30	*0.10*	2.26	2.20	2.7	1.22	1.27	-4.0	0.42	0.37	13	0.31	0.29	6.7	1.24	1.15	7.5	1.29	1.22	5.6	2.36	2.12	11
Bismuth	30	*0.20*	2.73	2.92	-6.7	1.39	1.33	4.4	*<0.20*	*<0.20*		*<0.20*	*<0.20*		1.17	1.08	8.0	1.14	1.02	11	1.93	1.98	-2.6
Cadmium	30	*0.020*	0.121	0.137	-12	0.196	0.206	-5.0	0.052	0.046	12	0.049	0.042	15	0.222	0.220	0.9	0.149	0.152	-2.0	0.154	0.125	21
Calcium	30	*50*	2430	2550	-4.8	1790	1950	-8.6	2540	2440	4.0	2290	2160	5.8	2320	2080	11	1900	1930	-1.6	2250	2260	-0.4
Chromium	30	*0.50*	92.3	97.4	-5.4	102	102	0	18.4	19.6	-6.3	16.0	15.0	6.5	160.0	153	4.5	99.2	99.7	-0.5	60.9	60.3	1.0
Cobalt	30	*0.10*	15.5	15.3	1.3	14.1	13.9	1.4	5.1	5.1	0.6	5.1	5.0	2.4	21.4	21.2	0.9	12.0	11.9	0.8	13.9	13.5	2.9
Copper	30	*0.50*	76.9	79.9	-3.8	51.7	51.3	0.8	6.8	6.9	-1.0	7.0	6.5	7.8	63.2	60.1	5.0	42.8	40.8	4.8	56.8	55.6	2.1
Iron	30	*50*	54400	51600	5.3	32400	32200	0.6	15800	15000	5.2	16100	14500	10	50700	47100	7.4	91900	87200	5.2	45600	42500	7.0
Lead	40	*0.50*	23.8	24.6	-3.3	19.6	18.5	5.8	5.8	5.7	0.3	6.6	7.3	-9.2	17.0	16.6	2.4	12.7	12.4	2.4	21.1	22.2	-5.1
Lithium	30	*2.0*	67.3	60.8	10	30.0	33.4	-11	10.1	8.5	17	9.6	7.9	19	35.3	29.2	19	26.3	21.6	20	68.6	49.8	32
Magnesium	30	*20*	11500	11400	0.9	8760	8340	4.9	3920	3710	5.5	4070	3780	7.4	12200	11400	6.8	8660	8350	3.6	8320	8380	-0.7
Manganese	30	*1.0*	1480	1530	-3.3	543	520	4.3	179	175	2.3	346	311	11	2100	2150	-2.4	1060	1060	0	2270	2000	13
Mercury	40	*0.0050*	0.0296	0.0258	14	0.0216	0.0230	-6.3	0.0072	0.0087	-19	0.0076	0.0076	0	0.0129	0.0137	-6.0	0.0279	0.0282	-1.1	0.0194	0.0200	-3.0
Molybdenum	40	*0.10*	6.66	6.36	4.6	2.60	2.78	-6.7	0.59	0.56	5.2	0.71	0.70	1.4	4.31	4.15	3.8	6.76	6.83	-1.0	5.50	5.09	7.7
Nickel	30	*0.50*	66.3	67.8	-2.2	68.5	66.5	3.0	11.5	11.6	-0.9	9.9	9.57	3.8	114.0	115	-0.9	68.2	66.6	2.4	39.8	38.9	2.3
Phosphorus	30	*50*	460	502	-8.7	616	624	-1.3	743	747	-0.5	769	749	2.6	582	519	11	2650	2680	-1.1	475	498	-4.7
Potassium	40	*100*	5560	6060	-8.6	3470	3620	-4.2	1920	1790	7.0	1390	1170	17	3560	3090	14	3340	3350	-0.3	4780	4790	-0.2
Selenium	30	*0.20*	0.30	0.29	3.4	0.52	0.48	8.0	*<0.20*	*<0.20*		*<0.20*	*<0.20*		0.24	0.22	8.7	0.59	0.63	-6.6	0.49	0.49	0
Silver	40	*0.10*	*<0.10*	*<0.10*		0.15	0.15	0	*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		0.15	0.15	0	*<0.10*	*<0.10*	
Sodium	40	*50*	270	275	-1.8	300	298	0.7	193	198	-2.6	277	182	41	216	185	15	231	243	-5.1	422	343	21
Strontium	40	*0.50*	22.9	24.8	-8.0	16.1	17.5	-8.3	51.0	50.0	2.0	41.4	38.1	8.3	25.6	22.4	13	23.8	25.1	-5.3	21.2	21.8	-2.8
Thallium	30	*0.050*	0.405	0.448	-10	0.263	0.262	0.4	0.087	0.078	11	0.054	0.061	-12	0.230	0.226	1.8	0.193	0.182	5.9	0.412	0.430	-4.3
Tin	40	*2.0*	2.2	2.5	-13	*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*		2.3	*<2.0*	
Titanium	40	*1.0*	1050	1190	-13	693	710	-2.4	433	446	-3.0	420	332	23	617	536	14	544	579	-6.2	867	918	-5.7
Uranium	30	*0.050*	23.8	25.4	-6.5	15.9	14.9	6.5	1.7	1.7	-3.5	1.4	1.3	2.2	11.9	11.5	3.4	14.1	14.0	0.7	25.1	26.4	-5.0
Vanadium	30	*0.20*	48.9	51.6	-5.4	36.7	37.1	-1.1	23.9	24.1	-0.8	19.9	17.8	11	45.0	42.2	6.4	33.6	33.2	1.2	39.3	39.7	-1.0
Zinc	30	*2.0*	142.0	144.0	-1.4	88.8	90.3	-1.7	27.8	28.7	-3.2	29.9	26.9	11	96.3	92.6	3.9	81.6	78.5	3.9	110.0	111.0	-0.9

Notes:

[1] Laboratory data quality objectives (DQOs) for moisture, TOC, and metals are expressed as the relative percent difference (RPD) .

[2] The laboratory DQOs for pH and particle size are the absolute difference between the original sample and laboratory duplicate.

[3] The DQO for field duplicates is an RPD of < 50%.

RPD (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs have not been calculated for cases where one of the samples is below detection and the other is not and in cases where both are below detection. RPD has been left blank.

Bold RPDs	values exceed the DQOs, but concentrations are < 10 x MDL.
Shaded RPDs	values exceed the DQOs, and concentrations are > 10 x MDL.
Bold Filter Swipe	value is > MDL, but < 10 x MDL.
Shaded Filter Swipe	value > 10x MDL.

Field Dup' samples are homogenization duplicates - the original and duplicate samples were split from the same homogenized bowl of sediment.

Italicized numbers are below detection limits.

Table 3.1–4. QA/QC data for metals analysis of sediment grab samples, Meadowbank study lakes and Baker Lake, 2015.

			Field Duplicates									Laboratory Duplicates											
			Tehek Lake			Third Portage Lake			Third Portage Lake			Various Lakes			Various Lakes			Various Lakes			Various Lakes		
Analyte	**Laboratory DQOs**[1,2]	**MDLs (mg/kg)**	**TE-4** 28-Aug-15	**Field DUP-8** 28-Aug-15	**RPD** (%)	**TPE-5** 30-Aug-15	**Field DUP-9** 30-Aug-15	**RPD** (%)	**TPE-B-4** 30-Aug-15	**Field DUP-10** 30-Aug-15	**RPD** (%)	**Original** August	**Laboratory Duplicate**	**RPD** (%)	**Original** August	**Laboratory Duplicate**	**RPD** (%)	**Original** August	**Laboratory Duplicate**	**RPD** (%)	**Original** August	**Laboratory Duplicate**	**RPD** (%)
Physical & Organic Parameters																							
Moisture (%)	20	*0.25*	84.4	83.3	1.3	87.5	86.0	1.7	86.5	86.0	0.6	85.2	85.5	-0.4									
pH	0.30	*0.10*	5.91	5.93	-0.3	6.04	6.16	-2.0	5.50	6.34	-14	5.87	5.70	0.2	5.84	5.86	0.02	6.35	6.34	0.01	6.16	6.21	0.05
Total Organic Carbon (% dw)	30	*0.10*	3.36	3.21	4.6	3.62	3.49	3.7	3.39	3.41	-0.6	3.74	3.80	-1.6	3.61	3.60	0.3	3.64	3.68	-1.1	0.59	0.59	0
Particle Size																							
% Gravel (>2mm)	5	*0.10*	*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		0.24	0.24	0
% Sand (2.00mm - 0.063mm)	5	*0.10*	3.73	4.88	-27	2.25	2.39	-6.0	1.33	1.76	-28	2.22	2.40	0.2	1.89	2.31	0.4	1.33	1.59	0.3	59.1	57.7	1.4
% Silt (0.063mm - 4µm)	5	*0.10*	76.1	72.7	4.6	70.2	70.7	-0.7	71.2	68.7	3.6	71.1	71.1	0	72.8	72.6	0.2	71.2	70.2	1.0	36.0	37.2	1.2
% Clay (<4µm)	5	*0.10*	20.2	22.5	-11	27.6	26.9	2.6	27.5	29.5	-7.0	26.7	26.6	0.1	25.3	25.1	0.2	27.5	28.2	0.7	4.67	4.89	0.2
Total Metals (mg/kg dw)																							
Aluminum	40	*50*	20800	21700	-4.2	24300	23200	4.6	23300	23300	0	24100	24500	-1.6	28000	27700	1.1	7410	6850	7.9	23200	23600	-1.7
Antimony	30	*0.10*	0.18	0.18	0	0.25	0.22	13	0.25	0.24	4.1	0.19	0.18	5.4	0.22	0.21	4.7	0.12	*<0.10*		0.22	0.24	-8.7
Arsenic	30	*0.100*	54.4	55.3	-1.6	18.2	17.5	3.9	17.9	17.6	1.7	12.5	12.5	0	15.8	15.9	-0.6	10.6	10.2	3.8	17.5	17.8	-1.7
Barium	40	*0.50*	128	140	-9.0	130	122	6.3	115	118	-2.6	119	124	-4.1	128	126	1.6	81.3	76.5	6.1	122	131	-7.1
Beryllium	30	*0.10*	1.90	1.83	3.8	1.83	1.73	5.6	1.67	1.59	4.9	2.36	2.15	9.3	2.01	1.88	6.7	0.31	0.3	3.3	1.73	1.78	-2.8
Bismuth	30	*0.20*	1.77	1.83	-3.3	2.35	2.29	2.6	2.13	2.10	1.4	1.93	1.99	-3.1	2.64	2.64	0	*<0.20*	*<0.20*		2.29	2.21	3.6
Cadmium	30	*0.020*	0.356	0.323	9.7	0.382	0.366	4.3	0.175	0.162	7.7	0.154	0.144	6.7	0.136	0.139	-2.2	0.049	0.046	6.3	0.366	0.364	0.5
Calcium	30	*50*	2090	2090	0	2450	2320	5.5	2330	2250	3.5	2250	2260	-0.4	2220	2040	8.5	2290	2190	4.5	2320	2320	0
Chromium	30	*0.50*	52.3	53.9	-3.0	124	124	0	120.0	116	3.4	60.9	60.4	0.8	126	124	1.6	16	14.6	9.2	124	126	-1.6
Cobalt	30	*0.10*	12.5	12.4	0.8	16.5	16.9	-2.4	14.8	14.9	-0.7	13.9	13.4	3.7	14.1	15.1	-6.8	5.1	4.85	5.0	16.9	16.5	2.4
Copper	30	*0.50*	55.6	55.7	-0.2	51.6	50.6	2.0	46.8	44.2	5.7	56.8	55.3	2.7	55.6	57.8	-3.9	7.03	6.56	6.9	50.6	50.4	0.4
Iron	30	*50*	101000	93600	7.6	46600	44900	3.7	44900	43600	2.9	45600	44700	2.0	41800	42900	-2.6	16100	15200	5.8	44900	44500	0.9
Lead	40	*0.50*	18.5	19.9	-7.3	21.0	21.2	-0.9	19.2	19.9	-3.6	21.1	21.8	-3.3	22.3	22.2	0.4	6.62	6.26	5.6	21.2	20.8	1.9
Lithium	30	*2.0*	43.6	39.4	10	46.8	41.3	12	42.3	36.5	15	68.6	56.2	20	58.7	56.7	3.5	9.6	9.3	3.2	41.3	42.8	-3.6
Magnesium	30	*20*	7310	7480	-2.3	10100	9760	3.4	9760	9280	5.0	8320	8260	0.7	11400	11500	-0.9	4070	3860	5.3	9760	9650	1.1
Manganese	30	*1.0*	2480	2400	3.3	2710	2500	8.1	3890	4190	-7.4	2270	2140	5.9	953	1020	-6.8	346	328	5.3	2500	2590	-3.5
Mercury	40	*0.0050*	0.0258	0.0291	-12	0.0203	0.0205	-1.0	0.0204	0.0212	-3.8	0.0194	0.0214	-9.8	0.0163	0.0163	0	0.0076	0.0068	11	0.0205	0.0211	-2.9
Molybdenum	40	*0.10*	14.20	14.20	0	4.30	4.10	4.8	3.83	3.91	-2.1	5.5	5.17	6.2	4.06	3.98	2.0	0.71	0.64	10	4.1	4.34	-5.7
Nickel	30	*0.50*	54.0	55.4	-2.6	105.0	106	-0.9	69.4	68.5	1.3	39.8	38.8	2.5	70.6	71.3	-1.0	9.94	9.66	2.9	106	105	0.9
Phosphorus	30	*50*	1150	1160	-0.9	421	392	7.1	394	384	2.6	475	489	-2.9	408	378	7.6	769	740	3.8	392	428	-8.8
Potassium	40	*100*	4090	4560	-11	4480	4360	2.7	4320	4180	3.3	4780	4830	-1.0	5230	5010	4.3	1390	1300	6.7	4360	4460	-2.3
Selenium	30	*0.20*	0.71	0.72	-1.4	0.85	0.80	6.1	0.74	0.72	2.7	0.49	0.5	-2.0	0.39	0.4	-2.5	*<0.20*	*<0.20*		0.8	0.81	-1.2
Silver	40	*0.10*	0.14	0.15	-6.9	*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*	
Sodium	40	*50*	333	281	17	375	303	21	382	343	11	422	382	10	417	333	22	277	277	0	303	302	0.3
Strontium	40	*0.50*	18.8	18.8	0	19.8	19.0	4.1	18.7	18.3	2.2	21.2	21	0.9	20	17.7	12	41.4	40	3.4	19.0	20.5	-7.6
Thallium	30	*0.050*	0.362	0.383	-5.6	0.459	0.447	2.6	0.348	0.366	-5.0	0.412	0.429	-4.0	0.415	0.395	4.9	0.054	*<0.050*		0.447	0.445	0.4
Tin	40	*2.0*	*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*		2.3	2.4	-4.3	*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Titanium	40	*1.0*	825	899	-8.6	822	786	4.5	803	833	-3.7	867	919	-5.8	1050	971	7.8	420	372	12.1	786	860	-9.0
Uranium	30	*0.050*	17.4	18.9	-8.3	16.1	16.3	-1.2	15.1	15.6	-3.3	25.1	24.8	1.2	19.4	19.1	1.6	1.37	1.29	6.0	16.3	15.6	4.4
Vanadium	30	*0.20*	33.3	35.3	-5.8	41.7	40.4	3.2	40.6	39.6	2.5	39.3	39.3	0	48.1	47.8	0.6	19.9	18.1	9.5	40.4	42.1	-4.1
Zinc	30	*2.0*	105.0	107.0	-1.9	110.0	110.0	0	99.3	96.1	3.3	110	108	1.8	117	119	-1.7	29.9	28.2	5.9	110	109	0.9

Notes:

[1] Laboratory data quality objectives (DQOs) for moisture, TOC, and metals are expressed as the relative percent difference (RPD) .

[2] The laboratory DQOs for pH and particle size are the absolute difference between the original sample and laboratory duplicate.

[3] The DQO for field duplicates is an RPD of < 50%.

RPD (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs have not been calculated for cases where one of the samples is below detection and the other is not and in cases where both are below detection. RPD has been left blank.

Bold RPDs	values exceed the DQOs, but concentrations are < 10 x MDL.
Shaded RPDs	values exceed the DQOs, and concentrations are > 10 x MDL.
Bold Filter Swipe	value is > MDL, but < 10 x MDL.
Shaded Filter Swipe	value > 10x MDL.

Field Dup' samples are homogenization duplicates - the original and duplicate samples were split from the same homogenized bowl of sediment.

Italicized numbers are below detection limits.

Table 3.1–4. QA/QC data for metals analysis of sediment grab samples, Meadowbank study lakes and Baker Lake, 2015.

Analyte	Laboratory DQOs[1,2]	MDLs (mg/kg)	Swipe MDLs (mg)	Equipment Swipes											
				SWIPE-1 FILTER	SWIPE-2 FILTER	SWIPE-3 FILTER	SWIPE-4 FILTER	SWIPE-5 FILTER	SWIPE-6 FILTER	SWIPE-7 FILTER	SWIPE-8 FILTER	SWIPE-9 FILTER	SWIPE-10 FILTER	SWIPE-QA-1 FILTER	SWIPE-QA-2 FILTER
				14-Aug-15	17-Aug-15	17-Aug-15	26-Aug-15	26-Aug-15	27-Aug-15	28-Aug-15	28-Aug-15	30-Aug-15	30-Aug-15	8-Oct-15	8-Oct-15
Physical & Organic Parameters															
Moisture (%)	20	*0.25*													
pH	0.30	*0.10*													
Total Organic Carbon (% dw)	30	*0.10*													
Particle Size															
% Gravel (>2mm)	5	*0.10*													
% Sand (2.00mm - 0.063mm)	5	*0.10*													
% Silt (0.063mm - 4µm)	5	*0.10*													
% Clay (<4µm)	5	*0.10*													
Total Metals (mg/kg dw)				**TOTAL METALS (mg)**											
Aluminum	40	*50*	0.010	**0.015**	*<0.010*	**0.017**	*<0.010*	**0.015**	*<0.010*	**0.017**	**0.014**	**0.020**	**0.013**	*<0.010*	*<0.010*
Antimony	30	*0.10*	0.010	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Arsenic	30	*0.100*	0.010	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Barium	40	*0.50*	0.00050	*<0.00050*	**0.00051**	**0.00076**	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	**0.00072**	*<0.00050*	*<0.00050*	*<0.00050*
Beryllium	30	*0.10*	0.00030	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Bismuth	30	*0.20*	0.010	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium	30	*0.020*	0.00050	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Calcium	30	*50*	0.050	**0.069**	**0.245**	**0.143**	*<0.050*	*<0.050*	*<0.050*	*<0.050*	**0.060**	*<0.050*	**0.057**	*<0.050*	*<0.050*
Chromium	30	*0.50*	0.0010	**0.0079**	**0.0081**	0.0104	**0.0025**	**0.0049**	**0.0029**	**0.0059**	**0.0047**	**0.0055**	0.0114	*<0.0010*	*<0.0010*
Cobalt	30	*0.10*	0.00050	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Copper	30	*0.50*	0.00050	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Iron	30	*50*	0.0020	0.0641	0.0463	0.0701	0.0250	0.0895	0.0391	0.0391	0.0462	0.0638	0.0737	**0.0074**	**0.0124**
Lead	40	*0.50*	0.0030	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Lithium	30	*2.0*	0.00050	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Magnesium	30	*20*	0.0050	**0.0108**	**0.0075**	**0.0122**	**0.0072**	**0.0090**	**0.0079**	0.0667	0.1040	0.0592	0.0951	**0.0090**	**0.0098**
Manganese	30	*1.0*	0.00030	**0.00114**	**0.00077**	**0.00129**	**0.00051**	**0.00117**	**0.00076**	**0.00100**	**0.00134**	**0.00120**	**0.00151**	*<0.00030*	*<0.00030*
Mercury	40	*0.0050*													
Molybdenum	40	*0.10*	0.0020	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Nickel	30	*0.50*	0.0030	**0.0035**	**0.0041**	**0.0047**	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	**0.0052**	*<0.0030*	*<0.0030*
Phosphorus	30	*50*	0.020	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*
Potassium	40	*100*	0.10	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Selenium	30	*0.20*	0.010	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Silver	40	*0.10*	0.00050	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Sodium	40	*50*	0.10	**0.11**	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Strontium	40	*0.50*	0.00030	**0.00032**	**0.00066**	**0.00045**	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Thallium	30	*0.050*	0.010	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Tin	40	*2.0*	0.0020	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Titanium	40	*1.0*	0.00050	**0.00061**	**0.00050**	**0.00091**	*<0.00050*	**0.00051**	*<0.00050*	*<0.00050*	**0.00060**	**0.00073**	*<0.00050*	*<0.00050*	*<0.00050*
Uranium	30	*0.050*													
Vanadium	30	*0.20*	0.0020	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Zinc	30	*2.0*	0.00030	**0.00208**	0.00473	0.00306	**0.00134**	**0.00046**	**0.00055**	**0.00087**	**0.00145**	**0.00202**	**0.00182**	**0.00033**	**0.00042**

Notes:

[1] Laboratory data quality objectives (DQOs) for moisture, TOC, and metals are expressed as the relative percent difference (RPD) .

[2] The laboratory DQOs for pH and particle size are the absolute difference between the original sample and laboratory duplicate.

[3] The DQO for field duplicates is an RPD of < 50%.
RPD (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
RPDs have not been calculated for cases where one of the samples is below detection and the other is not and in cases where both are below detection. RPD has been left blank.

Bold RPDs	values exceed the DQOs, but concentrations are < 10 x MDL.
Shaded RPDs	values exceed the DQOs, and concentrations are > 10 x MDL.
Bold Filter Swipe	value is > MDL, but < 10 x MDL.
Shaded Filter Swipe	value > 10x MDL.

Field Dup' samples are homogenization duplicates - the original and duplicate samples were split from the same homogenized bowl of sediment.

Italicized numbers are below detection limits.

Table 3.1–5. QA/QC data for hydrocarbon and PAH analysis of sediment grab samples, Meadowbank study lakes and Baker Lake, 2015.

			Field Duplicates[3]						Laboratory Duplicates		
			Third Portage Lake			Baker Lake			Various Lakes		
Analyte	Laboratory DQOs[1,2]	MDLs	TPS-COMP 14-Aug-15	COMP DUP-1 14-Aug-15	RPD (%)	BES-COMP 17-Aug-15	COMP DUP-2 17-Aug-15	RPD (%)	Original August	Laboratory Duplicate	RPD (%)
Physical Parameters											
Moisture (%)		*0.25*	83.8	85.2	-1.7	52.2	53.4	-2.3			
Aggregate Organics (mg/kg)											
Mineral Oil and Grease		*500*	*<1450*	1210		*<500*	*<500*				
Hydrocarbons (mg/kg)											
EPH10-19	40	*200*	*<620*	*<640*		*<200*	*<200*				
EPH19-32	40	*200*	*<620*	*<640*		*<200*	*<200*				
LEPH		*200*	*<620*	*<640*		*<200*	*<200*				
HEPH		*200*	*<620*	*<640*		*<200*	*<200*				
Polycyclic Aromatic Hydrocarbons (mg/kg)											
Acenaphthene	50	*0.0050*	*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*	
Acenaphthylene	50	*0.0050*	*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*	
Anthracene	50	*0.0040*	*<0.0040*	*<0.0040*		*<0.0040*	*<0.0040*		*<0.0040*	*<0.0040*	
Benzo(a)anthracene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Benzo(a)pyrene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Benzo(b)fluoranthene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Benzo(b+j+k)fluoranthene	50	*0.015*	*<0.015*	*<0.015*		*<0.015*	*<0.015*				
Benzo(g,h,i)perylene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Benzo(k)fluoranthene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Chrysene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Dibenz(a,h)anthracene	50	*0.0050*	*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*	
Fluoranthene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Fluorene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Indeno(1,2,3-c,d)pyrene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
2-Methylnaphthalene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Naphthalene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Phenanthrene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
Pyrene	50	*0.010*	*<0.010*	*<0.010*		*<0.010*	*<0.010*		*<0.010*	*<0.010*	
d10-Acenaphthene (%)	50		88.6	89.3	-0.8	89.6	90.0	-0.4			
d12-Chrysene (%)	50		107.9	111.7	-3.5	105.5	112.7	-6.6			
d8-Naphthalene (%)	50		86.6	82.6	4.7	88.5	85.6	3.3			
d10-Phenanthrene (%)	50		98.0	107.0	-8.8	95.6	102.7	-7.2			
B(a)P Total Potency Equivalent	50	*0.020*	*<0.020*	*<0.020*		*<0.020*	*<0.020*				
IACR (CCME)	50	*0.15*	*<0.15*	*<0.15*		*<0.15*	*<0.15*				

Notes:

[1] Laboratory data quality objectives are expressed as the relative percent difference (RPD).

[2] Laboratory duplicate analyses were not completed for Mineral Oil and Grease, LEPHs, or HEPHs.

[3] The DQO for field duplicates is an RPD of < 50%.

RPD (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs have not been calculated for cases where one of the samples is below detection and the other is not and in cases where both are below detection. RPD has been left blank.

Bold RPDs values exceed the DQOs, but concentrations are < 10 x MDL.

Shaded RPDs values exceed the DQOs, and concentrations are > 10 x MDL.

Field Dup' samples are homogenization duplicates - the original and duplicate samples were split from the same homogenized bowl of sediment.

Italicized numbers are below detection limits.

Table 3.1–6. QA/QC data for sequential extraction analysis of sediment grab samples, Third Portage Lake – East Basin, 2015.

Analytes	STEP 1			STEP 2		
	Original Blank	Laboratory Duplicate	RPD (%)	Original PDL	Laboratory Duplicate	RPD (%)
Dissolved Metals (mg/L)						
Aluminum (Al)	0.0188	0.019	-1.1	6	6	-1.6
Antimony (Sb)	*<0.000020*	*<0.000020*		0.000064	0.000064	0
Arsenic (As)	*<0.000020*	*<0.000020*		0.0105	0.0105	0
Barium (Ba)	0.00204	0.00203	0.5	0.1	0.1	0.9
Beryllium (Be)	*<0.000010*	*<0.000010*		0.000602	0.000601	0.2
Bismuth (Bi)	0.0000	0.0000	-8.7	0.00134	0.0014	-2.9
Boron (B)	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Cesium (Cs)	*<0.000050*	*<0.000050*		0.00116	0.00116	0
Cadmium (Cd)	0.000005	0.000007	**-33**	0.00025	0.000245	2.0
Calcium (Ca)	*<0.050*	*<0.050*		0.596	0.605	-1.5
Chromium (Cr)	0.0003	0.0003	-3.6	0.02	0.02	0
Cobalt (Co)	0.000026	0.000020	**26**	0.01	0.00639	-0.8
Copper (Cu)	0.0558	0.0552	1.1	0.0664	0.0666	-0.3
Lanthanum (La)	*<0.000050*	*<0.000050*		0.16	0.16	-0.6
Iron (Fe)	0.00550	0.00540	1.8	11.2	11.1	0.9
Lead (Pb)	0.00238	0.00243	-2.1	0.042	0.043	-3.5
Lithium (Li)	*<0.00050*	*<0.00050*		0	0.00265	3.7
Magnesium (Mg)	*<0.050*	*<0.050*		1.14	1.15	-0.9
Manganese (Mn)	0.000371	0.000365	1.6	0.73	0.74	-1.8
Phosphorus (P)	*<0.0020*	*<0.0020*		0.3	0.3	0.3
Molybdenum (Mo)	*<0.000050*	*<0.000050*		0.000339	0.000335	1.2
Nickel (Ni)	0.00072	0.00071	1.4	0.0264	0.0264	0
Potassium (K)	*<0.050*	*<0.050*		0.377	0	-0.3
Rubidium (Rb)	*<0.000050*	*<0.000050*		0.00602	0.00611	-1.5
Selenium (Se)	*<0.000040*	*<0.000040*		0.0	0.0	1.8
Silicon (Si)	*<0.10*	*<0.10*		2.29	2.34	-2.2
Silver (Ag)	0.000016	0.000016	0	0.000318	0.000316	0.6
Sodium (Na)	*<0.050*	*<0.050*		0.123	0.1240	-0.8
Strontium (Sr)	0.000184	0.000176	4.4	0.00398	0.00418	-4.9
Sulphur (S)	*<10*	*<10*		*<10*	*<10*	
Tellurium (Te)	*<0.000020*	*<0.000020*		0.000236	0.000205	14
Thallium (Tl)	0.000002	0.000002	0	0.000077	0.000081	-5.1
Thorium (Th)	*<0.0000050*	*<0.0000050*		0.00	0.000073	16
Tin (Sn)	*<0.00020*	*<0.00020*		*<0.00020*	*<0.00020*	
Titanium (Ti)	*<0.00050*	*<0.00050*		0.0799	0.080	-0.6
Tungsten (W)	*<0.000010*	*<0.000010*		0.000046	0.000041	11
Uranium (U)	0.000005	0.000005	0	0.0115	0.0117	-1.7
Vanadium (V)	*<0.00020*	*<0.00020*		0.0164	0.0165	-0.6
Zinc (Zn)	0.00314	0.00319	-1.6	0.0319	0.0323	-1.2
Zirconium (Zr)	*<0.00010*	*<0.00010*		0.00062	0.0006	3.3
Mercury (Hg)	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	

Notes:

RPD (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Bold values exceed 25%

RPDs have not been calculated for cases where one of the samples is below detection and the other is not and in cases where both are below detection.

Table 3.1–7. Field QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2015.

Sampling Event	Field QA	Phytoplankton Density (cells/L)							Total
		Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	
May	INUG-69	0	3,946	0	518,531	28,469	75,468	200	626,614
	DUP - 1	0	0	0	614,175	46,099	93,499	1,800	755,573
	RPD (%)		NA		-17	-47.3	-21	-160	-19
July	WAL-51	7,184	58,272	0	2,161,800	138,912	83,824	8,184	2,458,176
	DUP - 1	0	71,840	0	1,858,472	124,544	193,584	1,400	2,249,840
	RPD (%)	NA	-21		15	11	-79	141.6	8.9
July	BAP-37	0	57,472	0	1,310,488	77,256	109,576	2,200	1,556,992
	DUP - 2	200	57,472	0	1,532,992	160,264	250,656	800	2,002,384
	RPD (%)	NA	0		-16	-70	-78	93	-25
August	BAP-40	0	129,712	0	2,088,760	126,440	119,344	2,200	2,466,456
	DUP - 1	800	165,832	0	1,959,648	156,960	122,944	1,600	2,407,784
	RPD (%)	NA	-24		6.4	-21.5	-3.0	32	2.4
August	TPE-84	1,600	280,376	0	668,912	1,208,312	200	400	2,159,800
	DUP - 2	400	287,360	0	970,840	1,194,744	18,768	800	2,472,912
	RPD (%)	120	-2		-37	1.1	-196	-67	-13.5
August	TPN-84	200	215,520	0	1,877,424	648,360	54,288	38,520	2,834,312
	DUP - 3	0	122,128	0	1,354,192	605,656	24,752	16,768	2,123,496
	RPD (%)	NA	55		32	7	74.7	79	29
September	TPE-86	1,800	172,816	0	1,049,664	858,496	47,104	7,784	2,137,664
	DUP - 2	600	294,544	0	978,624	550,384	28,752	1,000	1,853,904
	RPD (%)	100	-52		7.0	44	48	154	14
September	PDL-41	7,400	359,200	0	939,920	219,520	22,152	14,968	1,563,160
	DUP - 3	18,400	251,440	0	1,134,288	240,472	7,384	600	1,652,584
	RPD (%)	-85	35		-19	-9	100	185	-5.6
November	TE-88	1,000	99,691	0	486,516	46,799	15,984	500	650,490
	DUP - 1	1,800	64,230	0	497,854	182,851	50,845	100	797,680
	RPD (%)	-57	43.3		-2.3	-118	-104	133	-20

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Bolded RPD values exceed 50%.

RPDs have not been calculated for cases where one or both of the samples is "0".

Table 3.1–7. Field QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2015.

Sampling Event	Field QA	Phytoplankton Biomass (mg/m^3)							Total	Taxa Richness
		Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate		
May	INUG-69	0.00	0.60	0.00	23	5.1	10	1.6	41	17
	DUP - 1	0.00	0.00	0.00	29	3.4	13	30	75	17
	RPD (%)		NA		-21	38	-22	-180	**-60**	0
July	WAL-51	0.29	1.3	0.00	246	11	11	12	281	35
	DUP - 1	0.00	1.1	0.00	230	12	23	11	278	33
	RPD (%)	NA	12		6.5	-7	-73	5	1.1	5.9
July	BAP-37	0.00	1.5	0.00	134	5.8	26	11	178	33
	DUP - 2	0.03	1.7	0.00	121	10	39	7.5	180	33
	RPD (%)	NA	-12		10	-55	-40	38	-1	0
August	BAP-40	0	3.9	0.00	177	19	14	14	228	44
	DUP - 1	0.09	5.6	0.00	175	22	27	9.7	239	40
	RPD (%)	NA	-115		-26	-116	-5	12	-29	-19.2
August	TPE-84	0.38	10	0.00	61	39	0.15	0.43	112	25
	DUP - 2	0.06	5.6	0.00	89	27	6.3	8.0	136	32
	RPD (%)	145	61		-37	35	-190	-180	-20	-25
August	TPN-84	0.03	7.3	0.00	203	20	5.5	28	263	31
	DUP - 3	0.00	5.5	0.00	157	32	4.2	18	217	33
	RPD (%)	NA	29		26	-47	27	41	19	-6.3
September	TPE-86	0.25	7.0	0.00	87	24	12	4.9	135	33
	DUP - 2	0.07	11	0.00	58	22	12	4.8	107	27
	RPD (%)	111	-41		41	6.0	1	2	23	20
September	PDL-41	2.5	9.0	0.00	97	11	4.0	13	137	30
	DUP - 3	6.0	5.3	0.00	114	12	1.3	6.6	145	29
	RPD (%)	-81	51		-16	-6	100	67	-5.4	3.4
November	TE-88	0.18	1.3	0.00	45	1.9	4.0	2.0	54	
	DUP - 1	0.40	0.79	0.00	46	5.7	6.5	1.6	61	28
	RPD (%)	-76	47		-3	-99	-47	24	-12.0	NA

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Bolded RPD values exceed 50%.

RPDs have not been calculated for cases where one or both of the samples is "0".

Table 3.1–8. Laboratory QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2015.

Sampling Event	Laboratory QA	Phytoplankton Density (cells/L)							Total
		Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	
May	TE-81	0	42,553	0	1,230,897	46,199	58,399	11,238	1,389,287
	Lab Dup	0	42,553	0	1,195,436	46,099	61,745	11,138	1,356,972
	RPD (%)		0		2.9	0	-6	1	2.4
July	BPJ-38	0	72,240	0	1,152,440	69,872	128,728	1,600	1,424,880
	Lab Dup	0	86,608	0	1,138,672	90,224	130,128	2,000	1,447,632
	RPD (%)		-18		1.2	-25	-1	-22	-1.6
July	TPN-83	0	43,104	0	1,441,816	86,408	51,488	23,952	1,646,768
	Lab Dup	0	57,472	0	1,412,680	107,960	37,920	29,936	1,645,968
	RPD (%)		-29		2.0	-22.2	30.4	-22	0.0
July	WAL-51	7,184	58,272	0	2,161,800	138,912	83,824	8,184	2,458,176
	Lab Dup	0	94,392	0	2,073,392	79,240	77,440	22,552	2,347,016
	RPD (%)	NA	-47		4.2	55	7.9	-93	4.6
August	BPJ-39	0	208,936	0	2,157,416	151,224	218,936	2,200	2,738,712
	Lab Dup	0	237,272	0	2,107,728	127,288	245,872	2,000	2,720,160
	RPD (%)		-13		2.3	17.2	-12	9.5	0.7
August	SP-85	64,856	188,584	0	797,624	188,200	7,184	1,000	1,247,448
	Lab Dup	28,736	129,912	0	869,464	126,344	7,184	2,200	1,163,840
	RPD (%)	77	36.8		-8.6	39.3	0.0	-75	6.9
August	TPS-52	0	96,792	0	1,286,952	116,144	15,968	9,384	1,525,240
	Lab Dup	0	122,728	0	1,191,960	145,680	23,552	16,168	1,500,088
	RPD (%)		-24		7.7	-23	-38	-53.1	1.7
September	WAL-55	200	526,032	0	2,084,176	283,640	86,056	30,536	3,010,640
	Lab Dup	7,184	489,712	0	2,064,624	288,824	77,672	30,936	2,958,952
	RPD (%)	-189	7		1	-1.8	10	-1	1.7
September	TEFF-41	3,200	496,496	0	1,370,760	290,560	29,536	7,784	2,198,336
	Lab Dup	4,800	331,064	0	1,391,128	274,592	50,688	400	2,052,672
	RPD (%)	-40	40		-1.5	6	-53	180.4	6.9
November	INUG-77	56,738	107,183	0	720,158	54,692	43,753	400	982,924
	Lab Dup	14,184	138,798	0	677,505	83,160	33,815	200	947,663
	RPD (%)	120	-26		6.1	-41	26	67	3.7

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Bolded RPD values exceed 25%.

RPDs have not been calculated for cases where one or both of the samples is "0".

Table 3.1–8. Laboratory QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2015.

Sampling Event	Laboratory QA	Phytoplankton Biomass (mg/m^3)							Total	Taxa Richness
		Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate		
May	TE-81	0.00	2.7	0.00	59.77	1.3	24.84	9.2	97.75	17
	Lab Dup	0.00	2.3	0.00	60.64	1.1	25.76	10.07	99.87	18
	RPD (%)		16.9		-1.4	10.1	-4	-9	-2.1	-5.7
July	BPJ-38	0.00	2.5	0.00	104.25	9.1	22.38	12.74	150.98	34
	Lab Dup	0.00	3.2	0.00	102.66	9.1	22.85	14.88	152.68	33
	RPD (%)		-25.1		2	0.4	-2	-15.5	-1.1	3.0
July	TPN-83	0.00	0.73	0.00	145.83	4.4	7.4	19.70	178.04	25
	Lab Dup	0.00	1.0	0.00	133.71	3.6	6.6	17.36	162.34	24
	RPD (%)		-35		9	20	11	13	9.2	4.1
July	WAL-51	0.29	1.3	0.00	246.03	10.86	10.84	11.59	280.85	35
	Lab Dup	0.00	1.8	0.00	222.78	9.9	10.49	10.58	255.45	33
	RPD (%)	NA	-33		10	10	3	9	9.5	5.9
August	BPJ-39	0.00	6.7	0.00	174.17	29.03	41.41	12.78	264.13	45
	Lab Dup	0.00	5.9	0.00	176.93	25.06	44.12	12.21	264.26	43
	RPD (%)		13		-1.6	14.7	-6.3	5	0.0	4.5
August	SP-85	1.8	4.6	0.00	80.34	27.17	0.36	0.97	115.19	26
	Lab Dup	0.70	2.4	0.00	74.20	27.25	0.36	7.3	112.12	28
	RPD (%)	88	63		7.9	0	0.0	-153	2.7	-7.4
August	TPS-52	0.00	7.7	0.00	121.30	6.6	2.5	17.19	155.30	35
	Lab Dup	0.00	3.5	0.00	113.41	8.6	3.4	21.95	150.93	35
	RPD (%)		75		7	-26.6	-31.4	-24.3	2.9	0
September	WAL-55	0.32	11.58	0.00	183.97	23.13	32.80	34.88	286.69	38
	Lab Dup	0.47	8.1	0.00	196.60	29.30	30.72	36.73	301.95	40
	RPD (%)	-38	35		-6.6	-24	7	-5	-5.2	-5.1
September	TEFF-41	1.1	12.37	0.00	154.84	16.44	3.2	9.8	197.75	35
	Lab Dup	1.5	3.2	0.00	162.37	17.29	4.5	5.6	194.51	36
	RPD (%)	-30	118		-4.7	-5	-33	53	1.7	-2.8
November	INUG-77	1.4	3.1	0.00	39.02	4.1	7.5	9.5	64.54	25
	Lab Dup	0.35	3.7	0.00	41.44	4.4	6.8	0.33	56.97	26
	RPD (%)	119	-17		-6	-7.8	9.4	187	12.5	-3.9

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Bolded RPD values exceed 25%.

RPDs have not been calculated for cases where one or both of the samples is "0".

Table 3.1–9. Percent recovery of benthic invertebrate samples, Meadowbank study lakes and Baker Lake, August 2015

Area-Replicate	Number of Organisms Recovered	Number of Organisms in Re-sort	Percent Recovery
BES-5	125	128	97.7%
BPJ-3	157	161	97.5%
INUG-2	112	117	95.7%
PDL-1	88	90	97.8%
TEFF-1	70	72	97.2%
TPE-2	126	130	96.9%
TPS-1	601	645	93.2%
		Average % Recovery	96.6%

Notes:

All samples were sorted in their entirety.

Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group.

3.2. Meadowbank Study Lakes

3.2.1. Limnology

3.2.1.1. General Observations

The ice-free season on the Meadowbank study lakes is very short. Ice break-up usually occurs during mid- to late-June; ice begins to form again on the lakes beginning in late September or early October, with complete ice cover by late October. Maximum ice thickness is about 2 m and occurs in March/April, increasing the concentration of some ions, such as chloride, in the water near the ice-water interface. This phenomenon is due to cryo-concentration where ice formation excludes certain ions and increases their concentration in the water column (Wetzel, 1983). Because the lakes are ice covered for most of the year, gas exchange with the atmosphere is limited, although oxygen concentrations usually remain high under the ice because of the low rates of biological activity and decomposition of organic material (processes that consume oxygen from the water). Historically, during winter there is typically a slight negative thermal stratification with near 0˚C water near the ice-water interface, increasing to 3˚C to 5 ˚C at depth.

During open water conditions, maximum water temperatures may reach 14˚C in summer with little evidence of thermal stratification, except for brief periods of time (days) and typically only a 4˚C to 5˚C temperature difference. Winds blow near constantly and at high speeds, maintaining uniform temperature and high oxygen profiles in the water column in all lakes due to vertical mixing. This also ensures that the distribution of phytoplankton and to a lesser extent, zooplankton is vertically more uniform.

3.2.1.2. Temporal and Spatial Trend Interpretation

Temperature and Oxygen

Depth profiles for temperature, dissolved oxygen, and conductivity are conducted during each monitoring event. Limnology data, when compared to previous monitoring data, provides an initial assessment of whether conditions are changing within a sampling area that may require additional follow-up investigation. Water temperatures at a depth of 3 m are shown in **Figure 3.2–1** for the Meadowbank project lakes since 2006.

The 2015 vertical temperature profiles are characteristic of the typical thermal regime of these lakes (**Figure 3.2–2** through **Figure 3.2–10**). Winter temperature profiles for the through-ice events show a slight negative thermal stratification with water temperatures near 0°C at the ice-water interface, increasing to no more than 3.5°C at depth (**Figure 3.2–2** [March], **Figure 3.2–3** [April], and **Figure 3.2–4** [May]). Oxygen concentrations in winter generally decrease slightly with increasing depth. Oxygen concentrations in all basins are greater than 5 mg/L, and usually greater than 10 mg/L even at the lowest depths, despite nearly nine months of ice cover.

Once the ice is off by mid-July, all the lakes turn over completely, leading to a well-mixed water column with uniform temperature and high oxygen concentrations. Water temperatures warm rapidly to reach maximum temperatures of at least 14°C by late July and into August. Deeper basins, such as TPS, are typically 2°C to 3°C colder than the shallower basins. Temperatures in 2015 were moderate and typical of historical temperature patterns (**Figure 3.2–1**). No vertical stratification, which occasionally establishes after extended periods of calm, windless conditions, was detected in 2015 (**Figure 3.2–5** and **Figure 3.2–6**).

In September, water temperatures cooled to below 5^{o}C but remained un-stratified. With vertical mixing, oxygen concentrations are high and fully saturated (**Figure 3.2–7**). While the values jumped around slightly, no vertical stratification was observed. The November sampling event was generally well mixed and un-stratified for DO and conductivity despite ice-cover on all the lakes (**Figure 3.2–8**).

The seasonal patterns in water temperature and oxygen concentrations observed in 2015 were typical of this area of the Arctic and similar to what has been observed in previous years. There were no differences in these patterns between the control lakes INUG and PDL and the near- and mid-field monitoring areas.

Conductivity

Although technically a 'water chemistry' parameter (it is also included in **Section 3.2.2**), field conductivity is discussed here as an indicator of stratification in the water column. From a monitoring perspective, uniform conductivity provides confidence that the water column is well-mixed and that a water chemistry sample will be representative. In contrast, variable conductivity may indicate the presence of water with different chemical properties (e.g., mining effluent), so profiling is useful to identify these situations and adjust sample collection if necessary to ensure that the different water masses are properly characterized. Oligotrophic systems with low dissolved solids and ions (Ca, Na, Cl, Mg, etc.) typically register conductivity measurements of less than 50 µS/cm. At the Meadowbank study lakes, conductivity is usually uniform in concentration from top to bottom at impact and reference lakes. While the overall range in conductivity is similar between ice-on (5 – 50 µS/cm) and ice-off (5 – 35 µS/cm) months, the conductivities in ice-off months are generally lower, consistent with cryo-concentration during progressive ice formation during winter months.

In 2015, field conductivity was uniform in concentration through the water column, providing further evidence of a complete vertical mixing, consistent with results of temperature and oxygen. Minor vertical differences due to cryo-concentration were observed when expected (winter: **Figure 3.2–8**), with no apparent differences between reference and near-field areas and fairly uniform profiles during the open water period (**Figure 3.2–5** to **Figure 3.2–7**).

Figure 3.2–1. Mean monthly field-measured temperature (°C) at 3 m depth from 2006 – 2015, Meadowbank study lakes.

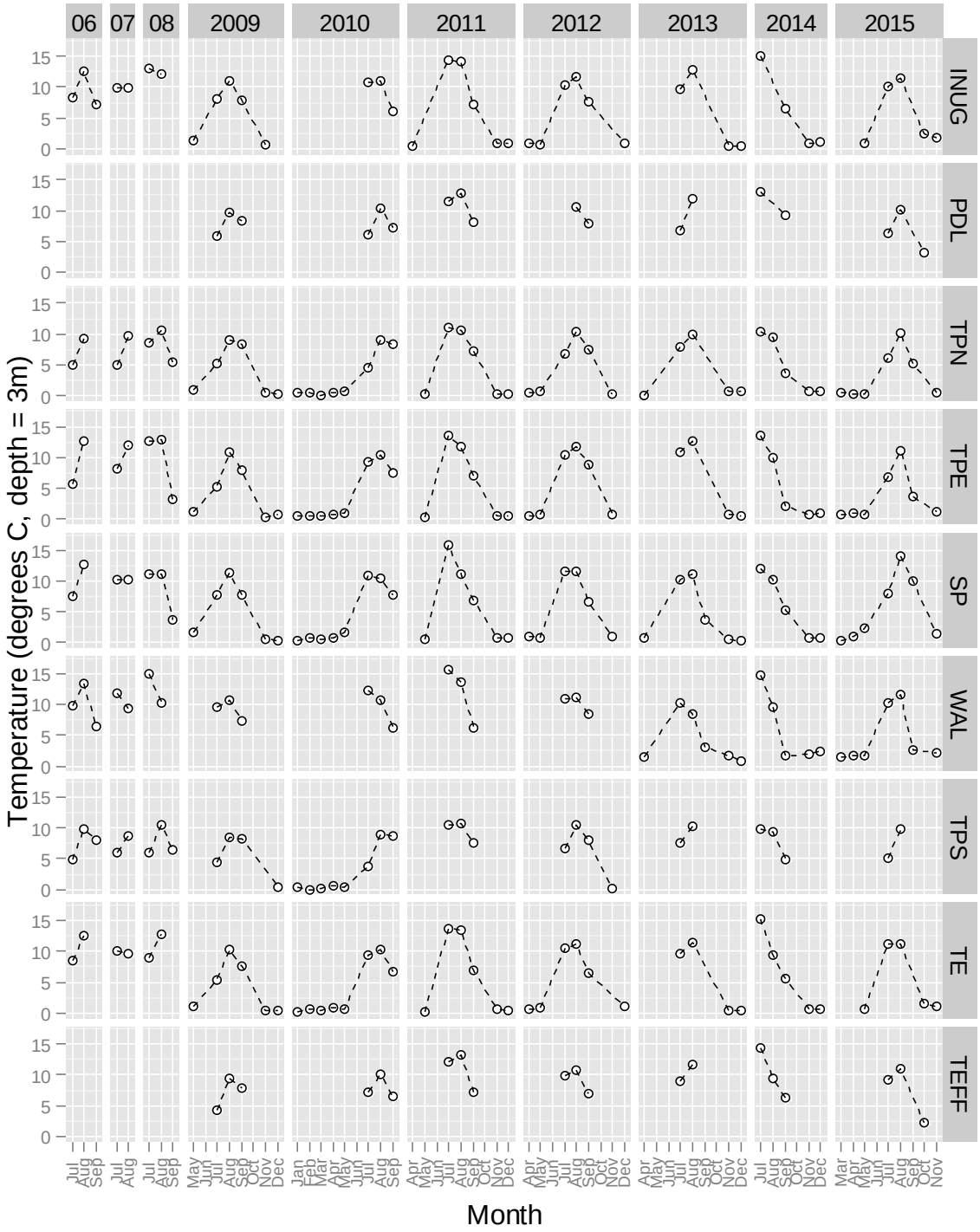


Figure 3.2–2. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for March, 2015.

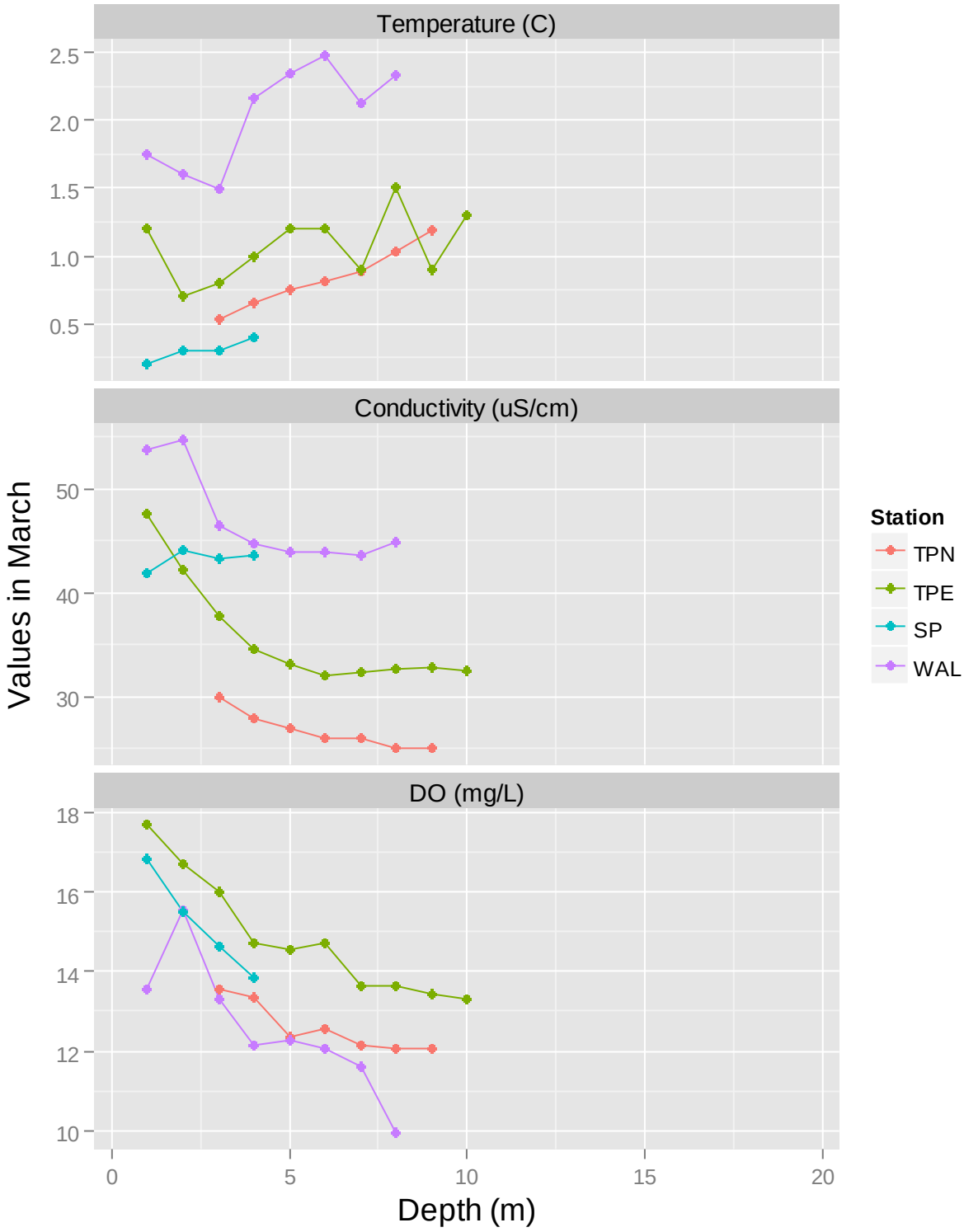


Figure 3.2–3. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for April, 2015.

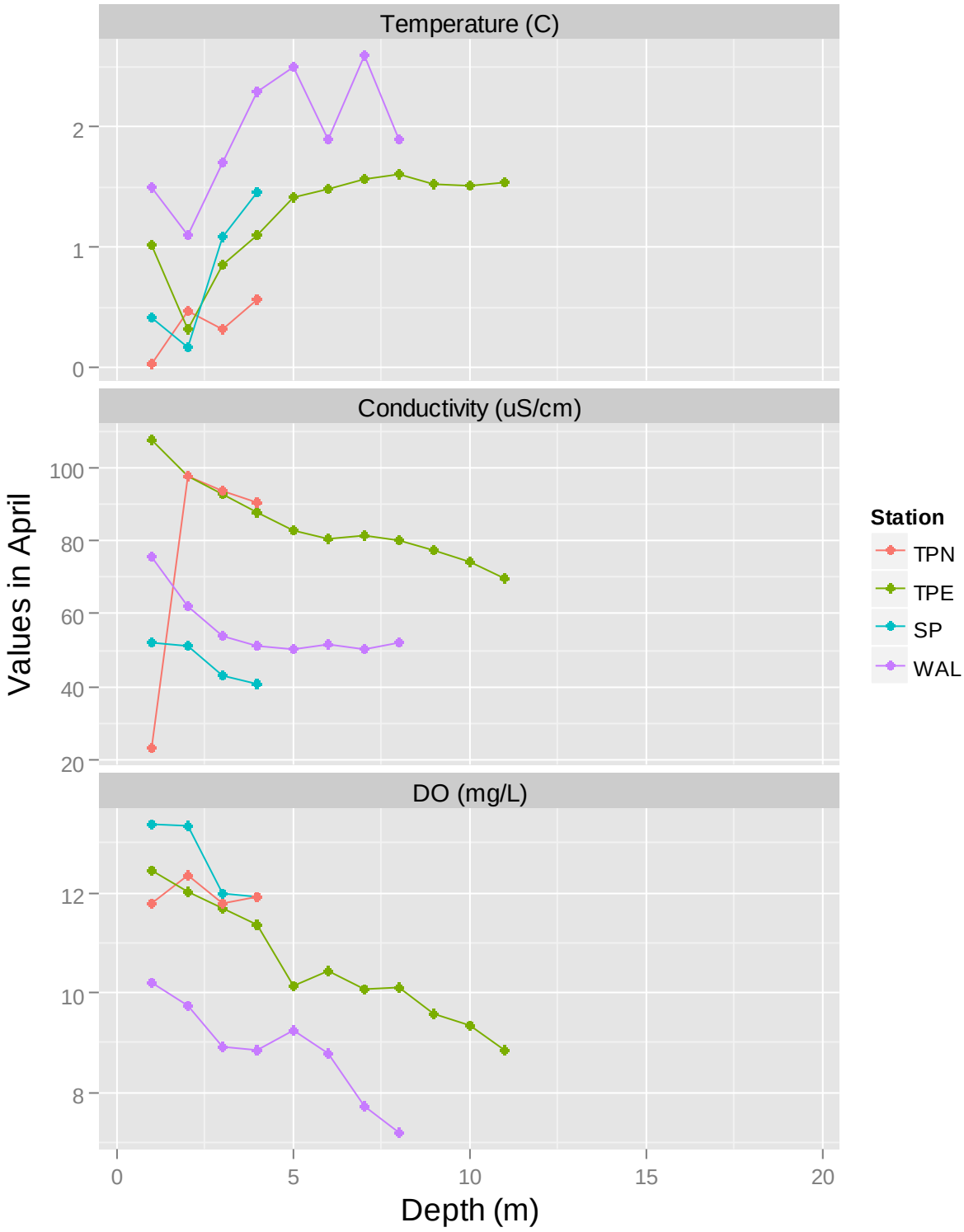


Figure 3.2–4. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for May, 2015.

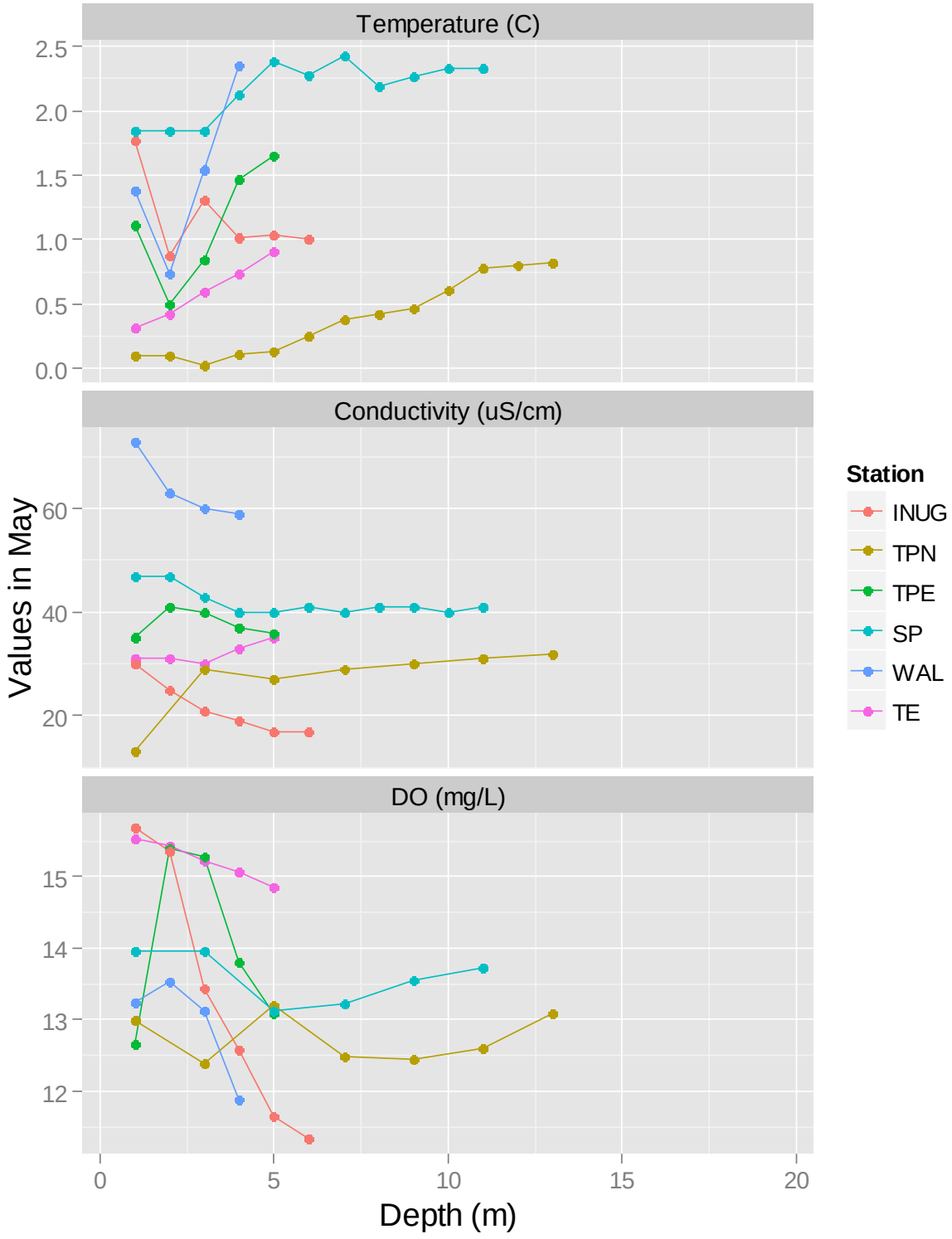


Figure 3.2–5. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for July, 2015.

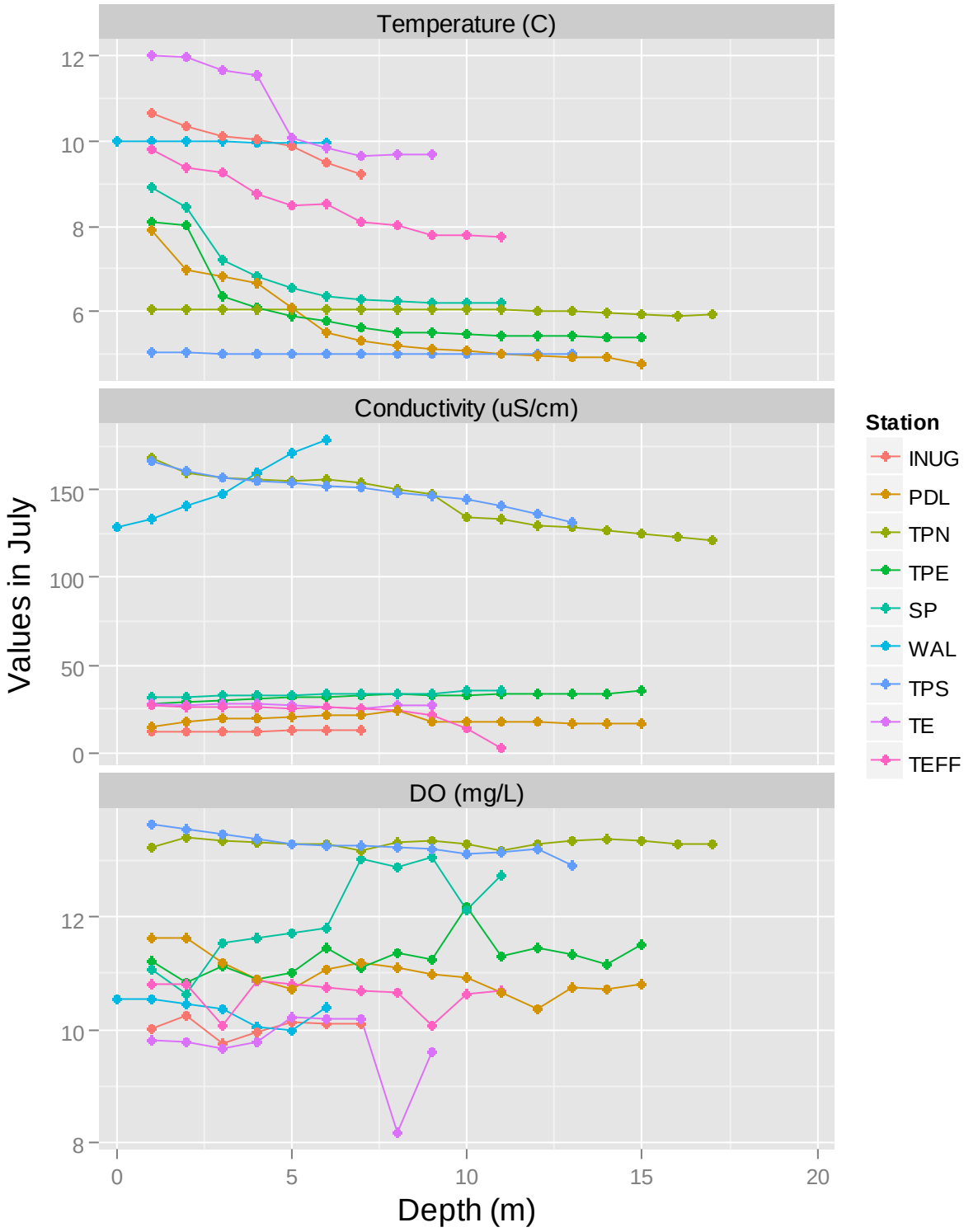


Figure 3.2–6. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for August, 2015.

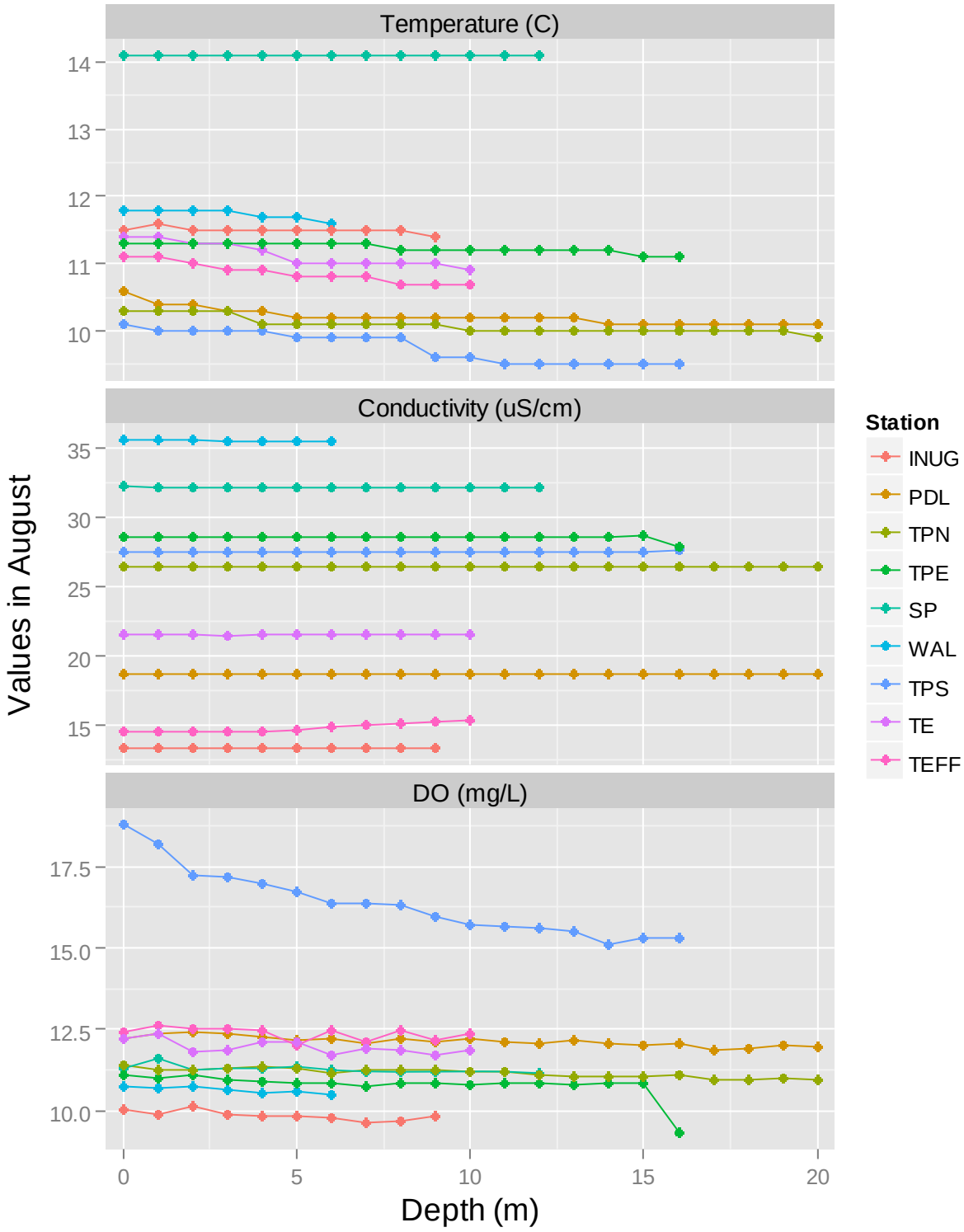


Figure 3.2–7. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for September, 2015.

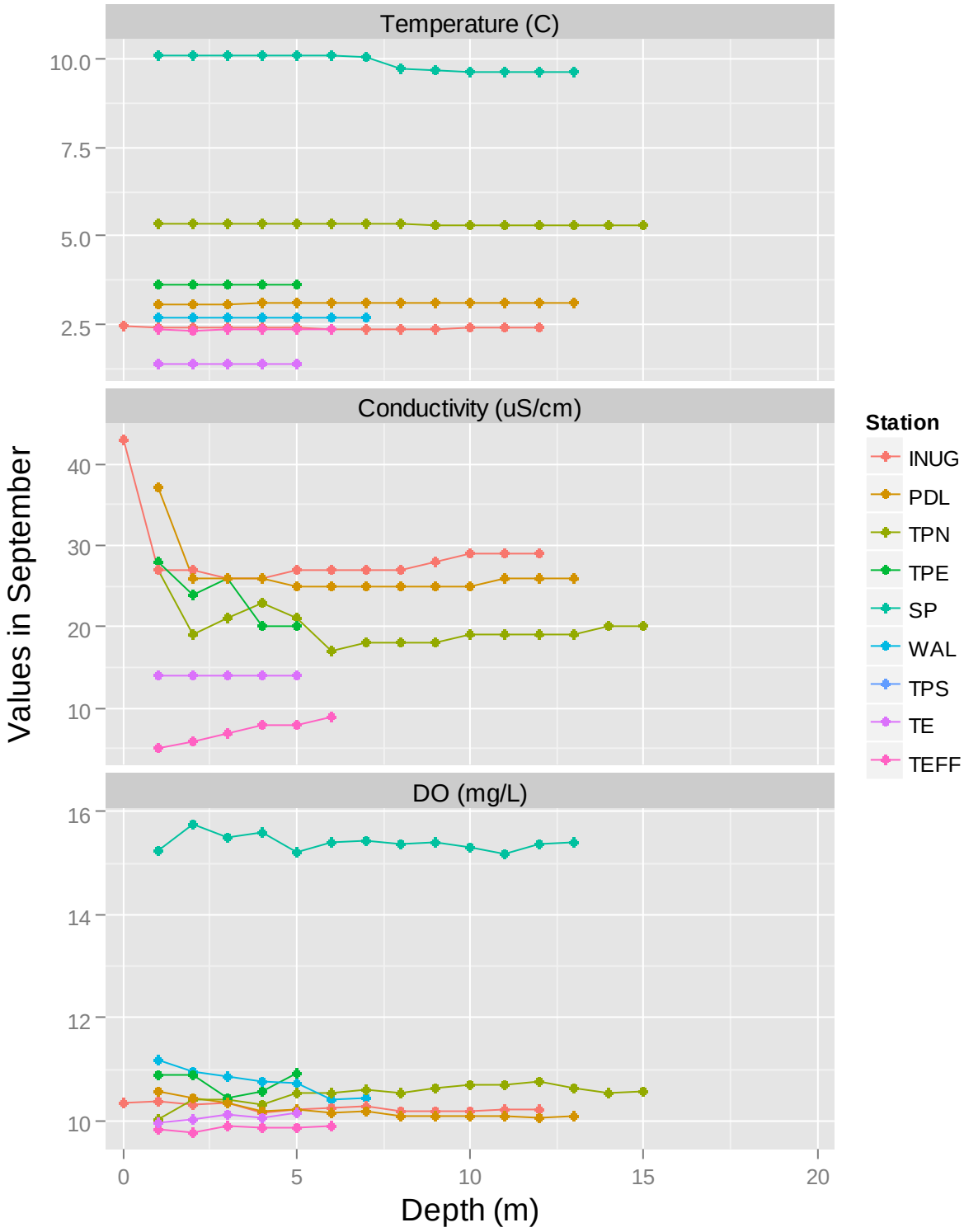
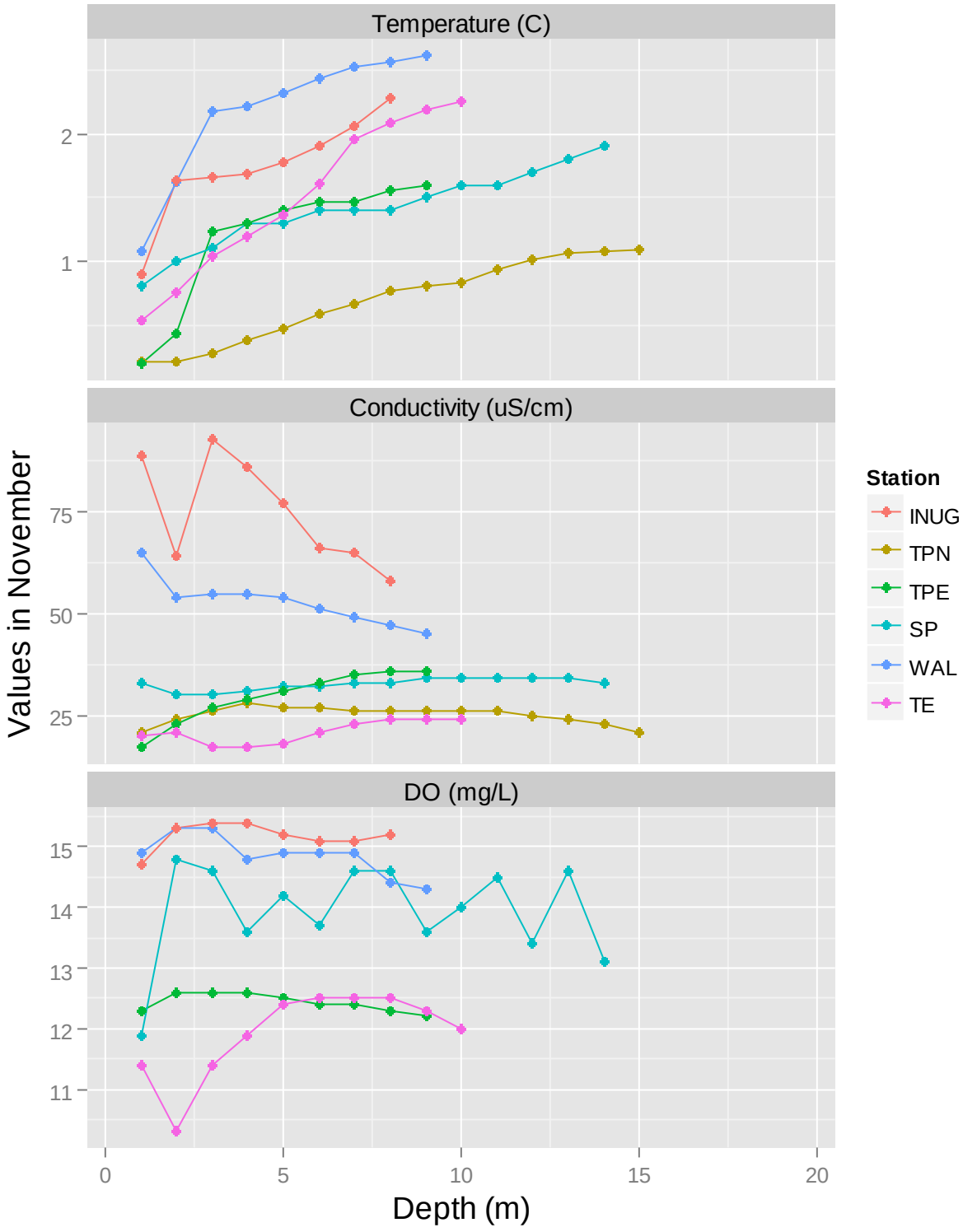


Figure 3.2–8. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for November, 2015.



3.2.2. Water Chemistry

3.2.2.1. General Observations

The general conditions affecting water quality in this region were described in **Section 3.2**. Key points to recall are:

- The Meadowbank study lakes are generally nutrient-poor, thermally un-stratified and well-mixed with uniform temperature and oxygen profiles with no winter anoxia beneath an ice cover.
- The Meadowbank study lakes are headwater lakes, so there are no significant natural sources of nutrients or sediment introduced to these lakes, save only local runoff that contributes little nutrient enrichment, but sustains these aquatic ecosystems. Many chemical parameters in water have been typically below laboratory detection limits (MDLs) since formal baseline monitoring started in 2006[15].

3.2.2.2. Temporal and Spatial Trend Interpretation

2015 water quality data from the Meadowbank project lakes were screened against site-specific trigger and threshold values in **Table 3.2–1** and against FEIS model predictions in **Table 3.2–5** to **Table 3.2–7** for Third Portage Lake, Second Portage Lake, and Wally Lake, respectively. The results are discussed below from a spatial and temporal trend perspective when relevant. Implications for the 2016 monitoring program are discussed at this end of this section.

CREMP monitoring results since 2006 were used to assess temporal and spatial trends related to mining activities. The general rationale for assessing these trends was discussed in **Section 1.5**; the process was tailored slightly for water chemistry, as described below.

As previously discussed, many water quality parameters had concentrations that were routinely below laboratory MDLs, thus providing little insight into the assessment of mine-related changes to water quality. To streamline the interpretation process, a conservative three-step screening process was used to identify parameters for inclusion into the formal trend assessment (the results are summarized in **Table 3.2–2**):

1. *Overall Detection Frequency* – Only those water quality parameters that exceeded MDLs in at least 10% of the samples were included in this discussion. Because the project lakes are ultra-oligotrophic, it is normal for many parameters to routinely be below MDLs. In 2015, just over half (53%) of parameters measured exceeded MDLs at least 10% of the time. These parameters are included in this discussion.
2. Control-*Impact Detection Frequency Comparison* – In order to avoid screening out infrequently detected parameters that were detected more often in association with mining activities, the proportion of samples exceeding MDLs between "control" and "impact" samples were compared. The intent of this screen was to identify parameters with <10% detection frequency (i.e., those screened out above) for which there were detection frequency changes potentially associated with mining activity (i.e., where the proportion of detected values increased by 0.1 or more). No parameters were added back into the trend assessment based on this second screening level.

[15] While formal baseline water quality monitoring started in 2006, reconnaissance baseline monitoring started in the mid-1990s and served as the foundation for designing the formal monitoring program.

3. *Apparent Detection Pattern Matching Mining Activity* – To avoid screening out infrequently detected parameters that may be associated with mining activities (see **Section 1.4**), trend plots were used to identify parameters with measured values associated with periods/locations of known mining activities. Where such patterns were observed, or where parameters were measured at greater than 5-times the MDL at near-field sampling areas in at least one event, these parameters were added back into the trend assessment process. Given that no such patterns have been observed since 2008 East Dike construction and no major activities have taken place on site in 2015, no parameters were added back into the trend assessment process based on this screen.

Parameters that were retained in the analysis are shown in **Figure 3.2–10** to **Figure 3.2–48**. Samples shown in these figures were collected from a depth of 3 meters. The red dashed line in each of these water chemistry figures is the trigger value specific to the parameter and area (i.e., Meadowbank lakes, Wally Lake, and Baker Lake each have their own trigger values). All parameters not retained for the trend assessment were assumed to have no spatial or temporal trends related to mining activities or to natural variability and were excluded from further consideration (although plots for these parameters are included for reference in **Appendix A1**).

Historical trend assessment results related to each of the mining activities are discussed at length in the 2012 CREMP report (Azimuth, 2013). Water chemistry parameters for which the 2015 means for Meadowbank study lakes exceeded their respective trigger values are presented in **Table 3.2–3**. For each parameter/area that exceeded the trigger, formal statistical testing of the observed result was conducted using the BACI statistical model (one-tailed; looking for uni-directional changes only). In this analysis, the model interaction term (or BACI effect term) represents the change at the test area relative to baseline after accounting for natural temporal changes (i.e., temporal changes at the reference area); for simplicity, changes are noted "relative to baseline/reference" conditions. Results are provided in **Table 3.2–4**; key results (i.e., those parameter/area combinations where the 2015 results were statistically different [$p<0.05$[16]]) were as follows:

- *Laboratory Conductivity/Hardness* – TPN, TPE, SP, TPS, TE, and WAL showed an increase relative to baseline/reference conditions. Conductivity is a composite variable that responds positively to increasing concentrations of ionic compounds (e.g., chlorides, sulphates, carbonates, sodium, magnesium, calcium, potassium and metallic ions). The observed change, therefore, is indicative of changes in its underlying compounds (e.g., see ionic compounds below for additional context).
- *Ionic* Compounds *(Calcium, Magnesium, Potassium, Sodium)* – TPN, TPE, and TPS showed an increase (relative to baseline/reference) in all of these major ions; TE and WAL showed increases in calcium and magnesium. Concentrations at these NF and MF areas have typically been <6 mg/L (calcium), <2 mg/L (magnesium), < 1.5 mg/L (sodium), and <1 mg/L (potassium) (i.e., still quite low). Slight increases of these ionic compounds in the Meadowbank study lakes are unlikely to adversely affect biota.
- *TDS* – TPN, TPE, SP, TPS, and WAL showed an increase relative to baseline/reference conditions. Similar to conductivity, TDS is a composite variable based on the combined amount of all inorganic and organic substances contained in a sample. The current TDS discharge limit in the water use licence (2AM-MEA1525) is 1,400 mg/L for both the maximum average concentration

[16] Results in the same targeted statistical power (0.9) as using $p<0.1$ for a two-tailed test.

and maximum allowable grab sample concentration [17]. Weber-Scannell and Duffy (2007) reviewed TDS toxicity to aquatic life. While they recommend deriving ion-specific limits for aquatic life (i.e., rather than for TDS), none of the literature studies they compiled showed effects at TDS concentrations less than 250 mg/L and they report mean TDS in the world's rivers of approximately 120 mg/L. There are no federal water quality guidelines for TDS in Canada or the US. In Alaska, TDS may not exceed 500 mg/L without a special permit and 1000 mg/L at any time (ADEC, 2012). A TDS receiving environment benchmark 500 mg/L was adopted at Diavik (WLWB, 2013). Thus, these changes leading to TDS concentrations on the order of 15 to 45 mg/L are very low and not of concern.

- *Alkalinity* – SP showed an increase in bicarbonate and total alkalinity in 2015 relative to baseline/reference conditions. Bicarbonate (HCO_3^-) comprised 100% of the total alkalinity faction, typical of surface water with pH in the range of 6.5 to 9. Bicarbonate alkalinity at SP has consistently exceeded the trigger dating back to 2011, and in 2013 the mean concentration was 10.1 mg/L (Azimuth, 2014)[18]. The mean concentration at SP increased in 2015 (11.5 mg/L) relative to 2013. The temporal trend of slightly increasing is unlikely to adversely affect biota at SP.
- *TKN* – WAL showed an increase in total Kjeldahl nitrogen (TKN) relative to the trigger value specific to Wally Lake. Exceedance of the trigger values was limited to the May and July sampling events. The 2014 TKN data was flagged as unreliable due to DL issues with the contract laboratory, but compared to 2013, an overall increase in TKN was noted in the spring (April/May) and early summer (July) sampling events in 2015 (**Figure 3.2–21**). Concentrations dropped for the late summer (August and September) and fall (November) sampling events in 2015, and were within the range reported in 2013 (0.13 to 01.5 mg/L [2015]; 0.12 to 0.14 mg/L [2013]). TKN is the sum of total ammonia nitrogen (i.e., NH_3 and NH_4^+) and organically bound nitrogen. Ammonia (as N) was detected in seven of ten samples in 2015, but in all seven cases the concentration was well below the trigger (derived from an effects-based trigger). On a percentage basis, total ammonia accounts for between approximately 5% and 10% of the TKN, indicating the majority of the nitrogen is bound to and/or incorporated in organic material. The slight increase in TKN above the statistically-derived trigger values is unlikely to adversely affect biota in Wally Lake; nonetheless, monitoring of this trend will continue in 2016.

Total and dissolved metals concentrations were consistently low or below their respective MDLs at the NF, MF, and FF locations (**Table 3.2–1**). In 2015, the same metals were measured above laboratory detection limits (MDLs) as in 2014. This is important to note in relation to ongoing discharges to the receiving environment (e.g., discharge from Vault attenuation pond to Wally Lake [July 7th – September 10th, 2015] and discharge of East Dike seepage to Second Portage Lake [during all of 2015, except from June 16th to August 10th, 2014]). Refer to **Section 1.4** and **Table 1.4–1** for more details on major mine-related activities in 2015.

Similar to previous years, the CREMP is detecting changes in some general water quality parameters that appear to be related to mining activity. These changes are also reflected in higher concentrations of some

[17] The discharge limit applies to effluent from the Vault Attenuation Pond at Monitoring Station ST-10 (directed to Wally Lake through the Wally Outfall Diffuser).

[18] Alkalinity was one of the parameters that were flagged as unreliable in last year's CREMP report because of data quality issues with analyses completed by Multilab (see **Section 2.2.2**).

parameters when compared to the model predictions in FEIS. Most metals are below the predicted concentrations for Third Portage Lake (**Table 3.2–5**), Second Portage Lake (**Table 3.2–6**), and Wally Lake (**Table 3.2–7**) with the exception of isolated instance of aluminum, iron, and manganese. Strontium consistently exceeded the model predictions in all three lakes, but importantly did not exceed the trigger (95th percentile of baseline) indicating current strontium concentrations are representative of pre-development conditions. It is important to point out that none of the above parameters that exceed the trigger values or FEIS model predictions have trigger values that were set in the context of effects-based threshold values (e.g., CCME water quality guidelines). Thus, CREMP water quality results are consistent with the "low" significance (i.e., <1x CCME WQG) rating applied to model predictions in the FEIS (Cumberland, 2005).

In the absence of available thresholds, trigger values for these substances were set at the 95th percentile of baseline data (i.e., in the absence of any mine-related inputs, 5% of the samples would be expected to exceed the trigger). Consequently, the BACI model results reported above only indicate that statistically significant changes have been detected. Available information suggests that the observed concentrations of these parameters, while increasing relative to baseline/reference conditions, are well below levels of concern. As in the past, it is recommended that these trends continue to be monitored in 2016.

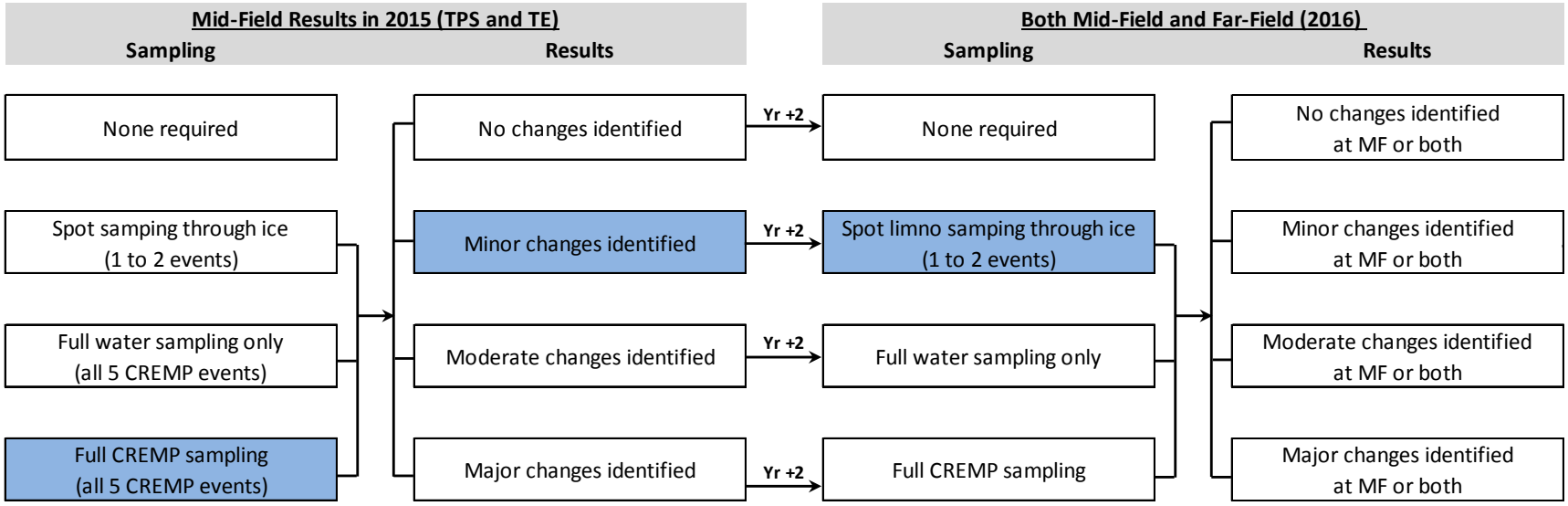
Pursuant to the new assessment strategy for MF and FF areas outlined in the *CREMP: 2015 Plan Update* (Azimuth, 2015a), formal analysis of the trigger/threshold exceedances in 2015 was applied to the decision criteria outlined in **Section 2.2.3** to determine the level of effort and frequency of sampling required at the MF and FF areas in 2016. The assessment strategy uses the water quality assessment results from current year (e.g., 2015) to inform sampling at MF and FF areas the following year (i.e., 2016). Given that 2015 is the first year of implementing the sampling effort and frequency assessment, the data were analyzed starting from the "Year +1" step of the flow chart where results from the MF areas are used to inform sampling at both MF and FF locations (**Figure 3.2–9**).

Trigger/threshold screening results are presented in **Table 3.2–8** according to their corresponding degree of change (i.e., no trigger exceedance, minor changes, moderate changes, and major changes). The outcome of the assessment for sampling at NF, MF and FF areas in 2016 is summarized below:

- *Near-field (TPE, TPN, SP, and WAL)*: Trigger exceedances were documented for parameters without effects-based thresholds (e.g., conductivity, hardness, and cations). The full program will be completed at the NF locations in 2016.
- *Mid-field (TE and TPS)*: Trigger exceedances were documented for parameters without effects-based thresholds (e.g., conductivity, hardness, and cations). Spot sampling through ice is recommended in 2016 to confirm the results. No open water sampling is required in 2016 unless contingency sampling is conducted in accordance with elevated limnology measurement.
- *Far-field (TEFF)*: No trigger exceedances were noted for TEFF in 2016. Spot sampling through ice is recommended in 2016 based on minor changes at TE in 2015. No open water sampling is required in 2016 unless contingency sampling is conducted in accordance with elevated limnology measurement.

Based on the new sampling intensity strategy incorporated into the *CREMP: 2015 Plan Update* (Azimuth, 2015a), the minor changes observed at TPS/TE and TEFF warrant water quality verification sampling at these MF and FF areas in the spring 2016. No other sampling (e.g., sediment chemistry or benthic invertebrate community) is needed at these locations in 2016.

Figure 3.2–9. Flow chart showing sampling effort and frequency assessment results for mid-field and far-field sampling in 2016.



Notes:
Blue-shaded cells show the linkage between 2015 CREMP results and the sampling effort and frequency for mid-field and far-field areas in 2016.

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Third Portage Lake East Basin (TPE)									
Area-Replicate ID					TPE-80-S	TPE-81-S	TPE-82-S	TPE-83-S	TPE-84-S	TPE-85-S	TPE-86-S	TPE-87-S	TPE-88-S	TPE-89-S
Depth (m)	CCME (2012)	Trigger[2]			3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	15-May-15	15-May-15	15-Jul-15	15-Jul-15	29-Aug-15	29-Aug-15	27-Sep-15	27-Sep-15	13-Nov-15	13-Nov-15
Field Measurements (Surface)														
Temperature (°C)					0.5	1.1	8.1	8.5	11.0	11.3	3.6	3.8	0.2	0.7
Specific Conductivity (µS/cm)					41	35	28	42	28	29	28	29	17	19
Dissolved Oxygen (mg/L)					14.90	12.66	11.23	10.70	12.58	11.12	10.89	11.43	12.30	14.30
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	6.85	7.28	6.97	7.07	7.33	7.32	7.08	7.21	7.46	7.48
Physical Tests (mg/L)														
Conductivity (µS/cm)		23.5	36.6		**39**	**40**	**31**	**29**	**30**	**30**	**29**	**30**	**32**	**31**
Hardness		8.5	16.7		**13.2**	**13.7**	**10.7**	**10.6**	**10.8**	**10.7**	**10.4**	**10.7**	**11.1**	**10.9**
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.23	7.16	7.16	7.13	7.08	7.11	6.98	6.98	7.06	7.03
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids		18.0	25.3		**25**	**24**	**20**	**20**	**22**	**22**	**28**	**25**	**19**	17
Turbidity (NTU)					~~0.18~~	~~0.19~~	0.29	0.39	0.26	0.26	0.40	0.34	0.26	0.25
Anions and Nutrients (mg/L)														
Alkalinity - Bicarbonate		8.6	17.8		**10**	**11**	8	8	7	8	8	8	8	8
Alkalinity - Carbonate		4	4		*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		**10**	**11**	8	8	7	8	8	8	8	8
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	0.024	0.026	0.006	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	0.008	0.009
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	0.92	0.94	0.67	0.64	0.71	0.70	0.70	0.70	0.72	0.73
Fluoride	0.120				0.09	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Nitrate (as N)	3.0	1.50	1.50	3	0.0432	0.0348	0.0287	0.0255	0.0144	0.0072	~~0.0085~~	~~0.0087~~	0.0135	0.0156
Nitrite (as N)	0.060	0.031	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.16	0.17	0.09	0.08	0.11	0.10	0.11	0.09	0.10	0.08
Ortho Phosphate (as P)		0.002	0.002		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	*<0.0020*	*<0.0020*	*<0.0020*	0.0026	*<0.0020*	*<0.0020*	0.0021	*<0.0020*	*<0.0020*	*<0.0020*
Silicate (as SiO_2)		1.0	1.08		*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Sulphate (SO_4)		64.71	65.20	128	6.01	6.06	4.27	4.06	4.61	4.54	4.59	4.60	4.79	4.78
Cyanides (mg/L)														
Total Cyanide					*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)														
Dissolved Organic Carbon		2.60	3.21		1.51	1.46	1.46	1.44	1.38	1.25	1.53	1.33	1.28	1.14
Total Organic Carbon		2.79	4.11		1.44	1.56	1.31	1.63	1.39	1.22	1.42	1.27	1.06	1.20
Plant Pigments (µg/L)														
Chlorophyll-*a*					0.16	0.04	0.11	0.17	0.50	0.50	0.33	0.29	0.76	0.66
Total Metals (mg/L)														
Aluminum[3]	***equation***	0.054	0.053	0.100	*<0.0030*	0.0049	~~0.0103~~	~~0.0132~~	~~0.0069~~	~~0.0080~~	~~0.0113~~	~~0.0102~~	0.0056	0.0059
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0005	0.0006	0.0005	0.0005	0.0004	0.0005	0.0004	0.0004	0.0005	0.0004
Barium		0.50	0.50	1	0.0042	0.0041	0.0033	0.0032	0.0031	0.0031	0.0030	0.0030	0.0031	0.0031
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		**3.50**	**3.63**	**2.72**	**2.57**	**2.69**	**2.72**	**2.65**	**2.65**	**2.69**	**2.65**
Chromium[4]	0.001	0.00056	0.00055	0.001	*<0.00010*	0.0001	~~0.0002~~	~~0.0001~~	*<0.00010*	0.0001	~~0.0001~~	~~0.0001~~	0.0001	0.0001
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	0.0005	0.0005	0.0005	0.0008	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Iron	0.3	0.155	0.157	0.3	*<0.010*	0.011	~~0.018~~	~~0.023~~	*<0.010*	0.012	0.019	0.021	*<0.010*	*<0.010*
Lead[3]	***equation***	0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		**1.25**	**1.29**	**0.95**	**0.91**	**0.97**	**0.97**	**0.98**	**0.96**	**0.96**	**0.95**
Manganese[3]		0.3157	0.3300	***equation***	0.0003	0.0004	0.0026	0.0030	0.0011	0.0012	0.0014	0.0013	~~0.0008~~	~~0.0008~~
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.0370	0.073	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel[3]	***equation***	0.0127	0.0130	0.025	0.0005	0.0006	0.0007	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0010	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		0.50	0.59		**0.68**	**0.72**	**0.53**	0.50	**0.51**	0.50	**0.55**	**0.51**	**0.62**	**0.53**
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.10	0.10	0.11	0.13	0.06	0.06	0.06	0.05	*<0.050*	*<0.050*
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		**1.31**	**1.30**	0.92	0.90	**1.05**	**1.03**	**1.09**	**1.09**	**1.01**	**1.02**
Strontium		0.0279	0.0330	0.049	0.0160	0.0165	0.0096	0.0108	0.0116	0.0117	0.0118	0.0115	0.0115	0.0114
Sulfur					2.05	2.05	1.52	1.42	1.59	1.70	1.54	1.58	1.76	1.67
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	0.00035	*<0.00030*	*<0.00030*	0.00039	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.015	0.0075	0.0075	0.015	0.000050	0.000052	0.000044	0.000051	0.000058	0.000056	~~0.000050~~	~~0.000049~~	0.000044	0.000045
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)														
Aluminum[3]		0.0263	0.0260	0.05	*<0.0010*	*<0.0010*	0.0027	0.0034	~~0.0032~~	~~0.0033~~	0.0020	0.0017	0.0014	0.0011
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	0.0005	0.0005	0.0005	0.0004	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004
Barium		0.5010	0.5000	1	0.0042	0.0041	0.0032	0.0031	0.0030	0.0030	0.0028	0.0028	0.0031	0.0030
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium					3.31	3.49	2.74	2.72	2.69	2.68	2.59	2.68	2.80	2.75
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	0.00046	0.00047	~~0.00053~~	~~0.00063~~	0.00036	0.0004	0.00035	0.00034	0.00037	0.00040
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					1.19	1.21	0.94	0.93	0.98	0.98	0.95	0.97	0.99	0.97
Manganese[3]		0.315	0.330	***equation***	*<0.00010*	0.0003	0.0020	0.0023	~~0.0006~~	~~0.0006~~	0.0003	0.0003	*<0.00010*	*<0.00010*
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel		0.013	0.013	0.025	*<0.00050*	0.0006	0.0006	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.66	0.66	0.51	0.51	0.52	0.53	0.51	0.51	0.55	0.51
Selenium		0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.09	0.10	0.10	0.12	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					1.29	1.32	0.93	0.84	1.01	0.98	1.03	1.05	1.00	0.99
Strontium		0.028	0.033	0.049	0.0159	0.0166	0.0113	0.0100	0.0113	0.0116	0.0112	0.0113	0.0113	0.0111
Sulfur					1.97	1.98	1.45	1.42	1.58	1.51	1.54	1.56	1.68	1.63
Thallium		0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.0075	0.015	0.00005	0.00005	0.00004	0.00004	0.00005	0.00005	0.00004	0.00004	0.00004	0.00004
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]		0.0053	0.0096	***equation***	*<0.0010*	*<0.0010*	*<0.0010*	~~0.001~~	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Third Portage Lake North Basin (TPN)									
Area-Replicate ID					TPN-80-S	TPN-81-S	TPN-82-S	TPN-83-S	TPN-84-S	TPN-85-S	TPN-86-S	TPN-87-S	TPN-88-S	TPN-89-S
Depth (m)	CCME (2012)	Trigger[2]			3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	16-May-15	16-May-15	24-Jul-15	24-Jul-15	29-Aug-15	29-Aug-15	27-Sep-15	27-Sep-15	13-Nov-15	13-Nov-15
Field Measurements (Surface)														
Temperature (°C)					0.1	0.9	6.4	6.1	10.1	10.3	5.3	5.1	0.6	0.2
Specific Conductivity (µS/cm)					13	44	~~155~~	~~168~~	26	26	27	25	29	21
Dissolved Oxygen (mg/L)					12.98	15.35	13.00	13.26	11.59	11.40	10.03	10.56		
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.02	7.12	7.31	7.27	7.13	7.12	7.06	6.99	7.51	7.43
Physical Tests (mg/L)														
Conductivity (µS/cm)		23.5	36.6		**36**	**38**	**28**	**28**	**28**	**28**	**27**	**28**	**29**	**29**
Hardness		8.5	16.7		**11.3**	**12.0**	**8.8**	**9.0**	**9.1**	**9.3**	**9.3**	**9.1**	**9.4**	**9.5**
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	6.90	6.95	6.92	6.91	6.97	6.95	6.93	6.91	6.94	6.91
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids		18.0	25.3		**20**	**25**	17	15	14	**19**	18	**20**	16	**18**
Turbidity (NTU)					~~0.14~~	~~0.17~~	0.16	0.19	0.24	0.20	0.27	0.30	0.24	0.23
Anions and Nutrients (mg/L)														
Alkalinity - Bicarbonate		8.6	17.8		8	8	7	6	6	6	6	6	6	6
Alkalinity - Carbonate		4	4		*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		8	8	7	6	6	6	6	6	6	6
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	0.028	0.028	0.011	0.010	*<0.0050*	0.006	0.011	0.005	0.006	0.006
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	0.98	1.06	0.76	0.76	0.75	0.75	0.74	0.74	0.75	0.75
Fluoride	0.120				0.08	0.08	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
Nitrate (as N)	3.0	1.50	1.50	3	0.0795	0.0864	0.0642	0.0640	0.0522	0.0532	0.0476	0.0481	0.0526	0.0532
Nitrite (as N)	0.060	0.031	0.031	0.060	0.001	0.001	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.148	0.152	0.09	0.10	0.09	0.10	0.12	0.15	0.09	0.08
Ortho Phosphate (as P)		0.002	0.002		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0021	0.0023	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Silicate (as SiO_2)		1.0	1.08		*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Sulphate (SO_4)		64.71	65.20	128	6.52	6.95	5.05	5.05	4.86	4.87	4.86	4.86	4.96	5.00
Cyanides (mg/L)														
Total Cyanide					0.001	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)														
Dissolved Organic Carbon		2.60	3.21		1.47	1.68	1.30	1.31	1.19	1.16	1.39	1.60	1.27	1.18
Total Organic Carbon		2.79	4.11		1.59	1.73	1.44	1.28	1.23	1.19	1.59	1.40	1.29	1.17
Plant Pigments (µg/L)														
Chlorophyll-*a*					0.31	0.37	0.12	0.18	0.45	0.44	0.35	0.33	0.93	1.28
Total Metals (mg/L)														
Aluminum[3]	***equation***	0.054	0.053	0.100	*<0.0030*	*<0.0030*	~~0.0076~~	~~0.0058~~	~~0.0067~~	~~0.0060~~	~~0.0089~~	~~0.0076~~	0.0034	0.0047
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Barium		0.50	0.50	1	0.0038	0.0041	0.0032	0.0031	0.0031	0.0031	0.0030	0.0031	0.0030	0.0031
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		**2.89**	**3.05**	**2.18**	**2.17**	**2.19**	**2.17**	**2.21**	**2.23**	**2.26**	**2.29**
Chromium[4]	0.001	0.00056	0.00055	0.001	*<0.00010*	*<0.00010*	~~0.0001~~	*<0.00010*	*<0.00010*	*<0.00010*	~~0.0002~~	~~0.0001~~	0.0001	0.0001
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	*<0.00050*	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0005	*<0.00050*
Iron	0.3	0.155	0.157	0.3	*<0.010*	*<0.010*	~~0.011~~	*<0.010*	*<0.010*	*<0.010*	0.013	0.013	*<0.010*	*<0.010*
Lead[3]	***equation***	0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		**1.11**	**1.18**	**0.86**	**0.84**	**0.88**	**0.86**	**0.87**	**0.87**	**0.87**	**0.88**
Manganese[3]		0.3157	0.3300	***equation***	0.0006	0.0007	0.0018	0.0017	0.0015	0.0014	0.0015	0.0014	~~0.0008~~	~~0.0008~~
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.0370	0.073	0.0003	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel[3]	***equation***	0.0127	0.0130	0.025	*<0.00050*	0.0005	0.0005	0.0005	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0006	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		0.50	0.59		**0.65**	**0.68**	0.48	0.49	0.50	0.47	0.49	0.49	0.47	0.49
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.06	0.06	0.07	0.07	0.06	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		**1.46**	**1.61**	**1.17**	**1.20**	**1.14**	**1.12**	**1.16**	**1.17**	**1.07**	**1.11**
Strontium		0.0279	0.0330	0.049	0.0146	0.0158	0.0103	0.0102	0.0109	0.0107	0.0104	0.0103	0.0103	0.0105
Sulfur					2.20	2.37	1.70	1.70	1.70	1.63	1.64	1.62	1.75	1.79
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.015	0.0075	0.0075	0.015	0.000053	0.000056	0.000044	0.000042	0.000044	0.000042	~~0.000044~~	~~0.000041~~	0.000037	0.000036
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)														
Aluminum[3]		0.0263	0.0260	0.05	*<0.0010*	*<0.0010*	0.0021	0.0023	~~0.0030~~	~~0.0037~~	0.0027	0.0016	0.0013	*<0.0010*
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Barium		0.5010	0.5000	1	0.0038	0.0042	0.0031	0.0031	0.0032	0.0031	0.0030	0.0030	0.0031	0.0031
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium					2.76	2.95	2.15	2.18	2.21	2.24	2.26	2.21	2.32	2.33
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	0.00043	0.00048	~~0.00050~~	~~0.00038~~	0.00033	0.00058	0.00041	0.00033	0.00039	0.00032
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					1.08	1.13	0.84	0.86	0.87	0.89	0.89	0.87	0.88	0.89
Manganese[3]		0.315	0.330	***equation***	0.0004	0.0005	0.0015	0.0014	0.0009	0.0011	0.0006	0.0006	*<0.00010*	*<0.00010*
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002
Nickel		0.013	0.013	0.025	*<0.00050*	*<0.00050*	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.62	0.64	0.46	0.50	0.47	0.49	0.49	0.47	0.47	0.46
Selenium		0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.05	0.05	0.06	0.06	*<0.050*	0.06	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					1.45	1.57	1.19	1.18	1.11	1.11	1.18	1.13	1.08	1.08
Strontium		0.028	0.033	0.049	0.0141	0.0152	0.0099	0.0099	0.0107	0.0107	0.0103	0.0102	0.0101	0.0103
Sulfur					2.14	2.32	1.69	1.71	1.63	1.69	1.62	1.64	1.73	1.68
Thallium		0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.0075	0.015	0.00005	0.00005	0.00003	0.00004	0.00004	0.00004	0.00004	0.00003	0.00003	0.00003
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]		0.0053	0.0096	***equation***	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Third Portage Lake South Basin (TPS)						Second Portage Lake (SP)				
Area-Replicate ID					TPS-49-S	TPS-50-S	TPS-51-S	TPS-52-S	TPS-53-S	TPS-54-S	SP-80-S	SP-81-S	SP-82-S	SP-83-S	SP-84-S
Depth (m)	CCME (2012)	Trigger[2]			3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	24-Jul-15	24-Jul-15	14-Aug-15	14-Aug-15	27-Sep-15	27-Sep-15	17-May-15	17-May-15	15-Jul-15	15-Jul-15	13-Aug-15
Field Measurements (Surface)															
Temperature (°C)					5.1	5.3	10.1	9.8	n/a	n/a	3.1	1.8	8.9	9.1	14.1
Specific Conductivity (µS/cm)					~~166~~	~~185~~	28	28	n/a	n/a	51	47	32	32	32
Dissolved Oxygen (mg/L)					13.67	15.48	18.82	14.10	n/a	n/a	14.31	13.96	11.06	11.08	14.45
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.11	6.99	6.85	7.03	6.54	6.84	7.64	7.54	6.90	7.02	7.50
Physical Tests (mg/L)															
Conductivity (µS/cm)		23.5	36.6		**25**	**26**	**28**	**28**	**28**	**27**	**46**	**44**	**35**	**35**	**35**
Hardness		8.5	16.7		8.4	**9.1**	**9.0**	**9.0**	**9.2**	**9.1**	**17.6**	**16.5**	**13.8**	**13.8**	**13.7**
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	6.87	6.89	6.93	7.09	6.90	6.88	7.01	7.07	7.27	7.29	7.21
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids		18.0	25.3		17	17	14	**19**	**19**	**20**	**30**	**26**	**21**	**22**	**20**
Turbidity (NTU)					0.20	0.16	0.20	0.22	0.27	0.27	~~0.18~~	~~0.15~~	0.53	0.39	0.26
Anions and Nutrients (mg/L)															
Alkalinity - Bicarbonate		8.6	17.8		6	6	6	7	6	6	**15**	**14**	**12**	**11**	**11**
Alkalinity - Carbonate		4	4		*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		6	6	6	7	6	6	**15**	**14**	**12**	**11**	**11**
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	0.012	0.012	0.006	*<0.0050*	0.007	0.006	0.009	0.011	*<0.0050*	*<0.0050*	0.006
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	0.73	0.74	0.75	0.74	0.74	0.73	0.99	0.94	0.78	0.75	0.77
Fluoride	0.120				0.06	0.06	0.06	0.06	0.06	0.06	0.08	0.08	0.06	0.06	0.06
Nitrate (as N)	3.0	1.50	1.50	3	0.0679	0.0670	0.0616	0.0612	0.0525	0.0515	0.0241	0.0239	0.0078	0.0050	*<0.0050*
Nitrite (as N)	0.060	0.031	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.08	0.08	0.13	0.09	0.10	0.10	0.17	0.14	0.10	0.11	**0.18**
Ortho Phosphate (as P)		0.002	0.002		*<0.0010*	*<0.0010*	0.0010	0.0010	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	0.0010
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0025	*<0.0020*
Silicate (as SiO_2)		1.0	1.08		*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	0.77	0.75	0.66	0.72	0.55
Sulphate (SO_4)		64.71	65.20	128	4.89	4.88	4.87	4.85	4.85	4.83	5.52	5.29	3.96	3.73	4.06
Cyanides (mg/L)															
Total Cyanide					*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)															
Dissolved Organic Carbon		2.60	3.21		1.30	1.27	1.37	1.30	1.20	1.17	1.77	1.67	1.84	1.89	1.67
Total Organic Carbon		2.79	4.11		1.29	1.30	1.51	1.44	1.21	1.17	1.85	1.85	1.84	1.89	1.82
Plant Pigments (µg/L)															
Chlorophyll-*a*					0.15	0.16	0.40	0.47	0.29	0.37	0.34	0.36	0.34	0.31	0.36
Total Metals (mg/L)															
Aluminum[3]	***equation***	0.054	0.053	0.100	~~0.0086~~	~~0.0051~~	~~0.0063~~	~~0.0065~~	~~0.0086~~	~~0.0099~~	*<0.0030*	*<0.0030*	~~0.0143~~	~~0.0142~~	~~0.0102~~
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003
Barium		0.50	0.50	1	0.0032	0.0032	0.0030	0.0029	0.0030	0.0030	0.0036	0.0034	0.0031	0.0029	0.0026
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.00	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		2.06	2.14	**2.19**	2.11	**2.20**	**2.23**	**4.76**	**4.49**	**3.66**	**3.62**	**3.59**
Chromium[4]	0.001	0.00056	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	~~0.0002~~	~~0.0001~~	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0008	0.0007	0.0008	0.0009	0.0008
Iron	0.3	0.155	0.157	0.3	~~0.029~~	*<0.010*	*<0.010*	*<0.010*	0.012	0.015	*<0.010*	*<0.010*	~~0.034~~	~~0.026~~	0.022
Lead[3]	***equation***	0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	~~0.00005~~	0.00008
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		0.82	**0.86**	**0.86**	**0.84**	**0.87**	**0.88**	**1.49**	**1.42**	**1.17**	**1.13**	**1.13**
Manganese[3]		0.3157	0.3300	***equation***	0.0020	0.0017	0.0015	0.0015	0.0015	0.0015	0.0003	0.0003	0.0028	0.0024	0.0013
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.0370	0.073	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Nickel[3]	***equation***	0.0127	0.0130	0.025	0.0005	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0006	0.0006	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	0.06	*<0.050*	*<0.050*
Potassium		0.50	0.59		**0.53**	**0.51**	0.49	**0.53**	0.49	**0.51**	**0.67**	**0.61**	**0.67**	0.50	**0.55**
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.08	0.08	0.06	0.07	0.06	0.05	0.32	0.30	0.29	0.32	0.22
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		**1.15**	**1.14**	**1.12**	**1.12**	**1.13**	**1.15**	**0.99**	0.93	0.77	0.67	0.77
Strontium		0.0279	0.0330	0.049	0.0100	0.0100	0.0098	0.0098	0.0104	0.0104	0.0238	0.0225	0.0159	0.0170	0.0163
Sulfur					1.64	1.70	1.90	1.70	1.66	1.61	1.85	1.78	1.50	1.36	1.52
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.015	0.0075	0.0075	0.015	0.000047	0.000044	0.000040	0.000040	~~0.000043~~	~~0.000043~~	0.000050	0.000051	0.000064	0.000053	0.000049
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)															
Aluminum[3]		0.0263	0.0260	0.05	0.0029	0.0026	~~0.0025~~	~~0.0027~~	0.0014	0.0017	*<0.0010*	*<0.0010*	0.0037	0.0041	~~0.0033~~
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003
Barium		0.5010	0.5000	1	0.0031	0.0031	0.0030	0.0030	0.0030	0.0030	0.0035	0.0034	0.0028	0.0025	0.0025
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	0.00	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium					2.02	2.23	2.18	2.18	2.24	2.21	4.69	4.36	3.66	3.67	3.62
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	~~0.00052~~	~~0.00043~~	0.00038	0.00033	0.00032	0.00033	0.00108	0.00067	~~0.00064~~	~~0.00076~~	0.00061
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					0.81	0.86	0.86	0.87	0.88	0.87	1.44	1.37	1.14	1.12	1.13
Manganese[3]		0.315	0.330	***equation***	0.0015	0.0014	0.0011	0.0011	0.0004	0.0005	0.0002	0.0002	0.0019	0.0016	~~0.0007~~
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Nickel		0.013	0.013	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.47	0.48	0.53	0.51	0.48	0.50	0.63	0.58	0.54	0.48	0.54
Selenium		0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.08	0.08	0.06	0.06	*<0.050*	*<0.050*	0.31	0.30	0.27	0.29	0.21
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					1.12	1.15	1.11	1.11	1.11	1.13	0.98	0.94	0.72	0.67	0.76
Strontium		0.028	0.033	0.049	0.0098	0.0098	0.0095	0.0097	0.0102	0.0101	0.0228	0.0220	0.0161	0.0168	0.0157
Sulfur					1.62	1.68	1.64	1.69	1.59	1.59	1.80	1.73	1.37	1.32	1.42
Thallium		0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.0075	0.015	0.00004	0.00004	0.00003	0.00003	0.00003	0.00003	0.00004	0.00004	0.00005	0.00005	0.00004
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.0053	0.0096	***equation***		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Second Portage Lake (SP)					Tehek Lake (TE)					
Area-Replicate ID	CCME (2012)	Trigger[2]			SP-85-S	SP-86-S	SP-87-S	SP-88-S	SP-89-S	TE-80-S	TE-81-S	TE-82-S	TE-83-S	TE-84-S	TE-85-S
Depth (m)					3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	13-Aug-15	6-Sep-15	6-Sep-15	2-Nov-15	2-Nov-15	14-May-15	14-May-15	27-Jul-15	27-Jul-15	28-Aug-15	28-Aug-15
Field Measurements (Surface)															
Temperature (°C)					14.1	10.0	10.1	0.8	3.5	0.3	0.6	11.7	12.0	11.4	11.4
Specific Conductivity (µS/cm)					32	~~198~~	~~120~~	33	42	31	34	23	28	22	22
Dissolved Oxygen (mg/L)					11.30	16.14	15.25	11.9	13.3	15.53	15.67	10.65	9.80	12.06	12.21
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.50	7.34	7.11	7.33	7.13	6.88	7.10	6.88	6.75	7.14	7.13
Physical Tests (mg/L)															
Conductivity (µS/cm)		23.5	36.6		**34**	**44**	**34**	**35**	**36**	**32**	**36**	**29**	**32**	**25**	**25**
Hardness		8.5	16.7		**13.6**	**13.8**	**13.7**	**14.2**	**14.3**	**11.7**	**12.1**	**11.4**	**12.9**	**9.8**	**9.7**
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.20	7.21	7.20	7.17	7.18	6.95	7.00	7.16	7.25	7.06	7.07
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids		18.0	25.3		**24**	14	12	**19**	**20**	**24**	**25**	**20**	**25**	**19**	**19**
Turbidity (NTU)					0.27	0.21	0.21	0.24	0.21	~~0.15~~	~~0.18~~	0.35	0.30	0.26	0.25
Anions and Nutrients (mg/L)															
Alkalinity - Bicarbonate		8.6	17.8		**11**	**10**	**10**	**11**	**12**	**9**	**10**	8	**9**	7	8
Alkalinity - Carbonate		4	4		*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		**11**	**10**	**10**	**11**	**12**	**9**	**10**	8	**9**	7	8
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	*<0.0050*	*<0.0050*	*<0.0050*	0.009	0.007	0.013	0.008	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	0.77	0.76	0.76	0.79	0.80	1.04	1.10	0.70	0.75	0.69	0.68
Fluoride	0.120				0.06	0.06	0.06	0.07	0.07	0.09	0.09	0.06	0.06	0.06	0.06
Nitrate (as N)	3.0	1.50	1.50	3	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	0.0057	0.0077	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Nitrite (as N)	0.060	0.031	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.12	0.11	0.14	0.13	0.12	**0.20**	0.15	0.09	0.10	0.11	0.09
Ortho Phosphate (as P)		0.002	0.002		0.0012	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0023	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0021
Silicate (as SiO_2)		1.0	1.08		0.56	*<0.50*	*<0.50*	*<0.50*	*<0.50*	0.54	0.62	0.53	0.57	*<0.50*	*<0.50*
Sulphate (SO_4)		64.71	65.20	128	4.08	4.12	4.13	4.36	4.38	3.94	4.31	3.24	3.75	2.93	2.89
Cyanides (mg/L)															
Total Cyanide					*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)															
Dissolved Organic Carbon		2.60	3.21		1.71	1.54	1.60	1.63	1.71	1.79	2.17	1.65	1.66	1.34	1.36
Total Organic Carbon		2.79	4.11		1.69	1.58	1.47	1.59	1.76	2.20	1.91	1.79	1.84	1.23	1.25
Plant Pigments (µg/L)															
Chlorophyll-*a*					0.40	0.18	0.28	0.93	0.74	0.62	0.46	0.31	0.25	0.35	0.36
Total Metals (mg/L)															
Aluminum[3]	***equation***	0.054	0.053	0.100	~~0.0076~~	~~0.0079~~	~~0.0100~~	0.0069	0.0050	*<0.0030*	*<0.0030*	~~0.0159~~	~~0.0115~~	~~0.0086~~	~~0.0074~~
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003	0.0001	0.0001
Barium		0.50	0.50	1	0.0027	0.0025	0.0026	0.0026	0.0026	0.0038	0.0040	0.0025	0.0026	0.0023	0.0022
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		**3.50**	**3.52**	**3.51**	**3.72**	**3.80**	**2.81**	**3.32**	**2.79**	**3.45**	**2.42**	**2.35**
Chromium[4]	0.001	0.00056	0.00055	0.001	*<0.00010*	~~0.0001~~	~~0.0002~~	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	~~0.0001~~	~~0.0001~~	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	0.0007	~~0.0008~~	~~0.0007~~	0.0007	0.0007	0.0006	0.0008	0.0006	0.0007	*<0.00050*	*<0.00050*
Iron	0.3	0.155	0.157	0.3	0.018	0.017	0.015	0.012	0.014	*<0.010*	*<0.010*	~~0.027~~	~~0.026~~	0.014	0.013
Lead[3]	***equation***	0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	~~0.00006~~	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		**1.10**	**1.13**	**1.11**	**1.18**	**1.19**	**1.08**	**1.25**	**0.93**	**1.10**	**0.85**	**0.84**
Manganese[3]		0.3157	0.3300	***equation***	0.0014	0.0011	0.0012	~~0.0008~~	~~0.0006~~	0.0004	0.0005	0.0024	0.0018	0.0014	0.0013
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.0370	0.073	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001
Nickel[3]	***equation***	0.0127	0.0130	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		0.50	0.59		**0.54**	0.49	0.49	**0.53**	**0.52**	**0.65**	**0.75**	0.44	0.50	0.41	0.42
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.21	0.18	0.18	0.17	0.18	0.21	0.24	0.24	0.24	0.18	0.17
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		0.77	0.77	0.78	0.86	0.84	**1.01**	**1.05**	0.69	0.76	0.68	0.69
Strontium		0.0279	0.0330	0.049	0.0158	0.0157	0.0157	0.0170	0.0169	0.0157	0.0174	0.0129	0.0153	0.0116	0.0113
Sulfur					1.46	1.42	1.45	1.54	1.55	1.38	1.51	1.10	1.32	1.00	0.99
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	0.00039	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.015	0.0075	0.0075	0.015	0.000047	~~0.000045~~	~~0.000051~~	0.000044	0.000044	0.000052	0.000057	0.000074	0.000064	0.000058	0.000059
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)															
Aluminum[3]		0.0263	0.0260	0.05	~~0.0035~~	0.0027	0.0026	0.0021	0.0015	*<0.0010*	*<0.0010*	0.0041	0.0033	~~0.0035~~	~~0.0027~~
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	0.0003	0.0003	0.0003	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001
Barium		0.5010	0.5000	1	0.0026	0.0025	0.0024	0.0025	0.0025	0.0038	0.0039	0.0024	0.0025	0.0023	0.0022
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium					3.59	3.64	3.62	3.74	3.78	2.86	3.01	2.96	3.37	2.50	2.47
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	0.00059	0.00068	0.00060	0.00054	0.00057	0.00053	0.00065	~~0.00048~~	~~0.00055~~	0.00040	0.00039
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.000525	0.001	*<0.000050*	0.00006	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					1.12	1.15	1.14	1.18	1.18	1.10	1.12	0.98	1.09	0.87	0.87
Manganese[3]		0.315	0.330	***equation***	~~0.0007~~	0.0004	0.0004	0.0003	0.0003	0.0002	0.0003	0.0013	0.0010	~~0.0006~~	~~0.0006~~
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Nickel		0.013	0.013	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.53	0.53	0.51	0.51	0.50	0.65	0.67	0.47	0.49	0.42	0.42
Selenium		0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.19	0.17	0.17	0.16	0.16	0.21	0.23	0.22	0.22	0.17	0.17
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					0.76	0.75	0.75	0.84	0.84	0.97	1.03	0.68	0.72	0.66	0.68
Strontium		0.028	0.033	0.049	0.0157	0.0154	0.0152	0.0161	0.0161	0.0149	0.0167	0.0130	0.0147	0.0114	0.0113
Sulfur					1.43	1.44	1.41	1.49	1.51	1.34	1.43	1.13	1.25	0.98	0.98
Thallium		0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.0075	0.015	0.00004	0.00004	0.00004	0.00004	0.00004	0.00005	0.00005	0.00006	0.00006	0.00005	0.00005
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.0053	0.0096	***equation***		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Tehek Lake (TE)				Tehek Lake Far-field (TEFF)					
Area-Replicate ID	CCME (2012)	Trigger[2]			TE-86-S	TE-87-S	TE-88-S	TE-89-S	TEFF-37-S	TEFF-38-S	TEFF-39-S	TEFF-40-S	TEFF-41-S	TEFF-42-S
Depth (m)					3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	4-Oct-15	4-Oct-15	21-Nov-15	21-Nov-15	27-Jul-15	27-Jul-15	28-Aug-15	28-Aug-15	4-Oct-15	4-Oct-15
Field Measurements (Surface)														
Temperature (°C)					1.4	1.7	0.5	0.5	9.9	9.8	11.1	11.1	2.1	2.4
Specific Conductivity (µS/cm)					14	12	20	10	39	27	15	14	5	5
Dissolved Oxygen (mg/L)					9.97	9.99	11.4	13.5	10.70	10.80	12.41	12.25	9.92	9.83
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	6.83	6.69	7.33	7.17	6.65	6.51	7.05	6.92	**6.24**	6.57
Physical Tests (mg/L)														
Conductivity (µS/cm)		23.5	36.6		**24**	23	20	21	18	21	17	17	17	17
Hardness		8.5	16.7		**9.2**	**8.6**	7.2	7.6	6.5	7.9	6.1	6.0	6.3	5.9
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.04	7.01	6.85	6.89	6.87	7.00	6.87	6.88	6.83	6.83
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids		18.0	25.3		17	17	14	15	12	16	14	15	15	13
Turbidity (NTU)					0.46	0.44	0.24	0.27	0.28	0.29	0.21	0.23	0.31	0.33
Anions and Nutrients (mg/L)														
Alkalinity - Bicarbonate		8.6	17.8		7	7	6	6	~~5~~	6	4	5	5	5
Alkalinity - Carbonate		4	4		*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		7	7	6	6	~~5~~	6	4	5	5	5
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	*<0.0050*	*<0.0050*	0.006	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	0.64	0.63	0.61	0.63	0.58	0.63	0.59	0.58	0.56	0.56
Fluoride	0.120				0.06	0.06	0.06	0.06	0.05	0.06	0.06	0.06	0.05	0.05
Nitrate (as N)	3.0	1.50	1.50	3	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Nitrite (as N)	0.060	0.031	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.15	0.13	0.11	0.11	0.09	0.08	0.08	0.08	0.11	0.10
Ortho Phosphate (as P)		0.002	0.002		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0023	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Silicate (as SiO_2)		1.0	1.08		*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Sulphate (SO_4)		64.71	65.20	128	2.76	2.61	2.27	2.40	2.04	2.40	2.05	2.02	2.00	1.95
Cyanides (mg/L)														
Total Cyanide					*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)														
Dissolved Organic Carbon		2.60	3.21		1.29	1.24	1.17	1.25	1.30	1.48	1.10	1.06	1.04	1.15
Total Organic Carbon		2.79	4.11		1.41	1.19	1.72	1.04	1.39	1.49	1.18	1.10	1.12	1.02
Plant Pigments (µg/L)														
Chlorophyll-*a*					0.26	0.33	0.78	0.87	0.21	0.28	0.27	0.26	0.28	0.30
Total Metals (mg/L)														
Aluminum[3]	***equation***	0.054	0.053	0.100	~~0.0148~~	~~0.0152~~	0.0063	0.0063	~~0.0104~~	~~0.0107~~	~~0.0065~~	~~0.0065~~	~~0.0084~~	~~0.0091~~
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0001	0.0001	*<0.00010*	*<0.00010*	0.0001	0.0001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Barium		0.50	0.50	1	0.0021	0.0023	0.0022	0.0025	0.0026	0.0023	0.0021	0.0021	0.0021	0.0020
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		**2.28**	**2.17**	1.81	1.85	1.56	1.94	1.46	1.40	1.48	1.39
Chromium[4]	0.001	0.00056	0.00055	0.001	*<0.00010*	~~0.0001~~	0.0002	0.0002	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	*<0.00050*	*<0.00050*	*<0.00050*	**0.0022**	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Iron	0.3	0.155	0.157	0.3	0.025	0.024	0.014	*<0.010*	~~0.011~~	~~0.019~~	*<0.010*	*<0.010*	0.014	0.016
Lead[3]	***equation***	0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		0.82	0.80	0.79	0.70	0.62	0.72	0.58	0.57	0.60	0.58
Manganese[3]		0.3157	0.3300	***equation***	0.0016	0.0012	0.0009	0.0009	0.0027	0.0030	0.0012	0.0012	0.0013	0.0013
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.0370	0.073	0.0001	0.0001	0.0002	0.0001	*<0.000050*	0.0001	0.0001	0.0001	*<0.000050*	*<0.000050*
Nickel[3]	***equation***	0.0127	0.0130	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		0.50	0.59		0.43	0.43	0.40	0.40	0.41	0.43	0.36	0.34	0.37	0.40
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.18	0.18	0.13	0.13	0.15	0.19	0.11	0.11	0.12	0.12
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		0.67	0.67	0.64	0.65	0.69	0.61	0.57	0.58	0.56	0.57
Strontium		0.0279	0.0330	0.049	0.0111	0.0109	0.0095	0.0099	0.0078	0.0093	0.0080	0.0078	0.0076	0.0076
Sulfur					1.01	0.97	0.84	0.87	0.72	0.85	0.70	0.69	0.74	0.73
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	0.00075	*<0.00090*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	0.00038	0.00038
Uranium	0.015	0.0075	0.0075	0.015	0.000065	~~0.000059~~	0.000039	0.000039	0.000041	0.000049	0.000043	0.000039	~~0.000038~~	~~0.000037~~
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)														
Aluminum[3]		0.0263	0.0260	0.05	0.0025	0.0015	0.0019	0.0012	0.0034	0.0029	~~0.0026~~	~~0.0028~~	0.0020	*<0.0010*
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	0.0001	*<0.00010*	*<0.00010*	0.0001	*<0.00010*	0.0001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Barium		0.5010	0.5000	1	0.0020	0.0021	0.0022	0.0024	0.0021	0.0023	0.0021	0.0020	0.0020	0.0020
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium					2.32	2.15	1.78	1.87	1.55	1.97	1.46	1.44	1.50	1.41
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	0.00032	0.00030	0.00040	0.00036	~~0.00027~~	~~0.00035~~	0.00029	0.00027	*<0.00020*	*<0.00020*
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.000525	0.001	0.00005	*<0.000050*	*<0.000050*	0.00007	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					0.82	0.78	0.67	0.71	0.63	0.73	0.59	0.58	0.61	0.58
Manganese[3]		0.315	0.330	***equation***	0.0010	0.0005	*<0.00010*	0.0002	0.0017	0.0021	~~0.0006~~	~~0.0006~~	0.0004	0.0004
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	0.0001	0.0001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.0001	*<0.000050*	*<0.000050*
Nickel		0.013	0.013	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.43	0.40	0.37	0.41	0.41	0.43	0.36	0.33	0.37	0.38
Selenium		0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.16	0.15	0.12	0.12	0.14	0.18	0.11	0.11	0.10	0.10
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					0.68	0.63	0.63	0.65	0.56	0.60	0.56	0.57	0.56	0.63
Strontium		0.028	0.033	0.049	0.0110	0.0104	0.0089	0.0094	0.0076	0.0092	0.0079	0.0079	0.0076	0.0073
Sulfur					0.96	0.91	0.82	0.87	0.70	0.84	0.71	0.70	0.68	0.79
Thallium		0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.0075	0.015	0.00005	0.00004	0.00003	0.00003	0.00004	0.00004	0.00003	0.00003	0.00003	0.00003
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]		0.0053	0.0096	***equation***	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Inuggugayualik Lake (INUG)									
Area-Replicate ID	CCME (2012)	Trigger[2]			INUG-68-S	INUG-69-S	INUG-70-S	INUG-71-S	INUG-72-S	INUG-73-S	INUG-74-S	INUG-75-S	INUG-76-S	INUG-77-S
Depth (m)					3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	16-May-15	16-May-15	27-Jul-15	27-Jul-15	27-Aug-15	27-Aug-15	1-Oct-15	1-Oct-15	23-Nov-15	23-Nov-15
Field Measurements (Surface)														
Temperature (°C)					0.1	1.8	10.7	10.7	11.5	11.5	2.5	2.4	0.9	0.6
Specific Conductivity (µS/cm)					14	30	12	12	13	13	~~157~~	43	89	48
Dissolved Oxygen (mg/L)					9.71	15.69	9.95	10.02	10.04	10.10	10.42	10.34	14.7	15
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	6.65	6.61	7.04	7.12	7.31	6.94	6.74	7.00	7.41	7.46
Physical Tests (mg/L)														
Conductivity (µS/cm)		23.5	36.6		23	21	15	15	16	16	16	17	17	17
Hardness		8.5	16.7		8.0	7.7	5.8	5.9	5.7	5.7	5.8	5.9	5.8	6.0
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	6.79	6.83	6.89	6.90	6.84	6.82	6.73	6.75	6.86	6.87
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids		18.0	25.3		**19**	**20**	16	17	16	15	13	12	12	12
Turbidity (NTU)					~~0.15~~	~~0.14~~	0.31	0.29	0.29	0.28	0.38	0.37	0.25	0.23
Anions and Nutrients (mg/L)														
Alkalinity - Bicarbonate		8.6	17.8		7	7	~~5~~	5	5	5	6	5	5	5
Alkalinity - Carbonate		4	4		*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		7	7	~~5~~	5	5	5	6	5	5	5
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	0.016	0.018	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	0.007	0.006
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	1.10	1.02	0.73	0.73	0.77	0.76	0.75	0.75	0.77	0.78
Fluoride	0.120				0.08	0.08	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Nitrate (as N)	3.0	1.50	1.50	3	*<0.0050*	0.0061	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Nitrite (as N)	0.060	0.031	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.16	0.17	0.09	0.09	0.12	0.12	0.15	0.14	0.12	0.12
Ortho Phosphate (as P)		0.002	0.002		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0021	*<0.0020*	0.0020	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	*<0.0020*	*<0.0020*	*<0.0020*	0.0058	0.0028	*<0.0020*	*<0.0020*	0.0025	*<0.0020*	0.0024
Silicate (as SiO_2)		1.0	1.08		*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Sulphate (SO_4)		64.71	65.20	128	1.38	1.28	0.88	0.88	0.90	0.90	0.87	0.87	0.90	0.91
Cyanides (mg/L)														
Total Cyanide					*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)														
Dissolved Organic Carbon		2.60	3.21		2.10	1.95	1.86	1.94	1.76	1.54	1.55	1.63	1.66	1.55
Total Organic Carbon		2.79	4.11		2.18	2.35	1.91	2.00	1.57	1.58	1.92	1.84	2.10	1.58
Plant Pigments (µg/L)														
Chlorophyll-*a*					0.48	0.20	0.30	0.27	0.39	0.44	0.32	0.37	0.95	0.87
Total Metals (mg/L)														
Aluminum[3]	***equation***	0.054	0.053	0.100	*<0.0030*	*<0.0030*	~~0.0104~~	~~0.0099~~	~~0.0079~~	~~0.0085~~	~~0.0124~~	~~0.0109~~	0.0071	0.0041
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0001	0.0001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Barium		0.50	0.50	1	0.0025	0.0023	0.0021	0.0019	~~0.0019~~	~~0.0019~~	0.0017	0.0018	0.0018	0.0018
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		1.65	1.56	1.18	1.13	1.16	1.14	1.12	1.17	1.13	1.21
Chromium[4]	0.001	0.00056	0.00055	0.001	*<0.00010*	*<0.00010*	~~0.0002~~	*<0.00010*	*<0.00010*	0.0001	*<0.00010*	*<0.00010*	0.0001	0.0001
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	*<0.00050*	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Iron	0.3	0.155	0.157	0.3	*<0.010*	*<0.010*	~~0.020~~	~~0.019~~	0.020	0.015	0.022	0.023	*<0.010*	*<0.010*
Lead[3]	***equation***	0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		**0.99**	**0.95**	0.71	0.69	0.69	0.69	0.68	0.72	0.67	0.72
Manganese[3]		0.3157	0.3300	***equation***	0.0004	0.0004	0.0050	0.0050	0.0023	0.0024	0.0023	0.0022	0.0010	0.0010
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00
Molybdenum	0.073	0.0365	0.0370	0.073	*<0.000050*	*<0.000050*	0.0001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Nickel[3]	***equation***	0.0127	0.0130	0.025	*<0.00050*	*<0.00050*	0.0005	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		0.50	0.59		**0.56**	**0.51**	0.38	0.40	0.40	0.40	0.36	0.39	0.36	0.37
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.14	0.14	0.15	0.15	0.12	0.12	0.12	0.13	0.10	0.11
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		0.75	0.72	0.56	0.54	0.57	0.56	0.58	0.56	0.55	0.58
Strontium		0.0279	0.0330	0.049	0.0100	0.0095	0.0064	0.0061	0.0068	0.0066	0.0064	0.0066	0.0065	0.0070
Sulfur					0.51	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.015	0.0075	0.0075	0.015	0.000045	0.000050	0.000054	0.000048	0.000048	0.000048	~~0.000043~~	~~0.000044~~	0.000038	0.000038
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)														
Aluminum[3]		0.0263	0.0260	0.05	*<0.0010*	*<0.0010*	0.0040	0.0052	~~0.0030~~	~~0.0036~~	0.0018	0.0024	0.0011	0.0020
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Barium		0.5010	0.5000	1	0.0026	0.0024	0.0019	0.0020	0.0018	0.0019	0.0017	0.0016	0.0017	0.0019
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium					1.62	1.55	1.15	1.17	1.15	1.14	1.15	1.18	1.18	1.21
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	0.00045	0.00047	~~0.00032~~	~~0.00030~~	0.00032	0.00033	0.00029	0.00030	0.00029	0.00042
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					0.95	0.92	0.70	0.71	0.69	0.69	0.70	0.72	0.70	0.72
Manganese[3]		0.315	0.330	***equation***	0.0001	*<0.00010*	0.0031	0.0033	~~0.0003~~	~~0.0003~~	0.0005	0.0005	*<0.00010*	*<0.00010*
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.0002	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Nickel		0.013	0.013	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.49	0.49	0.40	0.41	0.35	0.37	0.38	0.39	0.38	0.39
Selenium		0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.14	0.15	0.14	0.14	0.11	0.11	0.10	0.11	0.10	0.10
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					0.74	0.70	0.53	0.54	0.53	0.56	0.55	0.57	0.57	0.58
Strontium		0.028	0.033	0.049	0.0098	0.0091	0.0060	0.0061	0.0066	0.0065	0.0064	0.0064	0.0067	0.0069
Sulfur					*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Thallium		0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.0075	0.015	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00003	0.00003	0.00003	0.00003
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]		0.0053	0.0096	***equation***	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Pipedream Lake (PDL)					Wally Lake (WAL)					
Area-Replicate ID	CCME (2012)	Trigger[2]			PDL-37-S	PDL-38-S	PDL-39-S	PDL-40-S	PDL-41-S	WAL-49-S	WAL-50-S	WAL-51-S	WAL-52-S	WAL-53-S	WAL-54-S
Depth (m)					3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	28-Jul-15	28-Jul-15	26-Aug-15	26-Aug-15	4-Oct-15	15-May-15	15-May-15	19-Jul-15	19-Jul-15	19-Aug-15	19-Aug-15
Field Measurements (Surface)															
Temperature (°C)					7.9	6.3	10.6	10.6	3.0	1.4	1.2	10.0	10.6	11.6	11.8
Specific Conductivity (µS/cm)					15	18	19	19	37	73	63	~~129~~	41	38	36
Dissolved Oxygen (mg/L)					11.62	10.69	12.19	13.01	10.59	13.24	14.64	10.54	10.57	12.56	10.76
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	6.55	6.50	7.16	7.27	**6.43**	**6.61**	6.93	7.38	7.38	7.41	7.51
Physical Tests (mg/L)															
Conductivity (µS/cm)		23.5	36.6		22	22	22	22	23	**60**	**67**	33	35	**40**	**38**
Hardness		8.5	16.7		**8.8**	**8.7**	**8.9**	**8.8**	**8.9**	**25.9**	**28.5**	15.0	14.0	**17.0**	16.5
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.00	6.97	7.05	7.04	7.07	7.13	7.17	7.48	7.34	7.25	7.26
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Total Dissolved Solids		18.0	25.3		12	13	17	17	18	**45**	**45**	24	23	**27**	**26**
Turbidity (NTU)					0.20	0.22	0.22	0.19	0.23	~~0.18~~	~~0.14~~	0.35	0.29	0.32	0.29
Anions and Nutrients (mg/L)															
Alkalinity - Bicarbonate		8.6	17.8		8	8	8	7	8	**23**	**25**	12	12	12	12
Alkalinity - Carbonate		4	4		*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		8	8	8	7	8	**23**	**25**	12	12	12	12
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	0.021	0.032	0.012	*<0.0050*	0.014	0.006
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	0.59	0.59	0.62	0.62	0.60	1.08	1.22	0.60	0.62	0.81	0.75
Fluoride	0.120				0.04	0.04	0.04	0.04	0.04	0.07	0.07	0.04	0.04	0.05	0.04
Nitrate (as N)	3.0	1.50	1.50	3	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	0.0126	0.0088	*<0.0050*	0.0164	0.0668	0.0333
Nitrite (as N)	0.060	0.031	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.077	0.081	0.11	0.11	**0.17**	**0.205**	**0.273**	**0.17**	**0.23**	0.14	0.15
Ortho Phosphate (as P)		0.002	0.002		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0020	0.0025	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	0.0023	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0026	0.0021	*<0.0020*	*<0.0020*
Silicate (as SiO_2)		1.0	1.08		*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	**1.66**	**1.66**	0.87	0.79	0.64	0.68
Sulphate (SO_4)		64.71	65.20	128	1.59	1.60	1.67	1.68	1.63	5.44	6.08	2.98	3.39	4.39	4.02
Cyanides (mg/L)															
Total Cyanide					*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)															
Dissolved Organic Carbon		2.60	3.21		1.75	1.88	1.30	1.32	1.45	2.47	2.66	1.97	1.84	1.88	1.98
Total Organic Carbon		2.79	4.11		1.76	1.76	1.33	1.48	1.64	2.51	2.67	1.94	1.92	1.88	2.53
Plant Pigments (µg/L)															
Chlorophyll-*a*					0.30	0.33	0.38	0.39	0.35	0.19	0.21	0.26	0.51	0.77	0.89
Total Metals (mg/L)															
Aluminum[3]	***equation***	0.054	0.053	0.100	~~0.0050~~	~~0.0046~~	~~0.0048~~	~~0.0047~~	~~0.0059~~	*<0.0030*	*<0.0030*	~~0.0086~~	~~0.0079~~	~~0.0077~~	0.0383
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0002	0.0001	0.0001	0.0001	0.0002	0.0003	0.0004	0.0002	0.0002	0.0003	0.0005
Barium		0.50	0.50	1	0.0021	0.0020	0.0020	0.0020	0.0020	0.0038	0.0042	0.0024	0.0021	0.0024	0.0027
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	0.00	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.00	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		**2.33**	**2.28**	**2.18**	**2.20**	**2.24**	**7.11**	**8.04**	4.06	3.76	4.49	4.49
Chromium[4]	0.001	0.00056	0.00055	0.001	~~0.0001~~	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	0.0002
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	0.0005	0.0005	*<0.00050*	*<0.00050*	*<0.00050*	0.0013	0.0014	0.0009	0.0008	0.0009	0.0011
Iron	0.3	0.155	0.157	0.3	*<0.010*	*<0.010*	0.017	*<0.010*	0.012	*<0.010*	*<0.010*	~~0.019~~	~~0.021~~	0.018	0.120
Lead[3]	***equation***	0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	0.00049	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.00009
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		0.79	0.78	0.76	0.77	0.80	**2.04**	**2.29**	1.13	1.08	1.27	1.28
Manganese[3]		0.3157	0.3300	***equation***	0.0018	0.0016	0.0013	0.0013	0.0015	0.0006	0.0007	0.0023	0.0029	0.0016	0.0075
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.0370	0.073	0.0001	*<0.000050*	0.0001	*<0.000050*	*<0.000050*	0.0002	0.0003	0.0002	0.0001	0.0004	0.0003
Nickel[3]	***equation***	0.0127	0.0130	0.025	0.0007	0.0006	0.0006	0.0006	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		0.50	0.59		0.36	0.34	0.37	0.35	0.35	**0.74**	**0.80**	0.45	0.42	0.50	0.49
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.14	0.14	0.12	0.12	0.12	0.76	0.77	0.35	0.36	0.29	0.36
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		0.50	0.50	0.48	0.50	0.51	**0.87**	**0.99**	0.54	0.53	0.60	0.58
Strontium		0.0279	0.0330	0.049	0.0091	0.0091	0.0093	0.0094	0.0095	**0.0365**	**0.0429**	0.0201	0.0184	0.0219	0.0217
Sulfur					0.59	0.56	0.58	0.58	0.64	1.87	2.14	1.14	0.98	1.54	1.48
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	0.00112
Uranium	0.015	0.0075	0.0075	0.015	0.000021	0.000021	0.000023	0.000024	~~0.000021~~	0.000048	0.000053	0.000059	0.000047	0.000086	0.000086
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)															
Aluminum[3]		0.0263	0.0260	0.05	0.0025	0.0018	~~0.0024~~	~~0.0019~~	0.0036	*<0.0010*	*<0.0010*	0.0029	0.0027	~~0.0050~~	~~0.0056~~
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003
Barium		0.5010	0.5000	1	0.0020	0.0020	0.0020	0.0020	0.0019	0.0038	0.0042	0.0023	0.0020	0.0025	0.0022
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium					2.27	2.23	2.27	2.23	2.26	7.08	7.78	4.10	3.80	4.66	4.52
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	~~0.00046~~	~~0.00040~~	0.00040	0.00038	0.00048	0.00121	0.00122	~~0.00080~~	~~0.00075~~	0.00085	0.00083
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	0.01
Lead		0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					0.77	0.76	0.79	0.78	0.79	2.00	2.20	1.15	1.09	1.31	1.27
Manganese[3]		0.315	0.330	***equation***	0.0011	0.0010	~~0.0006~~	~~0.0005~~	0.0004	*<0.00010*	*<0.00010*	0.0013	0.0016	~~0.0003~~	~~0.0006~~
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	0.0001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.0002	0.0002	0.0001	0.0001	0.0004	0.0003
Nickel		0.013	0.013	0.025	0.0007	0.0006	0.0006	0.0005	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.35	0.31	0.34	0.33	0.32	0.67	0.77	0.42	0.40	0.52	0.49
Selenium	0.00055	0.00055	0.001		*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.14	0.13	0.12	0.12	0.11	0.76	0.75	0.34	0.36	0.28	0.31
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					0.48	0.47	0.49	0.48	0.50	0.90	0.98	0.53	0.53	0.60	0.57
Strontium	0.028	0.033	0.049		0.0087	0.0086	0.0095	0.0094	0.0090	**0.0363**	**0.0399**	0.0194	0.0183	0.0219	0.0208
Sulfur					0.55	0.55	0.57	0.58	0.59	1.86	2.05	1.11	0.97	1.53	1.37
Thallium	0.00041	0.00041	0.0008		*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin	0.0002	0.0002			*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium	1.01	1.00	2		*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.0075	0.0075	0.015		0.00002	0.00002	0.00002	0.00002	0.00002	0.00004	0.00005	0.00005	0.00004	0.00007	0.00006
Vanadium	0.0035	0.0035	0.006		*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.0053	0.0096	***equation***		~~0.001~~	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–1. Water quality results from the 2015 CREMP, Meadowbank study lakes.

Lake and Station					Wally Lake (WAL)			
Area-Replicate ID					WAL-55-S	WAL-56-S	WAL-57-S	WAL-58-S
Depth (m)	CCME (2012)	Trigger[2]			3	3	3	3
Date	Guideline[1]	Meadowbank	Wally Lake	Threshold[2]	26-Sep-15	26-Sep-15	22-Nov-15	22-Nov-15
Field Measurements (Surface)								
Temperature (°C)					2.7	2.3	0.9	1.1
Specific Conductivity (µS/cm)					~~110~~	52	30	65
Dissolved Oxygen (mg/L)					11.19	10.43	15.9	14.9
pH	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.90	7.80	7.05	7.27
Physical Tests (mg/L)								
Conductivity (µS/cm)		23.5	36.6		**39**	**42**	**44**	**45**
Hardness		8.5	16.7		16.3	**17.7**	**18.5**	**18.3**
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.75 - 8.17	6.5 - 9.0	7.21	7.23	7.25	7.30
Total Suspended Solids		3.0	3.0	5.0	*<1.0*	*<1.0*	1	*<1.0*
Total Dissolved Solids		18.0	25.3		**30**	24	**27**	**28**
Turbidity (NTU)					0.29	0.30	0.24	0.21
Anions and Nutrients (mg/L)								
Alkalinity - Bicarbonate		8.6	17.8		13	13	14	14
Alkalinity - Carbonate		4	4		*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide					*<1.0*	*<1.0*	*<1.0*	*<1.0*
Alkalinity - Total		8.5	17.8		13	13	14	14
Ammonia (as N)[3]	***equation***	0.065	0.067	0.126	*<0.0050*	*<0.0050*	0.008	0.013
Bromide					*<0.050*	*<0.050*	*<0.050*	*<0.050*
Chloride	120	60.28	60.2	120	0.76	0.79	0.84	0.87
Fluoride	0.120				0.05	0.05	0.05	0.05
Nitrate (as N)	3.0	1.50	1.50	3	0.0307	0.0451	0.0288	0.0650
Nitrite (as N)	0.060	0.031	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.170	0.163		0.14	0.13	0.14	0.14
Ortho Phosphate (as P)		0.002	0.002		*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total Diss.					*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Phosphorus (P)-Total	0.0040	0.0060	0.0067	0.004	*<0.0020*	*<0.0020*	*<0.0020*	0.0020
Silicate (as SiO_2)		1.0	1.08		0.58	0.62	0.74	0.73
Sulphate (SO_4)		64.71	65.20	128	4.08	4.45	4.58	4.88
Cyanides (mg/L)								
Total Cyanide					*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)								
Dissolved Organic Carbon		2.60	3.21		1.92	1.74	1.87	1.68
Total Organic Carbon		2.79	4.11		1.94	1.77	1.80	1.87
Plant Pigments (µg/L)								
Chlorophyll-*a*					0.64	0.58	1.28	1.04
Total Metals (mg/L)								
Aluminum[3]	***equation***	0.054	0.053	0.100	~~0.0072~~	~~0.0062~~	0.0030	0.0038
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00255	0.0026	0.005	0.0003	0.0004	0.0003	0.0002
Barium		0.50	0.50	1	0.0021	0.0022	0.0026	0.0023
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.000025	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.15	4.88		4.48	**4.90**	4.87	4.58
Chromium[4]	0.001	0.00056	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	0.0001
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00124	0.00149	0.002	~~0.0009~~	~~0.0009~~	0.0010	0.0009
Iron	0.3	0.155	0.157	0.3	0.024	0.020	0.012	*<0.010*
Lead[3]	***equation***	0.000525	0.000525	0.001	~~0.00006~~	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.83	1.36		1.31	**1.40**	**1.42**	1.30
Manganese[3]		0.3157	0.3300	***equation***	0.0016	0.0013	0.0011	~~0.0008~~
Mercury	0.000026	0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.0370	0.073	0.0003	0.0004	0.0003	0.0003
Nickel[3]	***equation***	0.0127	0.0130	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		0.50	0.59		0.50	0.49	0.52	0.47
Selenium	0.001	0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.31	0.32	0.31	0.27
Silver	0.0001				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		0.975	0.72		0.61	0.64	0.70	0.66
Strontium		0.0279	0.0330	0.049	0.0208	0.0234	0.0251	0.0217
Sulfur					1.43	1.58	1.61	1.55
Thallium	0.0008	0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.015	0.0075	0.0075	0.015	~~0.000051~~	~~0.000051~~	0.000050	0.000051
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0063	0.0106	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)								
Aluminum[3]		0.0263	0.0260	0.05	0.0016	0.0013	0.0010	*<0.0010*
Antimony		0.0101	0.0100	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.0026	0.005	0.0002	0.0003	0.0003	0.0003
Barium		0.5010	0.5000	1	0.0021	0.0021	0.0026	0.0024
Beryllium		0.0027	0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth					*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium		0.000025	0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00001
Calcium					4.42	4.83	5.01	5.00
Chromium		0.00055	0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt					*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00119	0.00148	0.002	0.00074	0.00077	0.00088	0.00091
Iron		0.155	0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.048	0.096	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium					1.29	1.37	1.45	1.41
Manganese[3]		0.315	0.330	***equation***	0.0004	0.0004	0.0003	0.0001
Mercury		0.000018	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.037	0.073	0.0003	0.0003	0.0003	0.0004
Nickel		0.013	0.013	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus					*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium					0.47	0.48	0.52	0.52
Selenium		0.00055	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon					0.29	0.31	0.32	0.28
Silver					*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium					0.59	0.59	0.71	0.68
Strontium		0.028	0.033	0.049	0.0206	0.0227	0.0247	0.0257
Sulfur					1.40	1.51	1.59	1.66
Thallium		0.00041	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002	0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.0075	0.015	0.00004	0.00004	0.00004	0.00006
Vanadium		0.0035	0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]		0.0053	0.0096	***equation***	*<0.0010*	*<0.0010*	0.001	*<0.0010*
Zirconium					*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d). A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results were flagged in the QC assessment (refer to **Section 3.1.2** for details)

Table 3.2–2. Screening process for water quality parameters, Meadowbank study lakes 2015.

CONVENTIONALS				TOTAL METALS				DISSOLVED METALS			
Screening Level	**1**	**2**	**3**	**Screening Level**	**1**	**2**	**3**	**Screening Level**	**1**	**2**	**3**
Screening Rule[1]	**>DL ≥ 10% frequency**	**C-I > 0.1 frequency**	**Pattern = Activity**	**Screening Rule[1]**	**>DL ≥ 10% frequency**	**C-I > 0.1 frequency**	**Pattern = Activity**	**Screening Rule[1]**	**>DL ≥ 10% frequency**	**C-I > 0.1 frequency**	**Pattern = Activity**
Conductivity	Figure 3.2-9			Aluminum	Figure 3.2-26			Aluminum	Figure 3.2-40		
Hardness	Figure 3.2-10			Antimony*	No	No	No	Antimony*	No	No	No
pH -Field	Figure 3.2-11			Arsenic	Figure 3.2-27			Arsenic	Figure 3.2-41		
pH -Lab	Figure 3.2-12			Barium	Figure 3.2-28			Barium	Figure 3.2-42		
TSS	Figure 3.2-13			Beryllium*	No	No	No	Beryllium*	No	No	No
TDS	Figure 3.2-14			Boron*	No	No	No	Boron*	No	No	No
B-Alkalinity	Figure 3.2-15			Cadmium*	No	No	No	Cadmium*	No	No	No
C-Alkalinity*	No	No	No	Calcium	Figure 3.2-29			Chromium*	No	No	No
T-Alkalinity	Figure 3.2-16			Chromium	Figure 3.2-30			Copper	Figure 3.2-43		
Ammonia-N	Figure 3.2-17			Copper	Figure 3.2-31			Iron*	No	No	No
Chloride	Figure 3.2-18			Iron	Figure 3.2-32			Lead*	No	No	No
Nitrate-N	Figure 3.2-19			Lead*	No	No	No	Lithium*	No	No	No
Nitrite-N*	No	No	No	Lithium*	No	No	No	Manganese	Figure 3.2-44		
TKN	Figure 3.2-20			Magnesium	Figure 3.2-33			Mercury*	No	No	No
T-phosphorous	Figure 3.2-21			Manganese	Figure 3.2-34			Molybdenum	Figure 3.2-45		
Ortho-phosphate*	No	No	No	Mercury*	No	No	No	Nickel*	No	No	No
Reactive silica	Figure 3.2-22			Molybdenum	Figure 3.2-35			Selenium*	No	No	No
Sulphate	Figure 3.2-23			Nickel*	No	No	No	Strontium	Figure 3.2-46		
DOC	Figure 3.2-24			Potassium	Figure 3.2-36			Thallium*	No	No	No
TOC	Figure 3.2-25			Selenium*	No	No	No	Tin*	No	No	No
T-Cyanide*	No	No	No	Sodium	Figure 3.2-37			Titanium*	No	No	No
Free Cyanide*	No	No	No	Strontium	Figure 3.2-38			Uranium	Figure 3.2-47		
				Thallium*	No	No	No	Vanadium*	No	No	No
				Tin*	No	No	No	Zinc*	No	No	No
				Titanium*	No	No	No				
				Uranium	Figure 3.2-39						
				Vanadium*	No	No	No				
				Zinc*	No	No	No				

Notes:

* Plots for these parameters are presented in **Appendix A1**.

[1] See text for further detail.

Table 3.2–3. Water variables at Meadowbank areas for which 2015 means exceeded triggers.

Parameter Measured	Trigger	PDL	TPN	TPE	SP	TPS	TE
		REF	NF	NF	NF	MF	MF
Bicarbonate Alkalinity					11.5		
Conductivity	23.5		29.8	32	37.8	27	26.8
Hardness	8.5	8.8	9.7	11.3	14.5	9.0	10
Calcium	2.1	2.2	2.4	2.8	3.8	2.2	2.5
Potassium	0.5		0.52	0.57	0.56	0.51	
Magnesium	0.83		0.92	1.02	1.21	0.86	0.92
Sodium	0.98		1.22	1.07		1.14	
Total Alkalinity	8.5				11.5		
TDS	18		18.3	22.1	20.6		19.3

Parameter Measured	Trigger	WAL
		NF
TKN	0.16	0.17
Conductivity	36.6	44.2
Hardness	16.7	18.8
Calcium	4.9	5.1
Magnesium	1.4	1.5
TDS	25.3	29.8

Notes:
No cases of trigger exceedances at INUG and TEFF in 2015.
*results should be interpreted with caution, particularly at low concentrations (See Azimuth [2015b] for more detail)
Reported mean values are all in units of mg/L with the exception of conductivity (µS/cm).
REF = reference; NF = near-field; MF = mid-field; FF = far-field

Table 3.2–4. Results of BACI tests for selected water variables and Meadowbank areas in 2015.

Parameter Measured	Test Area	n(B)	n(A)	Estimate	SE	P-value[1]	Proportional Change		
							Exp(Est.)	LCI	UCI
Alkalinity, bicarbonate	SP	5	5	0.345	0.053	**0.000**	1.41	1.25	1.6
Conductivity	TPN	6	5	0.553	0.016	**0.000**	1.74	1.68	1.8
	TPE	8	5	0.605	0.042	**0.000**	1.83	1.67	2.01
	SP	5	5	0.365	0.043	**0.000**	1.44	1.31	1.59
	TPS	23	3	0.263	0.179	**0.077**	1.3	0.9	1.88
	TE	5	5	0.122	0.086	**0.097**	1.13	0.93	1.38
	WAL	18	5	0.177	0.07	**0.01**	1.19	1.03	1.38
Hardness	TPN	6	5	0.468	0.018	**0.000**	1.6	1.53	1.66
	TPE	8	5	0.606	0.042	**0.000**	1.83	1.67	2.01
	SP	5	5	0.34	0.026	**0.000**	1.4	1.32	1.49
	TPS	23	3	0.255	0.114	**0.017**	1.29	1.02	1.63
	TE	5	5	0.107	0.092	0.139	1.11	0.9	1.37
	WAL	18	5	0.247	0.061	**0.000**	1.28	1.13	1.45
Calcium	TPN	6	5	0.526	0.017	**0.000**	1.69	1.63	1.76
	TPE	8	5	0.673	0.045	**0.000**	1.96	1.78	2.16
	SP	5	5	0.366	0.028	**0.000**	1.44	1.35	1.54
	TPS	23	3	0.286	0.134	**0.022**	1.33	1.01	1.76
	TE	5	5	0.106	0.1	0.159	1.11	0.88	1.4
	WAL	18	5	0.219	0.042	**0.000**	1.25	1.14	1.36
Potassium	TPN	6	5	0.234	0.023	**0.000**	1.26	1.2	1.33
	TPE	8	5	0.316	0.032	**0.000**	1.37	1.28	1.47
	SP	5	5	0.303	0.053	**0.000**	1.35	1.20	1.53
	TPS	23	3	0.154	0.083	**0.037**	1.17	0.98	1.38
Magnesium	TPN	6	5	0.392	0.018	**0.000**	1.48	1.42	1.54
	TPE	8	5	0.485	0.042	**0.000**	1.62	1.48	1.78
	SP	5	5	0.295	0.027	**0.000**	1.34	1.26	1.43
	TPS	23	3	0.22	0.1	**0.019**	1.25	1.01	1.53
	TE	5	5	0.127	0.062	**0.037**	1.14	0.98	1.31
	WAL	18	5	0.219	0.039	**0.000**	1.25	1.15	1.35
Sodium	TPN	6	5	0.713	0.023	**0.000**	2.04	1.94	2.15
	TPE	8	5	0.583	0.02	**0.000**	1.79	1.71	1.87
	TPS	23	3	0.399	0.2	**0.029**	1.49	0.99	2.25
Total alkalinity	SP	5	5	0.345	0.053	**0.000**	1.41	1.25	1.60
TDS	TPN	6	5	0.127	0.106	0.131	1.13	0.89	1.44
	TPE	8	5	0.361	0.091	**0.001**	1.43	1.17	1.75
	SP	5	5	0.19	0.107	**0.056**	1.21	0.95	1.55
	TE	5	5	0.117	0.08	**0.092**	1.12	0.93	1.35
	WAL	18	5	0.089	0.149	0.279	1.09	0.80	1.49
TKN	WAL	18	5	0.209	0.105	**0.030**	1.23	0.99	1.53

Notes:
[1] **Bolded** values are p-values < 0.05
Test area = area compared to control (INUG)
n(B) = number of months in the "before" period
n(A) = number of months in the "after" period (i.e., in 2015)
Estimate = BACI model estimate of the 2015 change in mean for log-transformed data
SE = standard error of the estimate
P-value = one-tailed test of the null hypothesis of no change or a decrease in mean (opposite for a pH lower trigger)
Exp(Est.) = estimated proportional change
LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Table 3.2–5. Water quality results from Third Portage Lake in 2015 compared against predicted concentrations in the FEIS.

Lake and Station		Simulated Maximum Whole Lake Concentration (mg/L) Third Portage Lake[2]				Third Portage Lake East Basin (TPE)									
		Upper Mixing		Mid-range Mixing											
Area-Replicate ID	CCME (2012)	Estimate (169 Mm^3)		Estimate (92 Mm^3)		TPE-80-S	TPE-81-S	TPE-82-S	TPE-83-S	TPE-84-S	TPE-85-S	TPE-86-S	TPE-87-S	TPE-88-S	TPE-89-S
Depth (m)	Guideline[1]	Without Dike Leaching	With Dike Leaching	Without Dike Leaching	With Dike Leaching	3	3	3	3	3	3	3	3	3	3
Date						15-May-15	15-May-15	15-Jul-15	15-Jul-15	29-Aug-15	29-Aug-15	27-Sep-15	27-Sep-15	13-Nov-15	13-Nov-15
Physical Tests (mg/L)															
Hardness		5.7	6.0	6.0	6.4	***13.2***	***13.7***	***10.7***	***10.6***	***10.8***	***10.7***	***10.4***	***10.7***	***11.1***	***10.9***
Alkalinity - Total		4.13	4.14	4.23	4.24	***10***	***11***	***8***	***8***	***7***	***8***	***8***	***8***	***8***	***8***
Chloride	120	0.8	0.8	1.0	1.1	0.92	0.94	0.67	0.64	0.71	0.70	0.70	0.70	0.72	0.73
Fluoride	0.120	0.07	0.08	0.07	0.09	*0.09*	*0.09*	0.07	*0.07*	0.07	*0.07*	*0.07*	*0.07*	*0.07*	0.07
Nitrate (as N)	3.0	0.0351	0.0363	0.0569	0.0588	0.0432	0.0348	0.0287	0.0255	0.0144	0.0072	0.0085	0.0087	0.0135	0.0156
Ortho Phosphate (as P)		0.0022	0.0022	0.0024	0.0024	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total	0.0040	0.0027	0.0029	0.0032	0.0035	*<0.0020*	*<0.0020*	*<0.0020*	0.0026	*<0.0020*	*<0.0020*	0.0021	*<0.0020*	*<0.0020*	*<0.0020*
Sulphate (SO_4)		1.7	1.7	2.0	2.0	***6.01***	***6.06***	***4.27***	***4.06***	***4.61***	***4.54***	***4.59***	***4.60***	***4.79***	***4.78***
Cyanides (mg/L)															
Total Cyanide		0	0	0	0	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Metals (mg/L)															
Aluminum[3]	***equation***	0.007	0.009	0.007	0.01	*<0.0030*	0.0049	***0.0103***	***0.0132***	0.0069	*0.0080*	***0.0113***	***0.0102***	0.0056	0.0059
Antimony		0.00056	0.00057	0.0006	0.00062	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00062	0.00062	0.00072	0.00072	0.0005	0.0006	0.0005	0.0005	0.0004	0.0005	0.0004	0.0004	0.0005	0.0004
Barium		0.02	0.022	0.02	0.023	0.0042	0.0041	0.0033	0.0032	0.0031	0.0031	0.0030	0.0030	0.0031	0.0031
Beryllium		0.001	0.001	0.001	0.001	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth		0.102	0.102	0.104	0.104	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.00001	0.00001	0.00001	0.00001	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	<0.000051	<0.000051	<0.000052	<0.000052	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		1.3	1.4	1.5	1.5	***3.50***	***3.63***	***2.72***	***2.57***	***2.69***	***2.72***	***2.65***	***2.65***	***2.69***	***2.65***
Chromium[4]	0.001	0.001	0.001	0.001	0.001	*<0.00010*	0.0001	0.0002	0.0001	*<0.00010*	0.0001	0.0001	0.0001	0.0001	0.0001
Cobalt		0.004	0.0013	0.0004	0.0017	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.0012	0.0012	0.0013	0.0013	0.0005	0.0005	0.0005	0.0008	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Iron	0.3	0.03	0.03	0.03	0.03	*<0.010*	0.01	0.02	0.02	*<0.010*	0.01	0.02	0.02	*<0.010*	*<0.010*
Lead[3]	***equation***	0.0006	0.0006	0.0006	0.0007	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.005	0.005	0.005	0.005	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.6	0.6	0.6	0.7	***1.25***	***1.29***	***0.95***	***0.91***	***0.97***	***0.97***	***0.98***	***0.96***	***0.96***	***0.95***
Manganese[3]		0.009	0.052	0.015	0.072	0.0003	0.0004	0.0026	0.0030	0.0011	0.0012	0.0014	0.0013	0.0008	0.0008
Mercury	0.000026	0.00005	0.00005	0.00005	0.00005	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.001	0.001	0.001	0.001	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel[3]	***equation***	0.0016	0.0016	0.002	0.0021	0.0005	0.0006	0.0007	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0010	*<0.00050*
Potassium		2	2.1	2	2.1	0.68	0.72	0.53	0.50	0.51	0.50	0.55	0.51	0.62	0.53
Selenium	0.001	0.001	0.001	0.001	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon		0.01	0.08	0.02	0.12	*0.10*	*0.10*	*0.11*	***0.13***	*0.06*	*0.06*	*0.06*	*0.05*	*<0.050*	*<0.050*
Silver	0.0001	0.00002	0.00002	0.00002	0.00002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		2	2	2	2.1	1.31	1.30	0.92	0.90	1.05	1.03	1.09	1.09	1.01	1.02
Strontium		0.002	0.005	0.004	0.007	***0.0160***	***0.0165***	***0.0096***	***0.0108***	***0.0116***	***0.0117***	***0.0118***	***0.0115***	***0.0115***	***0.0114***
Thallium	0.0008	0.0002	0.0002	0.0002	0.0002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Uranium	0.015	0.0002	0.0002	0.0002	0.0003	0.000050	0.000052	0.000044	0.000051	0.000058	0.000056	0.000050	0.000049	0.000044	0.000045
Vanadium		0.03	0.03	0.03	0.03	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.011	0.011	0.015	0.015	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium						*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Whole lake data are given for a range of mixing conditions, representing lower and upper mixing estimate for the north basin discharge location. The model includes treated water releases from the project (Years 1 to 4), and long-term substance loading due to leaching from the Bay-Goose dike (Cumberland, 2005).

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

Formatting for indicating the parameters that exceed the model predictions in the FEIS:

Mid-range Mixing Estimate (92 Mm^3):

- ***Bold italicized*** = concentrations exceed the prediction "With Dike Leaching."
- *Italicized* = concentrations exceed the prediction "Without Dike Leaching."

Upper-range Mixing Estimate (169 Mm^3):

- Bordered cells = concentrations exceed the prediction "With Dike Leaching."
- Shaded cells = concentrations exceed the prediction "Without Dike Leaching."

Italicized numbers are below detection limits.

Table 3.2–5. Water quality results from Third Portage Lake in 2015 compared against predicted concentrations in the FEIS.

Lake and Station		Simulated Maximum Whole Lake Concentration (mg/L) Third Portage Lake[2]				Third Portage Lake North Basin (TPN)									
		Upper Mixing		Mid-range Mixing											
Area-Replicate ID	CCME (2012)	Estimate (169 Mm^3)		Estimate (92 Mm^3)		TPN-80-S	TPN-81-S	TPN-82-S	TPN-83-S	TPN-84-S	TPN-85-S	TPN-86-S	TPN-87-S	TPN-88-S	TPN-89-S
Depth (m)	Guideline[1]	Without Dike Leaching	With Dike Leaching	Without Dike Leaching	With Dike Leaching	3	3	3	3	3	3	3	3	3	3
Date						16-May-15	16-May-15	24-Jul-15	24-Jul-15	29-Aug-15	29-Aug-15	27-Sep-15	27-Sep-15	13-Nov-15	13-Nov-15
Physical Tests (mg/L)															
Hardness		5.7	6.0	6.0	6.4	***11.3***	***12.0***	***8.8***	***9.0***	***9.1***	***9.3***	***9.3***	***9.1***	***9.4***	***9.5***
Alkalinity - Total		4.13	4.14	4.23	4.24	***8***	***8***	***7***	***6***	***6***	***6***	***6***	***6***	***6***	***6***
Chloride	120	0.8	0.8	1.0	1.1	0.98	*1.06*	0.76	0.76	0.75	0.75	0.74	0.74	0.75	0.75
Fluoride	0.120	0.07	0.08	0.07	0.09	*0.08*	*0.08*	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
Nitrate (as N)	3.0	0.0351	0.0363	0.0569	0.0588	***0.0795***	***0.0864***	***0.0642***	***0.0640***	0.0522	0.0532	0.0476	0.0481	0.0526	0.0532
Ortho Phosphate (as P)		0.0022	0.0022	0.0024	0.0024	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total	0.0040	0.0027	0.0029	0.0032	0.0035	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Sulphate (SO_4)		1.7	1.7	2.0	2.0	***6.52***	***6.95***	***5.05***	***5.05***	***4.86***	***4.87***	***4.86***	***4.86***	***4.96***	***5.00***
Cyanides (mg/L)															
Total Cyanide		0	0	0	0	***0.001***	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Metals (mg/L)															
Aluminum[3]	***equation***	0.007	0.009	0.007	0.01	*<0.0030*	*<0.0030*	*0.0076*	0.0058	0.0067	0.0060	*0.0089*	*0.0076*	0.0034	0.0047
Antimony		0.00056	0.00057	0.0006	0.00062	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00062	0.00062	0.00072	0.00072	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Barium		0.02	0.022	0.02	0.023	0.0038	0.0041	0.0032	0.0031	0.0031	0.0031	0.0030	0.0031	0.0030	0.0031
Beryllium		0.001	0.001	0.001	0.001	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth		0.102	0.102	0.104	0.104	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.00001	0.00001	0.00001	0.00001	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	<0.000051	<0.000051	<0.000052	<0.000052	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		1.3	1.4	1.5	1.5	***2.89***	***3.05***	***2.18***	***2.17***	***2.19***	***2.17***	***2.21***	***2.23***	***2.26***	***2.29***
Chromium[4]	0.001	0.001	0.001	0.001	0.001	*<0.00010*	*<0.00010*	0.0001	*<0.00010*	*<0.00010*	*<0.00010*	0.0002	0.0001	0.0001	0.0001
Cobalt		0.004	0.0013	0.0004	0.0017	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.0012	0.0012	0.0013	0.0013	*<0.00050*	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0005	*<0.00050*
Iron	0.3	0.03	0.03	0.03	0.03	*<0.010*	*<0.010*	0.01	*<0.010*	*<0.010*	*<0.010*	0.01	0.01	*<0.010*	*<0.010*
Lead[3]	***equation***	0.0006	0.0006	0.0006	0.0007	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.005	0.005	0.005	0.005	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.6	0.6	0.6	0.7	***1.11***	***1.18***	***0.86***	***0.84***	***0.88***	***0.86***	***0.87***	***0.87***	***0.87***	***0.88***
Manganese[3]		0.009	0.052	0.015	0.072	0.0006	0.0007	0.0018	0.0017	0.0015	0.0014	0.0015	0.0014	0.0008	0.0008
Mercury	0.000026	0.00005	0.00005	0.00005	0.00005	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.001	0.001	0.001	0.001	0.0003	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel[3]	***equation***	0.0016	0.0016	0.002	0.0021	*<0.00050*	0.0005	0.0005	0.0005	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	0.0006	*<0.00050*
Potassium		2	2.1	2	2.1	0.65	0.68	0.48	0.49	0.50	0.47	0.49	0.49	0.47	0.49
Selenium	0.001	0.001	0.001	0.001	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon		0.01	0.08	0.02	0.12	*0.06*	*0.06*	*0.07*	*0.07*	*0.06*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Silver	0.0001	0.00002	0.00002	0.00002	0.00002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		2	2	2	2.1	1.46	1.61	1.17	1.20	1.14	1.12	1.16	1.17	1.07	1.11
Strontium		0.002	0.005	0.004	0.007	***0.0146***	***0.0158***	***0.0103***	***0.0102***	***0.0109***	***0.0107***	***0.0104***	***0.0103***	***0.0103***	***0.0105***
Thallium	0.0008	0.0002	0.0002	0.0002	0.0002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Uranium	0.015	0.0002	0.0002	0.0002	0.0003	0.000053	0.000056	0.000044	0.000042	0.000044	0.000042	0.000044	0.000041	0.000037	0.000036
Vanadium		0.03	0.03	0.03	0.03	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.011	0.011	0.015	0.015	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium						*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Whole lake data are given for a range of mixing conditions, representing lower and upper mixing estimate for the north basin discharge location. The model includes treated water releases from the project (Years 1 to 4), and long-term substance loading due to leaching from the Bay-Goose dike (Cumberland, 2005).

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

Formatting for indicating the parameters that exceed the model predictions in the FEIS:

Mid-range Mixing Estimate (92 Mm^3):

- ***Bold italicized*** = concentrations exceed the prediction "With Dike Leaching."
- *Italicized* = concentrations exceed the prediction "Without Dike Leaching."

Upper-range Mixing Estimate (169 Mm^3):

- Bordered cells = concentrations exceed the prediction "With Dike Leaching."
- Shaded cells = concentrations exceed the prediction "Without Dike Leaching."

Italicized numbers are below detection limits.

Table 3.2–5. Water quality results from Third Portage Lake in 2015 compared against predicted concentrations in the FEIS.

Lake and Station		Simulated Maximum Whole Lake Concentration (mg/L) Third Portage Lake[2]				Third Portage Lake South Basin (TPS)					
		Upper Mixing		Mid-range Mixing							
Area-Replicate ID	CCME (2012)	Estimate (169 Mm^3)		Estimate (92 Mm^3)		TPS-49-S	TPS-50-S	TPS-51-S	TPS-52-S	TPS-53-S	TPS-54-S
Depth (m)	Guideline[1]	Without Dike Leaching	With Dike Leaching	Without Dike Leaching	With Dike Leaching	3	3	3	3	3	3
Date						24-Jul-15	24-Jul-15	14-Aug-15	14-Aug-15	27-Sep-15	27-Sep-15
Physical Tests (mg/L)											
Hardness		5.7	6.0	6.0	6.4	***8.4***	***9.1***	***9.0***	***9.0***	***9.2***	***9.1***
Alkalinity - Total		4.13	4.14	4.23	4.24	***6***	***6***	***6***	***7***	***6***	***6***
Chloride	120	0.8	0.8	1.0	1.1	0.73	0.74	0.75	0.74	0.74	0.73
Fluoride	0.120	0.07	0.08	0.07	0.09	0.06	0.06	0.06	0.06	0.06	0.06
Nitrate (as N)	3.0	0.0351	0.0363	0.0569	0.0588	***0.0679***	***0.0670***	***0.0616***	***0.0612***	0.0525	0.0515
Ortho Phosphate (as P)		0.0022	0.0022	0.0024	0.0024	*<0.0010*	*<0.0010*	0.0010	0.0010	*<0.0010*	*<0.0010*
Phosphorus (P)-Total	0.0040	0.0027	0.0029	0.0032	0.0035	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Sulphate (SO_4)		1.7	1.7	2.0	2.0	***4.89***	***4.88***	***4.87***	***4.85***	***4.85***	***4.83***
Cyanides (mg/L)											
Total Cyanide		0	0	0	0	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Metals (mg/L)											
Aluminum[3]	***equation***	0.007	0.009	0.007	0.01	*0.0086*	0.0051	0.0063	0.0065	*0.0086*	*0.0099*
Antimony		0.00056	0.00057	0.0006	0.00062	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00062	0.00062	0.00072	0.00072	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Barium		0.02	0.022	0.02	0.023	0.0032	0.0032	0.0030	0.0029	0.0030	0.0030
Beryllium		0.001	0.001	0.001	0.001	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth		0.102	0.102	0.104	0.104	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.00001	0.00001	0.00001	0.00001	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	<0.000051	<0.000051	<0.000052	<0.000052	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		1.3	1.4	1.5	1.5	***2.06***	***2.14***	***2.19***	***2.11***	***2.20***	***2.23***
Chromium[4]	0.001	0.001	0.001	0.001	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt		0.004	0.0013	0.0004	0.0017	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.0012	0.0012	0.0013	0.0013	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Iron	0.3	0.03	0.03	0.03	0.03	0.03	*<0.010*	*<0.010*	*<0.010*	0.01	0.02
Lead[3]	***equation***	0.0006	0.0006	0.0006	0.0007	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.005	0.005	0.005	0.005	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.6	0.6	0.6	0.7	***0.82***	***0.86***	***0.86***	***0.84***	***0.87***	***0.88***
Manganese[3]		0.009	0.052	0.015	0.072	0.0020	0.0017	0.0015	0.0015	0.0015	0.0015
Mercury	0.000026	0.00005	0.00005	0.00005	0.00005	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.001	0.001	0.001	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel[3]	***equation***	0.0016	0.0016	0.002	0.0021	0.0005	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Potassium		2	2.1	2	2.1	0.53	0.51	0.49	0.53	0.49	0.51
Selenium	0.001	0.001	0.001	0.001	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon		0.01	0.08	0.02	0.12	*0.08*	*0.08*	*0.06*	*0.07*	*0.06*	*0.05*
Silver	0.0001	0.00002	0.00002	0.00002	0.00002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		2	2	2	2.1	1.15	1.14	1.12	1.12	1.13	1.15
Strontium		0.002	0.005	0.004	0.007	***0.0100***	***0.0100***	***0.0098***	***0.0098***	***0.0104***	***0.0104***
Thallium	0.0008	0.0002	0.0002	0.0002	0.0002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Uranium	0.015	0.0002	0.0002	0.0002	0.0003	0.000047	0.000044	0.000040	0.000040	0.000043	0.000043
Vanadium		0.03	0.03	0.03	0.03	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.011	0.011	0.015	0.015	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium						*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Whole lake data are given for a range of mixing conditions, representing lower and upper mixing estimate for the north basin discharge location. The model includes treated water releases from the project (Years 1 to 4), and long-term substance loading due to leaching from the Bay-Goose dike (Cumberland, 2005).

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

Formatting for indicating the parameters that exceed the model predictions in the FEIS:

Mid-range Mixing Estimate (92 Mm^3):

- ***Bold italicized*** = concentrations exceed the prediction "With Dike Leaching."
- *Italicized* = concentrations exceed the prediction "Without Dike Leaching."

Upper-range Mixing Estimate (169 Mm^3):

- Bordered cells = concentrations exceed the prediction "With Dike Leaching."
- Shaded cells = concentrations exceed the prediction "Without Dike Leaching."

Italicized numbers are below detection limits.

Table 3.2–6. Water quality results from Second Portage Lake in 2015 compared against predicted concentrations in the FEIS.

Lake and Station		Simulated Maximum Whole Lake Concentration (mg/L) Second Portage Lake2				Second Portage Lake (SP)									
Area-Replicate ID	CCME (2012)	Upper Mixing Estimate (169 Mm^3)		Mid-range Mixing Estimate (92 Mm^3)		SP-80-S	SP-81-S	SP-82-S	SP-83-S	SP-84-S	SP-85-S	SP-86-S	SP-87-S	SP-88-S	SP-89-S
Depth (m)	Guideline[1]	Without Dike Leaching	With Dike Leaching	Without Dike Leaching	With Dike Leaching	3	3	3	3	3	3	3	3	3	3
Date						17-May-15	17-May-15	15-Jul-15	15-Jul-15	13-Aug-15	13-Aug-15	6-Sep-15	6-Sep-15	2-Nov-15	2-Nov-15
Physical Tests (mg/L)															
Hardness		8.9	8.9	8.9	8.9	***17.6***	***16.5***	***13.8***	***13.8***	***13.7***	***13.6***	***13.8***	***13.7***	***14.2***	***14.3***
Anions and Nutrients (mg/L)															
Alkalinity - Total		7.0	7.0	7.0	7.0	***15***	***14***	***12***	***11***	***11***	***11***	***10***	***10***	***11***	***12***
Ammonia (as N)[3]	***equation***	0.025	0.025	0.031	0.031	0.009	0.011	*<0.0050*	*<0.0050*	0.006	*<0.0050*	*<0.0050*	*<0.0050*	0.009	0.007
Chloride	120	0.7	0.7	0.8	0.8	***0.99***	***0.94***	0.78	0.75	0.77	0.77	0.76	0.76	0.79	0.80
Fluoride	0.120	0.07	0.071	0.07	0.071	***0.08***	***0.08***	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
Nitrate (as N)	3.0	0.017	0.017	0.025	0.025	0.0241	0.0239	0.0078	0.0050	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Ortho Phosphate (as P)		0.003	0.003	0.003	0.003	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	0.0010	0.0012	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total	0.0040	0.003	0.003	0.0031	0.0031	*<0.0020*	*<0.0020*	*<0.0020*	0.0025	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*
Sulphate (SO_4)		2.8	2.8	2.8	2.8	***5.52***	***5.29***	***3.96***	***3.73***	***4.06***	***4.08***	***4.12***	***4.13***	***4.36***	***4.38***
Cyanides (mg/L)															
Total Cyanide		0	0	0	0	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Metals (mg/L)															
Aluminum[3]	***equation***	0.007	0.007	0.007	0.007	*<0.0030*	*<0.0030*	***0.0143***	***0.0142***	***0.0102***	***0.0076***	***0.0079***	***0.0100***	0.0069	0.0050
Antimony		0.0005	0.0005	0.0005	0.0005	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.0005	0.0005	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
Barium		0.02	0.02	0.02	0.02	0.0036	0.0034	0.0031	0.0029	0.0026	0.0027	0.0025	0.0026	0.0026	0.0026
Beryllium		0.001	0.001	0.001	0.001	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth		0.1	0.1	0.1	0.1	*<0.000050*	0.00	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.00001	0.00001	0.00001	0.00001	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	<0.000050	<0.000050	<0.000051	<0.000051	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		2.3	2.3	2.3	2.3	***4.76***	***4.49***	***3.66***	***3.62***	***3.59***	***3.50***	***3.52***	***3.51***	***3.72***	***3.80***
Chromium[4]	0.001	0.001	0.001	0.001	0.001	*<0.00010*	*<0.00010*	0.0002	0.0001	*<0.00010*	*<0.00010*	0.0001	0.0002	*<0.00010*	*<0.00010*
Cobalt		0.0003	0.0004	0.0003	0.0004	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.0011	0.0011	0.0011	0.0011	0.0008	0.0007	0.0008	0.0009	0.0008	0.0007	0.0008	0.0007	0.0007	0.0007
Iron	0.3	0.03	0.03	0.03	0.03	*<0.010*	*<0.010*	***0.03***	0.03	0.02	0.02	0.02	0.02	0.01	0.01
Lead[3]	***equation***	0.0009	0.0009	0.0009	0.0009	*<0.000050*	*<0.000050*	*<0.000050*	0.00005	0.00008	*<0.000050*	*<0.000050*	*<0.000050*	0.00006	*<0.000050*
Lithium		0.005	0.005	0.005	0.005	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		0.8	0.8	0.8	0.8	***1.49***	***1.42***	***1.17***	***1.13***	***1.13***	***1.10***	***1.13***	***1.11***	***1.18***	***1.19***
Manganese[3]		0.0044	0.0067	0.0066	0.0089	0.0003	0.0003	0.0028	0.0024	0.0013	0.0014	0.0011	0.0012	0.0008	0.0006
Mercury	0.000026	0.00005	0.00005	0.00005	0.00005	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.001	0.001	0.001	0.001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002
Nickel[3]	***equation***	0.001	0.001	0.001	0.001	*<0.00050*	*<0.00050*	0.0006	0.0006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Potassium		2	2	2	2	0.67	0.61	0.67	0.50	0.55	0.54	0.49	0.49	0.53	0.52
Selenium	0.001	0.001	0.001	0.001	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon		0.01	0.01	0.01	0.01	***0.32***	***0.30***	***0.29***	***0.32***	***0.22***	***0.21***	***0.18***	***0.18***	***0.17***	***0.18***
Silver	0.0001	0.00001	0.00001	0.00001	0.00001	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		2	2	2	2	0.99	0.93	0.77	0.67	0.77	0.77	0.77	0.78	0.86	0.84
Strontium		0.8	0.8	0.8	0.8	0.0238	0.0225	0.0159	0.0170	0.0163	0.0158	0.0157	0.0157	0.0170	0.0169
Thallium	0.0008	0.0002	0.0002	0.0002	0.0002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Uranium	0.015	0.0002	0.0002	0.0002	0.0002	0.000050	0.000051	0.000064	0.000053	0.000049	0.000047	0.000045	0.000051	0.000044	0.000044
Vanadium		0.03	0.03	0.03	0.03	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.007	0.007	0.009	0.009	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] The Second Portage Lake water quality model includes substance loading from the Third Portage and East dikes and inflow from Third Portage and Wally lakes. Changes in water quality in Second Portage Lake were modelled for two different mixing scenarios of water releases into Third Portage Lake (Cumberland, 2005).

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

Formatting for indicating the parameters that exceed the model predictions in the FEIS:

Mid-range Mixing Estimate (92 Mm^3):

- ***Bold italicized*** = concentrations exceed the prediction "With Dike Leaching."
- **Bold** = concentrations exceed the prediction "Without Dike Leaching."

Upper-range Mixing Estimate (169 Mm^3):

- Bordered cells = concentrations exceed the prediction "With Dike Leaching."
- Shaded cells = concentrations exceed the prediction "Without Dike Leaching."

Italicized numbers are below detection limits.

Table 3.2–7. Water quality results from Wally Lake in 2015 compared against predicted concentrations in the FEIS.

Lake and Station		Simulated Maximum Whole Lake Concentration (mg/L)		Wally Lake (WAL)									
Area-Replicate ID	CCME (2012)	Wally Lake[2]		WAL-49-S	WAL-50-S	WAL-51-S	WAL-52-S	WAL-53-S	WAL-54-S	WAL-55-S	WAL-56-S	WAL-57-S	WAL-58-S
Depth (m)	Guideline[1]	Without Dike Leaching	With Dike Leaching	3	3	3	3	3	3	3	3	3	3
Date				15-May-15	15-May-15	19-Jul-15	19-Jul-15	19-Aug-15	19-Aug-15	26-Sep-15	26-Sep-15	22-Nov-15	22-Nov-15
Physical Tests (mg/L)													
Hardness		17.2	17.2	***25.9***	***28.5***	15.0	14.0	17.0	16.5	16.3	***17.7***	***18.5***	***18.3***
Anions and Nutrients (mg/L)													
Alkalinity - Total		13.24	13.34	***23***	***25***	12	12	12	12	13	**13**	***14***	***14***
Ammonia (as N)[3]	***equation***	0.089	0.089	0.021	0.032	0.012	*<0.0050*	0.014	0.006	*<0.0050*	*<0.0050*	0.008	0.013
Chloride	120	0.7	0.7	***1.08***	***1.22***	0.60	0.62	***0.81***	***0.75***	***0.76***	***0.79***	***0.84***	***0.87***
Fluoride	0.120	0.05	0.05	***0.07***	***0.07***	0.04	0.04	0.05	0.04	0.05	0.05	***0.05***	***0.05***
Nitrate (as N)	3.0	0.102	0.102	0.0126	0.0088	*<0.0050*	0.0164	0.0668	0.0333	0.0307	0.0451	0.0288	0.0650
Ortho Phosphate (as P)		0.003	0.003	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus (P)-Total	0.0040	0.0039	0.004	*<0.0020*	*<0.0020*	0.0026	0.0021	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	*<0.0020*	0.0020
Sulphate (SO_4)		5.3	5.3	***5.44***	***6.08***	2.98	3.39	4.39	4.02	4.08	4.45	4.58	4.88
Cyanides (mg/L)													
Total Cyanide		0	0	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Metals (mg/L)													
Aluminum[3]	***equation***	0.012	0.013	*<0.0030*	*<0.0030*	0.0086	0.0079	0.0077	***0.0383***	0.0072	0.0062	0.0030	0.0038
Antimony		0.0009	0.0009	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.005	0.006	0.0003	0.0004	0.0002	0.0002	0.0003	0.0005	0.0003	0.0004	0.0003	0.0002
Barium		0.02	0.02	0.0038	0.0042	0.0024	0.0021	0.0024	0.0027	0.0021	0.0022	0.0026	0.0023
Beryllium		0.001	0.001	0.00	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth		0.1	0.1	0.00	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.00001	0.00001	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Cadmium[3]	***equation***	0.00018	0.00019	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		4.7	4.7	***7.11***	***8.04***	4.06	3.76	4.49	4.49	4.48	***4.90***	***4.87***	4.58
Chromium[4]	0.001	0.001	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	0.0002	*<0.00010*	*<0.00010*	*<0.00010*	0.0001
Cobalt		0.0003	0.0003	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.002	0.002	0.0013	0.0014	0.0009	0.0008	0.0009	0.0011	0.0009	0.0009	0.0010	0.0009
Iron	0.3	0.03	0.03	*<0.010*	*<0.010*	0.02	0.02	0.02	***0.12***	0.02	0.02	0.01	*<0.010*
Lead[3]	***equation***	0.0007	0.0007	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	0.00009	0.00006	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.005	0.005	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Magnesium		1.3	1.3	***2.04***	***2.29***	1.13	1.08	1.27	1.28	***1.31***	***1.40***	***1.42***	1.30
Manganese[3]		0.002	0.002	0.0006	0.0007	***0.0023***	***0.0029***	0.0016	***0.0075***	0.0016	0.0013	0.0011	0.0008
Mercury	0.000026	0.0001	0.0001	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.002	0.002	0.0002	0.0003	0.0002	0.0001	0.0004	0.0003	0.0003	0.0004	0.0003	0.0003
Nickel[3]	***equation***	0.001	0.001	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Potassium		2	2	0.74	0.80	0.45	0.42	0.50	0.49	0.50	0.49	0.52	0.47
Selenium	0.001	0.001	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon		0.04	0.04	***0.76***	***0.77***	***0.35***	***0.36***	***0.29***	***0.36***	***0.31***	***0.32***	***0.31***	***0.27***
Silver	0.0001	0.00002	0.00002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		2	2	0.87	0.99	0.54	0.53	0.60	0.58	0.61	0.64	0.70	0.66
Thallium	0.0008	0.0002	0.0002	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Uranium	0.015	0.0007	0.0007	0.000048	0.000053	0.000059	0.000047	0.000086	0.000086	0.000051	0.000051	0.000050	0.000051
Vanadium		0.03	0.03	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.013	0.013	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Preliminary modelling of whole lake water quality in the receiving environment water bodies incorporates long-term loadings from the Vault dike and effluent releases from the Vault Attenuation pond (Cumberland, 2005).

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

Formatting for indicating the parameters that exceed the model predictions in the FEIS:

- ***Bold italicized*** = concentrations exceed the prediction "With Dike Leaching."
- **Bold** = concentrations exceed the prediction "Without Dike Leaching."

Table 3.2–8. Sampling effort and frequency assessment results for the 2016 CREMP.

Areas	Designation	Triggers Exceeded?	Minor Changes		Moderate Changes		Major Changes		Plan for 2016
		Yes/No	Yes/No	Parameters	Yes/No	Parameters	Yes/No	Parameters	
Sampling Strategy for Reference Areas									
INUG	Ref	No	No	-	No	-	No	-	Full CREMP (reference area)
PDL	Ref	Yes	Yes	Hard., Ca	No	-	No	-	Full CREMP (reference area)
Sampling Strategy for TE and TEFF									
TPE	NF	Yes	Yes	Cond., Hard., Ca, K, Mg, Na, TDS	No	-	No	-	Full CREMP (near-field area)
SP	NF	Yes	Yes	Cond., Hard., Ca, K, Mg, Alkalinity (HCO_3 & Total), TDS	No	-	No	-	Full CREMP (near-field area)
WAL	NF	Yes	Yes	Cond., Hard., Ca, Mg, TKN, TDS	No	-	No	-	Full CREMP (near-field area)
TE	MF	Yes	Yes	Cond., Hard., Ca, K, Mg, Na, TDS	No	-	No	-	Limnology and water sampling see **Table 4.2-1** for schedule
TEFF	FF	No	No	-	No	-	No	-	Limnology and water sampling see **Table 4.2-1** for schedule
Sampling Strategy for TPS									
TPN	NF	Yes	Yes	Cond., Hard., Ca, K, Mg, Na, TDS	No	-	No	-	Full CREMP (near-field area)
TPS	MF	Yes	Yes	Cond., Hard., Ca, K, Mg, Na	No	-	No	-	Limnology and water sampling see **Table 4.2-1** for schedule

Notes:

Minor exceedance of the early warning trigger values for parameters without effects-based threshold values.
Moderate exceedance of the early warning trigger values for parameters with effects-based thresholds.
Major exceedance of the effects-based threshold values.

Figure 3.2–10. Laboratory-measured conductivity (µS/cm) in water samples from Meadowbank study lakes since 2006.

Note: Laboratory-measured conductivity data from 2014 should be interpreted with caution, particularly at low concentrations (See Azimuth [2015b] for more detail).

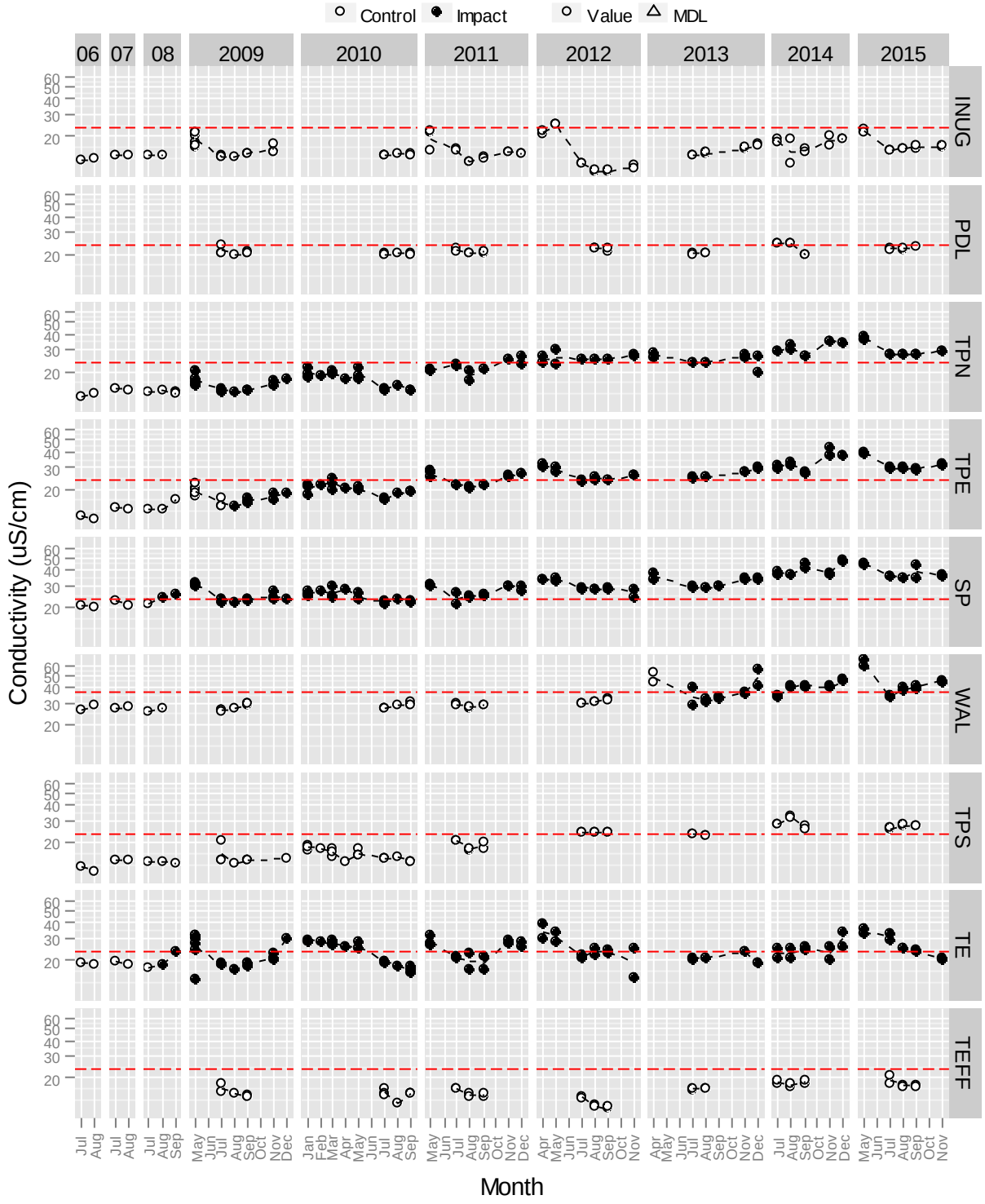


Figure 3.2–11. Hardness (mg/L) in water samples from Meadowbank study lakes since 2006.

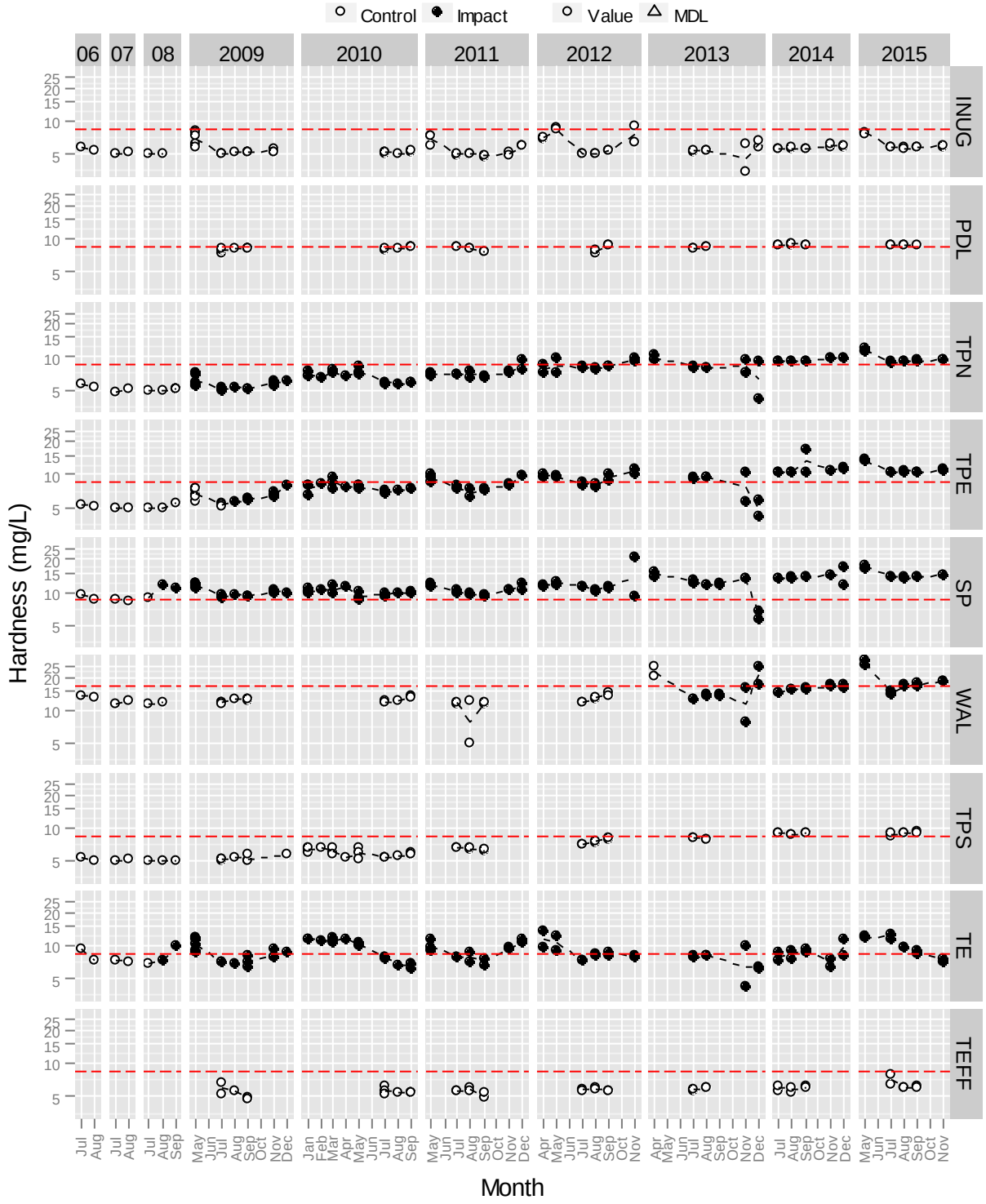


Figure 3.2–12. Field-measured pH in water samples from Meadowbank study lakes since 2006.

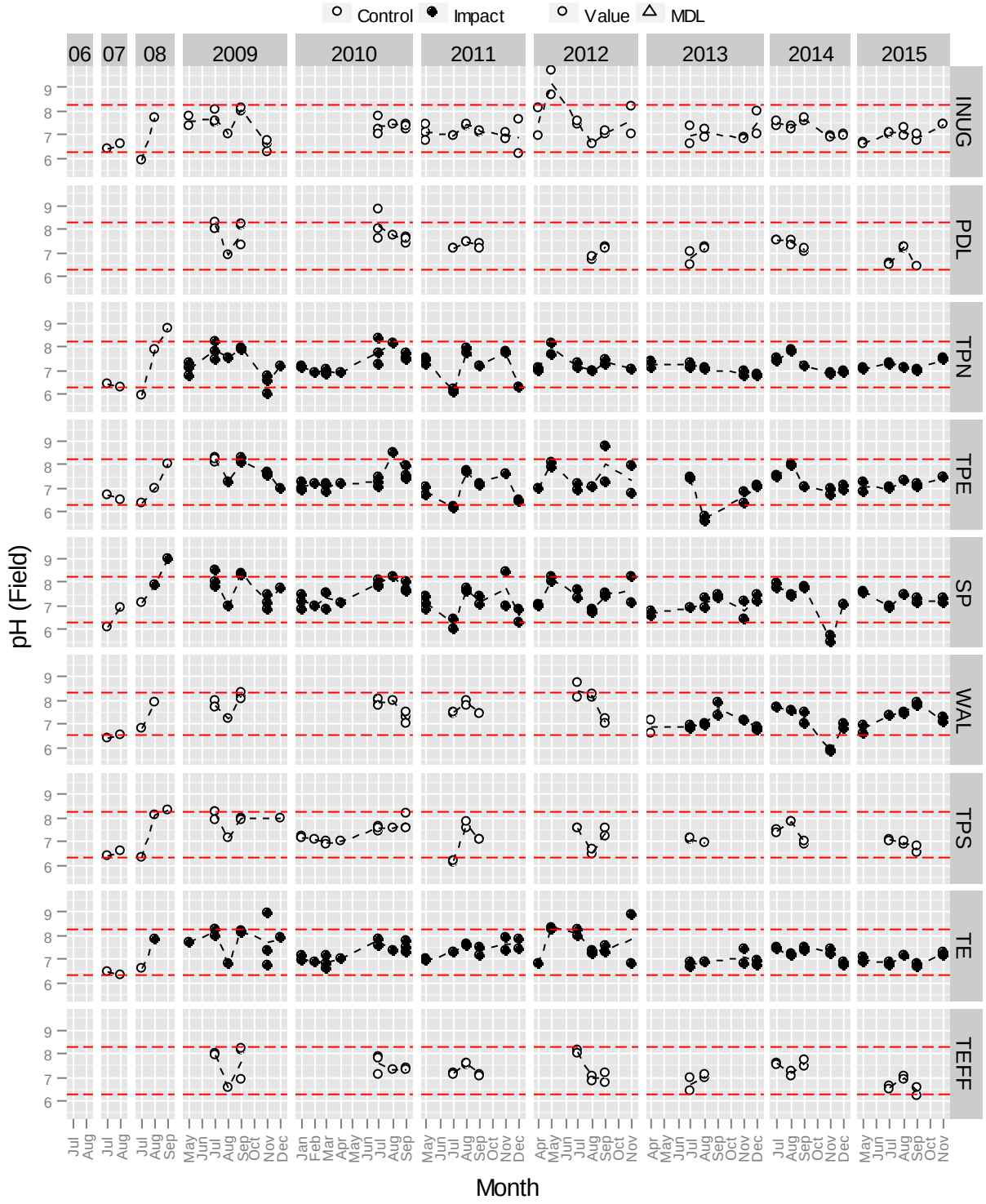


Figure 3.2–13. Laboratory-measured pH in water samples from Meadowbank study lakes since 2006.

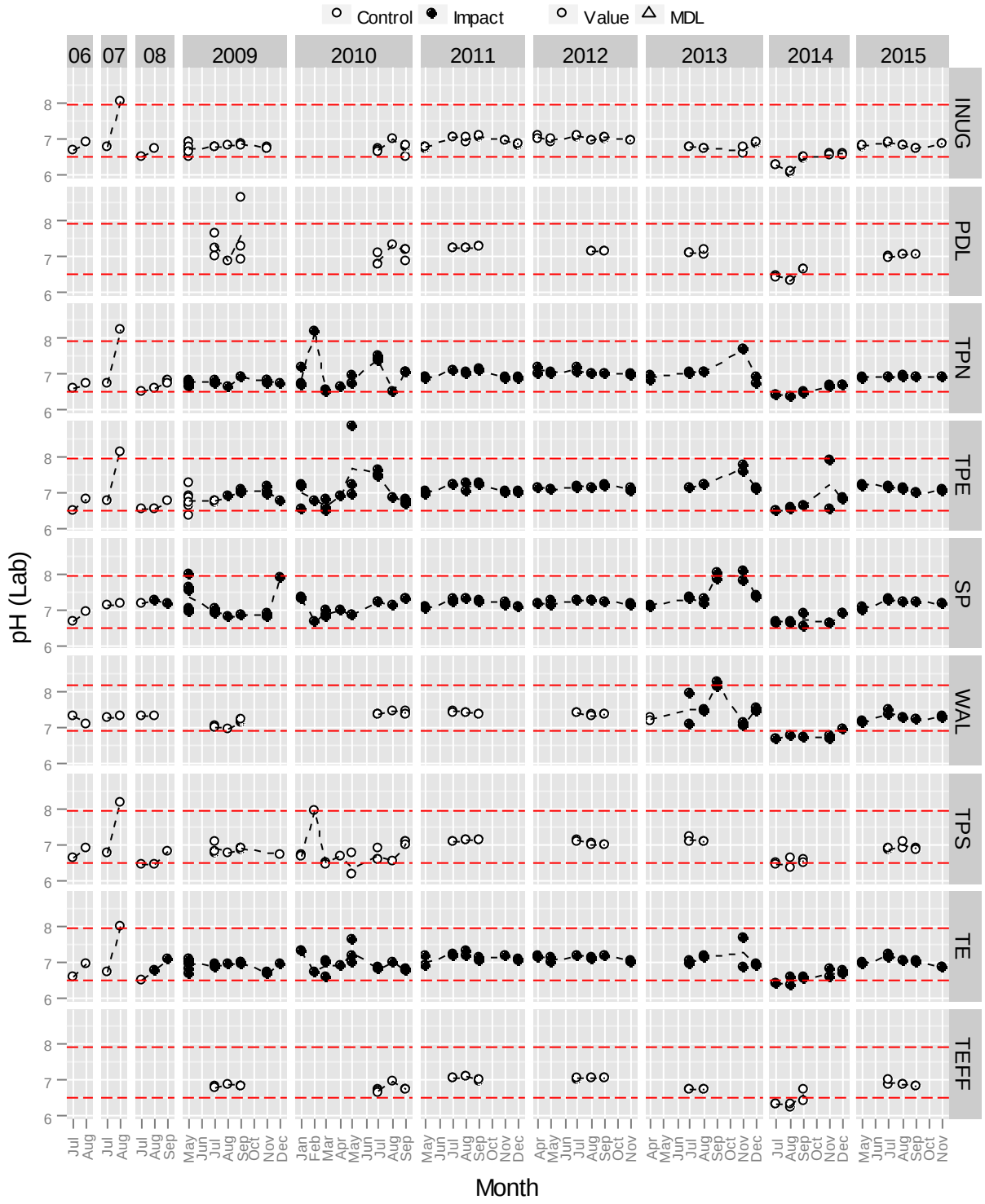


Figure 3.2–14. Total Suspended Solids (TSS; mg/L) in water samples from Meadowbank study lakes since 2006.

Note: TSS data from 2014 are deemed unreliable and were excluded from formal trend assessment (See Azimuth [2015b] for more detail).

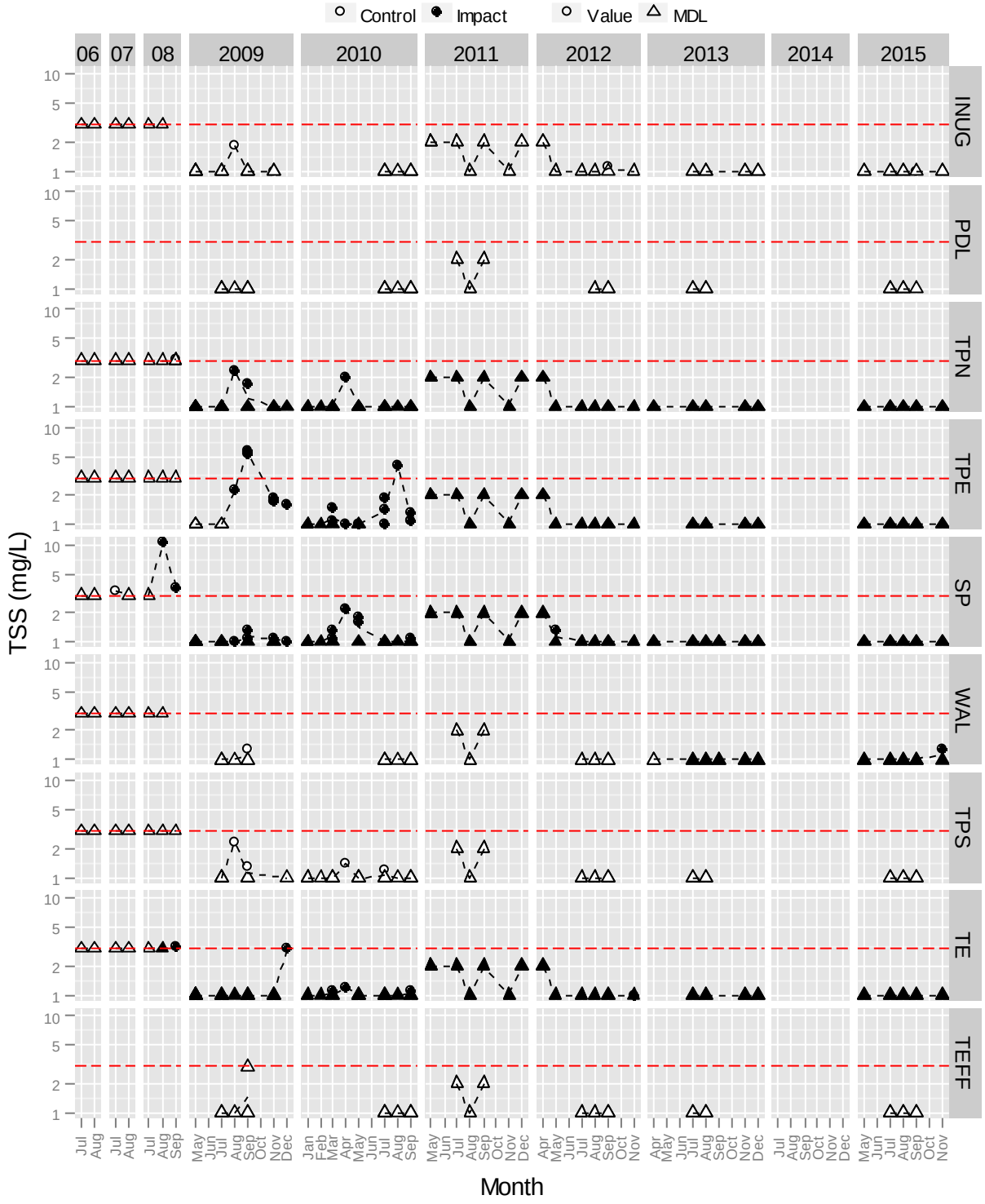


Figure 3.2–15. Total Dissolved Solids (TDS; mg/L) in water samples from Meadowbank study lakes since 2006.

Note: TDS data from 2014 should be interpreted with caution, particularly at low concentrations (See Azimuth [2015b] for more detail).

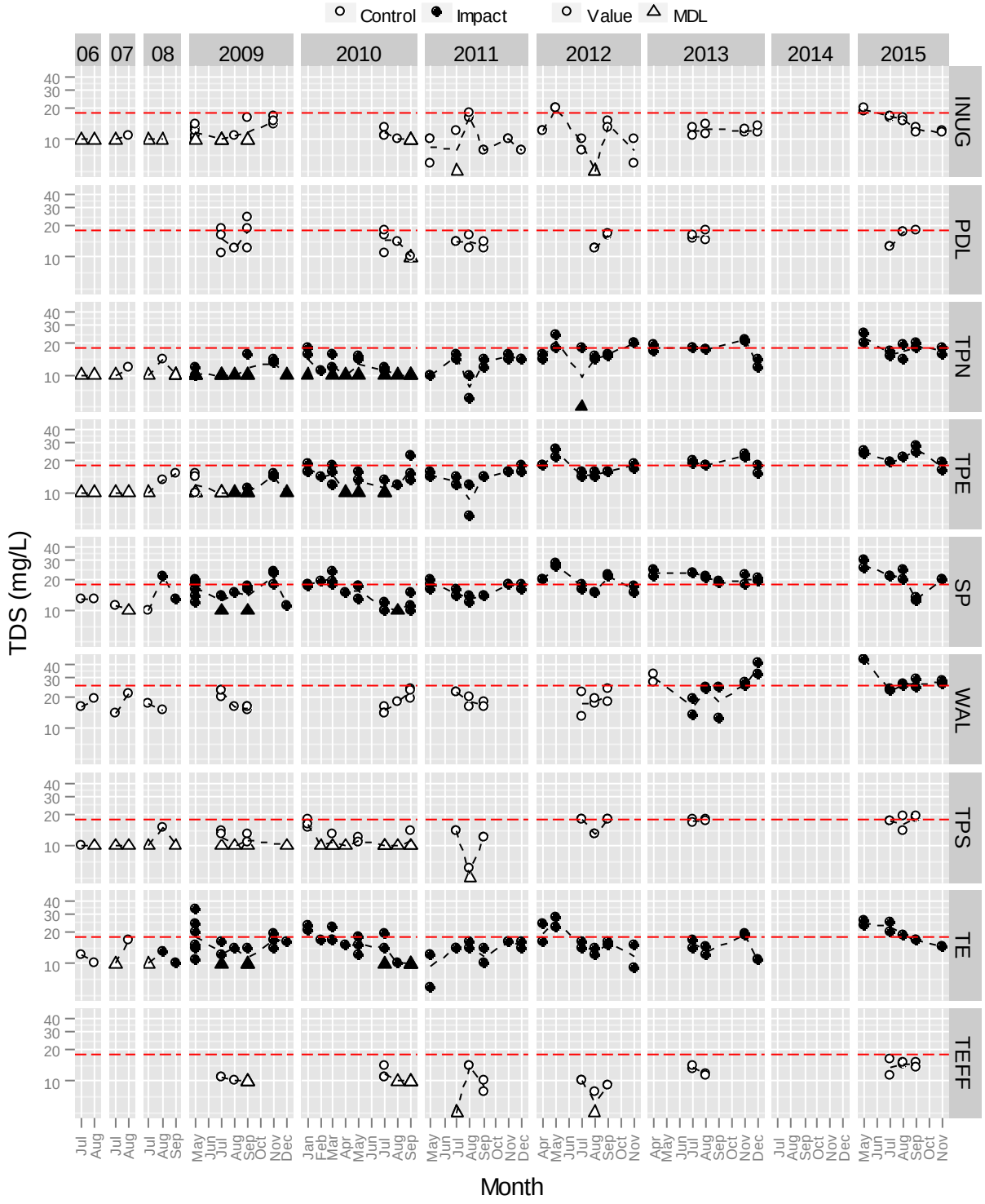


Figure 3.2–16. Bicarbonate Alkalinity (mg/L) in water samples from Meadowbank study lakes since 2006.

Note: Bicarbonate alkalinity data from 2014 are deemed unreliable and were excluded from formal trend assessment (see Azimuth [2015b] for more detail).

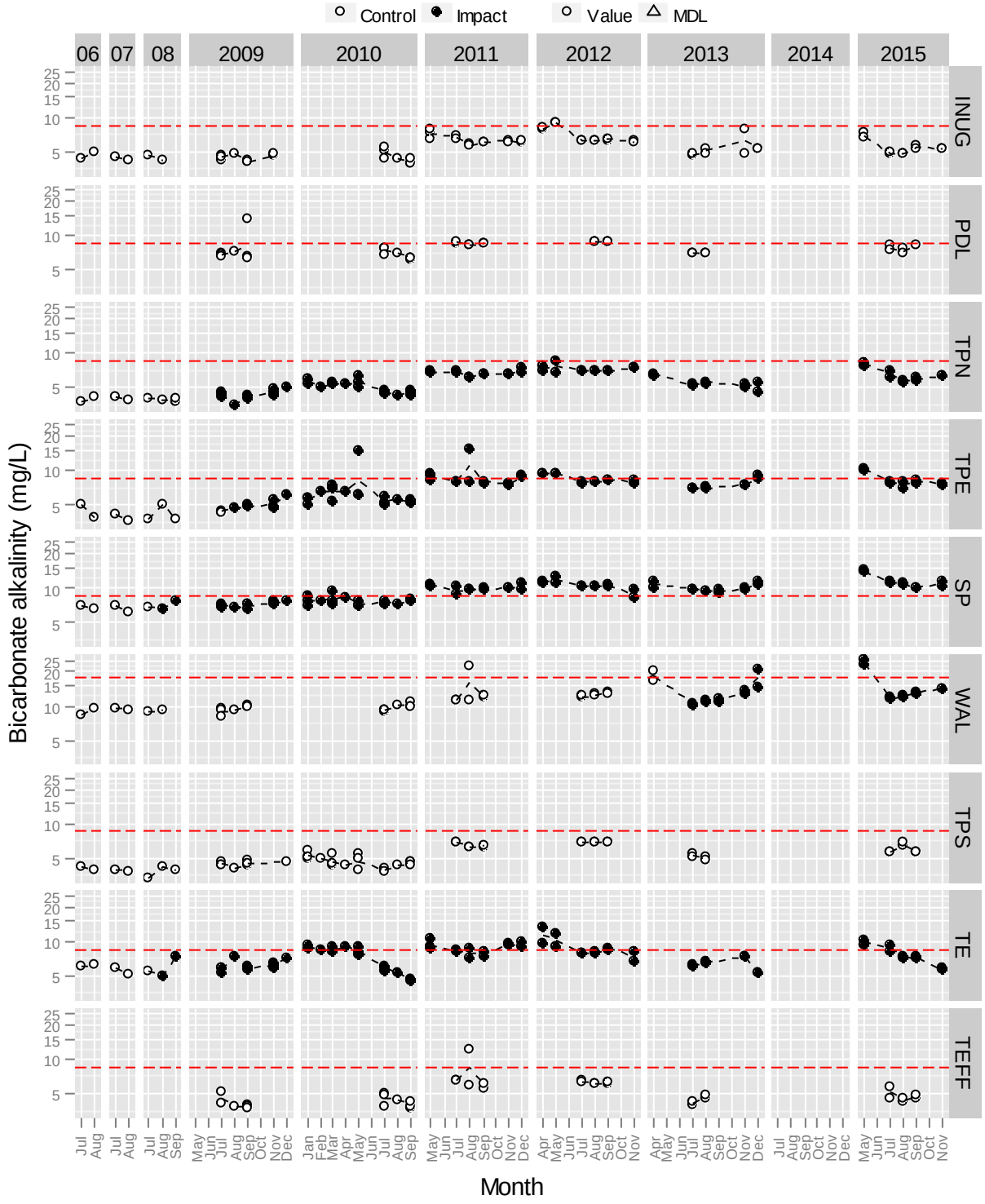


Figure 3.2–17. Total Alkalinity (mg/L) in water samples from Meadowbank study lakes since 2006.

Note: Total alkalinity data from 2014 are deemed unreliable and were excluded from formal trend assessment (See Azimuth [2015b] for more detail).

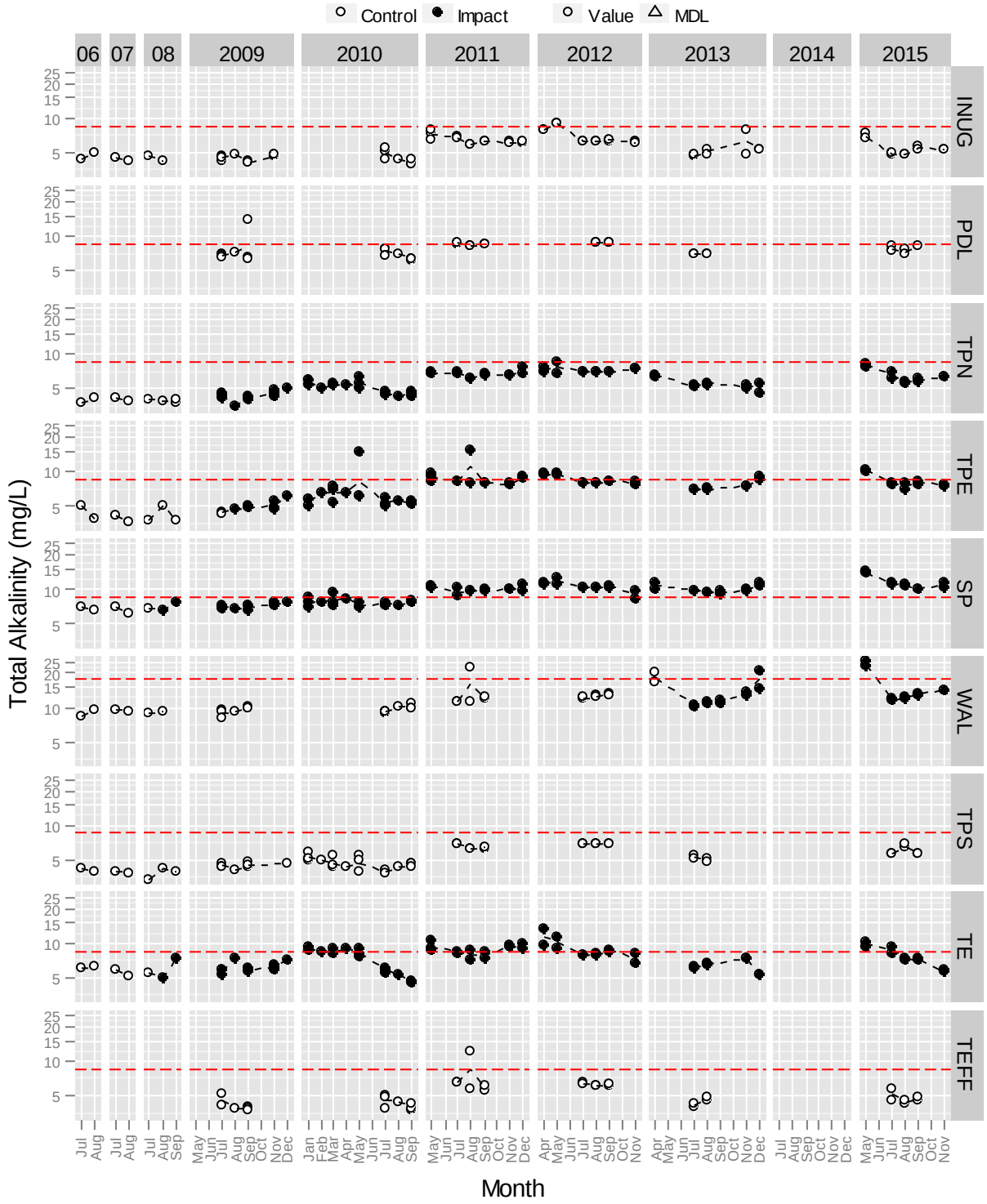


Figure 3.2–18. Ammonia-N (mg/L) in water samples from Meadowbank study lakes since 2006.

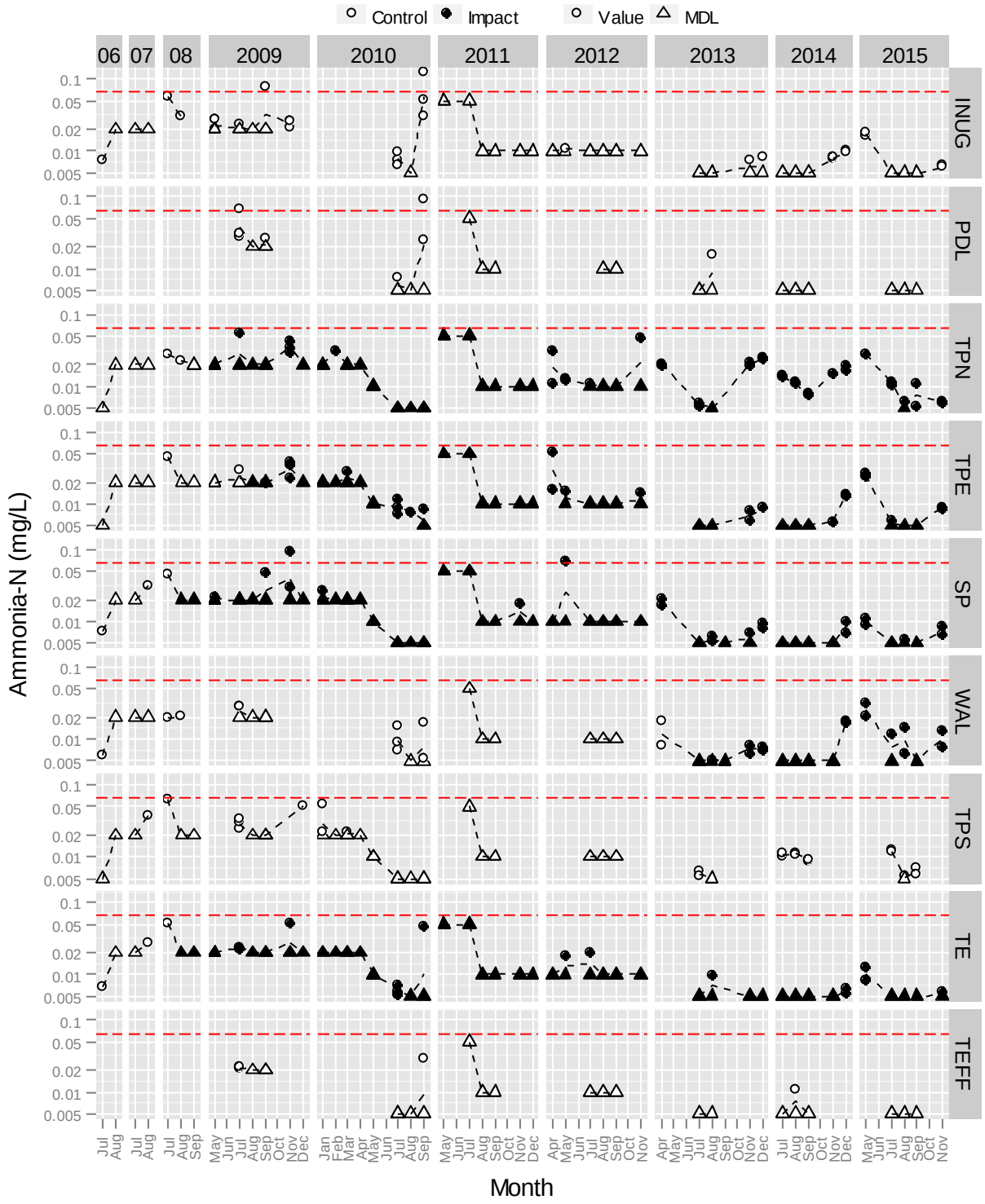


Figure 3.2–19. Chloride (mg/L) in water samples from Meadowbank study lakes since 2006.

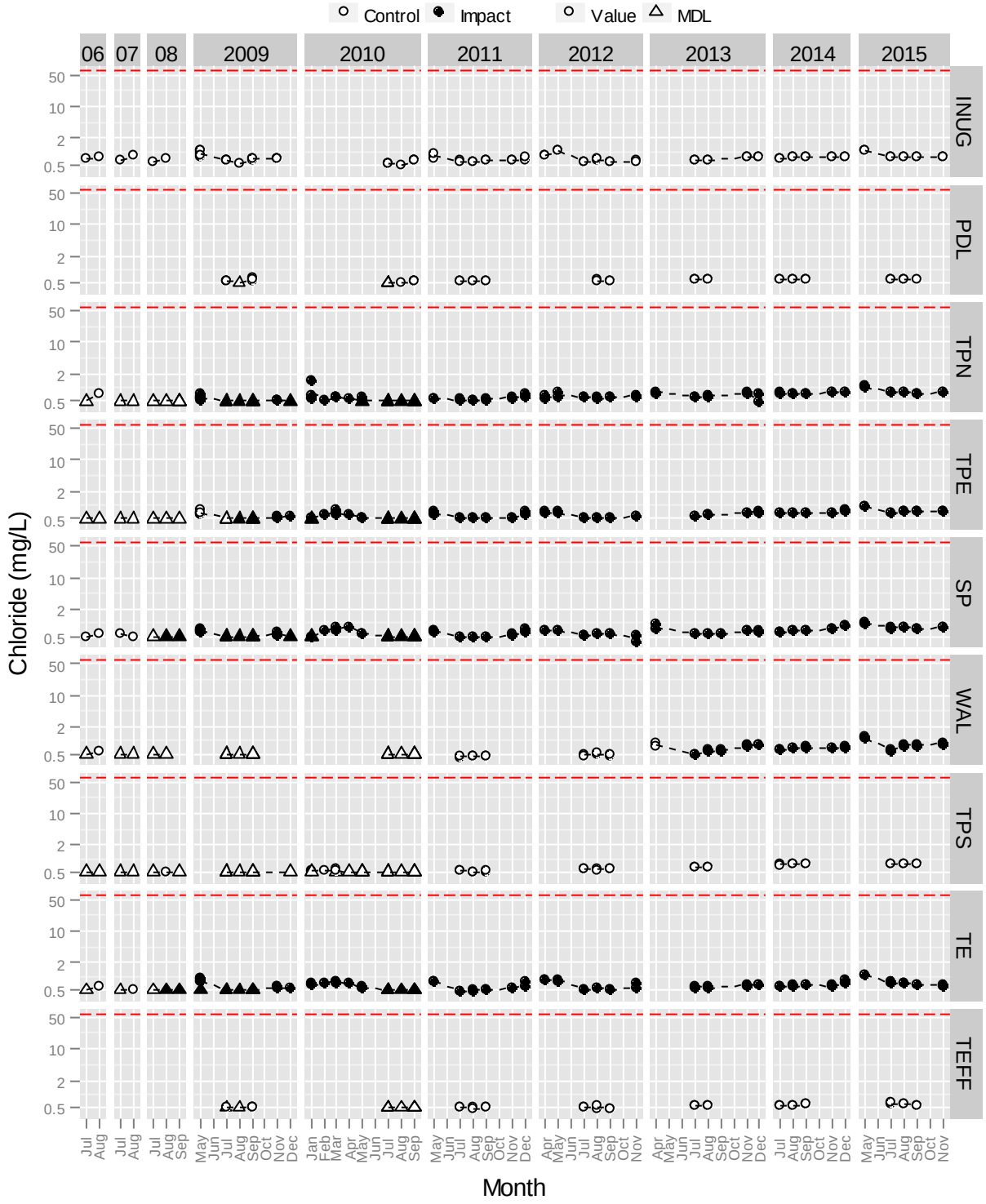


Figure 3.2–20. Nitrate-N (mg/L) in water samples from Meadowbank study lakes since 2006.

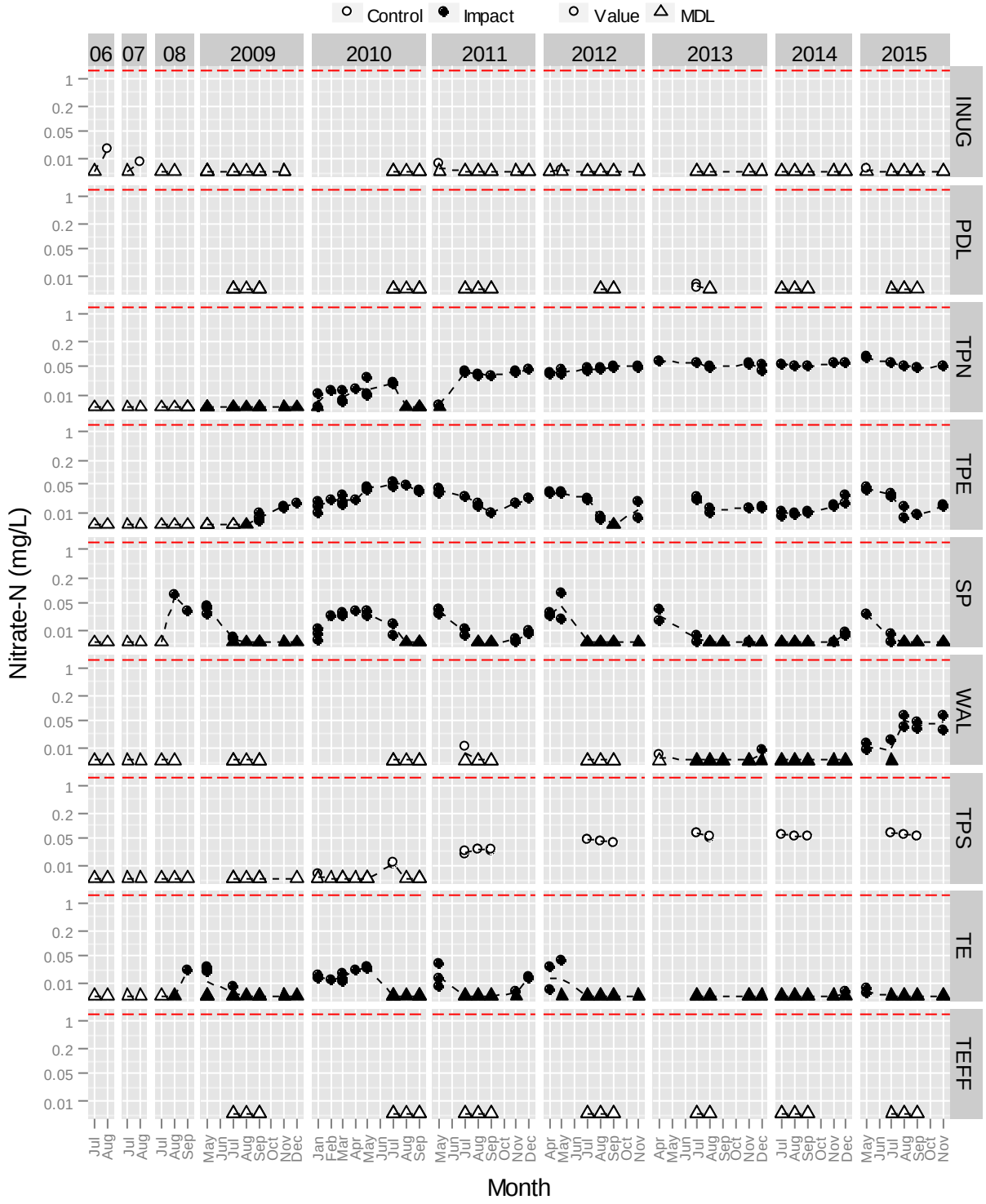


Figure 3.2–21. Total Kjeldahl Nitrogen (TKN; mg/L) in water samples from Meadowbank study lakes since 2006.

Note: TKN data from 2014 are deemed unreliable and were excluded from formal trend assessment (See Azimuth [2015b] for more detail).

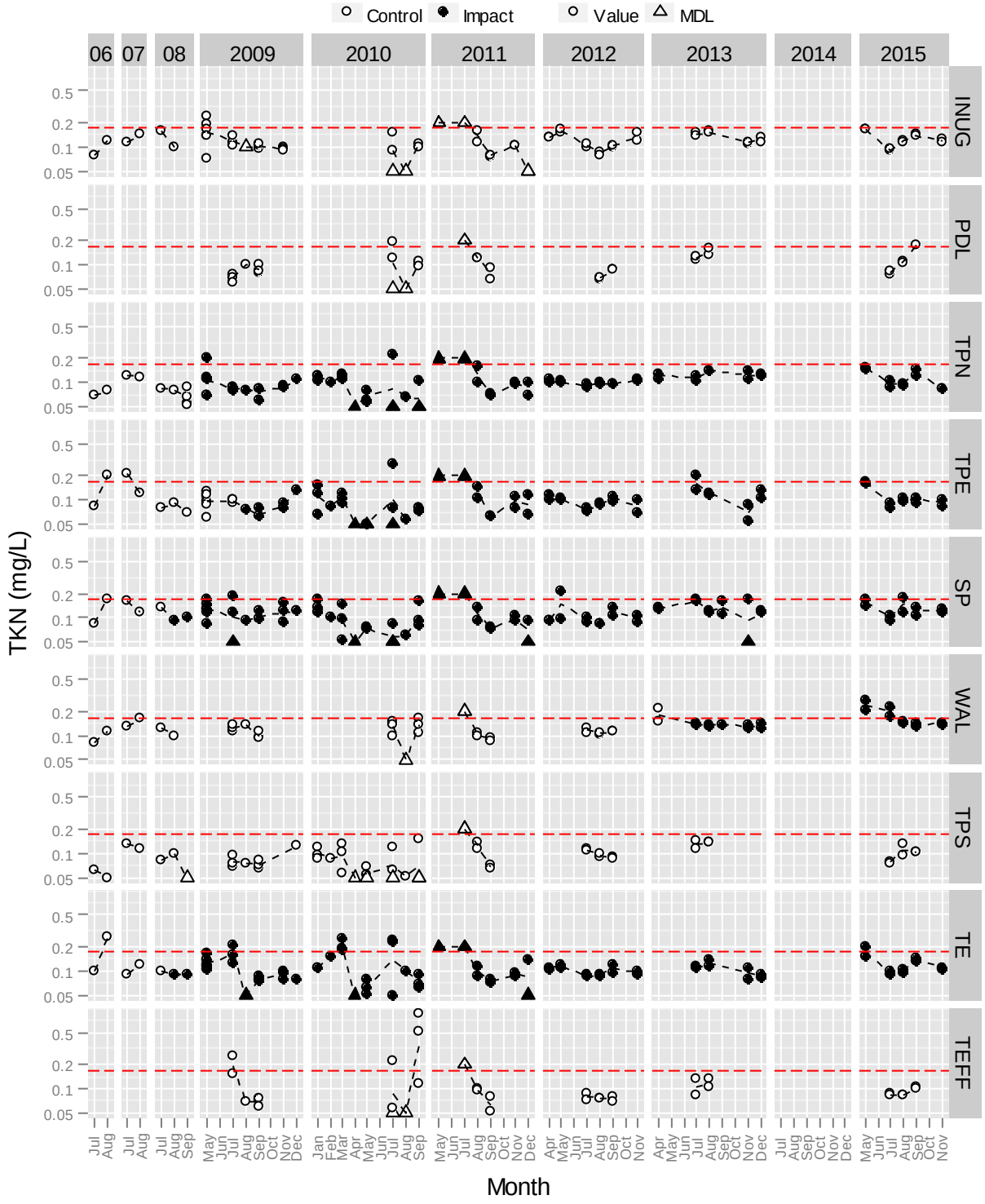


Figure 3.2–22. Total Phosphorus (mg/L) in water samples from Meadowbank study lakes since 2006.

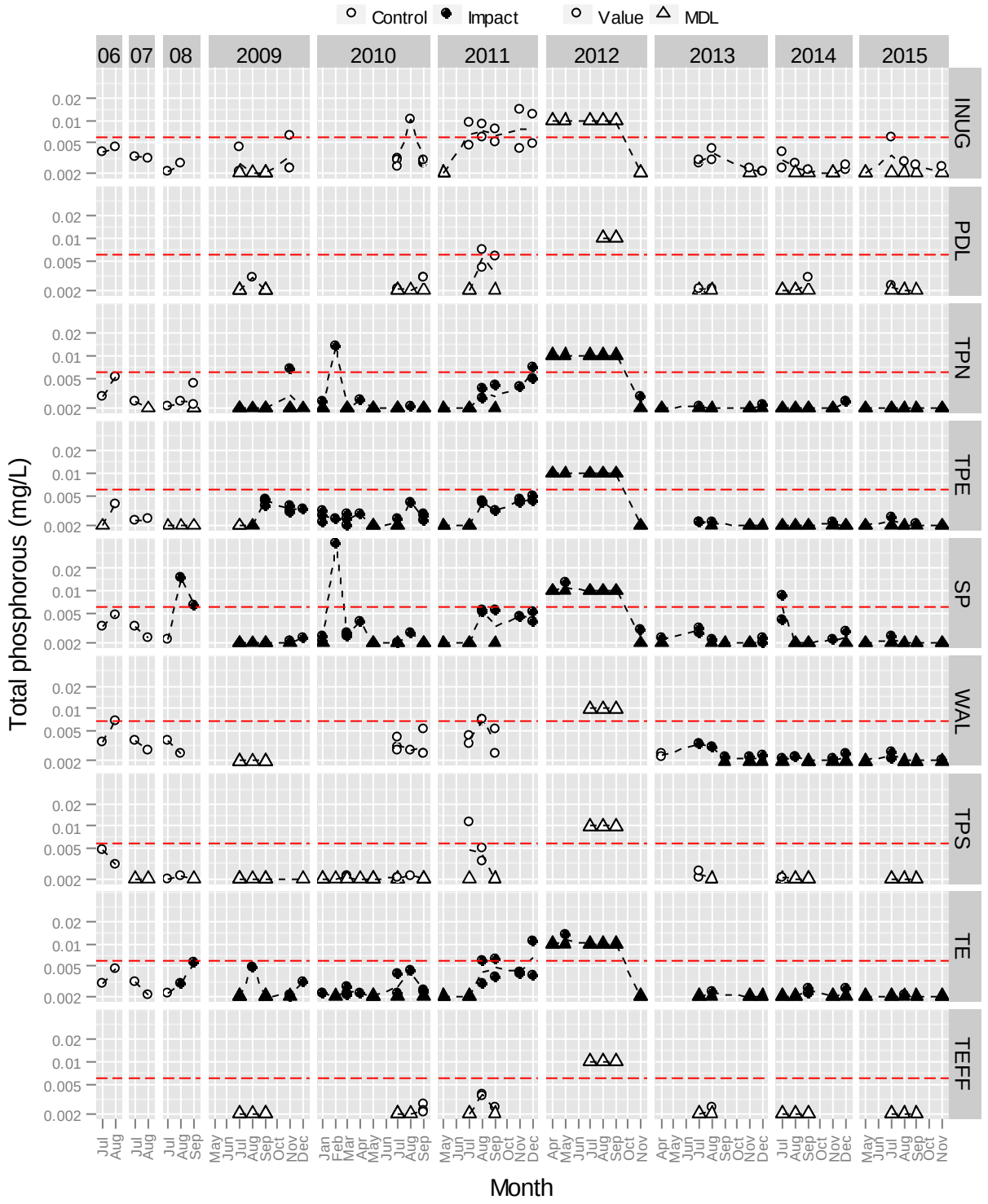


Figure 3.2–23. Reactive Silica (mg/L) in water samples from Meadowbank study lakes since 2006.

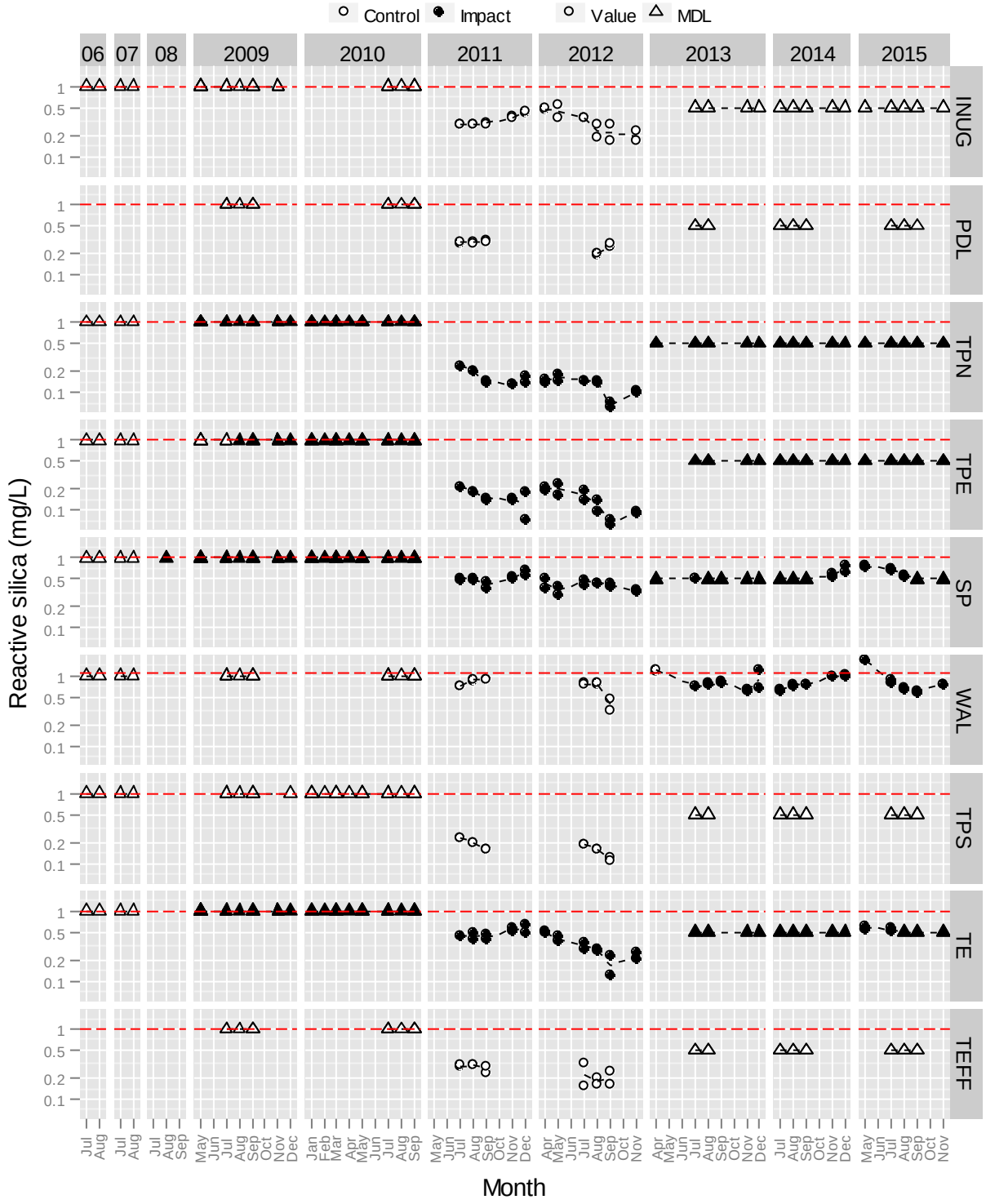


Figure 3.2–24. Sulphate (mg/L) in water samples from Meadowbank study lakes since 2006.

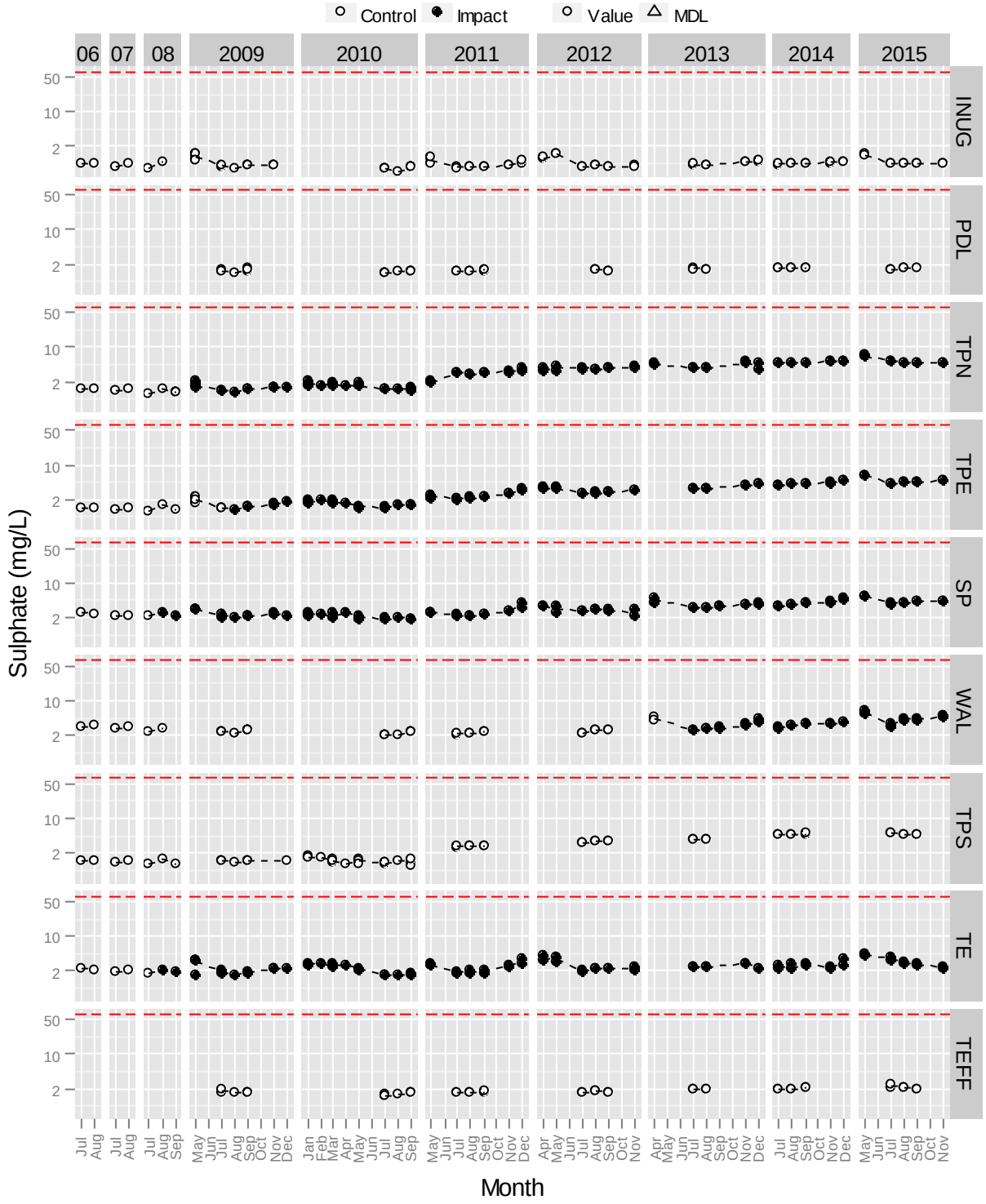


Figure 3.2–25. Dissolved Organic Carbon (DOC; mg/L) in water samples from Meadowbank study lakes since 2006.

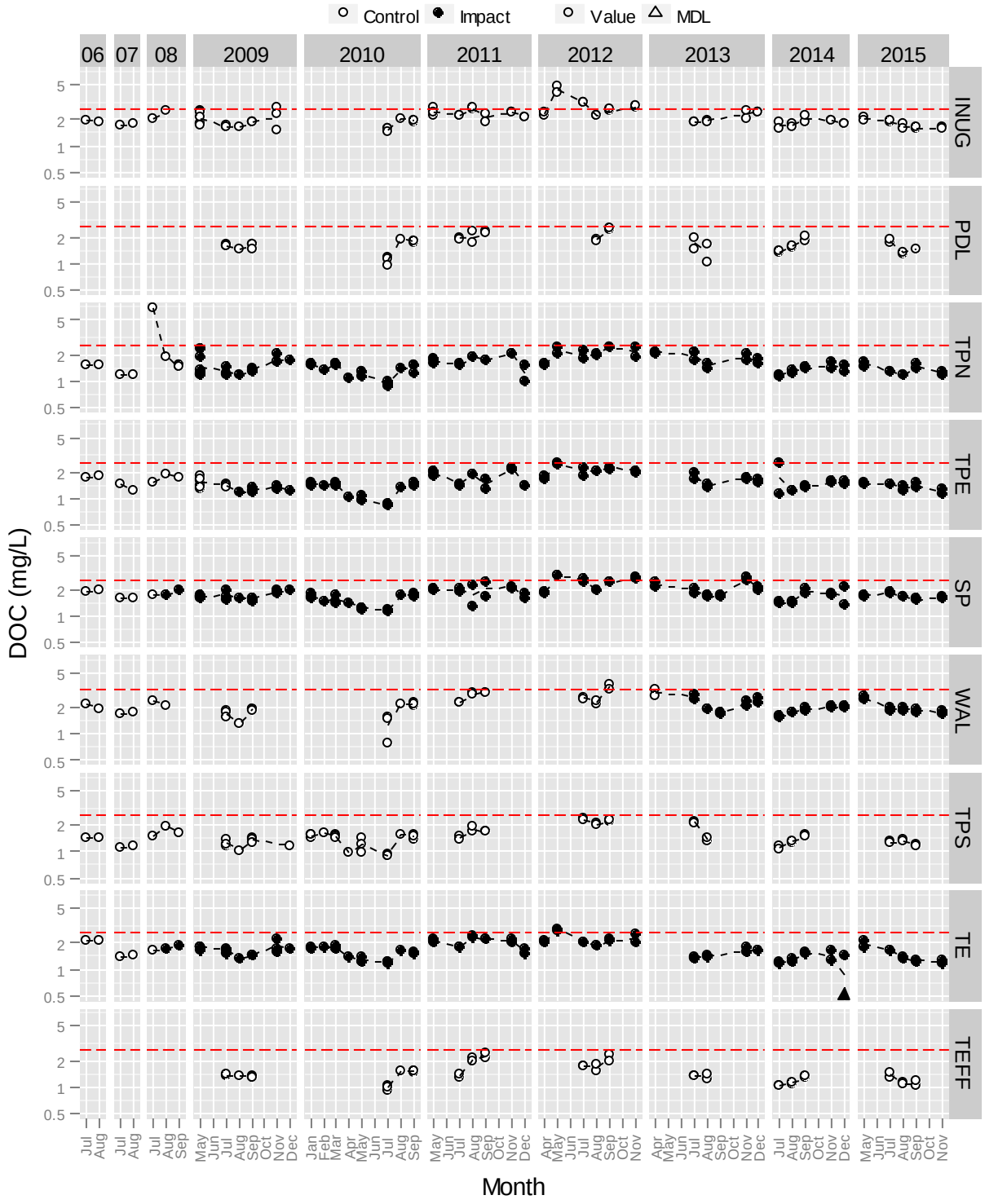


Figure 3.2–26. Total Organic Carbon (TOC; mg/L) in water samples from Meadowbank study lakes since 2006.

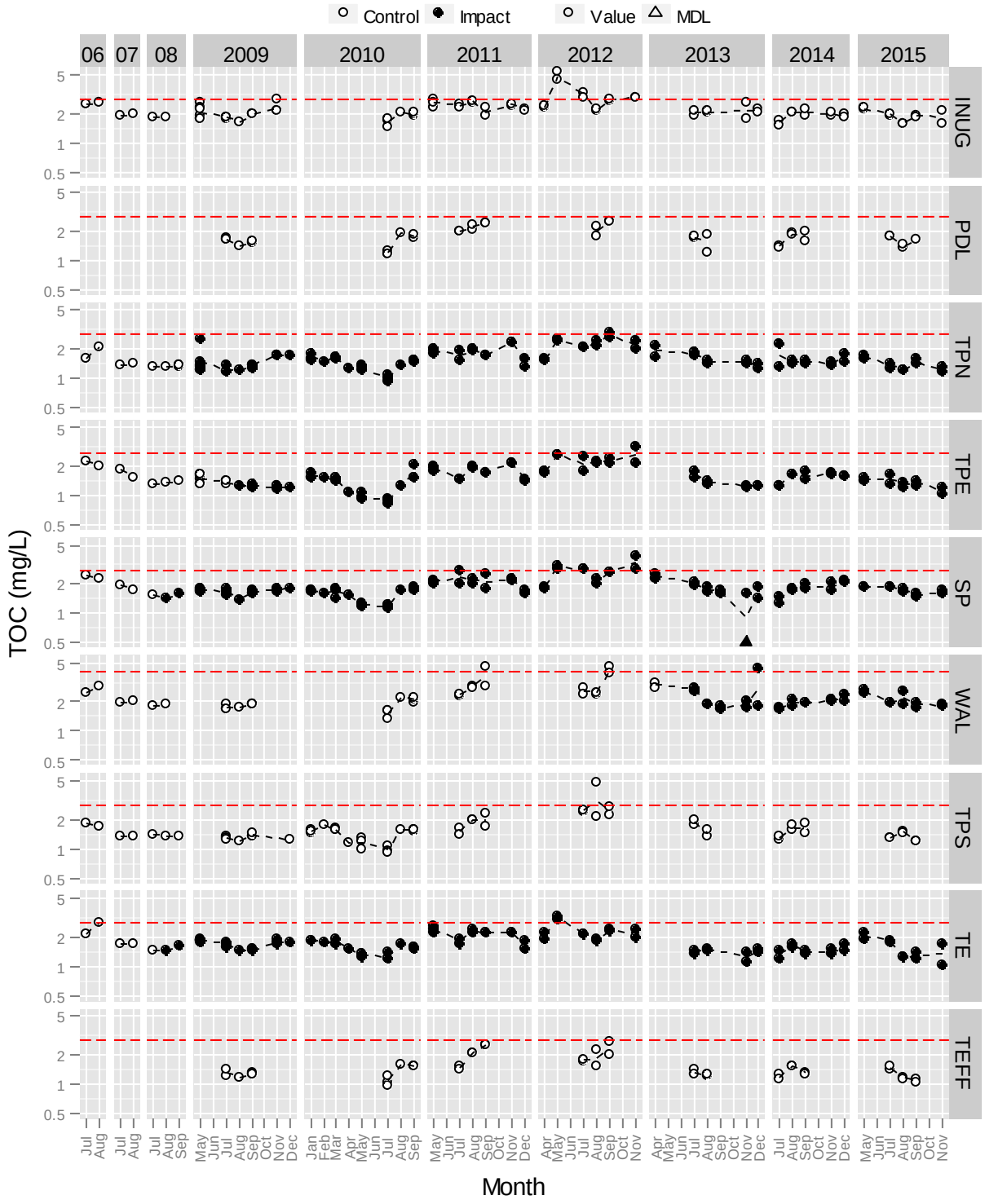


Figure 3.2–27. Total Aluminum (mg/L) in water samples from Meadowbank study lakes since 2006.

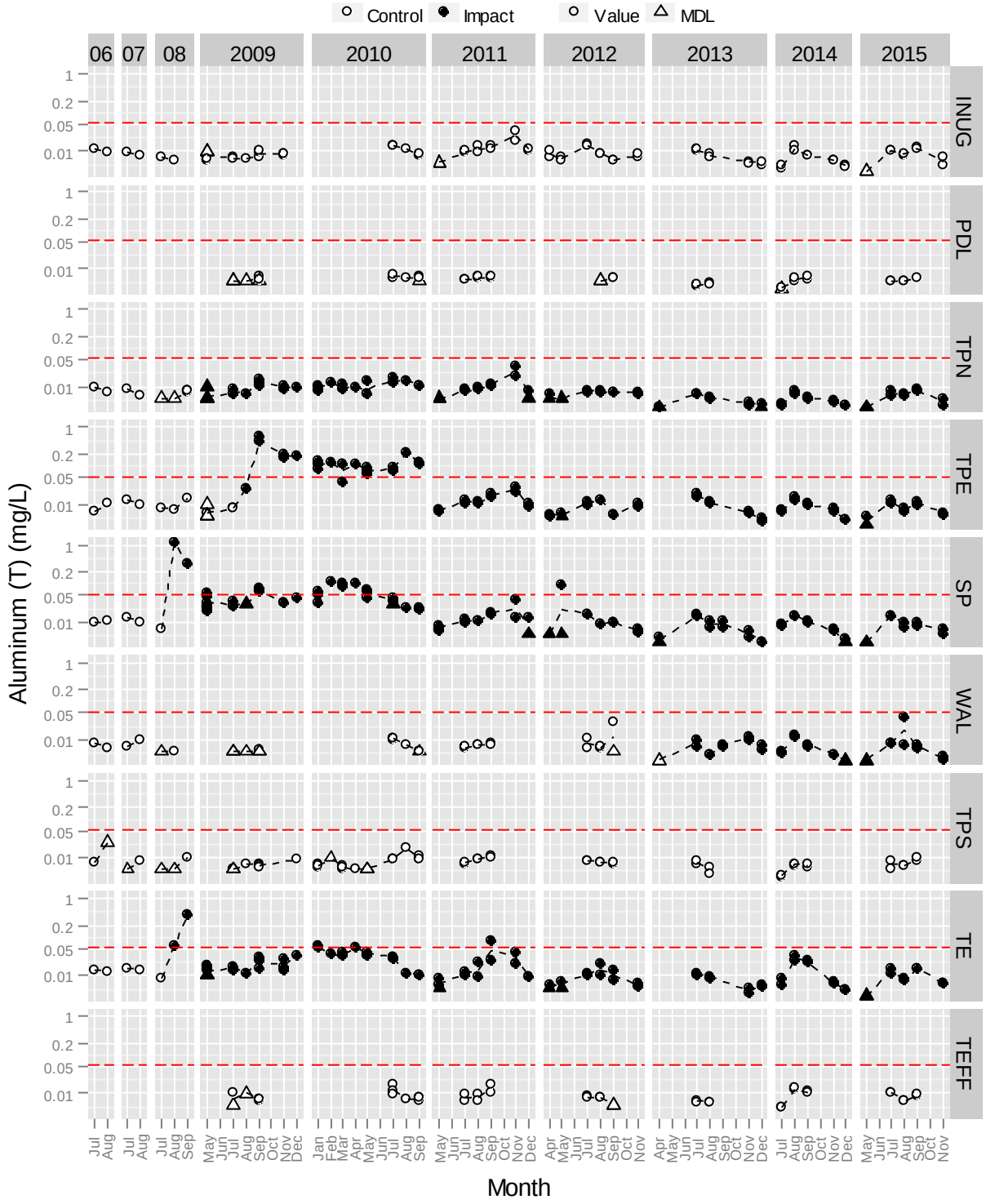


Figure 3.2–28. Total Arsenic (mg/L) in water samples from Meadowbank study lakes since 2006.

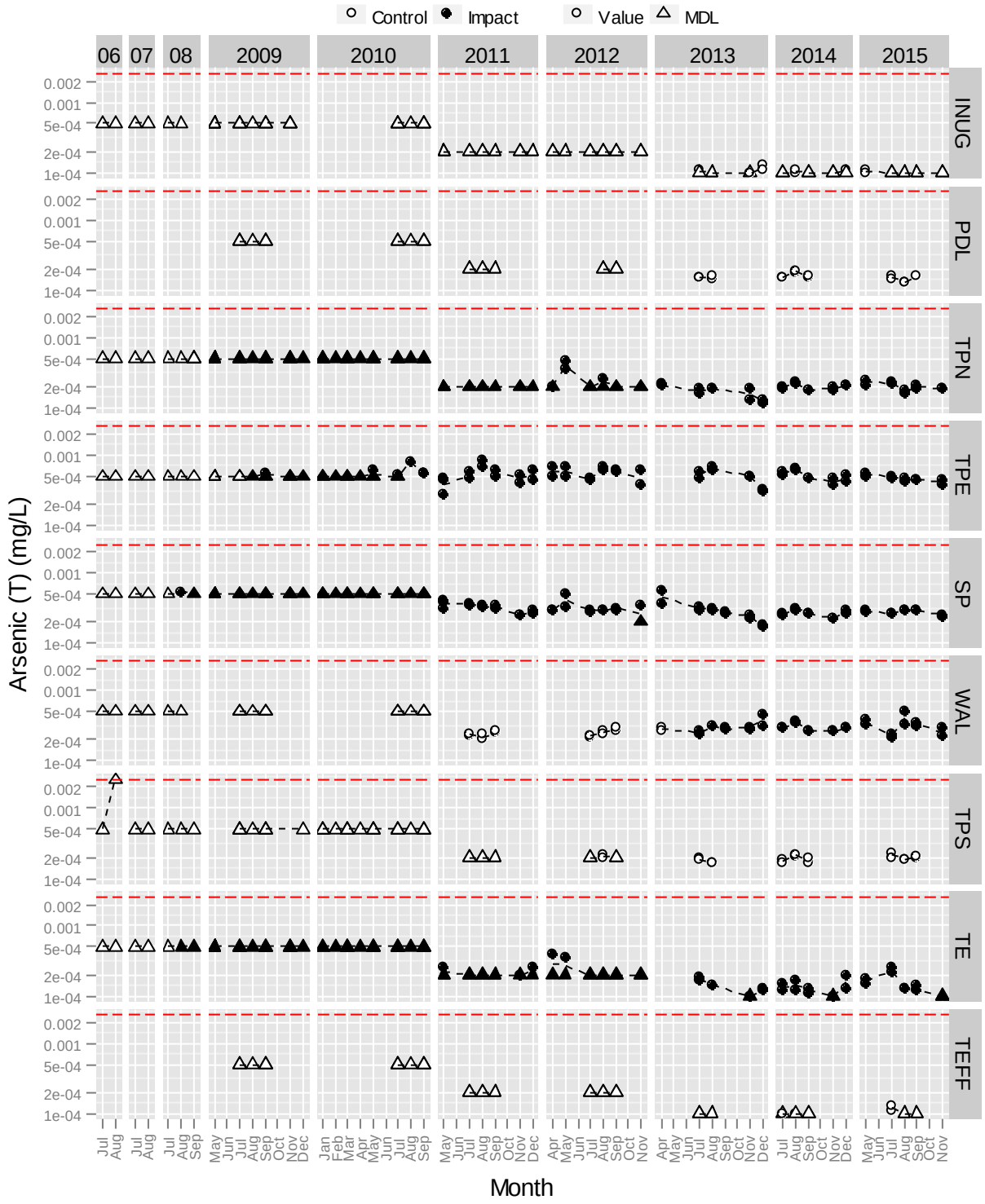


Figure 3.2–29. Total Barium (mg/L) in water samples from Meadowbank study lakes since 2006.

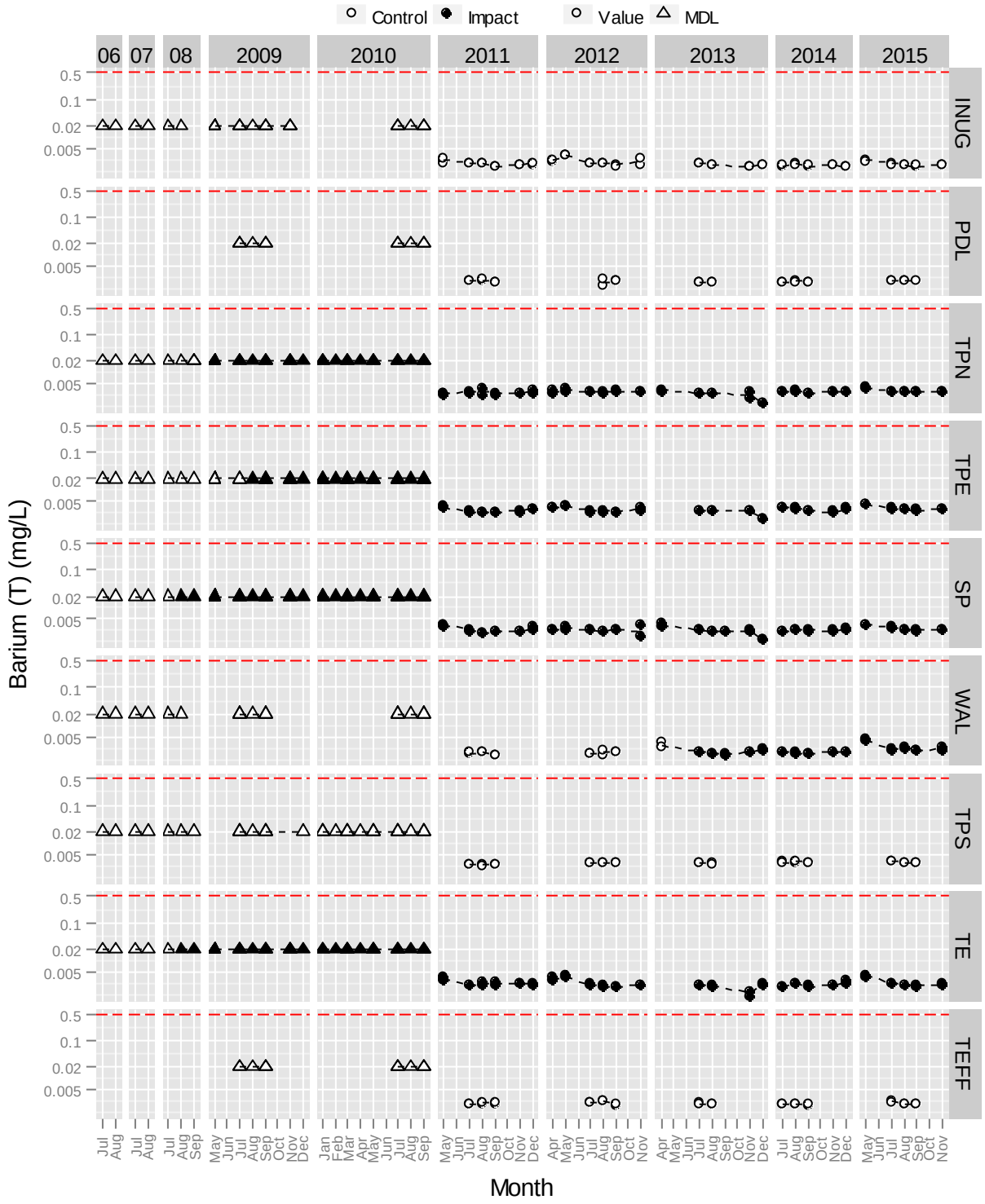


Figure 3.2–30. Total Calcium (mg/L) in water samples from Meadowbank study lakes since 2006.

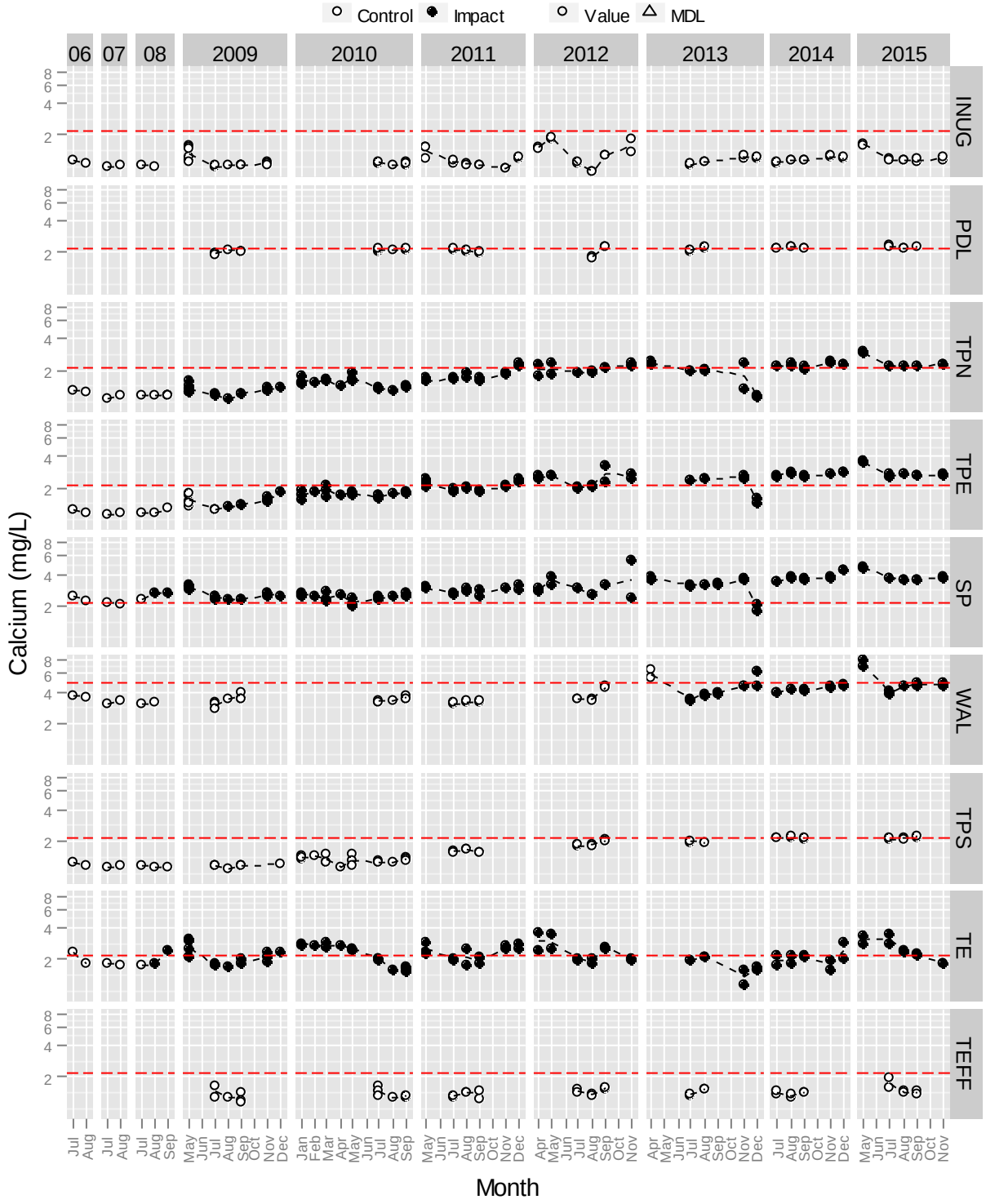


Figure 3.2–31. Total Chromium (mg/L) in water samples from Meadowbank study lakes since 2006.

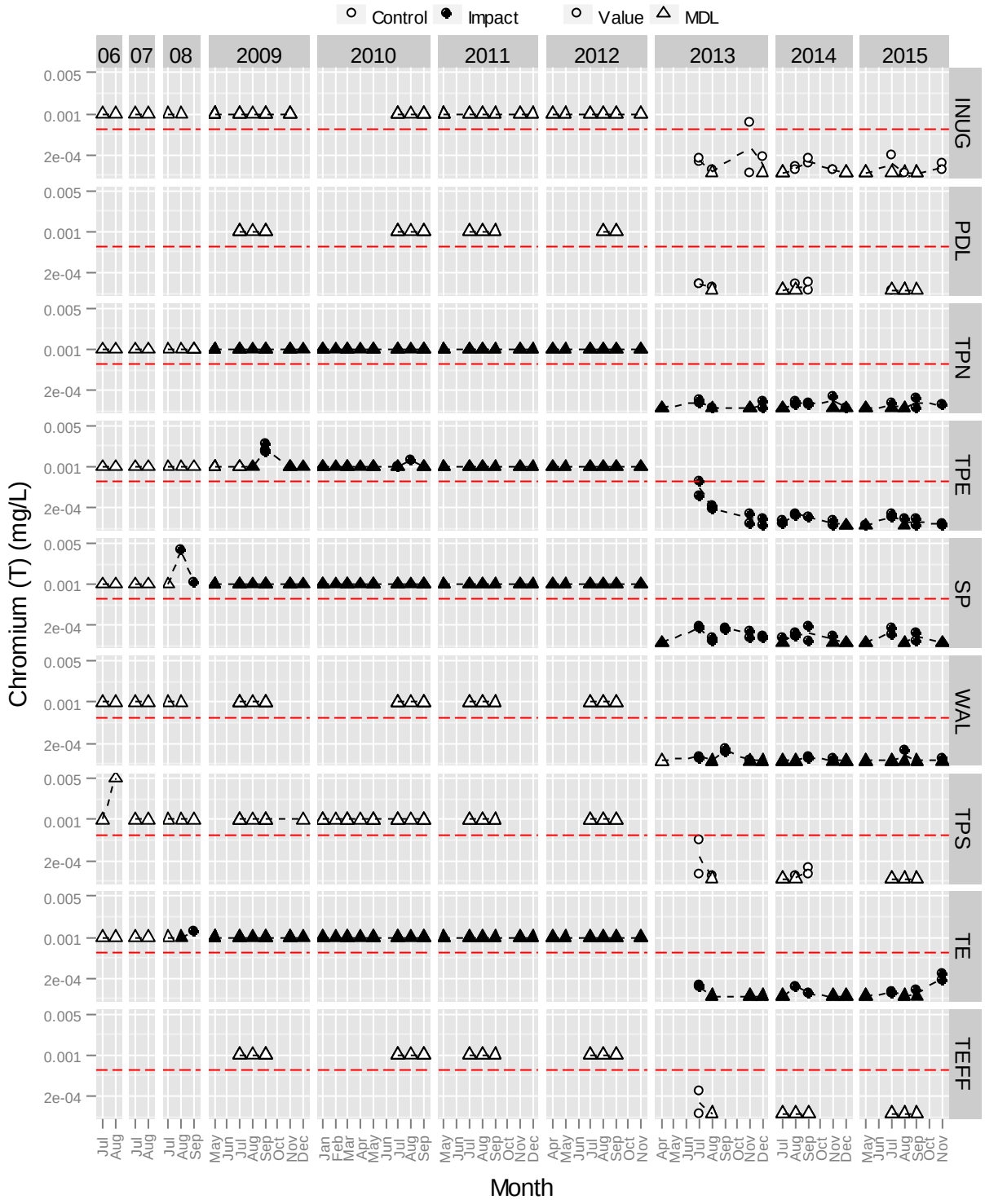


Figure 3.2–32. Total Copper (mg/L) in water samples from Meadowbank study lakes since 2006.

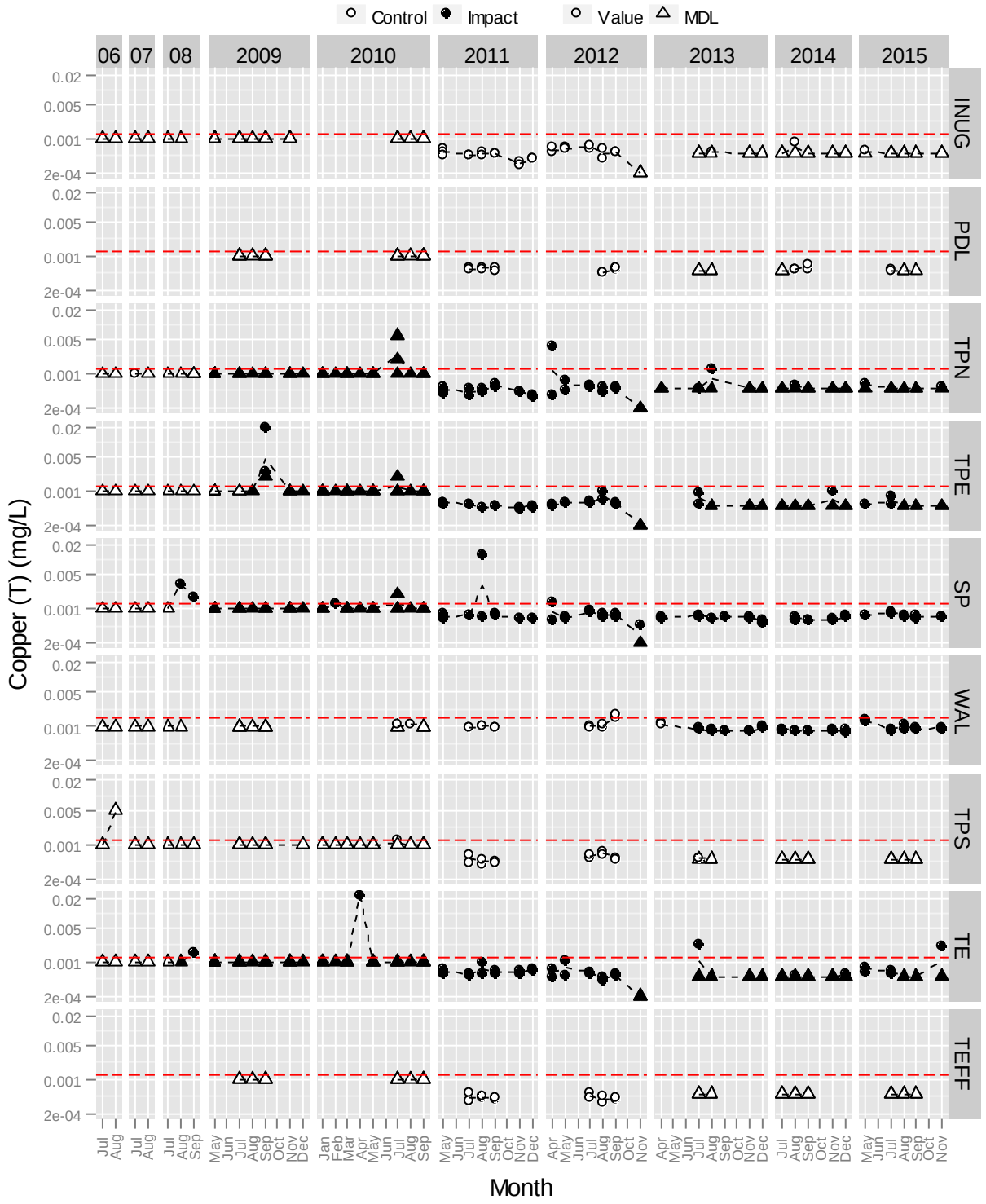


Figure 3.2–33. Total Iron (mg/L) in water samples from Meadowbank study lakes since 2006.

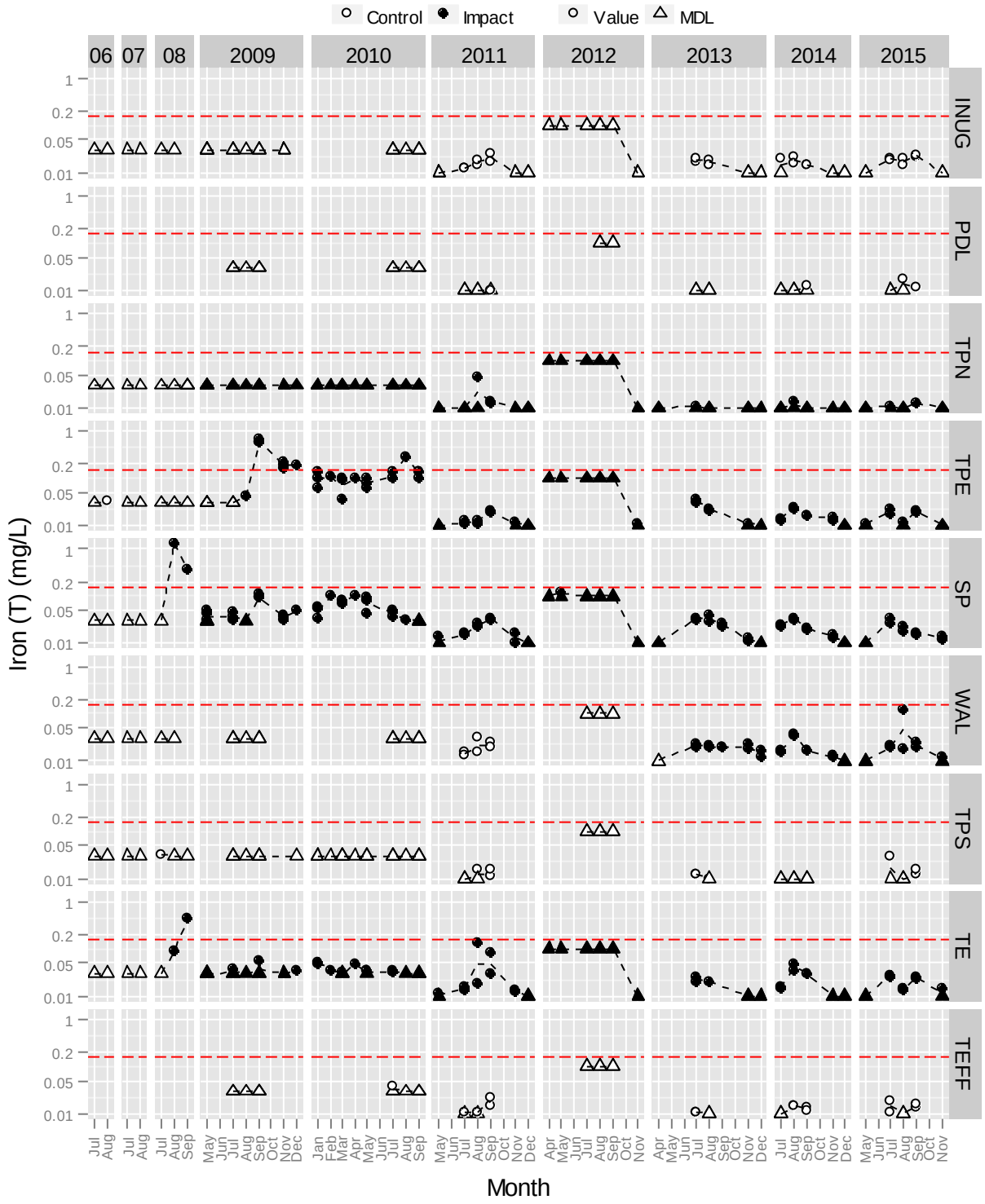


Figure 3.2–34. Total Magnesium (mg/L) in water samples from Meadowbank study lakes since 2006.

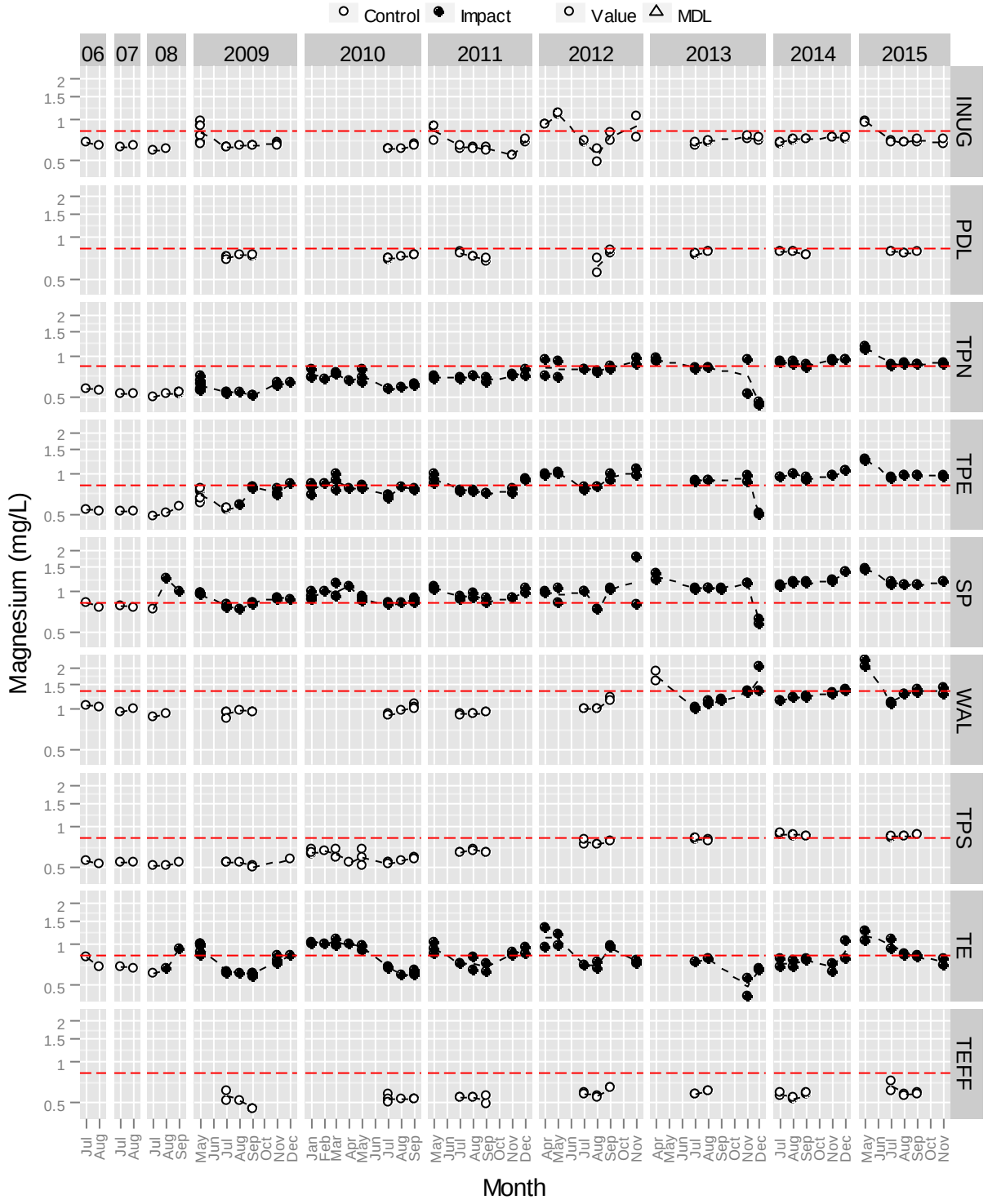


Figure 3.2–35. Total Manganese (mg/L) in water samples from Meadowbank study lakes since 2006.

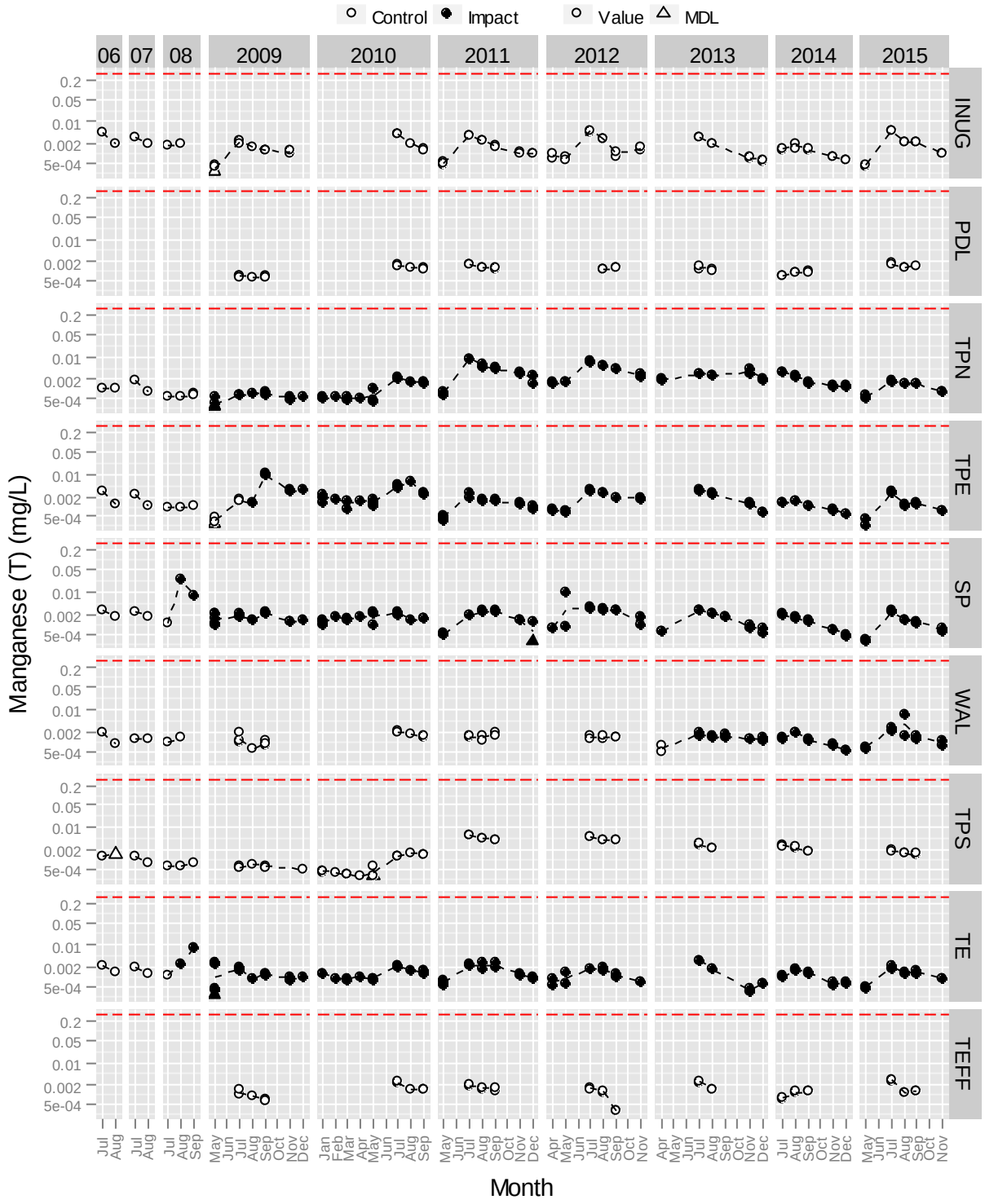


Figure 3.2–36. Total Molybdenum (mg/L) in water samples from Meadowbank study lakes since 2006.

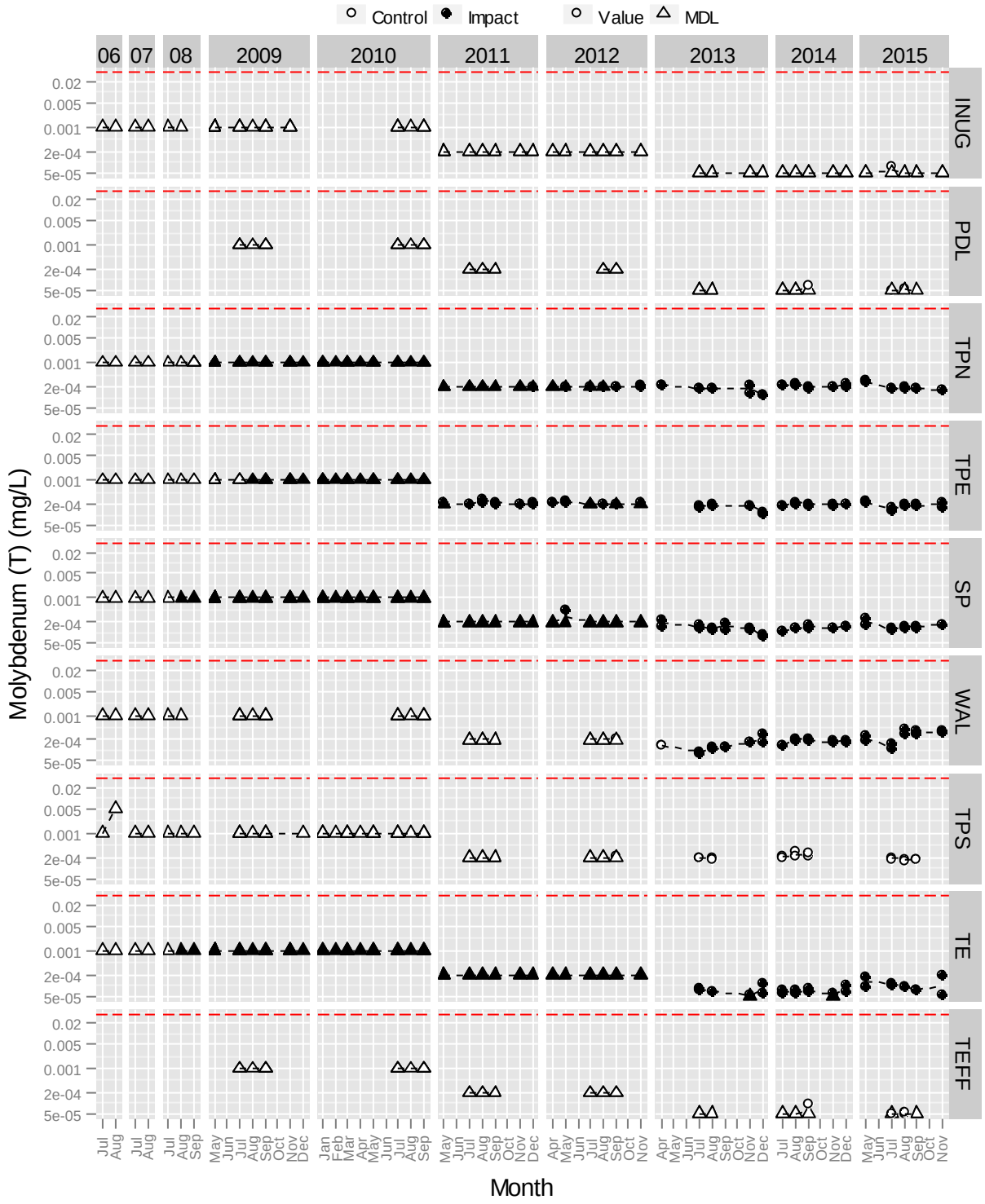


Figure 3.2–37. Total Potassium (mg/L) in water samples from Meadowbank study lakes since 2006.

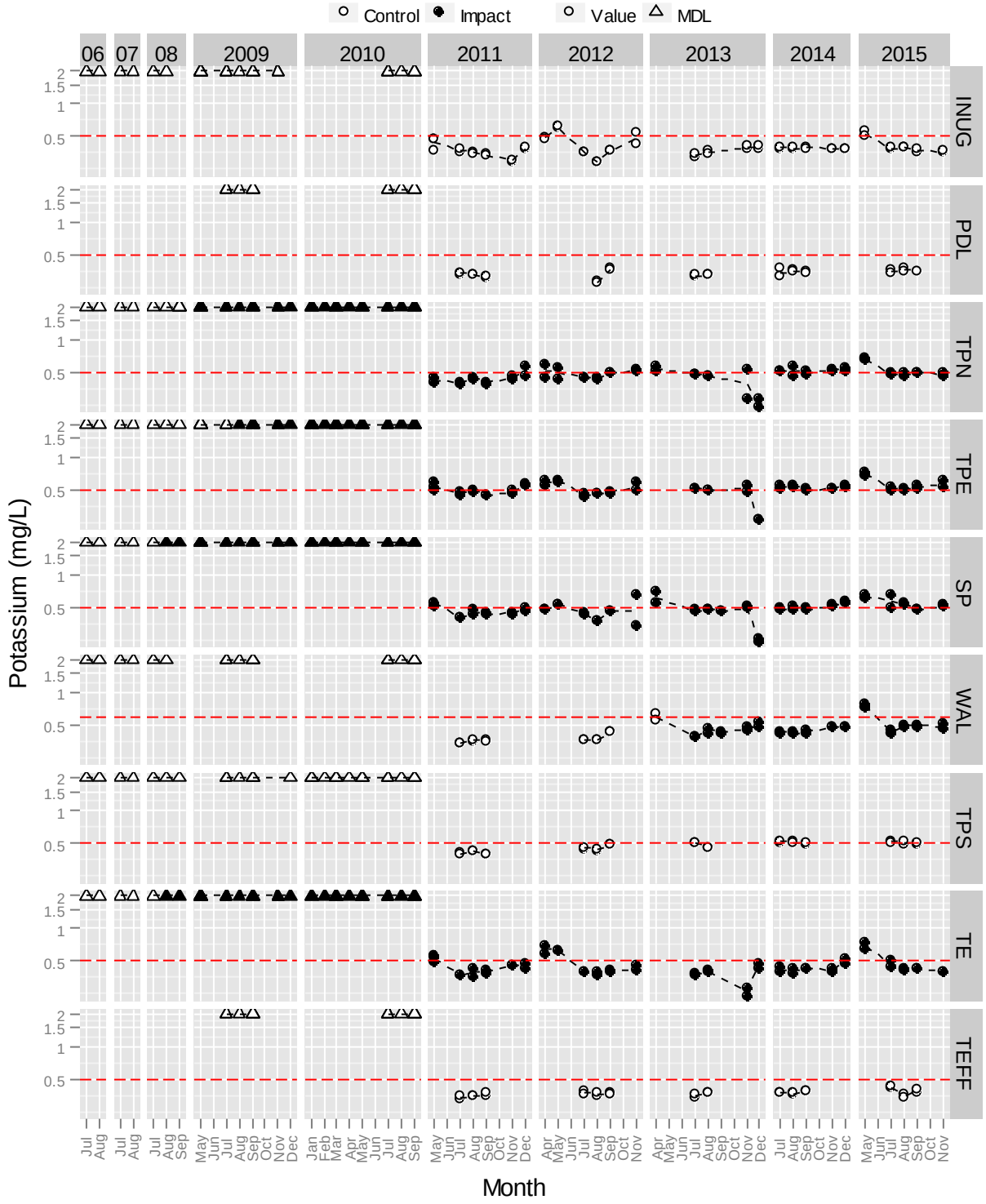


Figure 3.2–38. Total Sodium (mg/L) in water samples from Meadowbank study lakes since 2006.

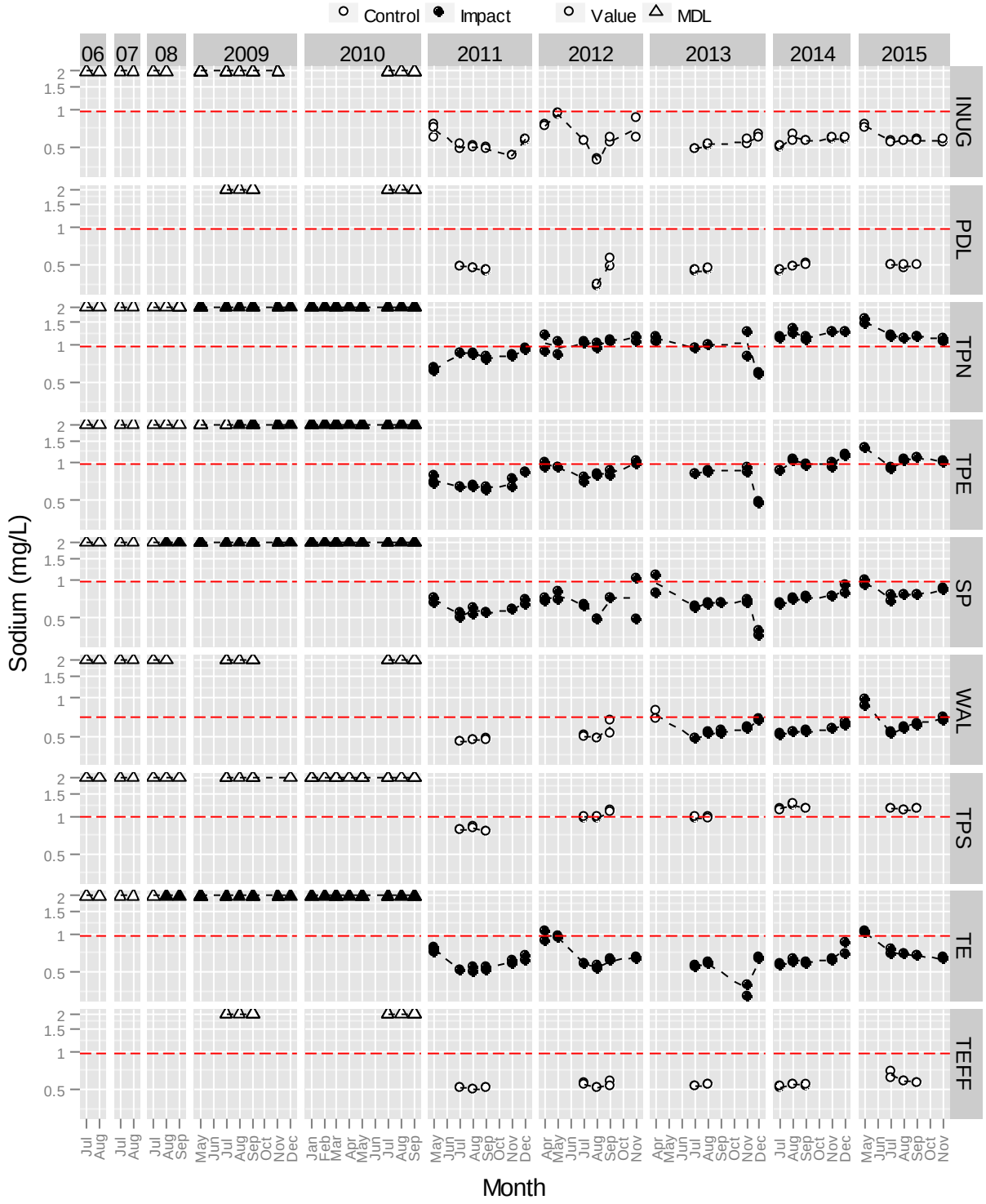


Figure 3.2–39. Total Strontium (mg/L) in water samples from Meadowbank study lakes since 2006.

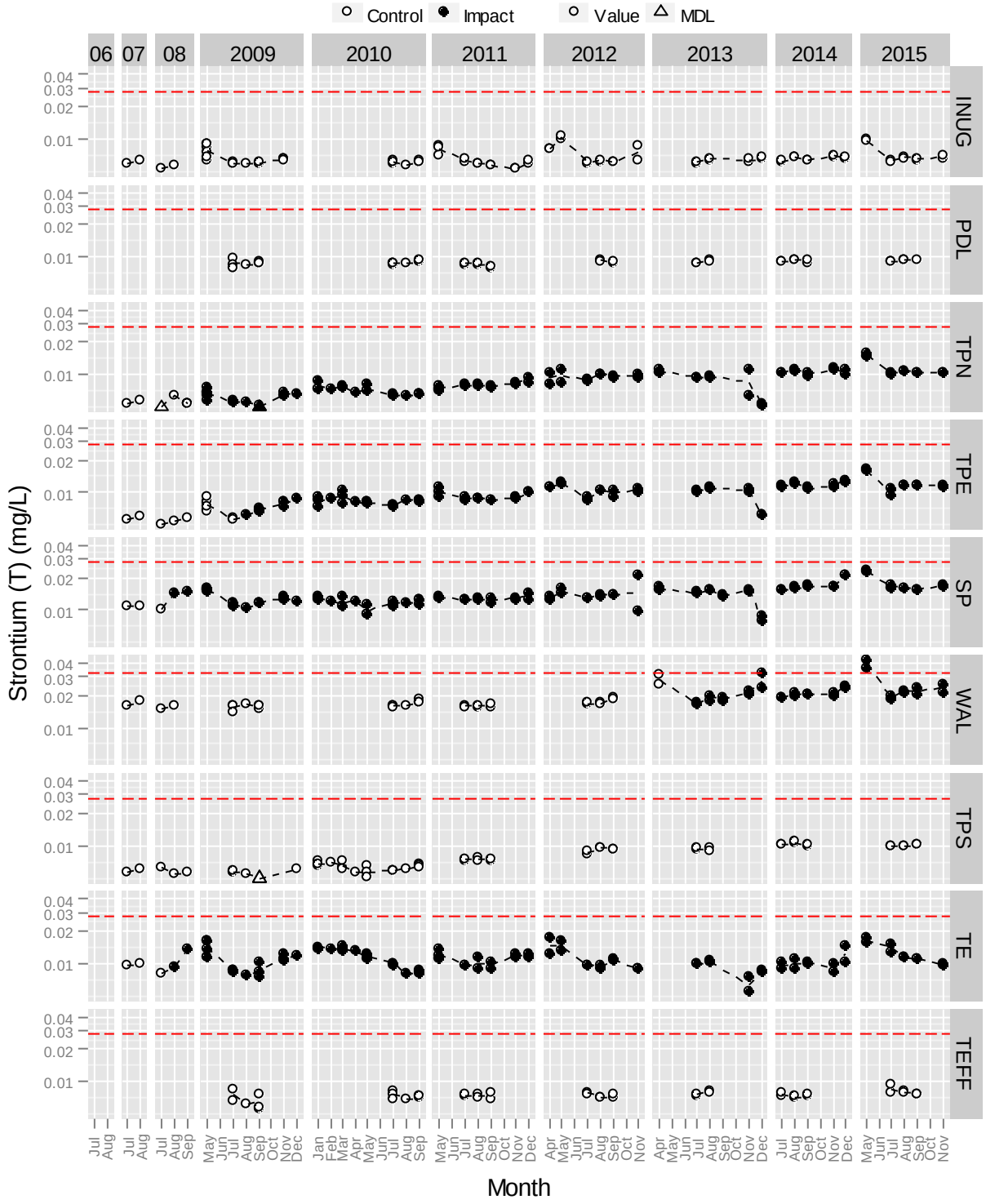


Figure 3.2–40. Total Uranium (mg/L) in water samples from Meadowbank study lakes since 2006.

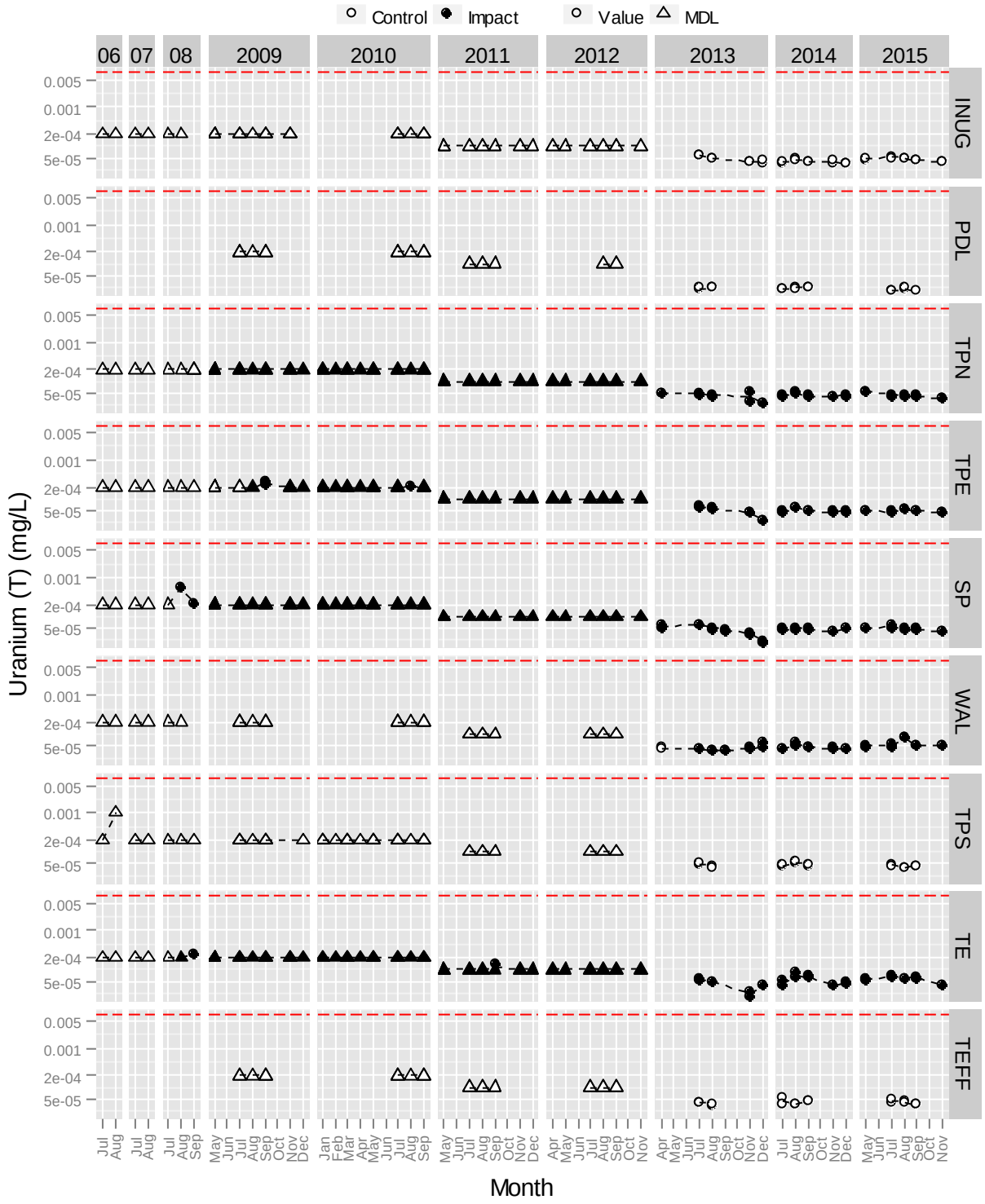


Figure 3.2–41. Dissolved Aluminum (mg/L) in water samples from Meadowbank study lakes since 2006.

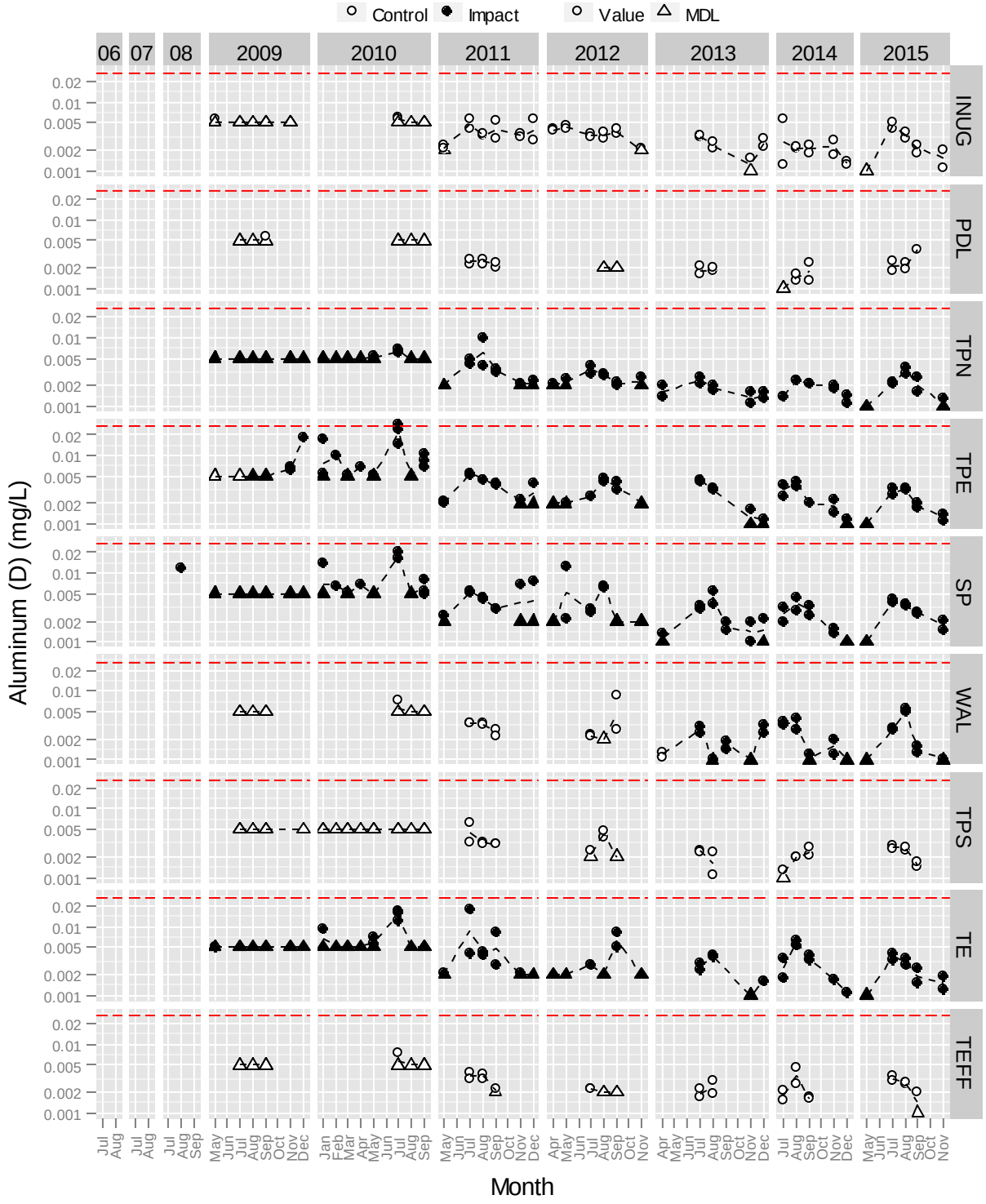


Figure 3.2–42. Dissolved Arsenic (mg/L) in water samples from Meadowbank study lakes since 2006.

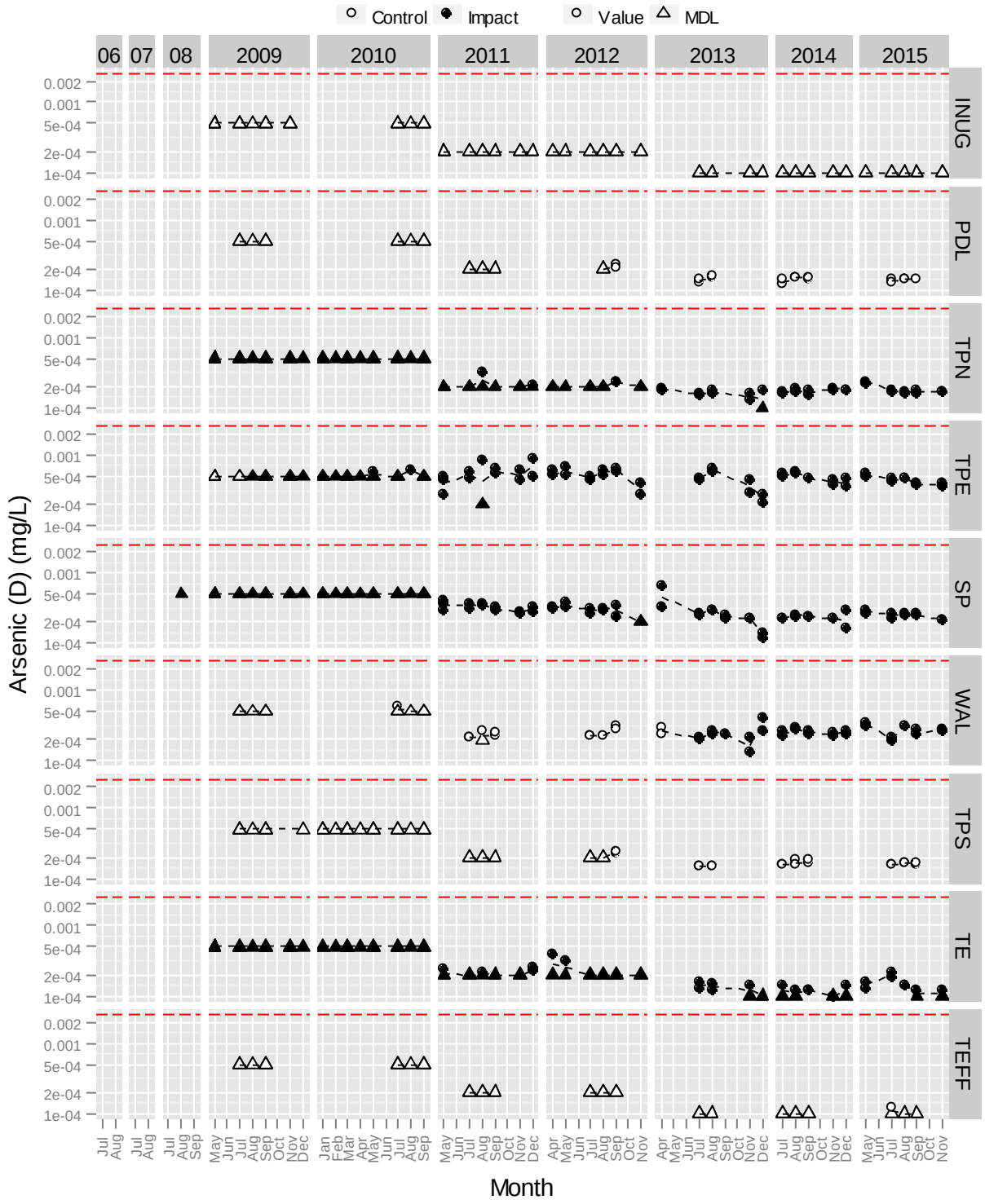


Figure 3.2–43. Dissolved Barium (mg/L) in water samples from Meadowbank study lakes since 2006.

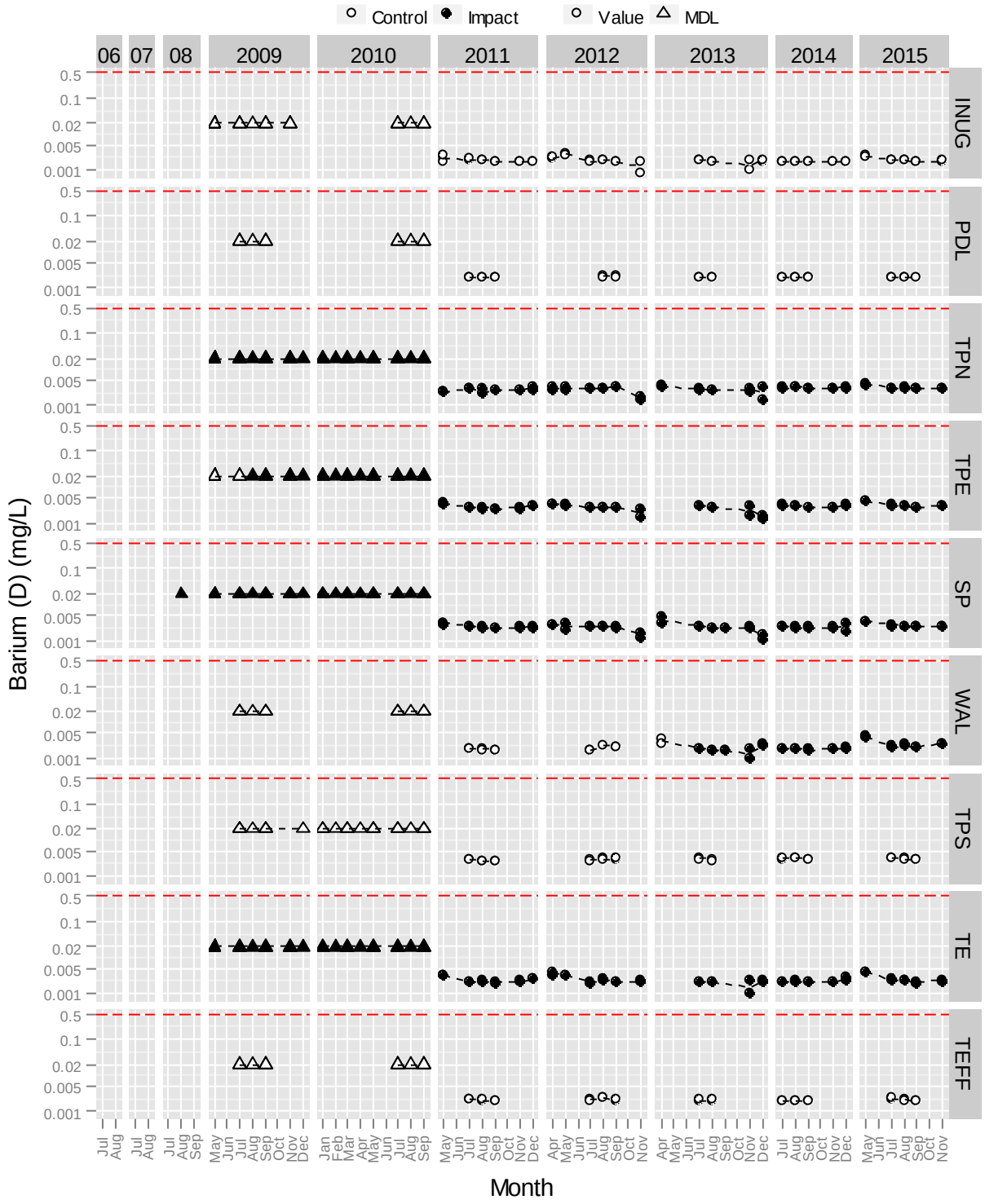


Figure 3.2–44. Dissolved Copper (mg/L) in water samples from Meadowbank study lakes since 2006.

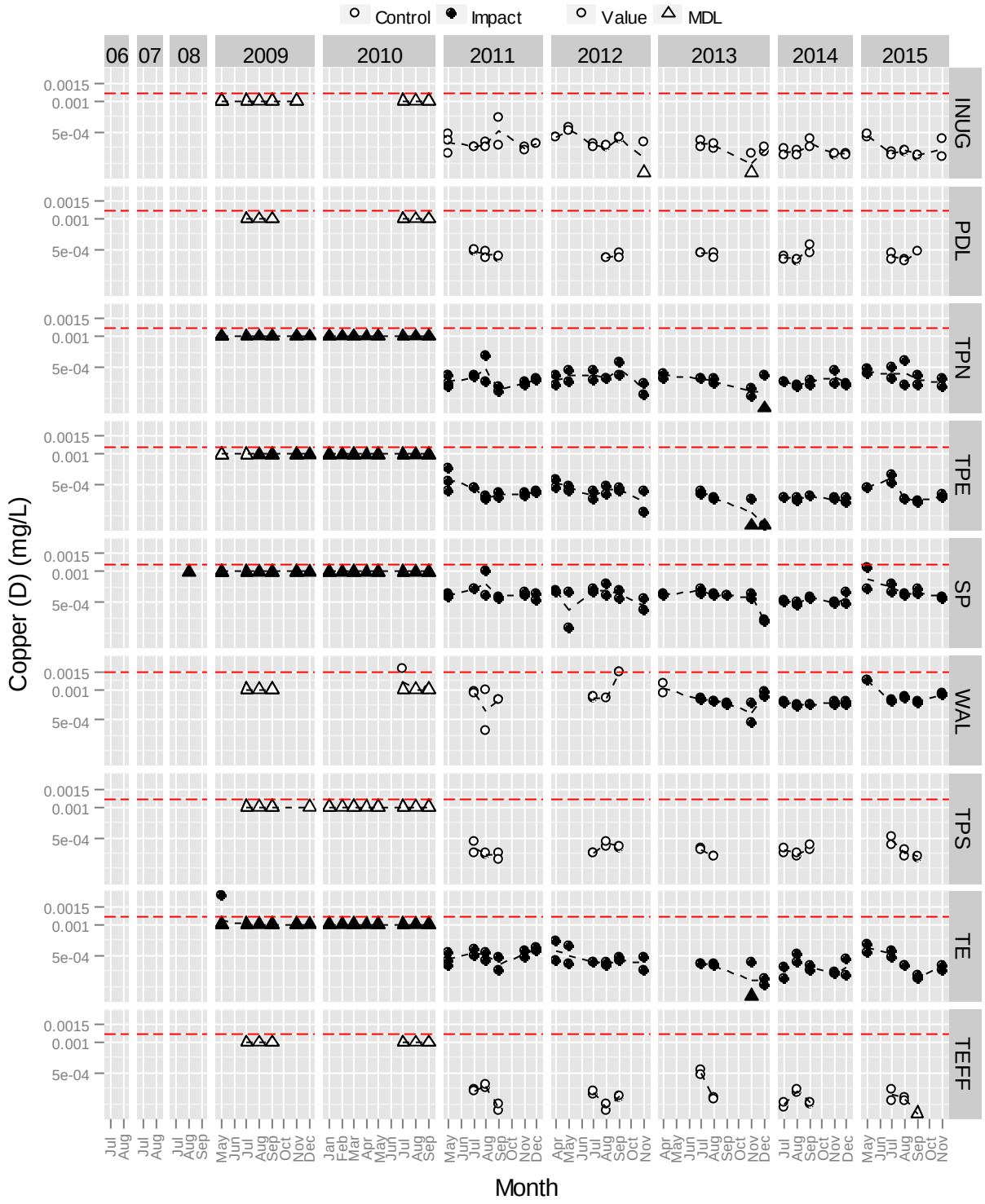


Figure 3.2–45. Dissolved Manganese (mg/L) in water samples from Meadowbank study lakes since 2006.

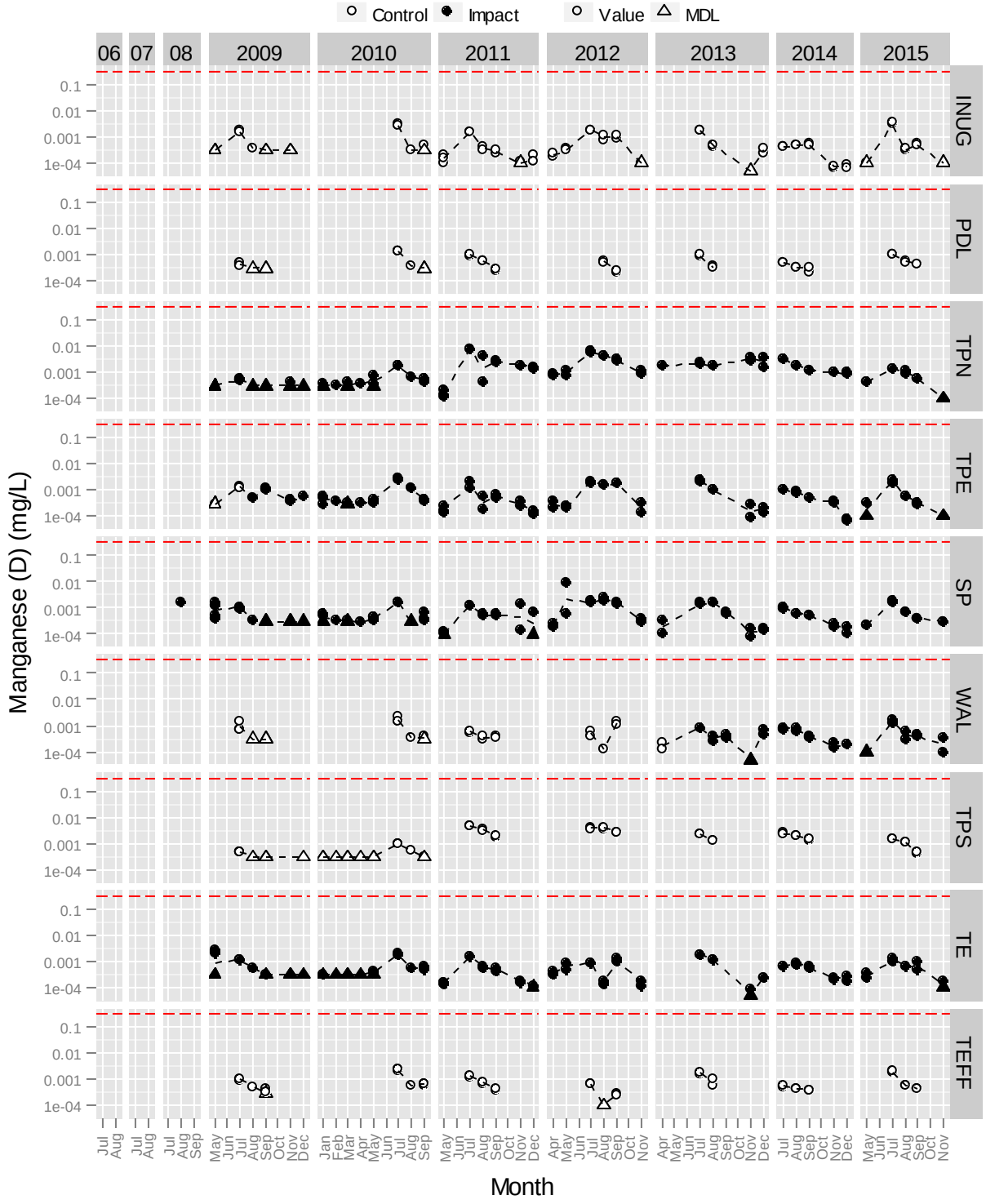


Figure 3.2–46. Dissolved Molybdenum (mg/L) in water samples from Meadowbank study lakes since 2006.

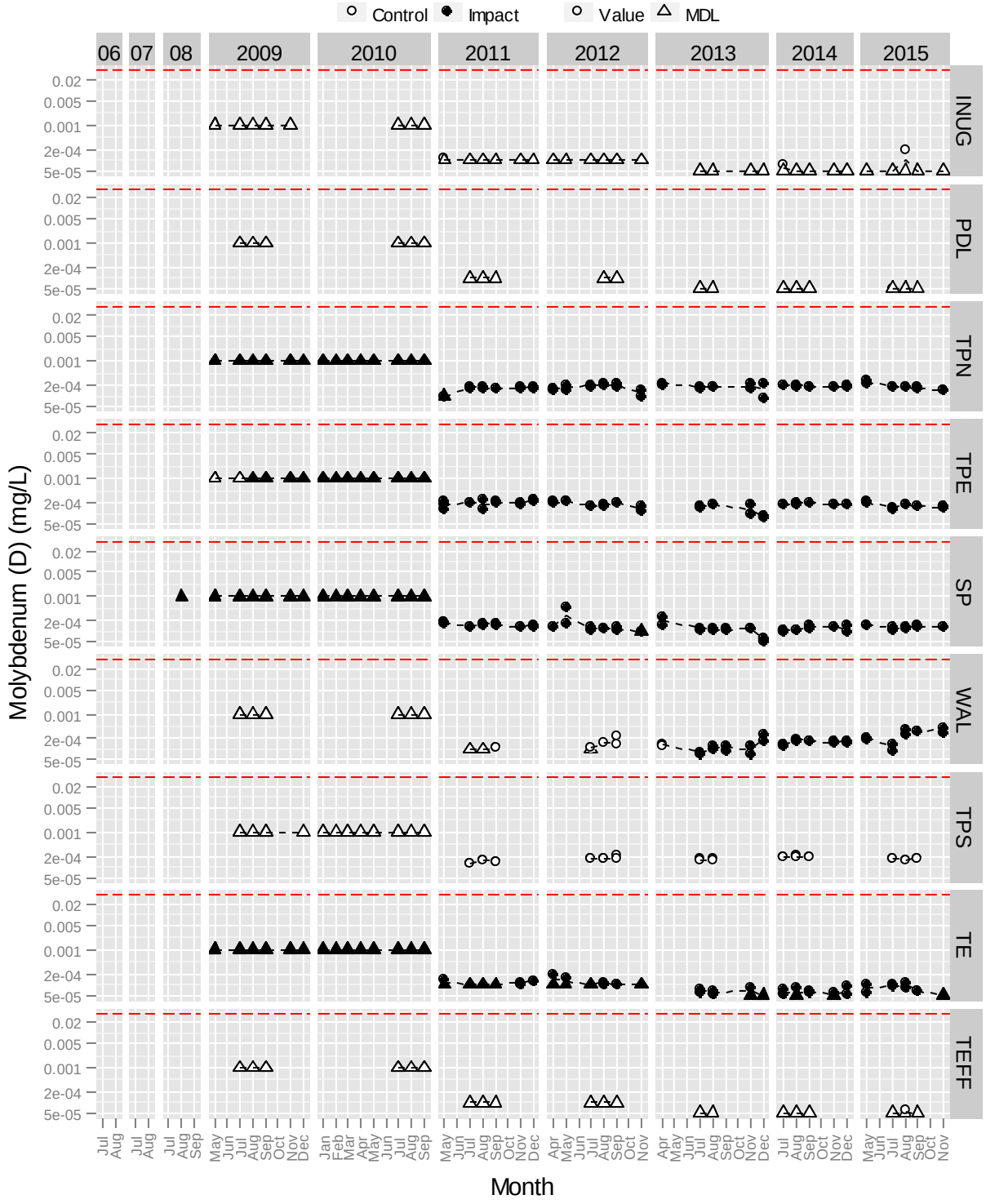


Figure 3.2–47. Dissolved Strontium (mg/L) in water samples from Meadowbank study lakes since 2006.

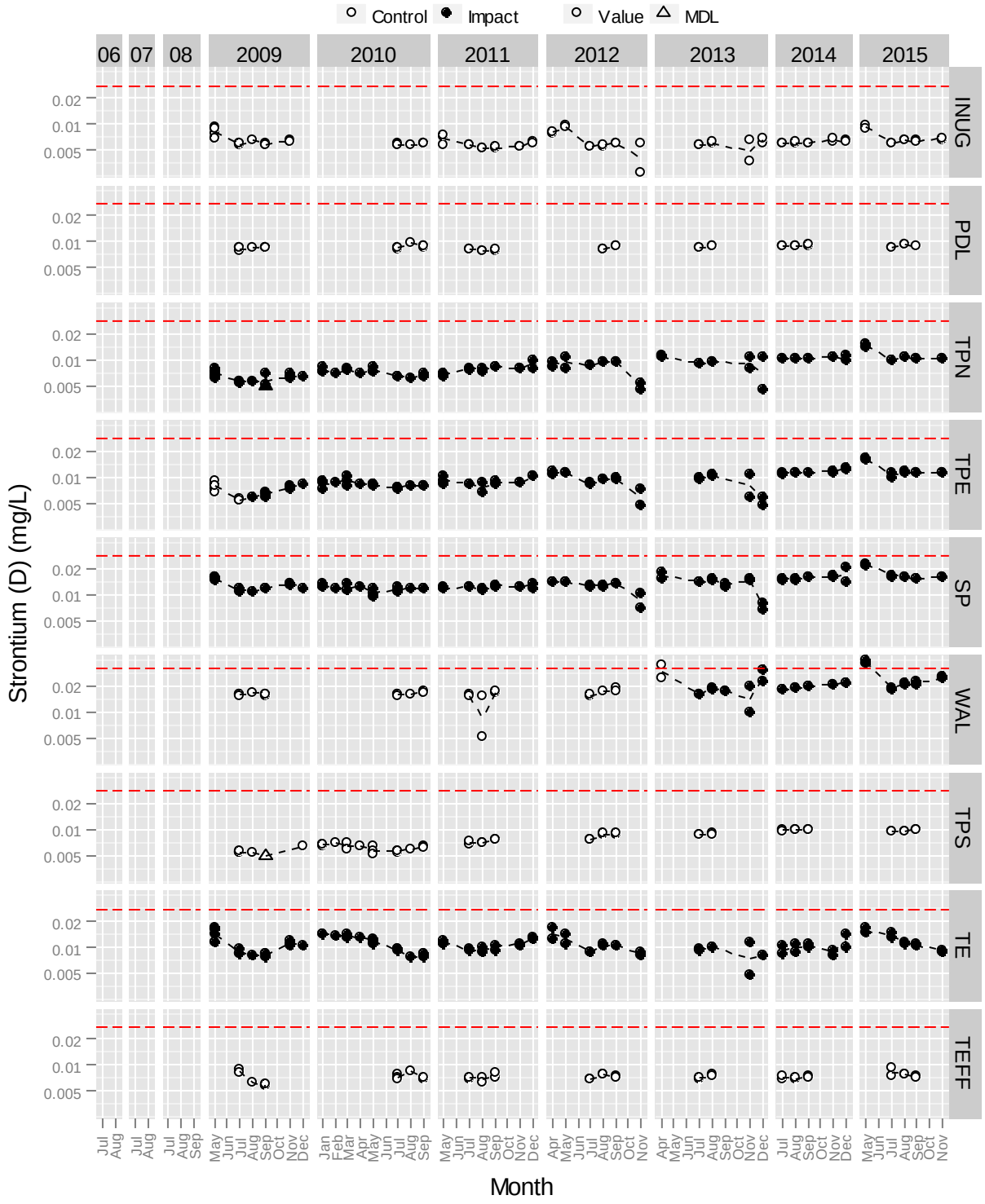
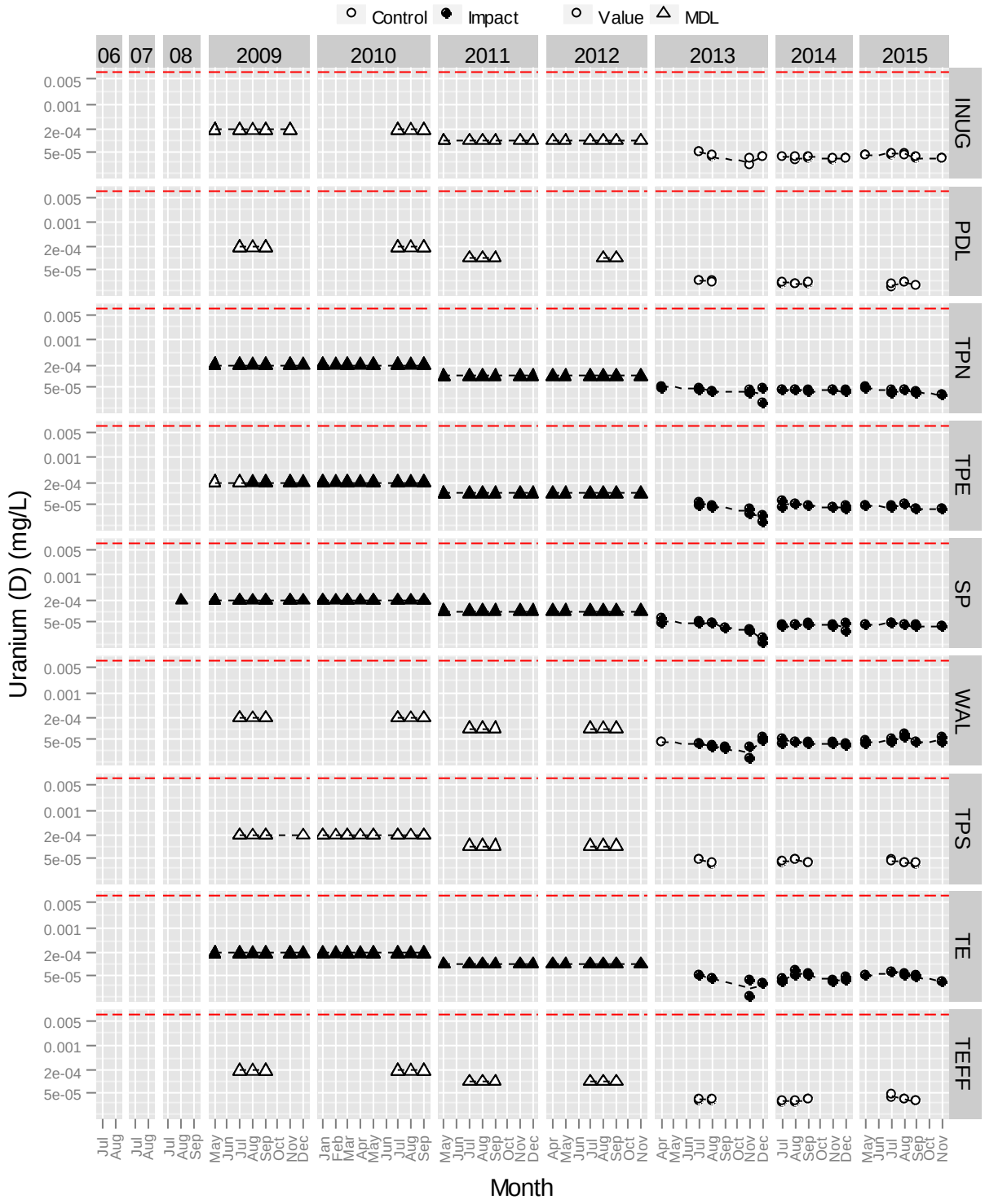


Figure 3.2–48. Dissolved Uranium (mg/L) in water samples from Meadowbank study lakes since 2006.



3.2.3. Sediment Chemistry

3.2.3.1. General Observations

Natural sedimentation rates are considered low, due to the headwater nature of the watersheds and the lack of any substantial riverine or tributary inflow. Thus, very little sediment is carried into the lakes besides what may drain off of the nearby tundra, or is deposited as dust in rain and snowfall. There are, however, a number of mine-site activities that can generate dust and potentially increase the net deposition into project lakes.

Based on historical bulk sampling of sediment using grab samples, we have observed reasonably large, within-basin or within-lake differences in surface sediment (i.e., top 3 – 5 cm) concentrations for a variety of metals, indicative of natural spatial heterogeneity driven by localized mineralization. There are a number of processes that can affect the pattern of metals distribution to sediments, including differential deposition of different grain size materials according to wind direction and speed, water depth, water currents, basin morphometry, bioturbation (i.e., vertical mixing of sediment by burrowing insect larvae) and patchy, heterogeneous distribution of metals in mineralized areas. Grain size has a very large influence on metals concentrations – all else equal, the more coarse the grain size (i.e., sandier), the lower the metals concentrations. As such, our sediment programs target low energy, depositional areas that are dominated by silt/clay sediment in areas of similar depth (6 – 10 m), where grain size tends to be finer and more consistent.

Sediment chemistry samples have been collected using grab samplers (targeting top 3 - 5 cm) or coring devices (targeting top 1.5 cm). Grab samples are used every year to characterize the chemical and physical conditions of sediments paired with the benthic invertebrate community samples. While grab samples can provide insights into temporal changes in sediment chemistry, core samples are a more sensitive tool and are used in the CREMP to formally test for changes in sediment chemistry related to mining. Core samples are collected every three years, and now match the timing of environmental effects monitoring studies required under the *Metal Mining Effluent Regulations*. Below is an overview of the various sediment coring programs at Meadowbank dating back to baseline sampling in 2008:

- 2008 – Baseline coring was conducted in July 2008 prior to onset of East Dike construction to characterize baseline surface metals concentrations at all monitoring areas.
- 2009 – The 2009 coring program was implemented to monitor potential changes to surface sediment chemistry that may have occurred as a result of the East Dike sedimentation event in August 2008. The 2009 study was conducted only at SP, TE, TPE, and INUG. TPE and INUG were used as the reference areas for SP and TE.
- 2012 – The 2012 program covered all Meadowbank study lakes sampling areas as well as reference areas.
- 2014 – The 2014 program covered all Meadowbank study lakes sampling areas and reference areas. Note that the 2014 program was advanced a year ahead to align with EEM program). Additional sampling was completed at TPE in 2014 to help assess whether the apparent changes in sediment chromium concentrations were related to spatially biased sampling or were a real temporal trend. Two zones in TPE were targeted for coring: the zone sampled initially in 2008 and 2009 (prior to dike construction; TPE-B) and the zone sampled in 2010 (TPE). Results from this analysis helped inform the design of the targeted chromium bioavailability study conducted at TPE in 2015.

Sediment sampling in 2015 was limited to grab sampling at the Meadowbank study lakes, synoptic with the benthic invertebrate community sampling location (**Figure 1.3–2**). Additional sediment samples were collected from all 5 replicates at INUG, PDL, TPE, and TPE-B for toxicity testing (*C. dilutus* and *H. azteca*) and sequential extraction tests (see **Section 2.3** for details of the study design). The chemistry results from grab samples collected in 2015 are discussed below in context with temporal and spatial trends document in the 2014 CREMP report. Results and from the chromium bioavailability study are discussed separately in **Section 3.2.3.3**.

3.2.3.2. Temporal and Spatial Trend Interpretation

The 2015 sediment grab chemistry data are screened against site-specific triggers/thresholds in **Table 3.2–9** (metals, particle size, TOC) and **Table 3.2–10** (hydrocarbons and PAHs). The concentrations of some key metals at TPE and TPE-B is shown in **Figure 3.2–50**.

To help with interpretation of long-term temporal and spatial trends, concentrations of individual metals have been plotted in **Figure 3.2–51** to **Figure 3.2–58**. Metals concentrations are shown by area/basin for the different sampling methods (grab [data points] vs core samples [box and whisker plots]). The red dashed line in each of sediment metals figures is the trigger value specific to the parameter and area (i.e., Meadowbank lakes, and Baker Lake each have their own trigger values). The box and whisker plots illustrate the statistical distribution of core samples within each area. Data interpretation for the box and whisker plots is as follows:

- The horizontal line inside the box represents the median concentration
- The upper and lower margins of the box represent the upper (75^{th}) and lower (25^{th}) percentile concentrations, respectively (the "interquartile" range)
- The vertical lines represent maximum and/or minimum concentrations (provided at least one value falls outside the box but within 1.5 times the interquartile range)
- 'x's that occur beyond the maximum or minimum lines represent concentrations that are greater than 1.5 times the interquartile distance and indicate 'outlier' concentrations that are real, but don't fit within the distribution of the rest of the data, for whatever reason.

Below is a summary of the trigger exceedances by exposure area for the 2015 grab samples (i.e., based on visual observations only; formal statistical testing of triggers is limited to core samples only):

- **Third Portage Lake** – Chromium was the only metal that exceeded the trigger values in 2015. The trigger values was exceeded in all 5 replicate samples at TPE, 3 samples from TPE-B, 2 samples from TPN, and 1 sample from TPS (**Table 3.2–9**). The additional grab samples collected at TPE-B for the targeted chromium bioavailability study provided an opportunity to test for statistical differences between the two zones in TPE (i.e., TPE and TPE-B). There were statistically significant differences in the chromium concentrations at TPE and TPE-B in 2015, a spatial trend that was not observed in the formal data analysis of last year's results (Azimuth, 2015b). Mean chromium at TPE-B was 115 mg/kg (106 to 124 mg/kg) compared to TPE where the average concentration was 148 mg/kg (124 to 200 mg/kg). By comparison, chromium concentrations at PDL averaged 135 mg/kg (range = 117 – 160 mg/kg). Temporally, the concentrations at TPE in 2015 are within the range for grab and core samples collected in 2014 **Figure 3.2–54**. A more thorough analysis of the targeted chromium bioavailability study results at TPE is presented in **Section 3.2.3.3**.
- **Wally Lake** – Cadmium (n=1), copper (n=5), lead (n=3), and zinc (n=2) exceeded the trigger values in 2015. Two samples exceeded the threshold for lead (i.e., CCME ISQG) of 35 mg/kg.

Based on visual evidence presented in the figures, no temporal trends of increasing concentrations were observed for these metals in Wally Lake.

- **Second Portage Lake** – One sample had an exceedance of the trigger value for zinc.

Formal statistical testing of the sediment core chemistry results against triggers/threshold was last completed as part of the 2014 CREMP report (Azimuth, 2015b). With the exception of chromium at TPE, there were no anomalous temporal/spatial patterns observed in 2014 for any sediment contaminants. A change in chromium was first noticed in TPE in 2009 when coring results showed an "increase" in concentrations despite samples being collected in July prior to the onset of Bay-Goose Dike construction (which started early August 2009; **Figure 3.2–54**). Those results highlighted spatial heterogeneity in chromium concentrations within TPE, which led to additional spatial mapping and statistical analyses as part of the 2013 CREMP report (Azimuth, 2014) to discern the dominant nature of the changes (i.e., spatial or temporal). Results from this endeavor were inconclusive, so the coring program at TPE in 2014 was expanded to provide clarity on the spatial vs temporal trend in chromium concentrations. Ten replicate samples were collected in two "zones" at TPE (i.e., the area sampled in 2008 and 2009 [called TPE-B] and the zone sampled in 2010 to 2013 [TPE]). Statistical analysis of the chromium concentrations presented in the 2014 CREMP report showed the observed trend in sediment chromium concentrations is temporal rather than spatial (i.e., no difference between TPE and TPE-B in 2014 sediment core chemistry). A review of the main potential sources of chromium to TPE was completed in last year's report, and Bay-Goose Dike construction material (i.e., ultramafic rock containing chromium) was considered the probable source of on-going chromium loading to sediments at TPE (Azimuth, 2015b).

The 2015 grab chemistry results, as presented above, did show a spatial pattern of chromium concentrations, with TPE being higher than TPE-B. The ecological significance of the elevated chromium was explored in the targeted metals bioavailability study (see next section).

3.2.3.3. Sediment Metals Bioavailability

This section presents results of the targeted metals bioavailability study conducted at TPE in 2015. The program was implemented to determine the ecological significance of elevated sediment chromium concentrations at TPE. This targeted bioavailability study is considered complementary to the existing CREMP. Overall, chromium bioavailability was assessed through a combination of toxicological (toxicity tests), chemical (bulk sediment chemistry [**Section 3.2.3.2**] and sequential extractions) and biological (benthic invertebrate community field survey [**Section 3.2.5**]) endpoints using a weight-of-evidence approach.

Toxicity Test Results

The full laboratory report for the 14-day *Hyalella* test and the 10-day *Chironomus* test is provided in **Appendix G**.

- *Point of Comparison* – While laboratory control results were used as a point of comparison to estimate effect sizes, decisions regarding the presence/absence of toxicity were ultimately made using control-impact comparisons (i.e., comparing the results of TPE and TPE-B to the results of INUG and PDL relative to the critical effect size discussed below). While laboratory controls are a necessary component of toxicity tests, the sediment used can be quite different from those found at a particular site. Consequently, reference sediments (field controls) are considered a more appropriate point of comparison (i.e., as they reduce potential differences related to physical differences in sediments).

- *Critical Effect Size* – A change of 20% in an endpoint in exposure treatments (TPE and TPE-B) relative to the field reference areas (INUG and PDL) was used to define an 'adverse effect' effect on the endpoint being measured (growth or survival). This value is commonly used to assess risks of contaminated sediment to aquatic organisms (e.g., Science Advisory Board, 2008). Effect size estimates were made for both INUG and PDL in cases where there were differences between the field controls. Given the use of two reference areas, an exposure treatment would need to be 20% lower than both field controls to be considered an adverse effect.

Survival and growth results from the 14-day *Hyalella* test are shown in **Figure 3.2–61**. Mean *Hyalella* survival in the reference treatments was 90% at INUG and 96% at PDL. Mean survival in the TPE and TPE-B exposure sediments were highly variable due to one replicate in each treatment where no organisms were enumerated at the end of the 14-day test. These results were considered anomalous for the following reasons:

1. Survival in the other four replicates in each treatment was generally good (between 70 and 100% at TPE-B and between 60 and 100% at TPE).
2. Given the high magnitude of response in the anomalous replicates, Maxxam's results were scrutinized for evidence corroborating the 0% survival results (e.g., for reported observations of stressed behavior or visual confirmation of dead organisms), but none was found. Maxxam was contacted regarding the possibility that those replicates were inadvertently not seeded with organisms at the onset of the tests; they replied that QA measures were in place to avoid seeding issues and added that it is not uncommon for corpses to decompose during a test.
3. Final ammonia concentrations were compared to the LC50 for ammonia toxicity to *Hyalella* reported by Ankley et al. (1995). Total ammonia concentrations were similar among the treatments and ranged between 3.4 mg/L (PDL) and 4.9 mg/L (INUG) at the end of the 14-day test; concentrations that are well below the LC50 of between ~40 mg/L (pH 7.5) and 64 mg/L (8.5) for moderately hard water (100 mg $CaCO_3$/mL) similar to the conditions reported by Maxxam. Thus, the anomalous results are unlikely due to elevated ammonia concentrations.
4. *Hyalella* growth (mean dw/organism) in the exposure treatments (based on surviving organisms only) was within the range reported for field controls PDL and INUG (**Table 3.2–11**). While TPE showed slightly lower growth (-23%) relative to PDL, the other three combinations of exposure and control areas all showed higher growth (8 to 56%) at TPE and TPE-B. Overall, the observed results suggest that there are no exposure-related constraints to amphipod growth (**Table 3.2–11**).
5. The lack of correlation between bulk chromium concentrations (the only metal that exceeded the trigger) and both survival and growth endpoints further supports the conclusion that the cause of 100% mortality in TPE-B rep 1 and TPE rep 3 is likely unrelated to chromium (**Figure 3.2–61**).

Based on the strength of the information presented above, the two replicates in question were treated as outliers. Excluding the two replicates where 100% *Hyalella* mortality was observed, average survival at TPE and TPE-B was greater than 80% in both treatments (**Figure 3.2–60**).

Survival and growth results for the 10-day *Chironomus* sediment toxicity test are plotted in **Figure 3.2–62**. Survival and growth were similar among the control treatments (laboratory and field) and exposure areas.

Sequential Extraction Results

As a complement to the sediment toxicity testing, sequential extraction analysis was conducted on the same sediment from TPE, TPE-B, INUG and PDL used in the toxicity tests. This geochemical analysis was used to determine in what form metals that are present in the sediment matrix are found. Raw data can be found in **Appendix H**.

As described in **Section 2.3.3.2**, sequential extraction analysis partitions the trace elements within each sample into four operationally-defined fractions that have been related to the bioavailability and mobility of elements. The proportion of total chromium associated with each fraction per sample is presented in **Table 3.2–12** and shown in **Figure 3.2–63.** As mentioned in the methods section, the 'residual' fraction shown for TPE, TPE-B, INUG, and PDL was estimated by subtracting the sum of the other 3 fractions from the average sediment concentration for the five replicates per area (**Table 3.2–9**). For comparison, the ISQG guideline and the trigger value are shown in **Figure 3.2–63**. It is clear from this plot that most of the chromium is found in the 'residual' fraction, which is less mobile and bioavailable than chromium associated with carbonates, iron and manganese hydroxides, and organic material. Importantly, the sum concentration of chromium from the more bioavailable fractions is well below the ISQG, indicating that even under conservative estimates where chromium partitions entirely from all three fractions, the risk of exposure above the effect-based guideline is unlikely.

Benthic Invertebrates

Benthic invertebrate results are described in detail in **Section 3.2.5**. In short, CREMP monitoring has identified no apparent adverse effects to the benthic invertebrate community in TPE related to this issue.

Weight-of-Evidence Assessment

Results from the target chromium bioavailability study provide evidence of low bioavailability, and hence toxicity, of the elevated sediment chromium concentrations at TPE/TPE-B to freshwater aquatic invertebrates. The primary lines of evidence supporting this conclusion are:

- *Toxicity* – no exposure-related toxicity was observed for the chironomid test. While less clear results were obtained in the amphipod test, available information also suggested no exposure-related toxicity. Given the dominance of chironomids (and the absence of amphipods) in the benthic invertebrate community in the Meadowbank project lakes, a greater weight is placed on those results.
- *Chemistry* – sediment chromium concentrations have increased in TPE, likely because of the use of ultramafic rock containing chromium for dike construction. It is important to note that chromium concentrations are naturally elevated (i.e., above CCME ISQG of 37.3 mg/kg dw) in most of the Meadowbank study lakes, highlighting the importance of local geology on sediment quality. The sequential extraction results showed that most chromium is sequestered within the residual fraction (i.e., low bioavailability).
- *Biology* – no adverse effects to the TPE benthic invertebrate community have been identified related to this issue.

3.2.3.4. Summary

No anomalous temporal/spatial patterns in the sediment grab chemistry results were observed in 2015 relative to recent years. Chromium concentrations at TPE, while exceeding the trigger, appear to have stabilized relative to the recent increasing temporal trend. Results of the target chromium bioavailability study conducted in 2015 to determine the ecological significance of the changes in chromium

concentrations in TPE confirmed low bioavailability. While the TPE chromium trend will continue to be closely monitored, no further targeted studies are recommended for 2016.

Table 3.2–9. Conventional sediment grab chemistry, particle size, and total metals (mg/kg), Meadowbank study lakes, 2015.

Lake & Basin	Screening Criteria			Third Portage Lake															
				East Basin										North Basin					
Area-Replicate ID	CCME[1]	Meadowbank[2]		TPE-1	TPE-2	TPE-3	TPE-4	TPE-5	TPE-B-1	TPE-B-2	TPE-B-3	TPE-B-4	TPE-B-5	TPN-1	TPN-2	TPN-3	TPN-4	TPN-5	
Date	ISQG	Trigger	Threshold	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	
Physical & Organic Parameters																			
Moisture (%)				85.7	81.5	87.5	87.8	87.5	88.4	86.9	90.5	86.5	86.3	81.0	83.2	85.0	84.3	85.9	
pH				5.80	5.84	6.19	5.96	6.04	6.98	6.68	5.68	5.5	6.13	6.05	6.21	6.28	6.03	5.91	
Total Organic Carbon (% dw)				3.81	2.66	3.69	3.74	3.62	3.61	3.26	6.81	3.39	3.64	3.41	3.54	5.15	3.43	4.05	
Particle Size																			
% Gravel (>2mm)				*<0.10*	1.31	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	0.31	*<0.10*	
% Sand (2.00mm - 0.063mm)				2.87	10.4	2.21	2.22	2.25	1.16	0.72	0.68	1.33	1.05	35.7	21.0	14.8	27.5	13.0	
% Silt (0.063mm - 4µm)				73.8	61.2	71.0	71.1	70.2	69.2	71.1	78.9	71.2	69.9	51.3	63.4	69.6	56.8	71.4	
% Clay (<4µm)				23.3	27.1	26.8	26.7	27.6	29.6	28.2	20.4	27.5	29.1	13.0	15.6	15.6	15.5	15.6	
Total Metals (mg/kg dw)																			
Aluminum				27100	28000	25300	24800	24300	23500	24300	20100	23300	23800	14300	17200	17700	15700	18900	
Antimony				0.26	0.22	0.24	0.26	0.25	0.23	0.24	0.17	0.25	0.25	0.29	0.23	0.31	0.20	0.27	
Arsenic*	5.9	120.0		24.9	15.8	17.6	19.5	18.2	14.3	13.9	7.9	17.9	16.9	13.8	8.91	20.6	19.2	23.2	
Barium				117	128	119	127	130	140	145	106	115	113	57.1	72.5	80.1	62.5	81.7	
Beryllium				1.77	2.01	1.81	1.87	1.83	1.69	1.82	1.3	1.67	1.74	0.84	1.01	1.13	0.92	1.17	
Bismuth				2.28	2.64	2.28	2.29	2.35	2.14	2.31	1.43	2.13	2.28	0.87	1.09	1.17	0.92	1.38	
Cadmium*	0.6	1.10		0.175	0.136	0.196	0.383	0.382	0.289	0.305	0.332	0.175	0.149	0.143	0.155	0.195	0.081	0.269	
Calcium				2420	2220	2610	2660	2450	2290	2300	2700	2330	2510	1630	1750	1930	1540	1650	
Chromium*	37.3	114.3		**200**	**126**	**139**	**151**	**124**	**116**	109	106	**120**	**124**	103	109	**117**	103	**120**	
Cobalt				18.5	14.1	16.3	17.4	16.5	16.3	16.7	8.27	14.8	16.3	9.80	9.22	13.1	10.8	12.4	
Copper*	35.7	126.0		57.2	55.6	50.7	49.1	51.6	46.2	47.9	44	46.8	47.9	42.2	47.8	57.1	40.1	60.7	
Iron				50800	41800	45100	48200	46600	41800	43100	22100	44900	43800	27500	22000	38500	35100	36500	
Lead	35	32.5	35	21.1	22.3	20.4	20.9	21.0	19.5	20.5	14.9	19.2	20.3	14.1	15.9	16.9	13.2	17.7	
Lithium				48.3	58.7	46.4	47.1	46.8	43.4	46.2	37.8	42.3	45.3	22.0	25.8	25.3	26.1	27.5	
Magnesium				12900	11400	10700	11000	10100	9720	9730	8750	9760	10200	6780	7490	7410	7050	8400	
Manganese				1610	953	1650	2950	2710	4760	4920	269	3890	1640	414	276	738	580	458	
Mercury	0.17	0.104	0.17	0.0238	0.0163	0.0197	0.0188	0.0203	0.0211	0.0195	0.0279	0.0204	0.019	0.0166	0.017	0.0265	0.0147	0.019	
Molybdenum				4.03	4.06	3.81	4.22	4.30	3.77	3.96	1.64	3.83	3.87	2.37	1.89	3.75	2.94	4.31	
Nickel				92.1	70.6	77.4	114	105	90.2	100	63.4	69.4	69.1	52.6	58.4	68.1	55.4	67.9	
Phosphorus				538	408	416	424	421	385	387	370	394	398	467	510	745	538	697	
Potassium				4670	5230	4540	4390	4480	4460	4600	3680	4320	4370	2130	2580	2660	2420	2900	
Selenium				0.68	0.39	0.82	0.86	0.85	0.61	0.61	0.69	0.74	0.73	0.45	0.45	0.74	0.39	0.73	
Silver				0.16	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	0.33	*<0.10*	*<0.10*	0.13	0.15	0.22	*<0.10*	0.19	
Sodium				363	417	443	383	375	349	375	443	382	363	217	223	253	225	276	
Strontium				19.2	20.0	19.5	20.8	19.8	19.4	20.1	19	18.7	19.5	14.4	15.4	15.9	14.4	16.0	
Thallium				0.372	0.415	0.387	0.443	0.459	0.404	0.436	0.279	0.348	0.364	0.161	0.196	0.212	0.185	0.244	
Tin				*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	
Titanium				867	1050	867	842	822	815	838	687	803	795	443	493	470	482	555	
Uranium				15.9	19.4	16.0	15.8	16.1	15.3	16.6	13.4	15.1	15.8	10.6	13.4	15.7	11.6	18.6	
Vanadium				49.2	48.1	44.1	43.3	41.7	40.7	40.9	32	40.6	41.9	27.2	31.8	32.4	28.9	34.1	
Zinc*	123	121.3		109	117	107	109	110	105	109	88	99.3	103	66.9	76.2	80.8	69.9	83.2	

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999, updated in 2002. ISQG = Interim freshwater Sediment Quality Guideline.

[2] Trigger and threshold values were developed in the *CREMP Design Document 2012* (Azimuth, 2012d). Thresholds are set equal to CCME ISQG guidelines, where available.

* CCME guideline not used as threshold value because threshold value would be lower than trigger value.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.2–9. Conventional sediment grab chemistry, particle size, and total metals (mg/kg), Meadowbank study lakes, 2015.

Lake & Basin	Screening Criteria			Third Portage Lake South Basin					Second Portage Lake					Tehek Lake				
Area-Replicate ID	CCME[1]	Meadowbank[2]		TPS-1	TPS-2	TPS-3	TPS-4	TPS-5	SP-1	SP-2	SP-3	SP-4	SP-5	TE-1	TE-2	TE-3	TE-4	TE-5
Date	ISQG	Trigger	Threshold	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	13-Aug-15	13-Aug-15	13-Aug-15	13-Aug-15	13-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15
Physical & Organic Parameters																		
Moisture (%)				84.2	86.7	84.9	84.3	83.0	86.2	86.0	86.2	84.6	77.8	73.9	81.4	83.5	84.4	84.0
pH				5.96	6.14	5.83	5.72	5.58	6.33	6.69	6.60	6.57	6.35	5.55	6.25	6.22	5.91	6.33
Total Organic Carbon (% dw)				3.96	5.23	4.06	3.90	3.24	4.33	4.37	4.70	4.22	2.66	1.93	2.69	3.05	3.36	3.48
Particle Size																		
% Gravel (>2mm)				*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
% Sand (2.00mm - 0.063mm)				15.5	1.87	11.1	5.59	10.4	2.71	2.48	2.27	1.69	4.89	32.6	12.2	7.99	3.73	4.22
% Silt (0.063mm - 4µm)				67.4	79.1	68.3	70.3	67.2	78.5	77.2	77.1	77.9	62.7	51.0	69.8	74.9	76.1	78.5
% Clay (<4µm)				17.0	19.0	20.6	24.1	22.3	18.8	20.3	20.6	20.4	32.4	16.4	18.0	17.1	20.2	17.3
Total Metals (mg/kg dw)																		
Aluminum				20400	18700	20700	24100	22200	21700	23100	22800	23100	31100	17500	21400	22800	20800	21600
Antimony				0.22	0.31	0.23	0.25	0.19	0.27	0.28	0.32	0.30	0.22	0.14	0.21	0.21	0.18	0.21
Arsenic*	5.9	120.0		14.2	63.2	19.0	20.0	18.4	35.3	30.0	34.2	32.7	25.3	9.29	23.0	15.8	54.4	37.0
Barium				91.7	120	88.4	102	103	138	130	117	144	142	90.1	110	117	128	123
Beryllium				1.22	1.26	1.29	1.49	1.28	1.73	1.73	1.73	1.81	2.26	1.54	1.91	2.08	1.90	2.16
Bismuth				1.39	1.56	1.49	1.86	1.55	1.96	2.00	2.01	2.07	2.73	1.83	1.90	2.05	1.77	1.95
Cadmium*	0.6	1.10		0.196	0.687	0.172	0.159	0.312	0.372	0.279	0.236	0.315	0.121	0.119	0.213	0.196	0.356	0.235
Calcium				1790	1920	1730	1730	1720	2610	2490	2550	2440	2430	1820	2280	2390	2090	2240
Chromium*	37.3	114.3		102	99.5	106	**117**	111	87.2	97.7	92.3	89.4	92.3	45.7	55.8	56.6	52.3	55.6
Cobalt				14.1	33.8	14.8	20.0	18.7	18.1	17.1	15.9	17.9	15.5	7.37	11.6	11.5	12.5	12.1
Copper*	35.7	126.0		51.7	63.4	55.8	69.1	53.3	68.5	67.9	66.5	68.0	76.9	41.3	52.4	54.6	55.6	57.1
Iron				32400	85600	33900	37700	35800	85200	62600	64200	78600	54400	33300	72500	57000	101000	86000
Lead	35	32.5	35	19.6	23.5	20.2	22.0	21.3	20.2	20.4	20.4	20.8	23.8	17.6	19.0	20.7	18.5	19.8
Lithium				30.0	26.3	33.0	34.9	34.7	38.5	38.7	37.9	39.8	67.3	34.8	44.4	47.1	43.6	52.7
Magnesium				8760	7790	8890	9430	9530	8700	9330	8820	8950	11500	6640	7940	7810	7310	7580
Manganese				543	3270	589	797	646	4800	3300	2370	3770	1480	465	2170	2670	2480	2640
Mercury	0.17	0.104	0.17	0.0216	0.0349	0.0207	0.0215	0.0186	0.0491	0.0436	0.0468	0.0419	0.0296	0.0167	0.0209	0.0255	0.0258	0.0261
Molybdenum				2.60	6.59	3.54	4.56	2.30	7.05	5.91	6.74	7.24	6.66	2.80	10.4	6.68	14.2	11.9
Nickel				68.5	115	70.0	72.0	85.7	77.8	72.6	62.2	74.5	66.3	30.5	41.8	41.1	54.0	46.6
Phosphorus				616	1270	571	484	647	596	608	608	593	460	640	654	557	1150	774
Potassium				3470	3310	3570	3840	3690	4070	4380	4200	4230	5560	3360	4480	4480	4090	4280
Selenium				0.52	1.06	0.57	0.70	0.45	0.80	0.71	0.70	0.79	0.30	0.36	0.62	0.71	0.71	0.70
Silver				0.15	0.23	0.16	0.15	0.15	0.21	0.19	0.21	0.18	*<0.10*	0.11	0.12	0.15	0.14	0.15
Sodium				300	318	285	315	309	368	320	318	326	270	204	357	381	333	340
Strontium				16.1	16.9	16.4	17.7	16.0	23.1	21.2	20.6	20.6	22.9	15.1	20.6	21.2	18.8	19.2
Thallium				0.263	0.390	0.277	0.316	0.315	0.339	0.340	0.320	0.343	0.405	0.283	0.344	0.382	0.362	0.363
Tin				*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	2.2	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium				693	552	686	679	718	634	757	718	723	1050	801	917	921	825	856
Uranium				15.9	18.0	16.7	21.4	16.8	16.3	16.4	16.0	16.8	23.8	17.9	17.7	19.8	17.4	19.6
Vanadium				36.7	34.6	37.4	43.1	36.4	36.5	39.4	38.0	39.4	48.9	28.3	34.5	35.7	33.3	35.3
Zinc*	123	121.3		88.8	105	91.0	98.5	101	109	110	108	116	**142**	76.3	96.3	99.9	105	102

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999, updated in 2002. ISQG = Interim freshwater Sediment Quality Guideline.

[2] Trigger and threshold values were developed in the *CREMP Design Document 2012* (Azimuth, 2012d). Thresholds are set equal to CCME ISQG guidelines, where available.

* CCME guideline not used as threshold value because threshold value would be lower than trigger value.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.2–9. Conventional sediment grab chemistry, particle size, and total metals (mg/kg), Meadowbank study lakes, 2015.

Lake & Basin	Screening Criteria			Tehek Far-field					Wally Lake					Inuggugayualik Lake				
Area-Replicate ID	CCME[1]	Meadowbank[2]		TEFF-1	TEFF-2	TEFF-3	TEFF-4	TEFF-5	WAL-1	WAL-2	WAL-3	WAL-4	WAL-5	INUG-1	INUG-2	INUG-3	INUG-4	INUG-5
Date	ISQG	Trigger	Threshold	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	19-Aug-15	19-Aug-15	19-Aug-15	19-Aug-15	19-Aug-15	27-Aug-15	27-Aug-15	27-Aug-15	27-Aug-15	27-Aug-15
Physical & Organic Parameters																		
Moisture (%)				86.5	87.1	87.3	85.9	85.7	90.2	91.6	88.1	89.2	90.5	81.9	84.7	84.9	86.0	83.9
pH				6.39	5.87	6.41	6.69	5.78	6.58	6.38	6.82	6.76	6.92	5.95	6.10	5.84	5.73	5.72
Total Organic Carbon (% dw)				3.98	3.81	4.05	3.64	3.61	7.92	11.6	7.48	9.01	10.1	3.81	4.36	4.94	4.86	3.81
Particle Size																		
% Gravel (>2mm)				*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
% Sand (2.00mm - 0.063mm)				2.36	1.89	4.17	4.16	3.31	5.66	1.30	1.89	0.87	1.29	5.59	6.26	3.49	2.65	3.05
% Silt (0.063mm - 4µm)				75.2	72.8	70.9	71.7	72.1	82.3	91.4	85.6	88.0	92.4	84.7	80.3	82.0	83.4	80.3
% Clay (<4µm)				22.4	25.3	24.9	24.2	24.6	12.0	7.32	12.5	11.2	6.36	9.76	13.5	14.5	13.9	16.7
Total Metals (mg/kg dw)																		
Aluminum				19200	24100	23800	23100	23200	20100	17200	24300	22400	18900	19300	20900	20400	20100	18300
Antimony				0.21	0.19	0.19	0.18	0.17	0.44	0.40	0.59	0.44	0.48	0.19	0.18	0.20	0.23	0.18
Arsenic*	5.9	120.0		15.9	12.5	11.4	12.2	18.9	19.6	44.1	21.8	63.8	62.2	**121**	11.4	17.1	61.9	**135**
Barium				117	119	128	118	123	123	101	161	128	112	109	126	128	132	109
Beryllium				1.89	2.36	1.92	1.99	2.06	1.59	1.36	1.83	1.78	1.54	1.29	1.39	1.43	1.41	1.22
Bismuth				1.65	1.93	1.85	1.87	1.85	1.98	1.64	2.55	2.23	1.86	1.14	1.21	1.25	1.22	1.07
Cadmium*	0.6	1.10		0.290	0.154	0.210	0.164	0.166	0.543	0.419	**1.16**	0.452	0.412	0.149	0.228	0.290	0.296	0.155
Calcium				1750	2250	2150	2200	2210	4330	4320	4040	4750	5310	1900	2280	2150	2110	1730
Chromium*	37.3	114.3		50.5	60.9	57.6	55.4	57.6	60.0	53.0	71.6	65.5	54.8	99.2	110	107	105	95.3
Cobalt				13.5	13.9	12.9	13.8	13.0	8.87	8.62	11.1	10.9	9.67	12.0	10.8	11.1	13.0	14.3
Copper*	35.7	126.0		48.9	56.8	53.0	53.8	53.1	**142**	**134**	**182**	**153**	**129**	42.8	46.1	48.1	48.0	42.0
Iron				71800	45600	39800	44100	52000	27800	35300	30800	49200	45600	91900	37500	44900	70900	129000
Lead	35	32.5	35	19.2	21.1	21.2	20.9	20.2	**34.1**	30.0	**42.9**	**35.6**	32.2	12.7	14.3	15.7	15.5	12.1
Lithium				52.5	68.6	51.4	51.1	54.3	37.6	28.6	41.9	36.9	32.8	26.3	29.4	28.4	28.2	25.0
Magnesium				6650	8320	7630	7970	7890	7650	6640	9130	8140	7200	8660	9450	9070	9120	8190
Manganese				3000	2270	2080	3230	2010	328	291	358	766	425	1060	712	660	1060	1440
Mercury	0.17	0.104	0.17	0.0227	0.0194	0.0204	0.0206	0.0202	0.0648	0.0812	0.0625	0.077	0.0841	0.0279	0.0318	0.040	0.0425	0.0273
Molybdenum				8.01	5.50	4.44	4.93	6.34	6.04	9.03	7.26	11.8	10.8	6.76	3.26	3.88	4.86	13.0
Nickel				44.7	39.8	41.9	38.9	39.8	54.2	51.8	71.1	60.1	53.1	68.2	78.1	78.6	85.0	72.0
Phosphorus				571	475	519	491	596	679	833	560	887	949	2650	810	1080	1820	2010
Potassium				3660	4780	4700	4800	4750	3620	3050	4100	4170	3560	3340	3600	3450	3360	3050
Selenium				0.73	0.49	0.54	0.54	0.50	0.82	0.81	1.11	0.89	0.83	0.59	0.54	0.64	0.74	0.63
Silver				0.11	*<0.10*	*<0.10*	*<0.10*	*<0.10*	0.65	0.60	0.73	0.63	0.56	0.15	0.18	0.22	0.23	0.15
Sodium				372	422	420	366	378	332	313	309	384	450	231	314	343	320	225
Strontium				17.2	21.2	20.7	20.1	20.7	29.8	27.2	28.2	30.7	31.7	23.8	26.1	24.5	24.1	20.9
Thallium				0.375	0.412	0.426	0.426	0.405	0.312	0.264	0.397	0.336	0.302	0.193	0.210	0.205	0.213	0.192
Tin				*<2.0*	2.3	2.2	*<2.0*	2.2	*<2.0*	*<2.0*	*<2.0*	*<2.0*	2.0	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium				669	867	906	920	911	632	425	677	691	625	544	601	550	517	474
Uranium				21.3	25.1	23.3	23.5	22.3	16.1	14.0	23.0	16.9	14.9	14.1	15.7	16.7	16.5	14.4
Vanadium				31.4	39.3	37.5	37.6	37.6	30.5	27.3	36.9	35.8	31.0	33.6	37.3	36.5	35.3	32.0
Zinc*	123	121.3		98.5	110	105	104	104	107	111	**150**	**132**	120	81.6	86.2	91.1	90.8	81.8

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999, updated in 2002. ISQG = Interim freshwater Sediment Quality Guideline.

[2] Trigger and threshold values were developed in the *CREMP Design Document 2012* (Azimuth, 2012d). Thresholds are set equal to CCME ISQG guidelines, where available.

* CCME guideline not used as threshold value because threshold value would be lower than trigger value.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.2–9. Conventional sediment grab chemistry, particle size, and total metals (mg/kg), Meadowbank study lakes, 2015.

Lake & Basin	Screening Criteria			Pipedream Lake				
Area-Replicate ID	CCME[1]	Meadowbank[2]		PDL-1	PDL-2	PDL-3	PDL-4	PDL-5
Date	ISQG	Trigger	Threshold	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15
Physical & Organic Parameters								
Moisture (%)				85.6	79.0	79.0	80.5	78.2
pH				5.89	6.25	6.22	6.19	5.94
Total Organic Carbon (% dw)				5.05	2.51	2.35	2.72	2.51
Particle Size								
% Gravel (>2mm)				*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
% Sand (2.00mm - 0.063mm)				9.96	14.8	5.72	5.83	13.5
% Silt (0.063mm - 4µm)				78.1	75.3	75.1	77.3	79.0
% Clay (<4µm)				12.0	9.88	19.2	16.9	7.55
Total Metals (mg/kg dw)								
Aluminum				17400	19200	23600	22000	16700
Antimony				0.26	0.23	0.29	0.30	0.26
Arsenic*	5.9	120.0		12.0	12.9	53.4	38.8	60.3
Barium				98.6	95.8	109	99.1	81.6
Beryllium				0.94	1.01	1.24	1.20	0.83
Bismuth				0.77	0.89	1.17	1.10	0.73
Cadmium*	0.6	1.10		0.280	0.133	0.222	0.125	0.194
Calcium				2660	2470	2320	2390	2390
Chromium*	37.3	114.3		**121**	**131**	**160**	**149**	**117**
Cobalt				10.3	11.5	21.4	18.1	15.2
Copper*	35.7	126.0		45.1	43.1	63.2	54.1	36.6
Iron				26200	29900	50700	44300	50300
Lead	35	32.5	35	14.4	14.3	17.0	16.8	13.2
Lithium				27.2	29.0	35.3	33.0	24.9
Magnesium				9700	10500	12200	11600	9590
Manganese				265	338	2100	1160	675
Mercury	0.17	0.104	0.17	0.021	0.0135	0.0129	0.0162	0.0175
Molybdenum				1.82	2.21	4.31	3.26	4.95
Nickel				80.0	78.2	114	90.3	78.1
Phosphorus				517	508	582	519	598
Potassium				2670	2970	3560	3350	2550
Selenium				0.42	0.38	0.24	0.35	0.40
Silver				0.25	0.18	*<0.10*	*<0.10*	0.15
Sodium				282	192	216	223	197
Strontium				23.0	25.4	25.6	25.7	23.2
Thallium				0.174	0.181	0.230	0.211	0.171
Tin				*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium				530	617	617	597	584
Uranium				7.54	7.75	11.9	10.5	6.41
Vanadium				33.3	38.0	45.0	41.9	34.1
Zinc*	123	121.3		77.4	77.1	96.3	87.2	71.3

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999, updated in 2002. ISQG = Interim freshwater Sediment Quality Guideline.

[2] Trigger and threshold values were developed in the *CREMP Design Document 2012* (Azimuth, 2012d). Thresholds are set equal to CCME ISQG guidelines, where available.

* CCME guideline not used as threshold value because threshold value would be lower than trigger value.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.2–10. Hydrocarbon and PAH results for composite sediment grabs at Meadowbank study lakes, 2015.

Lake	CCME (2002) Guidelines[1]	Third Portage Lake			Second Portage	Tehek	Tehek Far-field	Inuggugayualik	Wally	Pipedream
Area ID		TPE	TPN	TPS	SP	TE	TEFF	INUG	WAL	PDL
Date	ISQG	30-Aug-15	14-Aug-15	14-Aug-15	13-Aug-15	28-Aug-15	28-Aug-15	27-Aug-15	19-Aug-15	26-Aug-15
Physical Parameters										
Moisture (%)		85.2	83.0	83.8	83.8	81.3	86.6	84.5	90.1	80.1
Aggregate Organics (mg/kg)										
Mineral Oil and Grease		*<1650*	*<1400*	*<1450*	2120	1700	4240	2300	*<2250*	1800
Hydrocarbons (mg/kg)										
EPH10-19		*<600*	*<560*	*<620*	*<620*	*<460*	*<660*	*<640*	*<940*	*<500*
EPH19-32		*<600*	*<560*	*<620*	*<620*	*<460*	*<660*	*<640*	*<940*	*<500*
LEPH		*<600*	*<560*	*<620*	*<620*	*<460*	*<660*	*<640*	*<940*	*<500*
HEPH		*<600*	*<560*	*<620*	*<620*	*<460*	*<660*	*<640*	*<940*	*<500*
Polycyclic Aromatic Hydrocarbons (mg/kg)										
Acenaphthene	0.00671	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Acenaphthylene	0.00587	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Anthracene	0.0469	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*
Benzo(a)anthracene	0.0317	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(a)pyrene	0.0319	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(b)fluoranthene		*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(b+j+k)fluoranthene		*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*
Benzo(g,h,i)perylene		*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(k)fluoranthene		*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Chrysene	0.0571	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Dibenz(a,h)anthracene	0.00622	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Fluoranthene	0.111	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Fluorene	0.0212	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Indeno(1,2,3-c,d)pyrene		*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
2-Methylnaphthalene	0.0202	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Naphthalene	0.0346	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.020*	*<0.010*
Phenanthrene	0.0419	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Pyrene	0.053	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
d10-Acenaphthene (%)		91.7	86.1	88.6	93.3	95.8	86.4	78.0	94.7	90.7
d12-Chrysene (%)		108.0	108.3	107.9	112.7	88.0	80.6	81.4	111.9	100.1
d8-Naphthalene (%)		89.9	84.2	86.6	89.7	92.4	82.8	75.2	93.4	88.5
d10-Phenanthrene (%)		96.7	95.7	98.0	101.1	94.0	85.6	87.0	103.6	100.1
B(a)P Total Potency Equivalent		*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*	*<0.020*
IACR (CCME)		*<0.15*	*<0.15*	*<0.15*	*<0.15*	*<0.15*	*<0.15*	*<0.15*	*<0.15*	*<0.15*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999, updated in 2002.
ISQG = Interim freshwater Sediment Quality Guideline

Bolded concentrations exceed the ISQG guideline.

Italicized numbers are below detection limits.

Table 3.2–11. Effect size results for survival and growth endpoints from the sediment toxicity tests in 2015.

Sample Area	Control	INUG	PDL	TPE	TPE-B
Collection Date		27-Aug-15	26-Aug-15	30-Aug-15	30-Aug-15
Sediment Characteristics[1]					
% Total Organic Carbon		4.37	3.03	3.50	4.14
% Gravel (>2mm)	<0.10	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm-0.063mm)	99	4.21	9.96	3.99	0.99
% Silt (0.063mm-4µm)	0.15	82.1	77.0	69.5	72.1
% Clay (<4µm)	0.55	13.7	13.1	26.3	27.0
Chromium (mg/kg dw)		103 ± 6	136 ± 18	148 ± 31	115 ± 7
14-d *Hyalella azteca* Survival and Growth Test					
Mean Survival (%) ± SD	*100 ± 0*	90 ± 7	96 ± 9	68 ± 41	66 ± 38
Effect Size [2]					
Laboratory Control		*-10%*	*-4%*	*-32%*	*-34%*
Field Control - INUG				*-24%*	*-27%*
Field Control - PDL				*-29%*	*-31%*
Mean Dry Weight (mg) ± SD	*0.16 ± 0.01*	0.09 ± 0.02	0.13 ± 0.02	0.10 ± 0.02	0.14 ± 0.03
Effect Size [2]					
Laboratory Control		*-44%*	*-19%*	*-38%*	*-13%*
Field Control - INUG				*11%*	*56%*
Field Control - PDL				*-23%*	*8%*
10-d *Chironomus dilutus* Survival and Growth Test					
Mean Survival (%) ± SD	*96 ± 9*	96 ± 5	96 ± 9	98 ± 4	88 ± 8
Effect Size [2,3]		*0%*	*0%*	*2.1%*	*-8.3%*
Mean Dry Weight (mg) ± SD	*1.27 ± 0.19*	1.74 ± 0.22	1.88 ± 0.11	1.52 ± 0.19	1.65 ± 0.22
Effect Size [2]					
Laboratory Control		*37%*	*48%*	*20%*	*30%*
Field Control - INUG				*-13%*	*-5%*
Field Control - PDL				*-19%*	*-12%*

Notes:

[1] Mean of 5 replicates per area. One standard deviation shown for the chromium concentrations at each area.

[2] Effect size calculated as (control-sample) / control.

[3] No difference in effect size when comparing the test locations relative to survival in the laboratory or field control groups.

Shaded cells — Effect size reduction > 20% compared to the field control groups.

Table 3.2–12. Results from the sequential extraction analysis of sediments used in the toxicity tests.

Sample Area	**TPE**	**TPE-B**	**INUG**	**PDL**
Collection date	30-Aug-15	30-Aug-15	27-Aug-15	26-Aug-15
Sediment attributes				
% Total Organic Carbon	4.37	3.03	3.50	4.14
% Gravel (>2mm)	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm-0.063mm)	4.21	9.96	3.99	0.99
% Silt (0.063mm-4µm)	82.1	77.0	69.5	72.1
% Clay (<4µm)	13.7	13.1	26.3	27.0
Chromium (mg/kg dw)	103 ± 6	136 ± 18	148 ± 31	115 ± 7
Fractions - Chromium (%)				
Carbonate-bound	1.1	2.0	0.9	1.3
Fe / Mn oxide-bound	2.4	3.1	1.5	2.4
Organic matter-bound / Sulphide-bound	7.7	10.8	6.9	11.4
Residual*	**88.8**	**84.1**	**90.7**	**84.9**

Notes:

Bolded numbers indicate in which fraction the largest proportion of each metal is found, for each sample.

*The residual fraction was estimated by subtracting the sum of the other 3 fractions from the total.

Figure 3.2–49. Sediment grain size composition in sediment samples from Meadowbank study lakes since 2008.

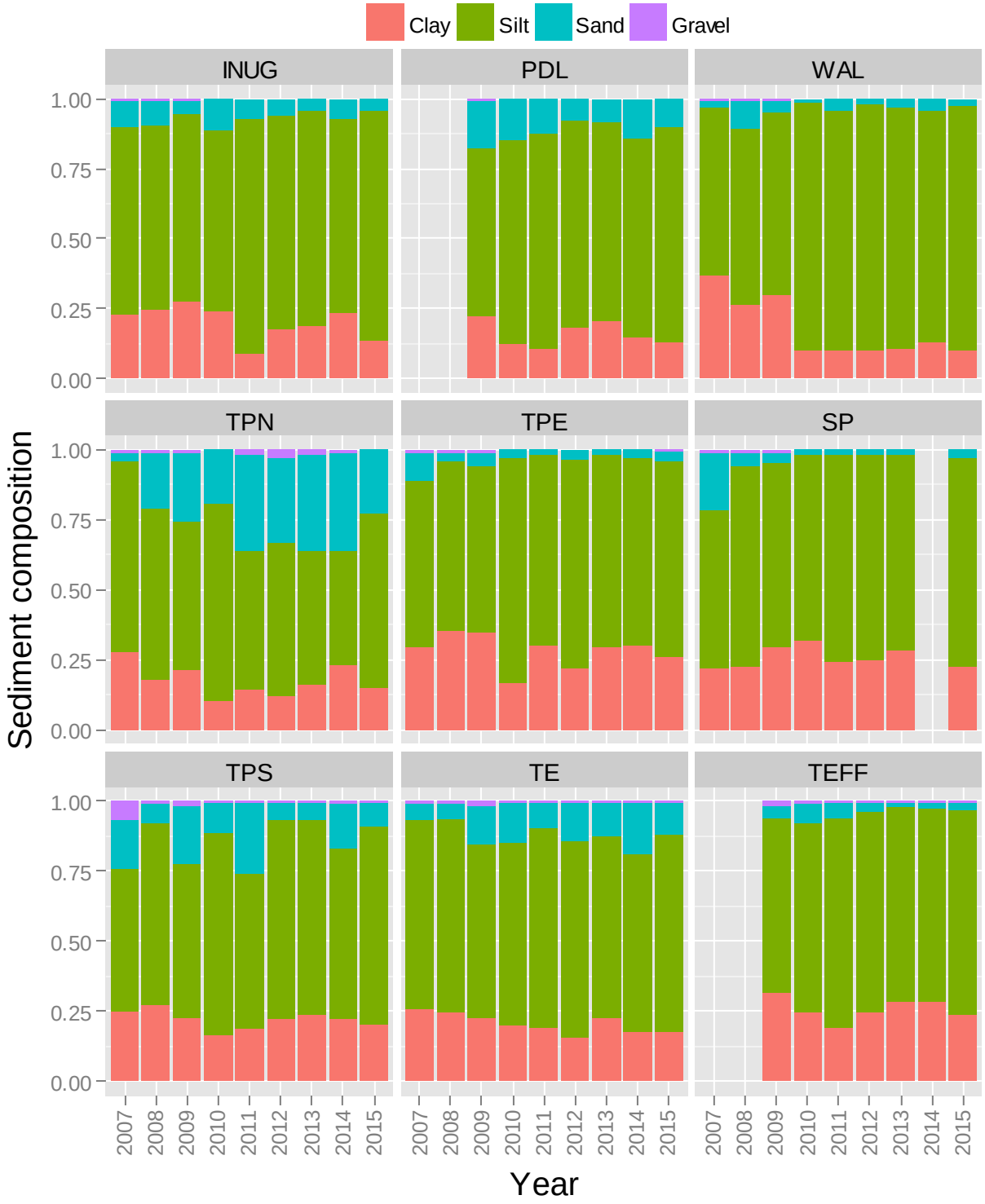


Figure 3.2–50. Metals concentrations in grab samples collected from TPE and TPE-B in Third Portage Lake in 2015.

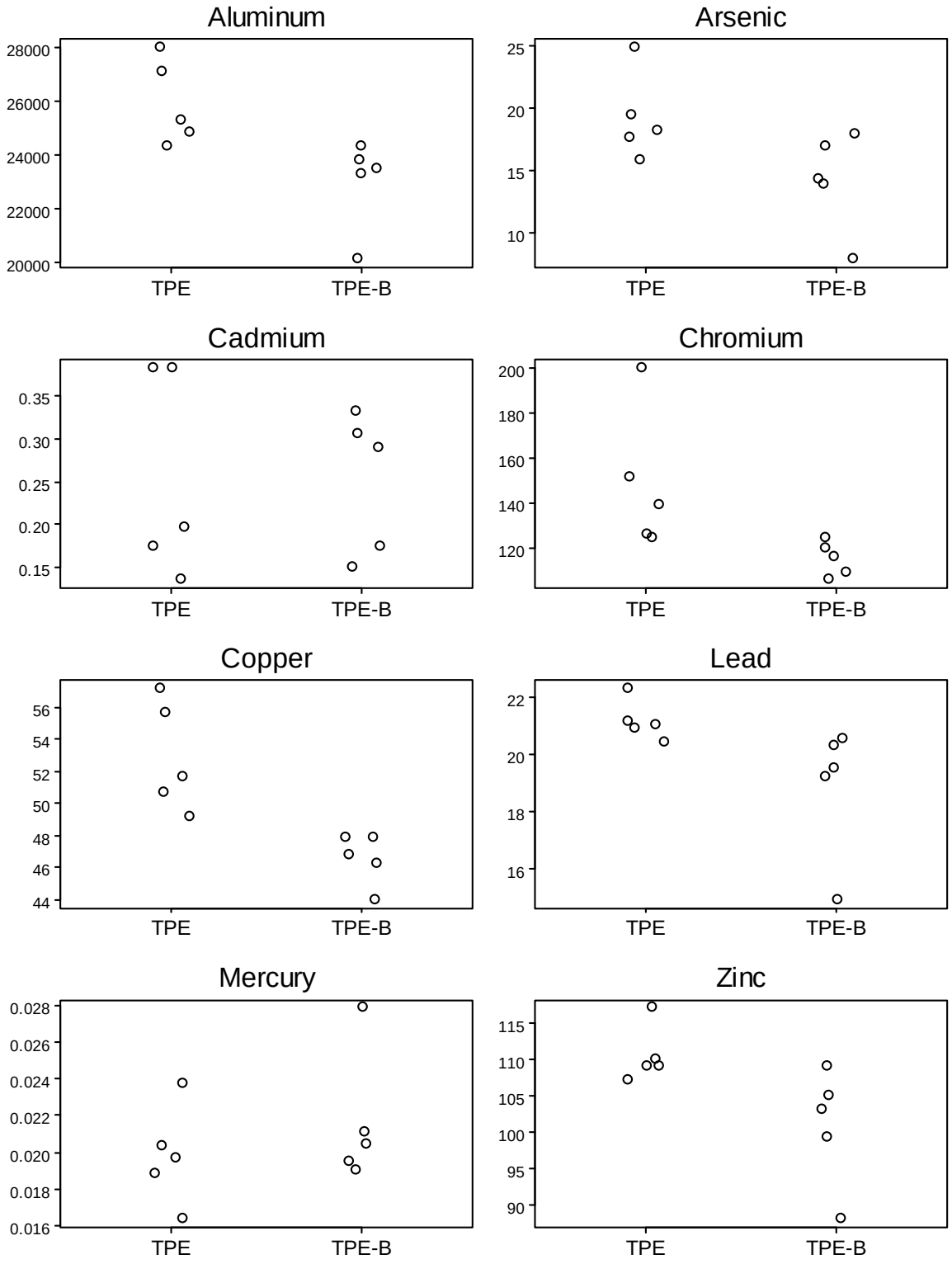


Figure 3.2–51. Total Aluminum (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: Grab samples = dots; Core samples = box and whisker

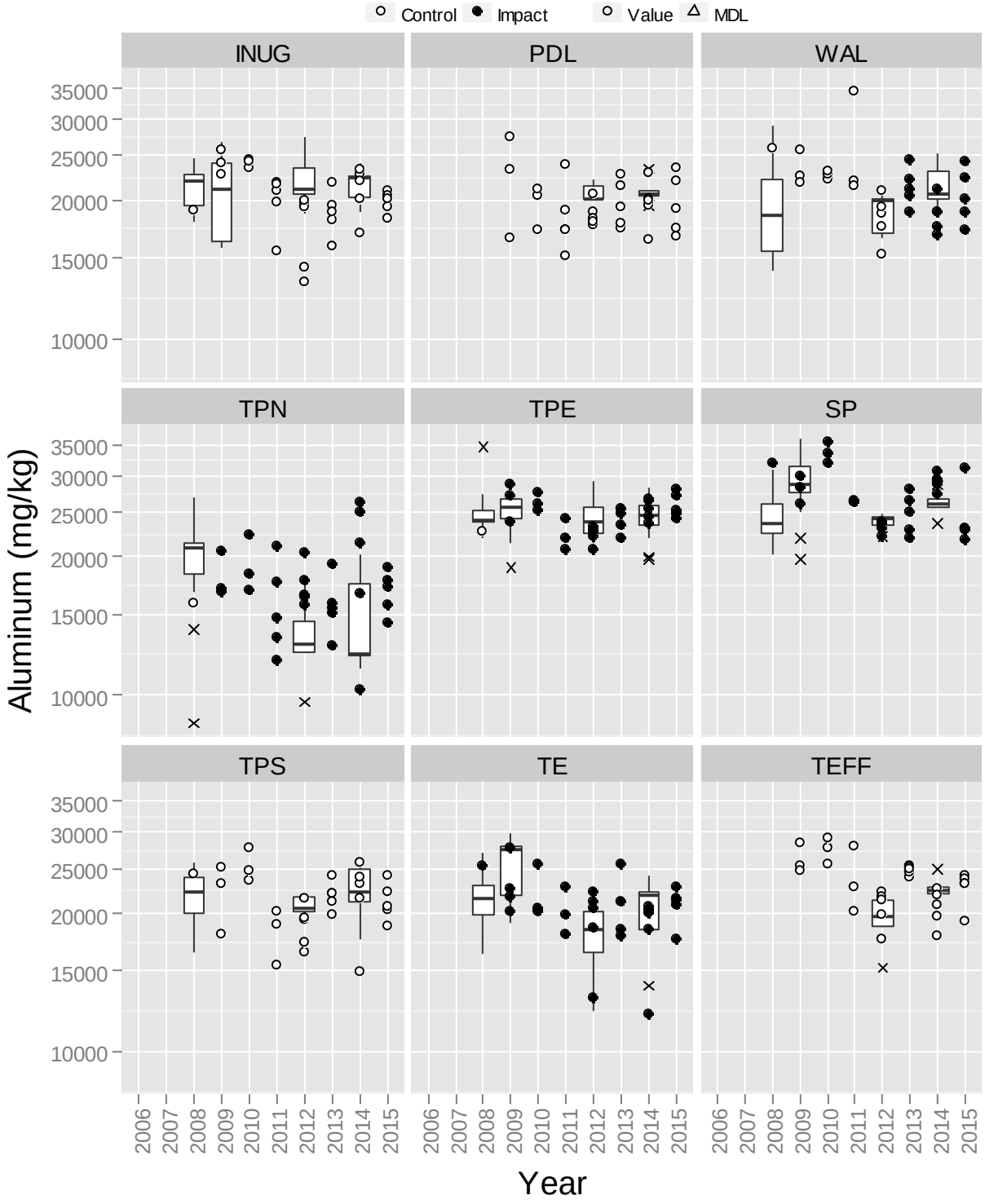


Figure 3.2–52. Total Arsenic (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: The red dashed line represents the trigger value. Grab samples = dots; Core samples = box and whisker.

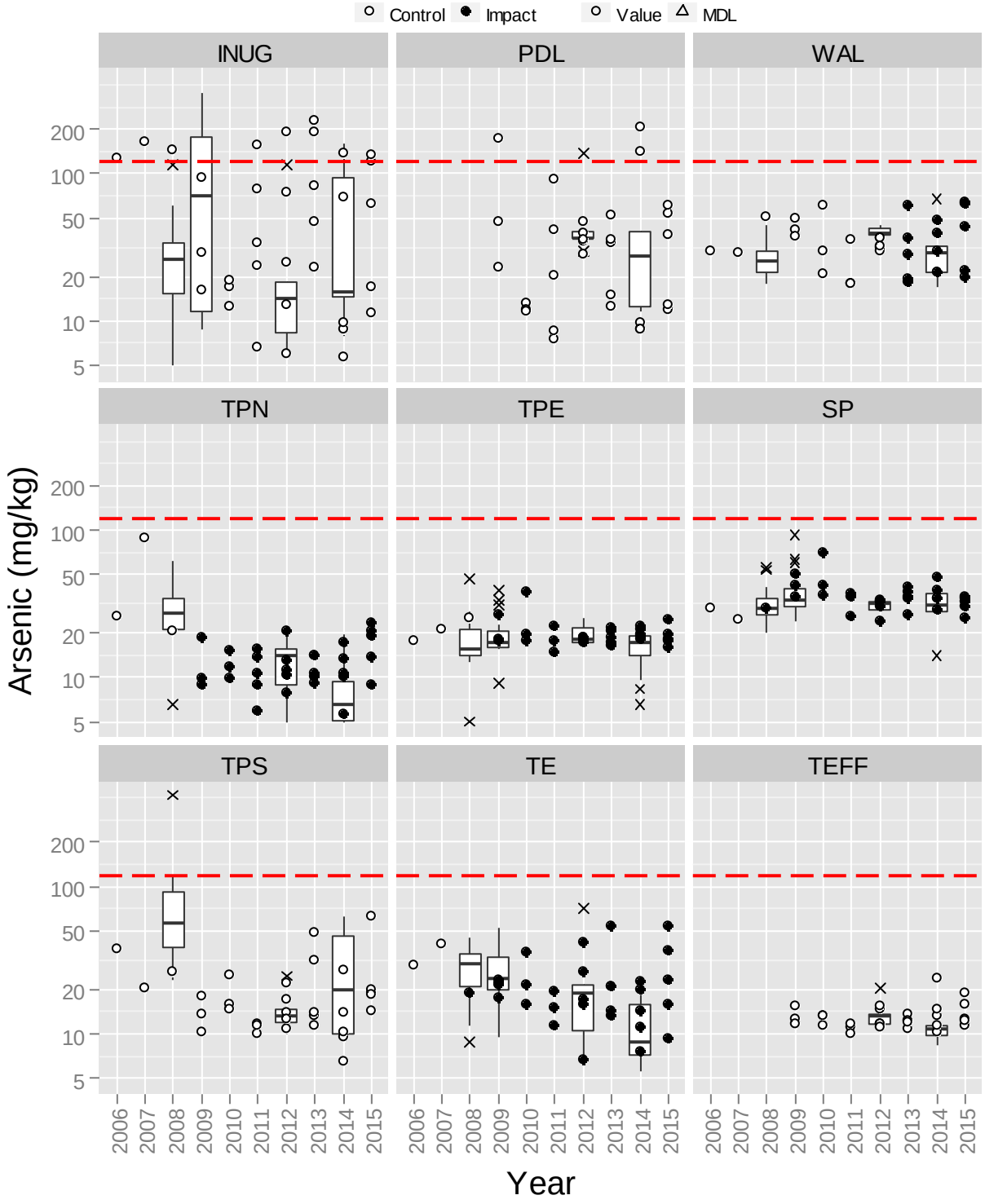


Figure 3.2–53. Total Cadmium (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: The red dashed line represents the trigger value. Grab samples = dots; Core samples = box and whisker.

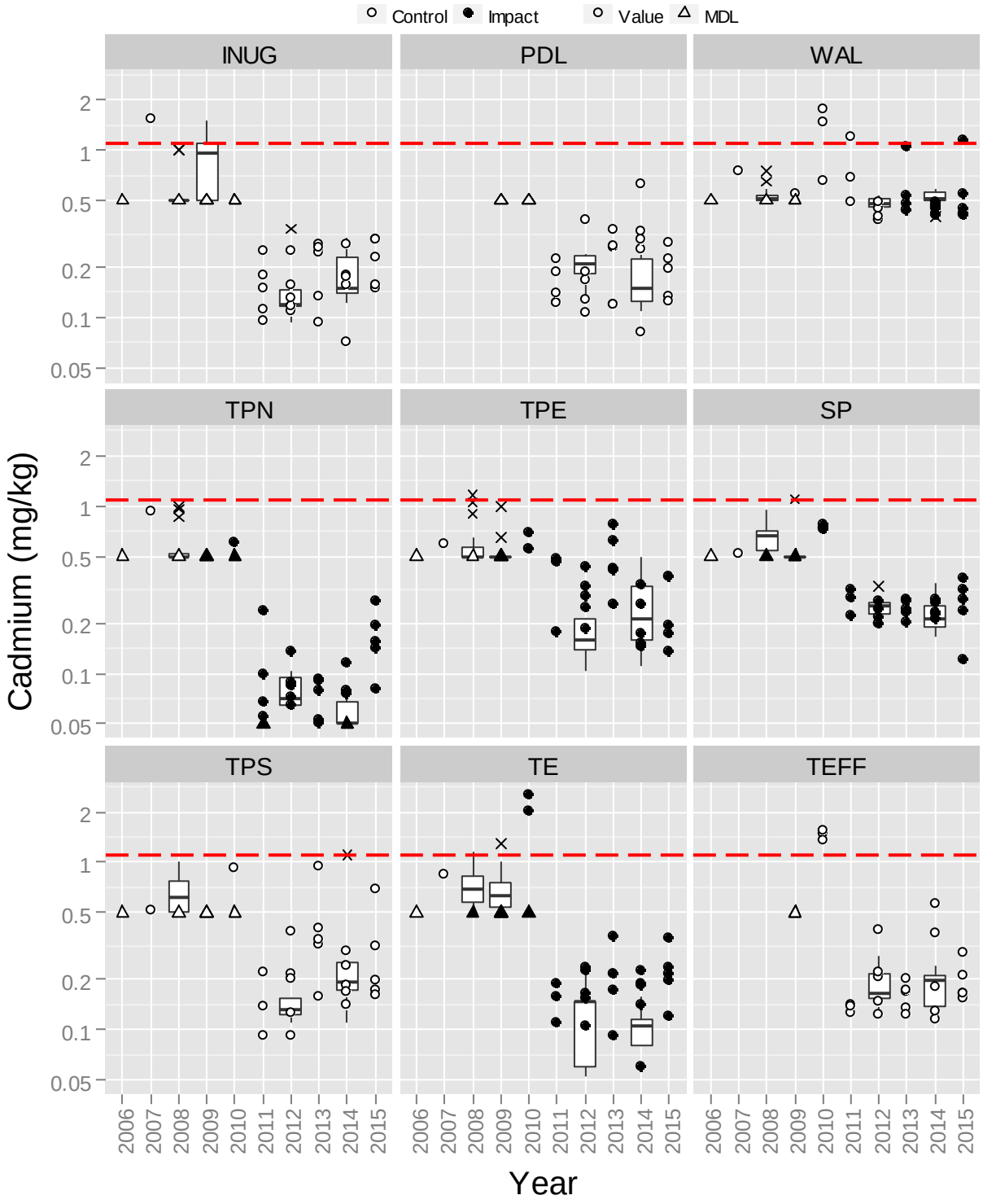


Figure 3.2–54. Total Chromium (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: The red dashed line represents the trigger value. Grab samples = dots; Core samples = box and whisker.

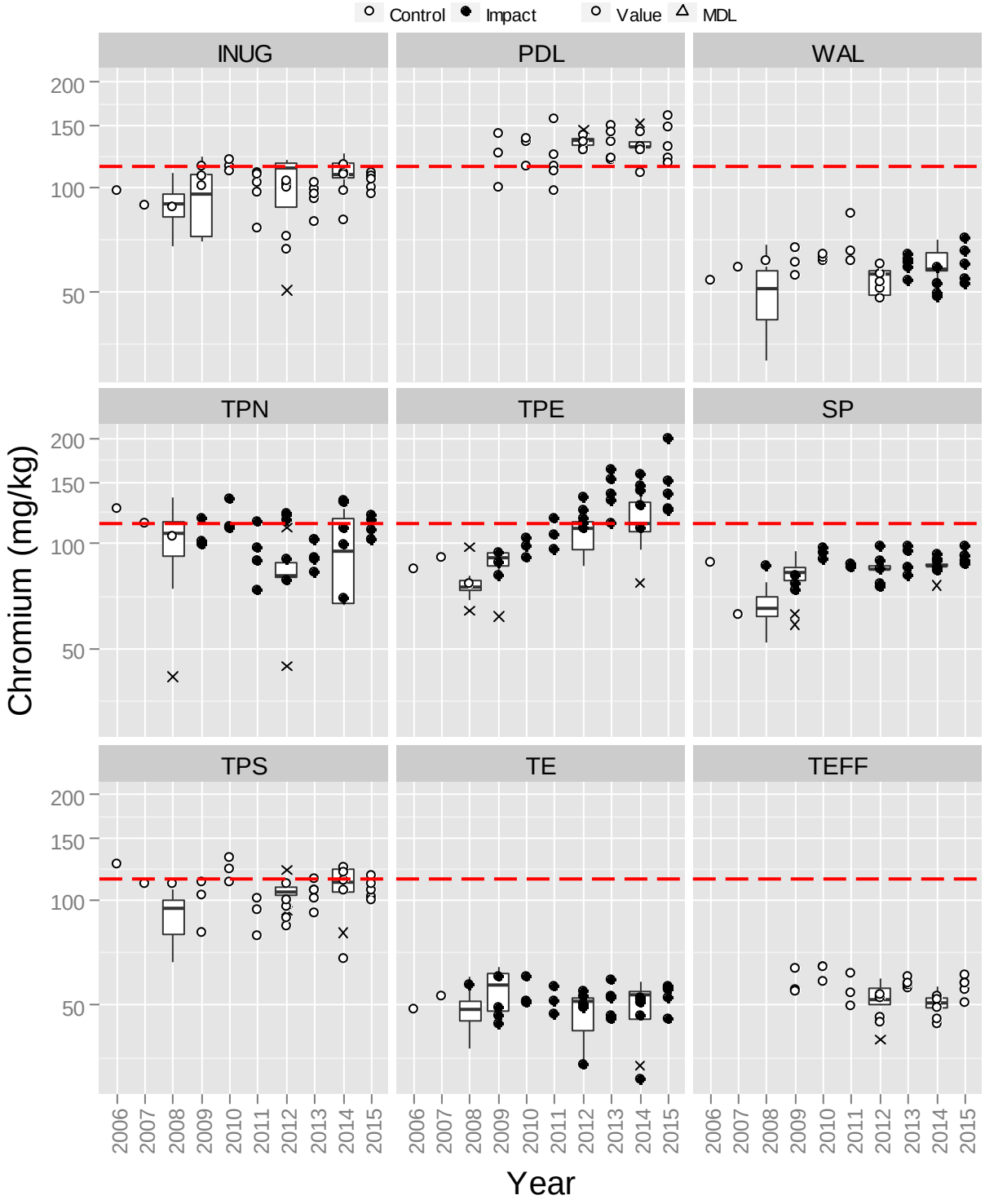


Figure 3.2–55. Total Copper (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: The red dashed line represents the trigger value. Grab samples = dots; Core samples = box and whisker.

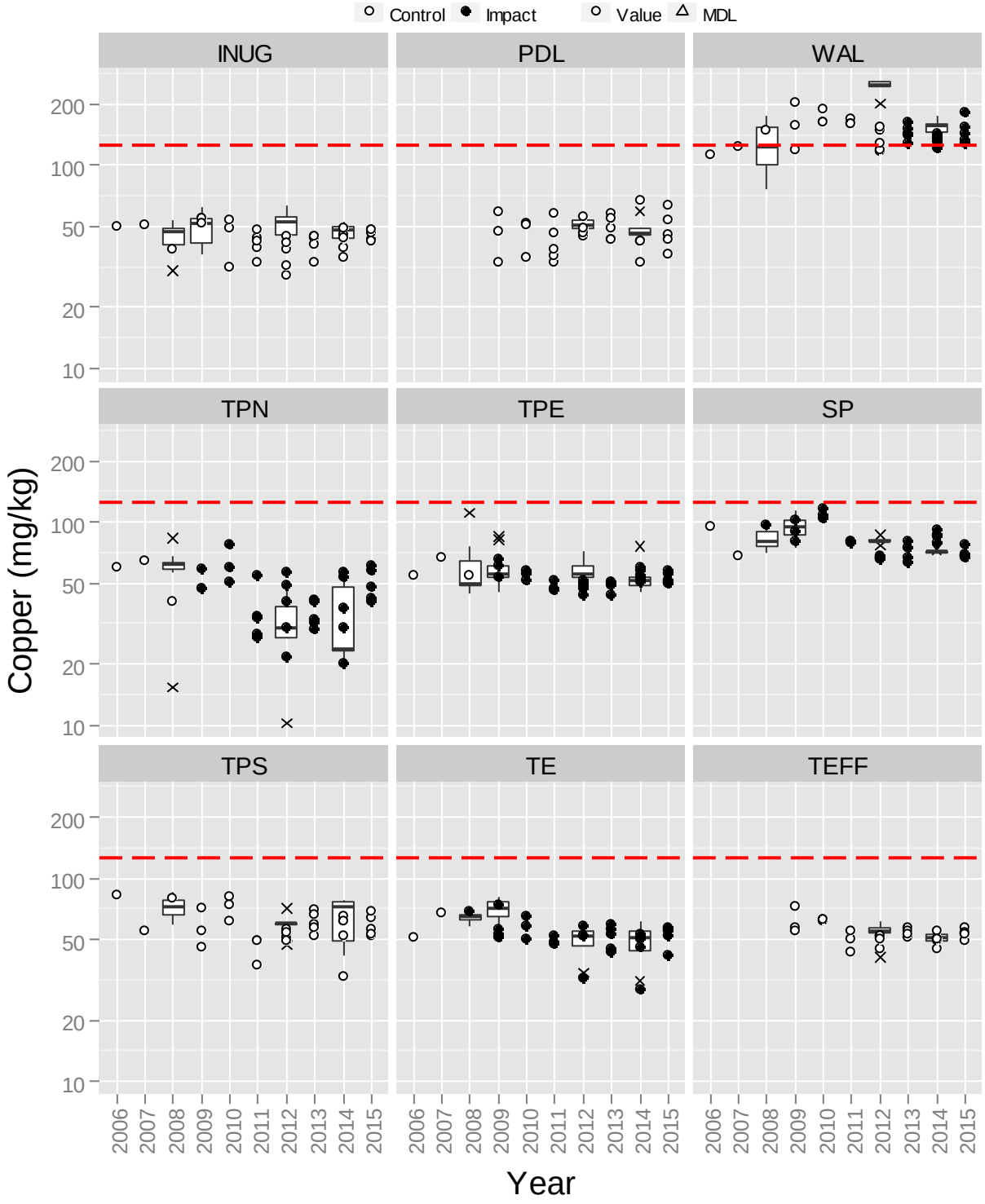


Figure 3.2–56. Total Lead (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: The red dashed line represents the trigger value. Grab samples = dots; Core samples = box and whisker.

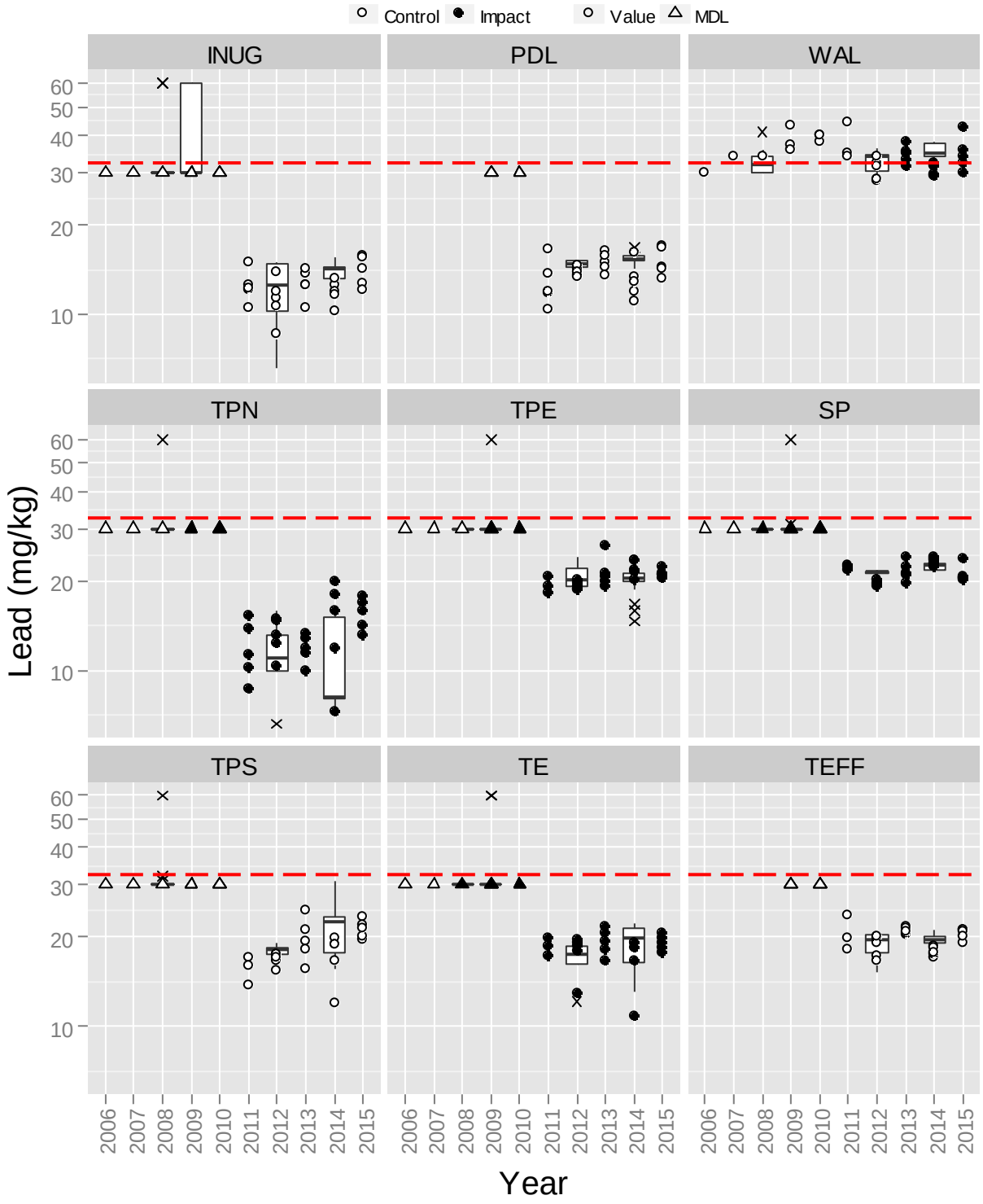


Figure 3.2–57. Total Mercury (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: The red dashed line represents the trigger value. Grab samples = dots; Core samples = box and whisker.

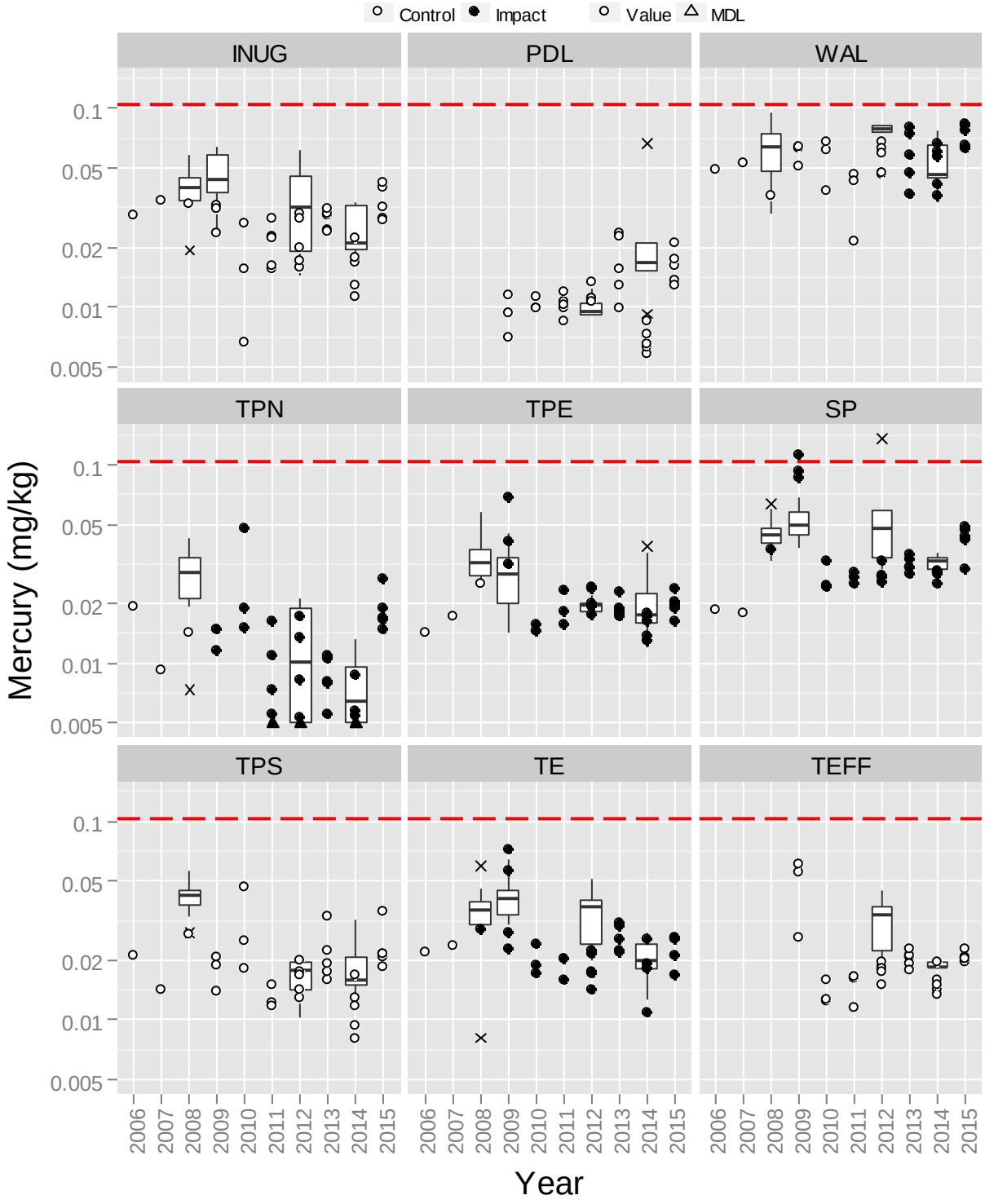


Figure 3.2–58. Total Zinc (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

Note: The red dashed line represents the trigger value. Grab samples = dots; Core samples = box and whisker.

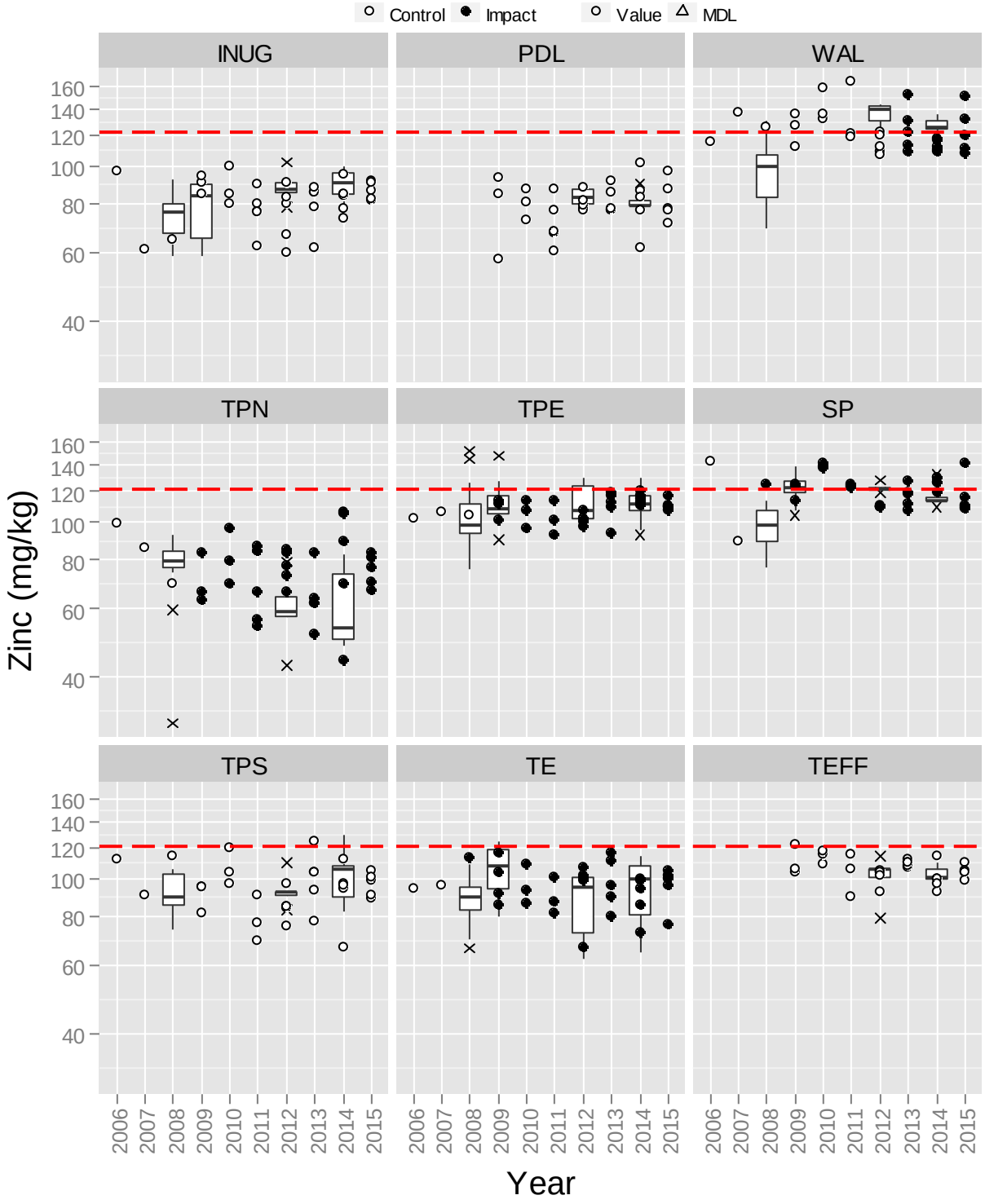


Figure 3.2–59. Total Chromium (mg/kg) in sediment cores (top panel) and grabs (bottom panel) from the East basin of Third Portage Lake since 2006.

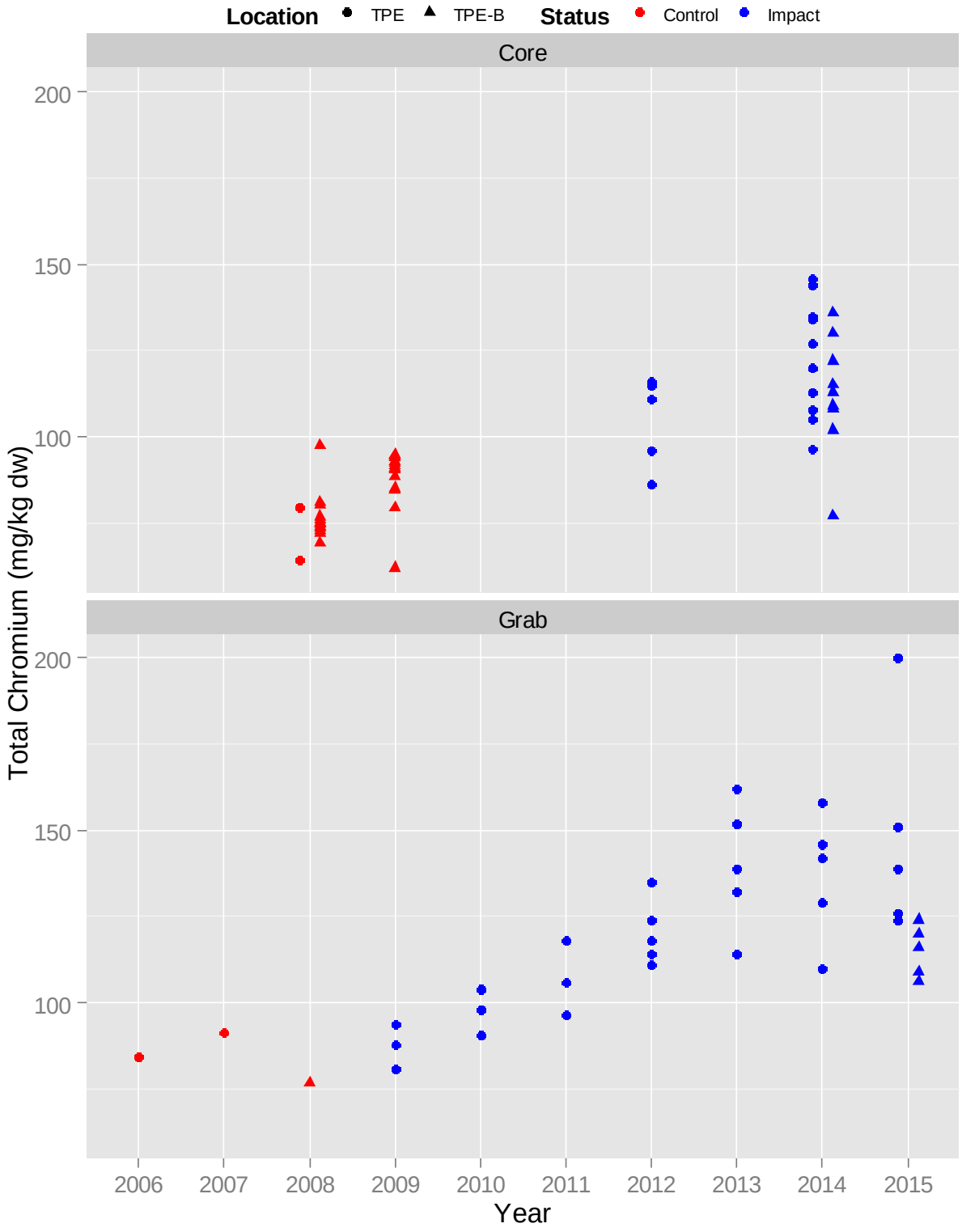


Figure 3.2–60. Growth and survival results for the *Hyalella azteca* sediment toxicity test.

Note: The adjusted mean does not include the replicates where anomalous results of 100% mortality were reported.

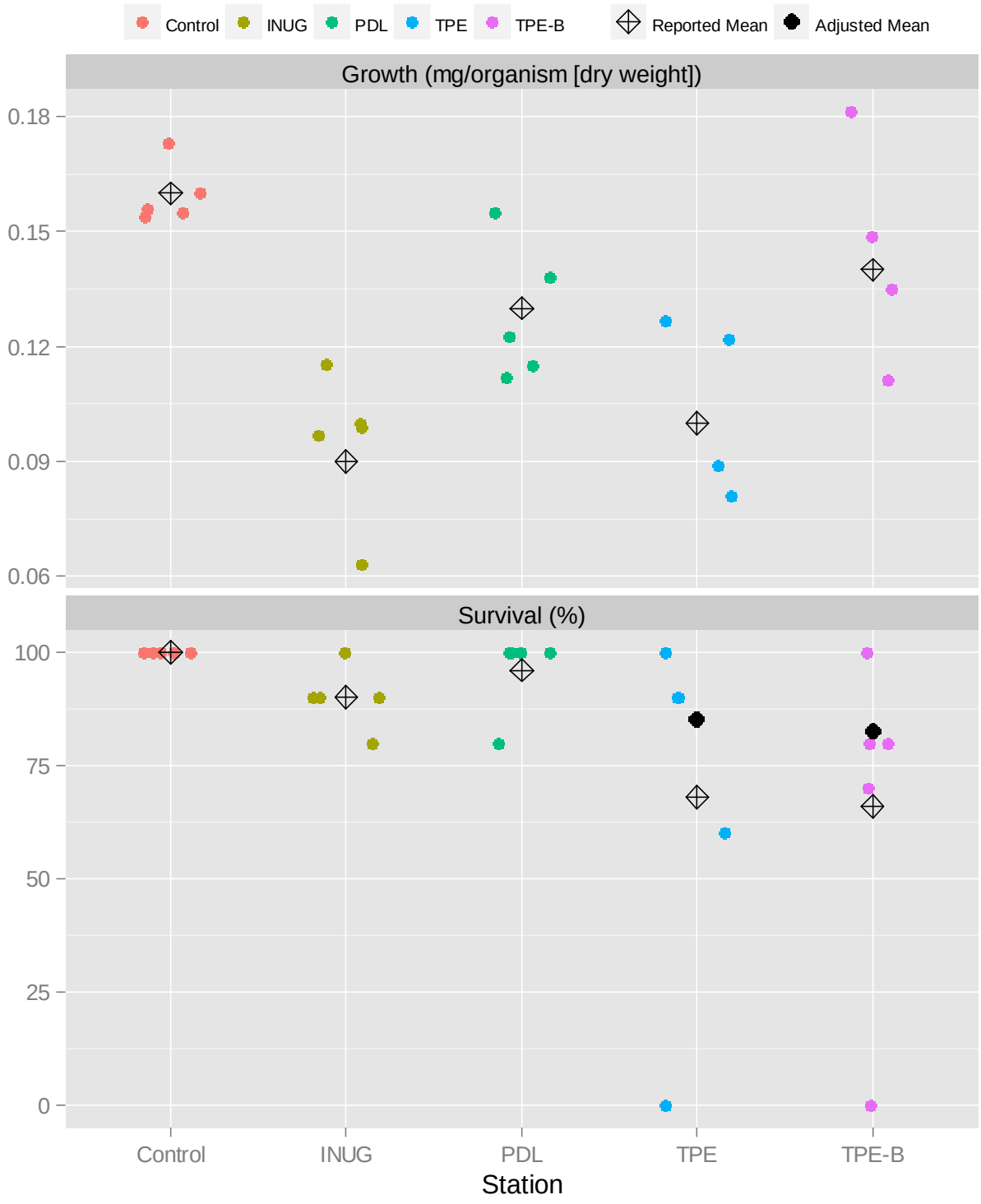


Figure 3.2–61. *Hyalella azteca* growth and survival relative vs. sediment chromium concentrations.

Note: The red dashed line represents the trigger value for chromium (114.3 mg/kg dw).

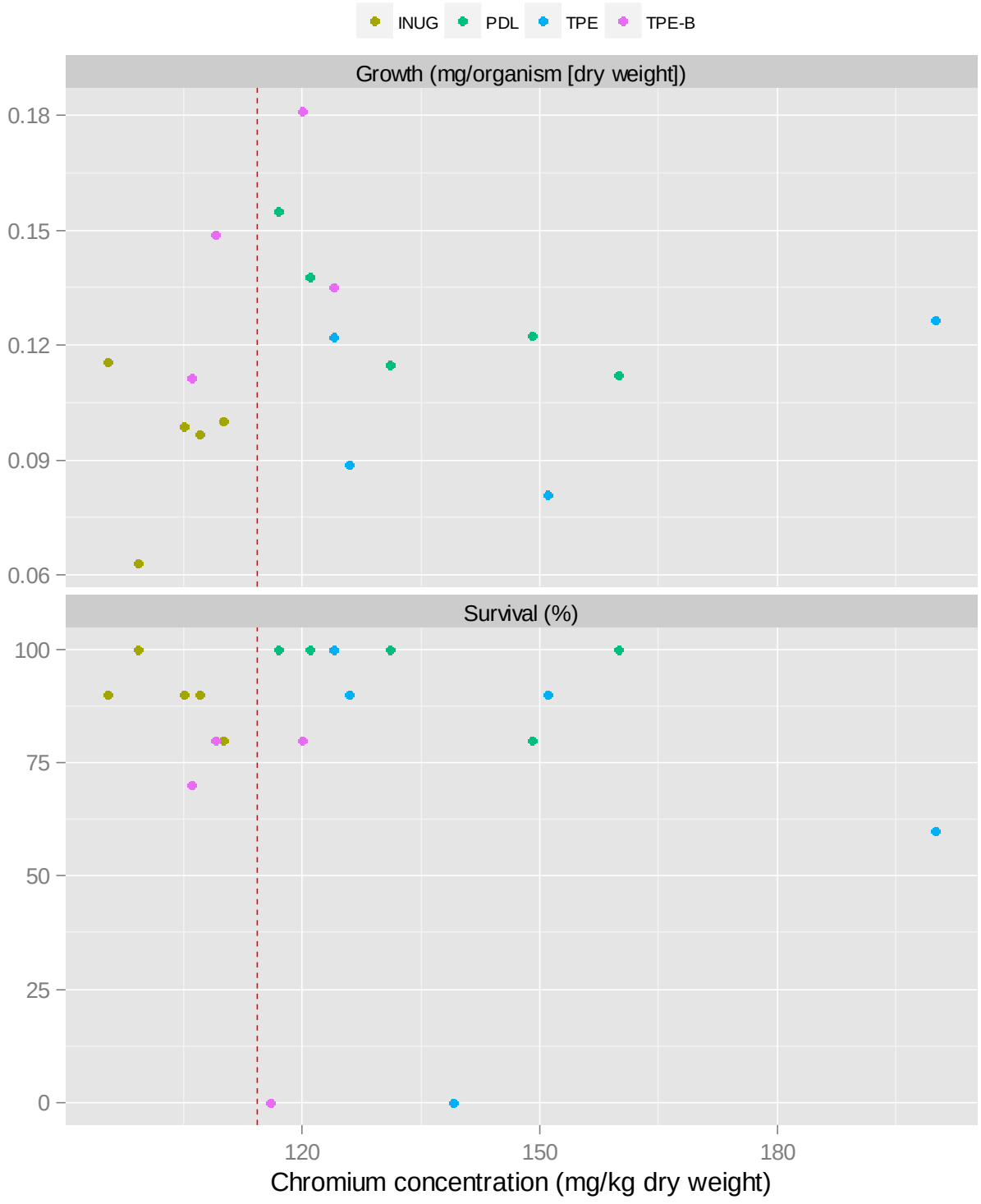


Figure 3.2–62. Growth and survival results for the *Chironomus dilutus* sediment toxicity tests.

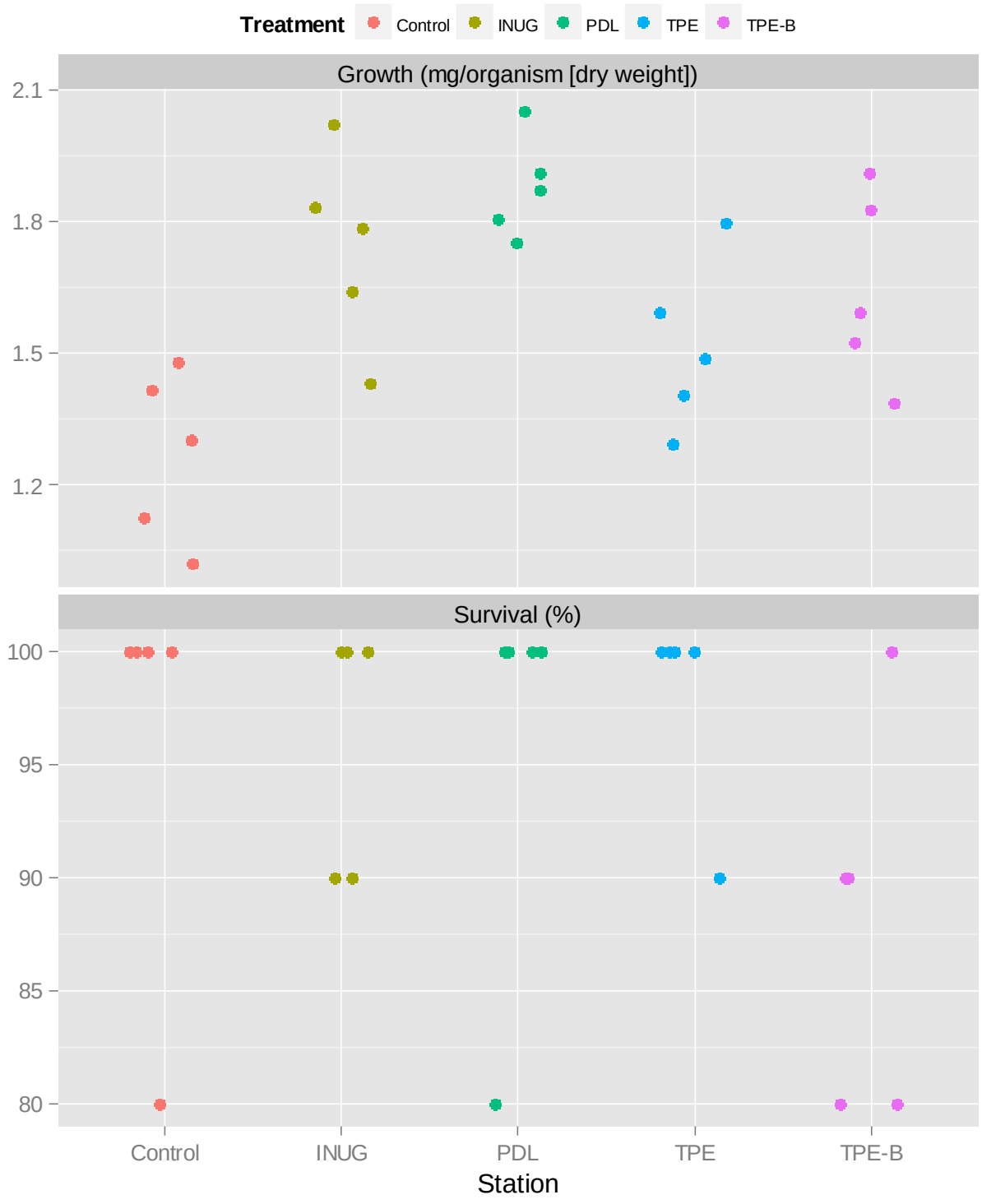
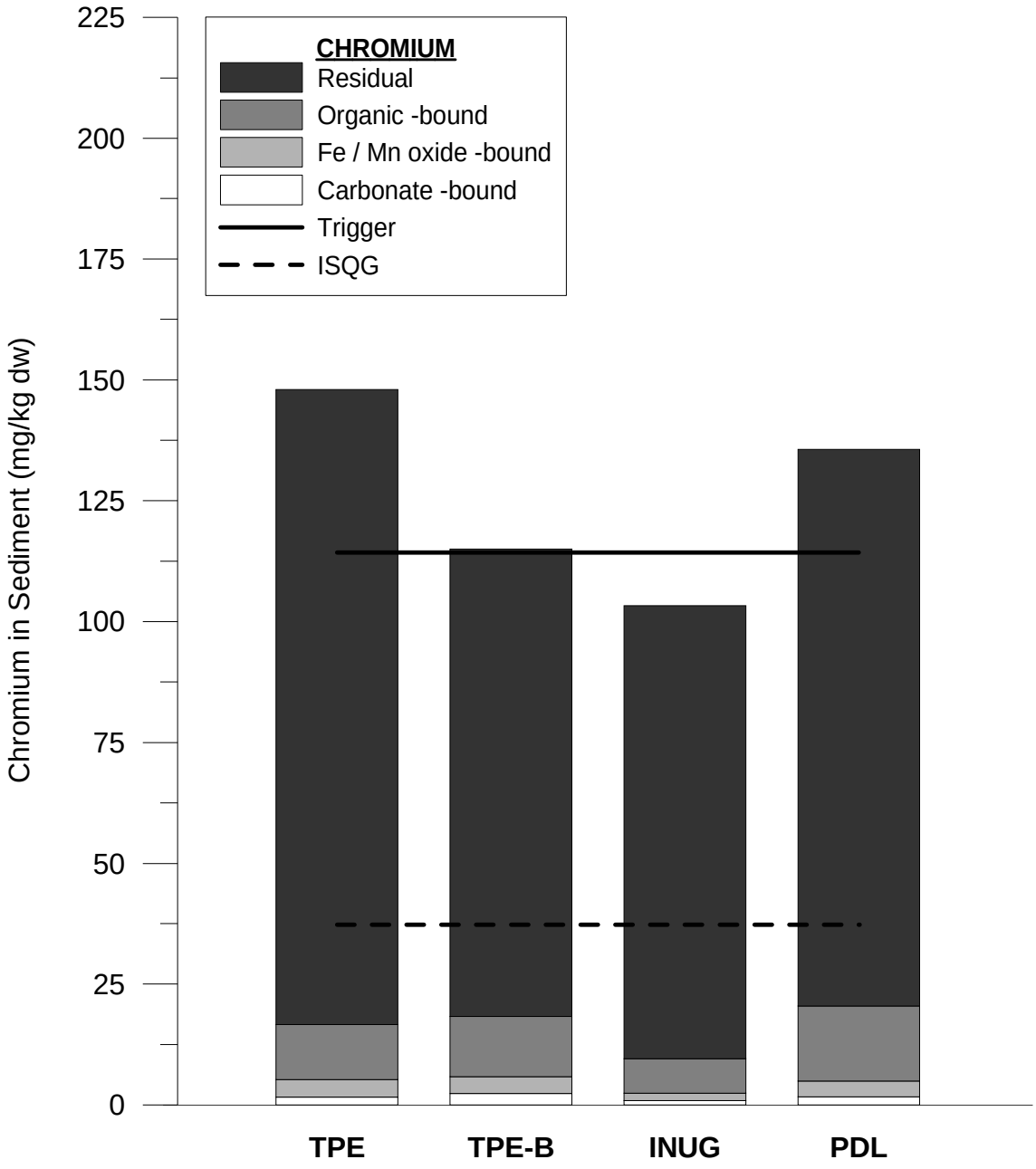


Figure 3.2–63. Sediment chromium bioavailability results from the sequential extraction procedure, Meadowbank study lakes, 2015.



3.2.4. Phytoplankton

3.2.4.1. General Observations

The diversity in types and sizes of phytoplankton is large and their abundance is great, typically exceeding 1 million individuals per litre with a total biomass of approximately 200 mg/m^3 in summer. Six major taxonomic groups of phytoplankton are present in the study lakes, namely blue-green algae (Cyanophyta), green algae (Chlorophyta), golden-brown algae (Chrysophyta), Diatom, Cryptophyta and Dinoflagellata. Chrysophytes (golden-brown algae) are small, usually unicellular phytoplankton that are consistently the most numerous taxonomic group in the Meadowbank area lakes. Chrysophytes also dominate biomass in all project lakes, typically representing 65% or more of total phytoplankton biomass in summer samples, with smaller proportions (usually <10% each) of the other five major groups. The dominant chrysophyte genera for the Meadowbank lakes are *Chrysococcus*, *Kephyrion*, *Chrysochromulina, Dinobryon* and *Chrysolkos*. Dominant genera for the other groups were *Oocystis* for chlorophytes, *Planktolyngbya* for cyanophytes, *Cyclotella* for diatoms, *Rhodomonas* and *Cryptomonas* for cryptophytes, and *Gymnodinium* and *Peridinium* for dinoflagellates (Azimuth, 2012a, 2011b, 2010a, 2009c, 2008a, and 2008b).

Mean phytoplankton biomass in the Meadowbank area lakes typically ranges from 100 to 200 mg/m^3 during summer with diminishing biomass in fall through winter. This range in biomass is fairly typical for oligotrophic, central Arctic Canadian lakes. For example, some nearby lakes such as Snap Lake (266 mg/m^3; De Beers, 2002), Kiggavik lakes (125 mg/m^3; McKee et al., 1989), Char, Spring and Saqvaqjuac lakes, not far from Baker Lake ranged up to 166 mg/m^3, 120 mg/m^3 and 130 mg/m^3 respectively (Kalff et al., 1975; Welch et al., 1989).

3.2.4.2. Temporal and Spatial Trend Interpretation

The approach to identify potential mine-related impacts involves visually searching for general temporal-spatial patterns that might be associated with mine-related activities (see **Section 1.5** for details), augmented by statistical analyses of 2015 data to test for changes relative to baseline/reference conditions using the BACI model (see **Section 2.5.3** for details).

The primary metrics upon which we based our general assessment were chlorophyll-*a* concentration (a surrogate for overall primary productivity), total biomass (mg/m^3), relative biomass of major taxonomic groups, and species richness (total # species). We chose to examine biomass and not abundance because the two tend to be reasonably well correlated and ultimately, biomass is a much better approximation of actual lake productivity or food available to zooplankton. The BACI statistical testing focused on total biomass and species richness as these reflect ecologically relevant aspects of the phytoplankton community (i.e., total mass of community and community composition, respectively); effect sizes of interest are 20% and 50%.

The expected response patterns in phytoplankton biomass and species richness is dictated by the nature of the physical and/or chemical changes caused by mine-related activities. For example, dike construction or dewatering may introduce turbidity, leading to a reduction in phytoplankton biomass/diversity. In contrast, introduction of other substances such as nitrogen nutrients associated with blasting by-products could increase primary production, so we are looking for both reductions and increases (i.e., two-tailed statistical tests) in phytoplankton-related metrics coinciding with mining activities (i.e., focusing primarily on data for SP, TPE and TPN).

One consideration with phytoplankton data is the high natural variability of control data. This potentially confounding "noise" effect can make it difficult to identify mining-related influences or "signals" at impact areas, unless the latter are quite large.

Density and biomass results for phytoplankton samples collected from the Meadowbank study lakes are provided in **Table 3.2–13** (a presence/absence species matrix is provided in **Appendix B**). The 2012 CREMP (Azimuth, 2013) provides a detailed description of historical trends in phytoplankton-related metrics; this report emphasizes results for 2015. Trend data for chlorophyll-*a*, total biomass, major taxa composition, and species richness are presented in **Figure 3.2–64** to **Figure 3.2–68**. Plots for all other phytoplankton metrics are presented in **Appendix C1**. The results for the BACI model statistical tests of the 2015 results against baseline/reference conditions for total biomass and species richness are provided in **Table 3.2–14**; Key results are described below:

- *Chlorophyll-a* – Concentrations at most reference areas ranged between 0.1 and 0.5 µg/L in summer months, reflecting the oligotrophic, nutrient poor condition of these lakes; a trend that has not changed over time. The seasonal pattern of chlorophyll-*a* concentrations among reference and exposure areas was similar in 2015, with higher concentrations observed at all locations during the fall through-ice sampling event in November relative to the open-water events. Despite some variability, chlorophyll-*a* concentrations have remained fairly consistent since 2006 (**Figure 3.2–64**).
- *Total Biomass* – Biomass results followed the same seasonal trends as previous years with highest biomass reported in the summer months (July) compared to fall/winter. Peak summer phytoplankton biomass at the reference areas was greater than 400 mg/m^3 at INUG while PDL was approximately 250 mg/m^3. The results are consistent with the range observed in previous years for PDL, but slightly higher for INUG (**Figure 3.2–66**). Biomass at the exposure areas in the summer months was generally in the range of 150 to 250 mg/m^3 as in previous years. Winter under-ice biomass is naturally very low at all locations in all years it has been measured. Note that the apparent "reductions" highlighted in **Table 3.2–14** are largely due to abnormally high results for INUG for July rather than an actual drop at TPE or TPS; neither of these apparent decreases were statistically significant (**Table 3.2–14**).
- *Major Taxa Composition* – Chrysophytes tend to dominate in all open-water months, a pattern that has been consistent since monitoring began in 2006 (**Figure 3.2–67**). No major differences were noted for 2015.
- *Species Richness* – Seasonal profiles in species richness were similar in shape to total biomass, with an increase from low diversity in under-ice months (INUG; 17 to 25 taxa) to peak diversity of between approximately 30 and 40 taxa during the open water season (**Table 3.2–13**). The seasonal pattern of species richness at the exposure areas was similar to the reference areas and consistent with previous years (**Figure 3.2–68**). There were no statistically significant changes in species richness in 2015 relative to baseline/reference conditions (**Table 3.2–14**).

The phytoplankton community taxa biomass and taxa richness data from 2015 are generally similar to previous years and within the range of historical baseline/reference conditions. These results continue to show that any minor changes to water quality as a result of mining activities (e.g., increased concentrations of some major ions relative to baseline/reference) are not resulting in persistent and adverse changes to the phytoplankton communities in the Meadowbank exposure lakes.

Table 3.2–13. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Density (cells/L)						
				Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Inuggugayualik Lake										
INUG-68	16-May-15	25	0.67	0	3,746	969,985	39,107	65,230	700	1,078,768
INUG-69	16-May-15	17	0.68	0	3,946	518,531	28,469	75,468	200	626,614
INUG-70	27-Jul-15	30	0.85	0	172,616	2,061,504	296,744	140,096	800	2,671,760
INUG-71	27-Jul-15	33	0.85	0	129,712	2,190,616	117,144	57,688	8,784	2,503,944
INUG-72	27-Aug-15	35	0.89	400	196,768	1,419,448	210,336	14,768	7,184	1,848,904
INUG-73	27-Aug-15	37	0.90	7,584	211,536	1,671,288	260,424	114,944	8,384	2,274,160
INUG-74	1-Oct-15	40	0.90	66,056	274,992	1,734,744	305,544	72,640	21,752	2,475,728
INUG-75	1-Oct-15	39	0.86	14,968	209,736	1,734,144	356,232	79,424	21,552	2,416,056
INUG-76	23-Nov-15	22	0.85	28,369	159,975	563,830	62,584	82,760	400	897,917
INUG-77	23-Nov-15	25	0.79	56,738	107,183	720,158	54,692	43,753	400	982,924
	Percent Density or Biomass			***0.98***	***8.3***	***76***	***9.7***	***4.2***	***0.39***	
Pipedream Lake										
PDL-37	28-Jul-15	28	0.72	0	36,320	1,790,048	225,112	59,872	1,400	2,112,752
PDL-38	28-Jul-15	23	0.71	0	14,368	1,986,416	207,552	38,920	10,584	2,257,840
PDL-39	26-Aug-15	32	0.84	9,184	244,456	1,361,176	219,520	43,504	600	1,878,440
PDL-40	26-Aug-15	32	0.85	3,800	123,328	1,370,160	213,536	22,952	400	1,734,176
PDL-41	4-Oct-15	30	0.91	7,400	359,200	939,920	219,520	22,152	14,968	1,563,160
	Percent Density or Biomass			***0.21***	***8.1***	***78***	***11***	***2.0***	***0.29***	
Third Portage Lake - East Basin										
TPE-80	15-May-15	18	0.66	0	10,638	450,355	3,846	40,607	200	505,646
TPE-81	15-May-15	17	0.75	0	21,277	312,057	3,946	43,353	200	380,833
TPE-82	15-Jul-15	23	0.64	0	64,656	1,168,008	51,088	7,384	400	1,291,536
TPE-83	15-Jul-15	29	0.72	0	122,328	1,547,576	41,920	14,568	1,400	1,727,792
TPE-84	29-Aug-15	25	0.72	1,600	280,376	668,912	1,208,312	200	400	2,159,800
TPE-85	29-Aug-15	37	0.85	1,000	704,432	1,524,608	1,460,552	28,952	21,952	3,741,496
TPE-86	27-Sep-15	33	0.77	1,800	172,816	1,049,664	858,496	47,104	7,784	2,137,664
TPE-87	27-Sep-15	32	0.78	1,200	280,376	1,121,304	781,872	39,320	7,584	2,231,656
TPE-88	13-Nov-15	19	0.77	100	88,653	677,505	235,643	26,977	100	1,028,977
TPE-89	13-Nov-15	26	0.78	100	124,114	363,202	377,441	11,438	100	876,395
	Percent Density or Biomass			***<0.1***	***12***	***55***	***31***	***1.6***	***0.25***	

Table 3.2–13. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Biomass (mg/m^3)						
				Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Inuggugayualik Lake										
INUG-68	16-May-15	25	0.67	0	0.3	42	7.2	9.3	9.1	67
INUG-69	16-May-15	17	0.68	0	0.6	23	5.1	10	1.6	41
INUG-70	27-Jul-15	30	0.85	0	2.4	369	13	15	14	413
INUG-71	27-Jul-15	33	0.85	0	2.1	399	6.3	12	21	440
INUG-72	27-Aug-15	35	0.89	0.1	5.8	157	13	1.0	2.3	179
INUG-73	27-Aug-15	37	0.90	0.6	6.4	167	12	5.8	10.0	202
INUG-74	1-Oct-15	40	0.90	3.4	6.0	156	21	9.7	8.1	204
INUG-75	1-Oct-15	39	0.86	2.0	8.3	148	18	7.0	7.9	191
INUG-76	23-Nov-15	22	0.85	0.7	6.7	30	3.9	13	9.8	64
INUG-77	23-Nov-15	25	0.79	1.4	3.1	39	4.1	7.5	9.5	65
	Percent Density or Biomass			***0.44***	***4.6***	***71***	***8.9***	***7.1***	***6.8***	
Pipedream Lake										
PDL-37	28-Jul-15	28	0.72	0	0.6	199	14	7.8	6.6	227
PDL-38	28-Jul-15	23	0.71	0	0.1	230	10	6.3	15	262
PDL-39	26-Aug-15	32	0.84	0.8	7.8	127	17	2.5	2.3	158
PDL-40	26-Aug-15	32	0.85	0.9	5.4	135	16	2.2	2.1	162
PDL-41	4-Oct-15	30	0.91	2.5	9.0	97	11	4.0	13	137
	Percent Density or Biomass			***0.45***	***2.4***	***83***	***7.2***	***2.4***	***4.2***	
Third Portage Lake - East Basin										
TPE-80	15-May-15	18	0.66	0	0.4	24	0.7	4.5	1.0	31
TPE-81	15-May-15	17	0.75	0	0.4	22	0.9	3.8	0.5	28
TPE-82	15-Jul-15	23	0.64	0	0.9	69	1.6	0.8	6.7	79
TPE-83	15-Jul-15	29	0.72	0	1.8	97	6.6	1.4	7.9	115
TPE-84	29-Aug-15	25	0.72	0.4	10	61	39	0.2	0.4	112
TPE-85	29-Aug-15	37	0.85	0.1	17	141	60	14	9.0	240
TPE-86	27-Sep-15	33	0.77	0.3	7.0	87	24	12	4.9	135
TPE-87	27-Sep-15	32	0.78	0.1	11	86	26	10	9.2	143
TPE-88	13-Nov-15	19	0.77	0.0	2.9	33	5.4	7.9	0.1	50
TPE-89	13-Nov-15	26	0.78	0.0	3.5	34	11	1.5	0.2	49
	Percent Density or Biomass			***<0.1***	***6.5***	***64***	***17***	***8.4***	***3.8***	

Table 3.2–13. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Density (cells/L)						
				Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Third Portage Lake - North Basin										
TPN-80	16-May-15	14	0.62	0	0	745,181	10,638	74,322	11,238	841,380
TPN-81	16-May-15	15	0.67	0	0	792,780	100	137,052	400	930,332
TPN-82	24-Jul-15	27	0.81	0	28,736	1,420,864	43,504	59,272	5,200	1,557,576
TPN-83	24-Jul-15	25	0.84	0	43,104	1,441,816	86,408	51,488	23,952	1,646,768
TPN-84	29-Aug-15	31	0.85	200	215,520	1,877,424	648,360	54,288	38,520	2,834,312
TPN-85	29-Aug-15	32	0.88	0	100,776	2,129,464	685,080	33,136	25,752	2,974,208
TPN-86	27-Sep-15	29	0.76	0	151,264	785,056	864,280	33,336	400	1,834,336
TPN-87	27-Sep-15	30	0.76	0	115,544	664,328	882,648	14,768	7,784	1,685,072
TPN-88	13-Nov-15	22	0.82	1,500	202,128	331,087	129,860	1,900	100	666,575
TPN-89	13-Nov-15	21	0.83	2,200	131,206	430,678	93,399	4,846	500	662,829
	Percent Density or Biomass			***<0.1***	***6.3***	***68***	***22***	***3.0***	***0.73***	
Third Portage Lake - South Basin										
TPS-49	24-Jul-15	25	0.76	0	64,656	1,025,928	50,288	40,520	3,800	1,185,192
TPS-50	24-Jul-15	29	0.78	0	43,304	1,306,104	44,104	13,384	3,800	1,410,696
TPS-51	14-Aug-15	33	0.88	0	309,112	1,486,320	194,968	16,368	2,200	2,008,968
TPS-52	14-Aug-15	35	0.86	0	96,792	1,286,952	116,144	15,968	9,384	1,525,240
TPS-53	27-Sep-15	35	0.88	0	517,248	1,092,968	413,888	30,752	7,784	2,062,640
TPS-54	27-Sep-15	31	0.84	0	280,376	676,696	731,784	19,968	8,784	1,717,608
	Percent Density or Biomass			***<0.1***	***13***	***69***	***16***	***1.4***	***0.36***	
Second Portage Lake										
SP-80	17-May-15	19	0.65	0	0	1,113,929	6,046	25,223	2,200	1,147,398
SP-81	17-May-15	20	0.60	0	0	926,586	1,800	79,814	1,200	1,009,400
SP-82	27-Jul-15	32	0.81	0	86,208	2,076,008	375,184	55,288	800	2,593,488
SP-83	27-Jul-15	33	0.76	0	172,616	4,021,472	417,888	24,952	1,200	4,638,128
SP-84	28-Aug-15	32	0.89	0	330,664	820,176	225,520	38,320	1,000	1,415,680
SP-85	28-Aug-15	26	0.88	64,856	188,584	797,624	188,200	7,184	1,000	1,247,448
SP-86	4-Oct-15	32	0.88	0	209,936	955,872	259,840	67,656	600	1,493,904
SP-87	4-Oct-15	32	0.86	7,184	187,384	1,200,328	365,200	88,608	1,000	1,849,704
SP-88	21-Nov-15	30	0.87	0	71,822	665,521	182,667	145,998	1,000	1,067,007
SP-89	21-Nov-15	24	0.78	0	85,306	415,494	60,592	25,177	300	586,868
	Percent Density or Biomass			***0.42***	***7.8***	***76***	***12***	***3.3***	***<0.1***	

Table 3.2–13. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Biomass (mg/m^3)						
				Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Third Portage Lake - North Basin										
TPN-80	16-May-15	14	0.62	0	0	30	0.3	13	4.9	48
TPN-81	16-May-15	15	0.67	0	0	39	0.1	19	8.0	66
TPN-82	24-Jul-15	27	0.81	0	2.5	110	2.5	7.7	29	152
TPN-83	24-Jul-15	25	0.84	0	0.7	146	4.4	7.4	20	178
TPN-84	29-Aug-15	31	0.85	0.0	7.3	203	20	5.5	28	263
TPN-85	29-Aug-15	32	0.88	0	3.1	342	25	5.0	18	394
TPN-86	27-Sep-15	29	0.76	0	3.4	71	27	9.6	0.4	112
TPN-87	27-Sep-15	30	0.76	0	3.4	74	33	1.9	3.3	116
TPN-88	13-Nov-15	22	0.82	0.3	1.8	50	33	2.7	1.6	90
TPN-89	13-Nov-15	21	0.83	0.5	2.3	23	3.3	2.0	6.4	38
	Percent Density or Biomass			***<0.1***	***3.1***	***62***	***27***	***4.5***	***3.3***	
Third Portage Lake - South Basin										
TPS-49	24-Jul-15	25	0.76	0	1.4	109	1.2	10	14	136
TPS-50	24-Jul-15	29	0.78	0	1.4	127	2.8	9.0	30	170
TPS-51	14-Aug-15	33	0.88	0	9.2	170	7.7	2.8	15	204
TPS-52	14-Aug-15	35	0.86	0	7.7	121	6.6	2.5	17	155
TPS-53	27-Sep-15	35	0.88	0	11	85	14	15	4.8	130
TPS-54	27-Sep-15	31	0.84	0	4.4	70	33	5.6	5.0	119
	Percent Density or Biomass			***<0.1***	***3.9***	***75***	***7.2***	***4.9***	***9.4***	
Second Portage Lake										
SP-80	17-May-15	19	0.65	0	0	126	2.5	2.5	6.9	138
SP-81	17-May-15	20	0.60	0	0	94	2.4	8.4	7.3	112
SP-82	27-Jul-15	32	0.81	0	1.1	201	27	10	15	255
SP-83	27-Jul-15	33	0.76	0	2.6	407	39	6.2	13	467
SP-84	28-Aug-15	32	0.89	0	4.8	71	23	3.6	2.5	106
SP-85	28-Aug-15	26	0.88	1.8	4.6	80	27	0.4	1.0	115
SP-86	4-Oct-15	32	0.88	0	4.1	61	25	8.7	1.5	100
SP-87	4-Oct-15	32	0.86	0.4	4.8	72	27	10	2.8	117
SP-88	21-Nov-15	30	0.87	0	1.9	49	34	30	6.4	122
SP-89	21-Nov-15	24	0.78	0	1.7	30	15	9.8	5.3	62
	Percent Density or Biomass			***0.13***	***3.1***	***53***	***25***	***15***	***4.0***	

Table 3.2–13. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Density (cells/L)						
				Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Tehek Lake										
TE-80	14-May-15	17	0.70	0	3,546	879,433	3,746	23,984	900	911,609
TE-81	14-May-15	17	0.71	0	42,553	1,230,897	46,199	58,399	11,238	1,389,287
TE-82	27-Jul-15	32	0.77	0	136,896	2,153,816	331,480	80,440	7,384	2,710,016
TE-83	27-Jul-15	35	0.84	57,472	151,464	2,229,872	415,704	158,680	7,784	3,020,976
TE-84	28-Aug-15	34	0.87	14,968	165,432	1,209,112	104,376	58,072	7,984	1,559,944
TE-85	28-Aug-15	31	0.89	0	180,200	1,181,176	176,616	400	7,784	1,546,176
TE-86	4-Oct-15	37	0.85	1,400	186,784	1,299,720	141,296	73,640	7,784	1,710,624
TE-87	4-Oct-15	36	0.85	2,000	216,120	1,411,680	264,224	59,472	200	1,953,696
TE-88	21-Nov-15	25	0.82	1,000	99,691	486,516	46,799	15,984	500	650,490
TE-89	21-Nov-15	24	0.78	1,400	67,576	539,807	79,514	43,653	700	732,651
	Percent Density or Biomass			***0.48***	***7.7***	***78***	***9.9***	***3.5***	***0.32***	
Tehek Lake - Far-field										
TEFF-37	27-Jul-15	34	0.75	0	158,848	2,356,184	313,112	8,184	2,600	2,838,928
TEFF-38	27-Jul-15	35	0.78	0	288,360	2,479,912	268,624	30,336	1,400	3,068,632
TEFF-39	28-Aug-15	30	0.87	1,800	265,808	1,200,144	180,800	28,936	15,168	1,692,656
TEFF-40	28-Aug-15	30	0.84	31,136	93,592	1,098,968	129,512	21,552	7,184	1,381,944
TEFF-41	4-Oct-15	35	0.87	3,200	496,496	1,370,760	290,560	29,536	7,784	2,198,336
TEFF-42	4-Oct-15	34	0.87	3,400	245,456	1,310,704	289,960	43,304	200	1,893,024
	Percent Density or Biomass			***0.30***	***12***	***75***	***11***	***1.2***	***0.26***	
Wally Lake										
WAL-49	15-May-15	18	0.73	0	17,831	425,632	10,546	92,753	100	546,861
WAL-50	15-May-15	16	0.75	0	14,184	485,816	4,500	59,338	200	564,038
WAL-51	19-Jul-15	35	0.81	7,184	58,272	2,161,800	138,912	83,824	8,184	2,458,176
WAL-52	19-Jul-15	37	0.84	0	93,792	1,594,064	102,992	18,968	9,584	1,819,400
WAL-53	19-Aug-15	41	0.88	800	1,316,072	1,689,240	460,040	129,944	600	3,596,696
WAL-54	19-Aug-15	46	0.87	7,384	1,251,216	1,265,384	515,512	95,440	15,568	3,150,504
WAL-55	26-Sep-15	38	0.86	200	526,032	2,084,176	283,640	86,056	30,536	3,010,640
WAL-56	26-Sep-15	36	0.87	0	476,244	1,875,840	428,088	154,696	29,536	2,964,404
WAL-57	22-Nov-15	23	0.84	0	39,907	588,653	22,084	31,969	300	682,913
WAL-58	22-Nov-15	24	0.85	0	53,592	461,293	16,692	51,599	600	583,776
	Percent Density or Biomass			***<0.1***	***20***	***65***	***10***	***4.2***	***0.49***	
	All 2015 Locations Relative Density or Biomass (%)			***0.30***	***11***	***71***	***15***	***2.9***	***0.36***	

Table 3.2–13. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Biomass (mg/m^3)						
				Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Tehek Lake										
TE-80	14-May-15	17	0.70	0	0.2	49	0.2	15	7.9	72
TE-81	14-May-15	17	0.71	0	2.7	60	1.3	25	9.2	98
TE-82	27-Jul-15	32	0.77	0	5.1	143	11	18	2.4	180
TE-83	27-Jul-15	35	0.84	1.9	4.5	225	21	22	13	288
TE-84	28-Aug-15	34	0.87	0.3	3.6	109	9.1	3.3	3.7	129
TE-85	28-Aug-15	31	0.89	0	5.0	107	14	0.3	3.2	129
TE-86	4-Oct-15	37	0.85	0.7	7.2	122	11	11	2.8	154
TE-87	4-Oct-15	36	0.85	0.5	3.3	142	22	9.2	0.2	178
TE-88	21-Nov-15	25	0.82	0.2	1.3	45	1.9	4.0	2.0	54
TE-89	21-Nov-15	24	0.78	0.3	0.6	41	2.8	5.7	10	61
	Percent Density or Biomass			***0.30***	***2.8***	***78***	***8.4***	***6.6***	***3.5***	
Tehek Lake - Far-field										
TEFF-37	27-Jul-15	34	0.75	0	3.6	207	13	1.6	14	240
TEFF-38	27-Jul-15	35	0.78	0	7.6	248	14	4.1	8.1	282
TEFF-39	28-Aug-15	30	0.87	0.3	5.9	116	12	1.6	7.6	144
TEFF-40	28-Aug-15	30	0.84	0.9	1.7	113	7.8	1.1	3.4	128
TEFF-41	4-Oct-15	35	0.87	1.1	12	155	16	3.2	9.8	198
TEFF-42	4-Oct-15	34	0.87	1.1	4.8	170	17	4.8	1.2	198
	Percent Density or Biomass			***0.29***	***3.0***	***85***	***6.7***	***1.4***	***3.7***	
Wally Lake										
WAL-49	15-May-15	18	0.73	0	0.1	20	16	12	0.1	47
WAL-50	15-May-15	16	0.75	0	0.1	23	8.9	7.7	1.0	41
WAL-51	19-Jul-15	35	0.81	0.3	1.3	246	11	11	12	281
WAL-52	19-Jul-15	37	0.84	0	3.2	181	12	6.9	18	220
WAL-53	19-Aug-15	41	0.88	0.3	24	137	81	24	5.5	273
WAL-54	19-Aug-15	46	0.87	1.1	21	99	82	27	15	245
WAL-55	26-Sep-15	38	0.86	0.3	12	184	23	33	35	287
WAL-56	26-Sep-15	36	0.87	0	16	179	19	36	21	271
WAL-57	22-Nov-15	23	0.84	0	3.1	47	2.7	8.3	4.2	65
WAL-58	22-Nov-15	24	0.85	0	4.9	45	4.8	13	1.8	69
	Percent Density or Biomass			***0.11***	***5.1***	***66***	***7.2***	***13***	***9.0***	
	All 2015 Locations Relative Density or Biomass (%)			***0.21***	***3.0***	***76***	***10***	***5.7***	***5.4***	

Table 3.2–14. Results of BACI test for phytoplankton variables at Meadowbank areas.

Parameter Measured	Test Area	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
Total biomass	TPN	7	5	0.16	0.27	0.569	17	-36	113
	TPE	8	5	-0.33	0.22	0.170	-28	-56	18
	SP	6	5	0.18	0.3	0.557	20	-39	133
	WAL	19	5	0.08	0.2	0.682	8	-28	63
	TPS	24	3	-0.27	0.31	0.406	-23	-60	46
	TE	6	5	0.17	0.22	0.475	18	-29	97
	TEFF	17	3	-0.13	0.16	0.419	-12	-37	22
Species	TPN	7	5	0	0.07	0.979	0	-15	17
	TPE	8	5	-0.1	0.06	0.154	-9	-21	4
	SP	6	5	0.03	0.08	0.682	3	-14	24
	WAL	19	5	-0.02	0.06	0.778	-2	-14	12
	TPS	24	3	-0.02	0.1	0.871	-2	-20	21
	TE	6	5	0.05	0.08	0.513	5	-11	25
	TEFF	17	3	-0.01	0.05	0.796	-1	-12	11

Notes:
*** Bolded** values are p-values < 0.1
Shaded cells indicate negative effect sizes (reductions) of 20% or more
Test area = area compared to control (INUG)
n(B) = number of months in the "before" period
n(A) = number of months in the "after" period (i.e., in 2014)
Estimate = BACI model estimate of the 2014 change in mean for log-transformed data
SE = standard error of the estimate
P-value = two-tailed test of the null hypothesis of no change
ES = estimated effect size (i.e., 100%*(exp[Estimate]-1))
LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Figure 3.2–64. Chlorophyll-*a* (µg/L) in water samples from Meadowbank study lakes since 2006.

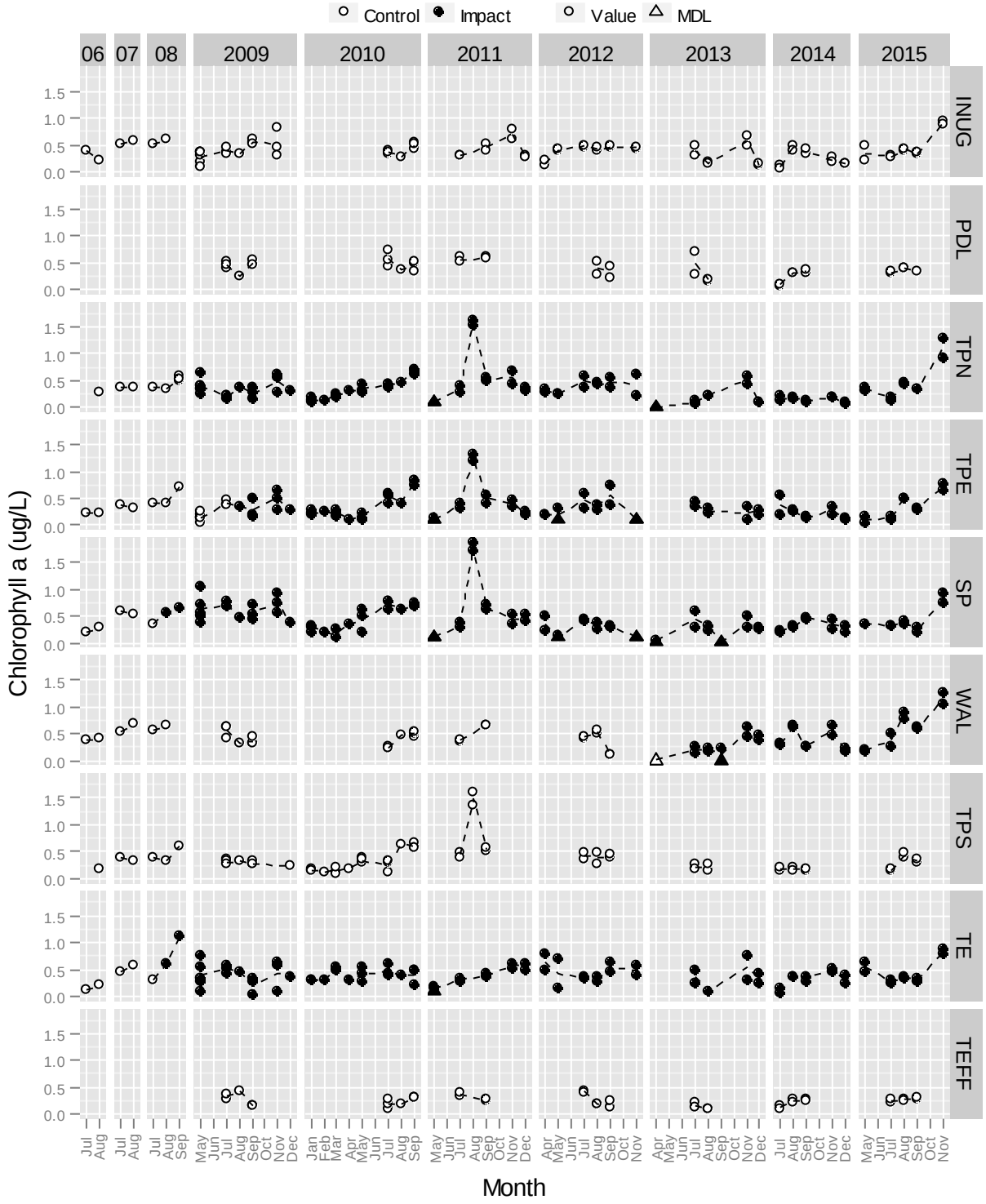


Figure 3.2–65. Total phytoplankton biomass (mg/m^3) from Meadowbank study lakes since 2006.

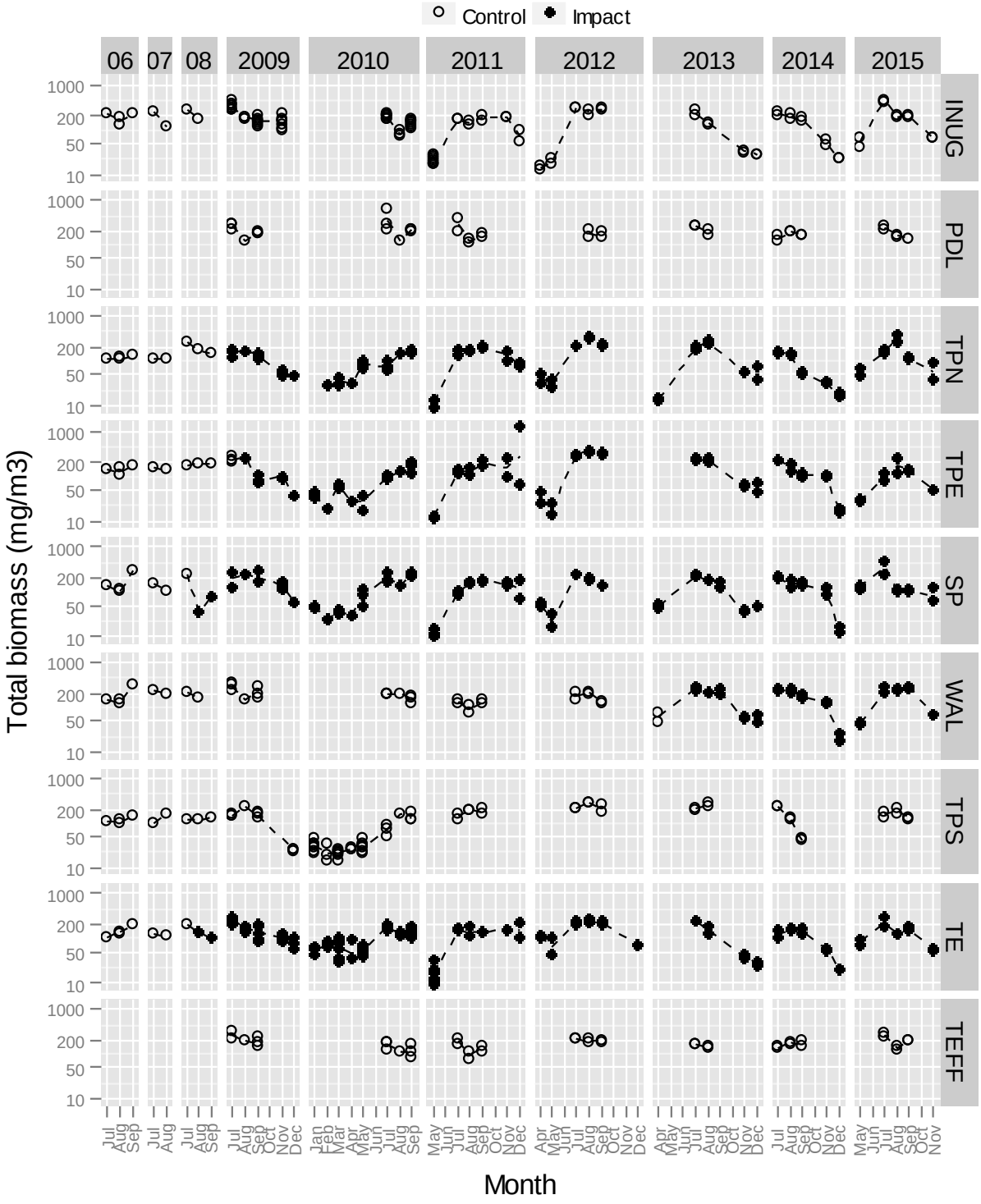


Figure 3.2–66. Phytoplankton biomass (mg/m^3) by major taxa group from Meadowbank study lakes since 2006.

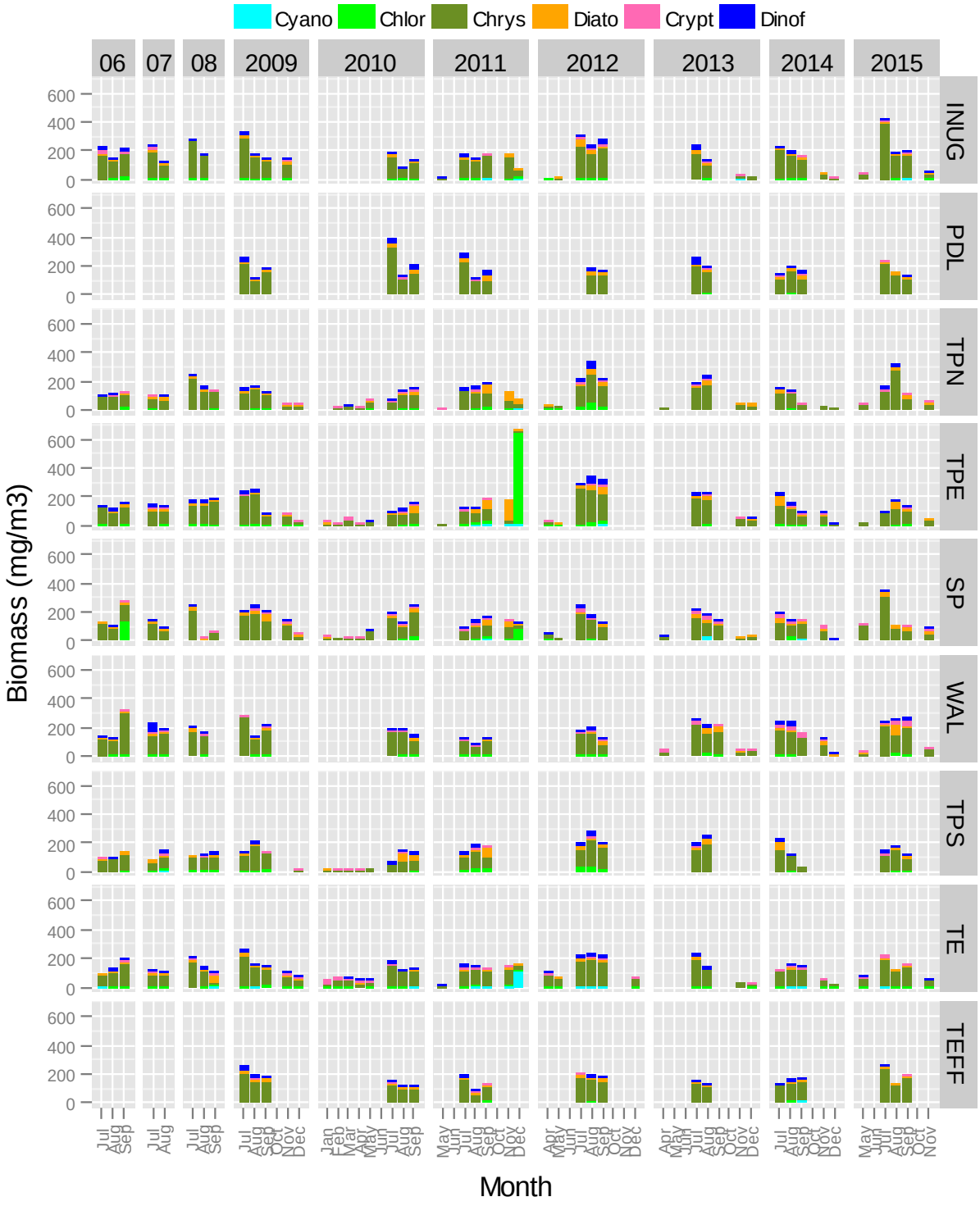


Figure 3.2–67. Relative phytoplankton biomass by major taxa group from Meadowbank study lakes since 2006.

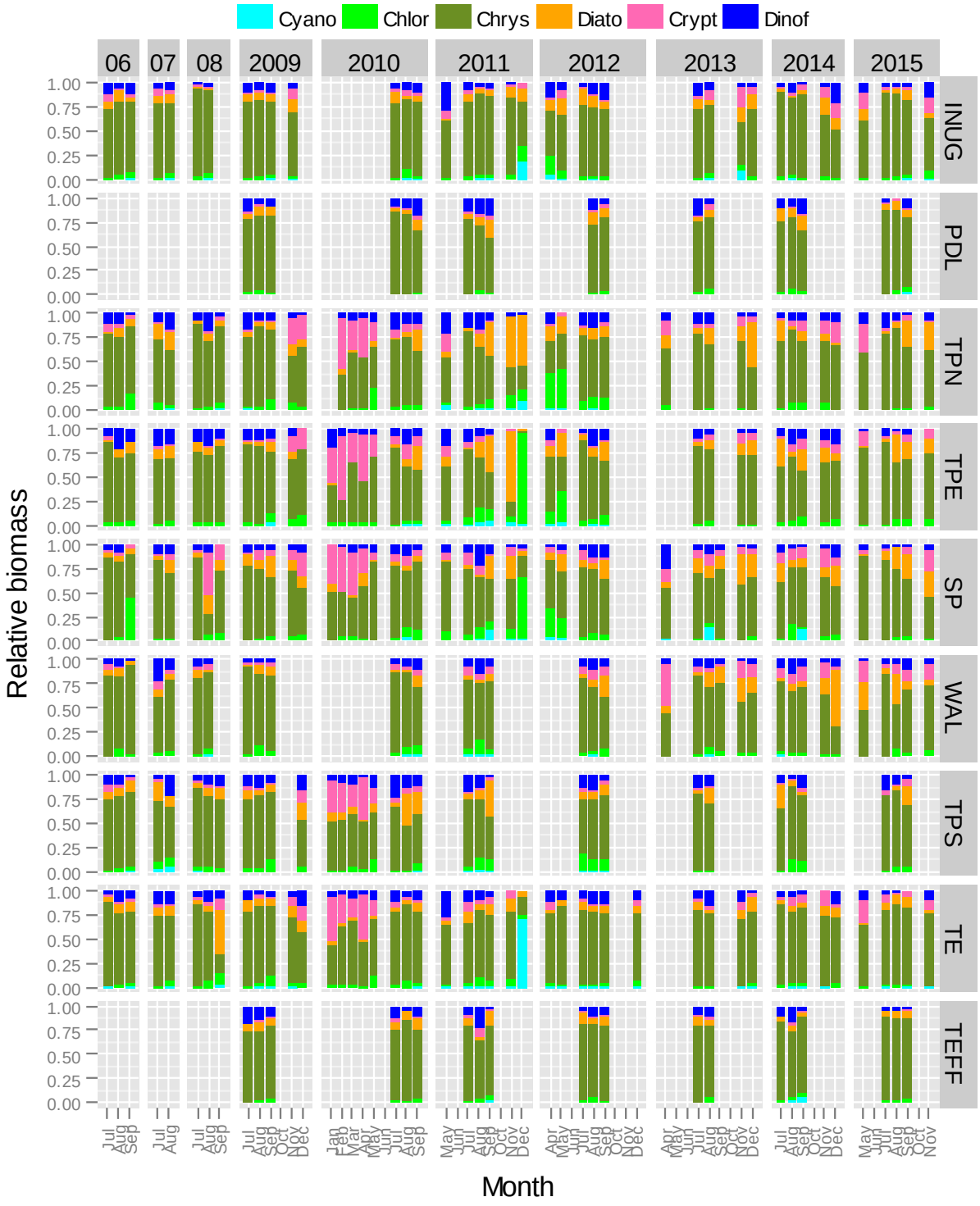
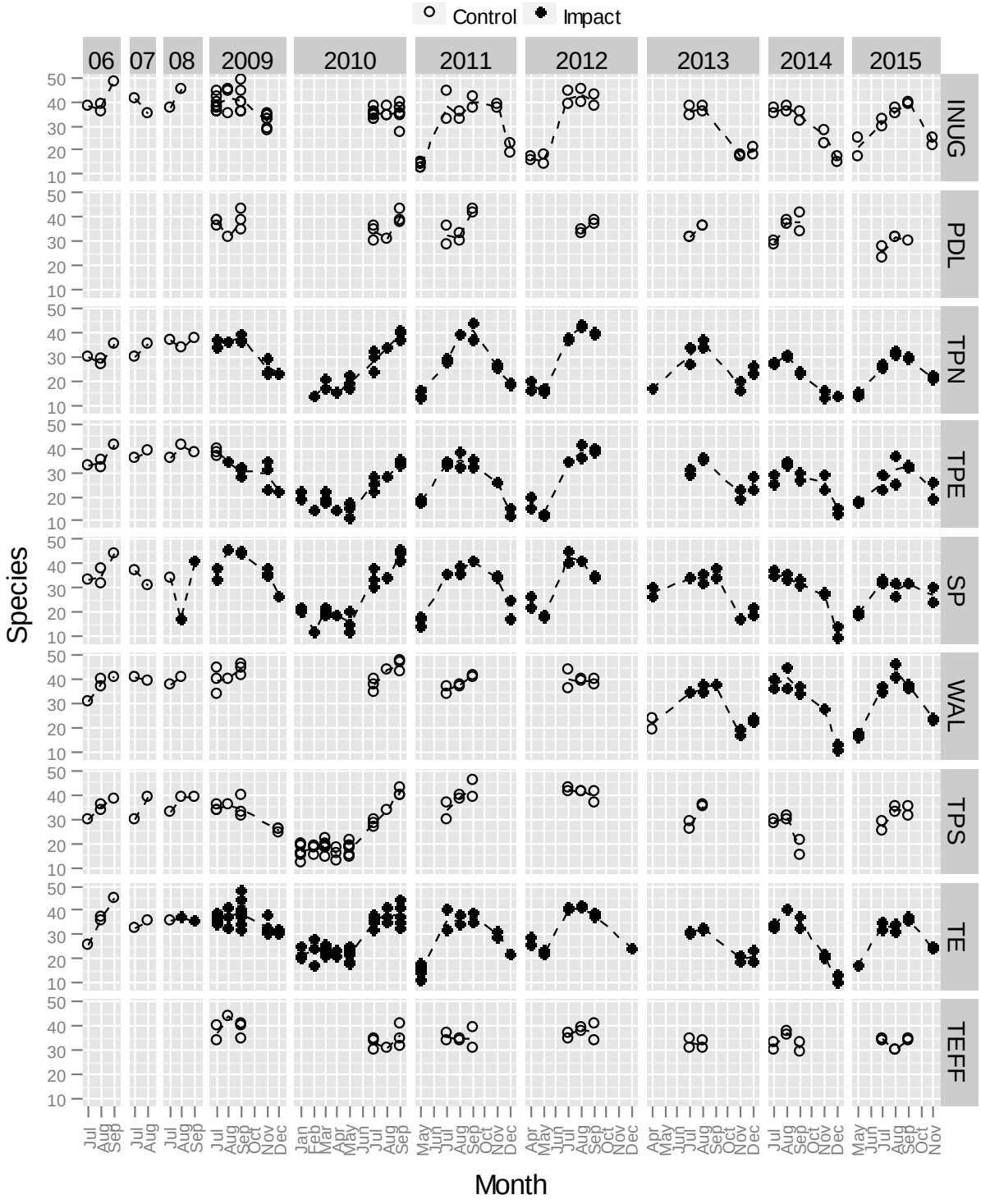


Figure 3.2–68. Phytoplankton species richness from Meadowbank study lakes since 2006.



3.2.5. Benthic Invertebrates

3.2.5.1. General Observations

The abundance and species composition of benthic invertebrates are strongly affected by water depth, substrate size and organic carbon. Other physical factors, such as water temperature, can influence larval development rates and ultimately timing of hatching for insect larvae. Consequently, even if sampling can be conducted simultaneously in all lakes (which is not practical), this would still not overcome differential timing of hatching of particular species between lakes. This is partly overcome in the CREMP by sampling during late fall, after the emergence of most groups, but is still a source of some variability.

Benthic invertebrate communities in the Meadowbank study lakes are typically characterized by low abundance and relatively few taxa. Abundance is generally less than 2,000 organisms/m^2 and is often less than 1,000 organisms/m^2 among both reference and exposure areas (e.g., **Figure 3.2–69**). Despite abundance generally being low at the study lakes, values above 5,000 organisms/m^2 are not uncommon for the area, and in a few cases estimates of abundance have exceeded 10,000 orgamsms/m^2 (e.g., WAL in 2006). Importantly, there can be substantial temporal variability within areas, as shown by the range in abundance values at TPE and WAL between 2006 and 2008 (**Figure 3.2–69**).

Taxa richness typically ranged from 8 to 12 for most area-year combinations (**Figure 3.2–73**). Typical of most Arctic lakes, the benthic invertebrate community has been dominated by the aquatic larval stages of insects, especially chironomids (Family Chironomidae), both in terms of abundance and taxa richness (e.g., **Figure 3.2–71** and **Figure 3.2–74**). The next most abundant group was Mollusca (clams) especially, *Cyclocalyx / Neopisidium*, genera of the family Sphaeriidae (fingernail clams). Oligochaete worms were also relatively abundant in the lake sediments; generally, at least one oligochaete taxon was present at most area/year combinations.

3.2.5.2. Temporal and Spatial Trend Interpretation

Benthic invertebrate abundance and richness results from the Meadowbank study lakes in 2015 are summarized in **Table 3.2–15** by major taxa group (i.e., Insecta, Mollusca, Oligochaeta, and other taxa[19]). Raw data are provided in **Appendix D** showing the organism counts by taxa for each of the replicate samples collected in 2015.

Time-series plots showing abundance and richness endpoints are presented in **Figure 3.2–69** to **Figure 3.2–74**. Below are descriptions of the endpoints based on Environment Canada guidance (EEM, 2011):

- *Total abundance* – the number of individual organisms per m^2, this metric is a measure of community density.
- *Total richness* – the number of different taxa (identified to the lowest practical taxonomic level, usually species) per grab.
- *Major taxa group abundance* – similar to total abundance, but broken down by major taxa group.
- *Major taxa group relative abundance* – proportional abundance of each major taxa group.
- *Major taxa group richness* – similar to total richness, but broken down by major taxa group.
- *Major taxa group relative richness* – proportional richness of each major taxa group.

[19] "Other taxa" includes flatworms (Turbellaria) and arthropods (Acalyptonotidae, Hygrobatidae, Lebertiidae, Oxidae, and O. Notostraca).

Other benthic invertebrate community results presented in **Appendix E**, but not discussed in detail include time-series plots of abundance and richness within each major taxa group, Simpson's Diversity[20] and Bray-Curtis Index values[21].

The identification of potential mine-related impacts generally involved visually examining the data for spatial/temporal patterns that matched mine-related events. Visual examination of the data was further supported with statistical analyses of the 2015 data to test for changes relative to baseline/reference conditions using the BACI model (see **Section 2.5.4** for details). The BACI comparisons involved looking at longer-term trends (i.e., up to four-year trends) and focused only on benthic invertebrate abundance and taxa richness. Details regarding historical trends (e.g., related to sedimentation events) are discussed in the 2011 CREMP (Azimuth, 2012a) and the 2011 EAS (Azimuth, 2012b). This report focuses on the 2015 results and trends over the last four years, similar to the approach taken in recent CREMP reports (Azimuth, 2014; Azimuth 2015b). BACI model results for benthic invertebrate abundance and richness are presented in **Table 3.2–16** and **Table 3.2–17**, respectively. Key results are described below:

- *Total abundance* – Abundance results were somewhat variable in 2015, with INUG, TPN, TPS, and TE showing either their highest (TPN, TPS, TE) or second highest (INUG) mean abundance across all years. By comparison, TPE, TEFF, and WAL were within the range of previous years (**Figure 3.2–69**). The highest abundance, as well as the greatest spatial variability, was observed at TPS with between ~3,500 and 12,000 organisms per m^2 (**Table 3.2–15**). Total abundance was particularly high in three of the five replicates at TPS (>6,000 organisms/m^2) with increased abundance of chironomid larvae (*Micropsectra* and *Paratanytarsus*), chironomid pupae, and fingernail clams (*Cyclocalyx/Neopisidium*). The presence of relatively high abundance of chironomid pupae corresponds to the timing of collection at TPN and TPS earlier in the program. With the exception of SP, all of the other Meadowbank areas were sampled after returning from Baker Lake on August 18th. An average of 25 to 30 pupae was enumerated in each replicate from TPN and TPS. By comparison, only 6 chironomid pupae counted in all of the replicates combined from INUG, PDL, TPE, TE, TEFF, and WAL that were sampled after August 18th (**Appendix D**). Based on these results, it appears that sampling at TPN and TPS occurred either during or prior to emergence of a chironomid cohort. As a result, higher total abundance at these locations is attributed, in part, to a sampling artifact (i.e., timing of collection) rather than physical, chemical, or environmental conditions at TPN and TPS. That said, the percentage of pupae relative to total abundance in each of the TPN and TPS was generally between 10% and 20% at these areas, so while adding some variability it is not of sufficient magnitude to obscure the primary conclusions reported herein.

  The comparatively high total abundance at INUG in 2015 resulted in an apparent decrease in relative abundance at TPE, TEFF, and WAL in the BACI analysis, although none of the results were statistically significant (**Table 3.2–16**). The same observation was also observed in 2013, when comparatively high abundance at INUG resulted in apparent decreases in benthic invertebrate productivity at TPE, TEFF, and WAL. The opposite trend was observed in 2014 due to lower total abundance at INUG, and as a result, WAL was the only area where relative abundance was lower than 20% in the BACI analysis of the 2014-2015 'after' period (**Table 3.2–**

[20] Simpson's Diversity takes into account both the abundance patterns and taxa richness of the community based on the proportion of individuals that each taxa contributes to total abundance.

[21] Bray-Curtis Index is a distance coefficient (based on comparison of a site to one or more [pooled] reference sites) that ranges between 0 (both identical) to 1 (completely different). The index measures the percentage of difference between sites.

16). Overall, none of these areas show a consistent decreasing trend in invertebrate abundance that could be attributable to mining activity and none were statistically significant relative to each other or to reference area lakes.

- *Major taxa group abundance and relative abundance* – Insects were the dominant taxa group followed by molluscs (**Figure 3.2–70** and **Figure 3.2–71**). While there were no apparent trends in composition changes related to mining, it is notable that most peaks (or valleys) in total abundance over the years appear to be driven by changes in abundance of insects (predominantly chironomids). Notable examples of this are WAL in 2006 and TPS in 2015
- *Taxa richness* – Taxa richness was generally higher in 2015 relative to previous years, and was ranked the highest across all years at TPE, TPS, TE, and TEFF in 2015 (**Figure 3.2–72**). Most areas averaged between 11 and 14 taxa, the exceptions being PDL (9 taxa) and TPS (17 taxa) (**Table 3.2–15**). The BACI results showed no statistically significant decreases in richness at near-field, mid-field, or far-field areas in 2015 or the longer term 2, 3 and 4-yr after periods (**Table 3.2–17**). Despite some within-year variability in taxa richness, the Meadowbank study areas show either stable or slightly increasing taxa richness across near-field areas.
- *Major taxa group richness and relative richness* – Similar to abundance, insects were dominant in terms of absolute and proportional (generally over 50%) richness, followed by molluscs (~10 to 20%) (**Figure 3.2–73** and **Figure 3.2–74**). There were no apparent trends in composition related to mining.

Benthic invertebrate community abundance and richness were particularly high for a number of areas in 2015, most notably TPS and INUG. Despite some variability, the benthic invertebrate metrics (total abundance and taxa richness) were generally within the range reported for the various locations, with no apparent decreasing trends. In summary, no mine-related effects to the benthic invertebrate communities in the Meadowbank project lakes were observed in 2015.

Table 3.2–15. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Depth (m)	Abundance (#/m^2)					Richness (# taxa)					Simpson's Diversity	Bray-Curtis Index
			Oligochaetes	Insects	Molluscs	Other Taxa	**Total**	Oligochaetes	Insects	Molluscs	Other Taxa	**Total**		
Inuggugayualik Lake														
INUG-1	27-Aug-15	6.9	22	565	348	0	935	1	7	2	0	10	0.83	0.48
INUG-2	27-Aug-15	7.1	43	1696	630	0	2370	1	13	3	0	17	0.88	0.23
INUG-3	27-Aug-15	7.6	130	1609	457	65	2261	1	10	3	2	16	0.87	0.28
INUG-4	27-Aug-15	8.9	22	1304	391	0	1717	1	9	2	0	12	0.79	0.35
INUG-5	27-Aug-15	8.1	43	935	435	0	1413	1	6	2	0	9	0.84	0.34
	Area Mean		***52***	***1222***	***452***	***13***	***1739***	***1***	***9***	***2***	***0***	***13***	***0.84***	***0.33***
Pipedream Lake														
PDL-1	26-Aug-15	6.8	0	1239	196	0	1435	0	9	2	0	11	0.86	0.54
PDL-2	26-Aug-15	6.6	87	957	304	22	1370	2	7	1	1	11	0.84	0.46
PDL-3	26-Aug-15	8	0	891	435	43	1370	0	6	1	2	9	0.76	0.52
PDL-4	26-Aug-15	7.8	43	370	196	0	609	1	4	1	0	6	0.77	0.61
PDL-5	26-Aug-15	8.7	0	783	283	43	1109	0	6	1	1	8	0.75	0.52
	Area Mean		***26***	***848***	***283***	***22***	***1178***	***1***	***6***	***1***	***1***	***9***	***0.79***	***0.53***
Second Portage Lake														
SP-1	13-Aug-15	8.9	43	1261	674	22	2000	2	8	2	1	13	0.89	0.51
SP-2	13-Aug-15	9.1	0	1022	565	109	1696	0	7	2	2	11	0.86	0.51
SP-3	13-Aug-15	8.3	22	1587	500	0	2109	1	7	2	0	10	0.79	0.52
SP-4	13-Aug-15	7.6	22	1326	565	174	2087	1	13	2	2	18	0.91	0.49
SP-5	13-Aug-15	7.8	22	1087	630	43	1783	1	9	2	2	14	0.83	0.57
	Area Mean		***22***	***1257***	***587***	***70***	***1935***	***1***	***9***	***2***	***1***	***13***	***0.85***	***0.52***
Tehek Lake														
TE-1	28-Aug-15	7.7	43	587	717	22	1370	1	8	2	1	12	0.73	0.53
TE-2	28-Aug-15	7.4	22	1196	630	65	1913	1	12	1	1	15	0.81	0.49
TE-3	28-Aug-15	7.9	22	783	435	130	1370	1	6	1	2	10	0.78	0.60
TE-4	28-Aug-15	7.2	130	848	543	152	1674	2	9	2	3	16	0.83	0.46
TE-5	28-Aug-15	7.2	22	1174	261	22	1478	1	9	1	1	12	0.72	0.54
	Area Mean		***48***	***917***	***517***	***78***	***1561***	***1***	***9***	***1***	***2***	***13***	***0.77***	***0.52***
Tehek Lake - Far-field														
TEFF-1	28-Aug-15	8.2	0	696	196	87	978	0	8	1	3	12	0.83	0.70
TEFF-2	28-Aug-15	7.9	0	609	370	0	978	0	12	1	0	13	0.82	0.57
TEFF-3	28-Aug-15	7.7	0	478	22	109	609	0	8	1	2	11	0.90	0.68
TEFF-4	28-Aug-15	7.8	0	304	174	130	609	0	7	1	2	10	0.87	0.68
TEFF-5	28-Aug-15	7.4	0	804	174	43	1022	0	9	1	1	11	0.85	0.54
	Area Mean		***0***	***578***	***187***	***74***	***839***	***0***	***9***	***1***	***2***	***11***	***0.85***	***0.63***
Third Portage Lake - East Basin														
TPE-1	30-Aug-15	8.5	87	1891	522	65	2565	2	12	1	2	17	0.88	0.53
TPE-2	30-Aug-15	9	109	1870	326	22	2326	2	10	1	1	14	0.80	0.54
TPE-3	30-Aug-15	6.8	87	2000	674	22	2783	2	10	1	1	14	0.86	0.58
TPE-4	30-Aug-15	6.8	109	2217	717	22	3065	3	10	1	1	15	0.83	0.56
TPE-5	30-Aug-15	7.1	109	2000	1065	0	3174	1	9	1	0	11	0.82	0.64
	Area Mean		***100***	***1996***	***661***	***26***	***2783***	***2***	***10***	***1***	***1***	***14***	***0.84***	***0.57***

Table 3.2–15. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Meadowbank study lakes, 2015.

Area-Replicate	Date	Depth (m)	Abundance (#/m^2)					Richness (# taxa)					Simpson's Diversity	Bray-Curtis Index
			Oligochaetes	Insects	Molluscs	Other Taxa	**Total**	Oligochaetes	Insects	Molluscs	Other Taxa	**Total**		
Third Portage Lake - North Basin														
TPN-1	14-Aug-15	8.6	0	2978	696	0	3674	0	8	1	0	9	0.88	0.59
TPN-2	14-Aug-15	8.7	65	3239	196	0	3500	1	8	1	0	10	0.84	0.66
TPN-3	14-Aug-15	8.3	22	2761	522	0	3304	1	10	1	0	12	0.85	0.57
TPN-4	14-Aug-15	8.4	0	2500	326	0	2826	0	9	1	0	10	0.89	0.53
TPN-5	14-Aug-15	10.5	0	2022	87	0	2109	0	12	1	0	13	0.83	0.64
	Area Mean		***17***	***2700***	***365***	***0***	***3083***	***0***	***9***	***1***	***0***	***11***	***0.86***	***0.60***
Third Portage Lake - South Basin														
TPS-1	14-Aug-15	8.3	587	9391	2587	0	12565	4	11	1	0	16	0.86	0.83
TPS-2	14-Aug-15	9	65	5826	761	0	6652	2	11	1	0	14	0.88	0.71
TPS-3	14-Aug-15	7.0	87	5870	848	0	6804	3	16	1	0	20	0.85	0.74
TPS-4	14-Aug-15	9.5	22	2978	413	22	3435	1	14	1	1	17	0.89	0.57
TPS-5	14-Aug-15	8.2	130	2587	1065	0	3783	3	14	1	0	18	0.85	0.61
	Area Mean		***178***	***5330***	***1135***	***4***	***6648***	***3***	***13***	***1***	***0***	***17***	***0.87***	***0.69***
Wally Lake														
WAL-1	19-Aug-15	8.7	43	565	304	0	913	1	9	2	0	12	0.90	0.51
WAL-2	19-Aug-15	8.3	43	1957	587	22	2609	1	8	2	1	12	0.78	0.60
WAL-3	19-Aug-15	8.8	43	239	239	0	522	1	3	1	0	5	0.71	0.65
WAL-4	19-Aug-15	8.9	43	2543	674	109	3370	1	9	2	3	15	0.84	0.60
WAL-5	19-Aug-15	8.4	22	1609	587	43	2261	1	6	2	1	10	0.81	0.58
	Area Mean		***39***	***1383***	***478***	***35***	***1935***	***1***	***7***	***2***	***1***	***11***	***0.81***	***0.59***

Table 3.2–16. Results of BACI tests for benthic invertebrate abundance at Meadowbank areas.

After Period	Test Area	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2015	TPN	2	1	0.65	0.47	0.80	91	-99	70441
	TPE	3	1	-0.60	0.67	0.23	-45	-97	866
	SP	2	1	0.31	0.26	0.78	36	-95	3582
	TPS	9	1	0.94	0.37	0.98	157	9	503
	TE	2	1	-0.11	0.24	0.36	-10	-96	1809
	TEFF	6	1	-0.63	0.46	0.11	-47	-84	73
	WAL	7	1	-0.89	0.98	0.20	-59	-96	351
2014-15	TPN	2	2	0.09	0.67	0.55	9	-94	1848
	TPE	3	2	-0.11	0.57	0.43	-10	-85	457
	SP	2	2	0.99	0.57	0.89	168	-77	3083
	TPS	8	2	0.68	0.28	0.98	98	4	277
	TE	2	2	0.22	0.41	0.68	24	-79	624
	TEFF	5	2	-0.01	0.42	0.49	-1	-66	188
	WAL	7	2	-0.23	0.72	0.38	-21	-85	332
2013-15	TPN	2	3	-0.04	0.53	0.47	-4	-82	412
	TPE	3	3	-0.40	0.54	0.25	-33	-85	196
	SP	2	3	0.76	0.52	0.88	113	-59	1021
	TPS	7	3	0.21	0.30	0.75	23	-38	145
	TE	2	3	-0.19	0.57	0.38	-17	-86	400
	TEFF	4	3	-0.34	0.35	0.19	-29	-71	75
	WAL	7	3	-0.54	0.59	0.20	-42	-85	129
2012-15	TPN	2	4	0.00	0.44	0.50	0	-70	237
	TPE	3	4	-0.25	0.48	0.31	-22	-77	168
	SP	2	4	0.64	0.51	0.86	89	-54	669
	TPS	6	4	0.26	0.27	0.81	30	-31	144
	TE	2	4	-0.25	0.50	0.32	-22	-80	213
	TEFF	3	4	-0.32	0.35	0.21	-27	-71	80
	WAL	6	4	-0.51	0.56	0.19	-40	-83	116

Notes:
*** Bolded** values are p-values < 0.1
Shaded cells indicate negative effect sizes (reductions) of 20% or more
Test area = area compared to control (INUG)
n(B) = number of years in the "before" period
n(A) = number of years in the "after" period
Estimate = BACI model estimate of the after-period change in mean for log-transformed data
SE = standard error of the estimate
p-value = one-tailed test of the null hypothesis of no change or an increase in mean
ES = estimated effect size (i.e., 100%*(exp[Estimate]-1))
LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Table 3.2–17. Results of BACI tests for benthic invertebrate taxa richness at Meadowbank areas.

After Period	Test Area	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2015	TPN	2	1	0.26	0.24	0.76	29	-94	2747
	TPE	3	1	0.20	0.15	0.84	22	-37	136
	SP	2	1	0.41	0.21	0.85	51	-89	2054
	TPS	9	1	0.46	0.18	0.98	59	5	140
	TE	2	1	0.46	0.22	0.86	58	-90	2469
	TEFF	6	1	0.04	0.27	0.56	4	-48	110
	WAL	7	1	-0.11	0.31	0.36	-11	-58	90
2014-15	TPN	2	2	0.09	0.24	0.63	10	-60	203
	TPE	3	2	0.22	0.12	0.91	25	-16	85
	SP	2	2	0.58	0.20	0.95	78	-25	326
	TPS	8	2	0.43	0.13	0.99	53	13	108
	TE	2	2	0.42	0.18	0.93	52	-30	232
	TEFF	5	2	0.18	0.21	0.79	20	-29	104
	WAL	7	2	0.07	0.22	0.62	7	-37	82
2013-15	TPN	2	3	0.13	0.19	0.73	14	-37	107
	TPE	3	3	0.15	0.11	0.88	16	-14	55
	SP	2	3	0.41	0.26	0.89	51	-34	242
	TPS	7	3	0.16	0.15	0.84	18	-17	68
	TE	2	3	0.24	0.32	0.75	27	-54	252
	TEFF	4	3	-0.04	0.19	0.42	-4	-41	57
	WAL	7	3	-0.05	0.19	0.41	-5	-39	49
2012-15	TPN	2	4	0.19	0.17	0.83	21	-25	93
	TPE	3	4	0.17	0.10	0.93	18	-8	53
	SP	2	4	0.45	0.22	0.94	56	-15	186
	TPS	6	4	0.17	0.14	0.86	18	-15	64
	TE	2	4	0.22	0.27	0.77	24	-41	160
	TEFF	3	4	-0.11	0.20	0.30	-10	-46	48
	WAL	6	4	0.04	0.18	0.58	4	-32	57

Notes:
*** Bolded** values are p-values < 0.1
Shaded cells indicate negative effect sizes (reductions) of 20% or more
Test area = area compared to control (INUG)
n(B) = number of years in the "before" period
n(A) = number of years in the "after" period
Estimate = BACI model estimate of the after-period change in mean for log-transformed data
SE = standard error of the estimate
p-value = one-tailed test of the null hypothesis of no change or an increase in mean
ES = estimated effect size (i.e., 100%*(exp[Estimate]-1))
LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Figure 3.2–69. Benthic invertebrate total abundance (#/m^2) from Meadowbank study lakes since 2006.

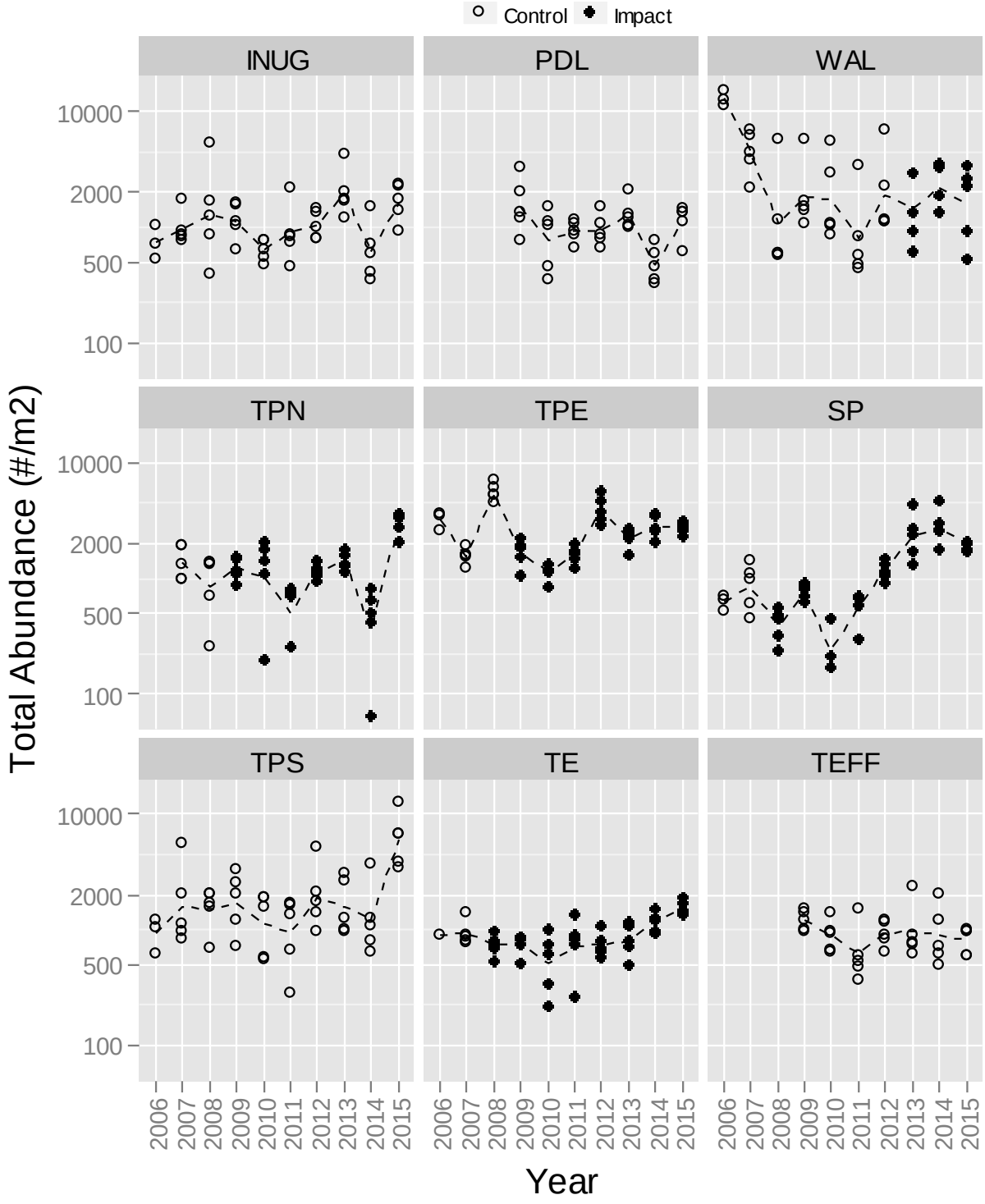


Figure 3.2–70. Benthic invertebrate abundance (#/m^2) by major taxa group from Meadowbank study lakes since 2006.

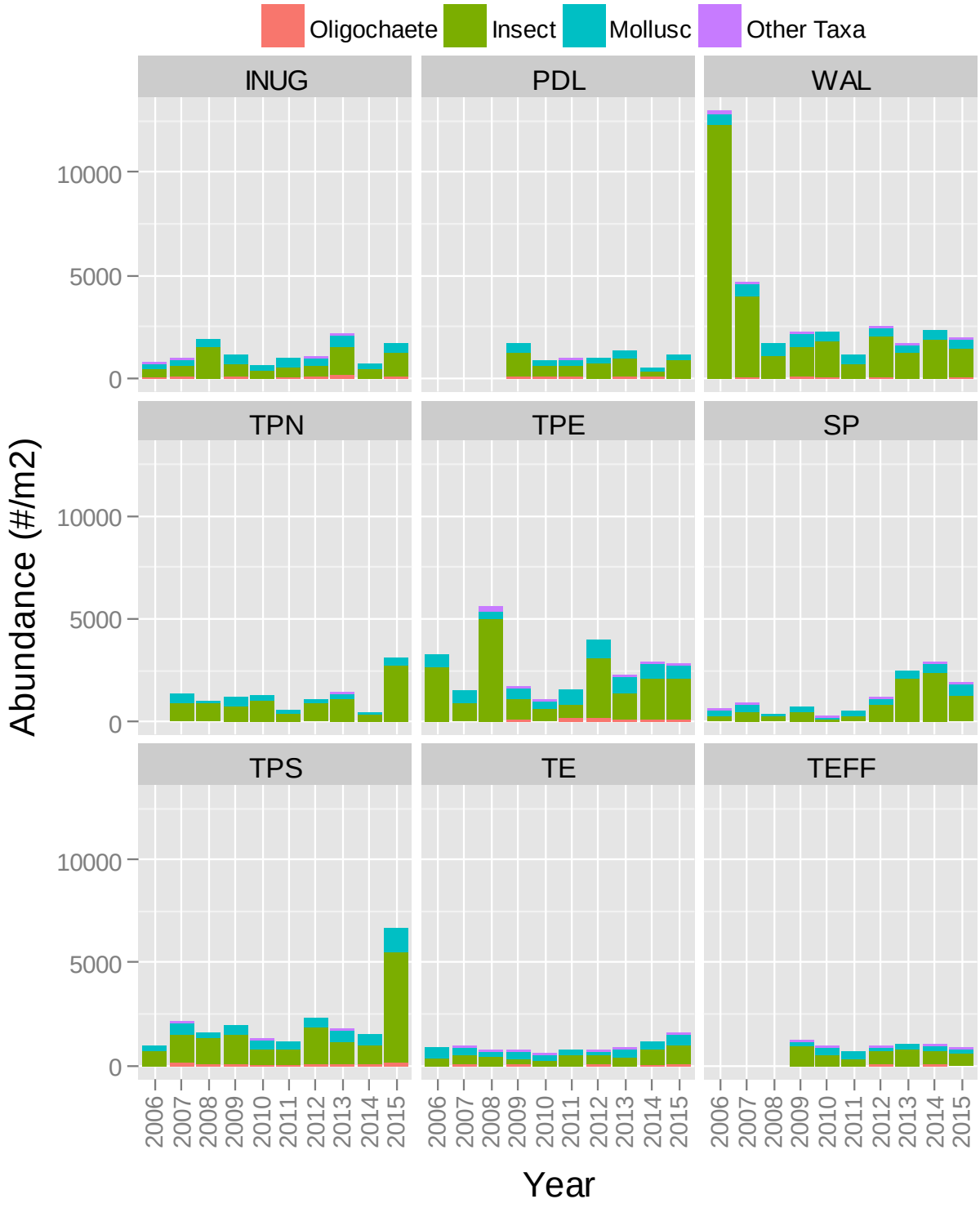


Figure 3.2–71. Benthic invertebrate relative abundance by major taxa group from Meadowbank study lakes since 2006.

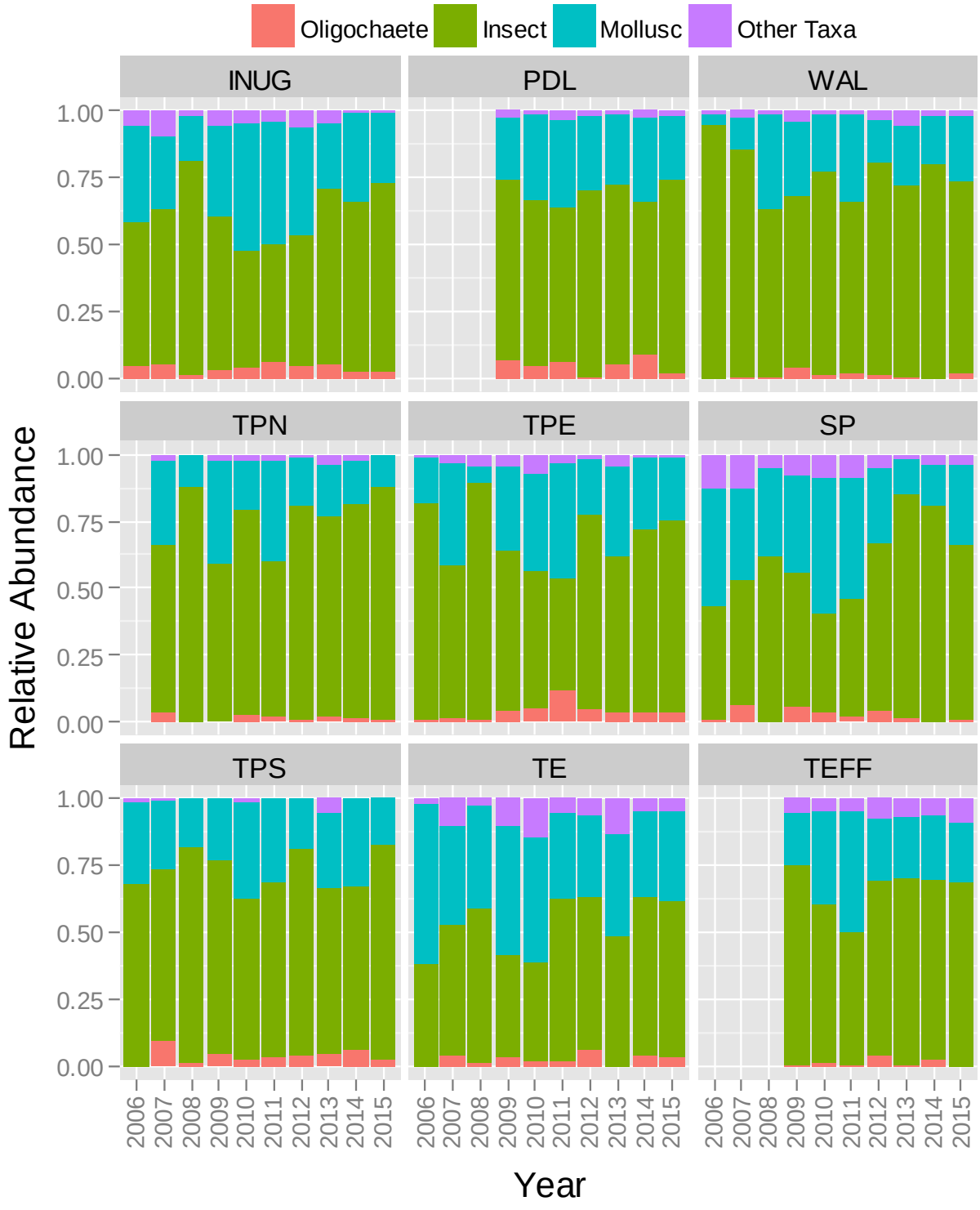


Figure 3.2–72. Benthic invertebrate total richness (# taxa) from Meadowbank study lakes since 2006.

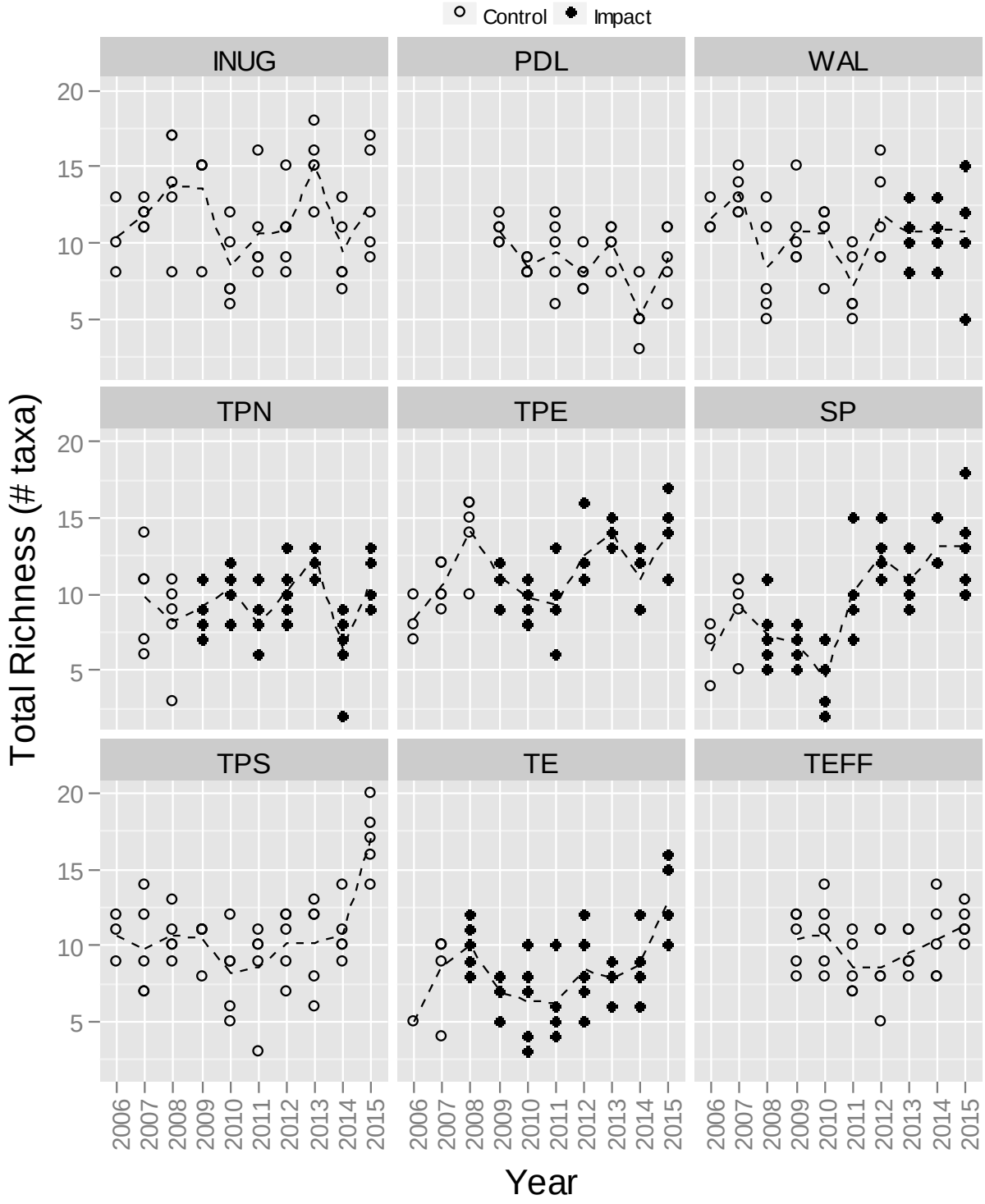


Figure 3.2–73. Benthic invertebrate richness (# taxa) by major taxa group from Meadowbank study lakes since 2006.

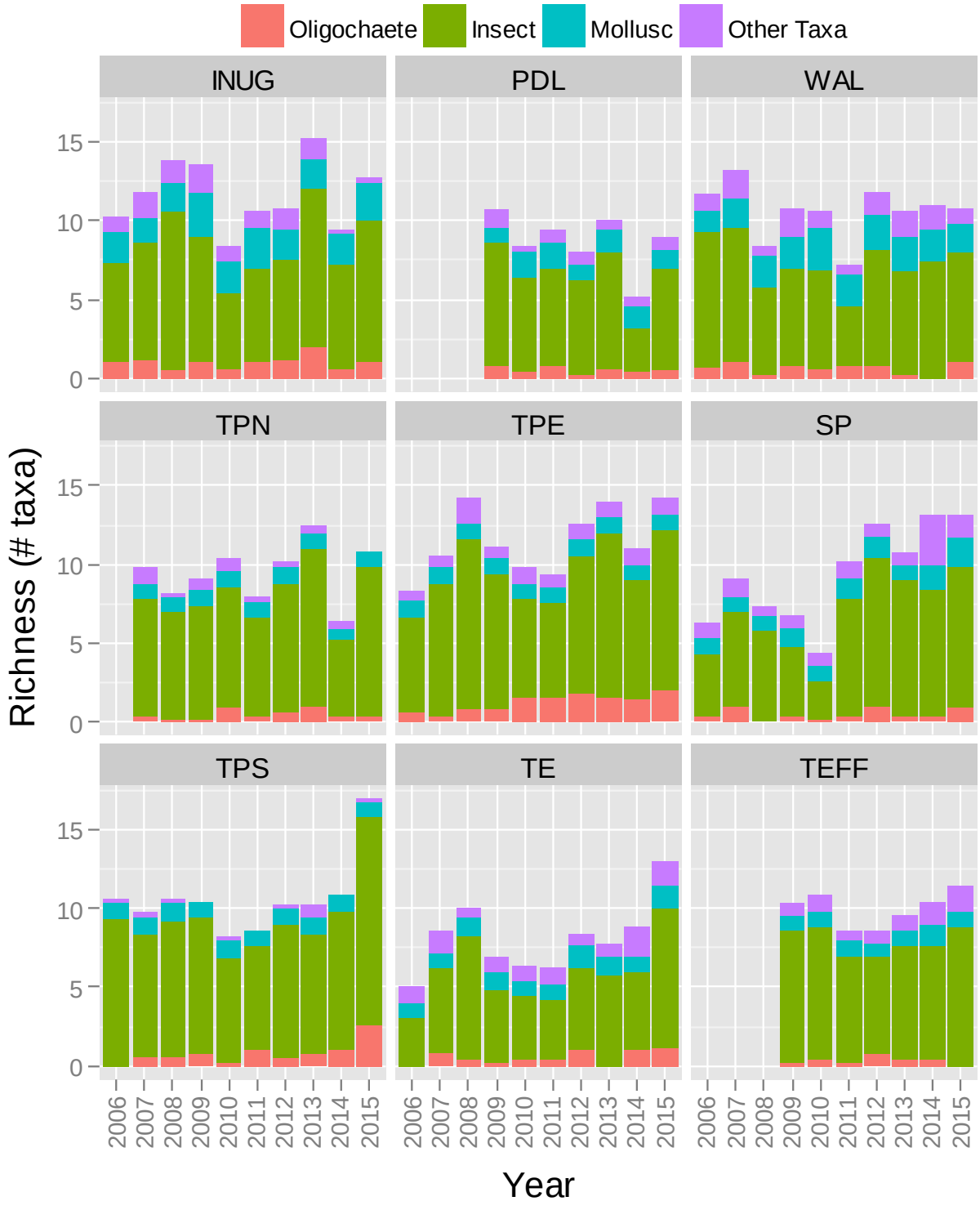
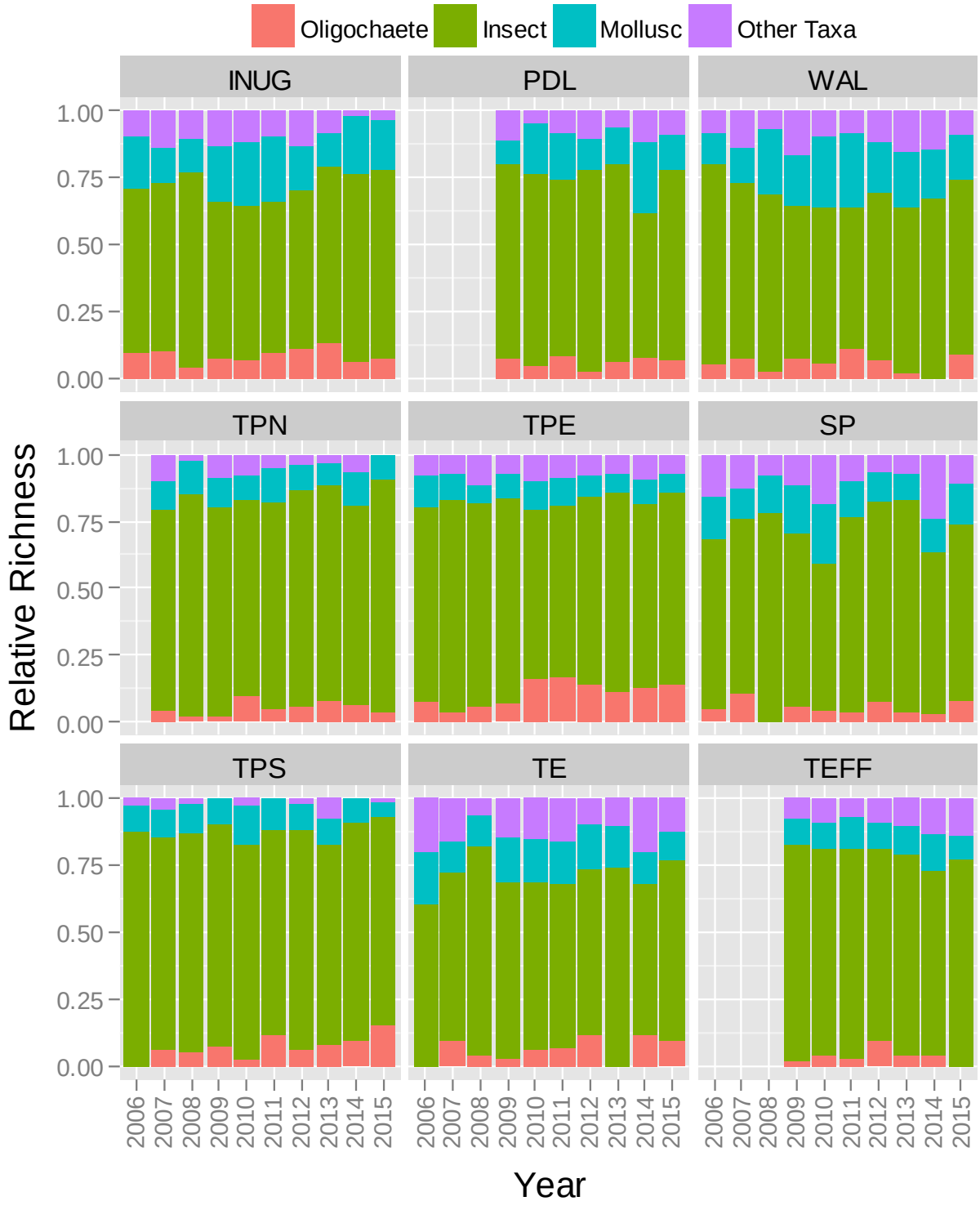


Figure 3.2–74. Benthic invertebrate relative richness by major taxa group from Meadowbank study lakes since 2006.



3.3. Baker Lake

3.3.1. Limnology

Throughout this discussion, the following abbreviations will be used for each lake area/basin: Baker Lake – Barge Dock, –Proposed Jetty (no longer a proposed jetty, but located adjacent to AEM's fuel storage area and the Meadowbank Spud Barge), –East Shore (sediment chemistry/benthic invertebrates only), –Akilahaarjuk Point (BBD, BPJ, BES, and BAP, respectively). Limnology surveys were conducted in July and August. The planned September sampling event was not completed due to inclement weather at Baker Lake (Tom Thompson. pers. comm. [email October 5th, 2015]).

3.3.1.1. General Observations

Baker Lake is a large lake with much greater wind fetch than the Meadowbank lakes and a unique limnology, due partly to its proximity to tidally influenced Chesterfield Inlet, influence of the Thelon River and deep water that is naturally elevated in dissolved solids. These natural complexities interact, leading to the "competing" influences of less-saline Thelon River water and more-saline Baker Lake water. Timing of sampling relative to freshet on the Thelon River, coupled with shifts in north/south wind speed and direction lead to variable degrees of horizontal and vertical mixing of the water column. When sampling near to the north shore, these factors may combine to confound the detection of potential changes in water quality related to barge activity, with the "signal" getting lost in the "noise" of natural variability in this dynamic location.

The following parameters are associated with more-saline or higher conductivity water that appears to be present in deep water (>12 m) and demonstrates considerable fluctuations within and between years. These include conductivity, hardness, calcium, chloride, magnesium, sodium and TDS. Other parameters also have a high level of natural variability and appear to be correlated with the above parameters in Baker Lake and include ammonia, nitrate, TKN, total phosphorus, sulphate and TOC/DOC.

As described below (and in **Section 3.3.2**), sampling results to date show marked differences in certain parameters (e.g., total dissolved solids and ancillary parameters such as water hardness, alkalinity and some nutrients) associated with hard (e.g., slightly brackish) water. Variability related to these factors potentially confounds the identification of development-related effects on local limnology and water quality. A deep limnology survey was conducted in August 2012 to better characterize Baker Lake limnology at depth. All parameters measured (temperature, conductivity, dissolved oxygen, pH, total dissolved solids and salinity) showed a strong and abrupt stratification from 8 - 12 m depth at areas BBD 1 and 2, and BPJ. For example, conductivity increased from <20 µS/cm in shallow, near-shore water, to >200 µS/cm between 8 and 12 m depth, depending on location. Conductivity remained uniformly high to the maximum depth sampled (40 m).

3.3.1.2. Temporal and Spatial Trend Interpretation

The major mine-related activity that occurs in this area is seasonal barge traffic, which begins around mid-August and may continue through September. It should also be noted that the Hamlet of Baker Lake's sewage lagoons and landfill are situated in a watershed that discharges seasonally into Baker Lake between BBD and BPJ. Locally, propeller wash may cause vertical mixing in very discrete areas when there is active traffic. Otherwise (with the exception of spills etc.), there are no other activities with the potential to alter limnological parameters. There has been no influence on shoreline development, volume or any other feature of Baker Lake itself.

At Baker Lake, limnological conditions are similar to the Meadowbank study lakes except that water temperatures are cooler, typically reaching no more than 10°C in mid-summer and are generally un-

stratified because of the large, cold water volume and large fetch of Baker Lake (**Figure 3.3–1** and **Figure 3.3–2**).

As described above in the 2012 deep limnology profiling at Baker Lake, conductivity can show a strong and abrupt stratification. Overall, the general pattern of temperature and conductivity in Baker Lake was similar in 2015 as in previous monitoring periods (**Figure 3.3–2**). Occasional elevations in conductivity and related parameters are due to the heterogeneity of surface waters related to the natural phenomena of wind driven currents, vertical mixing of deeper, higher conductivity water and influence of the Thelon River.

Figure 3.3–1. Mean monthly field-measured temperature (°C) at 3 m depth from 2008 – 2015, Baker Lake.

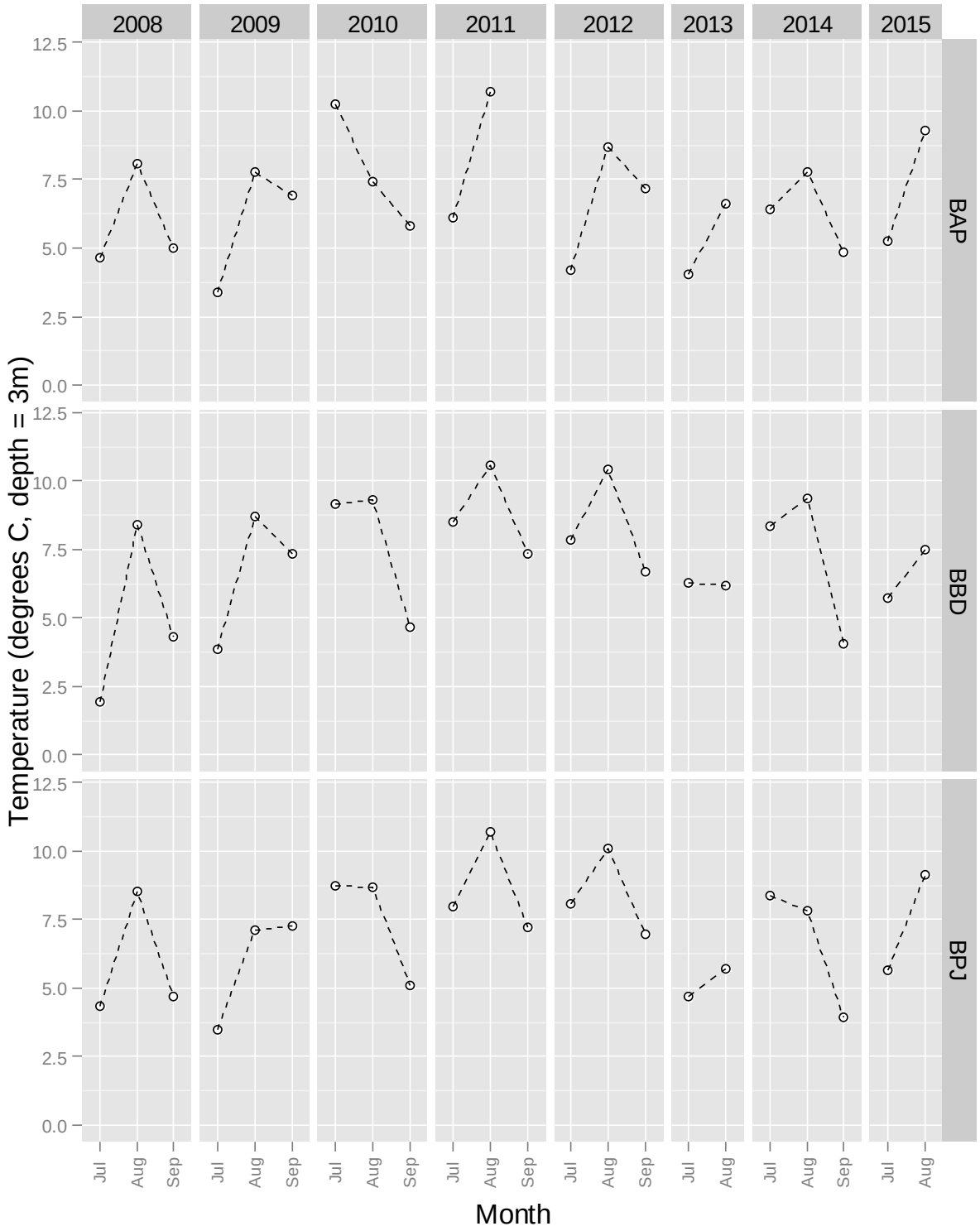
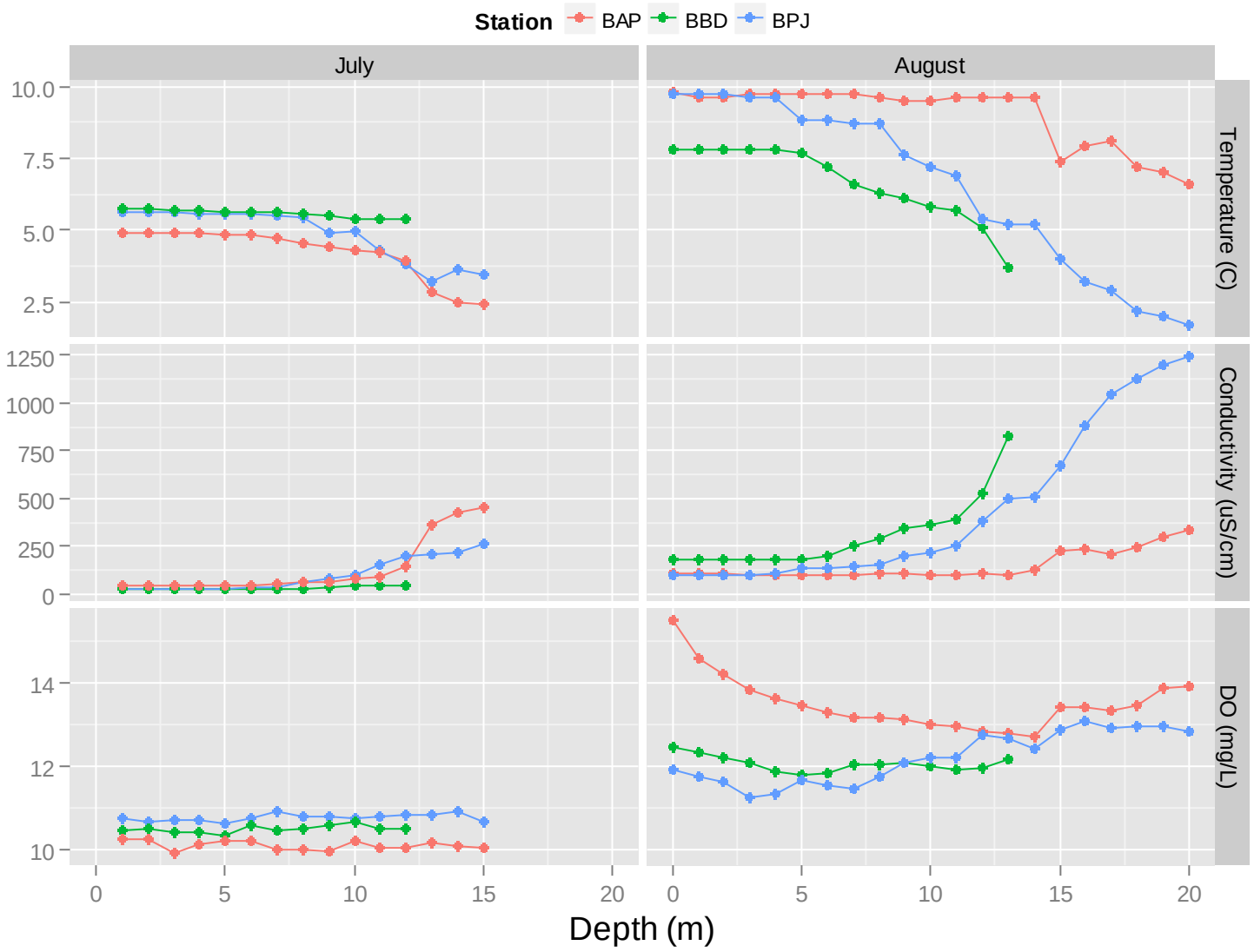


Figure 3.3–2. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles in Baker Lake for July and August, 2015.



3.3.2. Water Chemistry

3.3.2.1. General Observations

Baker Lake is very large and exposed along the north-south axis to high wind and wind-generated currents. Monitoring areas along the north shore also have the added complexity of a large river (Thelon River) that discharges into Baker Lake at its western end, and possibly a residual deep-water brackish layer. Depending on wind speed and direction, water from this deeper layer can influence water chemistry parameters (conductivity, salts, and dissolved solids) in surface waters. Consequently, there can be pronounced spatial (horizontal and vertical) and temporal variability in certain parameters. Despite this variability, many parameters in the Baker Lake samples were also typically below laboratory MDLs.

3.3.2.2. Temporal and Spatial Trend Interpretation

Results for conventional water quality parameters, nutrients and metals for 2015 are presented in **Table 3.3–1**; they are discussed, where relevant from a spatial and temporal trend perspective.

CREMP monitoring results since 2008 were used to assess temporal and spatial trends related to mining activities. The general rationale for assessing these trends was discussed in **Section 1.5**; the process was tailored slightly for water chemistry, as described below.

As discussed in **Section 3.2.2** for Meadowbank study lakes, most water quality parameters in Baker Lake were routinely below laboratory MDLs. Thus, detection of changes to water quality related to barge activity (or related to potential non-mining inputs from the Hamlet of Baker Lake's sewage lagoons and landfill, which are situated in a watershed that discharges seasonally into Baker Lake between BBD and BPJ) would be relatively easy to detect, notwithstanding the confounding influence of elevated conductivity, dissolved salts and TDS depending on limnological conditions. Similar to Meadowbank, starting with the parameters listed in **Table 3.3–1**, a conservative two-step screening process was used to identify parameters for inclusion into the formal trend assessment (the results are summarized in **Table 3.3–2** with figure number references for all parameters that were screened in):

1. *Overall Detection Frequency* - Only those water quality parameters that exceeded MDLs in at least 10% of the samples were included in this discussion. Because this lake is ultra-oligotrophic, it is normal for many parameters to routinely be below MDLs.
2. *Control-Impact Detection Frequency Comparison* – In order to avoid screening out infrequently detected parameters that were detected more often in association with barge activities, the proportion of samples exceeding MDLs between "control" and "impact" samples were compared; the intent of this screen was to identify parameters with <5% detection frequency (i.e., those screened out above) for which there were detection frequency changes potentially associated with mining activity (i.e., where the proportion of detected values increased by 0.05 or more). Only total lead was found to have an increased detection frequency in impact samples relative to control samples.

All routine parameters, anions and nutrients, and metal (total and dissolved) retained based on the two-step screening process are shown in **Figure 3.3–3** to **Figure 3.3–48**. The samples were collected from a depth of 3 meters for all areas and events, consistent with the SOP. The red dashed line in each of these water chemistry figures is the trigger value specific to Baker Lake. All parameters not retained for the trend assessment were assumed to have no spatial or temporal trends related to barge activities or to natural variability and were excluded from further consideration (plots for these parameters are included for reference in **Appendix A2**).

There were no instances of the mean concentrations exceeding the trigger values in 2015. There were trigger exceedances reported in 2014, but none of the parameter/area combinations were significant (at $p<0.1$). Clearly, the relatively stable barge traffic over the past few years (**Figure 1.4–1**) is not adversely affecting water quality at the exposure areas. This is not surprising given that there were no reported spills in 2015 and that any effects to the water column from prop wash would be ephemeral and would clear quickly with no lingering effects to the water column. Based on the results from 2015, there are no follow-up measures for management in 2016.

Table 3.3–1. Water quality results from the 2015 CREMP, Baker Lake

Lake and Station				Baker Lake				Baker Lake				Baker Lake			
				Akilahaarjuk Point (BAP)				Barge Dock (BBD)				Proposed Jetty (BPJ)			
Area-Replicate ID				BAP-37-S	BAP-38-S	BAP-39-S	BAP-40-S	BBD-37-S	BBD-38-S	BBD-39-S	BBD-40-S	BPJ-37-S	BPJ-38-S	BPJ-39-S	BPJ-40-S
Depth (m)	CCME	Trigger[2]		3	3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Baker Lake	Threshold[2]	21-Jul-15	21-Jul-15	15-Aug-15	15-Aug-15	21-Jul-15	21-Jul-15	15-Aug-15	15-Aug-15	21-Jul-15	21-Jul-15	15-Aug-15	15-Aug-15
Field Measurements (Surface)															
Temperature (°C)				4.9	5.7	9.8	9.0	5.7	5.8	7.8	7.2	5.6	5.7	9.7	8.7
Specific Conductivity (µS/cm)				47	41	106	135	28	25	176	202	29	32	98	139
Dissolved Oxygen (mg/L)				10.26	10.47	15.49	13.57	10.43	10.3	12.45	12.78	10.73	10.85	11.89	11.74
pH	6.5 - 9.0	6.74 - 8.12	6.5 - 9.0	**6.72**	**6.69**	6.94	7.06	6.97	6.91	6.98	6.94	6.94	6.87	7.02	7.00
Physical Tests (mg/L)															
Conductivity (µS/cm)		494.5		56	48	119	138	31	28	175	205	33	30	101	136
Hardness		41.2		12.9	12.1	16.3	19.4	10.7	10.4	23.3	26.2	10.8	10.7	16.6	20.7
pH (Laboratory)	6.5 - 9.0	6.74 - 8.12	6.5 - 9.0	~~7.12~~	~~7.14~~	~~6.99~~	~~7.02~~	~~7.13~~	~~7.12~~	~~6.98~~	~~6.96~~	~~7.14~~	~~7.16~~	~~7.02~~	~~7.02~~
Total Suspended Solids		3.0	5.0	1.1	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	1.0	*<1.0*
Total Dissolved Solids		208		39	31	68	82	17	19	93	108	25	24	59	77
Turbidity (NTU)				0.30	0.44	0.32	0.31	0.33	0.31	0.28	0.32	0.39	0.34	0.30	0.33
Anions and Nutrients (mg/L)															
Alkalinity - Bicarbonate		10.6		9	9	9	8	8	9	9	9	8	8	9	9
Alkalinity - Carbonate		4		*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*
Alkalinity - Hydroxide				*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*	*<2.0*	*<2.0*	*<1.0*	*<1.0*
Alkalinity - Total		10.6		9	9	9	8	8	9	9	9	8	8	9	9
Ammonia (as N)[3]	***equation***	0.067	0.126	0.01	*<0.0050*	0.015	0.01	*<0.0050*	*<0.0050*	0.02	0.01	*<0.0050*	0.01	*<0.0050*	0.01
Bromide				*<0.050*	*<0.050*	0.10	0.12	*<0.050*	*<0.050*	0.16	0.18	*<0.050*	*<0.050*	0.09	0.12
Chloride	120	95.7	120	10	7	27	32	2.83	2.22	42.30	50.40	3.55	2.80	22	32
Fluoride	0.120			0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05
Nitrate (as N)	3.0	1.51	3	0.0276	0.0267	0.0119	0.0108	0.0269	0.0267	0.0168	0.0176	0.0275	0.0271	0.0128	0.0153
Nitrite (as N)	0.060	0.031	0.060	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Kjeldahl Nitrogen		0.214		0.19	**0.22**	0.16	0.14	0.19	0.19	0.17	0.16	0.18	0.19	0.17	0.20
Ortho Phosphate (as P)		0.002		*<0.0010*	*<0.0010*	0.0011	*<0.0010*	*<0.0010*	*<0.0010*	0.0010	0.0011	*<0.0010*	*<0.0010*	*<0.0010*	0.0011
Phosphorus (P)-Total Diss.				0.0024	0.0024	*<0.0020*	0.0020	0.0028	0.0032	*<0.0020*	0.0025	0.0026	0.0026	0.0038	0.0025
Phosphorus (P)-Total	0.0040	0.0096	0.004	0.0038	0.0041	*<0.0020*	*<0.0020*	0.0041	0.0042	0.0033	0.0022	0.0057	0.0060	0.0031	0.0020
Silicate (as SiO_2)		1.0		*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
Sulphate (SO_4)		65.92	128	1.85	1.52	4.37	5.12	0.87	0.79	6.59	7.76	0.97	0.86	3.60	5.06
Cyanides (mg/L)															
Total Cyanide				*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Free Cyanide	0.005			*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Organic / Inorganic Carbon (mg/L)															
Dissolved Organic Carbon		4.05		3.10	3.01	2.97	2.99	3.13	3.03	2.93	2.97	3.07	2.97	3.07	3.07
Total Organic Carbon		4.25		3.09	2.94	3.10	3.07	3.25	3.05	3.06	3.03	3.20	3.33	3.06	2.99
Plant Pigments (µg/L)															
Chlorophyll-*a*				0.49	0.56	0.97	0.85	0.48	0.29	0.65	0.62	0.64	0.53	0.89	0.84
Total Metals (mg/L)															
Aluminum[3]	***equation***	0.056	0.100	~~0.0126~~	~~0.0121~~	~~0.0115~~	~~0.0125~~	~~0.0160~~	~~0.0197~~	~~0.0159~~	~~0.0142~~	~~0.0136~~	~~0.0184~~	~~0.0111~~	~~0.0126~~
Antimony		0.0101	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic	0.0050	0.00257	0.005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium		0.51	1	0.0174	0.0172	0.0181	0.0177	0.0172	0.0178	0.0181	0.0177	0.0192	0.0179	0.0181	0.0182
Beryllium		0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth				*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron	1.5	0.76	1.5	*<0.010*	*<0.010*	0.01	0.01	*<0.010*	*<0.010*	0.01	0.02	*<0.010*	*<0.010*	0.01	0.01
Cadmium[3]	***equation***	0.000025	0.000040	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium		4.50		2.59	2.52	2.91	3.05	2.46	2.50	3.25	3.31	2.45	2.47	2.82	3.08
Chromium[4]	0.001	0.00056	0.001	*<0.00010*	*<0.00010*	*<0.00010*	0.0002	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt				*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper[3]	***equation***	0.00125	0.002	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Iron	0.3	0.160	0.3	~~0.02~~	~~0.02~~	0.02	0.04	~~0.03~~	~~0.03~~	0.03	0.02	~~0.03~~	~~0.02~~	0.02	0.03
Lead[3]	***equation***	0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.096	0.0010	0.0010	*<0.0010*	0.0011	0.0010	0.0010	0.0012	0.0013	0.0012	0.0010	0.0014	0.0015
Magnesium		7.44		1.53	1.39	2.61	2.97	1.08	1.09	3.63	4.05	1.14	1.11	2.43	3.10
Manganese[3]		0.3400	***equation***	0.0042	0.0042	0.0041	0.0038	0.0045	0.0047	0.0061	0.0057	0.0043	0.0045	0.0048	0.0043
Mercury	0.000026	0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum	0.073	0.0365	0.073	*<0.000050*	*<0.000050*	0.0001	0.0001	0.0001	*<0.000050*	0.0001	0.0001	*<0.000050*	*<0.000050*	0.0001	0.0001
Nickel[3]	***equation***	0.0128	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus				*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium		2.43		0.59	0.56	0.94	1.05	0.45	0.44	1.27	1.38	0.45	0.46	0.87	1.10
Selenium	0.001	0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon				0.18	0.17	0.15	0.14	0.18	0.19	0.17	0.16	0.18	0.18	0.15	0.16
Silver	0.0001			*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium		54.0		5.1	3.9	14.3	17.1	1.17	1.09	22.20	26.50	1.63	1.41	12.80	18.30
Strontium		0.0564	0.049	0.0201	0.0194	0.0262	0.0276	0.0178	0.0182	0.0320	0.0349	0.0180	0.0184	0.0252	0.0289
Sulfur				0.62	0.53	1.56	1.92	*<0.50*	*<0.50*	2.33	2.62	*<0.50*	*<0.50*	1.37	1.88
Thallium	0.0008	0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.00	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	0.00031	0.00035	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium	0.015	0.0075	0.015	0.00004	0.00003	0.00004	0.00004	0.00003	0.00004	0.00004	0.00005	0.00004	0.00004	0.000039	0.000041
Vanadium		0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]	0.030	0.0132	***equation***	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*	*<0.0030*
Zirconium				*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Dissolved Metals (mg/L)															
Aluminum[3]		0.0274	0.05	0.0050	0.0036	~~0.0040~~	~~0.0059~~	0.0042	0.0037	~~0.0053~~	~~0.0058~~	0.0042	0.0037	~~0.0045~~	~~0.0045~~
Antimony		0.0101	0.020	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Arsenic		0.0026	0.005	*<0.00010*	*<0.00010*	0.0001	0.0001	*<0.00010*	0.0001	0.0001	0.0001	*<0.00010*	0.0001	0.0001	0.0001
Barium		0.5089	1	0.0174	0.0173	0.0177	0.0174	0.0175	0.0173	0.0177	0.0179	0.0175	0.0174	0.0181	0.0178
Beryllium		0.0027	0.0053	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*	*<0.000020*
Bismuth				*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Boron		0.76	1.5	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	0.01	0.01	*<0.010*	*<0.010*	*<0.010*	0.01
Cadmium		0.000025	0.00004	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Calcium				2.61	2.54	2.63	3.02	2.46	2.44	3.27	3.49	2.46	2.45	2.84	3.14
Chromium		0.00055	0.001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Cobalt				*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Copper		0.00116	0.002	~~0.00022~~	~~0.00023~~	0.00027	0.00028	~~0.00022~~	~~0.00025~~	0.00029	0.00029	~~0.00028~~	~~0.00033~~	0.00025	0.00025
Iron		0.155	0.3	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Lead		0.000525	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	~~0.00005~~	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Lithium		0.048	0.096	*<0.0010*	*<0.0010*	0.0011	0.0012	*<0.0010*	*<0.0010*	0.0014	0.0013	*<0.0010*	*<0.0010*	0.0013	0.0014
Magnesium				1.55	1.39	2.36	2.89	1.10	1.05	3.67	4.25	1.13	1.10	2.31	3.13
Manganese[3]		0.339	***equation***	0.0026	0.0027	~~0.0002~~	~~0.0005~~	0.0027	0.0027	0.0026	0.0025	0.0029	0.0027	0.0011	0.0009
Mercury		0.000018	0.000026	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<0.0000050*
Molybdenum		0.037	0.073	*<0.000050*	*<0.000050*	*<0.000050*	0.0001	*<0.000050*	*<0.000050*	0.0001	0.0001	*<0.000050*	*<0.000050*	*<0.000050*	0.0001
Nickel		0.013	0.025	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Phosphorus				*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Potassium				0.57	0.52	0.85	1.00	0.44	0.42	1.29	1.44	0.46	0.46	0.84	1.10
Selenium		0.00055	0.001	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*	*<0.000050*
Silicon				0.16	0.16	0.12	0.12	0.16	0.16	0.14	0.14	0.16	0.16	0.14	0.13
Silver				*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Sodium				5.09	3.86	13.90	16.00	1.32	0.93	23.00	26.60	1.73	1.35	11.10	17.40
Strontium		0.049	0.049	0.0199	0.0192	0.0256	0.0271	0.0177	0.0174	0.0316	0.0345	0.0180	0.0177	0.0240	0.0284
Sulfur				0.63	0.51	1.33	1.80	*<0.50*	*<0.50*	2.27	2.68	*<0.50*	*<0.50*	1.22	1.83
Thallium		0.00041	0.0008	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*	*<0.000010*
Tin		0.0002		*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*	*<0.00010*
Titanium		1.01	2	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*
Uranium		0.0075	0.015	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00004	0.00003	0.00003	0.00003	0.00003
Vanadium		0.0035	0.006	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*	*<0.00050*
Zinc[3]		0.0122	***equation***	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Zirconium				*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*	*<0.00030*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2015.

[2] Trigger and threshold values were developed in *CREMP Design Document 2012* (Azimuth, 2012d).
A number of thresholds were derived from methods (or sources) other than CCME guidelines. Refer to the *CREMP: 2015 Plan Update* (Azimuth, 2015a) for more details.

[3] "***equation***" means that CCME guidelines (or thresholds) are calculated based on an equation which is either pH or hardness dependent. The ammonia and aluminum (t & d) guidelines vary with pH; the cadmium, copper, lead, manganese, nickel and zinc guidelines vary with hardness.

[4] Chromium CCME guideline is for Cr VI.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

~~strikethrough~~ = results flagged as unreliable in the QC assessment

Table 3.2–2. Screening process for water quality parameters, Meadowbank study lakes 2015.

CONVENTIONALS				TOTAL METALS				DISSOLVED METALS			
Screening Level	**1**	**2**	**3**	**Screening Level**	**1**	**2**	**3**	**Screening Level**	**1**	**2**	**3**
Screening Rule[1]	**>DL ≥ 10% frequency**	**C-I > 0.1 frequency**	**Pattern = Activity**	**Screening Rule[1]**	**>DL ≥ 10% frequency**	**C-I > 0.1 frequency**	**Pattern = Activity**	**Screening Rule[1]**	**>DL ≥ 10% frequency**	**C-I > 0.1 frequency**	**Pattern = Activity**
Conductivity	Figure 3.2-9			Aluminum	Figure 3.2-26			Aluminum	Figure 3.2-40		
Hardness	Figure 3.2-10			Antimony*	No	No	No	Antimony*	No	No	No
pH -Field	Figure 3.2-11			Arsenic	Figure 3.2-27			Arsenic	Figure 3.2-41		
pH -Lab	Figure 3.2-12			Barium	Figure 3.2-28			Barium	Figure 3.2-42		
TSS	Figure 3.2-13			Beryllium*	No	No	No	Beryllium*	No	No	No
TDS	Figure 3.2-14			Boron*	No	No	No	Boron*	No	No	No
B-Alkalinity	Figure 3.2-15			Cadmium*	No	No	No	Cadmium*	No	No	No
C-Alkalinity*	No	No	No	Calcium	Figure 3.2-29			Chromium*	No	No	No
T-Alkalinity	Figure 3.2-16			Chromium	Figure 3.2-30			Copper	Figure 3.2-43		
Ammonia-N	Figure 3.2-17			Copper	Figure 3.2-31			Iron*	No	No	No
Chloride	Figure 3.2-18			Iron	Figure 3.2-32			Lead*	No	No	No
Nitrate-N	Figure 3.2-19			Lead*	No	No	No	Lithium*	No	No	No
Nitrite-N*	No	No	No	Lithium*	No	No	No	Manganese	Figure 3.2-44		
TKN	Figure 3.2-20			Magnesium	Figure 3.2-33			Mercury*	No	No	No
T-phosphorous	Figure 3.2-21			Manganese	Figure 3.2-34			Molybdenum	Figure 3.2-45		
Ortho-phosphate*	No	No	No	Mercury*	No	No	No	Nickel*	No	No	No
Reactive silica	Figure 3.2-22			Molybdenum	Figure 3.2-35			Selenium*	No	No	No
Sulphate	Figure 3.2-23			Nickel*	No	No	No	Strontium	Figure 3.2-46		
DOC	Figure 3.2-24			Potassium	Figure 3.2-36			Thallium*	No	No	No
TOC	Figure 3.2-25			Selenium*	No	No	No	Tin*	No	No	No
T-Cyanide*	No	No	No	Sodium	Figure 3.2-37			Titanium*	No	No	No
Free Cyanide*	No	No	No	Strontium	Figure 3.2-38			Uranium	Figure 3.2-47		
				Thallium*	No	No	No	Vanadium*	No	No	No
				Tin*	No	No	No	Zinc*	No	No	No
				Titanium*	No	No	No				
				Uranium	Figure 3.2-39						
				Vanadium*	No	No	No				
				Zinc*	No	No	No				

Notes:

* Plots for these parameters are presented in **Appendix A1**.

[1] See text for further detail.

Figure 3.3–3. Laboratory-measured conductivity (µS/cm) in water samples from Baker Lake since 2008.

Note: Laboratory-measured conductivity data from 2014 should be interpreted with caution, particularly at low concentrations (see Azimuth, 2015b for details).

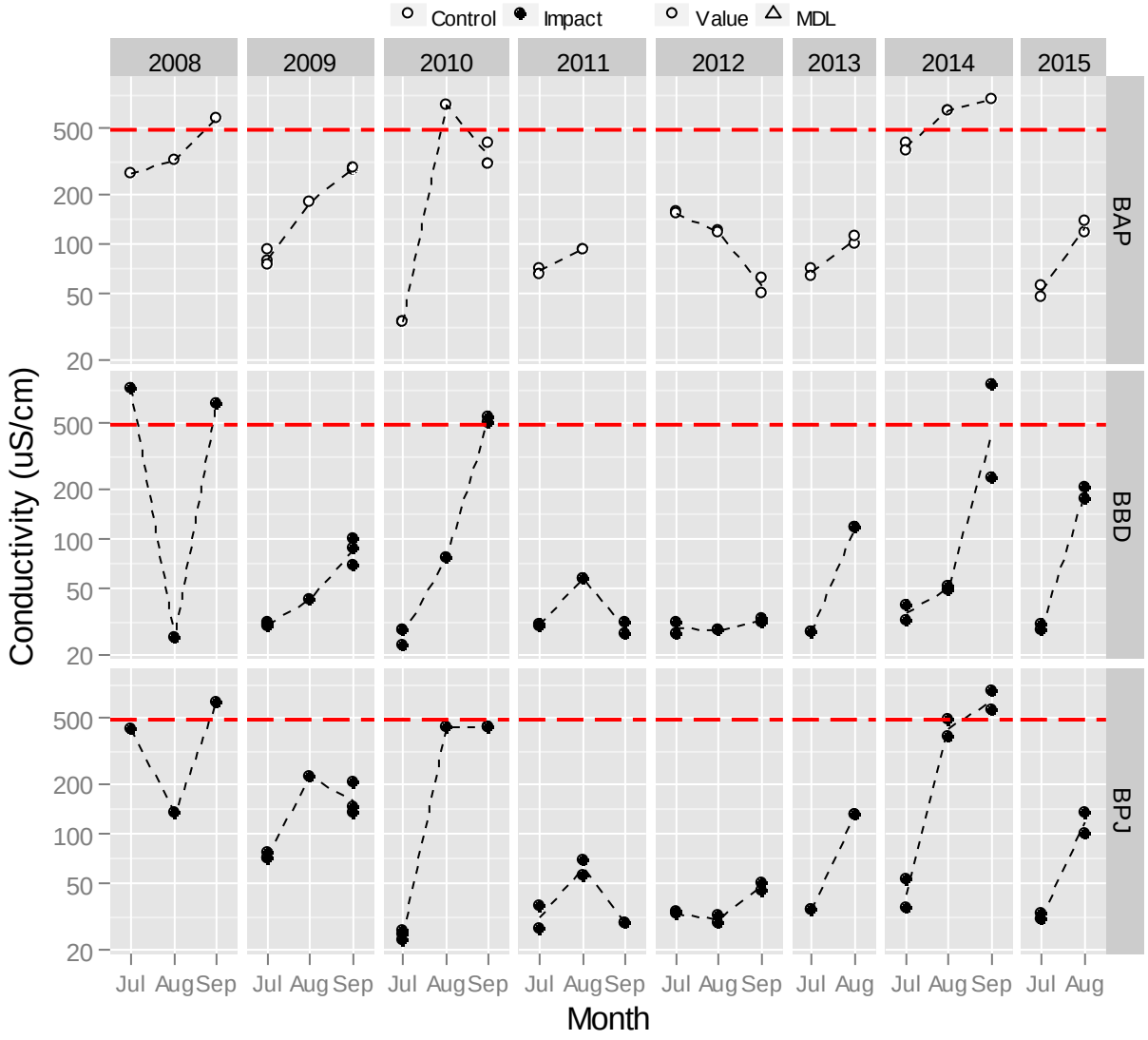


Figure 3.3–4. Hardness (mg/L) in water samples from Baker Lake since 2008.

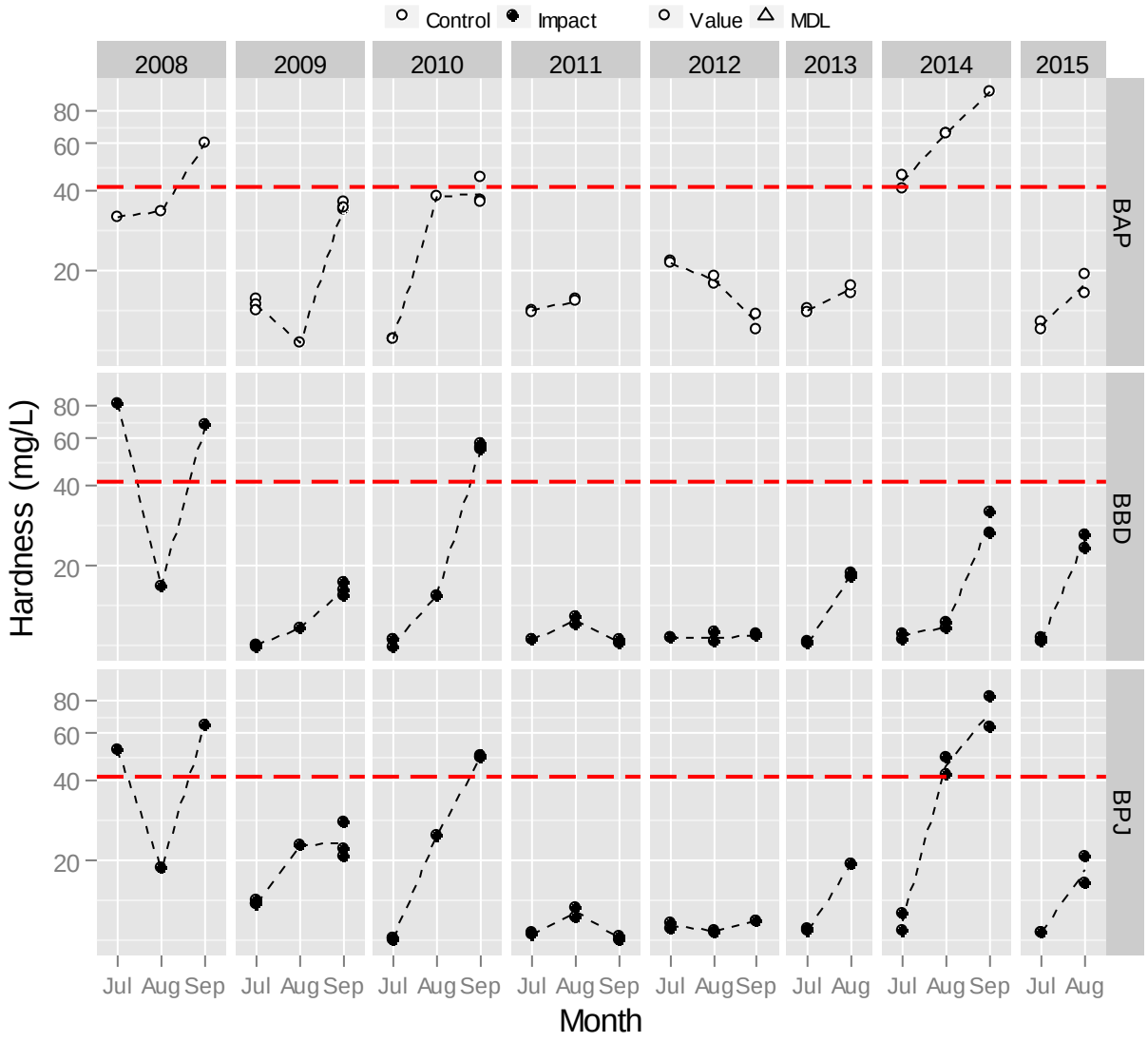


Figure 3.3–5. Field-measured pH in water samples from Baker Lake since 2008.

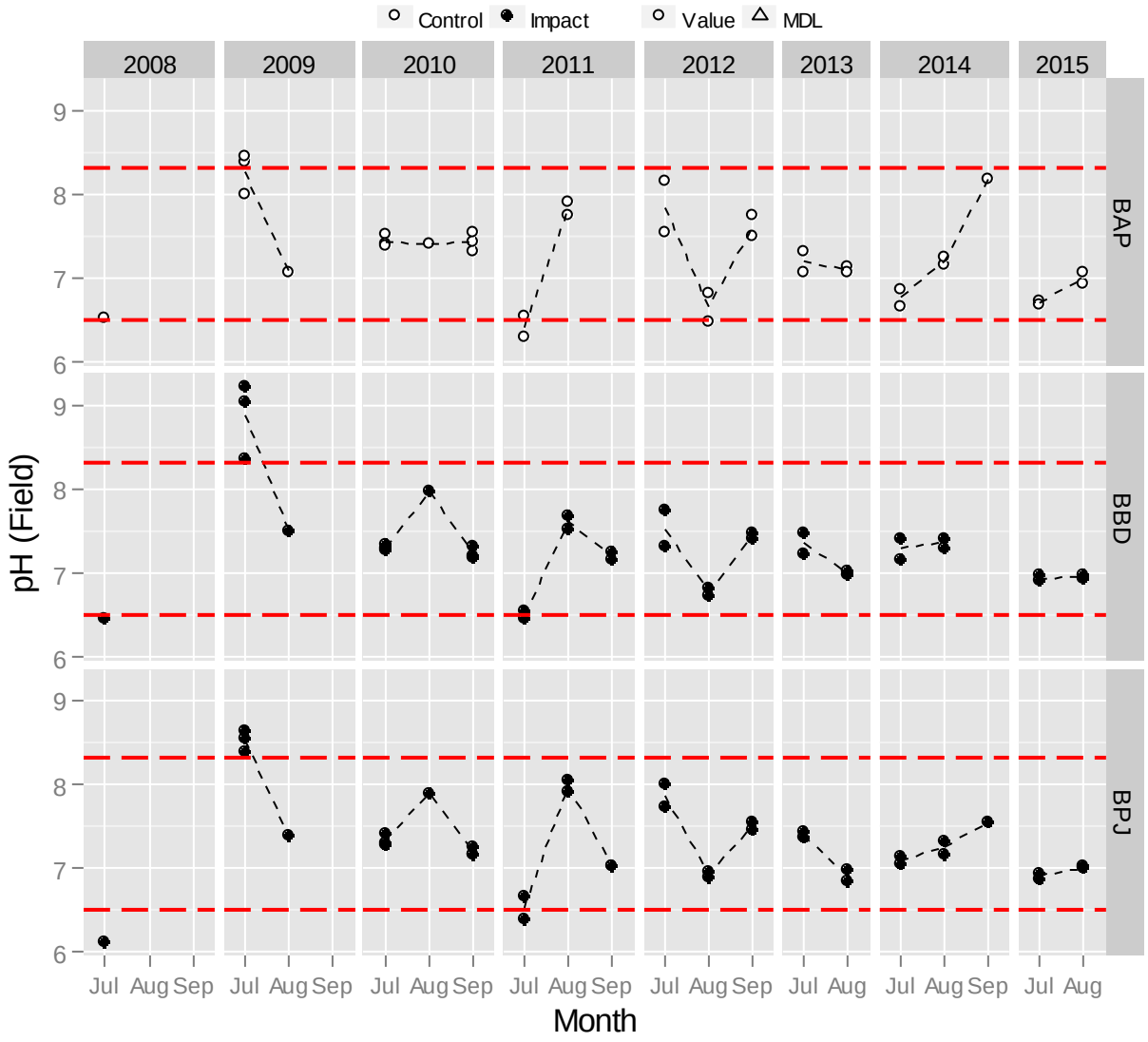


Figure 3.3–6. Laboratory-measured pH in water samples from Baker Lake since 2008.

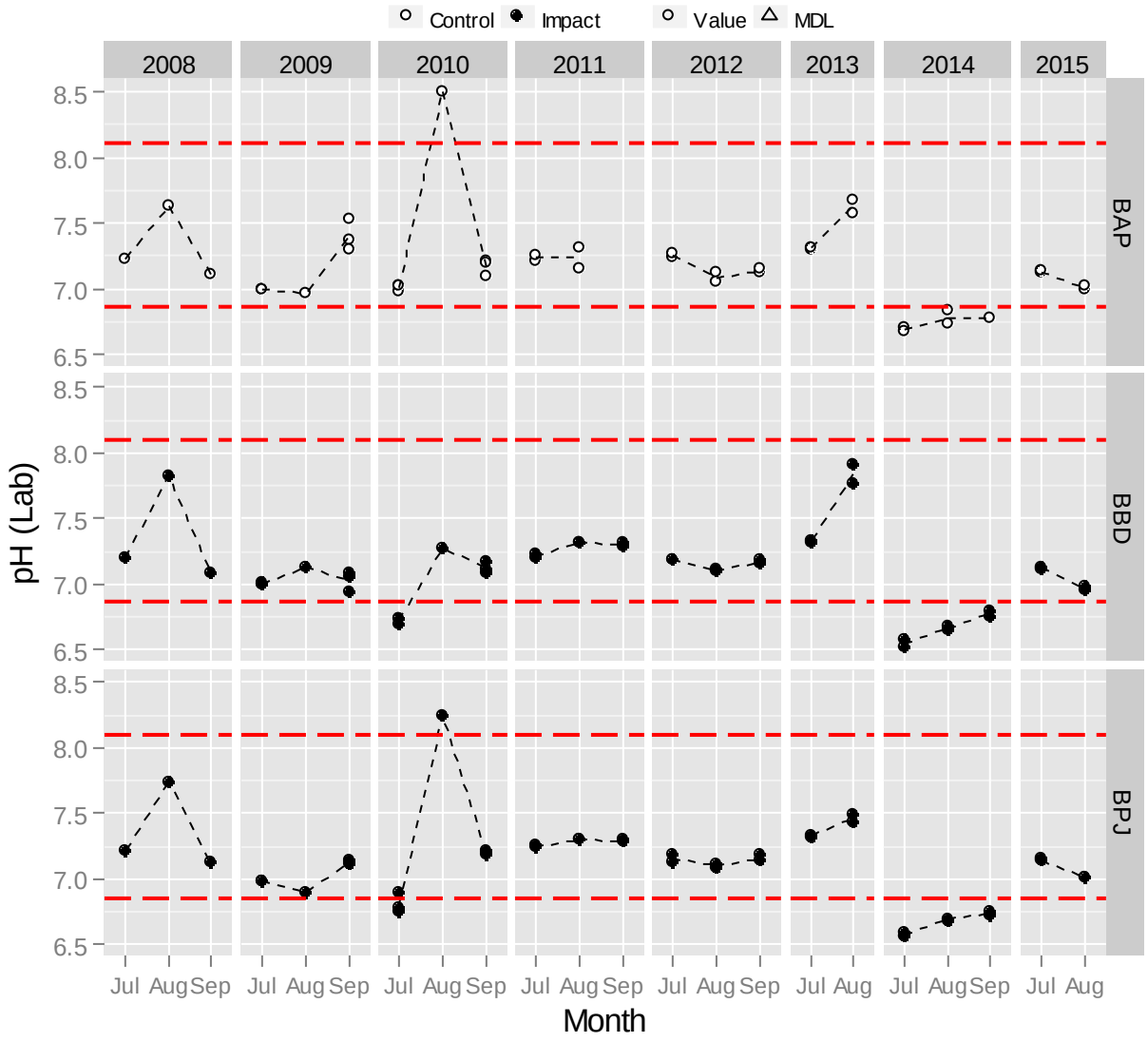


Figure 3.3–7. Total Suspended Solids (TSS; mg/L) in water samples from Baker Lake since 2008.

Note: TSS data from 2014 are deemed unreliable and were excluded from formal trend assessment (see Azimuth, 2015b for more detail).

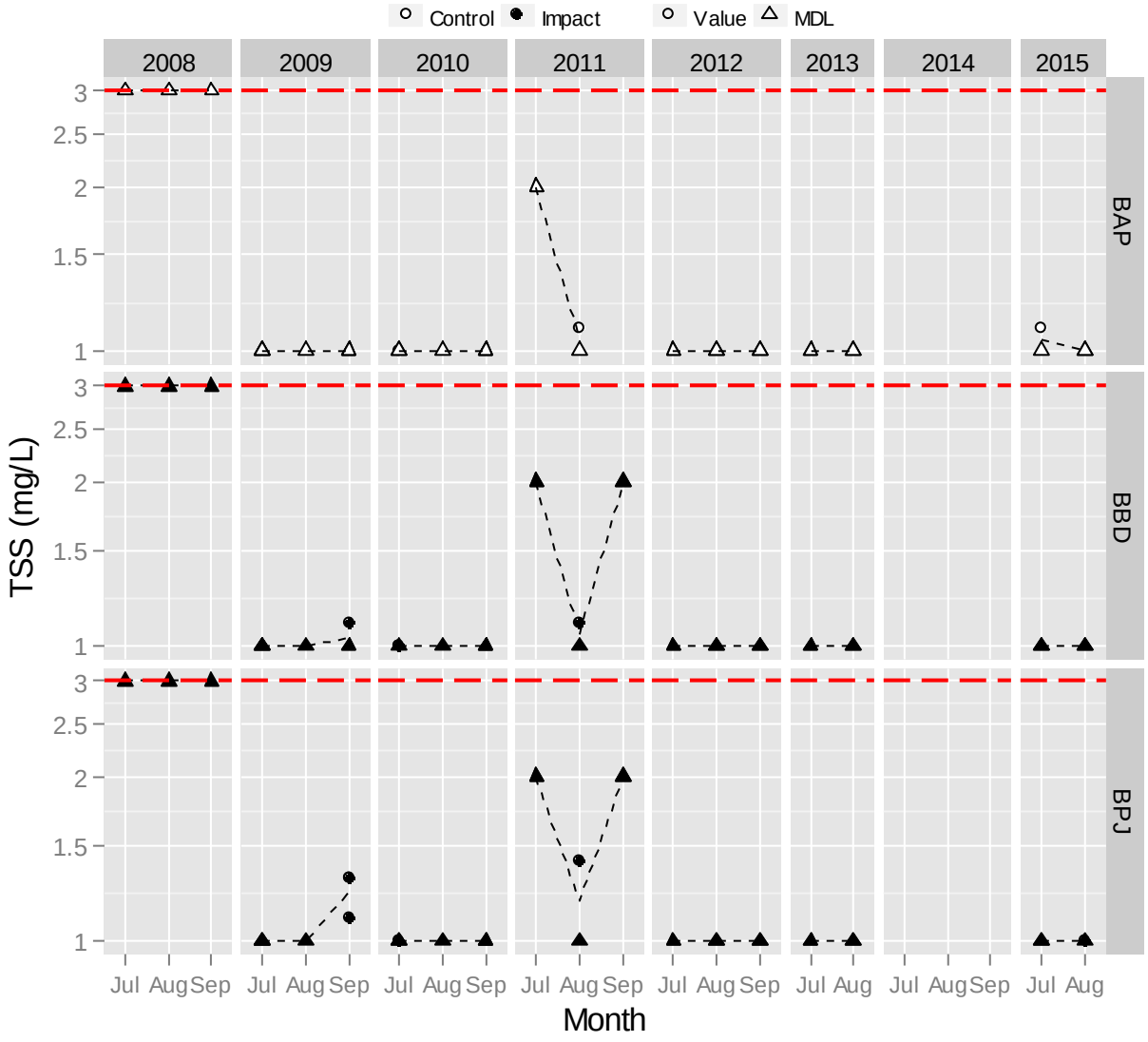


Figure 3.3–8. Total Dissolved Solids (TDS; mg/L) in water samples from Baker Lake since 2008.

Note: TDS data from 2014 are deemed unreliable and were excluded from formal trend assessment (see Azimuth, 2015b for more detail).

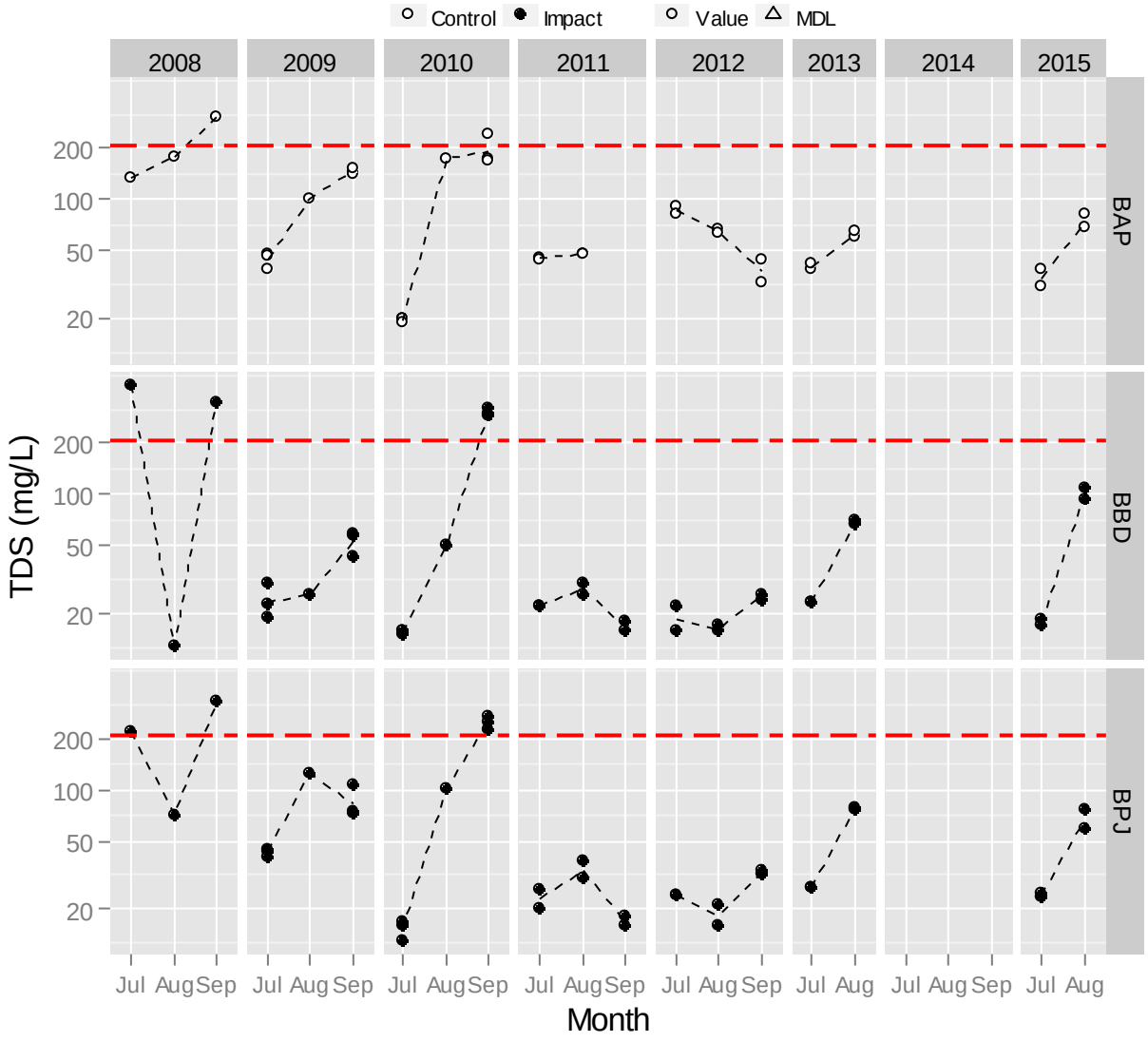


Figure 3.3–9. Bicarbonate Alkalinity (mg/L) in water samples from Baker Lake since 2008.

Note: Bicarbonate alkalinity data from 2014 are deemed unreliable and were excluded from formal trend assessment (see Azimuth, 2015b for more detail).

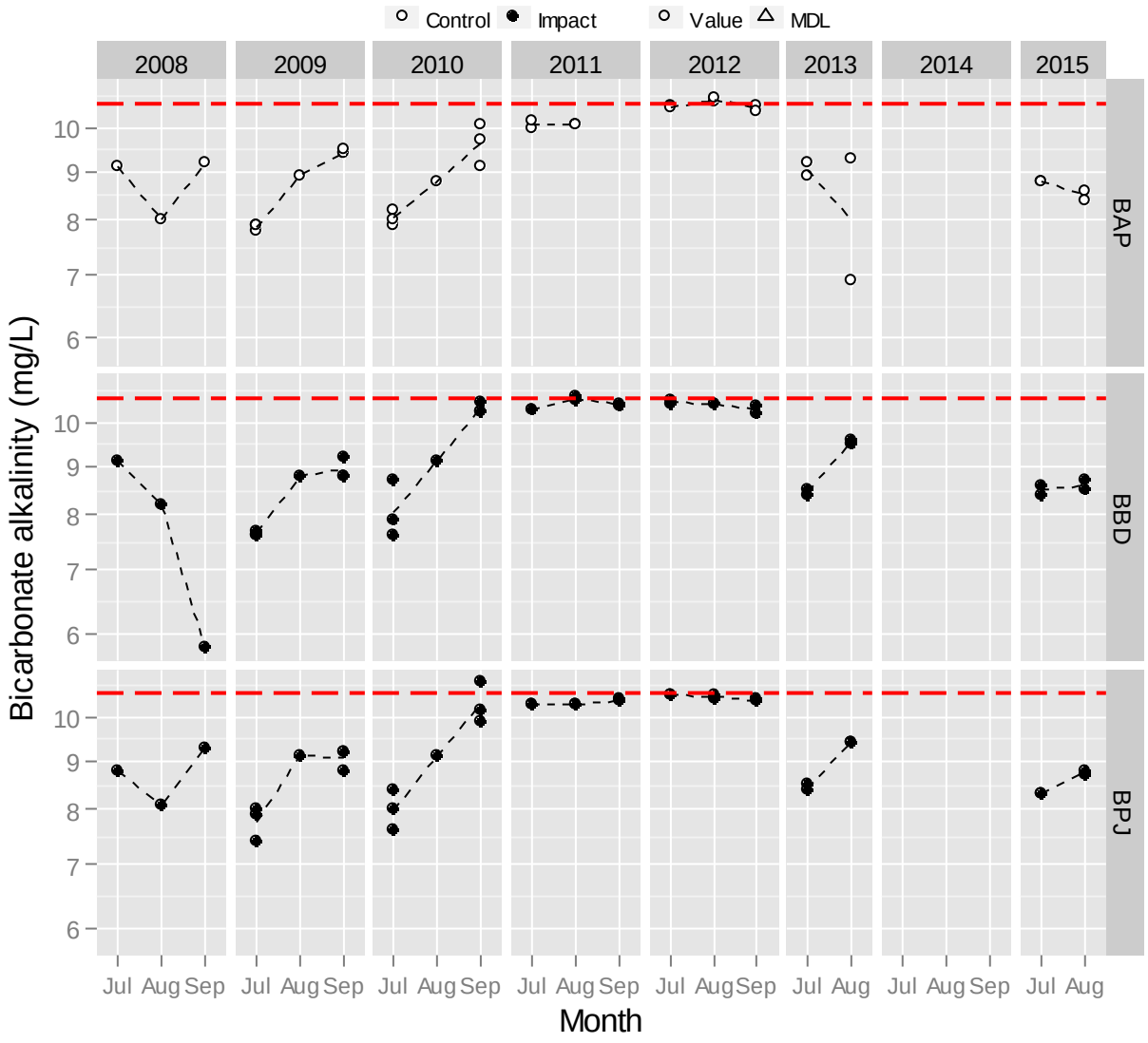


Figure 3.3–10. Total Alkalinity (mg/L) in water samples from Baker Lake since 2008.

Note: Total alkalinity data from 2014 are deemed unreliable and were excluded from formal trend assessment (see Azimuth, 2015b for more detail).

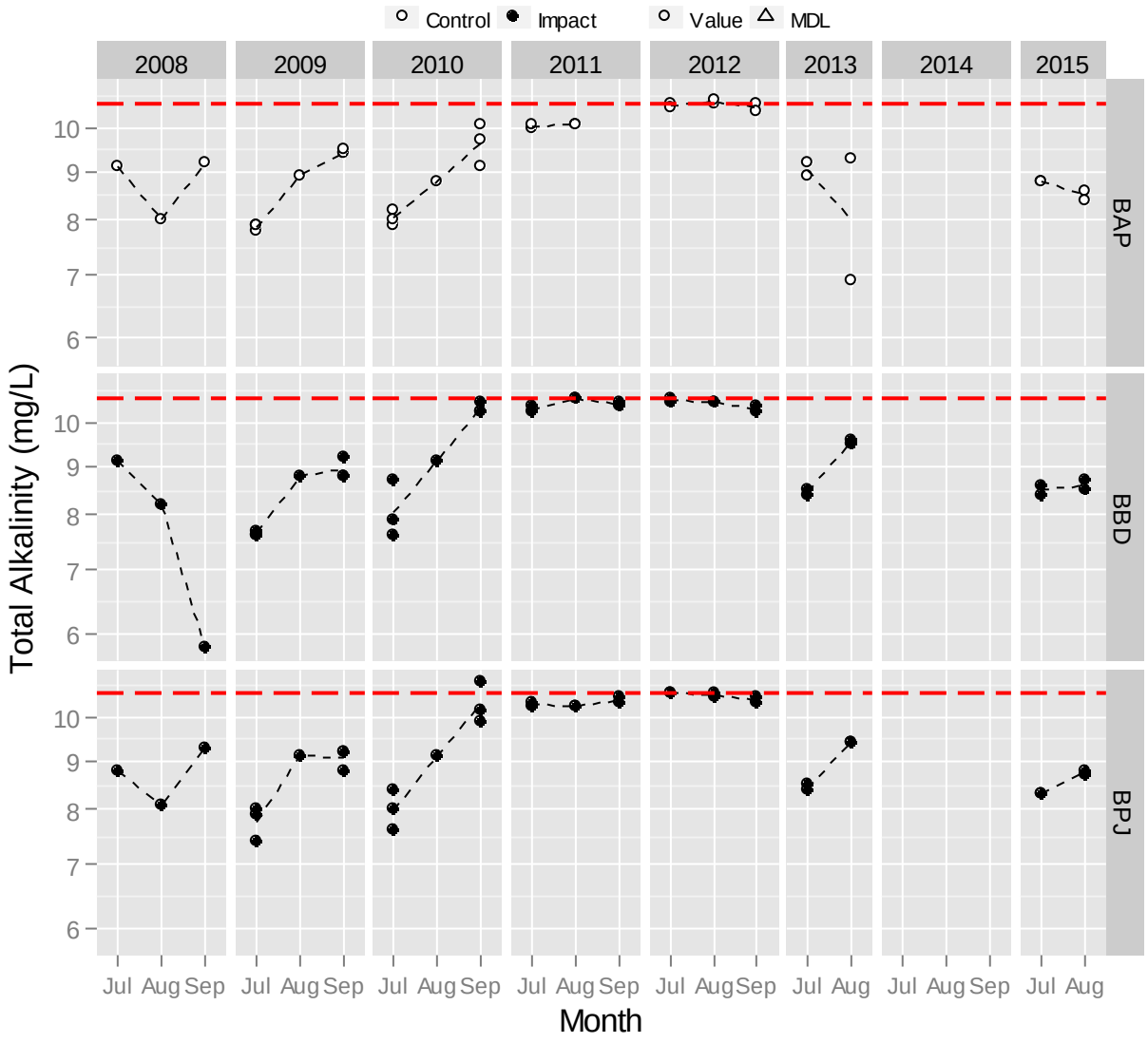


Figure 3.3–11. Ammonia-N (mg/L) in water samples from Baker Lake since 2008.

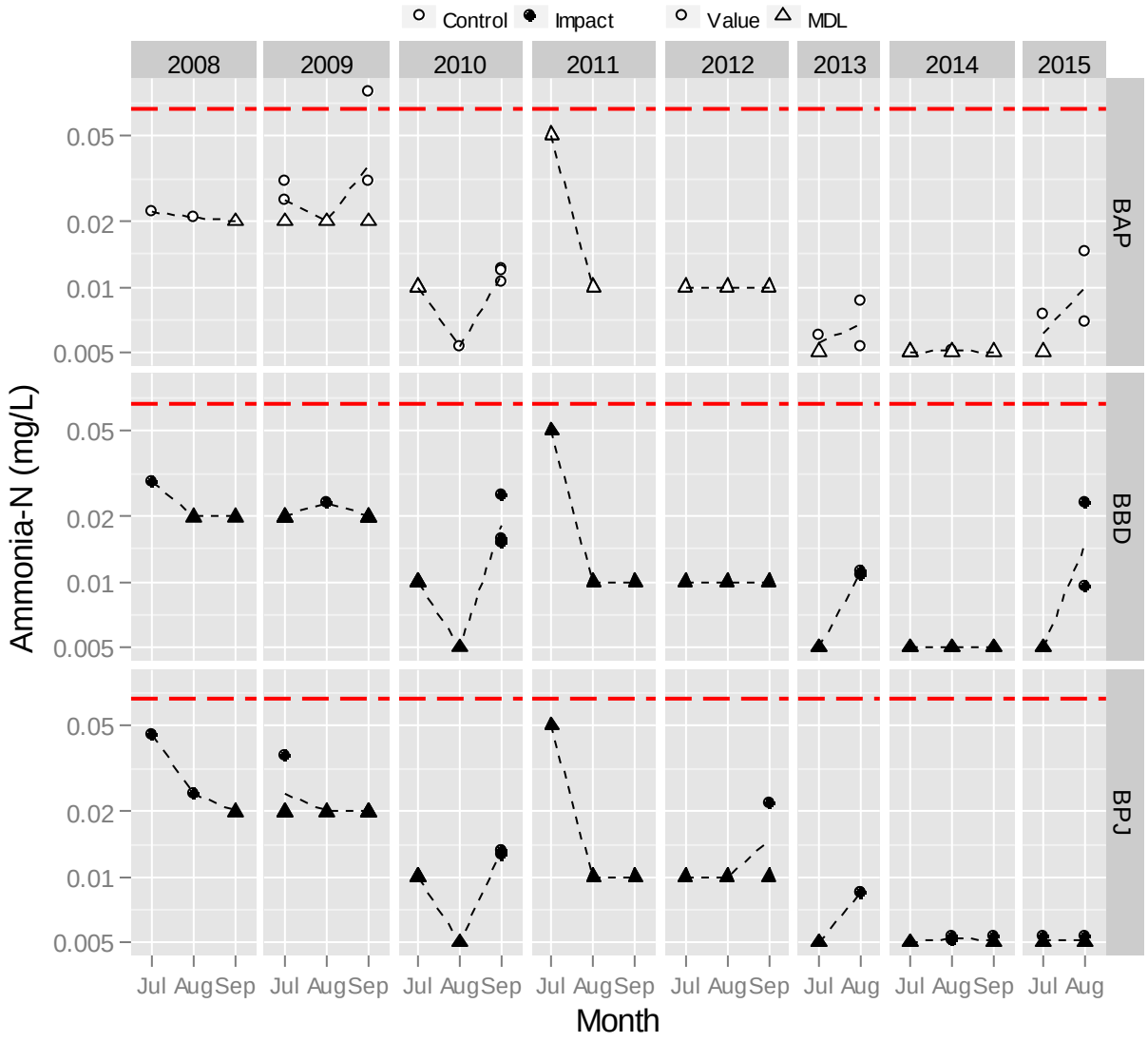


Figure 3.3–12. Chloride (mg/L) in water samples from Baker Lake since 2008.

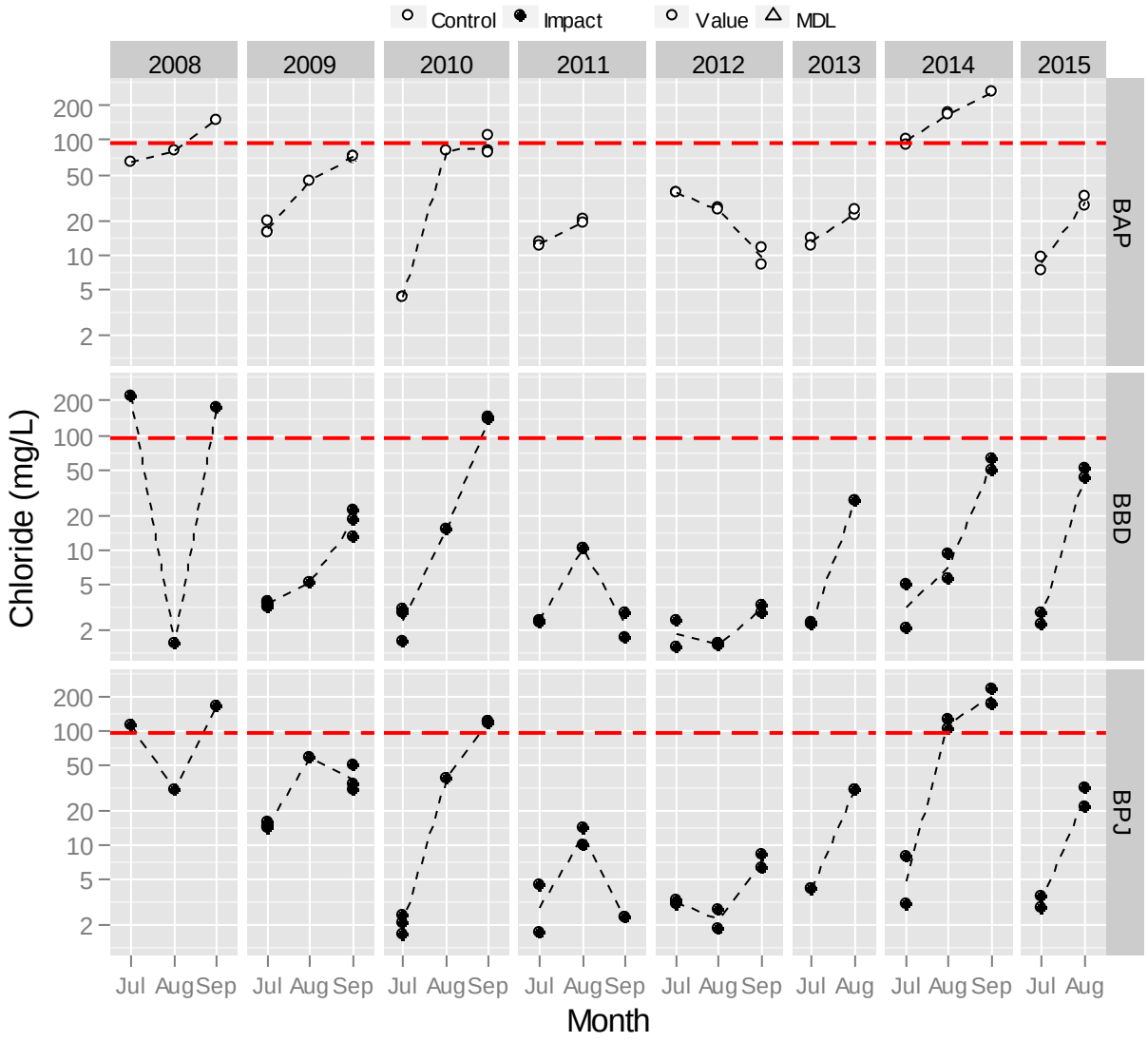


Figure 3.3–13. Nitrate-N (mg/L) in water samples from Baker Lake since 2008.

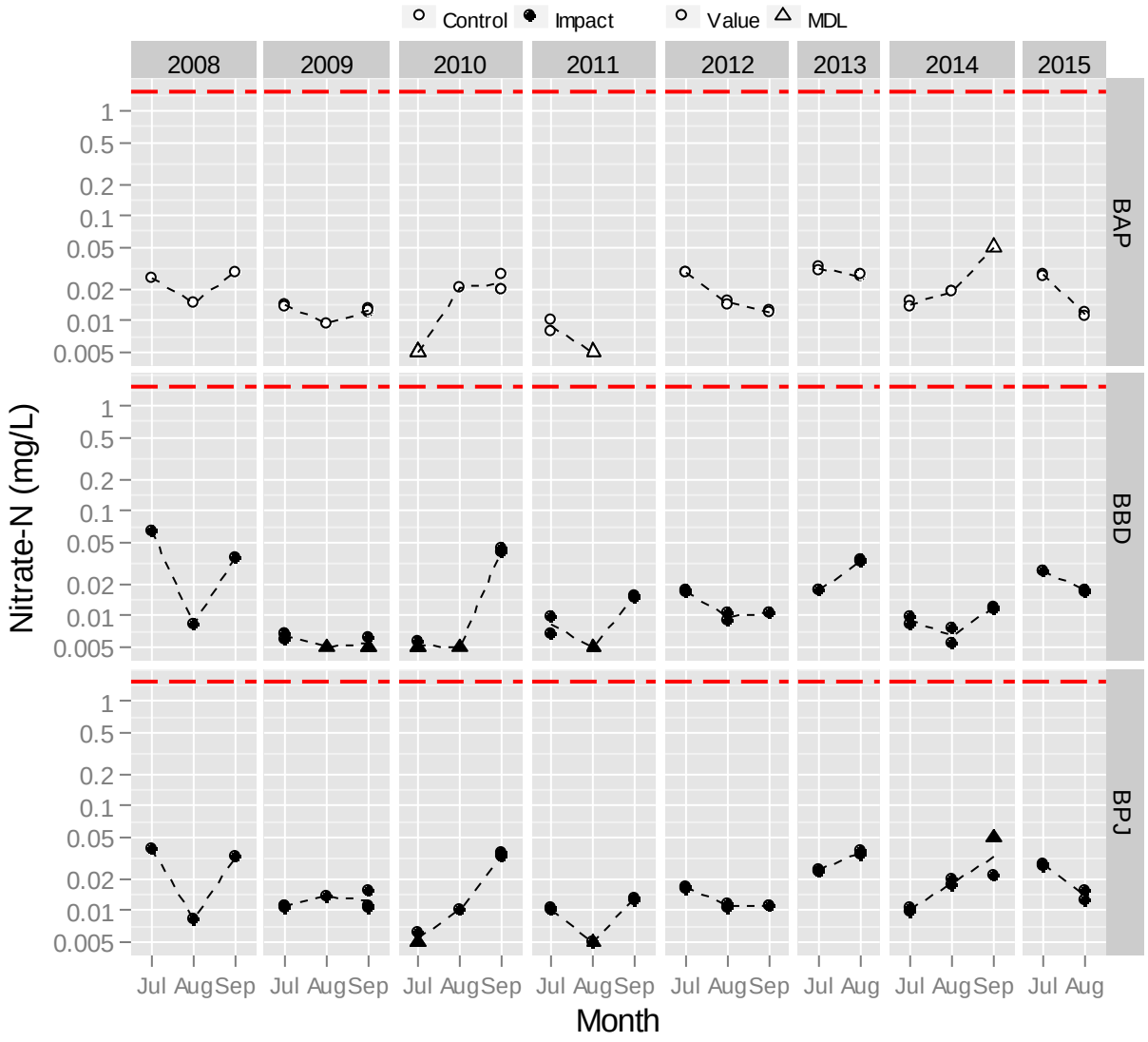


Figure 3.3–14. Total Kjeldahl Nitrogen (TKN; mg/L) in water samples from Baker Lake since 2008.

Note: TKN alkalinity data from 2014 are deemed unreliable and were excluded from formal trend assessment (see Azimuth, 2015b for more detail).

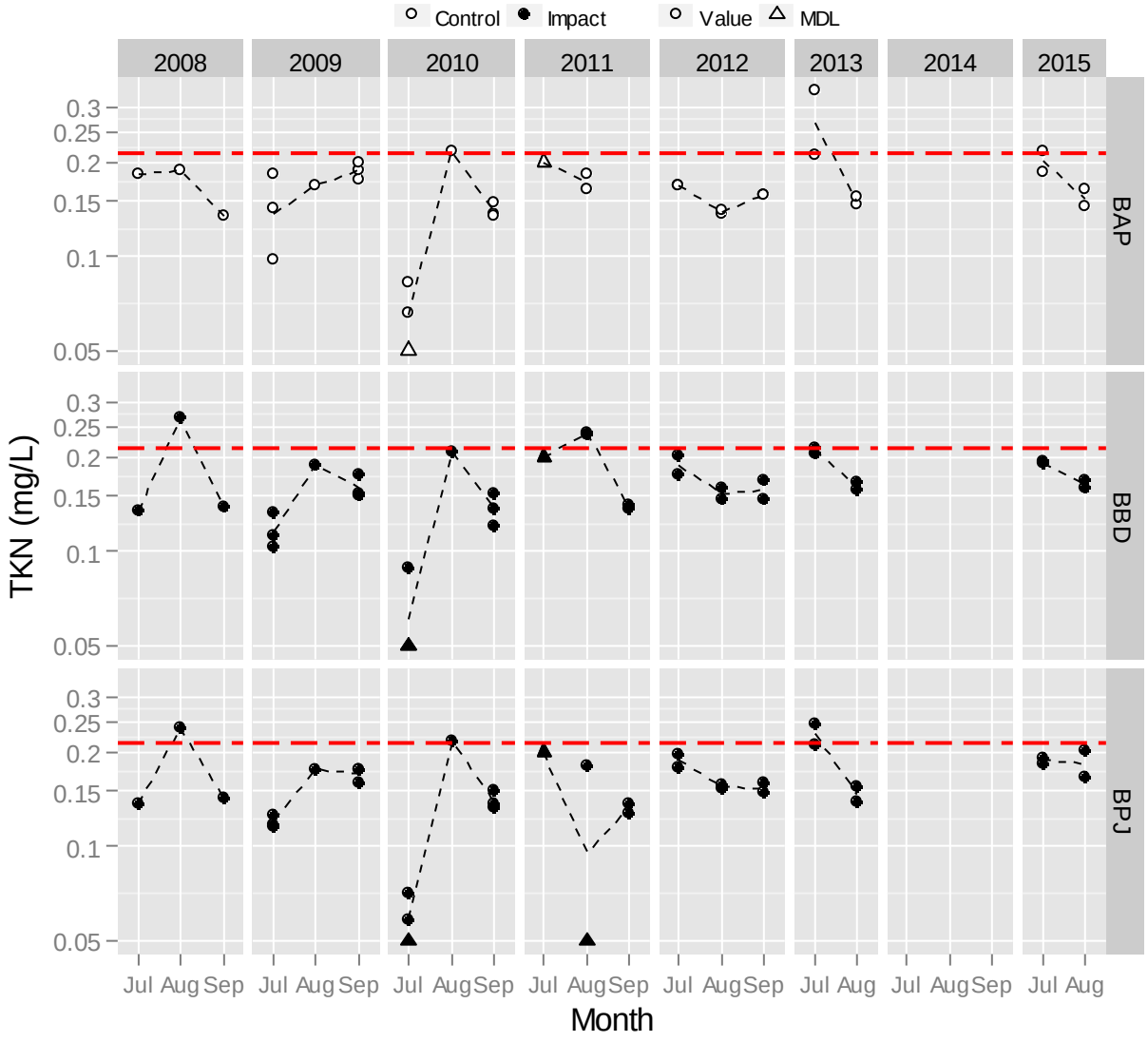


Figure 3.3–15. Total Phosphorus (mg/L) in water samples from Baker Lake since 2008.

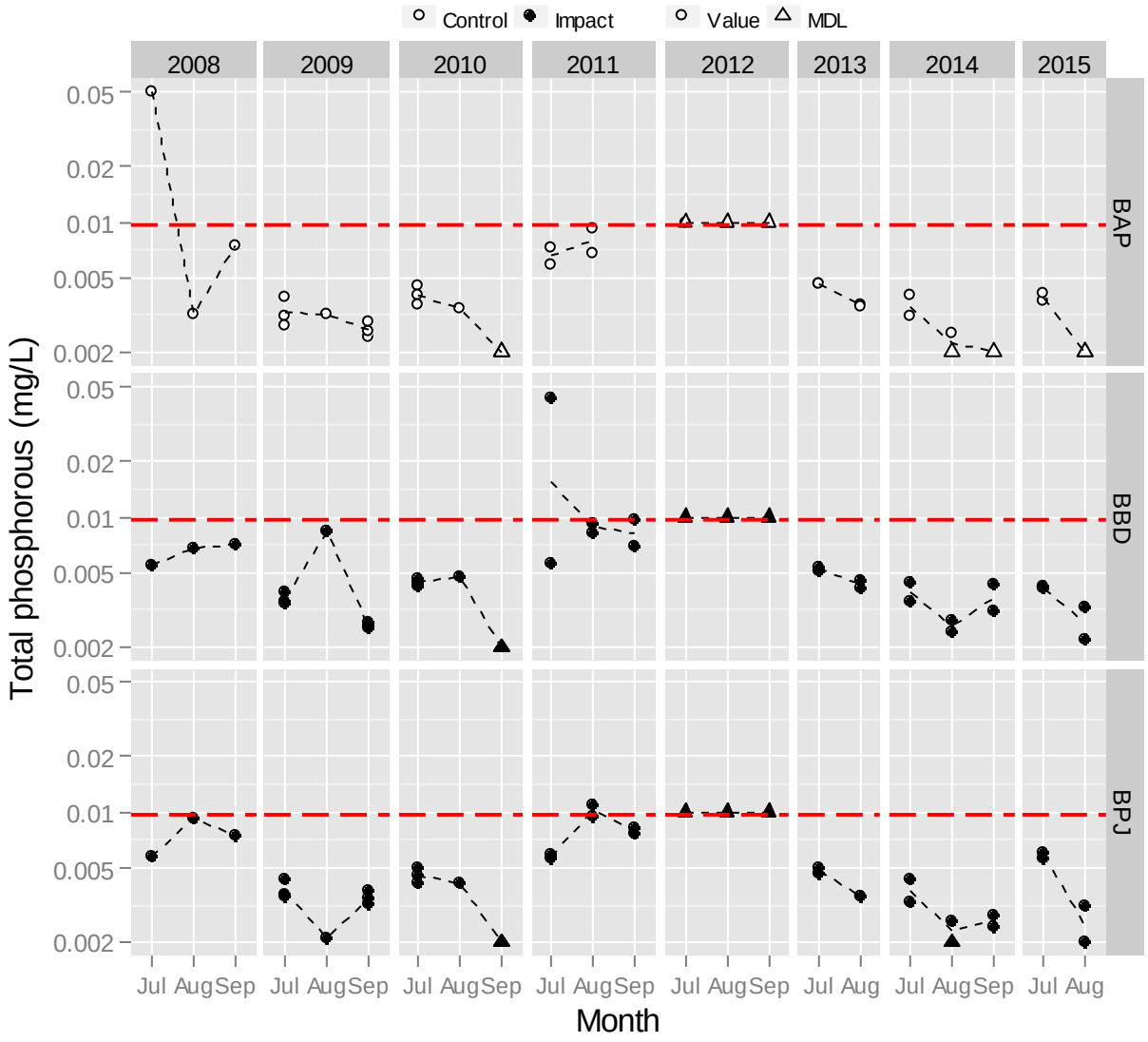


Figure 3.3–16. Total Ortho-phosphate (mg/L) in water samples from Baker Lake since 2008.

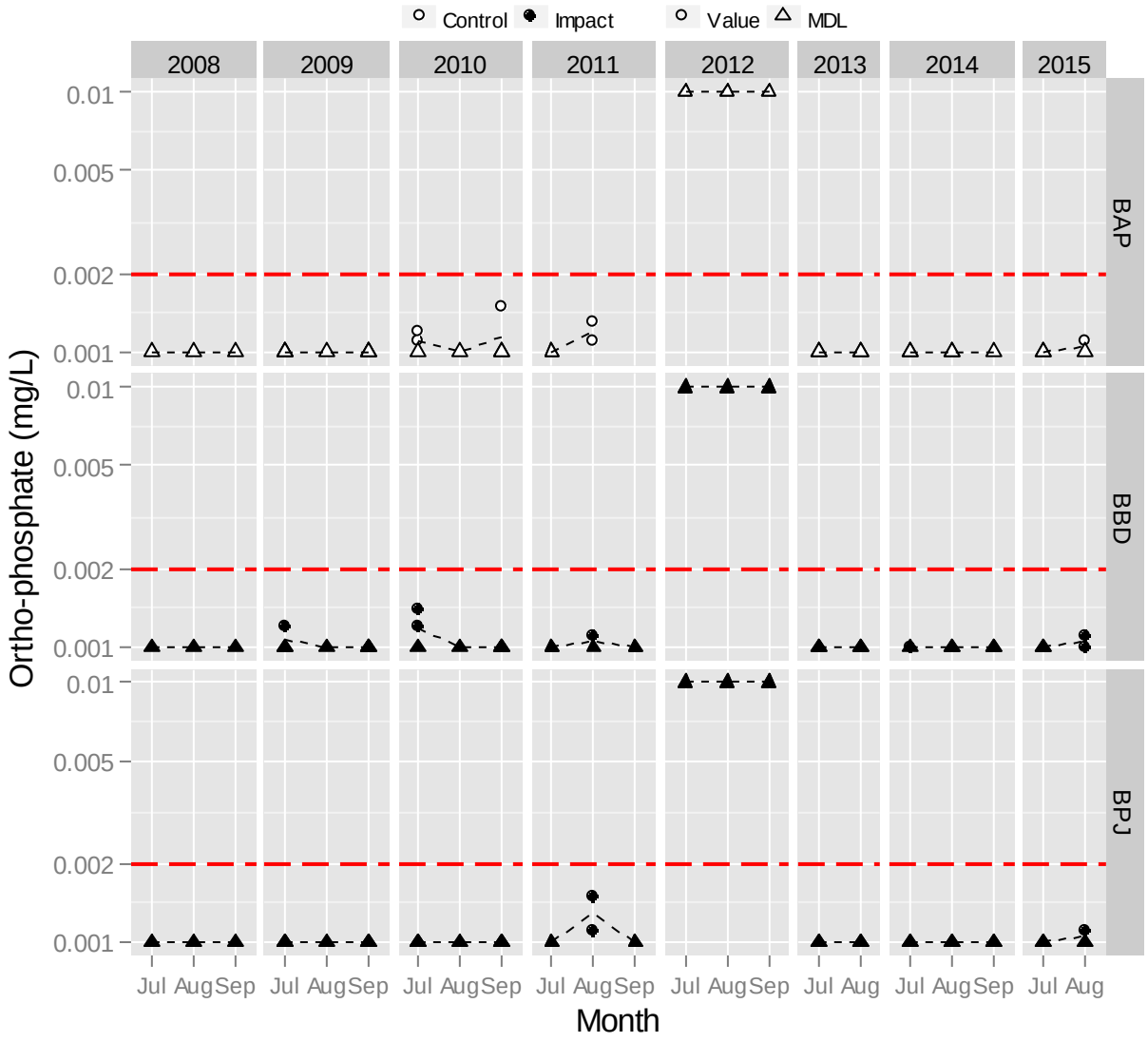


Figure 3.3–17. Reactive Silica (mg/L) in water samples from Baker Lake since 2008.

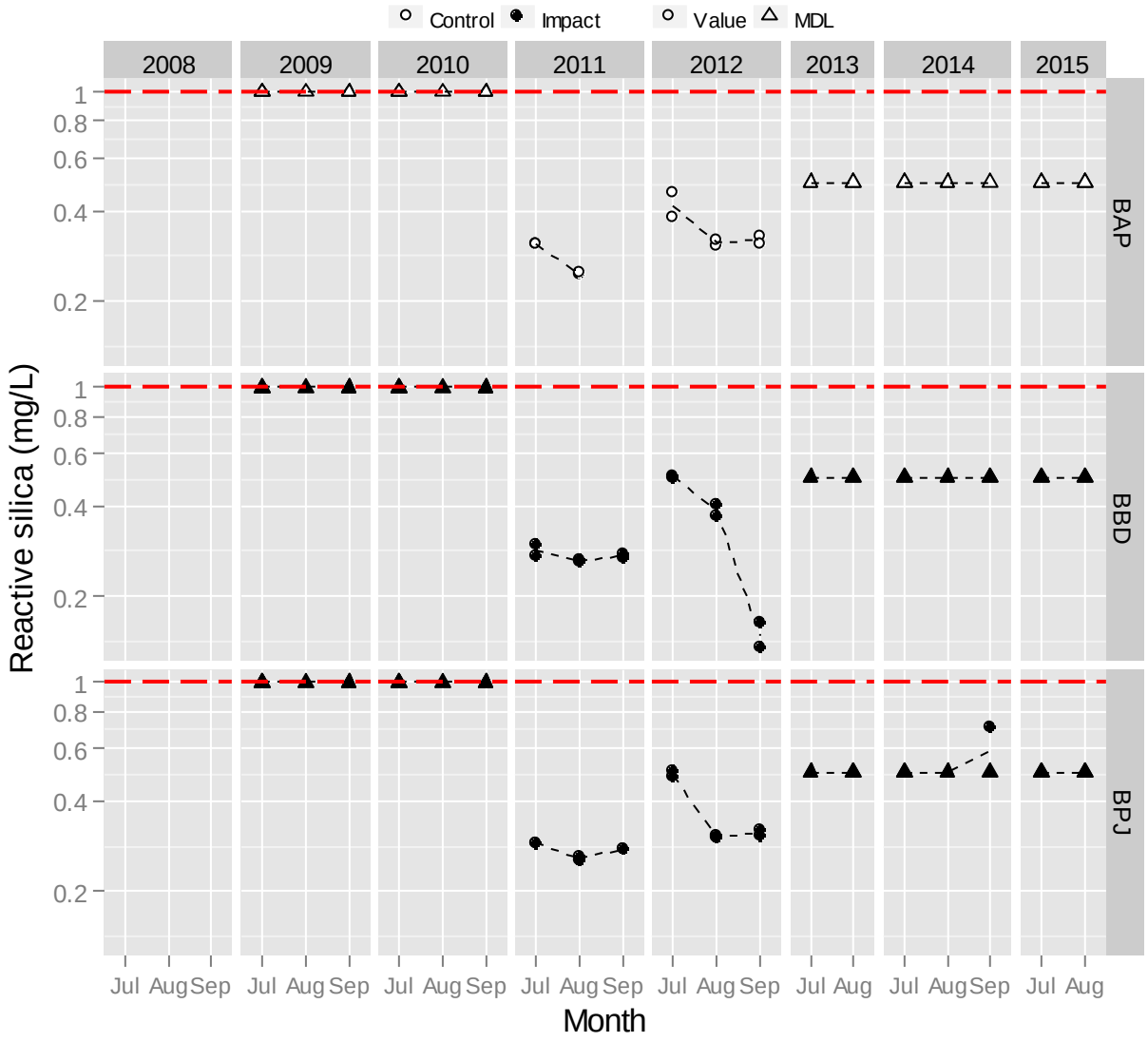


Figure 3.3–18. Sulphate (mg/L) in water samples from Baker Lake since 2008.

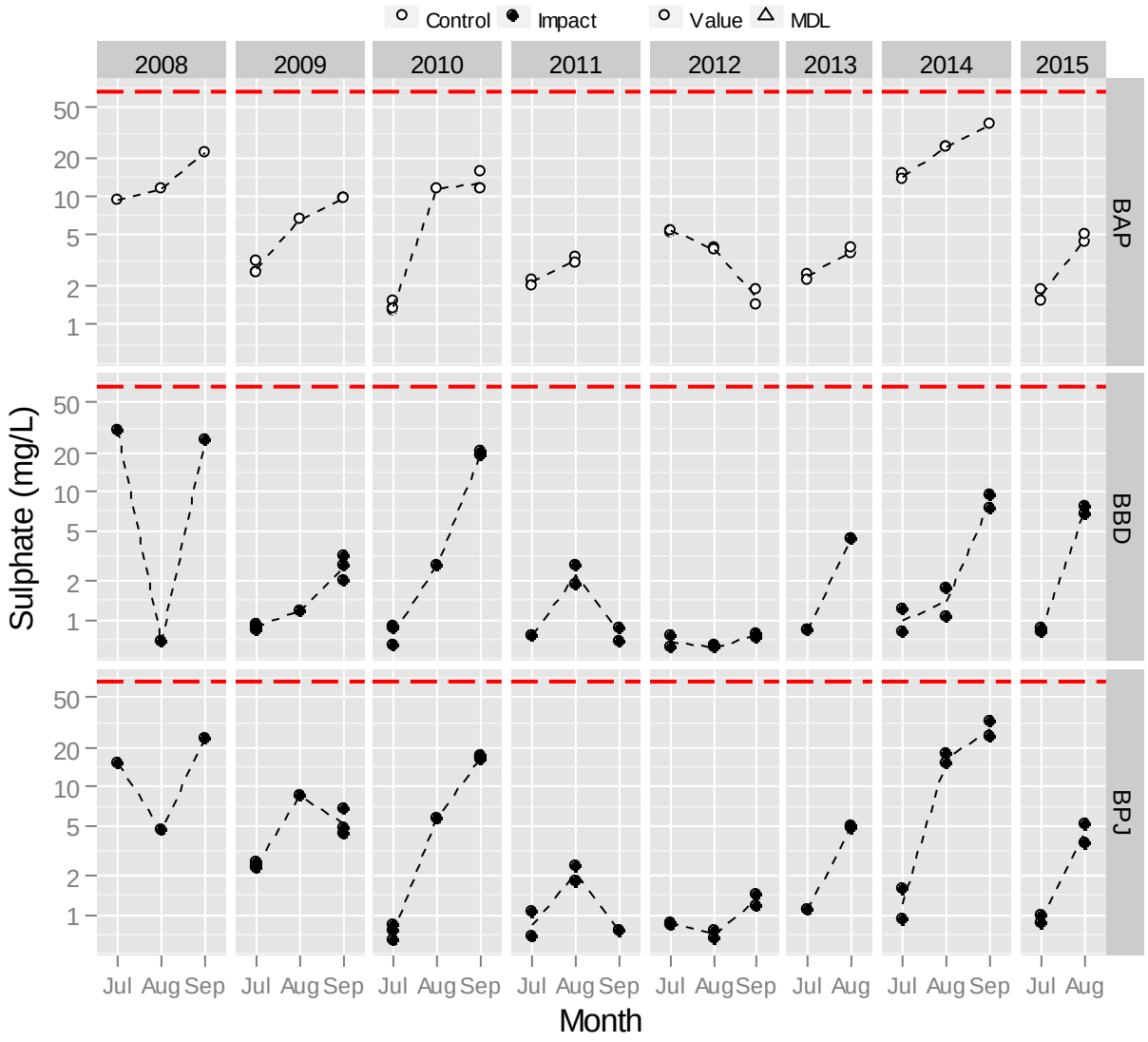


Figure 3.3–19. Dissolved Organic Carbon (DOC; mg/L) in water samples from Baker Lake since 2008.

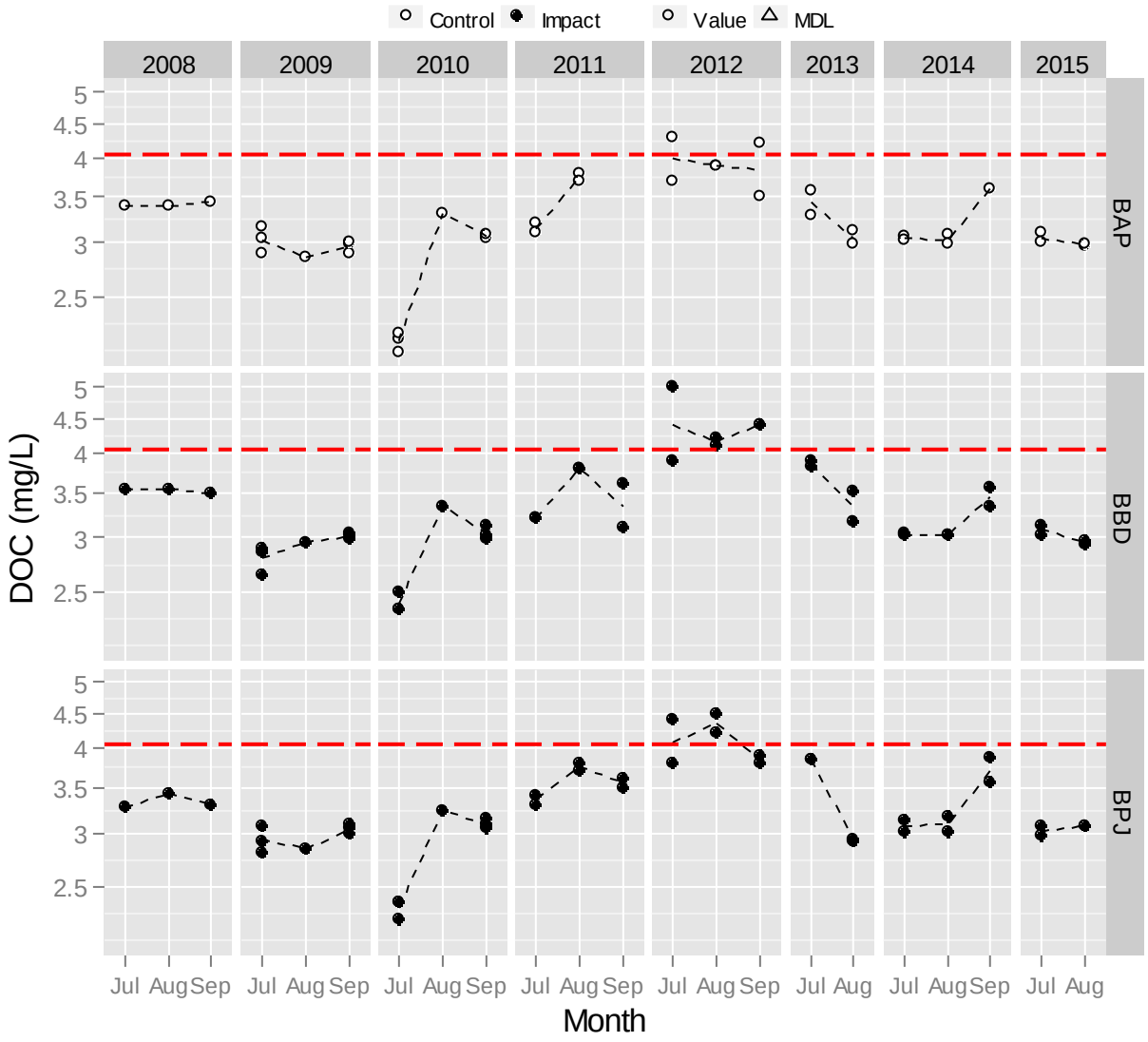


Figure 3.3–20. Total Organic Carbon (TOC; mg/L) in water samples from Baker Lake since 2008.

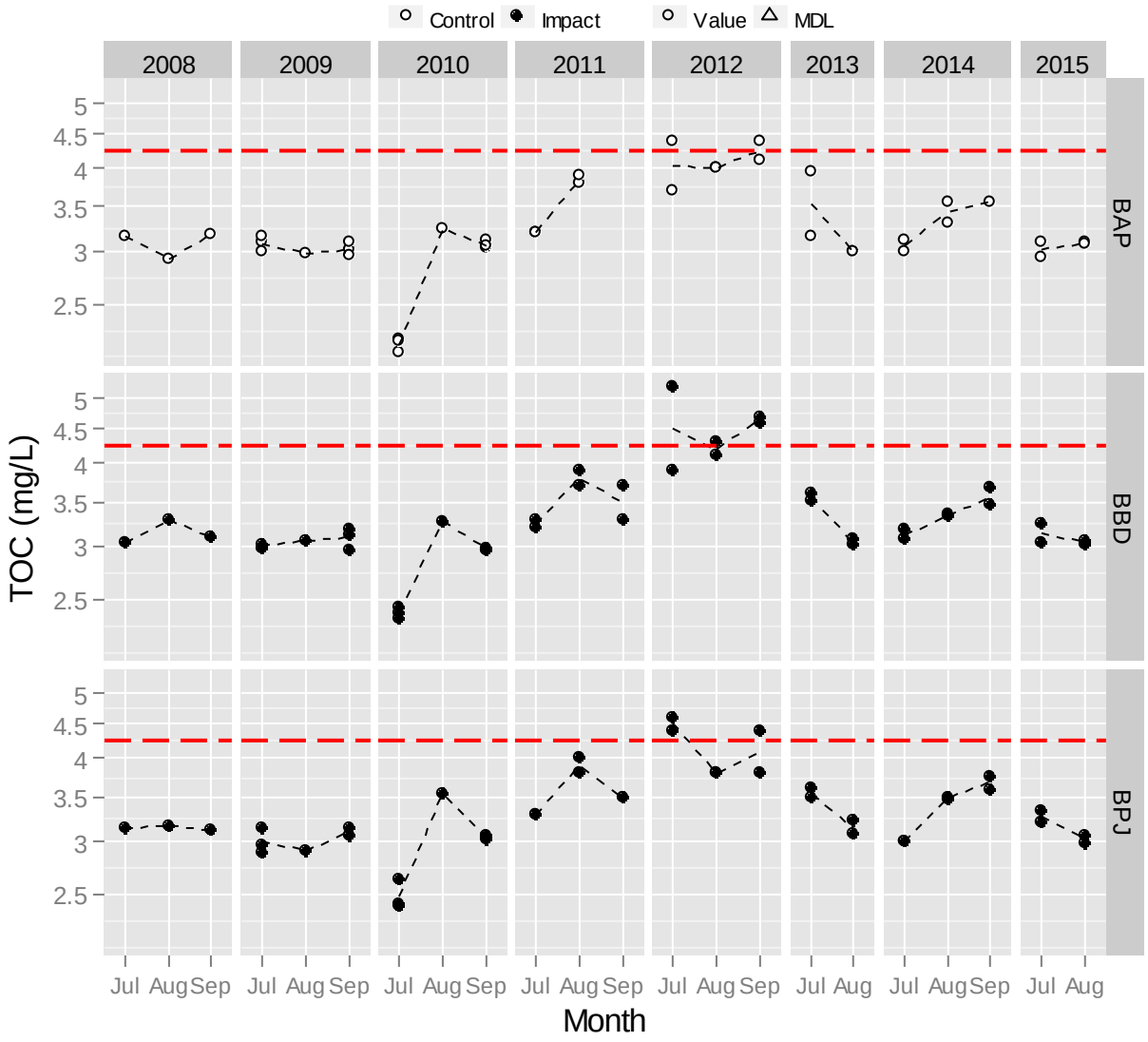


Figure 3.3–21. Total Aluminum (mg/L) in water samples from Baker Lake since 2008.

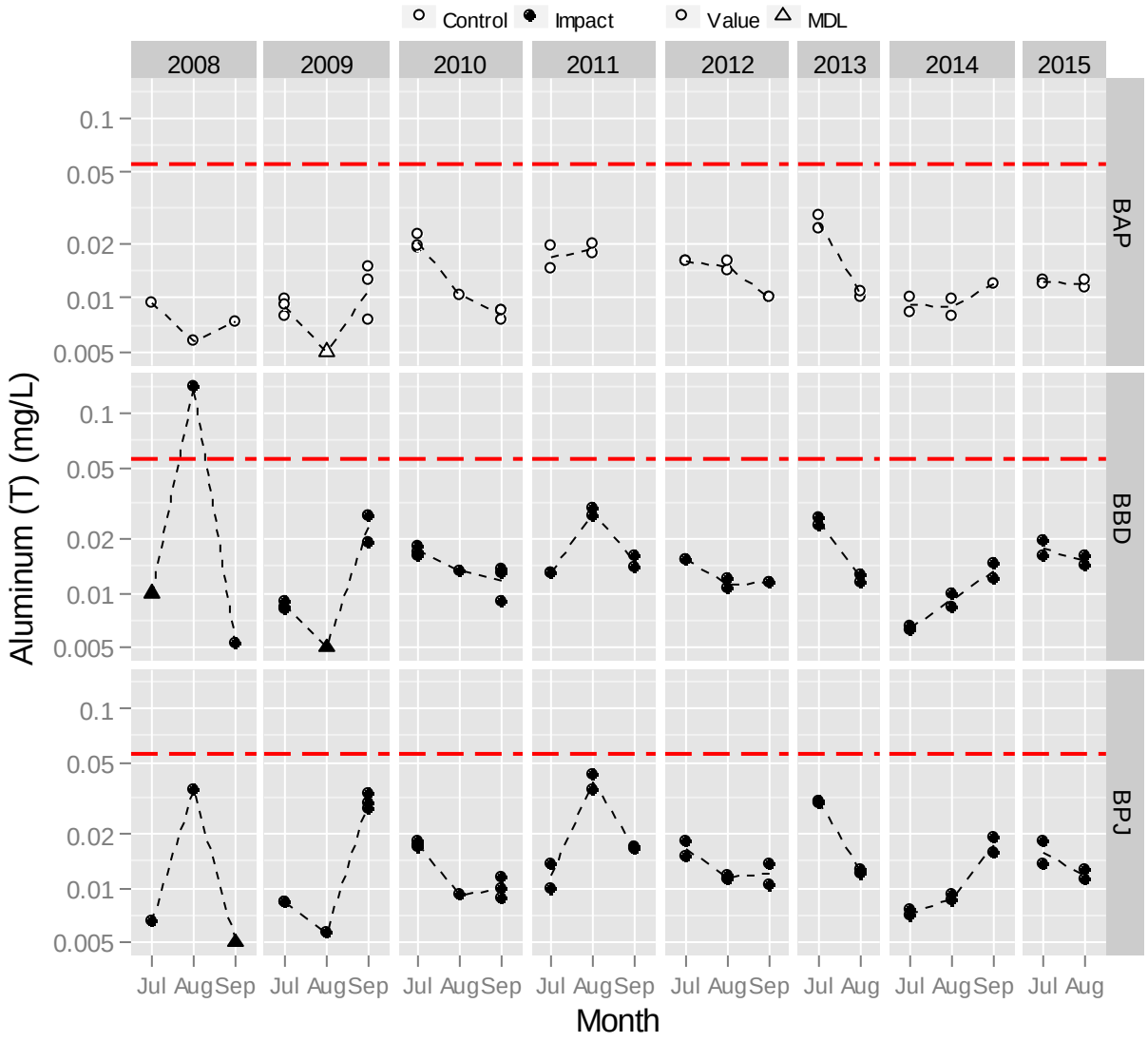


Figure 3.3–22. Total Arsenic (mg/L) in water samples from Baker Lake since 2008.

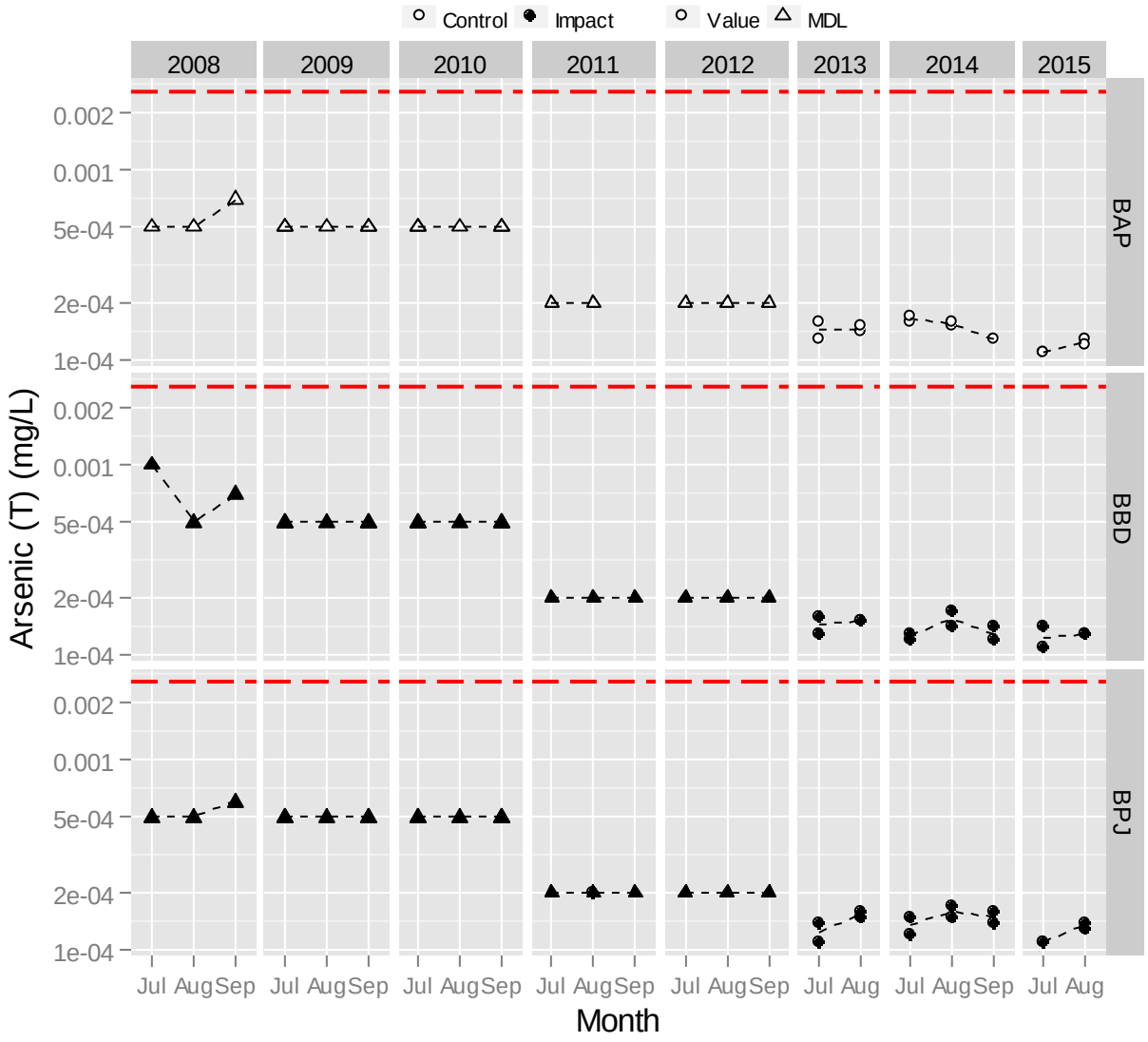


Figure 3.3–23. Total Barium (mg/L) in water samples from Baker Lake since 2008.

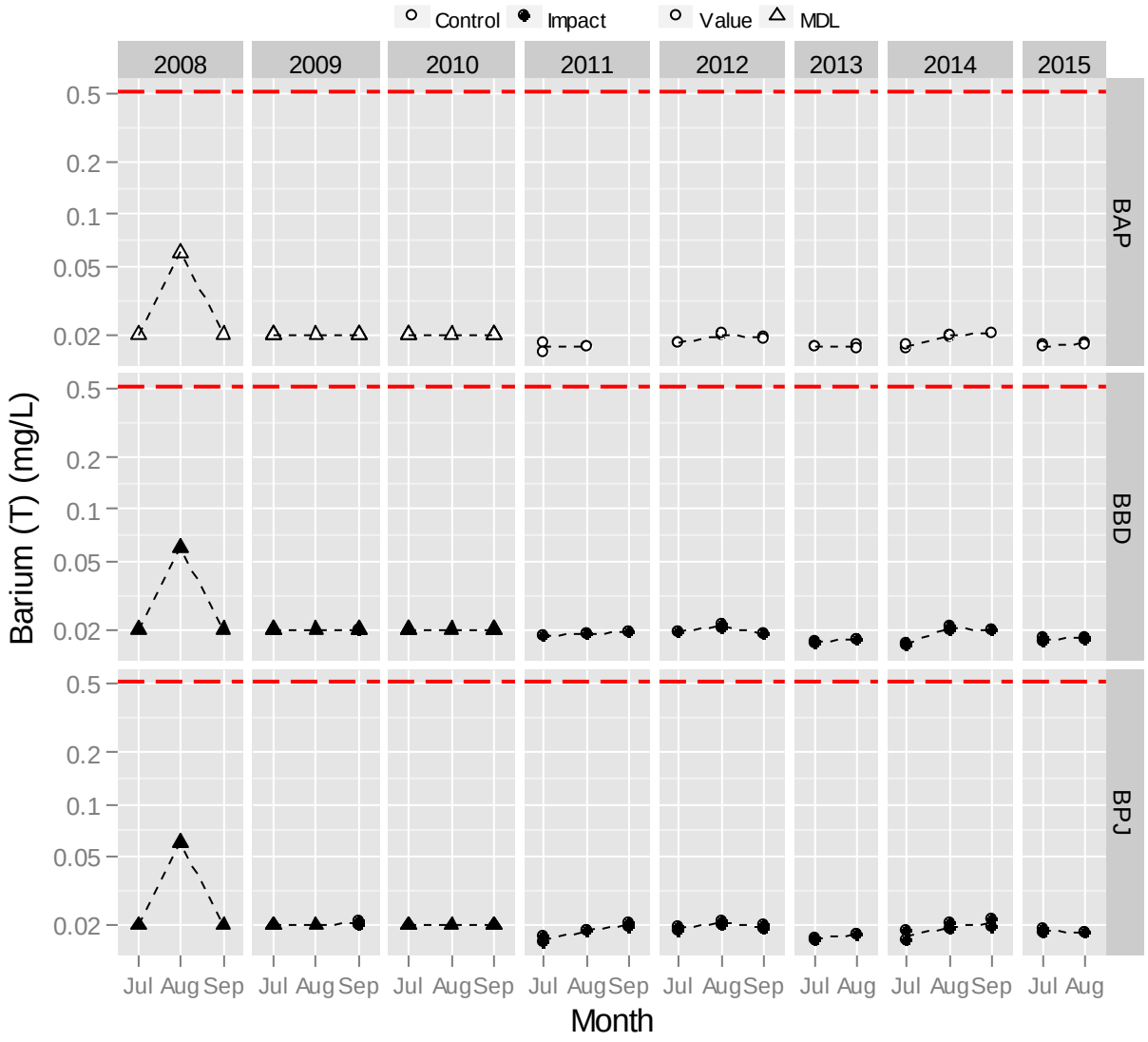


Figure 3.3–24. Total (mg/L) Boron in water samples from Baker Lake since 2008.

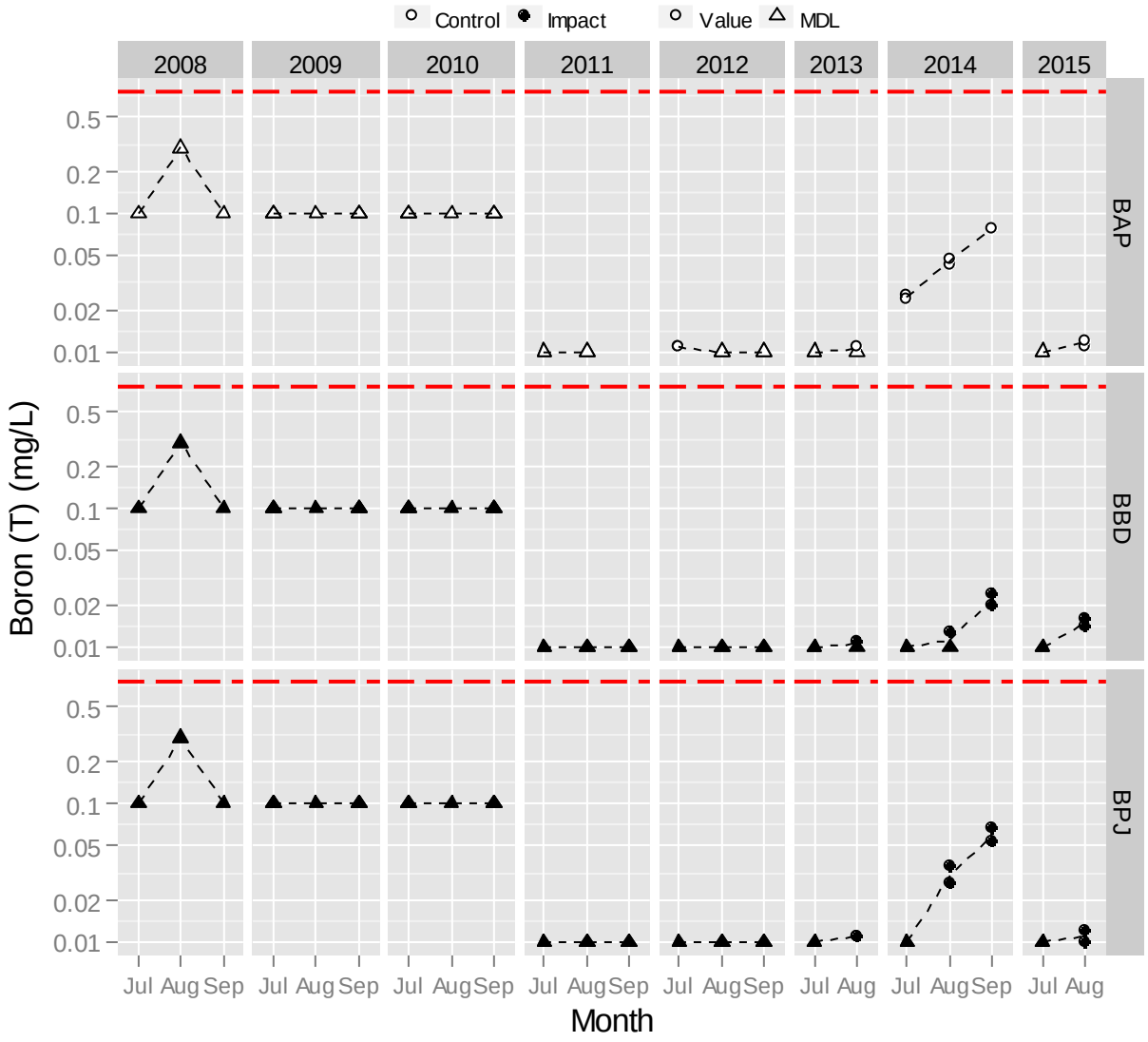


Figure 3.3–25. Total Calcium (mg/L) in water samples from Baker Lake since 2008.

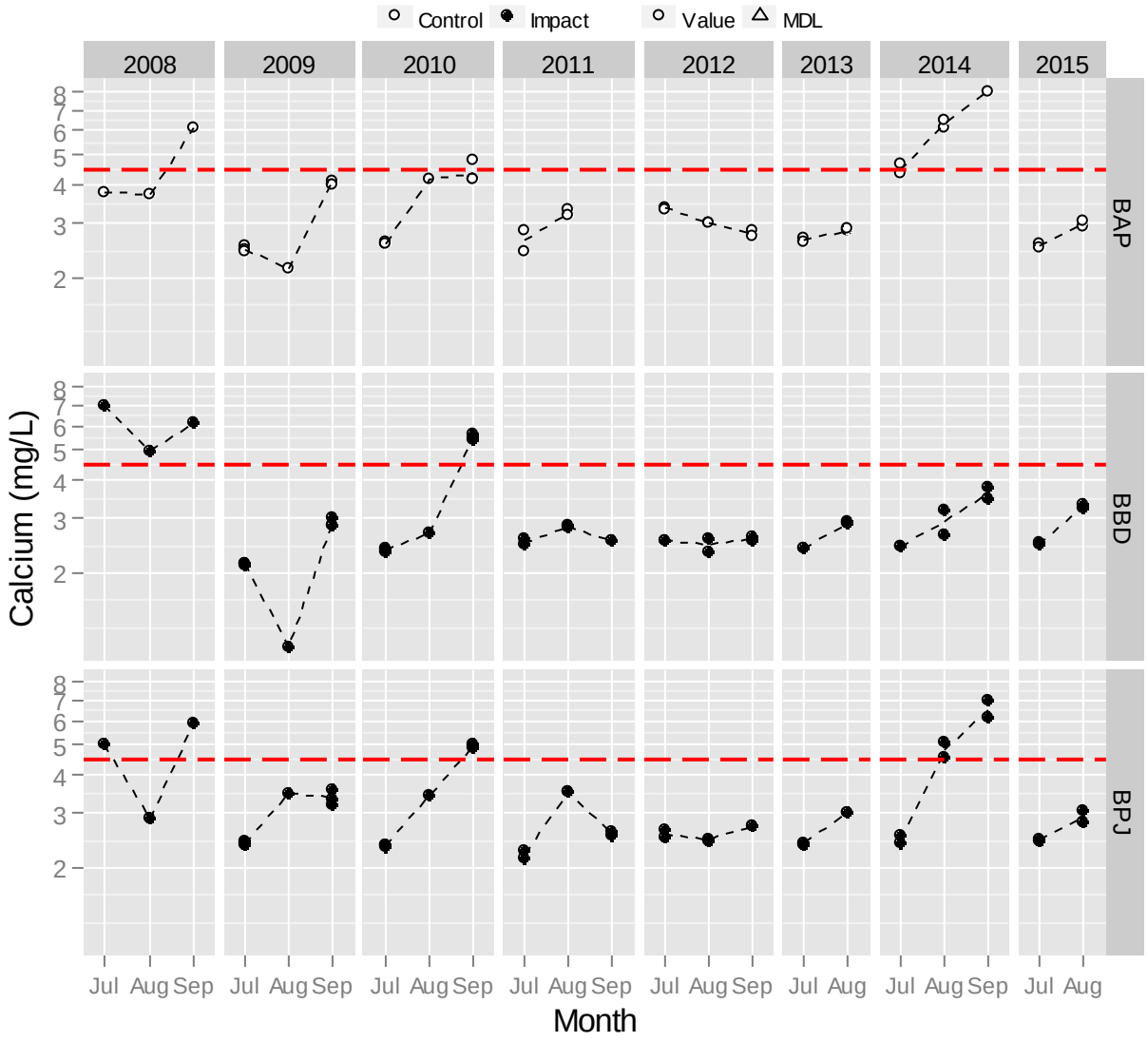


Figure 3.3–26. Total Chromium (mg/L) in water samples from Baker Lake since 2008.

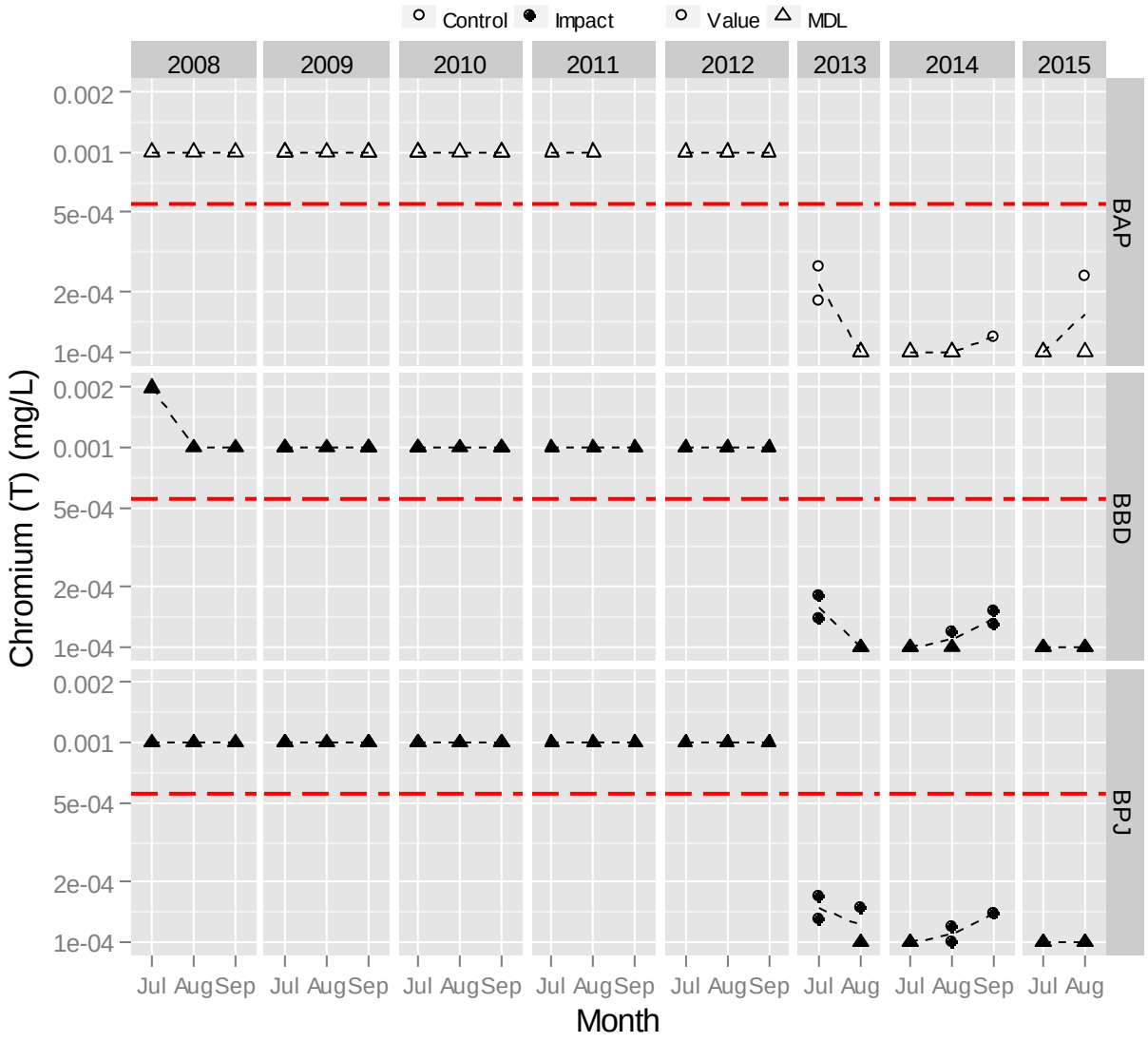


Figure 3.3–27. Total Copper (mg/L) in water samples from Baker Lake since 2008.

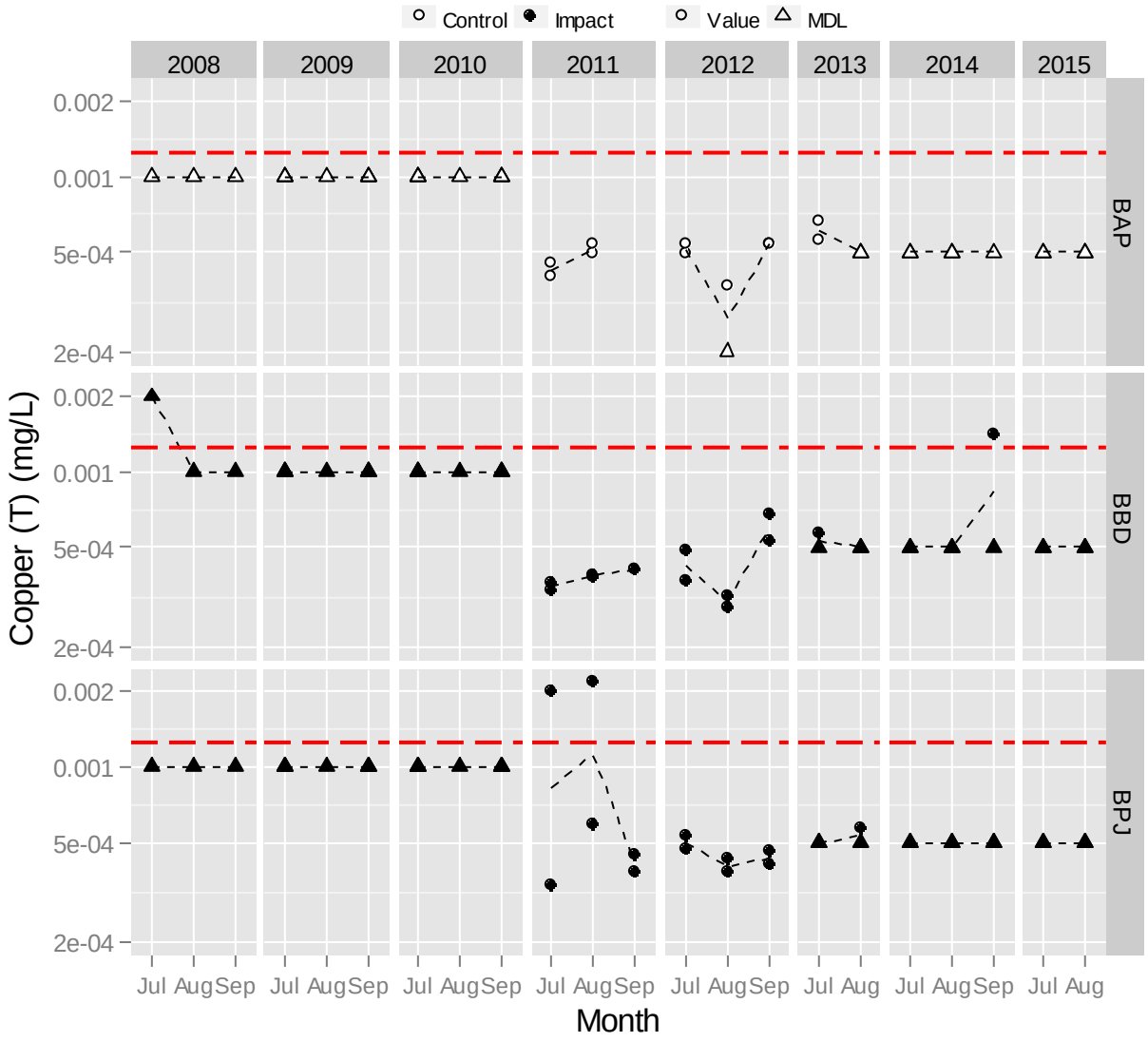


Figure 3.3–28. Total Iron (mg/L) in water samples from Baker Lake since 2008.

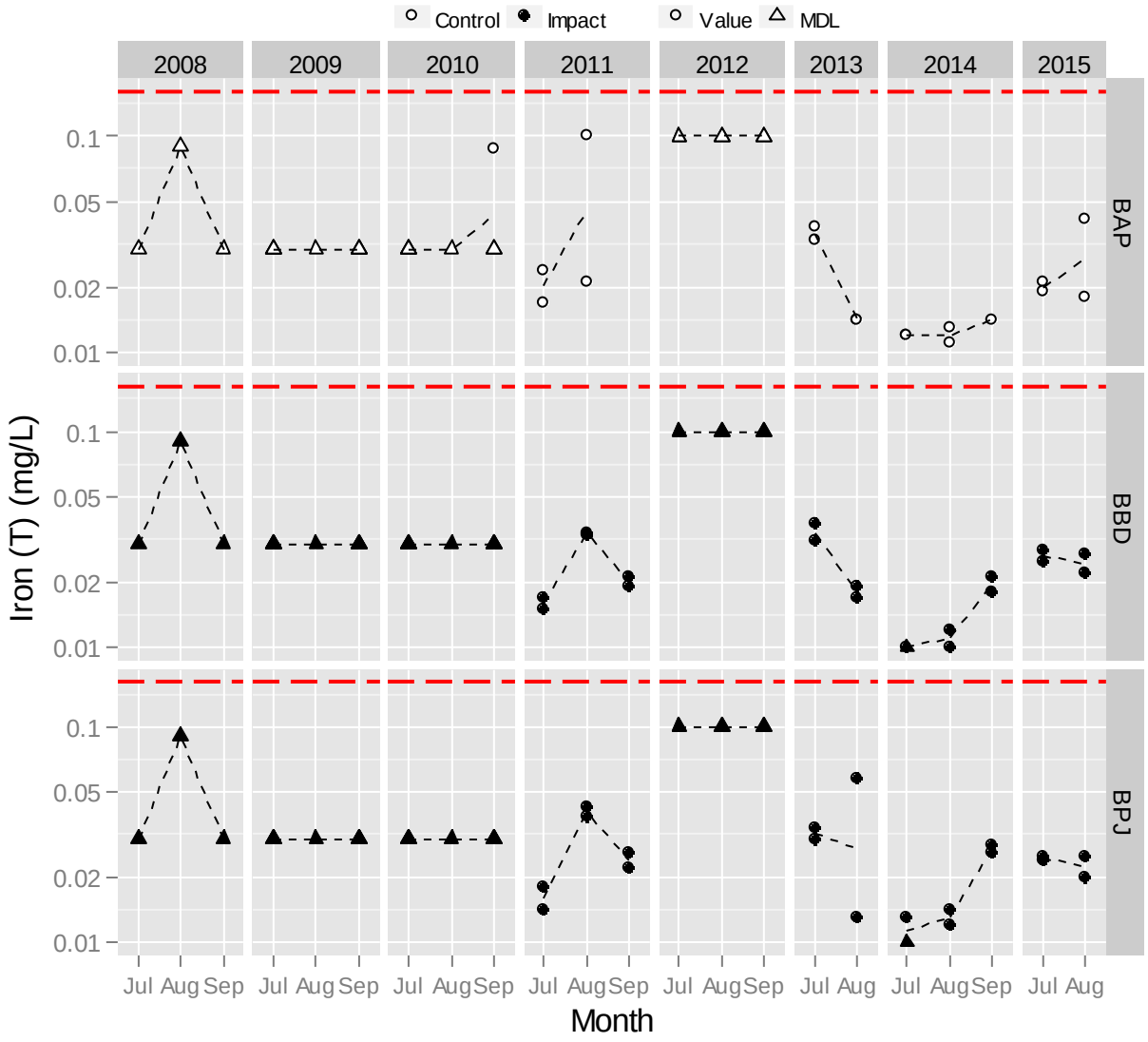


Figure 3.3–29. Total Lead (mg/L) in water samples from Baker Lake since 2008.

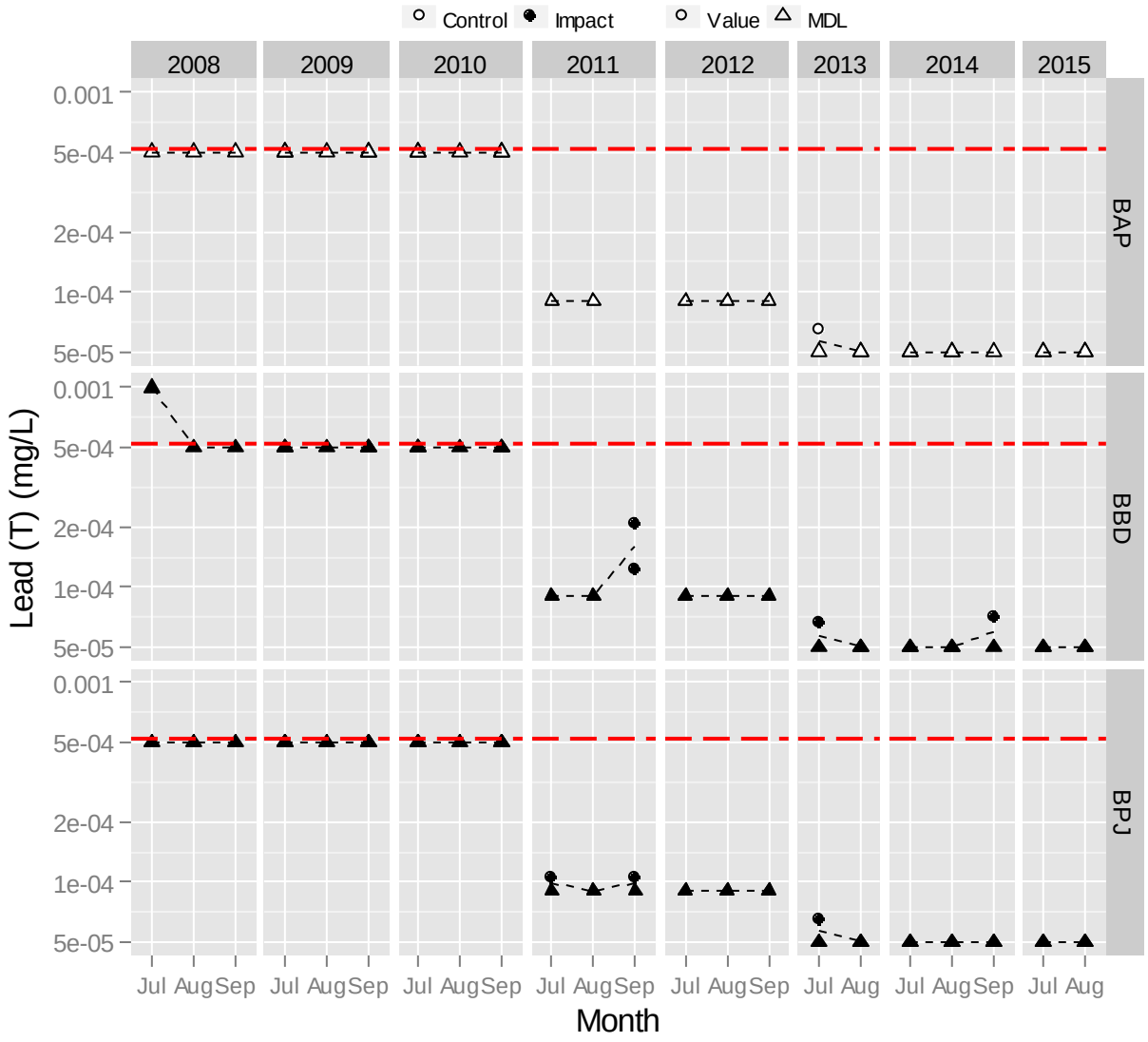


Figure 3.3–30. Total Lithium (mg/L) in water samples from Baker Lake since 2008.

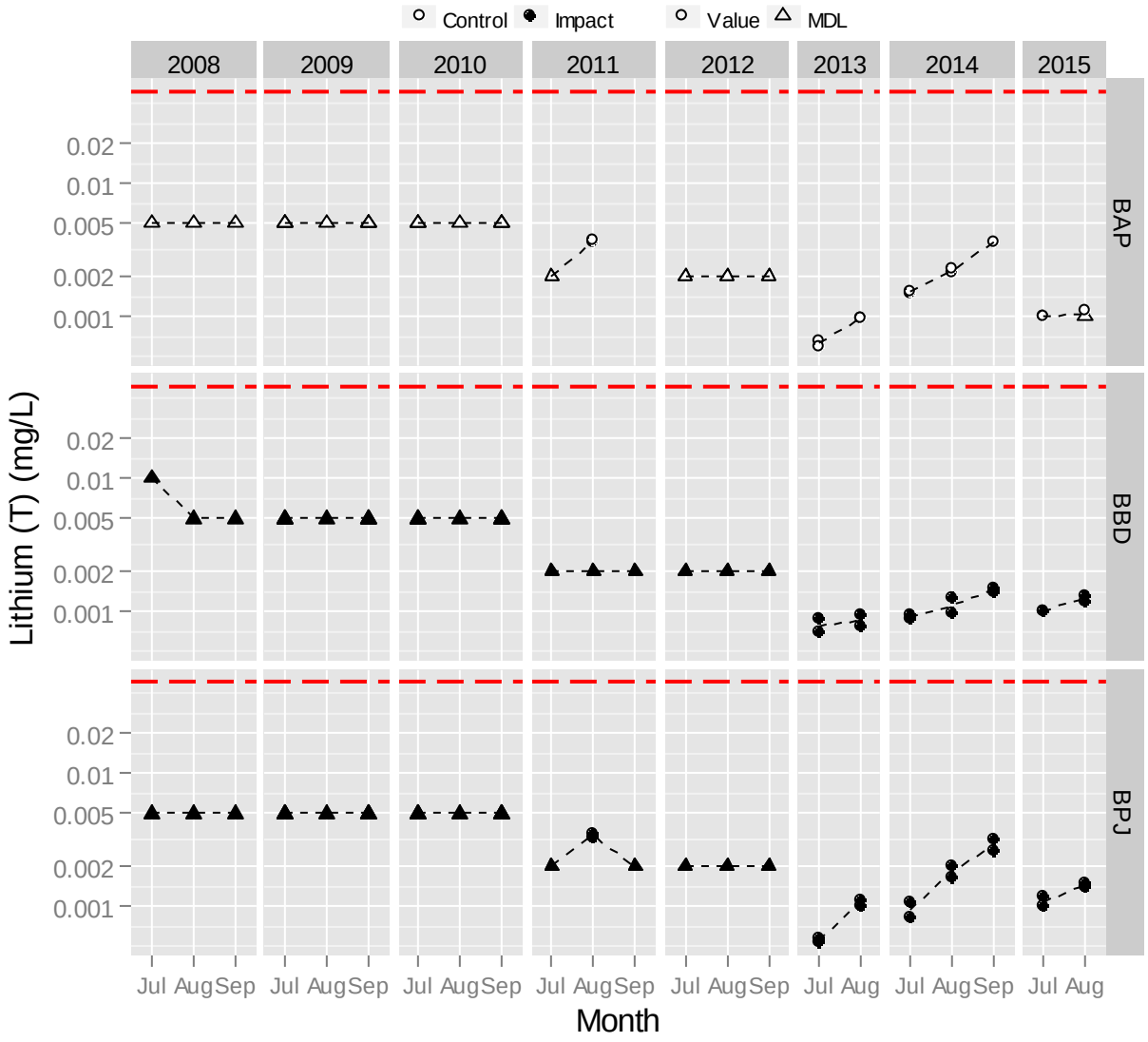


Figure 3.3–31. Total Magnesium (mg/L) in water samples from Baker Lake since 2008.

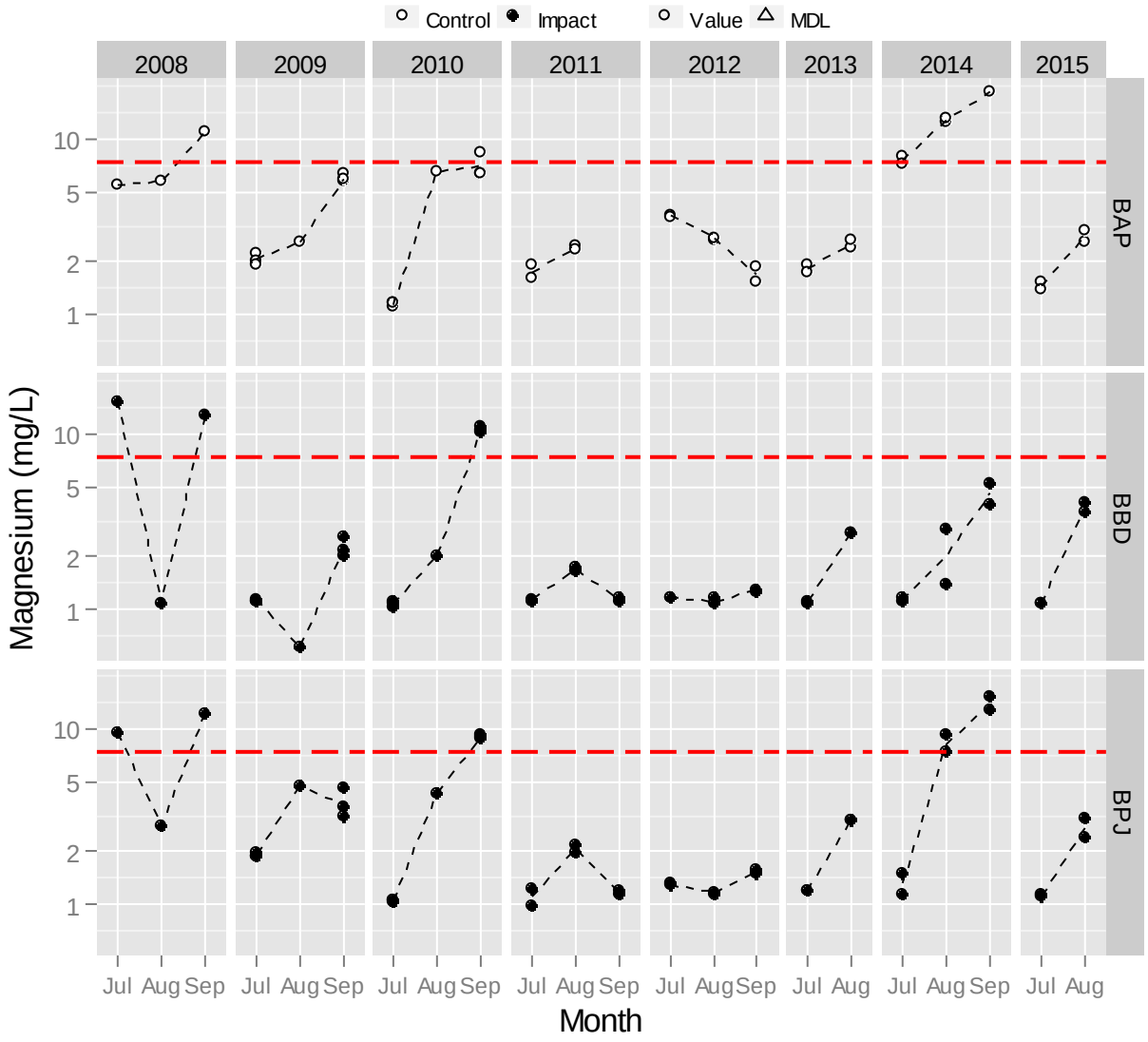


Figure 3.3–32. Total Manganese (mg/L) in water samples from Baker Lake since 2008.

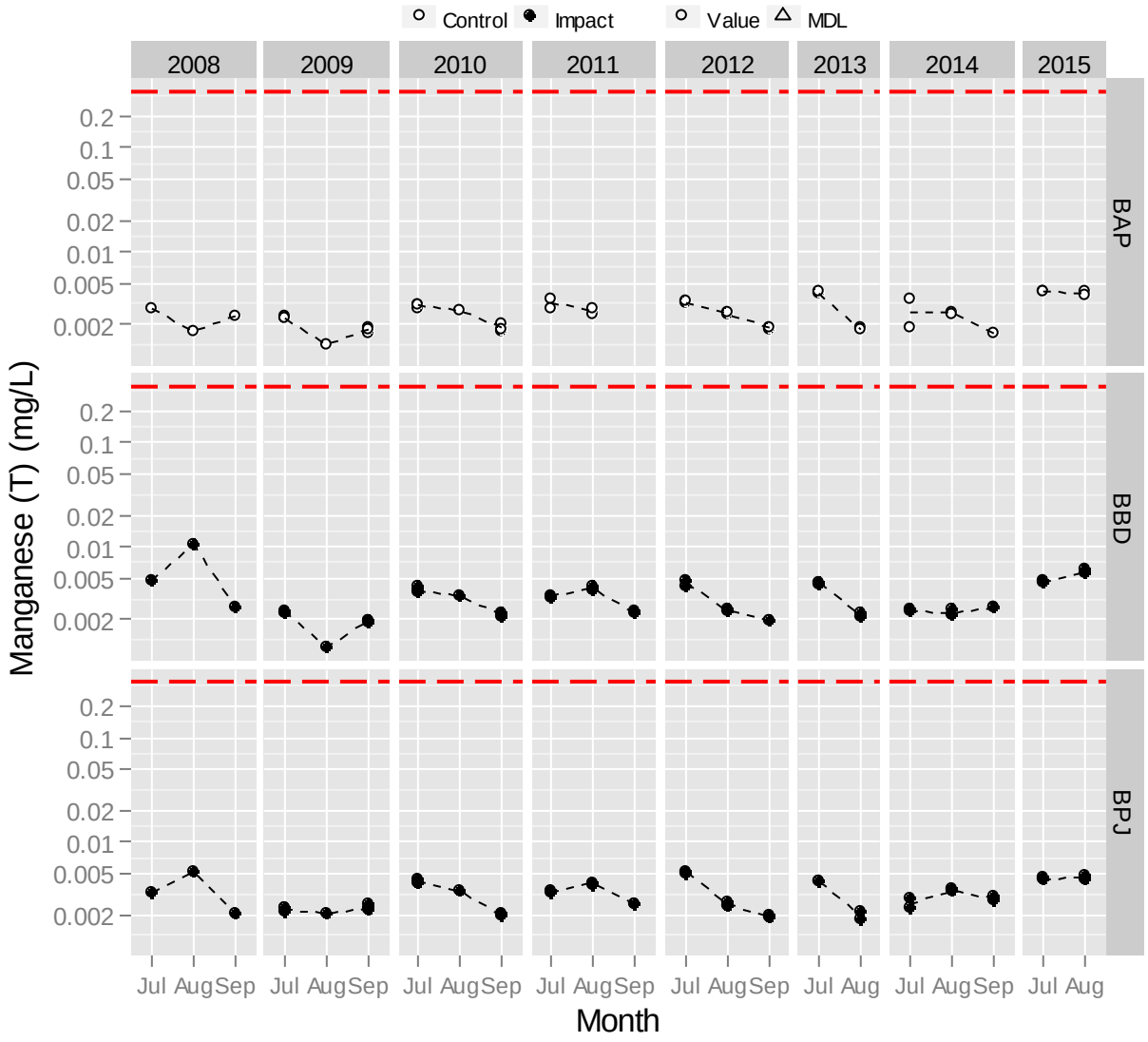


Figure 3.3–33. Total Molybdenum (mg/L) in water samples from Baker Lake since 2008.

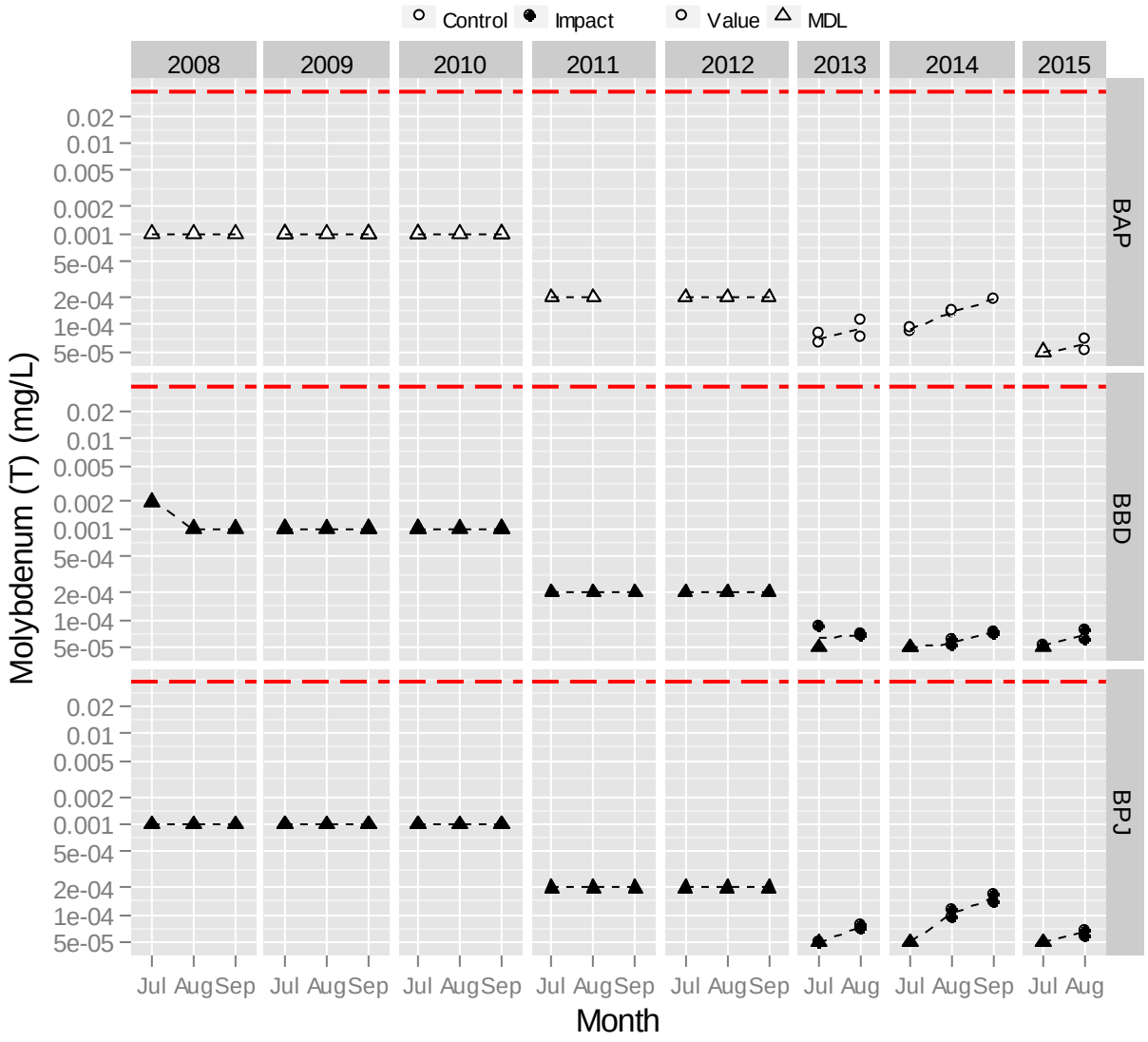


Figure 3.3–34. Total Potassium (mg/L) in water samples from Baker Lake since 2008.

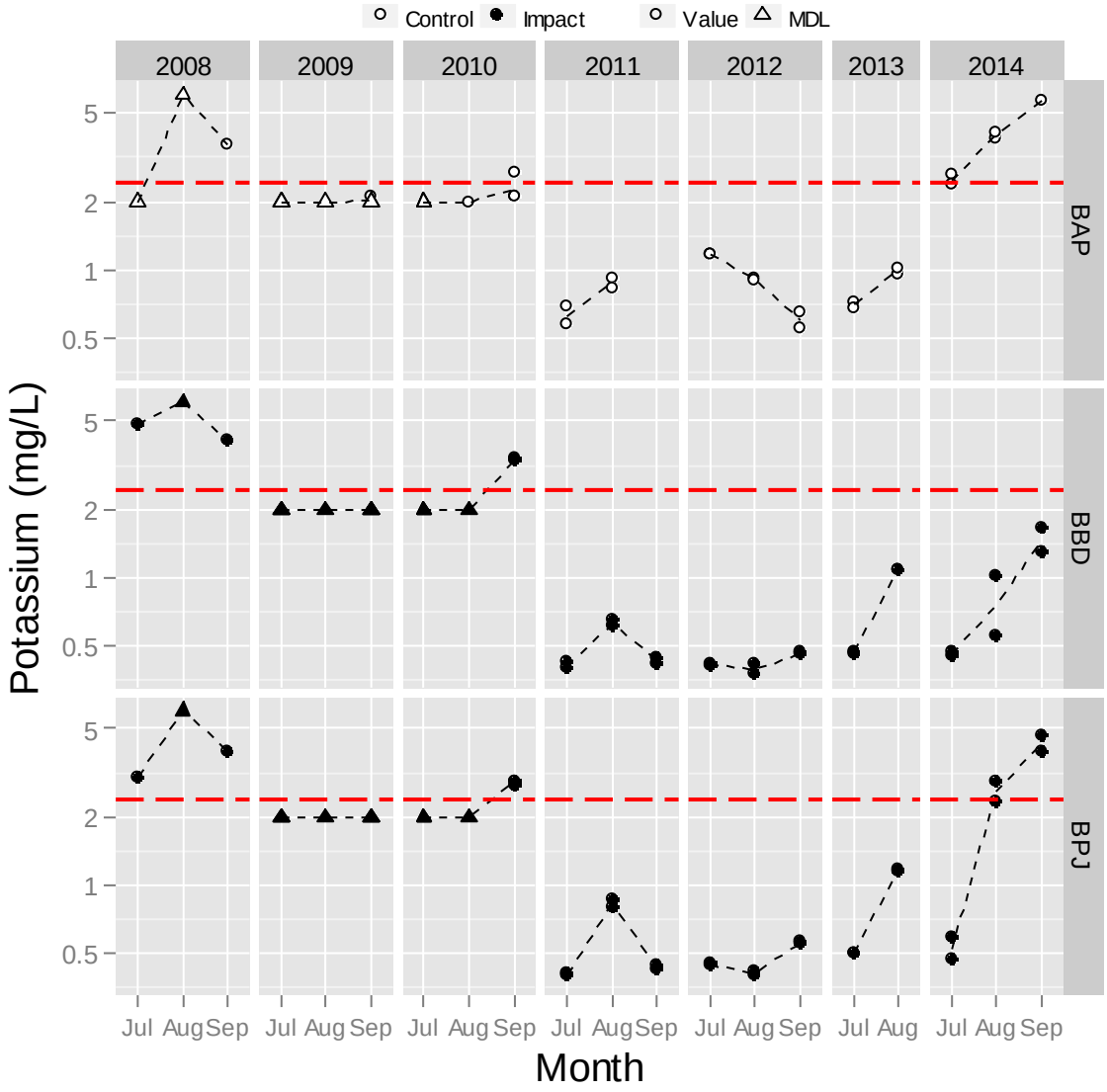


Figure 3.3–35. Total Sodium (mg/L) in water samples from Baker Lake since 2008.

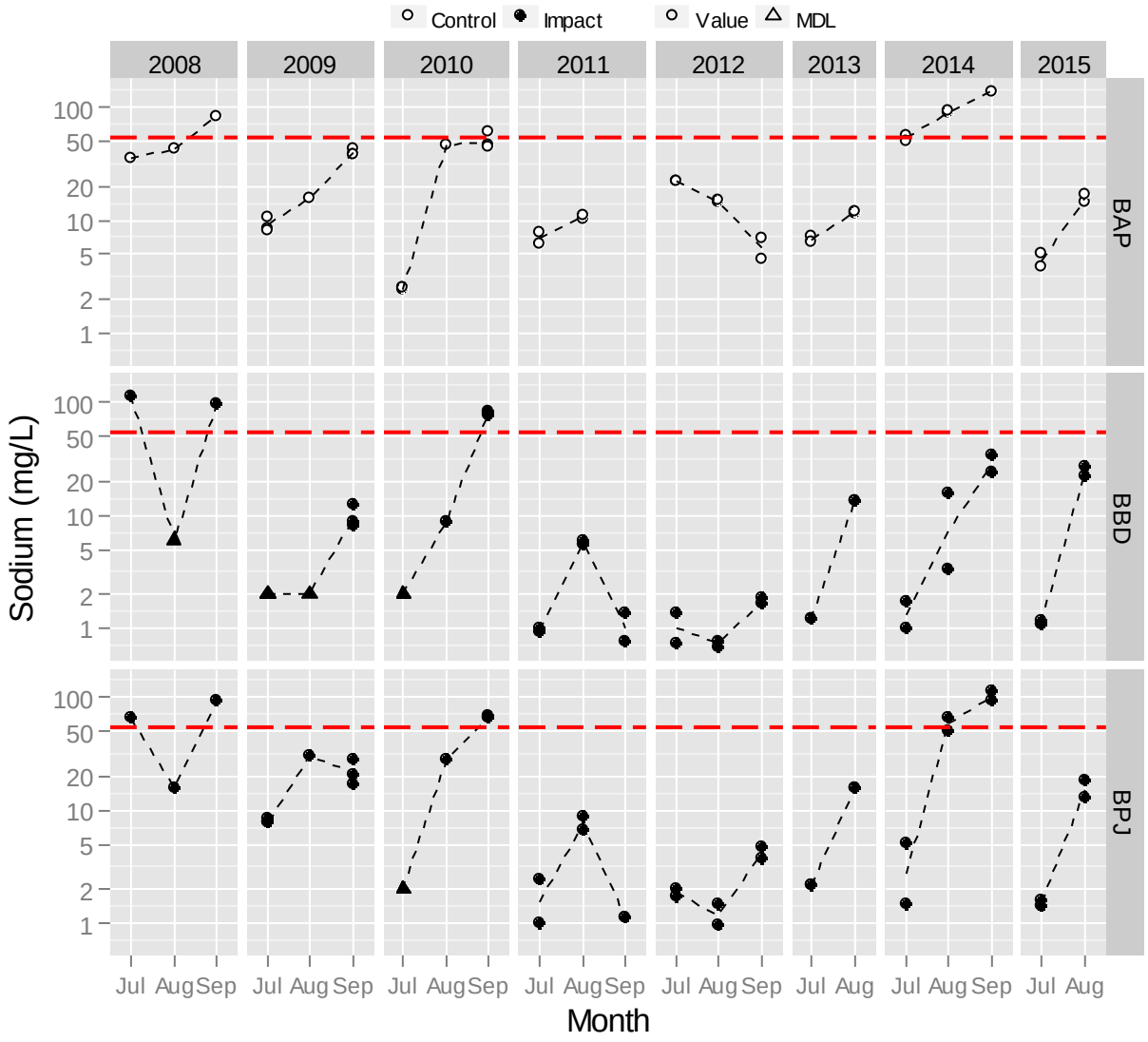


Figure 3.3–36. Total Strontium (mg/L) in water samples from Baker Lake since 2008.

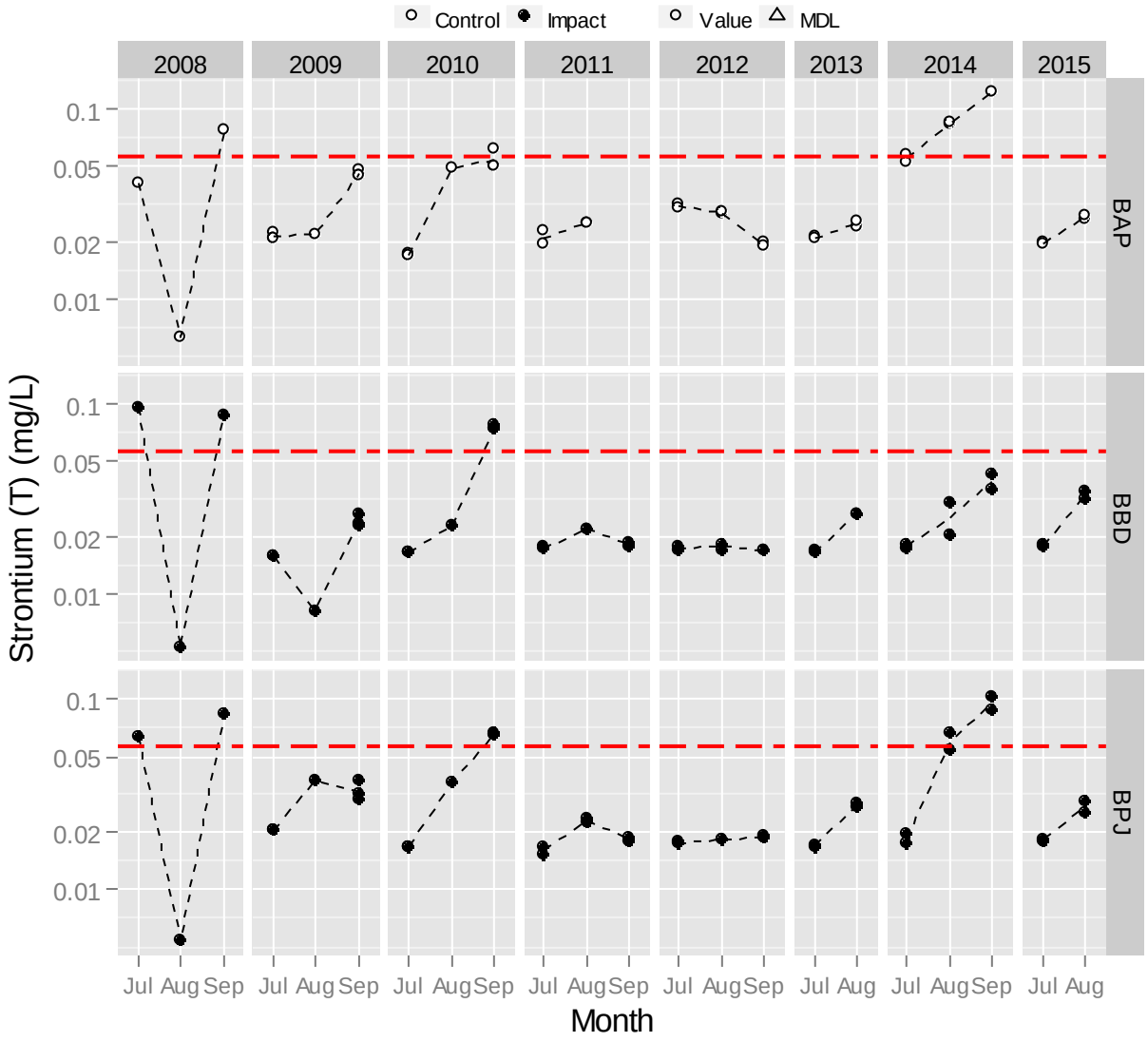


Figure 3.3–37. Total Titanium (mg/L) in water samples from Baker Lake since 2008.

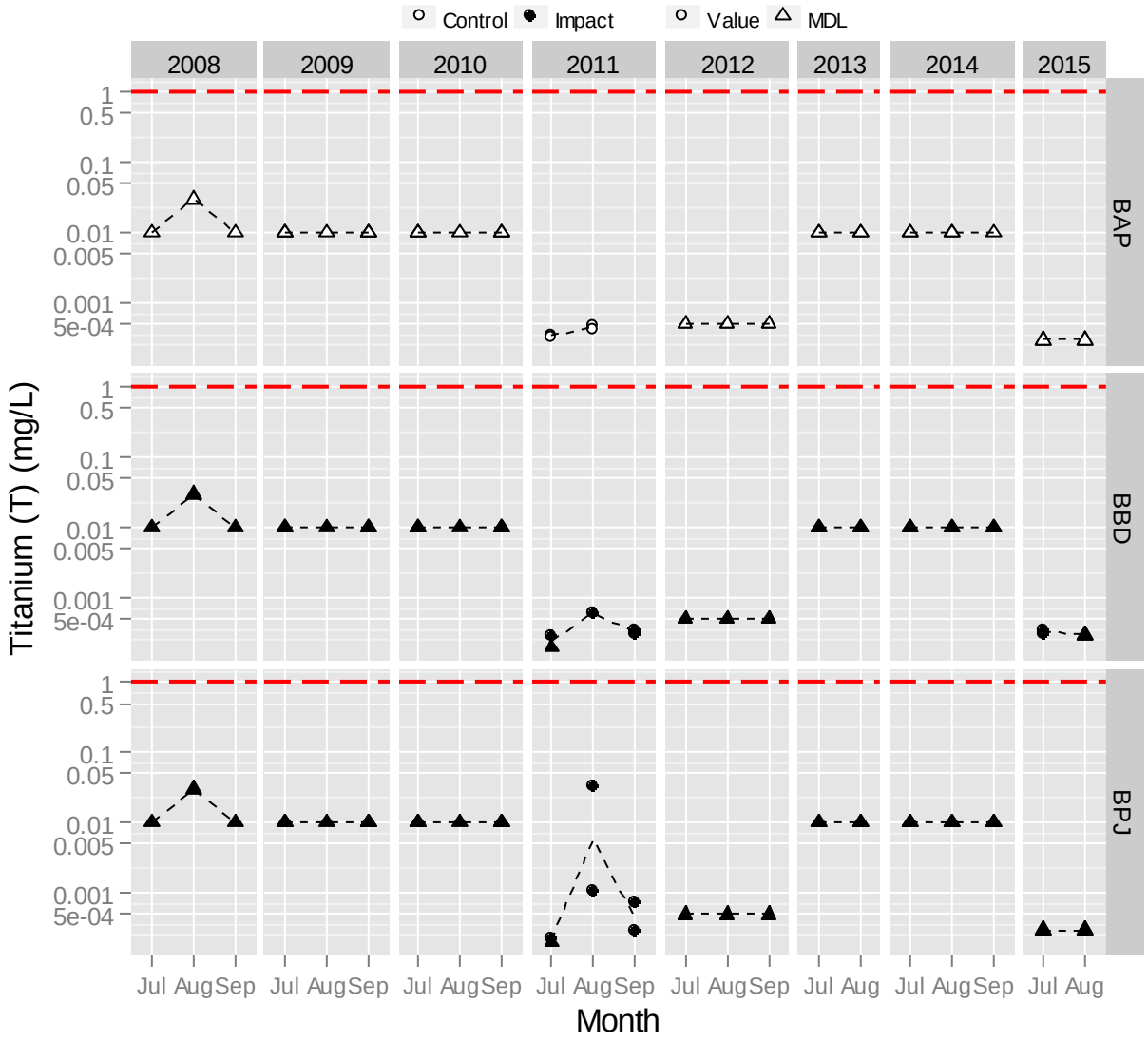


Figure 3.3–38. Total Uranium (mg/L) in water samples from Baker Lake since 2008.

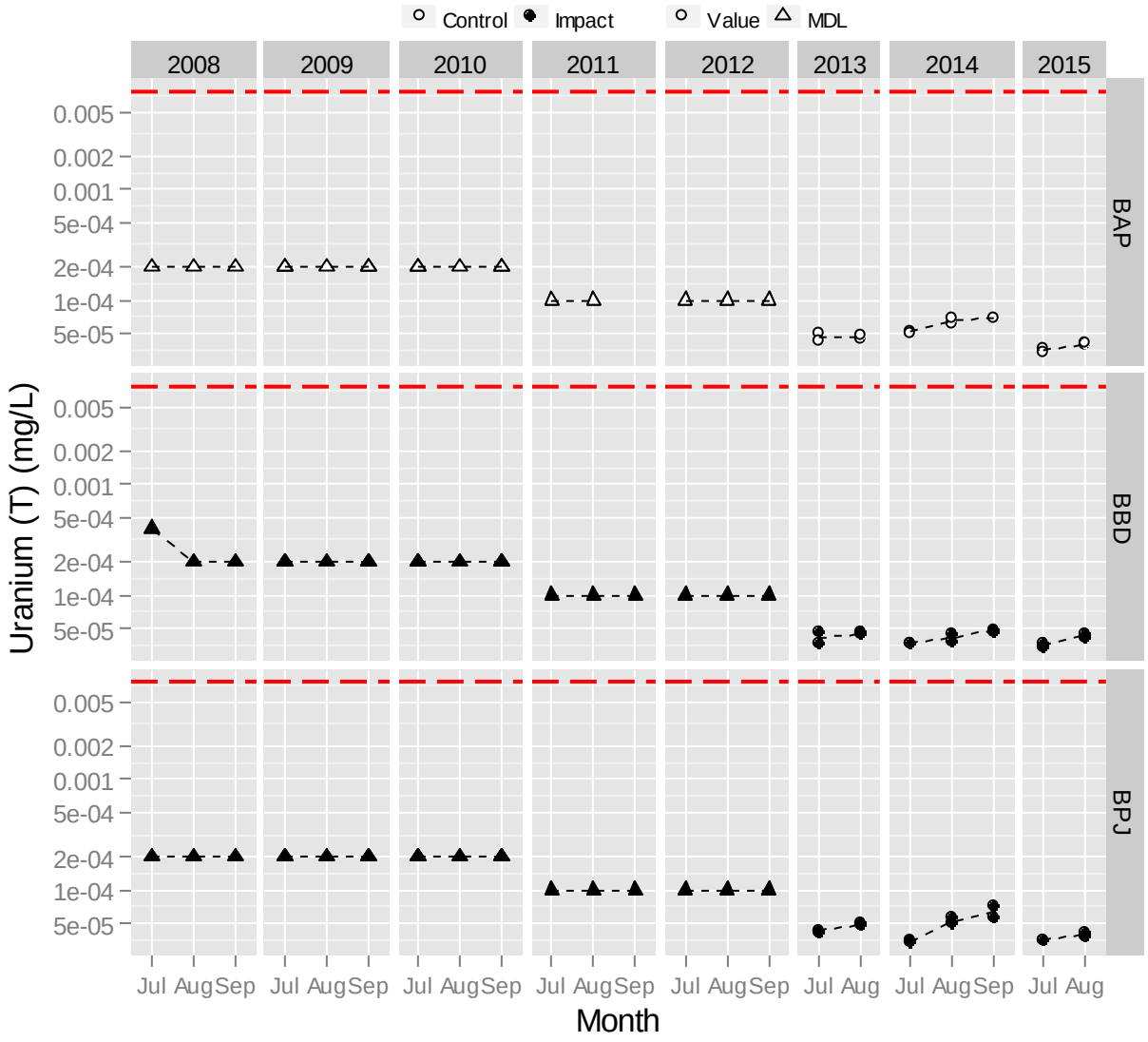


Figure 3.3–39. Dissolved Aluminum (mg/L) in water samples from Baker Lake since 2008.

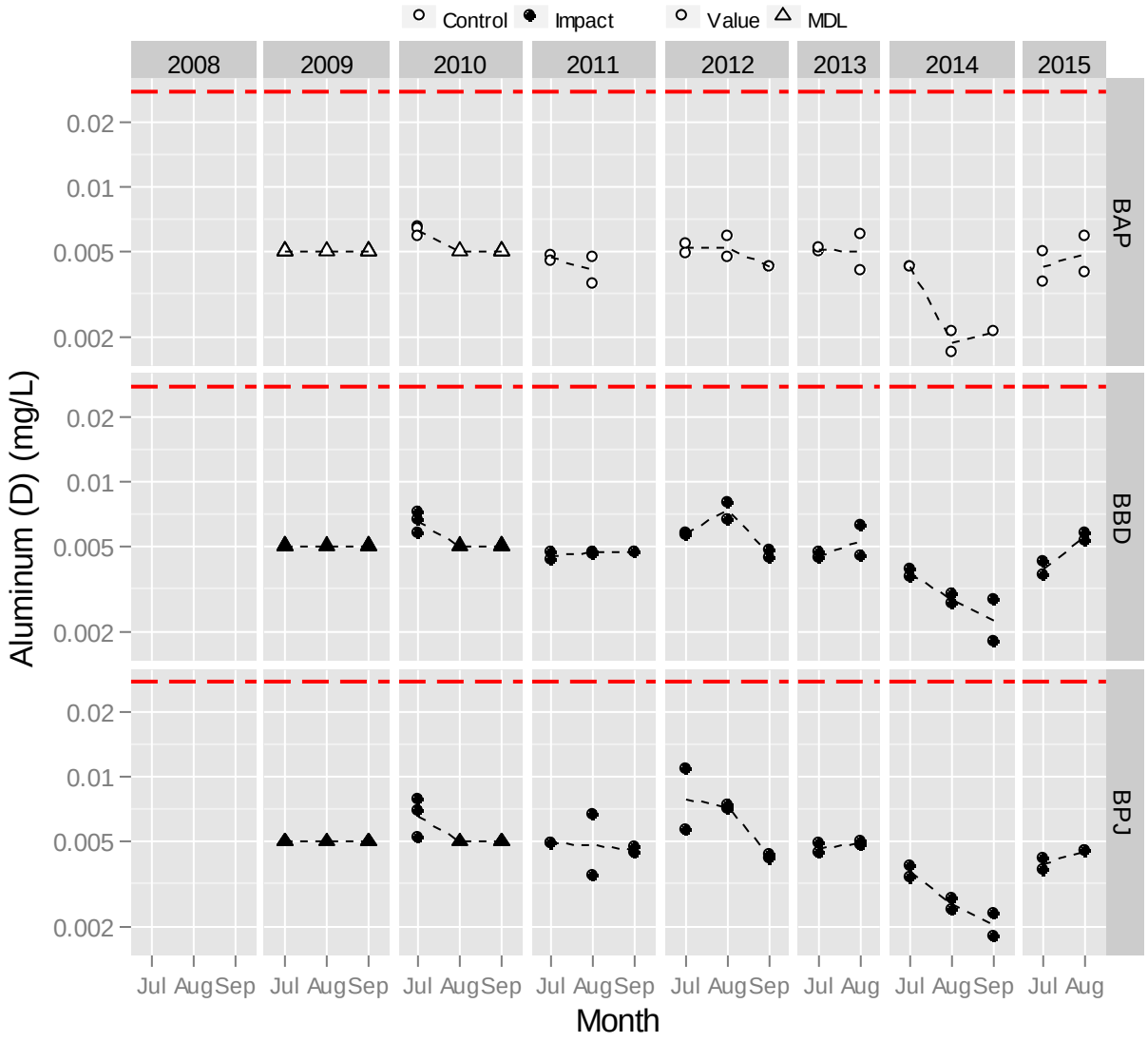


Figure 3.3–40. Dissolved Arsenic (mg/L) in water samples from Baker Lake since 2008.

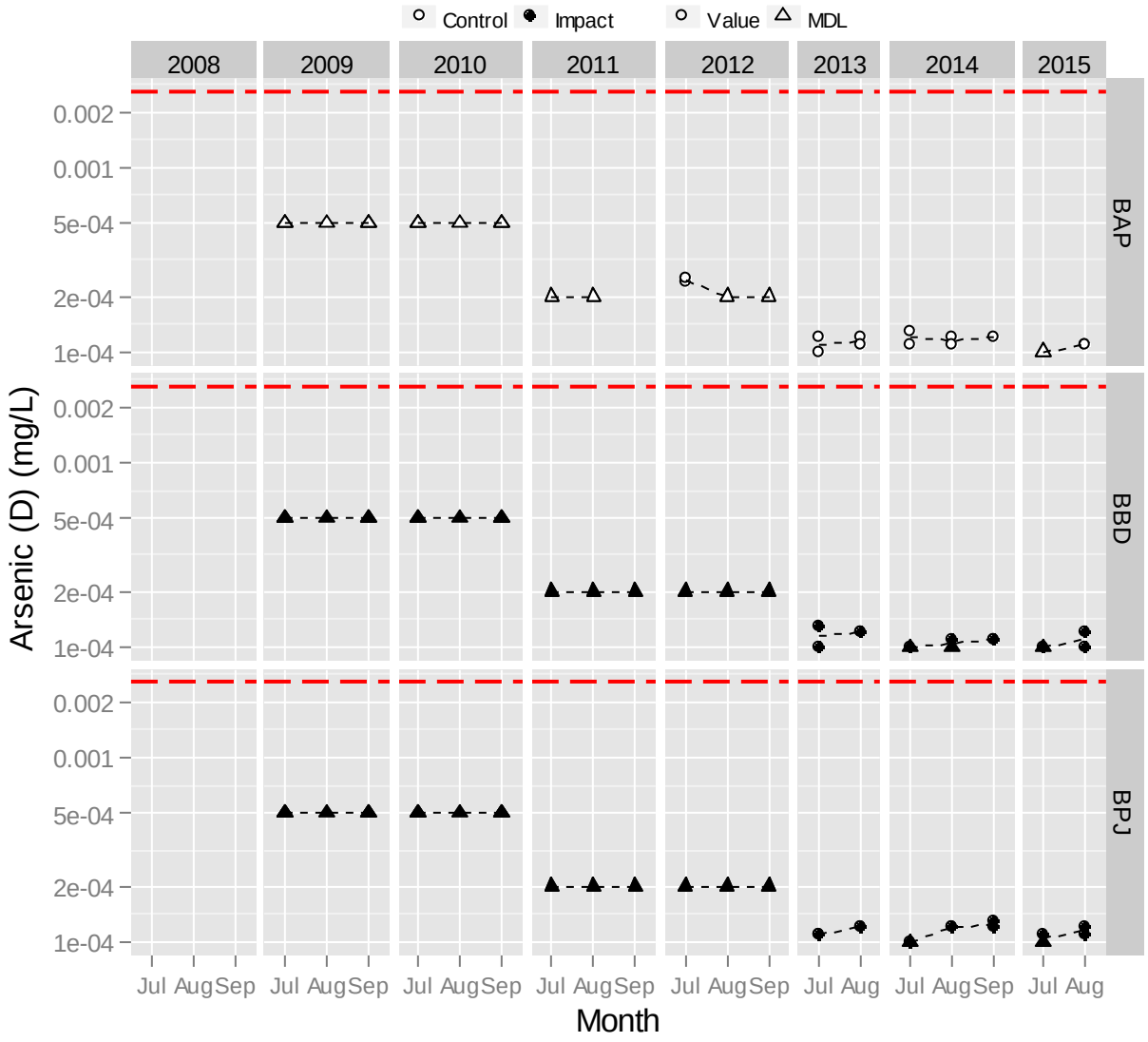


Figure 3.3–41. Dissolved Barium (mg/L) in water samples from Baker Lake since 2008.

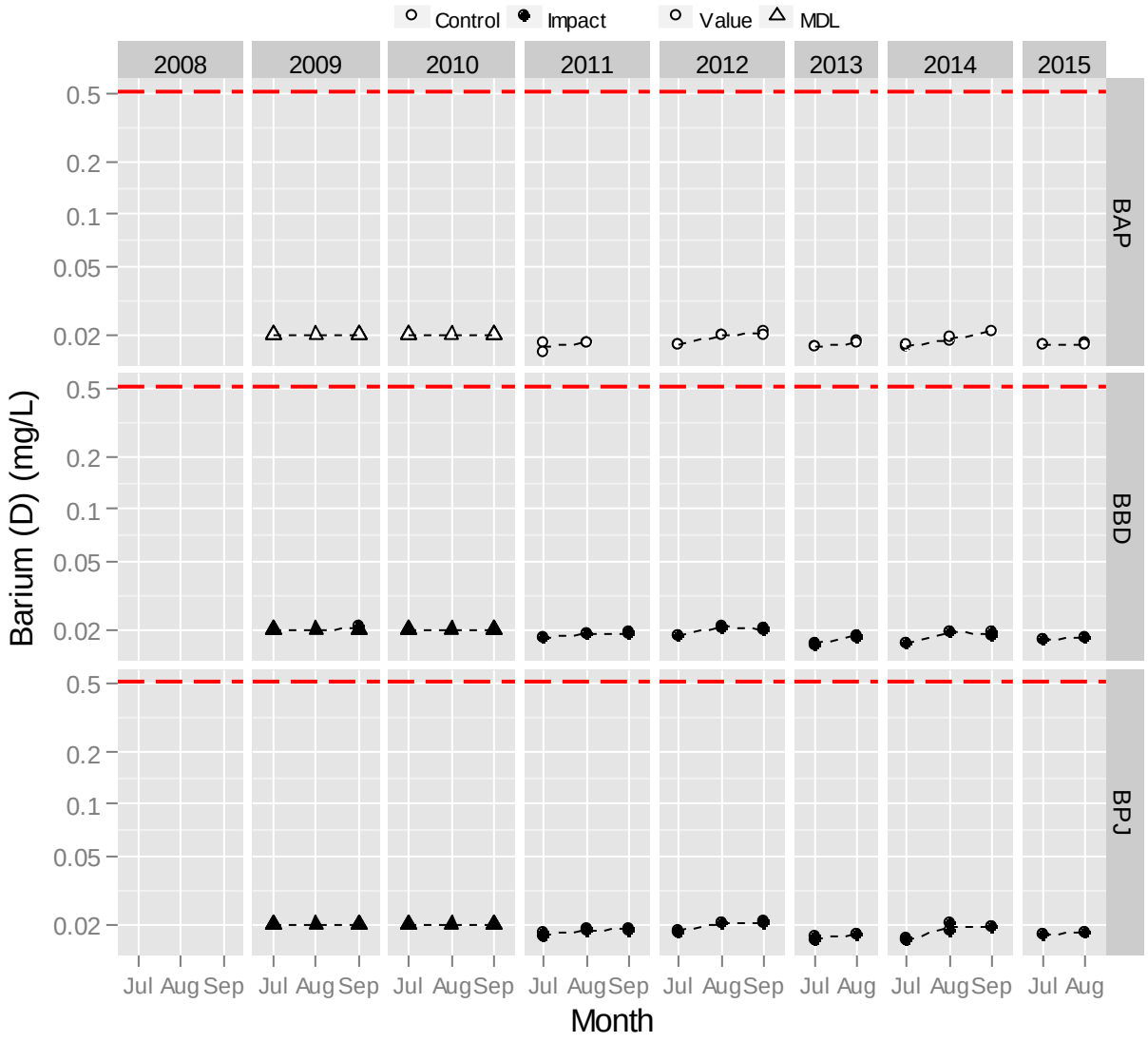


Figure 3.3–42. Dissolved Boron (mg/L) in water samples from Baker Lake since 2008.

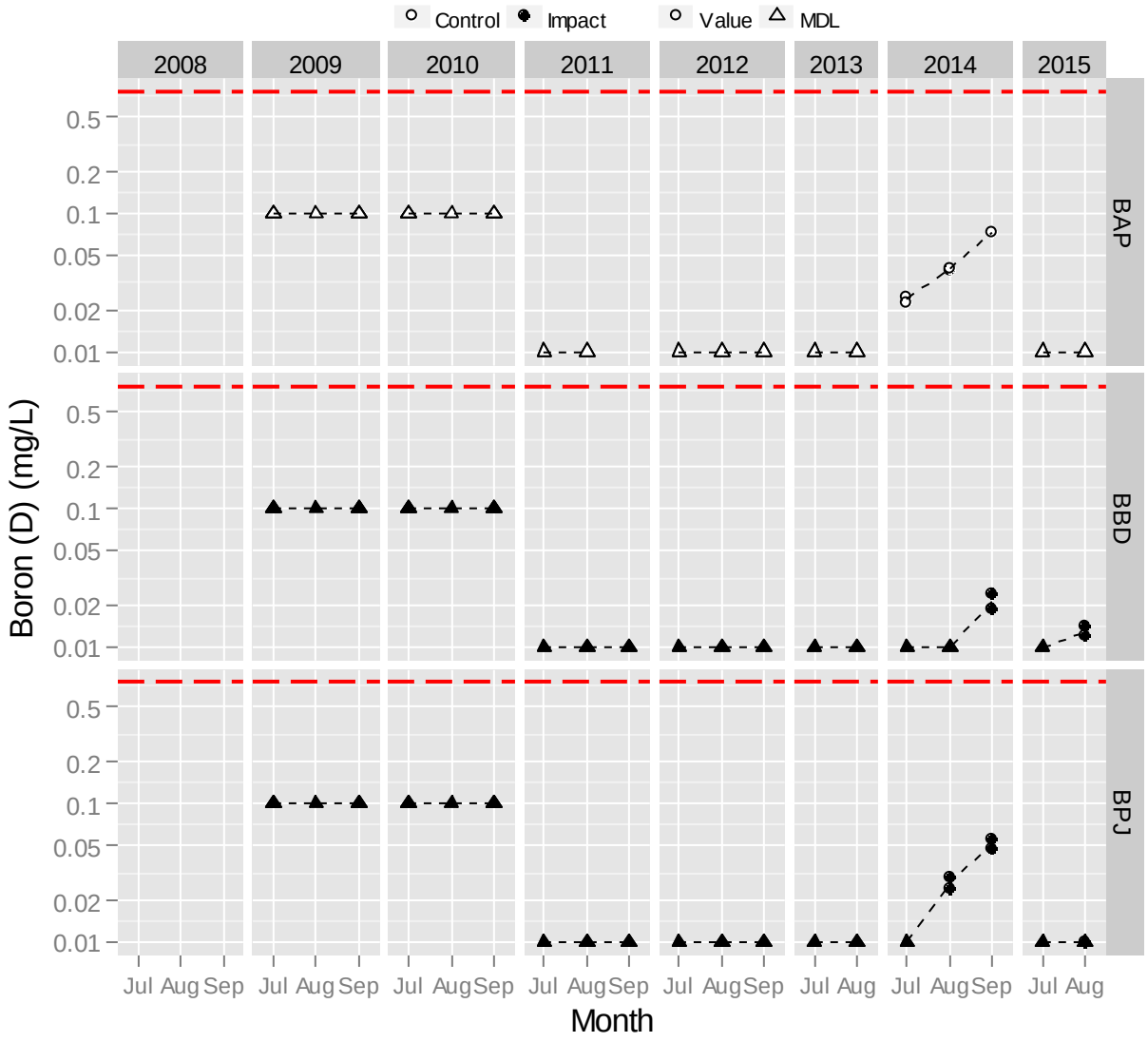


Figure 3.3–43. Dissolved Copper (mg/L) in water samples from Baker Lake since 2008.

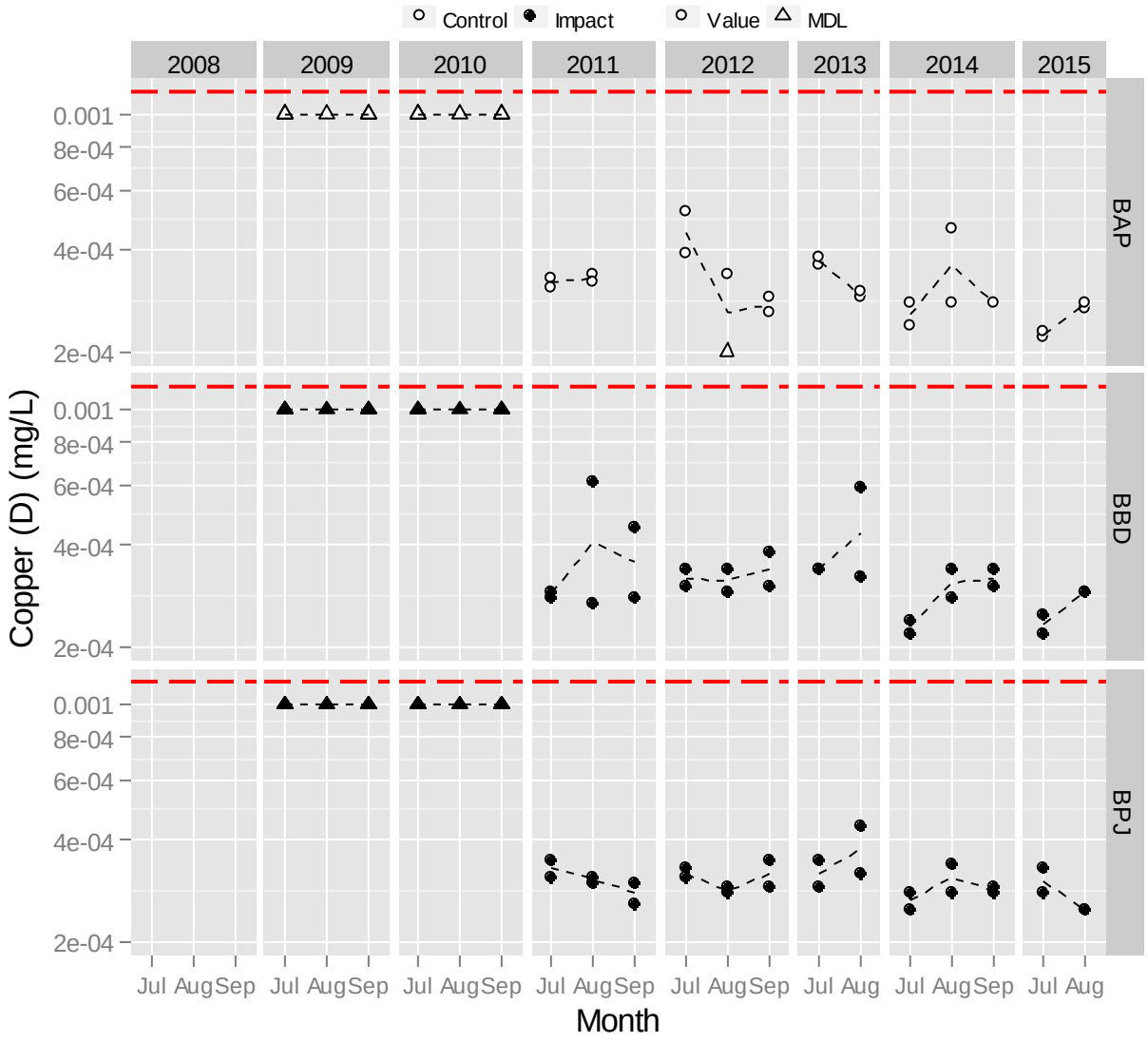


Figure 3.3–44. Dissolved Lithium (mg/L) in water samples from Baker Lake since 2008.

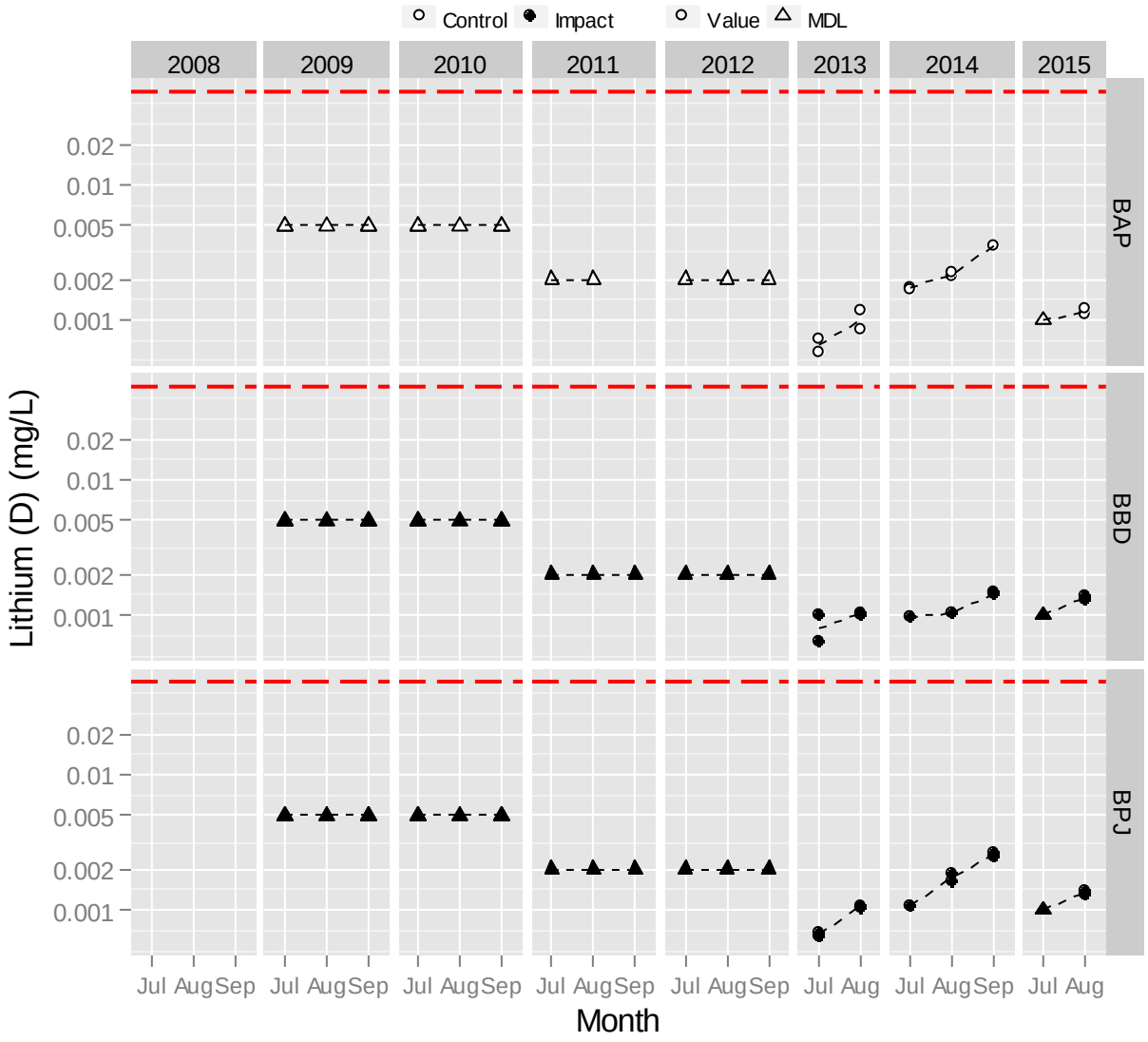


Figure 3.3–45. Dissolved Manganese (mg/L) in water samples from Baker Lake since 2008.

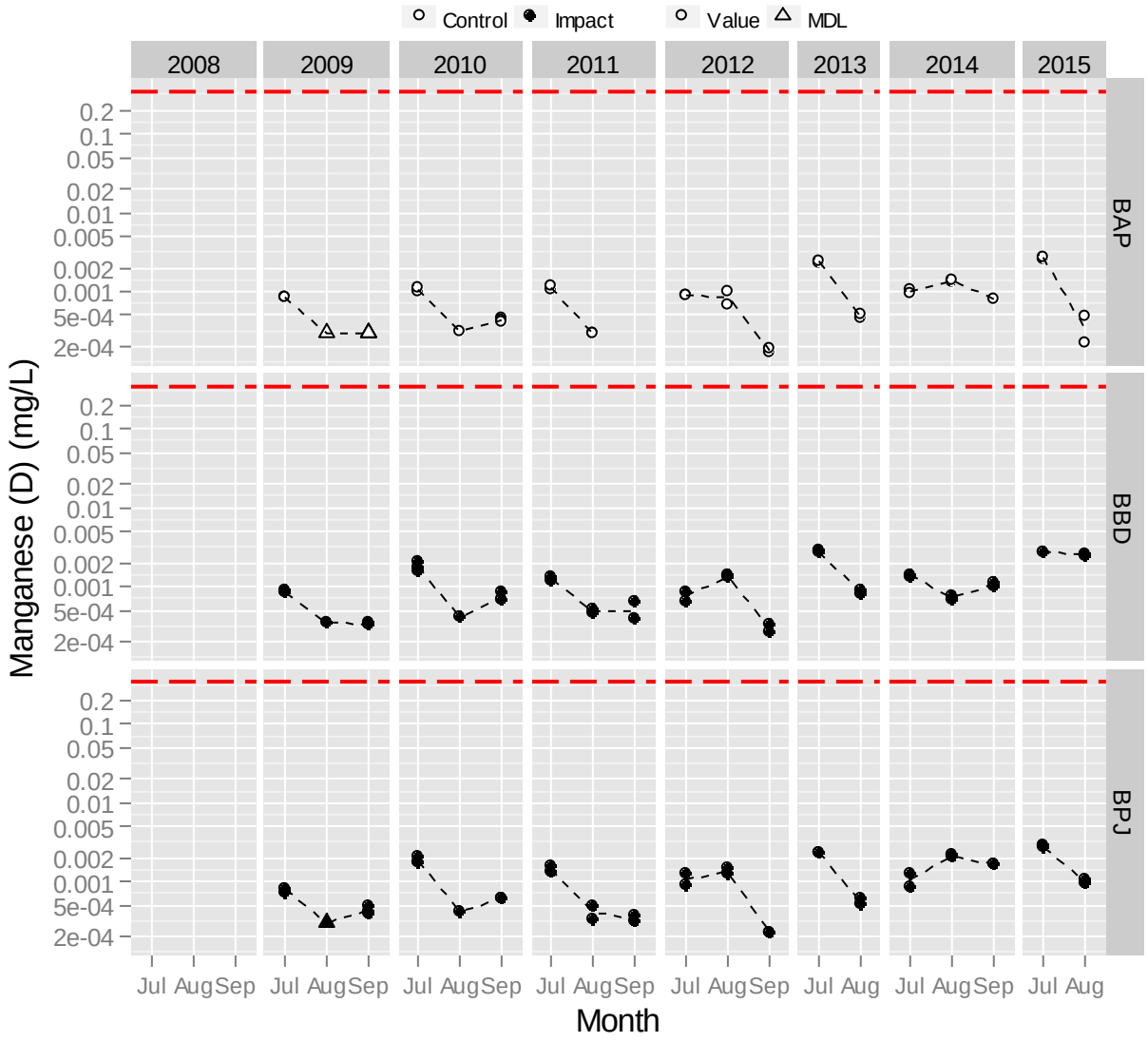


Figure 3.3–46. Dissolved Molybdenum (mg/L) in water samples from Baker Lake since 2008.

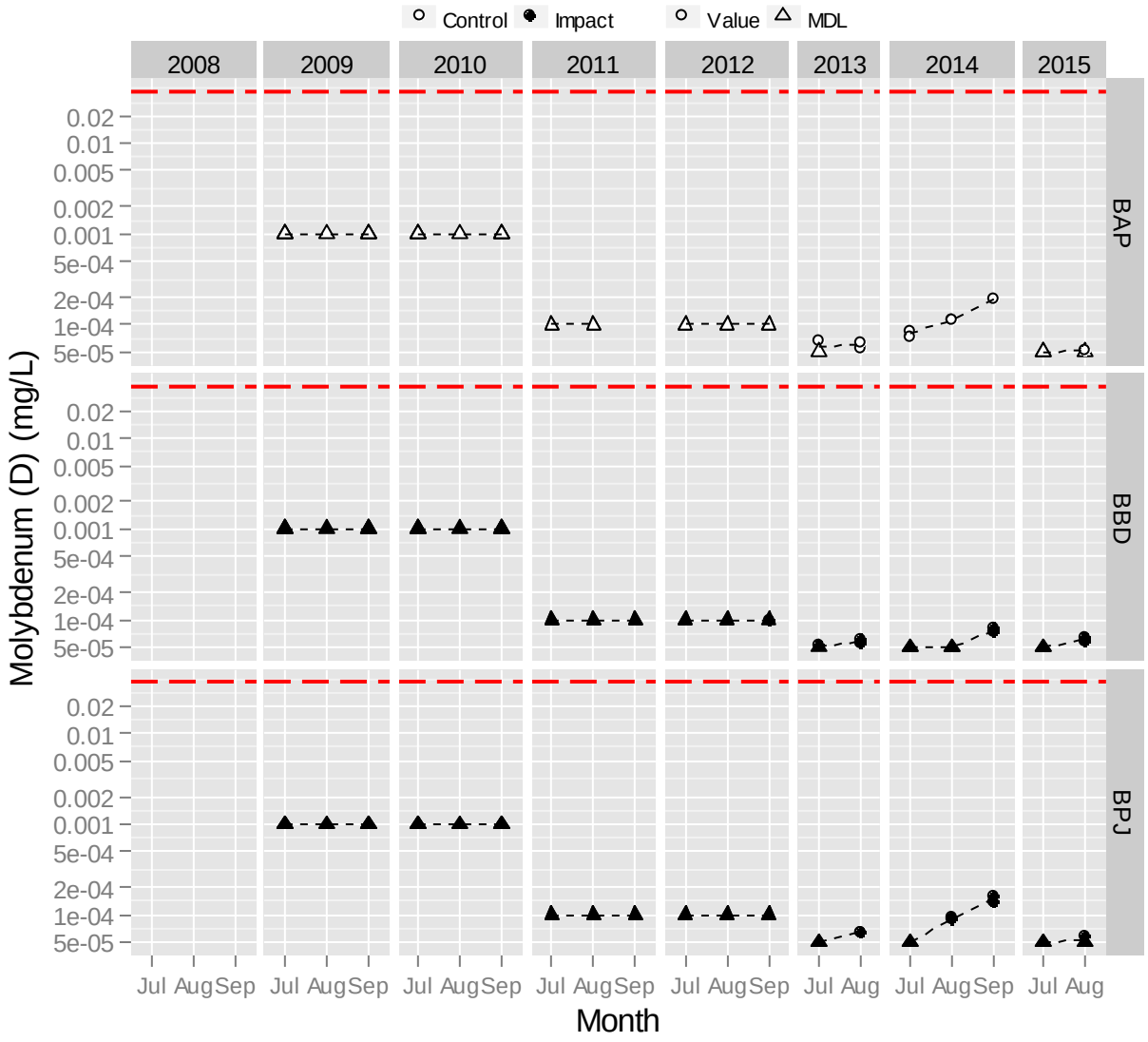


Figure 3.3–47. Dissolved Strontium (mg/L) in water samples from Baker Lake since 2008.

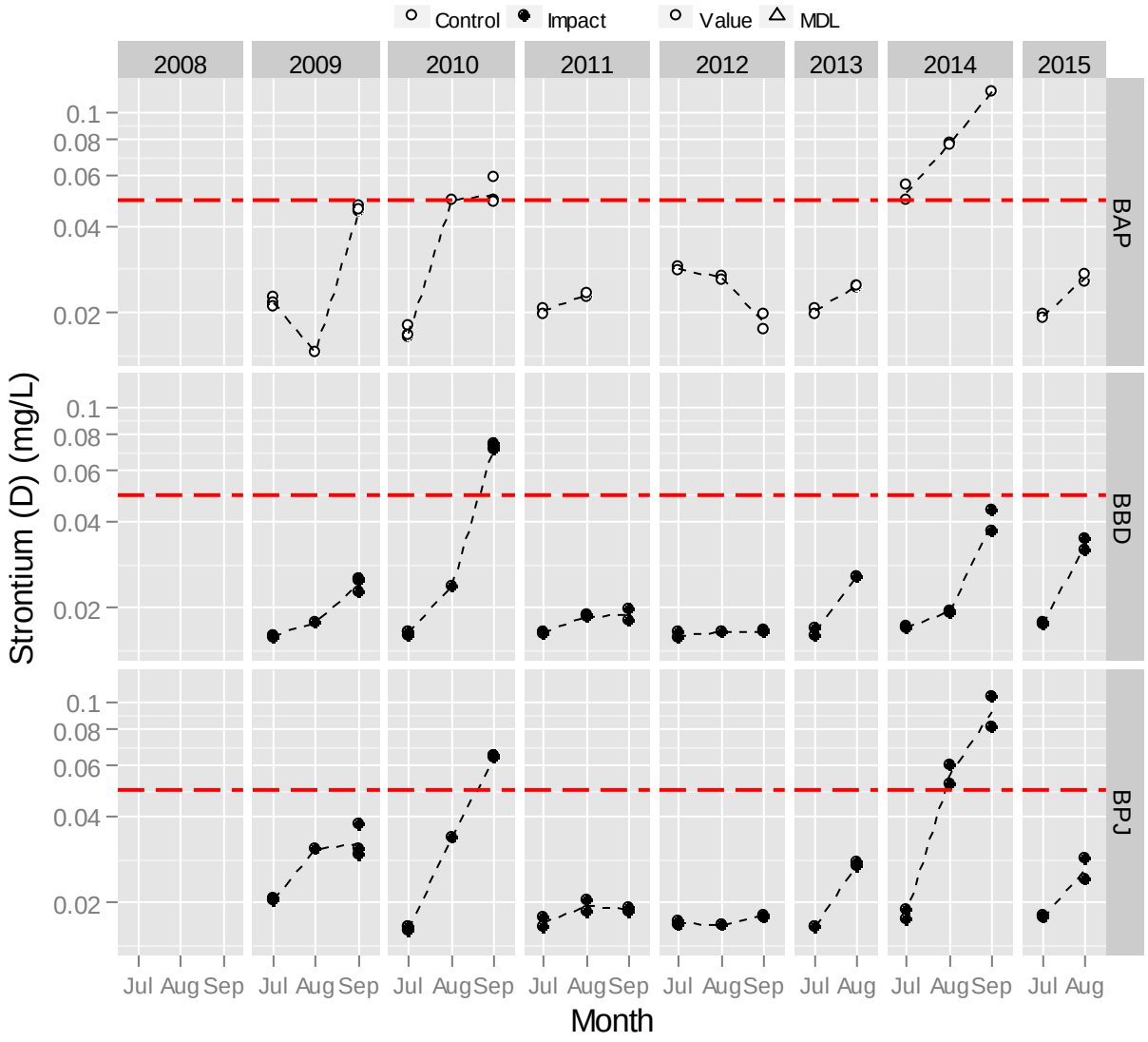
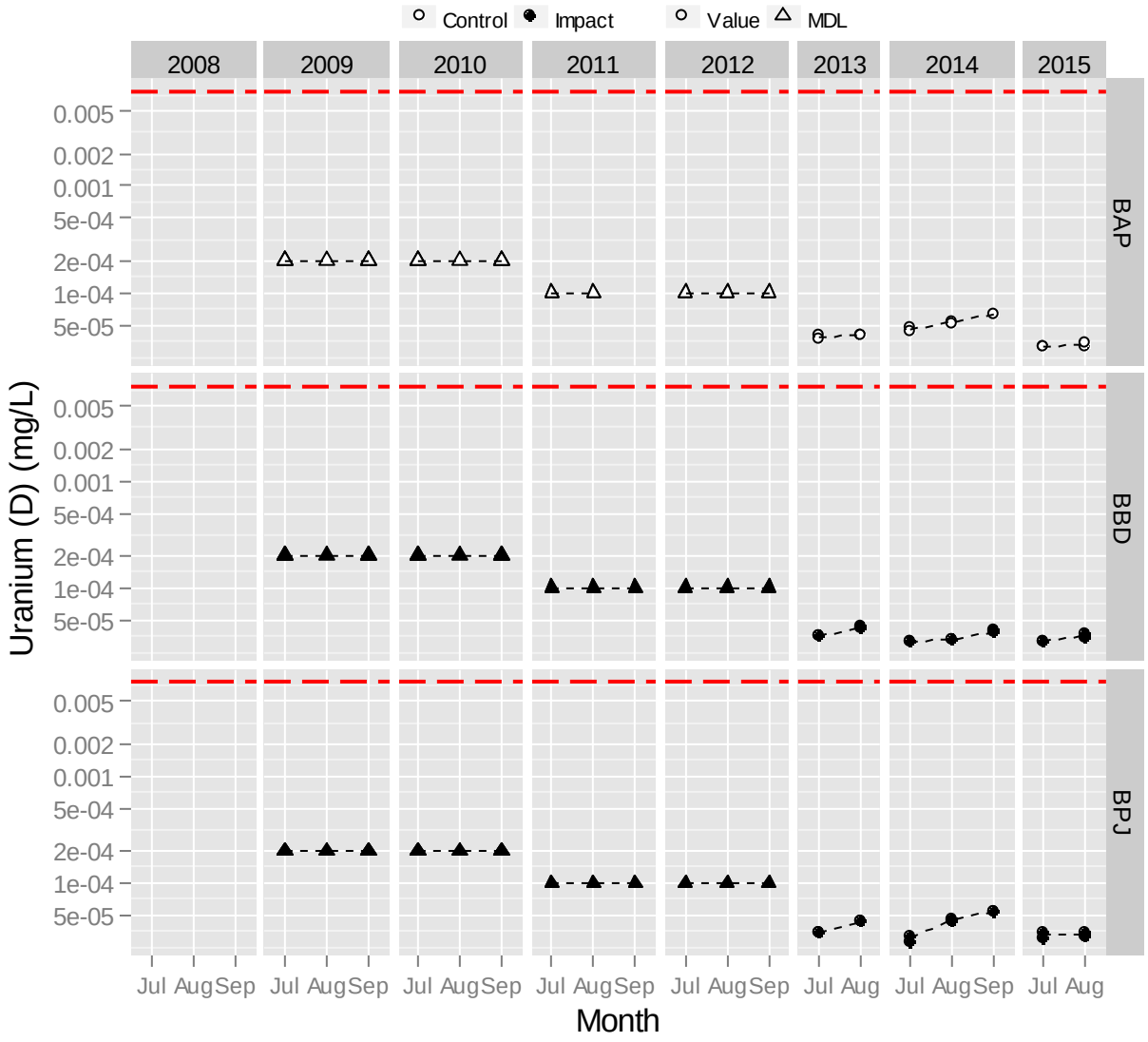


Figure 3.3–48. Dissolved Uranium (mg/L) in water samples from Baker Lake since 2008.



3.3.3. Sediment Chemistry

3.3.3.1. General Observations

Baker Lake has multiple confounding influences that potentially affect water quality (including potential inputs from the Hamlet of Baker Lake's sewage lagoons and landfill, which are situated in a watershed that discharges seasonally into Baker Lake between BBD and BPJ). Shipping-related influence on sediment metals concentrations would be limited to disturbance of bottom sediments from ship propeller wash and possibly from contaminant introductions (e.g., discharges, leaks, or spills); no spills were reported in 2015. Note that the red dashed line in each of sediment metals figures is the trigger value specific to the parameter and area (i.e., Meadowbank lakes, and Baker Lake each have their own trigger values).

Sediment grain size, which is known to affect sediment chemistry, is a confounding factor in this case as the BAP reference has generally had a higher percentage of sandy, with less silt/clay, relative to the exposure areas (**Table 3.3–3** and **Figure 3.3–49**). Typically, the more coarse the grain size (i.e., sandier), the lower the metal concentration. Despite our attempt to target areas that are dominated by silt/clay sediment in areas of similar depth (6 – 10 m), this was not always possible.

3.3.3.2. Temporal and Spatial Trend Interpretation

Patterns in metals concentrations within and between areas have been quite consistent since monitoring began in 2008. In general, metals concentrations have not appeared to have changed or trended higher or lower over time regardless of area. Metals concentrations at the exposure area BPJ are uniformly higher than the control/reference areas BAP and BES, likely due to the influence of grain size. In 2015, impact area BPJ percent silt/clay was between 40% and 80%. Replicate 5, which had the lowest silt/clay content, also had the lowest concentrations of metals relative to the other replicate samples (**Table 3.3–3**). Impact area BBD and reference area BES both had approximately equal particle size distributions between sand and silt/clay (**Figure 3.3–49**).

Concentrations of aluminum, arsenic, chromium, copper, lead, mercury, and zinc in grab (all years, including 2015) and core (previous years only) samples are shown in **Figure 3.3–50** to **Figure 3.3–57**, respectively. The concentrations measured in 2015 are in the range of previously reported concentrations for each area/analyte combination. Arsenic exceeded the trigger value in all 5 replicates at BPJ in 2015, as was the case for the majority of the samples dating back to 2008 (**Figure 3.3–51**). As stated in the 2014 CREMP report, the fact that arsenic concentrations at BPJ have consistently exceed the trigger (8.3 mg/kg) without showing an increasing temporal trend implies the arsenic trigger is not appropriate for this area (Azimuth, 2015b). As in previous years, concentrations of hydrocarbons and PAH's in the composite sediment samples were below their respective MDL's (**Table 3.3–4**).

There continues to be no evidence of any barge-related impacts to sediment metals or organics concentrations at impact areas in Baker Lake. The majority of the influence of barge traffic would be disturbance and re-settling of existing sediment particles. Although sediment grain size is inherently different between exposure and reference areas, there was no pattern of change for any metal over time that would suggest metals contamination, such as from loss of paint from the hulls of barges.

Table 3.3–3. Conventional sediment grab chemistry, particle size, and total metals (mg/kg), Baker Lake, 2015.

Lake & Basin	Screening Criteria			Baker Lake					Baker Lake					Baker Lake				
				Barge Dock					Proposed Jetty					Akilahaarjuk Point				
Area-Replicate ID	CCME[1]	Baker Laker[2]		BBD-1	BBD-2	BBD-3	BBD-4	BBD-5	BPJ-1	BPJ-2	BPJ-3	BPJ-4	BPJ-5	BAP-1	BAP-2	BAP-3	BAP-4	BAP-5
Date	ISQG	Trigger	Threshold	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15
Physical & Organic Parameters																		
Moisture (%)														36.1	39.2	47.1	45.4	39.5
pH				6.65	6.35	7.02	6.83	7.12	7.17	6.52	6.53	6.20	6.72	6.79	6.80	5.87	6.36	7.59
Total Organic Carbon (% dw)				0.38	0.45	0.28	0.28	0.15	0.78	0.42	0.53	0.48	0.28	0.21	0.28	0.59	0.71	0.29
Particle Size																		
% Gravel (>2mm)				0.70	*<0.10*	*<0.10*	6.03	*<0.10*	*<0.10*	0.35	0.42	*<0.10*	1.32	0.15	*<0.10*	*<0.10*	*<0.10*	*<0.10*
% Sand (2.00mm - 0.063mm)				50.2	51.2	67.3	52.0	79.6	15.7	35.3	24.7	15.2	57.8	74.3	73.3	63.0	68.3	75.5
% Silt (0.063mm - 4µm)				43.0	44.9	30.0	36.5	18.4	73.0	57.7	66.3	73.3	36.0	23.0	23.9	32.6	28.2	21.9
% Clay (<4µm)				6.14	3.82	2.62	5.52	1.89	11.2	6.66	8.55	11.6	4.89	2.54	2.79	4.35	3.43	2.50
Total Metals (mg/kg dw)																		
Aluminum				8090	7410	5940	6720	5280	9950	8430	8840	10400	6910	4830	5550	7010	6060	5000
Antimony				0.17	0.12	*<0.10*	0.13	*<0.10*	0.14	0.14	0.14	0.12	*<0.10*	0.13	0.16	0.17	0.15	0.13
Arsenic*	5.9	8.3		6.90	**10.6**	6.82	7.35	5.12	**30.0**	**15.5**	**20.0**	**29.9**	**10.7**	6.61	7.59	7.99	3.69	3.75
Barium				89.8	81.3	64.9	85.0	57.8	157	109	99.4	120	86.5	381	484	402	378	323
Beryllium				0.39	0.31	0.26	0.32	0.22	0.45	0.38	0.40	0.37	0.32	0.31	0.34	0.42	0.39	0.32
Bismuth				*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	0.24	*<0.20*	0.21	0.21	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*
Cadmium	0.6	0.55	0.6	0.045	0.049	0.035	0.034	0.023	0.103	0.062	0.076	0.077	0.054	0.028	0.031	0.052	0.043	0.033
Calcium				2360	2290	1710	1820	1440	2770	2710	2540	2650	2150	2300	2440	2540	2340	2120
Chromium	37.3	27.0	37.3	17.5	16.0	12.2	14.9	11.8	23.5	21.0	26.7	24.3	17.4	15.7	17.1	18.4	18.9	16.0
Cobalt				5.35	5.10	4.44	5.45	4.02	8.16	6.23	6.57	7.30	5.25	3.83	4.07	5.08	4.36	4.14
Copper	35.7	20.5	35.7	8.64	7.03	5.42	6.80	4.38	9.94	7.17	8.96	9.88	5.87	4.90	4.96	6.84	6.75	4.58
Iron				15800	16100	12700	14300	11500	25000	19400	20400	22600	17800	14100	15300	15800	14400	13300
Lead	35	32.5	35	7.07	6.62	4.91	5.94	3.88	10.5	8.25	9.91	8.97	6.26	4.44	4.83	5.75	5.30	4.45
Lithium				11	9.6	8.7	9.9	7.8	11.8	10.2	10.0	10.4	8.70	7.30	8.10	10.1	9.50	7.70
Magnesium				4170	4070	3550	3930	3250	5050	4230	4430	5320	3720	2960	3170	3920	3660	3060
Manganese				438	346	516	370	321	3290	1500	1320	1020	2390	196	247	179	131	910
Mercury	0.17	0.088	0.17	0.0060	0.0076	*<0.0050*	*<0.0050*	*<0.0050*	0.0155	0.0084	0.0105	0.0109	0.007	*<0.0050*	*<0.0050*	0.0072	0.0057	0.0055
Molybdenum				1.10	0.71	0.52	1.05	0.47	2.24	1.88	1.31	1.27	1.58	0.51	0.67	0.59	0.63	0.94
Nickel				11.0	9.94	8.30	10.0	7.93	15.5	12.6	16.3	15.0	11.1	9.03	9.83	11.5	11.5	9.59
Phosphorus				720	769	515	661	464	1140	1010	1060	1190	715	772	722	743	654	651
Potassium				1820	1390	1050	1390	940	1840	1700	1530	2150	1390	1170	1430	1920	1670	1270
Selenium				*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*
Silver				*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Sodium				242	277	166	178	167	357	214	286	320	221	145	154	193	182	137
Strontium				51.8	41.4	32.6	36.9	31.1	52.0	51.8	47.5	51.2	47.8	41.9	48.6	51.0	46.9	41.1
Thallium				0.070	0.054	*<0.050*	0.062	*<0.050*	0.095	0.070	0.080	0.068	0.053	0.054	0.060	0.087	0.071	0.056
Tin				*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium				423	420	288	307	272	370	460	338	522	406	318	375	433	376	304
Uranium				2.24	1.37	0.916	1.83	0.872	2.17	1.74	1.84	1.77	1.28	1.50	1.44	1.68	1.65	1.21
Vanadium				25.0	19.9	15.9	21.8	15.3	25.5	24.1	23.5	27.5	22.3	20.8	22.6	23.9	22.5	19.7
Zinc	123	73.6	123	30.6	29.9	24.2	28.8	21.6	43.5	33.2	37.8	42.0	28.5	20.0	21.3	27.8	25.7	20.7

Lake & Basin	Baker Lake				
	East Shore				
Area-Replicate ID	BES-1	BES-2	BES-3	BES-4	BES-5
Date	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15
Physical & Organic Parameters					
Moisture (%)					
pH	6.70	6.88	6.84	6.79	6.85
Total Organic Carbon (% dw)	0.50	0.45	0.54	0.59	0.55
Particle Size					
% Gravel (>2mm)	1.15	0.24	*<0.10*	*<0.10*	*<0.10*
% Sand (2.00mm - 0.063mm)	46.7	59.1	48.6	43.1	48.2
% Silt (0.063mm - 4µm)	44.8	36.0	45.0	49.6	45.8
% Clay (<4µm)	7.40	4.67	6.47	7.28	5.97
Total Metals (mg/kg dw)					
Aluminum	8800	6980	8470	8890	8720
Antimony	0.14	0.12	0.14	0.16	0.15
Arsenic*	5.05	4.26	5.01	5.03	4.73
Barium	104	126	123	117	104
Beryllium	0.43	0.38	0.46	0.46	0.44
Bismuth	*<0.20*	*<0.20*	*<0.20*	0.23	*<0.20*
Cadmium	0.047	0.047	0.061	0.061	0.058
Calcium	2580	2220	2560	2660	2590
Chromium	22.8	20.2	23.4	22.3	22.8
Cobalt	6.19	5.50	6.26	6.31	6.12
Copper	7.09	6.01	7.37	7.05	6.98
Iron	17100	15100	16500	16400	16400
Lead	7.28	5.93	7.24	7.84	6.91
Lithium	11.4	10.4	12.0	11.8	11.3
Magnesium	4770	4280	4860	4780	4720
Manganese	573	554	1220	1150	819
Mercury	0.0108	0.0087	0.011	0.0121	0.0106
Molybdenum	0.73	0.62	0.87	0.84	0.73
Nickel	13.3	12.7	14.6	14.0	13.7
Phosphorus	760	681	715	794	741
Potassium	1990	1530	1890	1900	1990
Selenium	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*
Silver	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Sodium	237	206	268	247	248
Strontium	50.1	39.9	49.5	52.3	52.6
Thallium	0.075	0.072	0.083	0.083	0.077
Tin	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium	451	336	432	429	462
Uranium	1.65	1.44	1.73	1.85	1.59
Vanadium	25.4	22.0	24.8	24.5	25.0
Zinc	33.6	29.6	35.0	33.1	32.5

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999, updated in 2002. ISQG = Interim freshwater Sediment Quality Guideline.

[2] Trigger and threshold values were developed in the *CREMP Design Document 2012* (Azimuth, 2012d).
Thresholds are set equal to CCME ISQG guidelines, where available.

* CCME guideline not used as threshold value because threshold value would be lower than trigger value.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.3–4 Hydrocarbon and PAH results from composite sediment grabs at Baker Lake, 2015.

Lake	CCME (2002) Guidelines[1]	Baker Lake			
Area ID		BBD	BPJ	BAP	BES
Date	ISQG	17-Aug-15	18-Aug-15	16-Aug-15	17-Aug-15
Physical Parameters					
Moisture (%)		32.7	51.6	41.5	52.2
Aggregate Organics (mg/kg)					
Mineral Oil and Grease		600	*<525*	710	*<500*
Hydrocarbons (mg/kg)					
EPH10-19		*<200*	*<200*	*<200*	*<200*
EPH19-32		*<200*	*<200*	*<200*	*<200*
LEPH		*<200*	*<200*	*<200*	*<200*
HEPH		*<200*	*<200*	*<200*	*<200*
Polycyclic Aromatic Hydrocarbons (mg/kg)					
Acenaphthene	0.00671	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Acenaphthylene	0.00587	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Anthracene	0.0469	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*
Benzo(a)anthracene	0.0317	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(a)pyrene	0.0319	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(b)fluoranthene		*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(b+j+k)fluoranthene		*<0.015*	*<0.015*	*<0.015*	*<0.015*
Benzo(g,h,i)perylene		*<0.010*	*<0.010*	*<0.010*	*<0.010*
Benzo(k)fluoranthene		*<0.010*	*<0.010*	*<0.010*	*<0.010*
Chrysene	0.0571	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Dibenz(a,h)anthracene	0.00622	*<0.0050*	*<0.0050*	*<0.0050*	*<0.0050*
Fluoranthene	0.111	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Fluorene	0.0212	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Indeno(1,2,3-c,d)pyrene		*<0.010*	*<0.010*	*<0.010*	*<0.010*
2-Methylnaphthalene	0.0202	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Naphthalene	0.0346	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Phenanthrene	0.0419	*<0.010*	*<0.010*	*<0.010*	*<0.010*
Pyrene	0.053	*<0.010*	*<0.010*	*<0.010*	*<0.010*
d10-Acenaphthene (%)		89.7	94.4	95.4	89.6
d12-Chrysene (%)		105.1	112.4	111.2	105.5
d8-Naphthalene (%)		88.5	93.1	93.8	88.5
d10-Phenanthrene (%)		94.8	100.3	101.5	95.6
B(a)P Total Potency Equivalent		*<0.020*	*<0.020*	*<0.020*	*<0.020*
IACR (CCME)		*<0.15*	*<0.15*	*<0.15*	*<0.15*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999, updated in 2002.

ISQG = Interim freshwater Sediment Quality Guideline

Bolded concentrations exceed the ISQG guideline.

Italicized numbers are below detection limits.

Figure 3.3–49. Sediment grain size composition in sediment samples from Baker Lake since 2008.

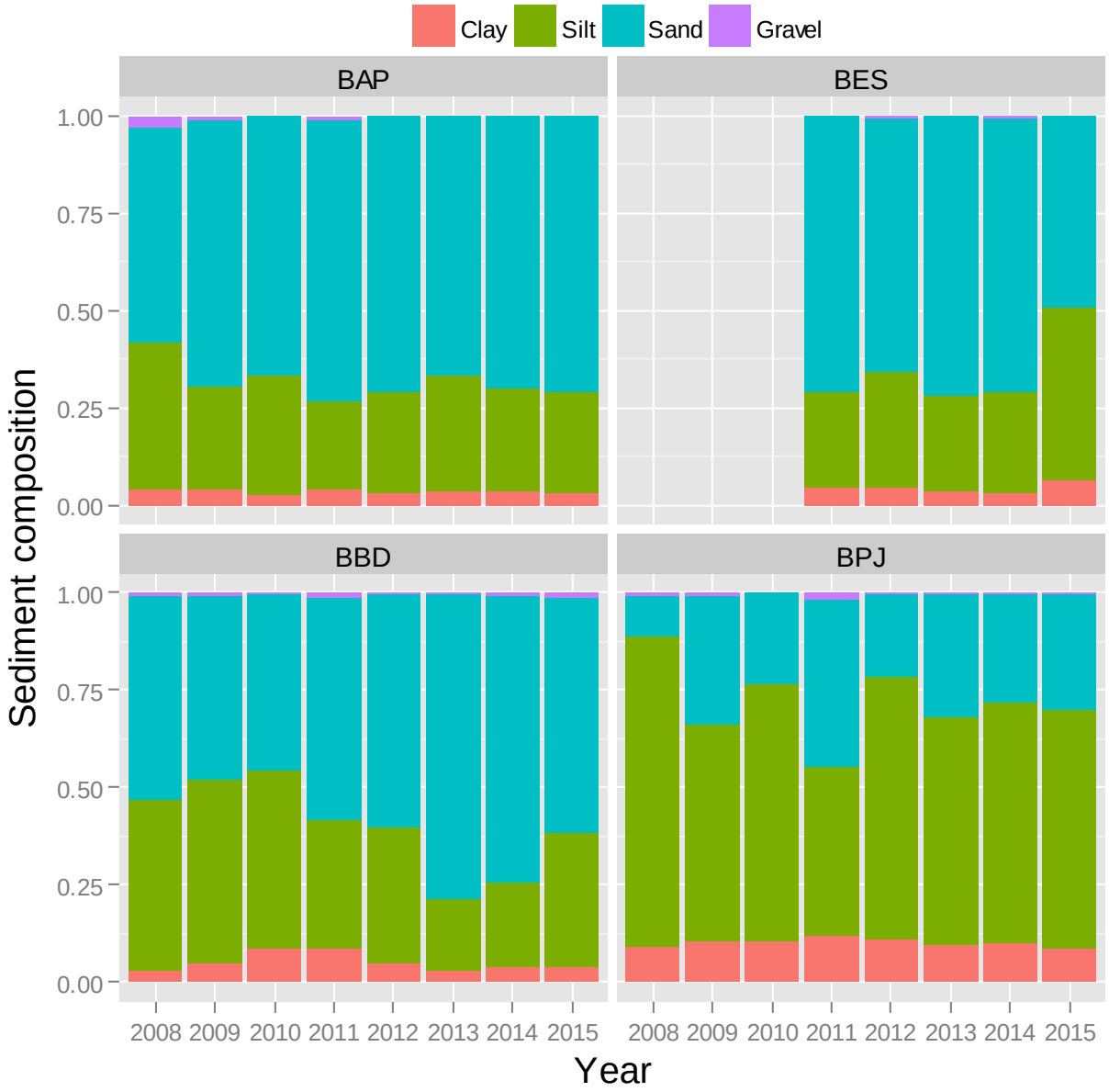


Figure 3.3–50. Total Aluminum (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

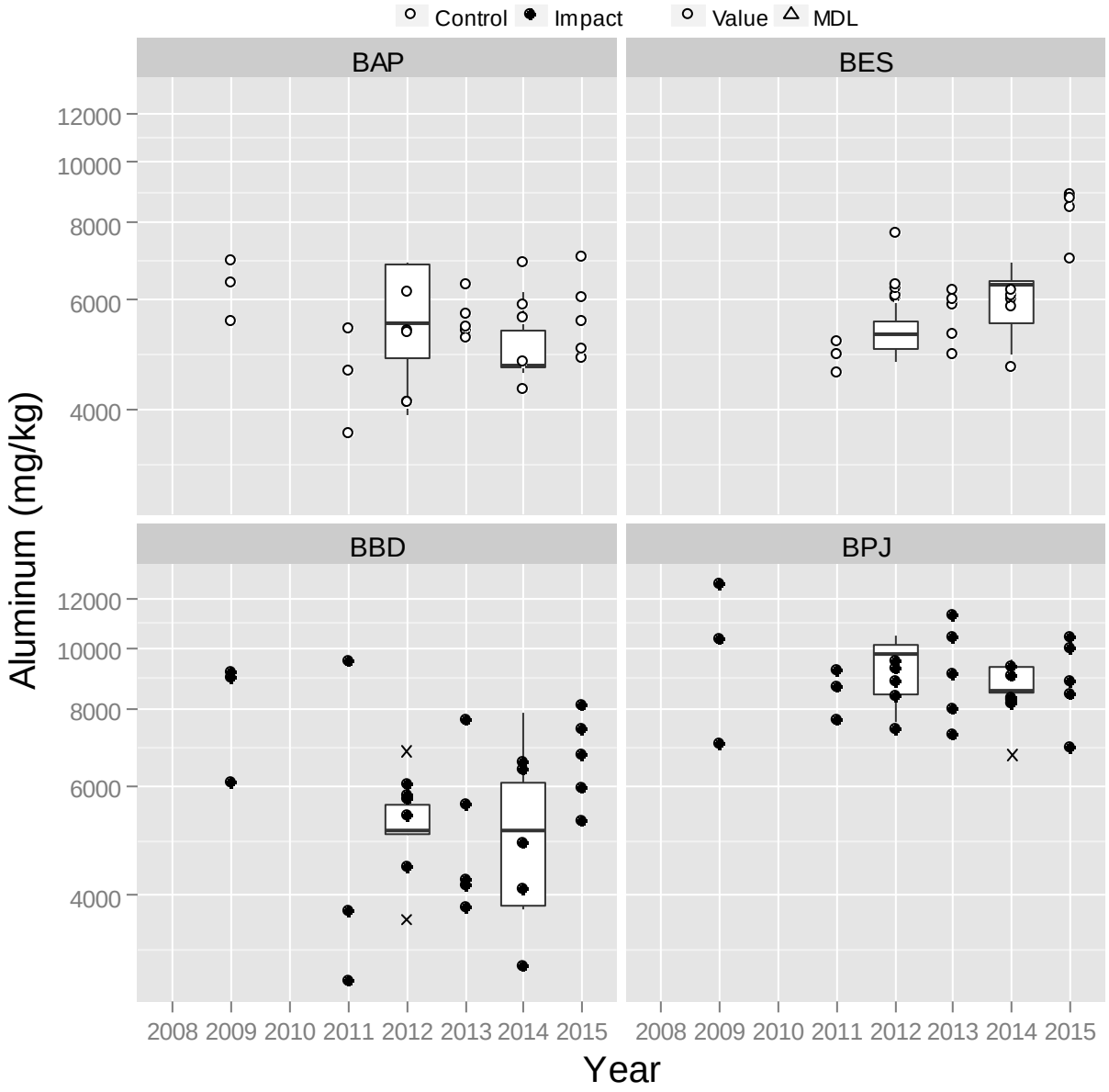


Figure 3.3–51. Total Arsenic (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

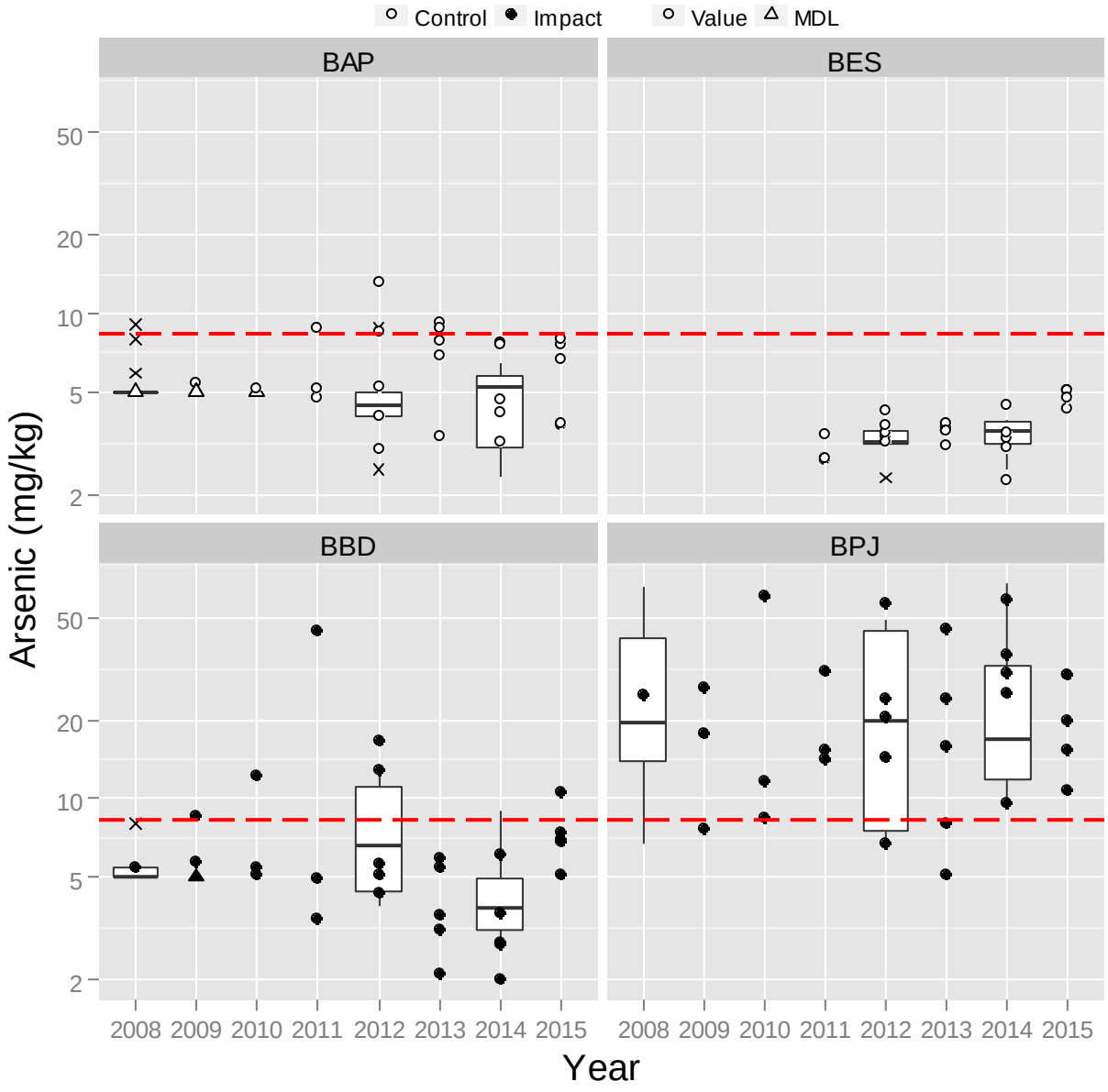


Figure 3.3–52. Total Cadmium (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

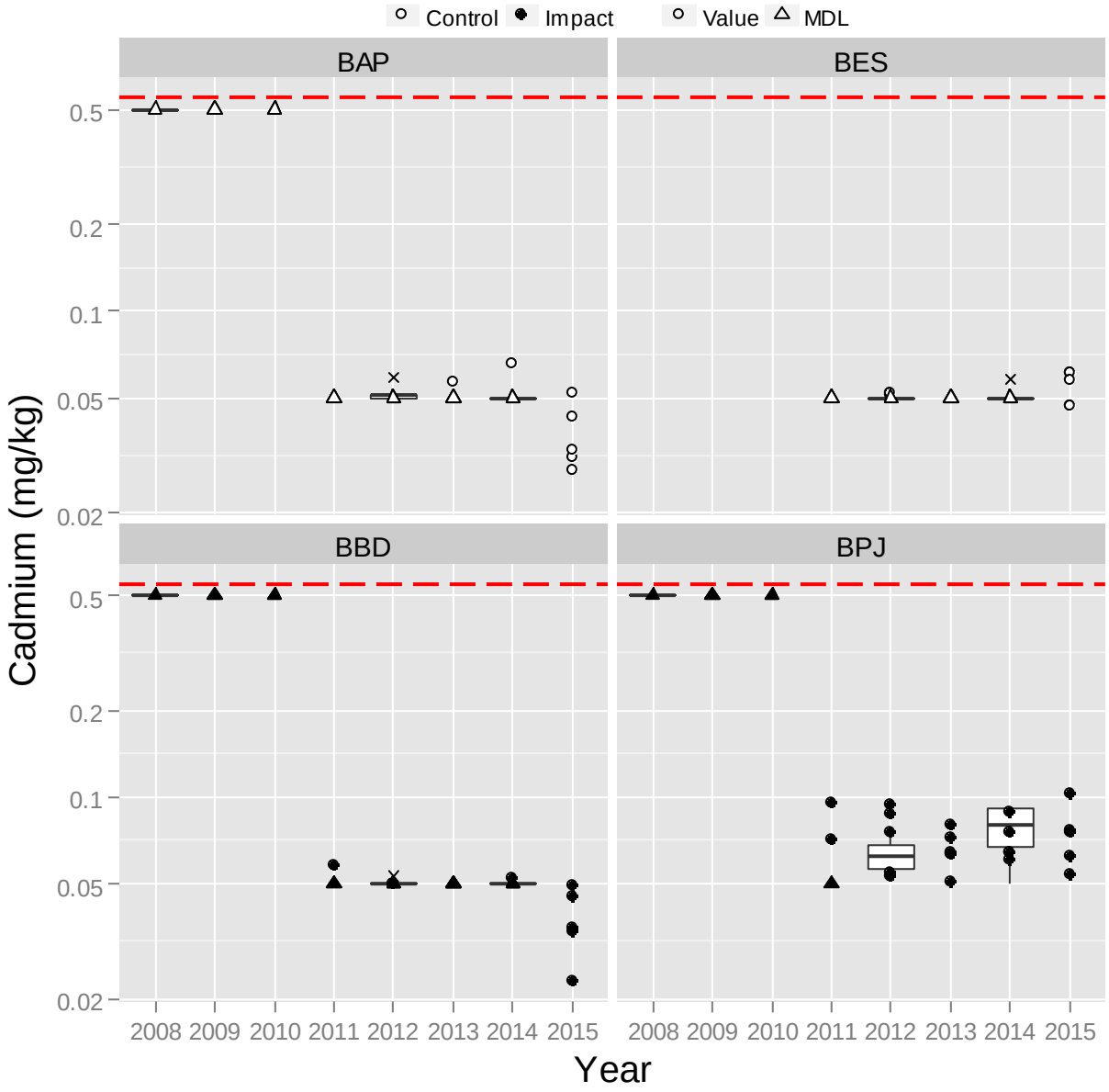


Figure 3.3–53. Total Chromium (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

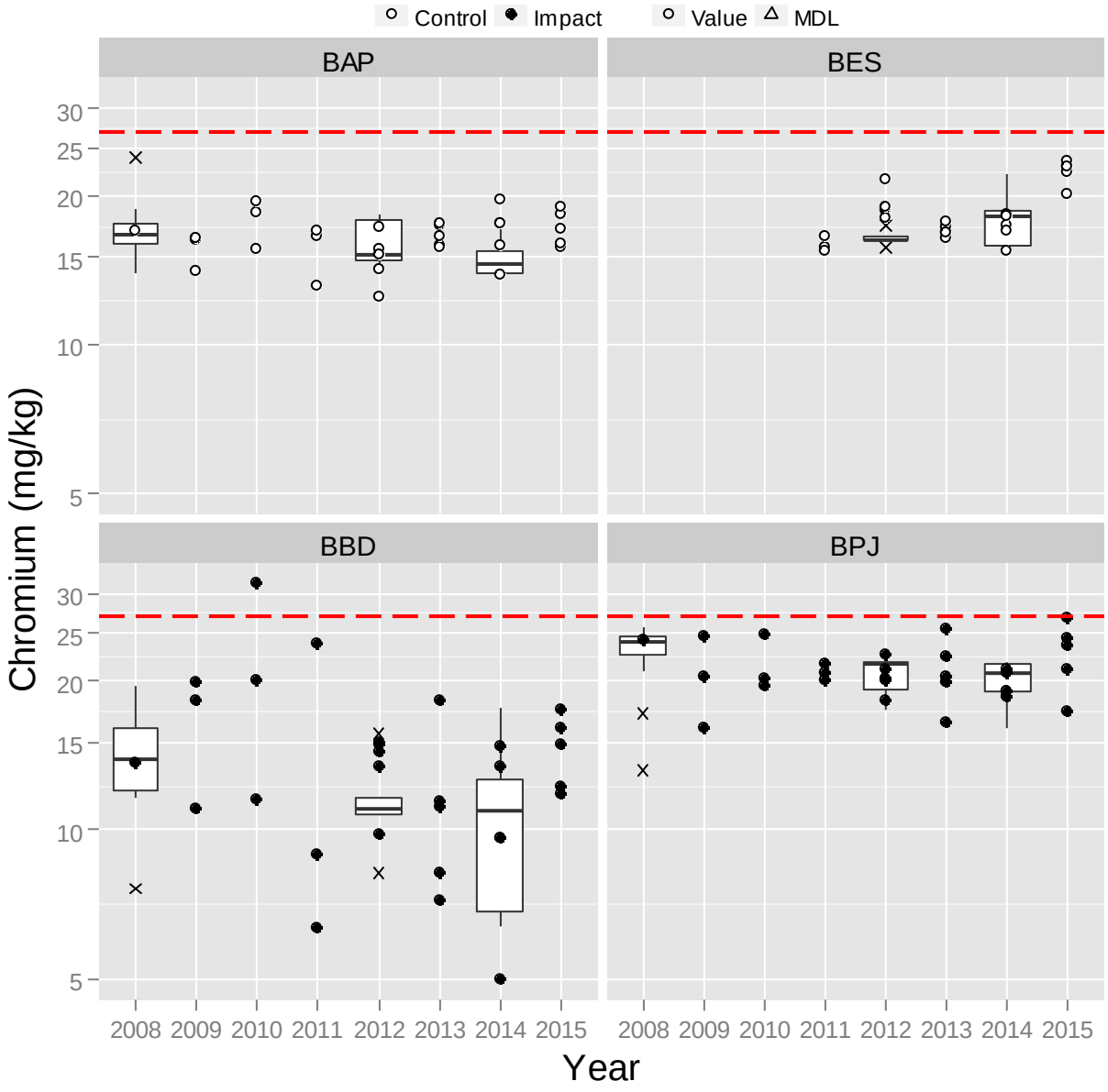


Figure 3.3–54. Total Copper (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

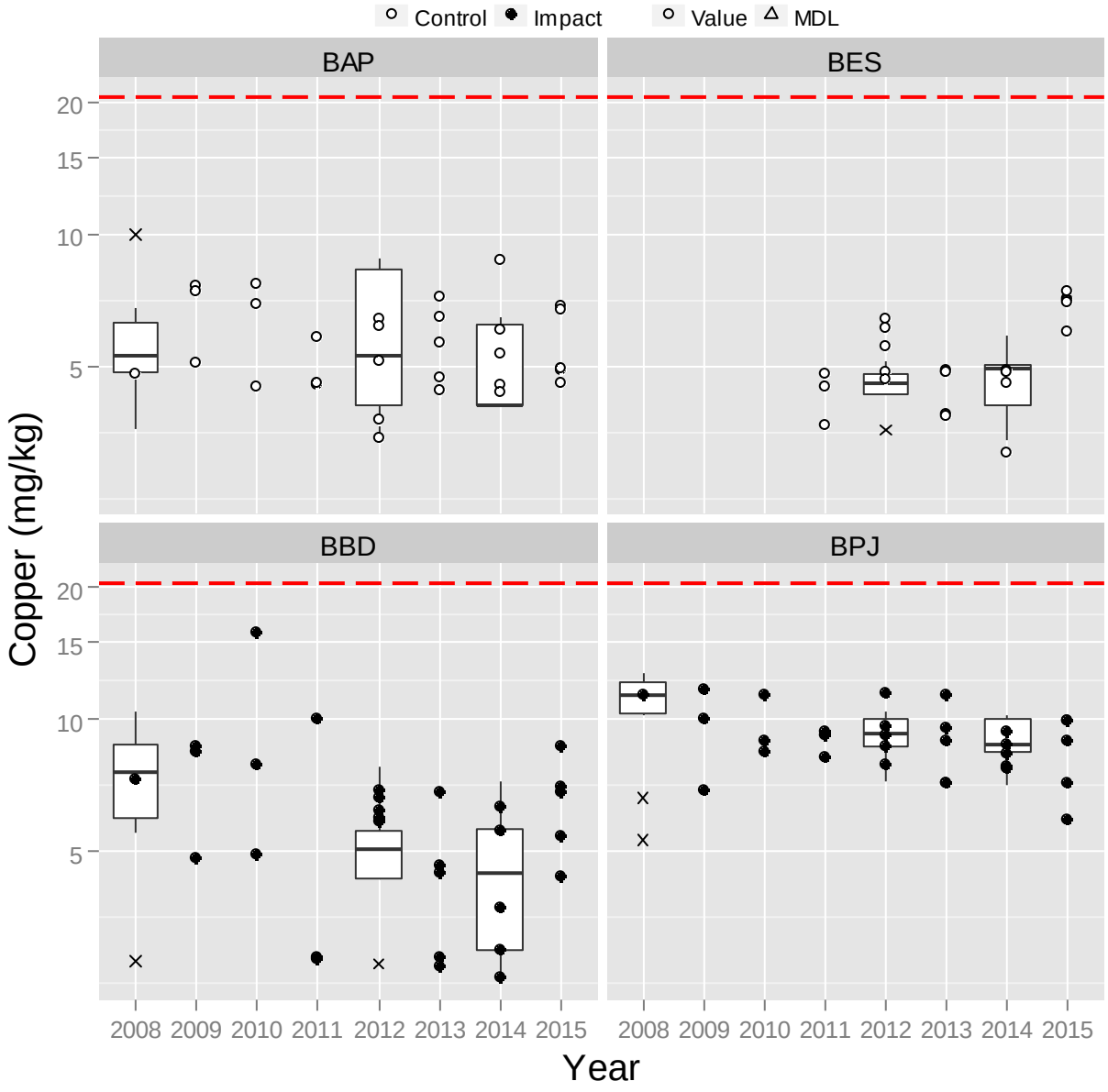


Figure 3.3–55. Total Lead (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

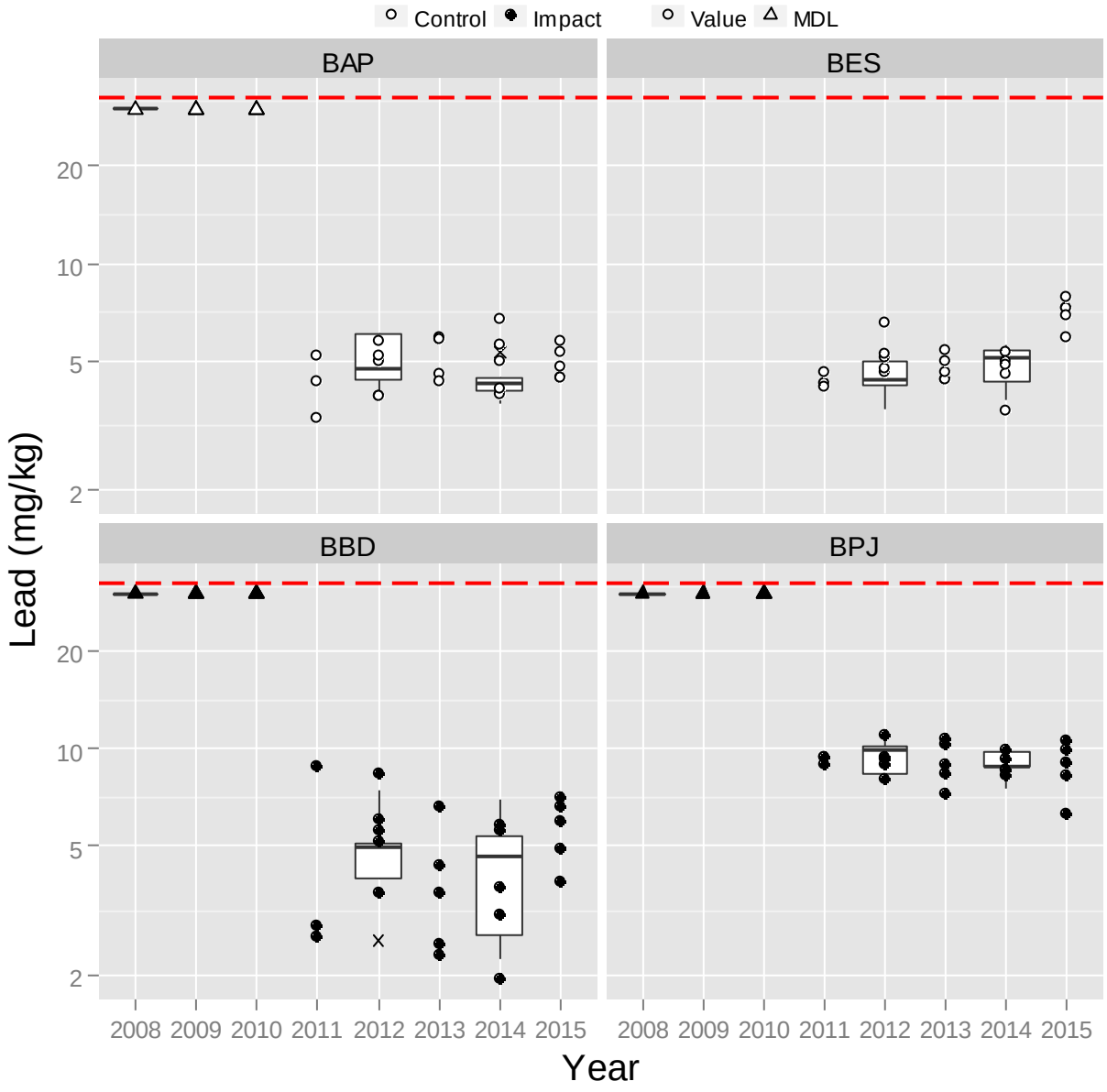


Figure 3.3–56. Total Mercury (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

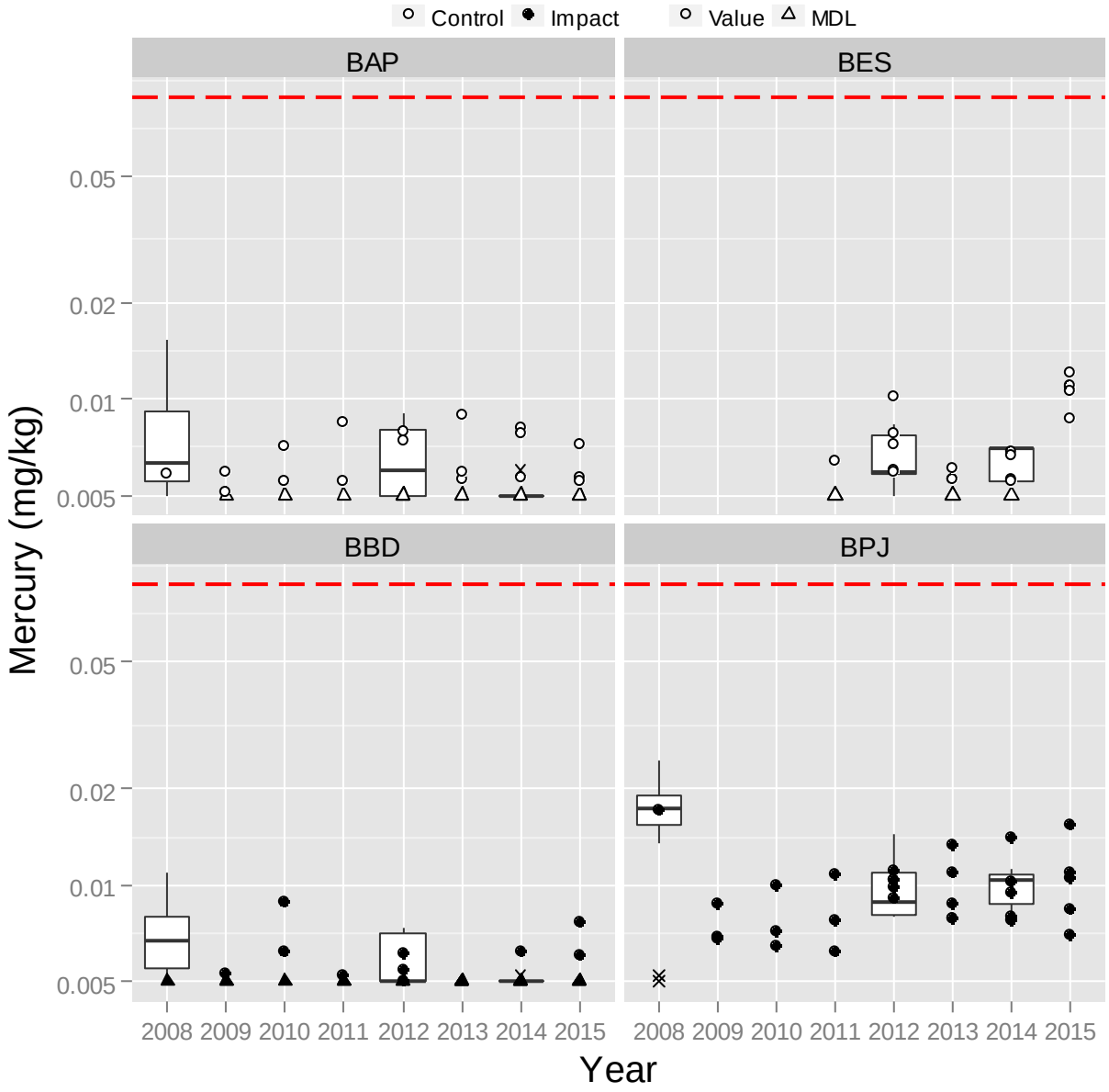
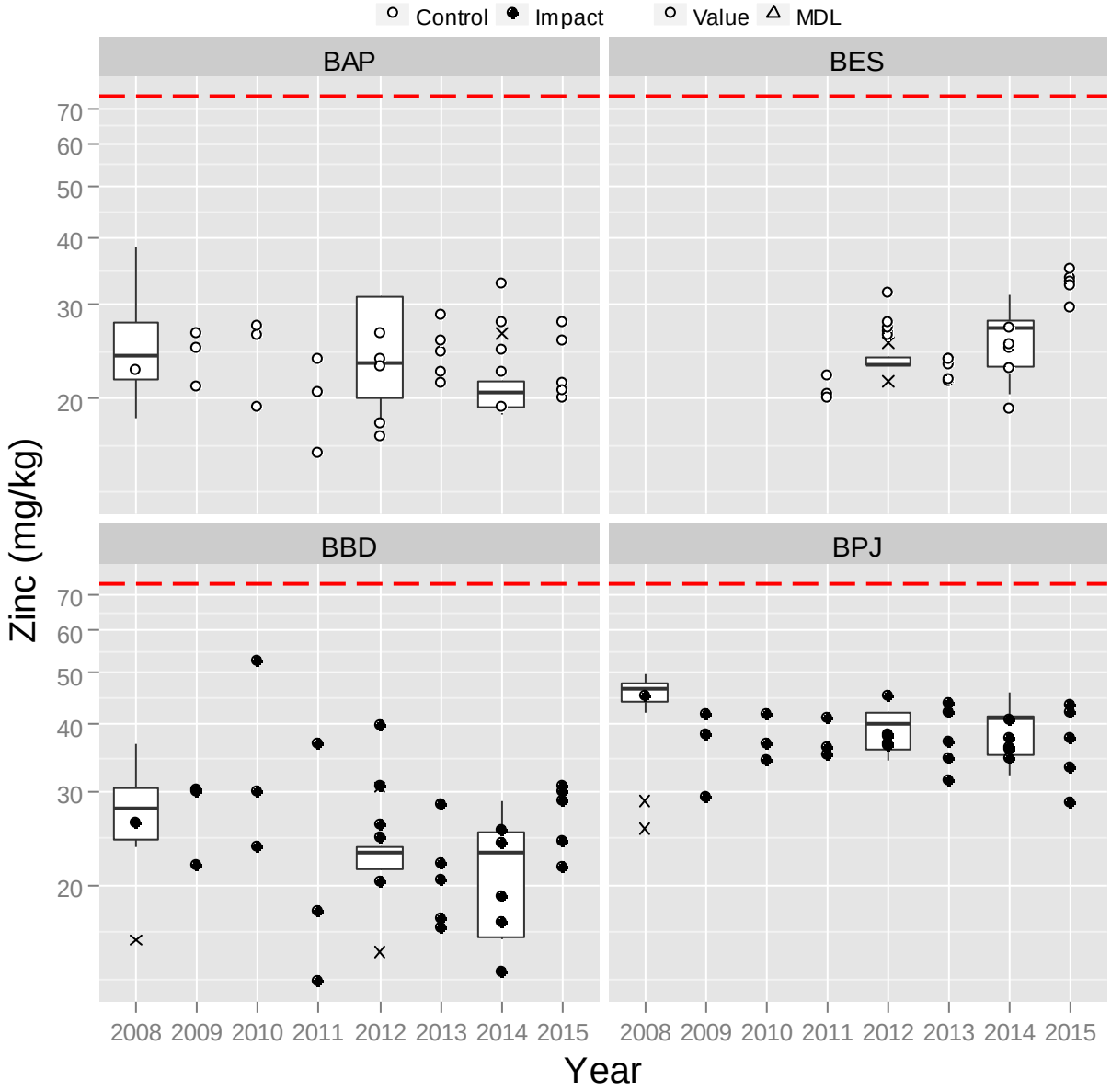


Figure 3.3–57. Total Zinc (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.



3.3.4. Phytoplankton

3.3.4.1. General Observations

The phytoplankton community of Baker Lake is relatively similar to the Meadowbank Lakes despite some seasonal differences in water quality due to the competing influences of less saline water from the Thelon River and more saline water from the deeper portion of Baker Lake (see **Section 3.3.1**). Taxonomic composition and biomass in Baker Lake were similar to the Meadowbank study lakes, with chrysophytes (e.g., *Chrysococcus*, *Kephyrion*, *Dinobryon*) comprising the dominant taxonomic group since monitoring began in 2008. Cryptophytes and diatoms typically comprise the second and third most abundant groups in Baker Lake as shown in **Figure 3.3–59**. Mean summer phytoplankton biomass in Baker Lake is generally similar to the Meadowbank lakes, reaching a maximum of between 200 to 300 mg/m^3.

3.3.4.2. Temporal and Spatial Trend Interpretation

No winter/spring sampling has been conducted at Baker Lake areas so interpretations are limited to summer open water period (which coincides with barge activity). Because of the large size of Baker Lake, it is unlikely that barge traffic (in the absence of a fuel or chemical spill) could influence whole-lake phytoplankton community.

The 2015 density and biomass results for phytoplankton are provided in **Table 3.3–5**. The results for the BACI model statistical tests of the 2015 results against baseline/reference conditions are provided in **Table 3.3–6**. Effect sizes are 20% for the trigger and 50% for the threshold.

Major findings at Baker Lake areas for chlorophyll-*a*, biomass, species richness and major taxa group composition are as follows:

- *Chlorophyll-a* – concentrations at reference area BAP historically range between 0.4 to 1 µg/L (**Figure 3.3–58**). July concentrations were ~0.5 µg/L compared to ~0.9 µg/L in August. Chlorophyll-*a* concentrations have been lower, yet consistent, at all areas since 2013 compared to pre-2013 results. On-going challenges with delivering the chlorophyll-*a* samples to the laboratory in the optimal temperature range means these data should be interpreted with caution.
- *Total biomass* – phytoplankton biomass at the reference area BAP was within the range of previously-reported values for the July and August sampling events (**Figure 3.3–59**). At BBD, the biomass estimates for July were variable between the two samples, but overall slightly lower than the July 2013 and 2014 sampling events. Low biomass at BBD-37 in July (~90 mg/m^3) resulted in a statistically significant reduction in phytoplankton biomass of 34% (p=0.084) (**Table 3.3–6**). By August, phytoplankton biomass had increased to ~215 mg/m^3, similar to the results observed at BAP (~235 mg/m^3). Low phytoplankton biomass for individual sampling events/replicate samples has previously been observed (e.g., August 2013 at BPJ) without any apparent long-term downward trend towards lower phytoplankton productivity.
- *Major taxa composition* – there were no apparent differences in relative composition of phytoplankton communities between BAP and impact areas BBD and BPJ in 2015 (**Figure 3.3–61**).
- *Species richness* – similar to total biomass, taxa richness was comparable to all previous years with the exception of 2013 (**Figure 3.3–62**). The same seasonal trends of lower richness in July relative to August were observed in the 2015 as in previous years. There were no statistically significant changes in species richness for 2015 relative to previous years and the BAP reference.

The reduced phytoplankton biomass observed at BBD in 2015 is considered representative of the variability in this endpoint given there were no instances of trigger exceedances in water quality parameters in 2015. Phytoplankton biomass will continue to be monitored for potential temporal trends, but no follow-up measures are recommended other than routine monitoring for 2016.

Table 3.3–5. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Baker Lake, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Density (cells/L)							
				Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Baker Akilahaarjuk Point											
BAP-37	21-Jul-15	33	0.82	0	57,472	0	1,310,488	77,256	109,576	2,200	1,556,992
BAP-38	21-Jul-15	37	0.80	0	57,472	200	2,349,584	58,104	276,592	2,000	2,743,952
BAP-39	15-Aug-15	41	0.88	0	215,520	0	2,327,632	178,344	238,088	1,600	2,961,184
BAP-40	15-Aug-15	44	0.84	0	129,712	0	2,088,760	126,440	119,344	2,200	2,466,456
Percent Density or Biomass				***<0.1***	***4.7***	***<0.1***	***83***	***4.5***	***7.6***	***<0.1***	
Baker Barge Dock											
BBD-37	21-Jul-15	31	0.82	0	71,840	0	714,016	94,008	32,936	800	913,600
BBD-38	21-Jul-15	33	0.86	0	86,208	0	1,122,304	36,536	159,264	3,600	1,407,912
BBD-39	15-Aug-15	42	0.90	0	143,880	200	1,518,624	151,560	194,984	1,600	2,010,848
BBD-40	15-Aug-15	47	0.89	0	130,312	200	1,576,096	148,744	231,920	3,200	2,090,472
Percent Density or Biomass				***<0.1***	***6.7***	***<0.1***	***77***	***6.7***	***9.6***	***0.14***	
Baker Proposed Jetty											
BPJ-37	21-Jul-15	39	0.84	200	179,800	200	1,022,328	75,056	90,208	2,600	1,370,392
BPJ-38	21-Jul-15	34	0.82	0	72,240	0	1,152,440	69,872	128,728	1,600	1,424,880
BPJ-39	15-Aug-15	45	0.84	0	208,936	0	2,157,416	151,224	218,936	2,200	2,738,712
BPJ-40	15-Aug-15	43	0.88	0	144,080	0	1,371,960	169,712	180,616	8,984	1,875,352
Percent Density or Biomass				***<0.1***	***8.2***	***<0.1***	***77***	***6.3***	***8.3***	***0.21***	
All 2015 Locations Relative Density or Biomass (%)				***<0.1***	***6.4***	***<0.1***	***79***	***5.7***	***8.4***	***0.14***	

Table 3.3–5. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Baker Lake, 2015.

Area-Replicate	Date	Taxa Richness	Simpson's Diversity	Phytoplankton Biomass (mg/m^3)							
				Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
Baker Akilahaarjuk Point											
BAP-37	21-Jul-15	33	0.82	0	1.5	0	134	5.83	26	10.96	178
BAP-38	21-Jul-15	37	0.80	0	2.1	3.1	226	9.00	37	16.63	293
BAP-39	15-Aug-15	41	0.88	0	3.8	0	185	20.80	28	7.00	245
BAP-40	15-Aug-15	44	0.84	0	3.9	0	177	18.74	14	13.99	228
Percent Density or Biomass				***<0.1***	***1.2***	***0.33***	***76***	***5.8***	***11***	***5.1***	
Baker Barge Dock											
BBD-37	21-Jul-15	31	0.82	0	4.5	0	63	7.85	7.9	8.73	92
BBD-38	21-Jul-15	33	0.86	0	1.6	0	99	5.87	31	28.83	166
BBD-39	15-Aug-15	42	0.90	0	5.1	2.11	127	18.58	38	3.29	195
BBD-40	15-Aug-15	47	0.89	0	14	2.18	129	27.40	54	9.40	236
Percent Density or Biomass				***<0.1***	***3.7***	***0.62***	***61***	***8.7***	***19***	***7.3***	
Baker Proposed Jetty											
BPJ-37	21-Jul-15	39	0.84	0	2.5	1.60	92	5.34	13	24.30	140
BPJ-38	21-Jul-15	34	0.82	0	2.5	0	104	9.11	22	12.74	151
BPJ-39	15-Aug-15	45	0.84	0	6.7	0	174	29.03	41	12.78	264
BPJ-40	15-Aug-15	43	0.88	0	7.5	0	141	27.03	36	8.08	220
Percent Density or Biomass				***<0.1***	***2.5***	***0.21***	***66***	***9.1***	***15***	***7.5***	
All 2015 Locations Relative Density or Biomass (%)				***<0.1***	***2.3***	***0.37***	***69***	***7.7***	***14***	***6.5***	

Table 3.3–6. Results of BACI tests for phytoplankton variables at Baker Lake areas.

Parameter Measured	Test Area	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
Total biomass	BBD	19	2	-0.38	0.21	**0.084**	-32	-56	6
	BPJ	19	2	-0.21	0.18	0.266	-19	-45	19
Species	BBD	19	2	-0.06	0.06	0.332	-6	-17	7
	BPJ	19	2	0.00	0.06	0.958	0	-11	12

Notes:
*** Bolded** values are p-values < 0.1
Shaded cells indicate negative effect sizes (reductions) of 20% or more
Test area = area compared to control (BAP)
n(B) = number of months in the "before" period
n(A) = number of months in the "after" period (i.e., in 2014)
Estimate = BACI model estimate of the 2014 change in mean for log-transformed data
SE = standard error of the estimate
p-value = two-tailed test of the null hypothesis of no change
ES = estimated effect size (i.e., 100%*(exp[Estimate]-1))
LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Figure 3.3–58. Chlorophyll-*a* (µg/L) in water samples from Baker Lake since 2008.

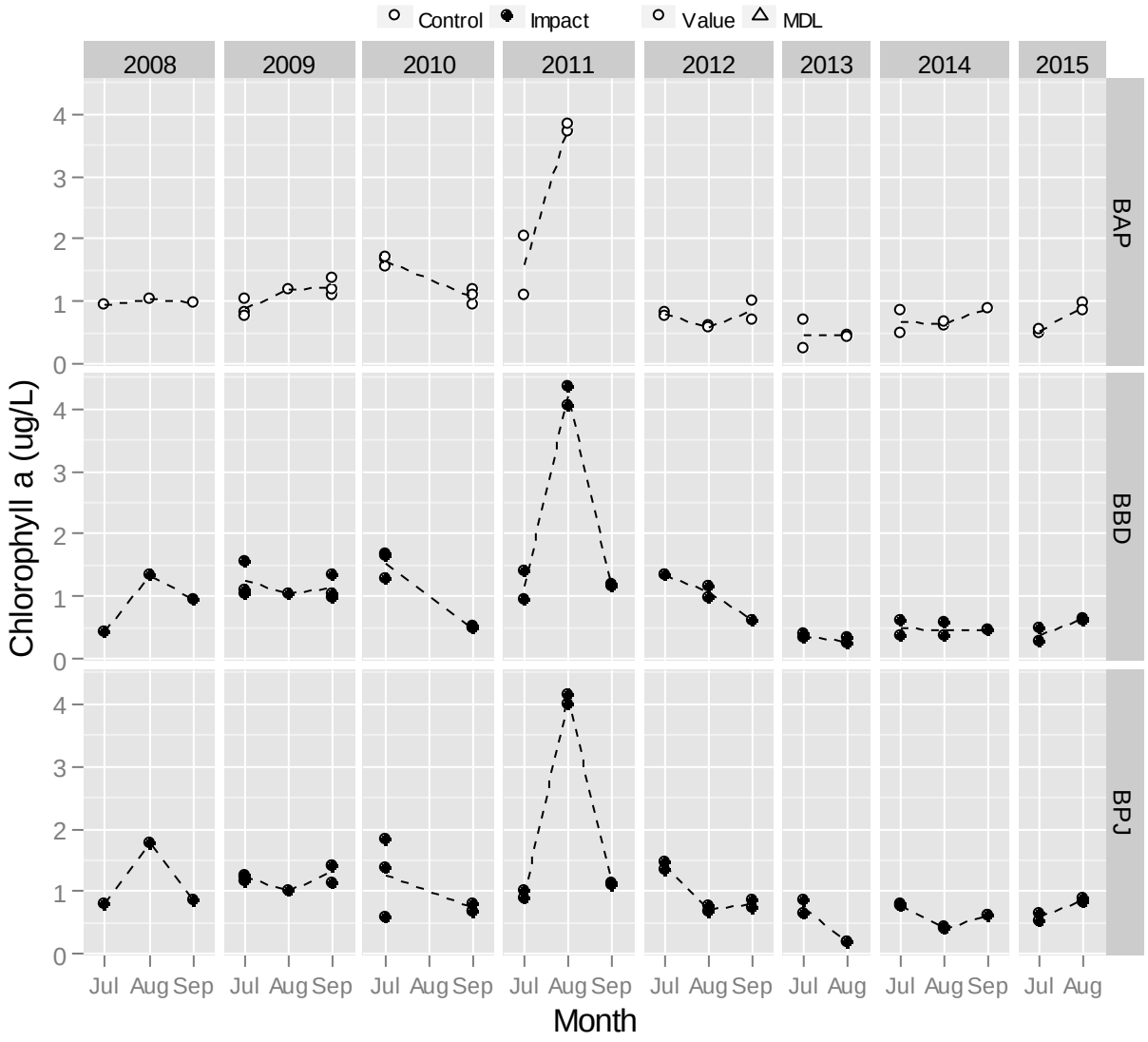


Figure 3.3–59. Total phytoplankton biomass (mg/m^3) from Baker Lake since 2008.

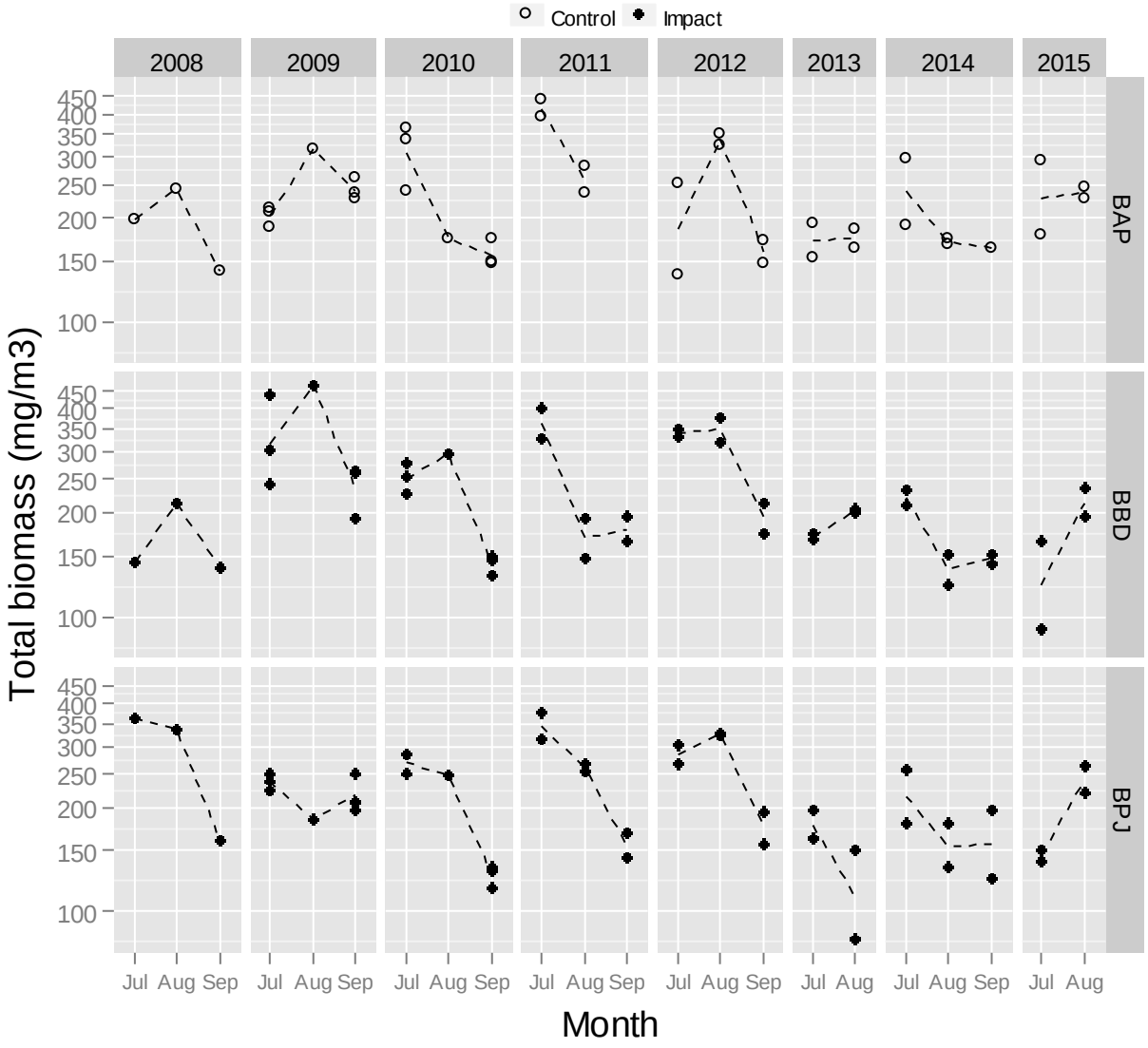


Figure 3.3–60. Phytoplankton biomass (mg/m^3) by major taxa group from Baker Lake since 2008.

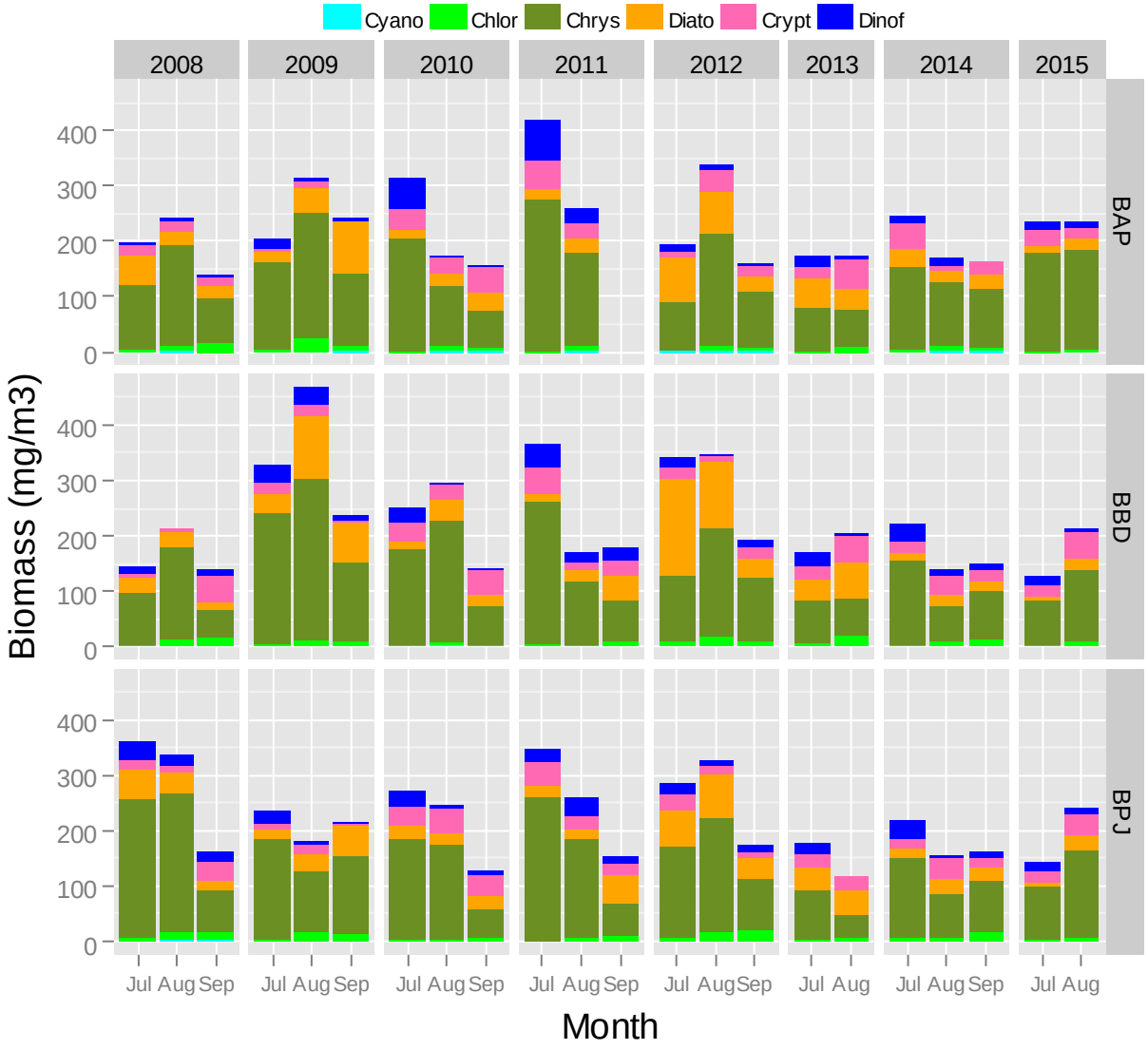


Figure 3.3–61. Phytoplankton relative biomass by major taxa group from Baker Lake since 2008.

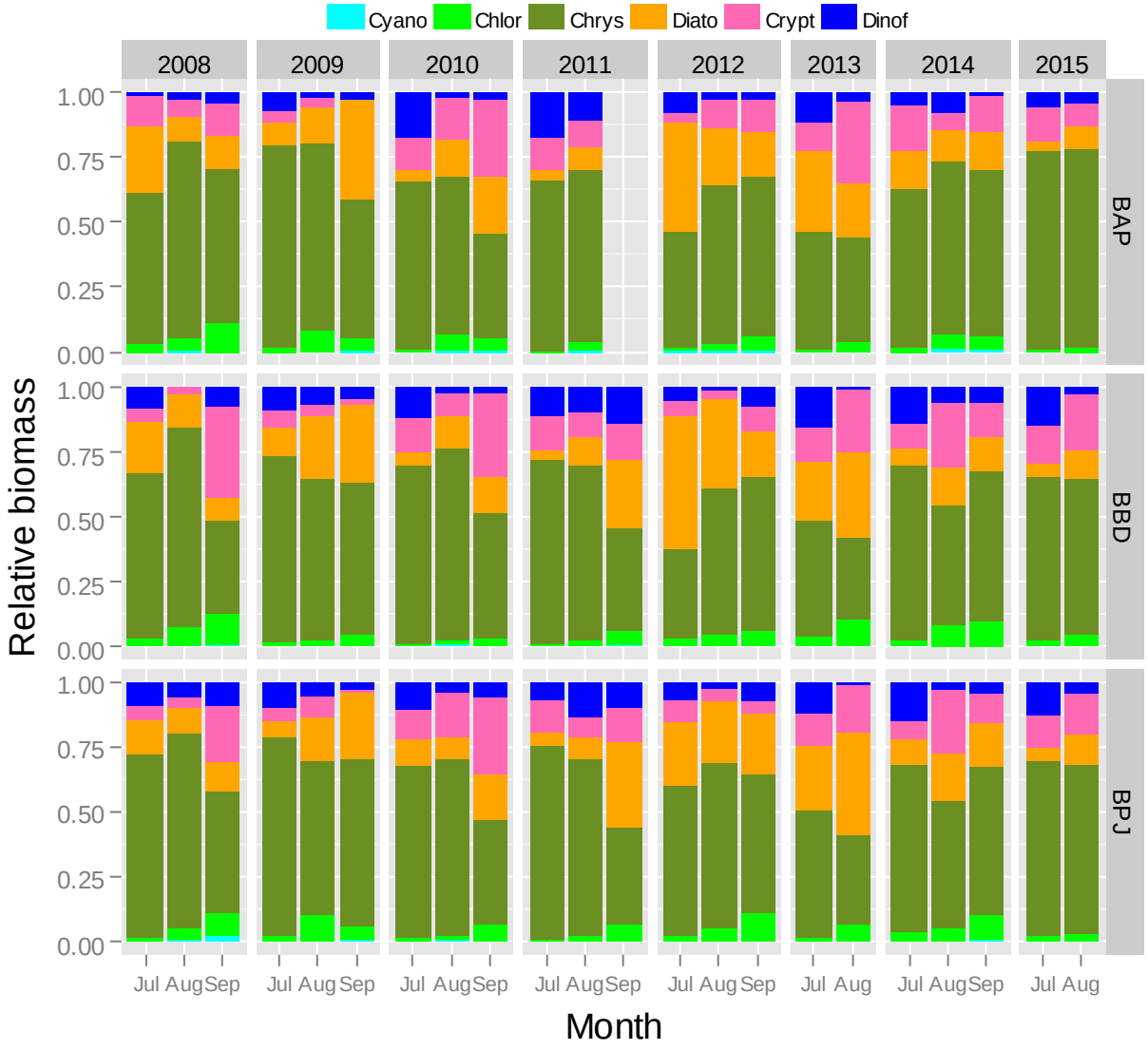
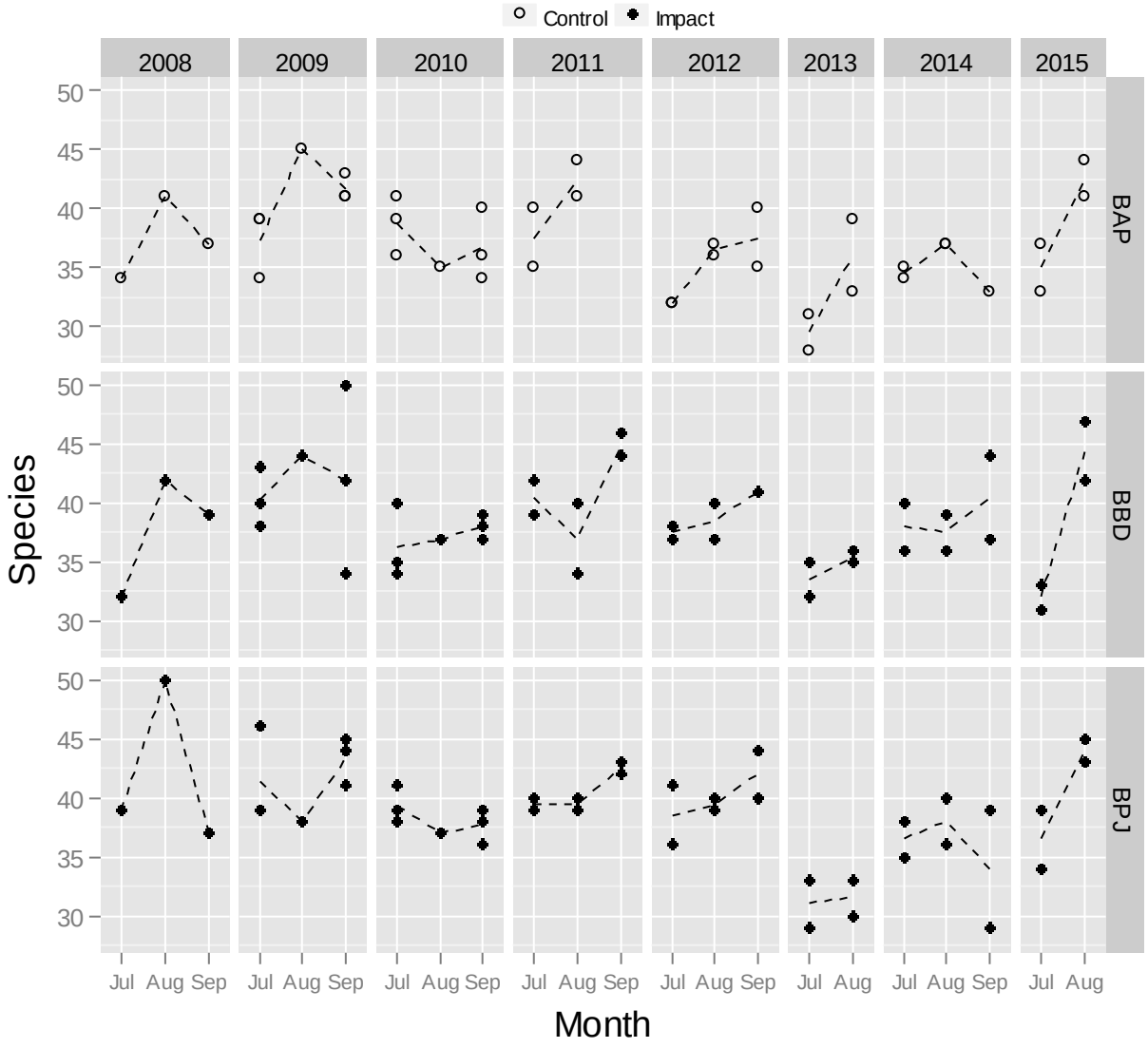


Figure 3.3–62. Phytoplankton species richness from Baker Lake since 2008.



3.3.5. Benthic Invertebrates

3.3.5.1. General Observations

Abundance and species composition of benthic invertebrate communities at Baker Lake are strongly affected by a variety of parameters, including grain size, water depth and sediment organic content (as discussed in Section 3.2.5.1). Investigations in the Meadowbank lakes and Baker Lake have targeted areas of similar depth and grain size (i.e., dominated by silt/clay with a small [<5%] sand fraction). Unlike the Meadowbank study lakes, sediment grain size in Baker Lake has tended to be more variable and less predictable at all locations, with consistently coarser grain size, with a higher sand fraction than observed in Meadowbank lakes (see the 2015 results in **Table 3.3–3** as an example of the variability within, and between areas). Higher sand content is typically associated with a lower TOC concentration and a different benthic community.

Similar to Meadowbank study lakes, the Baker Lake benthic community is generally characterized by relatively low abundance and taxa richness. Benthic invertebrate community abundance at Baker Lake often exceeds 5,000 organisms/m^2 (**Figure 3.3–63**), which is higher than abundance typically reported for Meadowbank study areas (**Figure 3.2–69**). Annual variability was sometimes high, as seen for example at BBD (e.g., from 2008 to 2009). There have also been fairly consistent spatial differences in abundance among areas (e.g., BBD and BPJ have generally had lower abundance than BAP). Taxa richness typically ranged from 6 to 12 in exposure areas and from about 12 to 22 in reference areas (e.g., **Figure 3.3–66** and **Figure 3.3–67**).

The benthic invertebrate community in Baker Lake is dominated by the aquatic larval stages of insects, especially chironomids (Family Chironomidae), both in terms of abundance (**Figure 3.3–64** and **Figure 3.3–65**) and taxa richness (**Figure 3.3–67** and **Figure 3.3–68**). The next most abundant group was typically Mollusca (clams) especially, *Cyclocalyx/Neopisidium*, genera of the family Sphaeriidae (fingernail clams). Oligochaete worms can also be relatively abundant in the lake sediments, possibly because of the sandier grain size sediment; generally, at least one oligochaete taxon was present at most area/year combinations.

3.3.5.2. Temporal and Spatial Trend Interpretation

Benthic invertebrates have been collected from Baker Lake annually in August since 2008. Baker Lake was added to the core program to ensure that monitoring was also in place to track activities in that area related primarily to barge traffic and shipping. There are two near-field impact areas, one targeting the hamlet's barge landing area (BBD) and the other AEM's fuel storage facility (BPJ). The initial (since 2008) reference area (BAP) is several kilometers to the east of the hamlet along the north shore of the lake. A second reference area (BES) was added in 2011 to provide a broader perspective for temporal patterns in benthic community structure.

Abundance and richness results from 2015 are shown in **Table 3.3–7**. Details regarding historical trends are discussed in the 2011 CREMP (Azimuth, 2012a). This report focuses on the 2015 results and trends over the last four years. BACI model (see **Section 2.4.4**) results are presented in **Table 3.3–8** (abundance) and **Table 3.3–9** (richness). Key results are described below:

- *Total abundance* – Mean abundance was generally higher across all Baker Lake areas in 2015 relative to previous years (**Figure 3.3–63**). At BBD, mean abundance in 2015 was the highest reported since the program began in 2008, while both BAP and BPJ had the second highest mean abundance since sampling began at each area. No reduction in abundance was observed at BPJ or BBD relative to BAP in 2015. Longer-term BACI results indicate there are no development-related patterns on benthic invertebrate community abundance since 2008.

- *Major taxa group abundance and relative abundance* – As discussed previously, the benthic invertebrate communities at reference and impact areas in Baker Lake are comprised primarily of chironomid larvae. However, the relative proportion of different taxa is markedly different for the impact areas BBD and BPJ compared to reference are BAP (apart from 2008; **Figure 3.3–64** and **Figure 3.3–65**). Since 2009, between approximately 25 to 60% of individuals at BAP have been oligochaetes, compared to less than 10% at the impact areas and reference area BES (which was added in 2011 to provide a reference area with more similar characteristics to the exposure areas). The dominant oligochaete taxa in terms of density at BAP in 2015 were from the Naididae subfamilies Rhyacodrilinae (*Rhyacodrilus sp*) and Tubificinae (see **Appendix D**).
- *Taxa richness* – Mean taxa richness was high across all Baker Lake areas in 2015 (**Figure 3.3–66**), and as such, the BACI model results showed positive, yet uncertain ($p>0.1$), effects sizes for total richness in 2015 and the two-year, 3-year, and 4-year time periods (**Table 3.3–9**).
- *Major taxa group richness and relative richness* – From a taxa richness perspective, impact areas BBD and BPJ appear reasonably similar to both reference area (BES and BAP), with insects dominating the communities (**Figure 3.3–67** and **Figure 3.3–68**). There were no apparent trends in species composition, indicating the barge operations are not adversely affecting the community.

Monitoring results to date have been variable across the sites. A detailed discussion on early trends is presented in the 2012 CREMP (Azimuth, 2013). Overall, it is difficult to attribute any of the observed patterns to development-related activities, especially in light of no apparent barge-related effects to water quality and sediment chemistry.

Table 3.3–7. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Baker Lake, 2015.

Area-Replicate	Date	Depth (m)	Abundance (#/m^2)					Richness (# taxa)					Simpson's Diversity	Bray-Curtis Index
			Oligochaetes	Insects	Molluscs	Other Taxa	**Total**	Oligochaetes	Insects	Molluscs	Other Taxa	**Total**		
Baker Akilahaarjuk Point														
BAP-1	16-Aug-15	7.9	7804	3152	4109	130	413	29	5	18	1	5	0.92	0.39
BAP-2	16-Aug-15	8.0	6674	1261	4587	174	652	30	5	19	2	4	0.93	0.42
BAP-3	16-Aug-15	8.1	9217	3348	5043	630	196	24	7	13	2	2	0.89	0.46
BAP-4	16-Aug-15	8.7	9587	3848	5565	65	109	24	5	16	1	2	0.91	0.50
BAP-5	16-Aug-15	9.1	4457	217	3674	457	109	23	2	17	1	3	0.89	0.48
	Area Mean		***7548***	***2365***	***4596***	***291***	***296***	***26***	***5***	***17***	***1***	***3***	***1***	***0***
Baker Barge Dock														
BBD-1	17-Aug-15	8.5	5043	0	5000	0	43	15	0	13	0	2	0.75	0.64
BBD-2	17-Aug-15	9.4	11870	174	11370	261	65	15	1	12	1	1	0.68	0.72
BBD-3	17-Aug-15	8.6	8478	43	7913	391	130	18	1	12	2	3	0.82	0.69
BBD-4	17-Aug-15	8.4	2043	0	2000	0	43	15	0	13	0	2	0.88	0.61
BBD-5	17-Aug-15	8.2	5630	0	4478	43	1109	19	0	16	1	2	0.89	0.61
	Area Mean		***6613***	***43***	***6152***	***139***	***278***	***16***	***0***	***13***	***1***	***2***	***1***	***1***
Baker East Shore														
BES-1	17-Aug-15	9.5	2304	87	1609	326	283	16	2	10	1	3	0.91	0.60
BES-2	17-Aug-15	9.3	3022	283	2304	239	196	21	2	16	1	2	0.92	0.51
BES-3	17-Aug-15	9.3	2304	87	1891	87	239	16	3	10	1	2	0.90	0.53
BES-4	17-Aug-15	9.4	2304	217	1674	283	130	19	3	13	1	2	0.94	0.53
BES-5	17-Aug-15	9.2	2261	152	1478	326	304	19	2	13	1	3	0.93	0.55
	Area Mean		***2439***	***165***	***1791***	***252***	***230***	***18***	***2***	***12***	***1***	***2***	***1***	***1***
Baker Proposed Jetty														
BPJ-1	18-Aug-15	9.3	4109	152	3043	565	348	15	1	11	1	2	0.90	0.50
BPJ-2	18-Aug-15	7.8	5370	174	4587	326	283	19	1	14	1	3	0.89	0.55
BPJ-3	18-Aug-15	8.0	3087	65	2739	0	283	16	1	13	0	2	0.89	0.60
BPJ-4	18-Aug-15	8.8	500	0	457	0	43	8	0	7	0	1	0.91	0.87
BPJ-5	18-Aug-15	8.3	1457	196	1217	43	0	15	2	12	1	0	0.88	0.64
	Area Mean		***2904***	***117***	***2409***	***187***	***191***	***15***	***1***	***11***	***1***	***2***	***1***	***1***

Table 3.3–8. Results of BACI tests for benthic invertebrate abundance at Baker Lake areas.

After Period	Test Area	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2015	BBD	7	1	0.70	1.23	0.71	102	-90	3991
	BPJ	7	1	0.60	1.03	0.71	82	-85	2143
2014-15	BBD	6	2	0.04	0.90	0.52	4	-89	850
	BPJ	6	2	0.28	0.80	0.63	32	-81	829
2013-15	BBD	5	3	0.29	0.78	0.64	34	-80	810
	BPJ	5	3	0.24	0.71	0.62	27	-78	627
2012-15	BBD	4	4	0.86	0.78	0.85	137	-65	1495
	BPJ	4	4	-0.20	0.69	0.39	-18	-85	347

Notes:
See notes in the table below.

Table 3.3–9. Results of BACI tests for benthic invertebrate taxa richness at Baker Lake areas.

After Period	Test Area	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2015	BBD	7	1	0.14	0.35	0.65	15	-51	171
	BPJ	7	1	0.12	0.40	0.61	13	-57	196
2014-15	BBD	6	2	0.08	0.27	0.61	8	-44	109
	BPJ	6	2	0.25	0.24	0.83	28	-29	130
2013-15	BBD	5	3	0.13	0.24	0.70	14	-36	103
	BPJ	5	3	0.25	0.25	0.82	28	-31	137
2012-15	BBD	4	4	0.21	0.22	0.81	23	-28	110
	BPJ	4	4	0.05	0.26	0.58	5	-45	100

Notes:
*** Bolded** values are p-values < 0.1
Shaded cells indicate negative effect sizes (reductions) of 20% or more
Test area = area compared to control (BAP)
n(B) = number of years in the "before" period
n(A) = number of years in the "after" period
Estimate = BACI model estimate of the after-period change in mean for log-transformed data
SE = standard error of the estimate
p-value = one-tailed test of the null hypothesis of no change or an increase in mean
ES = estimated effect size (i.e., 100%*(exp[Estimate]-1))
LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Figure 3.3–63. Benthic invertebrate total abundance (#/m^2) from Baker Lake since 2008.

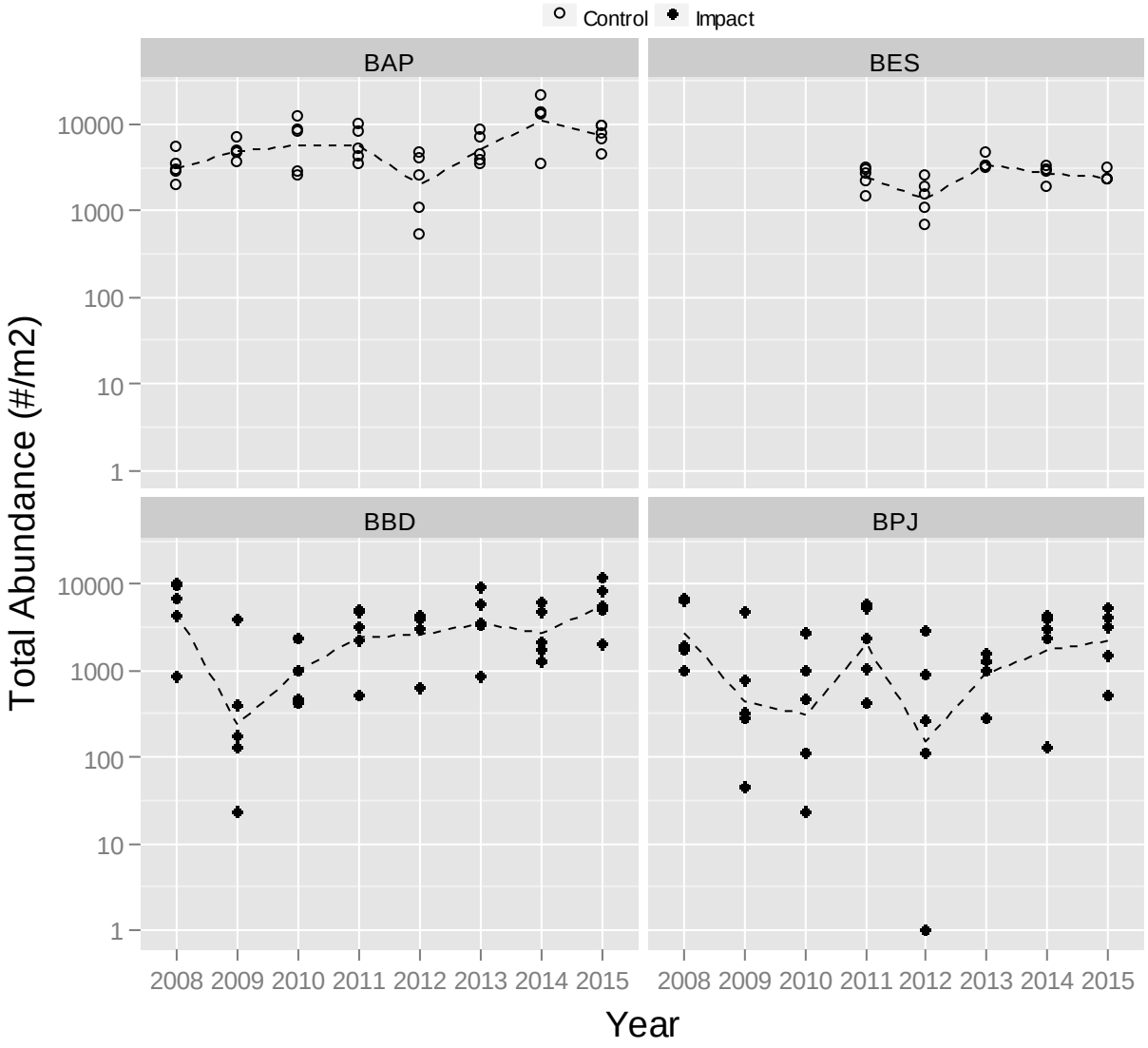


Figure 3.3–64. Benthic invertebrate abundance (#/m^2) by major taxa group from Baker Lake since 2008.

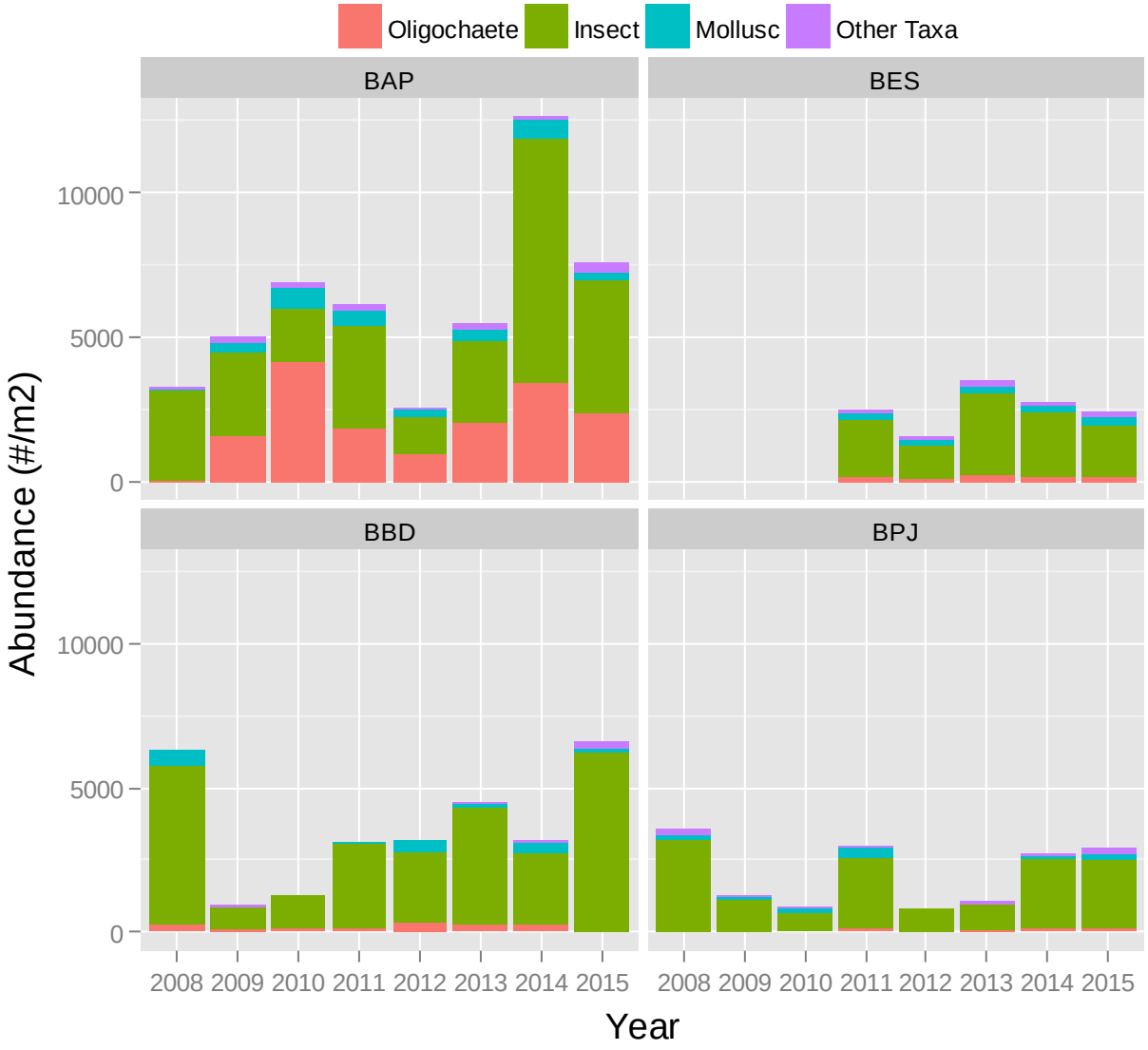


Figure 3.3–65. Benthic Invertebrate relative abundance by major taxa group from Baker Lake since 2008.



Figure 3.3–66. Benthic invertebrate total richness (# taxa) from Baker Lake since 2008.

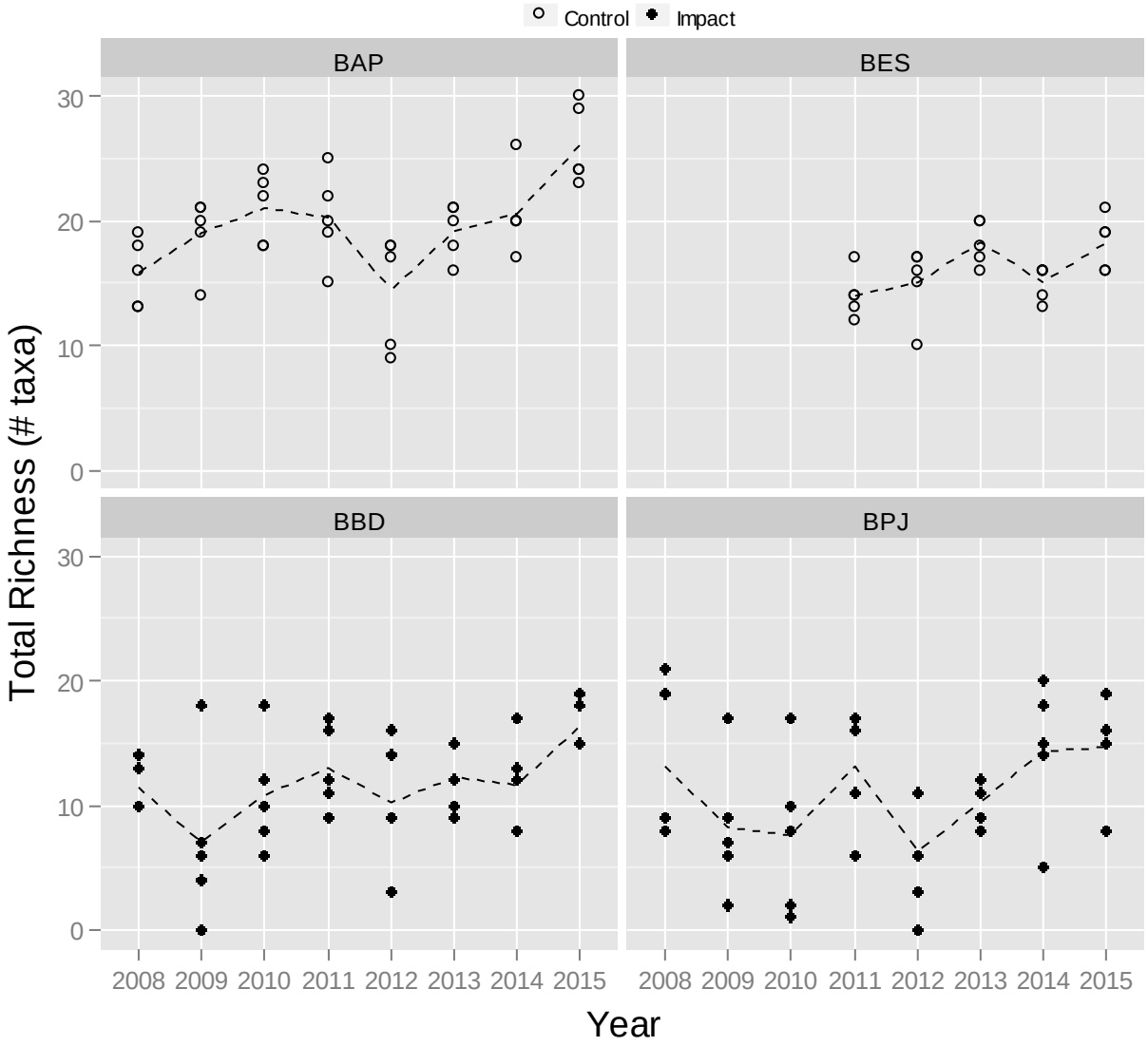
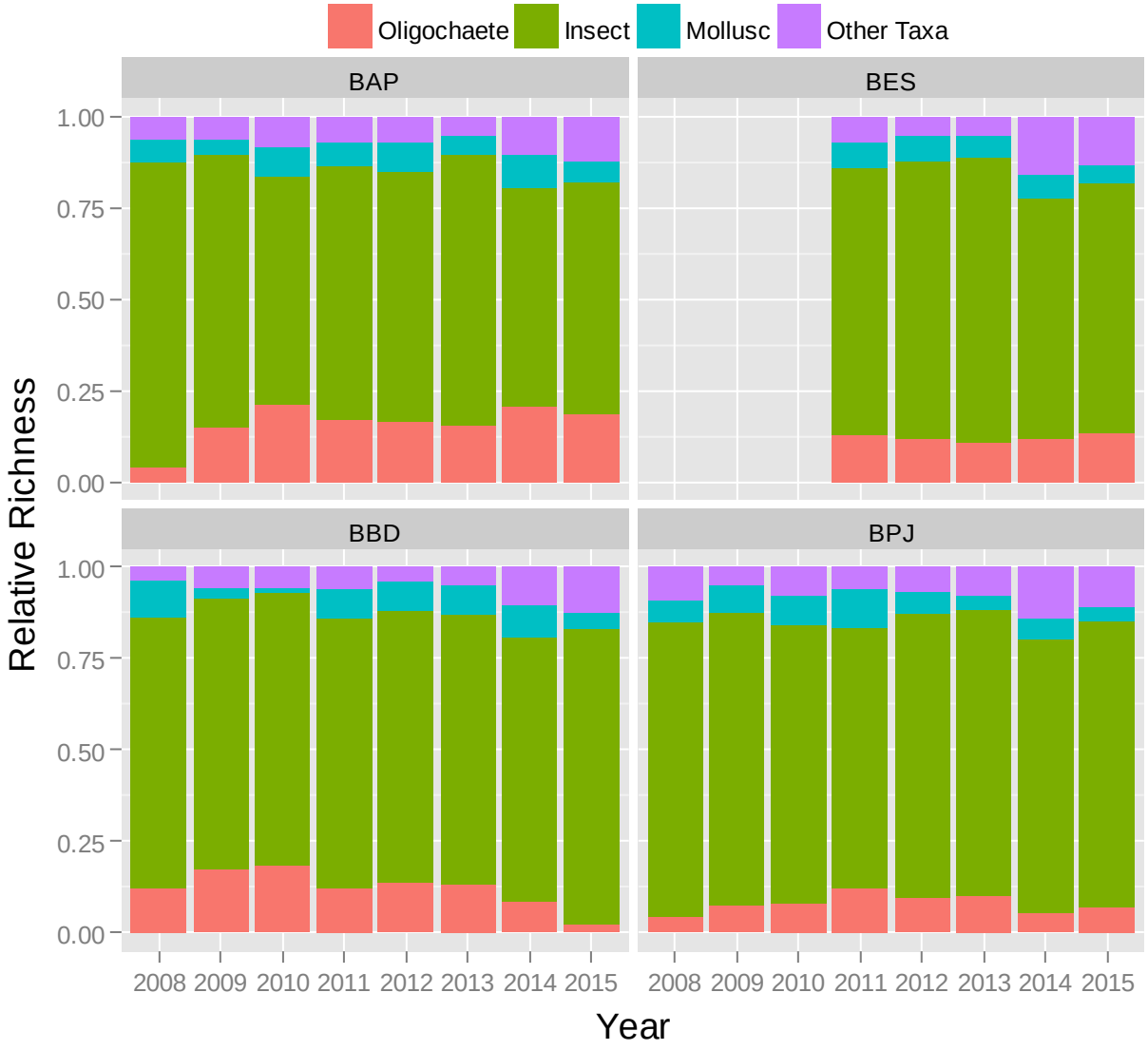


Figure 3.3–67. Benthic invertebrate richness (# taxa) by major taxa group from Baker Lake since 2008.



Figure 3.3–68. Benthic invertebrate relative richness by major taxa group from Baker Lake since 2008.



4. SUMMARY AND IMPLICATIONS FOR MANAGEMENT

4.1. Summary of the 2015 CREMP Program

The CREMP focuses on identifying changes in limnological parameters, water and sediment chemistry, or changes to primary (phytoplankton) and secondary (benthic invertebrate community) aquatic producers that may be associated with mine development activities. This is accomplished through the application of a temporal/spatial trend assessment that includes application of quantitative decision criteria (i.e., early warning "triggers" and action "thresholds") to facilitate immediate and objective decision-making regarding appropriate management actions. This information is integrated annually into the Aquatic Ecosystem Monitoring Program (AEMP) for holistic environmental management and decision making.

Meadowbank Study Lakes

CREMP monitoring started in 2006 and in-water mine development started in 2008. Key mine development activities that could result in changes to the aquatic receiving environment include: East Dike construction (2008), Bay-Goose Dike construction (2009-10), dewatering of both lakes and impoundments (2009-11, 2013), effluent discharge (2012 to present), and general site-related mining activities that mostly generate dust (e.g., rock crushing, blasting, ore and waste hauling; 2008 to present). Key findings for 2015 are summarized in **Table 4.1–1**:

- *Water Chemistry* – As in the past, there were some statistically significant mine-related changes relative to baseline/reference conditions identified in 2014 at one or more near-field (NF) areas that exceeded their respective triggers: alkalinity (SP); conductivity (TPN, TPE, TPS, SP, WAL, TE); hardness (TPN, TPE, TPS, SP, WAL, TE); major cations (i.e., calcium, potassium, magnesium, and sodium [TPN, TPE, SP, WAL]); TDS (TPN, TPE, TPS, SP, WAL, TE); and TKN (WAL). In the absence of effects-based thresholds (e.g., CCME water quality criteria) for these parameters, their triggers were set at the 95th percentile of baseline data. While these results represent mine-related changes, the observed concentrations are still relatively low and unlikely to adversely affect aquatic life. **These trends need to be reviewed again in 2016**.
- *Sediment Chemistry* – Quantitative trigger analysis for sediment is based on coring results, which are conducted on a three-year cycle to coincide with MMER EEM field studies. This program was last conducted in 2014 and will be conducted next in 2017. Grab samples submitted for analysis in 2015 showed similar concentrations to previous years based on visual comparison of the data. With the exception of chromium at TPE, none of the grab samples exceeded the trigger values in 2015. The 2014 CREMP report provided a thorough examination of the temporal and spatial trend of chromium at TPE, with an overall conclusion that ultramafic rock used to construct the Bay-Goose Dike is the likely source of increased sediment chromium concentrations at TPE relative to baseline conditions. As per the recommendations in last year's CREMP (Azimuth, 2015b), the 2015 program incorporated bioavailability and toxicity testing to evaluated whether sediment chromium concentrations pose a risk to the benthic invertebrate community at TPE. Sequential extraction tests on sediment show the majority of sediment chromium is sequestered in the sediment matrix, which is largely non-bioavailable. Furthermore, the fractions that are bioavailable occur at concentrations below effects-based threshold concentrations (i.e., ISQG and PEL). Toxicity tests on amphipod (*Hyalella*) and midge larvae (*Chironomus*) survival and growth provided no evidence of contaminant-related effects to the test organisms exposed to sediments from TPE compared to the field control treatment (INUG and PDL). These results provide effects-based evidence that chromium concentrations at TPE are unlikely to adversely affect the benthic

invertebrate community. No targeted follow-up studies are proposed for TPE beyond **continued evaluation of the temporal trend in sediment chromium concentrations in 2016**.

- *Phytoplankton Community* – TPE and TPS both had slightly reduced biomass relative to reference in 2015, but in both cases the results were not statistically significant. Overall, the phytoplankton results from 2015 were within the range of reference/baseline conditions in each area.
- *Benthic Invertebrate Community* – A few locations had particularly high abundance in 2015 relative to previous years, notably INUG and TPS. There was an "apparent" reduction (>20%) in total abundance at TPE, TEFF, and WAL when compared to INUG, but none of the results were statistically significant. Furthermore, when compared to previous years the results are well within the range of natural variability. In summary, there were no statistically significant short-term (i.e., past year) or longer-term (i.e., past two to four years) trends in reduced abundance or richness at the NF, MF, or FF locations in 2015.

Baker Lake

CREMP monitoring at Baker Lake started in 2008. Key mine-related activities include barge/shipping traffic and general land-based activities associated with the tank farm area. No spills of fuels, hydrocarbons or any other materials were reported in the vicinity of the barge dock and jetty in 2015. There were no cases where water quality parameters exceeded the triggers in 2015. A minor decrease in phytoplankton biomass was noted at BBD in 2015, but the result is considered representative of the variability in this endpoint given there were no instances of trigger exceedances in water quality parameters in 2015. Overall, there were no changes in the aquatic receiving environment were observed that were attributable to AEM's activities in Baker Lake, and as such, no follow-up management actions are required for 2016.

Table 4.1–1. Summary of key findings from the 2015 CREMP, Meadowbank Mine.

Variable Type & Variable	Magnitude[1]	Spatial Scale[2]	Causation[3]	Permanence[4]	Uncertainty[5]	Comments	Management Action[6]
Exposure - Limnology							
Oxygen	**0**	n/a	n/a	n/a	?		**0**
Temperature	**0**	n/a	n/a	n/a	?		**0**
Conductivity	**0**	n/a	n/a	n/a	?		**0**
Exposure - Water Chemistry							
Conventionals	**1**	Large	High	Low	?	The following parameters (conventionals and nutrients) were elevated relative to reference/baseline conditions. However, concentrations suggest low potential for adverse effects. **Alkalinity** (SP); **Conductivity** (TPN, TPE, TPS, SP, WAL, TE); **Hardness** (TPN, TPE, TPS, SP, WAL, TE); **Ca/K/Mg/Na** (TPN, TPE, SP, WAL [not Na]); **TDS** (TPN, TPE, TPS, SP, WAL, TE)	**1**
Nutrients	**1**	Small	Moderate	Low	?	**TKN** (WAL)	**1**
Total Metals	**0**	n/a	n/a	n/a	?		**0**
Dissolved Metals	**0**	n/a	n/a	n/a	?		**0**
Total Suspended Solids	**0**	n/a	n/a	n/a	?		**0**
Exposure - Sediment Chemistry							
Physical	**0**	n/a	n/a	n/a	?		**0**
Total Metals	**1**	Large	High	Moderate	??	Sediment chromium concentrations exceed the trigger at TPE, but appear to have stabilized. Results of a targeted chromium bioavailability study showed low potential for adverse effects (toxicity testing) and that the majority of chromium in the sediments is associated with the least bioavailable fraction (sequential extraction). These results are consistent with benthic invertebrate community results at TPE (see text for details) and indicate that the changes in sediment chromium concentrations observed at TPE over the past few years are not affecting biota	**1**
Organics	**0**	n/a	n/a	n/a	?		**0**
Effects - Phytoplankton							
Chlorophyll-*a* *	**0**	n/a	n/a	n/a	?	Continued data quality issue for chlorophyll-*a* (temperature control in transit)	**0**
Total Biomass	**0**	n/a	n/a	n/a	?		**0**
Taxa Richness	**1**	Moderate	Low	Low	?	>20% lower at BBD than reference conditions. Result is attributed to natural variability given no trigger exceedances were reported in 2015.	**1**
Effects - Benthic Invertebrates							
Total Abundance	**0**	n/a	n/a	n/a	?		**0**
Total Richness	**0**	n/a	n/a	n/a	?		**0**

Notes:

[1] **Magnitude Ratings (narrative in brackets used in the absence of specific triggers/thresholds):**

- **0** – no exceedances of triggers or thresholds (or no apparent changes from baseline of concern)
- **1** – early warning trigger exceeded (or change from baseline warranting concern)
- **2** – threshold exceeded (or change from baseline exceeding magnitude of concern)

[2] **Spatial Scale Ratings:**

- n/a – no magnitude of effect, therefore not evaluated
- Small – localized scale
- Moderate – sub-basin to basin scale
- Large – basin to whole lake scale

[3] **Causation Ratings:**

- n/a – no magnitude of effect, therefore not evaluated
- Low – no evidence for a mine-related source
- Moderate – some likelihood of a mine-related source
- High – the source of the problem is very likely to be mine-related

[4] **Permanence Ratings:**

- n/a – no magnitude of effect, therefore not evaluated
- Low – rapidly reversible (e.g., months to years)
- Moderate – slowly reversible (e.g., years to decades)
- High – largely irreversible (e.g., decades +)

[5] **Uncertainty Ratings:**

- ? – low uncertainty
- ?? – moderate uncertainty
- ??? – high uncertainty

[6] **Management Actions:**

- **0** – no action
- **1** – continued trend monitoring in 2015
- **2** – active follow-up with more detailed quantitative assessment in 2015

4.2. Monitoring Components for 2016

The current status of the rationale, framework, strategy, methods, triggers/thresholds, and scope of the CREMP were documented in the *CREMP: 2015 Plan Update* (Azimuth, 2015a). A key aspect of the updated plan was the design of the new results-based sampling strategy outlined in **Section 2.2.3** to improve program efficiency at the mid-field and far-field Meadowbank areas when warranted. The current program for 2016 is summarized in **Table 4.2–1**. Based on the outcome of the water quality screening results at NF and MF areas in the context of this new assessment framework (**Section 3.2.2.2**), the full CREMP program (through ice and open water) is limited to the NF areas in 2016. Through-ice limnology sampling at TPS, TE, and TEFF is planned for a minimum of one, but ideally two events in the spring of 2016. Contingency water samples may need to be collected during the spring through ice event(s) if anomalous *in-situ* limnology results are observed.

Table 4.2–1. Monitoring components planned for 2016 CREMP.

Project Lake	Area ID	Through-Ice					Open-Water			Through-Ice	
		Jan	Feb	Mar	April or May	Jun	Jul	Aug	Sep	Oct	Nov or Dec
Reference Areas											
Inuggugayualik	INUG				Limno Water Phyto	Limno[1]	**Ice not safe**	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	**Ice not safe**	Limno Water Phyto
Pipedream	PDL						**Ice not safe**	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	**Ice not safe**	
Near-Field Areas											
Third Portage	TPE	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno[1]	**Ice not safe**	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	**Ice not safe**	Limno Water Phyto	Limno[1]
Third Portage	TPN	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno[1]	**Ice not safe**	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	**Ice not safe**	Limno Water Phyto	Limno[1]
Second Portage	SP	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno[1]	**Ice not safe**	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	**Ice not safe**	Limno Water Phyto	Limno[1]
Wally	WAL	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno[1]	**Ice not safe**	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	**Ice not safe**	Limno Water Phyto	Limno[1]
Mid-Field Areas											
Third Portage	TPS				Limno[2]	Limno[2]	**Ice not safe**				**Ice not safe**	Limno[2]	Limno[2]
Tehek	TE				Limno[2]	Limno[2]	**Ice not safe**				**Ice not safe**	Limno[2]	Limno[2]
Far-Field Areas											
Tehek	TEFF				Limno[2]	Limno[2]	**Ice not safe**				**Ice not safe**	Limno[2]	Limno[2]

Table 4.2–1. Monitoring components planned for 2016 CREMP.

Project Lake	Area ID	Through-Ice						Open-Water			Through-Ice		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Baker Lake	BBD						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		
	BPJ						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		
	BAP						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		
	BES						Ice not safe		Sed Benthos		Ice not safe		

Notes:

Limno: 2 depth profiles for 6 (or 3 for some areas) events per year.

Limno[1]: Basic limnology data should be collected at key near-field areas (TPN, TPE, SP, and WAL) at least once mid-winter to reduce uncertainty regarding the potential occurrence of changes over winter; water chemistry will also be collected if profiling shows unusual results.

Limno[2]: 1 depth profile for 2 events per year; water chemistry will also be collected if profiling shows unusual results.

Water: 2 replicate samples from 3m depth; same locations as limno.

Phyto: 2 replicate samples from 3m depth; same locations as limno.

Sed: 1 composite for organics (LEPH, HEPH, PAH(low), Mineral Oil and Grease); 5 replicates for physical (TOC, Grain Size, Moisture).

Benthos: 5 replicate samples (2 grab composite/sample); same locations as sediment.

Table 4.2–1. Monitoring components planned for 2016 CREMP.

Project Lake	Area ID	Through-Ice						Open-Water			Through-Ice		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Baker Lake	BBD						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		
	BPJ						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		
	BAP						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		
	BES						Ice not safe		Sed Benthos		Ice not safe		

Notes:

Limno: 2 depth profiles for 6 (or 3 for some areas) events per year.

Limno[1]: Basic limnology data should be collected at key near-field areas (TPN, TPE, SP, and WAL) at least once mid-winter to reduce uncertainty regarding the potential occurrence of changes over winter; water chemistry will also be collected if profiling shows unusual results.

Limno[2]: 1 depth profile for 2 events per year; water chemistry will also be collected if profiling shows unusual results.

Water: 2 replicate samples from 3m depth; same locations as limno.

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Sed: 1 composite for organics (LEPH, HEPH, PAH(low), Mineral Oil and Grease); 5 replicates for physical (TOC, Grain Size, Moisture).

Benthos: 5 replicate samples (2 grab composite/sample); same locations as sediment.

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APPENDICES

APPENDIX A

Water Quality Parameter Plots

APPENDIX A1

Meadowbank Water Quality Plots 2006 – 2015

LIST OF FIGURES – APPENDIX A1

Note on the water quality plots: the red dashed line represents the trigger value for each parameter.

Figure A1–1. Carbonate Alkalinity (mg/L) in water samples from Meadowbank study lakes since 2006. 4
Figure A1–2. Nitrite-N (mg/L) in water samples from Meadowbank study lakes since 2006. 5
Figure A1–3. Orthophosphate (mg/L) in water samples from Meadowbank study lakes since 2006. .. 6
Figure A1–4. Total Cyanide (mg/L) in water samples from Meadowbank study lakes since 2006. 7
Figure A1–5. Free Cyanide (mg/L) in water samples from Meadowbank study lakes since 2006. 8
Figure A1–6. Total antimony (mg/L) in water samples from Meadowbank study lakes since 2006. 9
Figure A1–7. Total Beryllium (mg/L) in water samples from Meadowbank study lakes since 2006. .. 10
Figure A1–8. Total Boron (mg/L) in water samples from Meadowbank study lakes since 2006. 11
Figure A1–9. Total Cadmium (mg/L) in water samples from Meadowbank study lakes since 2006... 12
Figure A1–10. Total Lead (mg/L) in water samples from Meadowbank study lakes since 2006. 13
Figure A1–11. Total Lithium (mg/L) in water samples from Meadowbank study lakes since 2006..... 14
Figure A1–12. Total Mercury (mg/L) in water samples from Meadowbank study lakes since 2006..... 15
Figure A1–13. Total Nickel (mg/L) in water samples from Meadowbank study lakes since 2006..... 16
Figure A1–14. Total Selenium (mg/L) in water samples from Meadowbank study lakes since 2006. .. 17
Figure A1–15. Total Thallium (mg/L) in water samples from Meadowbank study lakes since 2006. ... 18
Figure A1–16. Total Tin (mg/L) in water samples from Meadowbank study lakes since 2006..... 19
Figure A1–17. Total Titanium (mg/L) in water samples from Meadowbank study lakes since 2006.... 20
Figure A1–18. Total Vanadium (mg/L) in water samples from Meadowbank study lakes since 2006.. 21
Figure A1–19. Total Zinc (mg/L) in water samples from Meadowbank study lakes since 2006. 22
Figure A1–20. Dissolved Antimony (mg/L) in water samples from Meadowbank study lakes since 2006. 23
Figure A1–21. Dissolved Beryllium (mg/L) in water samples from Meadowbank study lakes since 2006. 24
Figure A1–22. Dissolved Boron (mg/L) in water samples from Meadowbank study lakes since 2006. 25
Figure A1–23. Dissolved Cadmium (mg/L) in water samples from Meadowbank study lakes since 2006. 26
Figure A1–24. Dissolved Chromium (mg/L) in water samples from Meadowbank study lakes since 2006. 27
Figure A1–25. Dissolved Iron (mg/L) in water samples from Meadowbank study lakes since 2006. ... 28
Figure A1–26. Dissolved Lead (mg/L) in water samples from Meadowbank study lakes since 2006. .. 29
Figure A1–27. Dissolved Lithium (mg/L) in water samples from Meadowbank study lakes since 2006.30

Figure A1–28. Dissolved Mercury (mg/L) in water samples from Meadowbank study lakes since 2006. 31

Figure A1–29. Dissolved Nickel (mg/L) in water samples from Meadowbank study lakes since 2006. 32

Figure A1–30. Dissolved Selenium (mg/L) in water samples from Meadowbank study lakes since 2006. 33

Figure A1–31. Dissolved Thallium (mg/L) in water samples from Meadowbank study lakes since 2006. 34

Figure A1–32. Dissolved Tin (mg/L) in water samples from Meadowbank study lakes since 2006. 35

Figure A1–33. Dissolved Titanium (mg/L) in water samples from Meadowbank study lakes since 2006. 36

Figure A1–34. Dissolved Vanadium (mg/L) in water samples from Meadowbank study lakes since 2006. 37

Figure A1–35. Dissolved Zinc (mg/L) in water samples from Meadowbank study lakes since 2006. ... 38

Figure A1–1. Carbonate Alkalinity (mg/L) in water samples from Meadowbank study lakes since 2006.

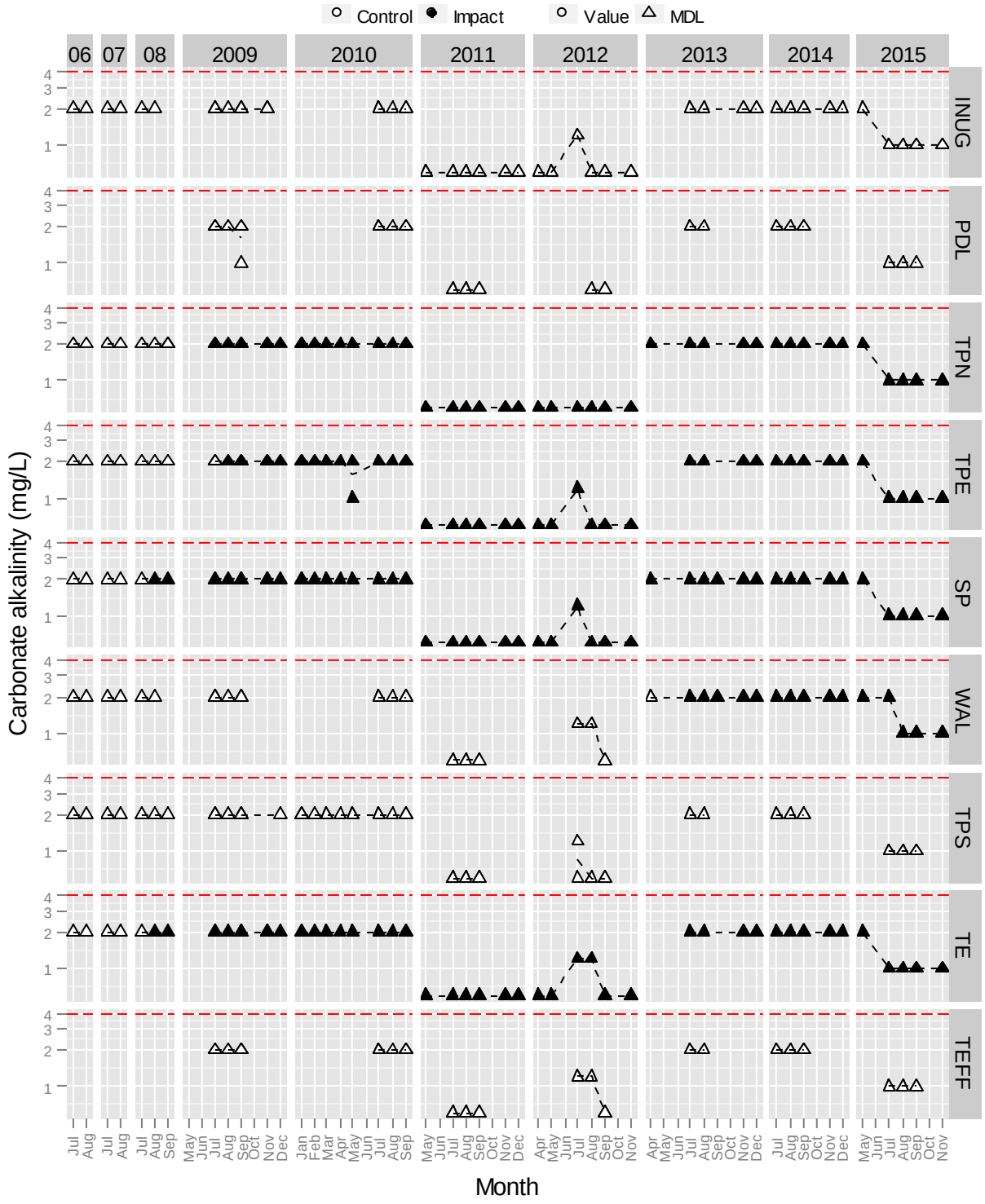


Figure A1–2. Nitrite-N (mg/L) in water samples from Meadowbank study lakes since 2006.

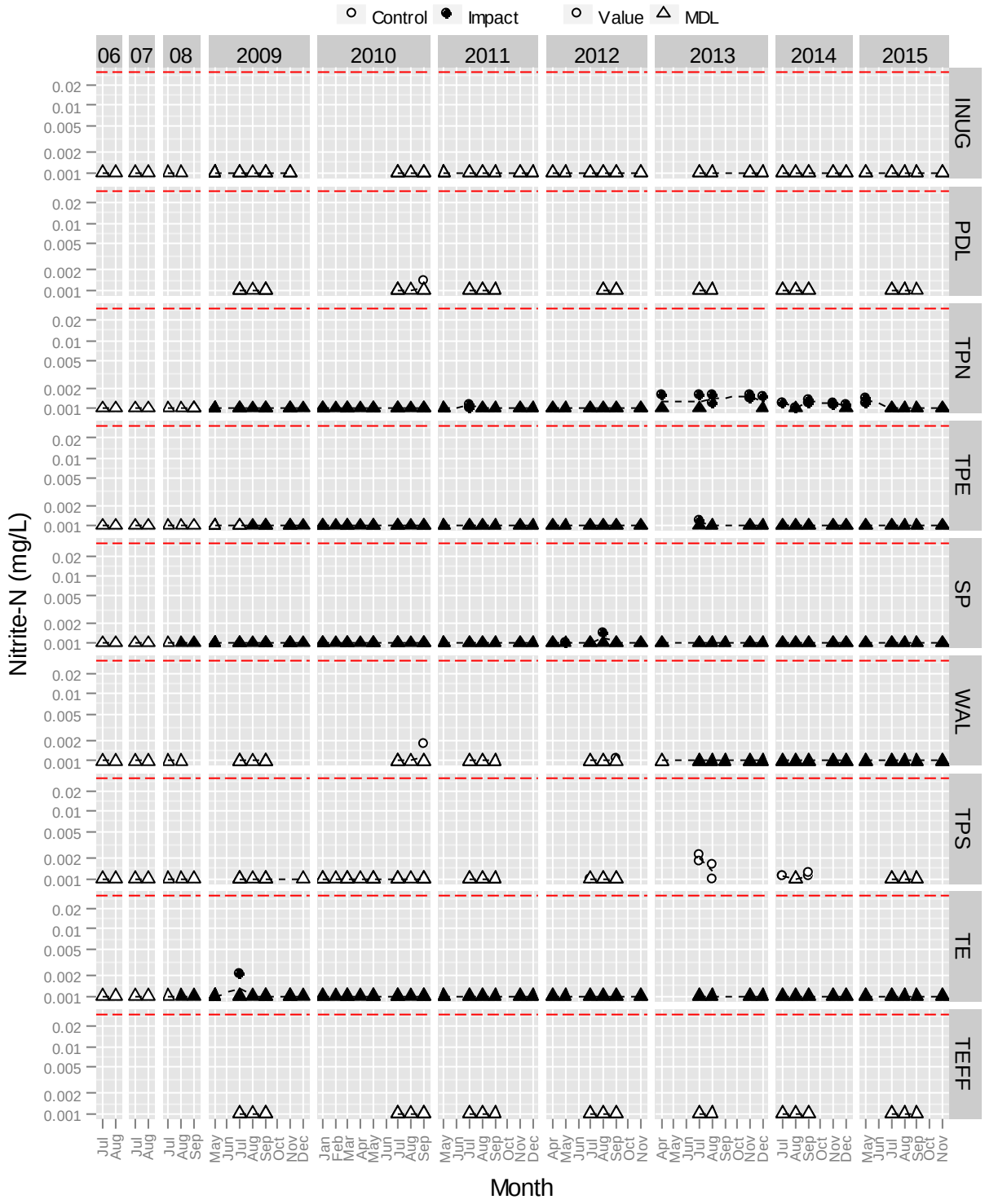


Figure A1–3. Orthophosphate (mg/L) in water samples from Meadowbank study lakes since 2006.

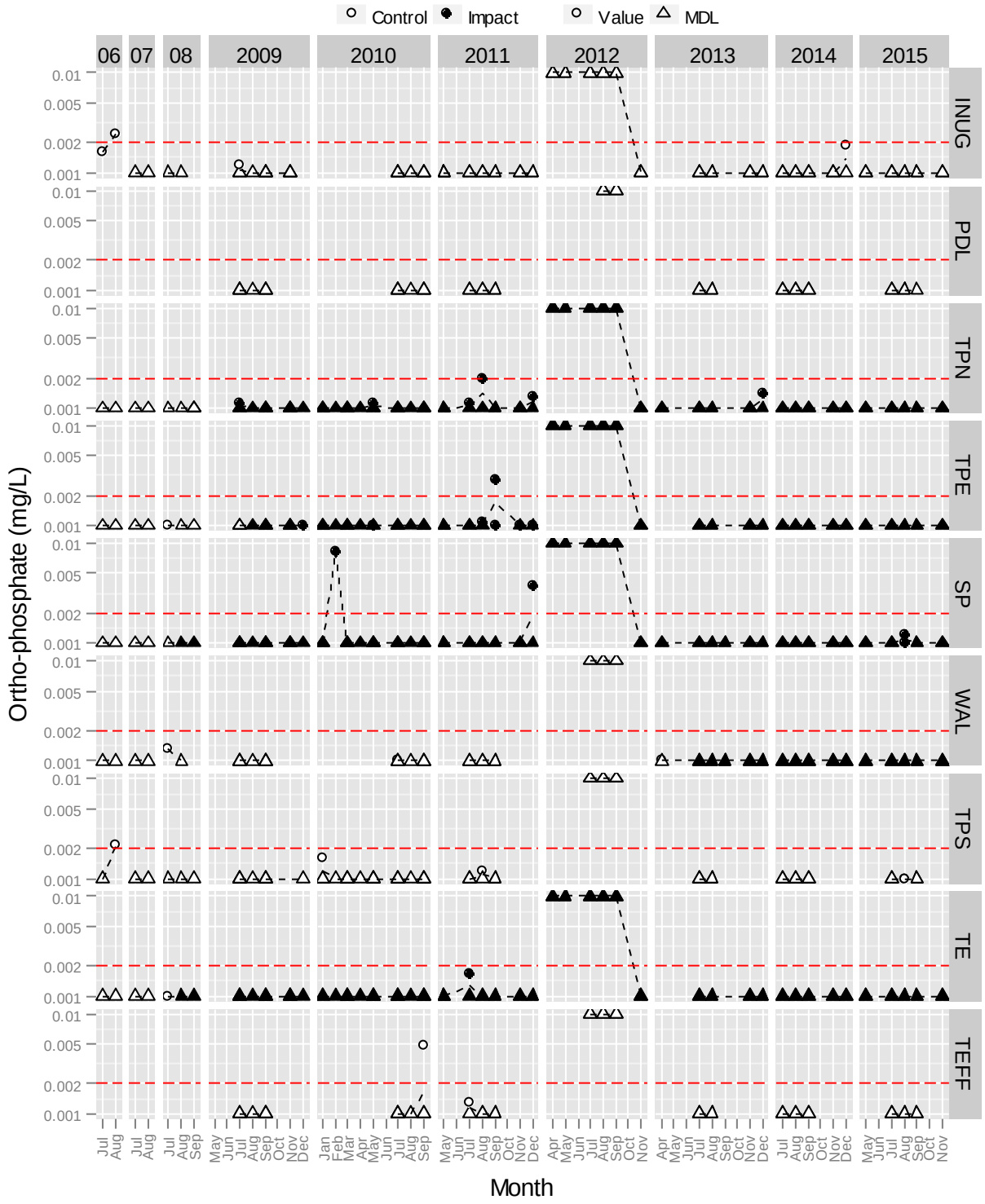


Figure A1–4. Total Cyanide (mg/L) in water samples from Meadowbank study lakes since 2006.

Note: No trigger for total cyanide. Detection limit lowered from 0.005 mg/L in 2014 to 0.001 mg/L in 2015.

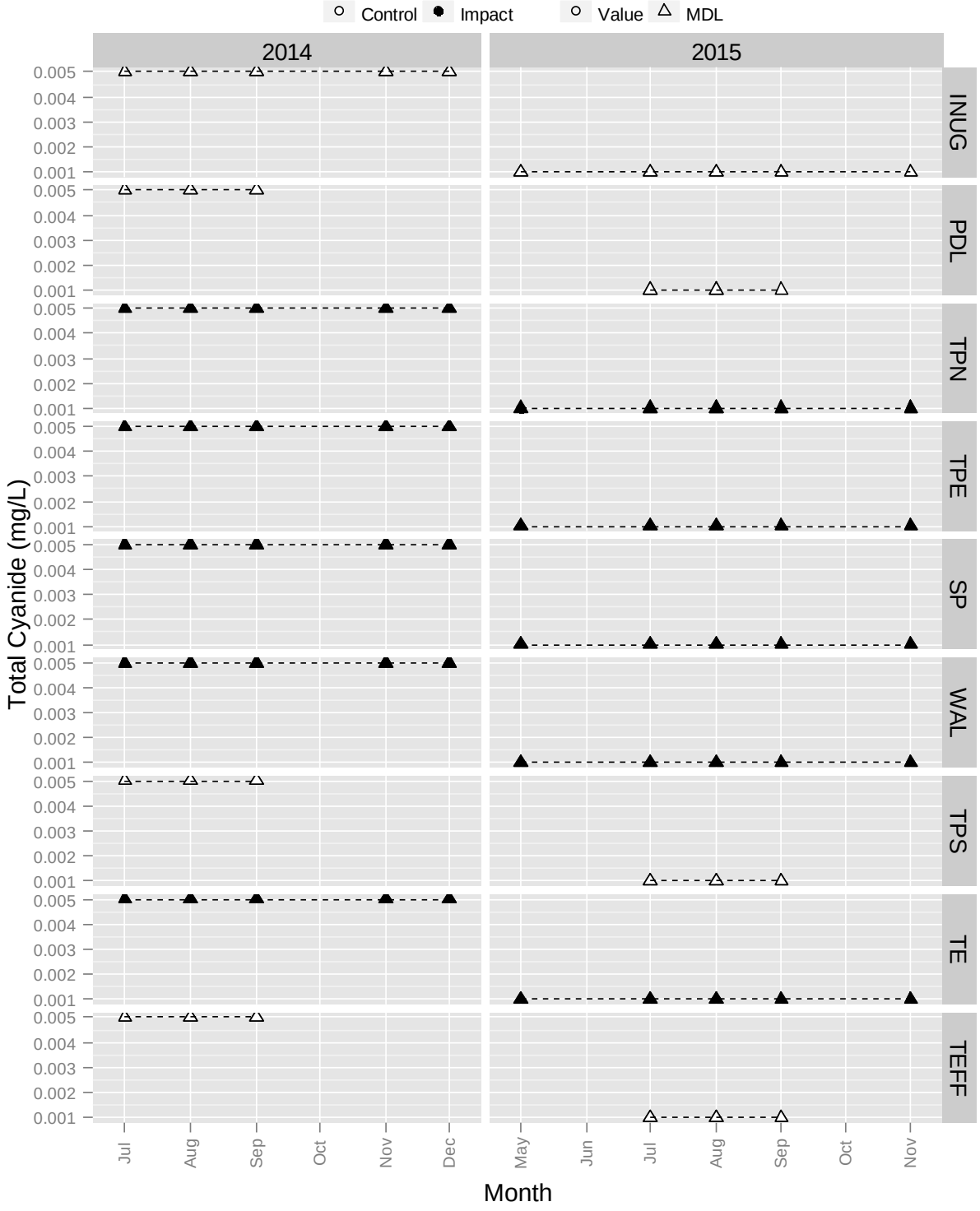


Figure A1–5. Free Cyanide (mg/L) in water samples from Meadowbank study lakes since 2006.

Note: No trigger for free cyanide. Detection limit lowered from 0.005 mg/L in 2014 to 0.001 mg/L in 2015.

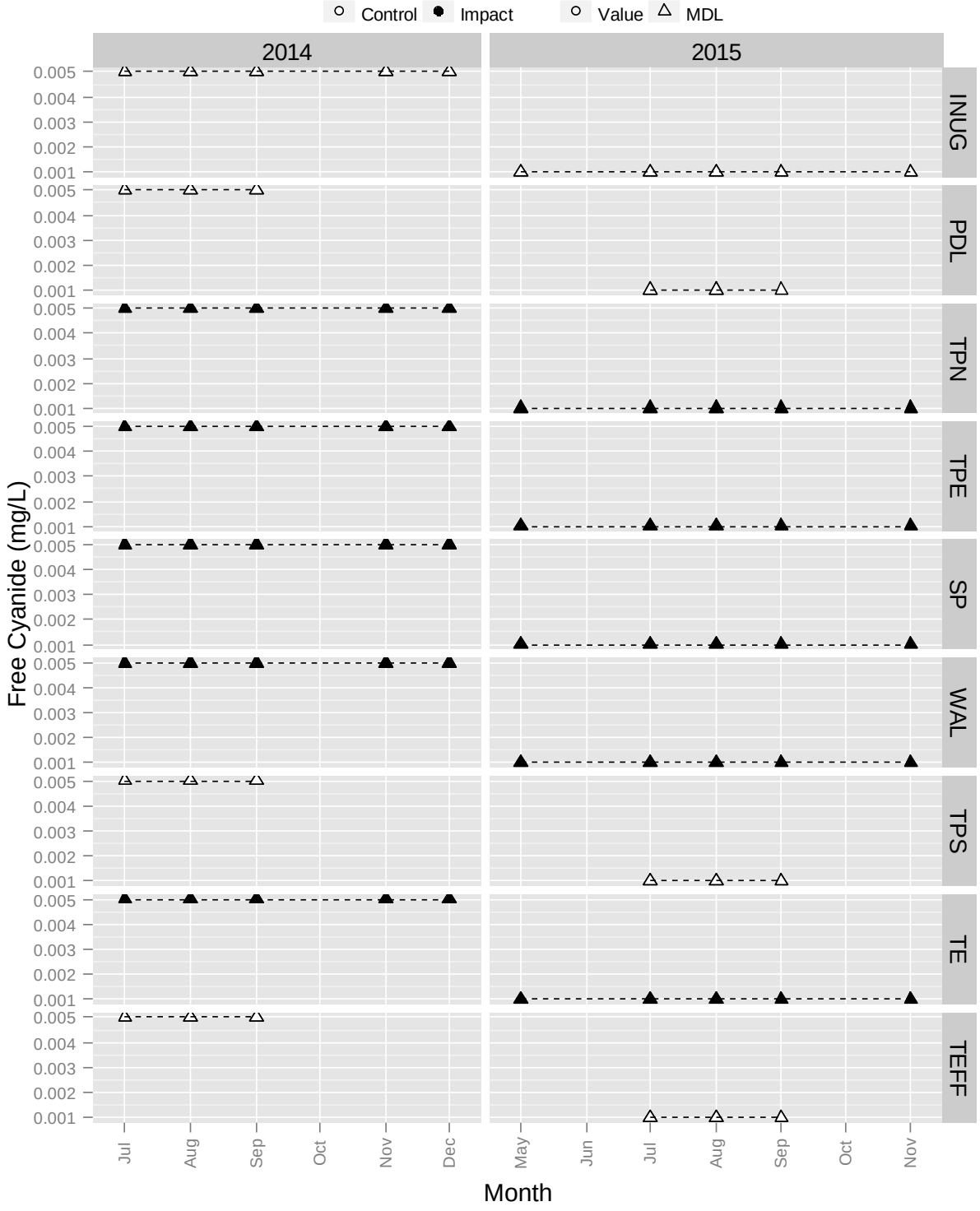


Figure A1–6. Total antimony (mg/L) in water samples from Meadowbank study lakes since 2006.

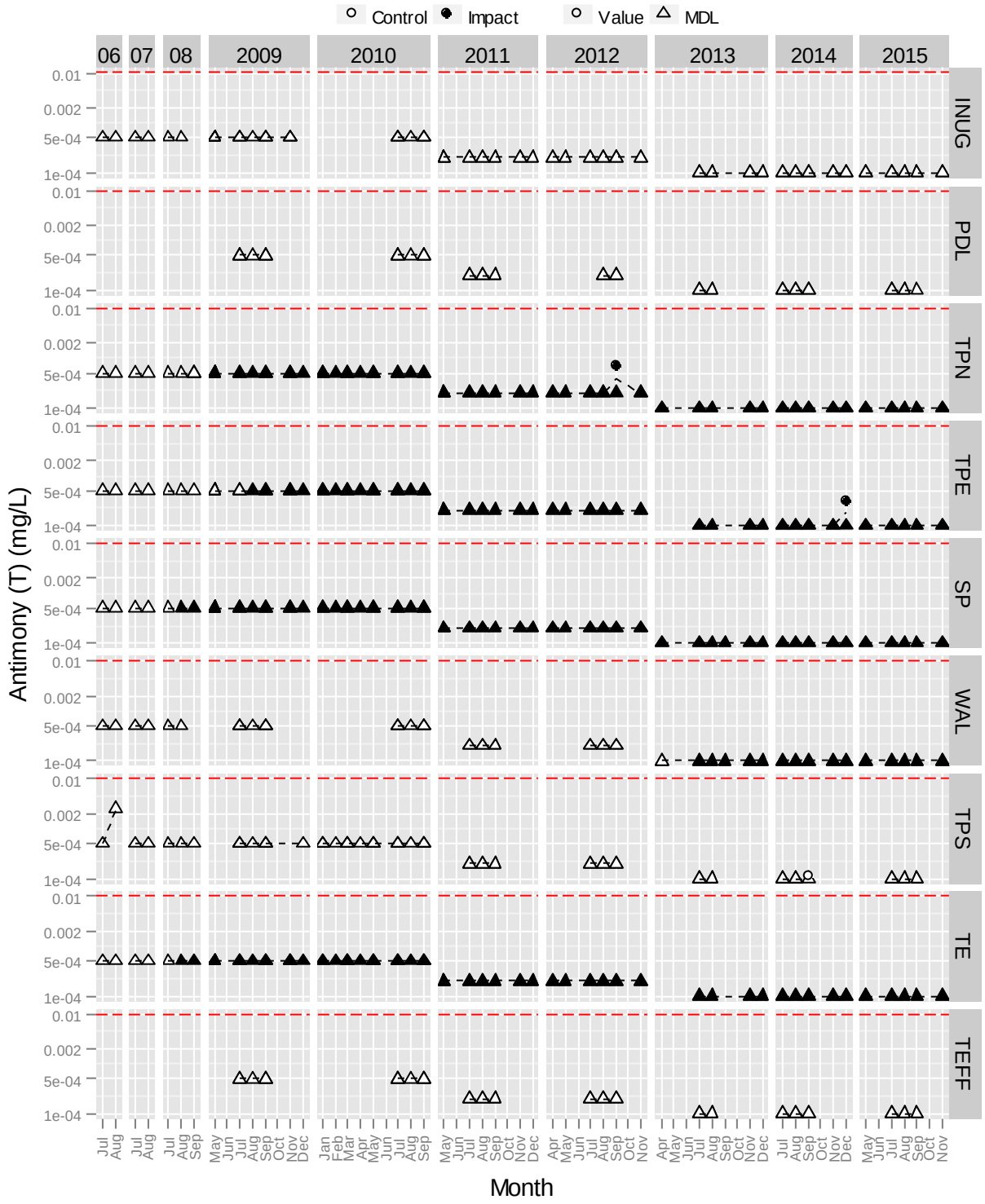


Figure A1–7. Total Beryllium (mg/L) in water samples from Meadowbank study lakes since 2006.

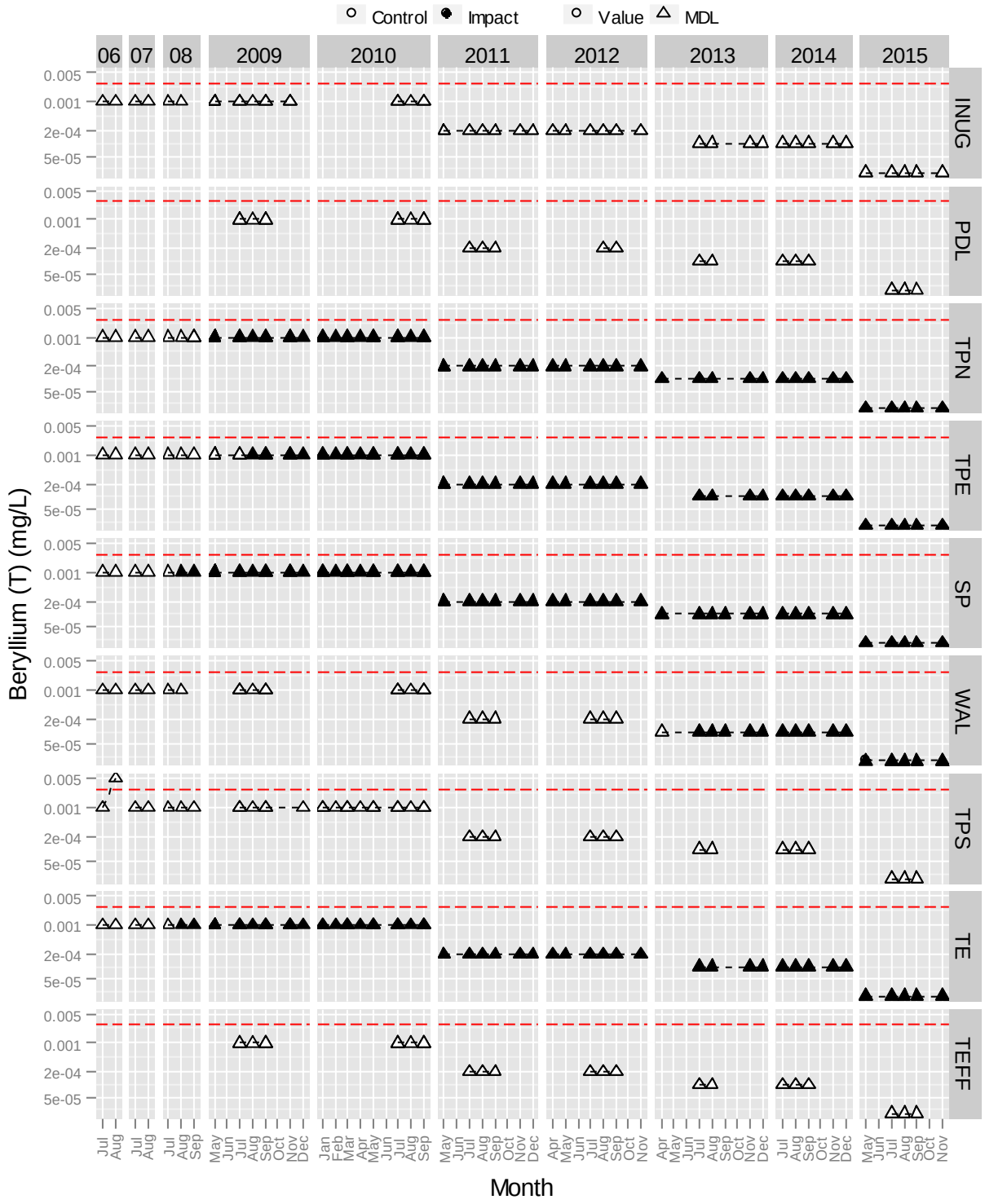


Figure A1–8. Total Boron (mg/L) in water samples from Meadowbank study lakes since 2006.

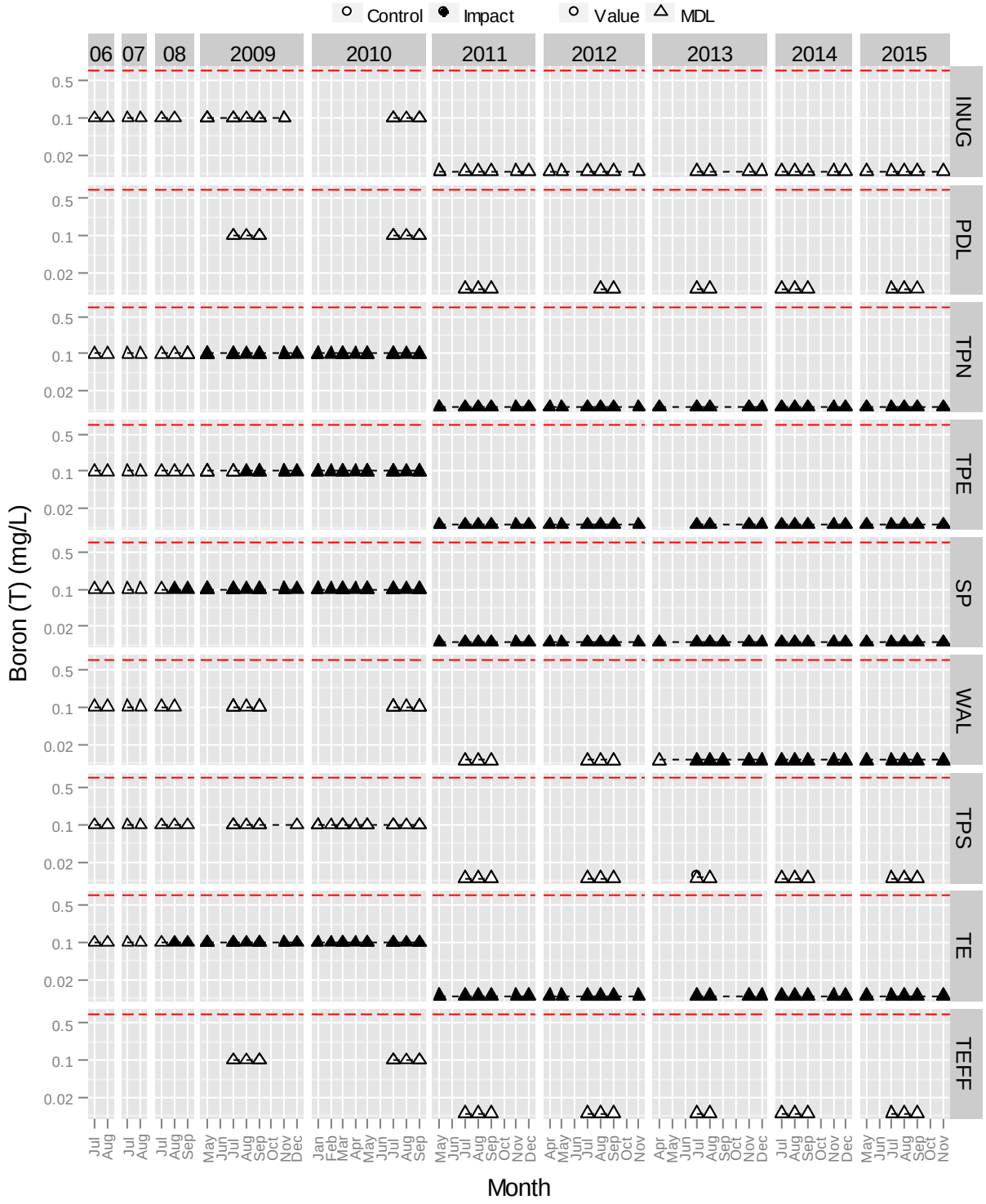


Figure A1–9. Total Cadmium (mg/L) in water samples from Meadowbank study lakes since 2006.

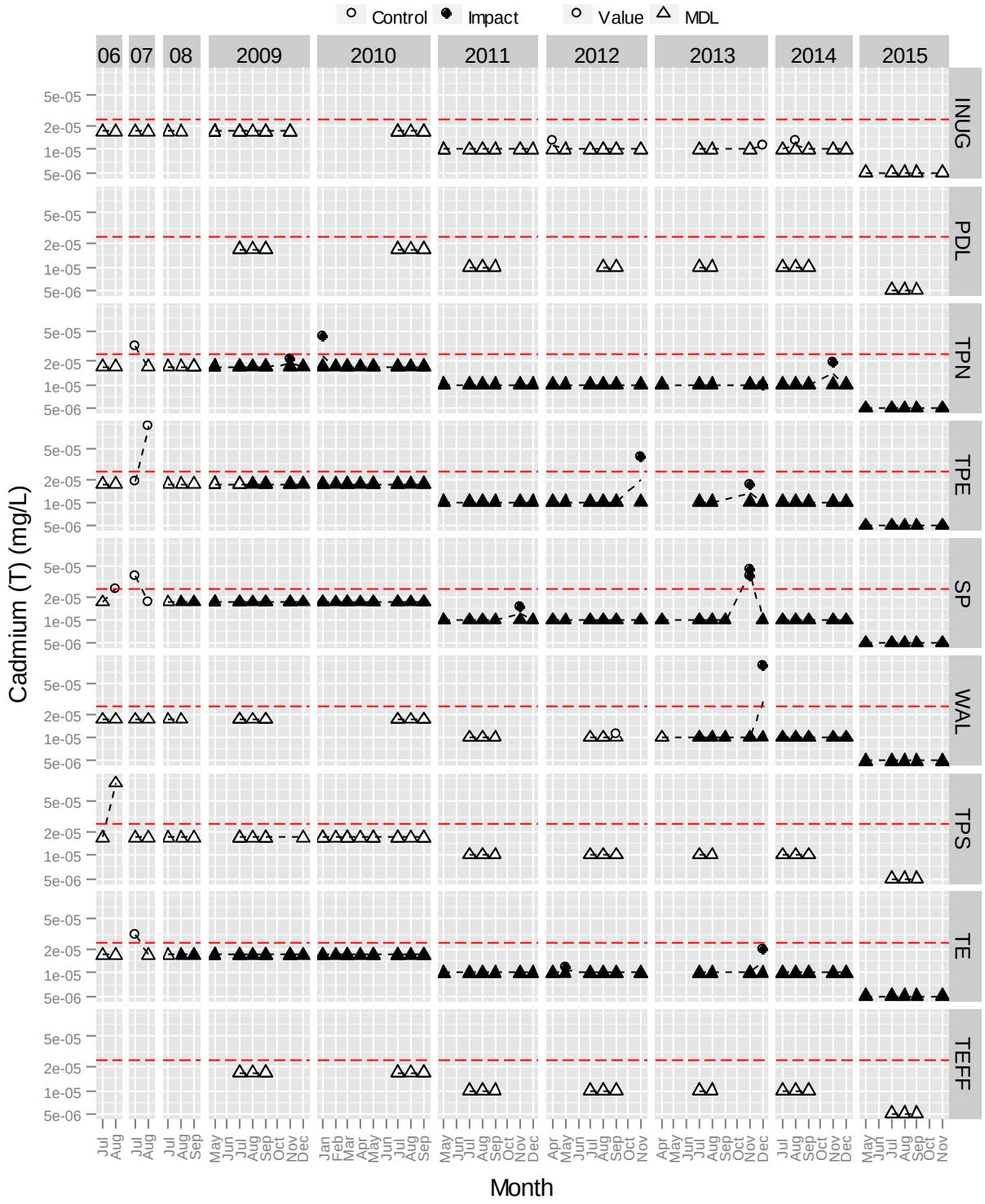


Figure A1–10. Total Lead (mg/L) in water samples from Meadowbank study lakes since 2006.

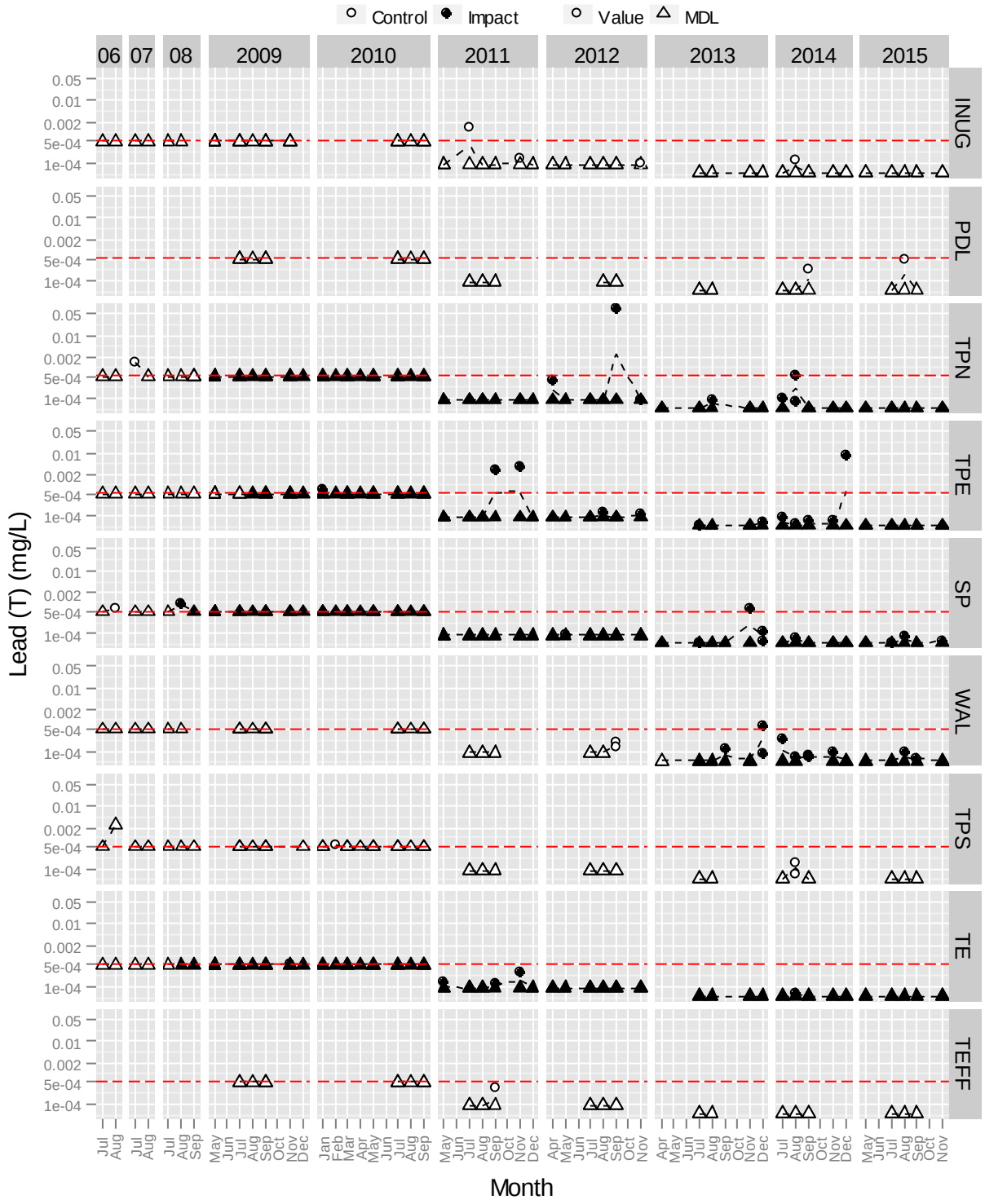


Figure A1–11. Total Lithium (mg/L) in water samples from Meadowbank study lakes since 2006.

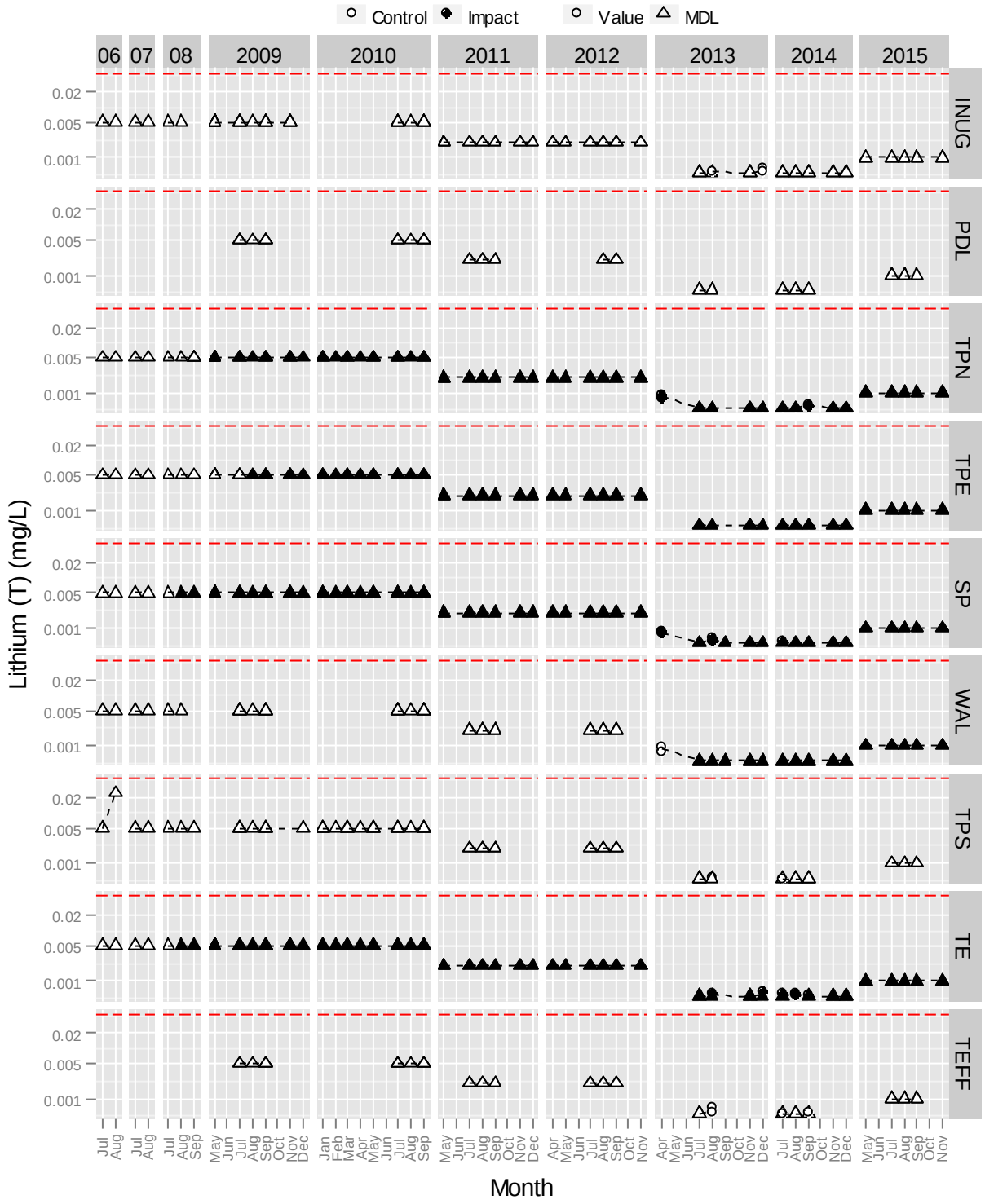


Figure A1–12. Total Mercury (mg/L) in water samples from Meadowbank study lakes since 2006.

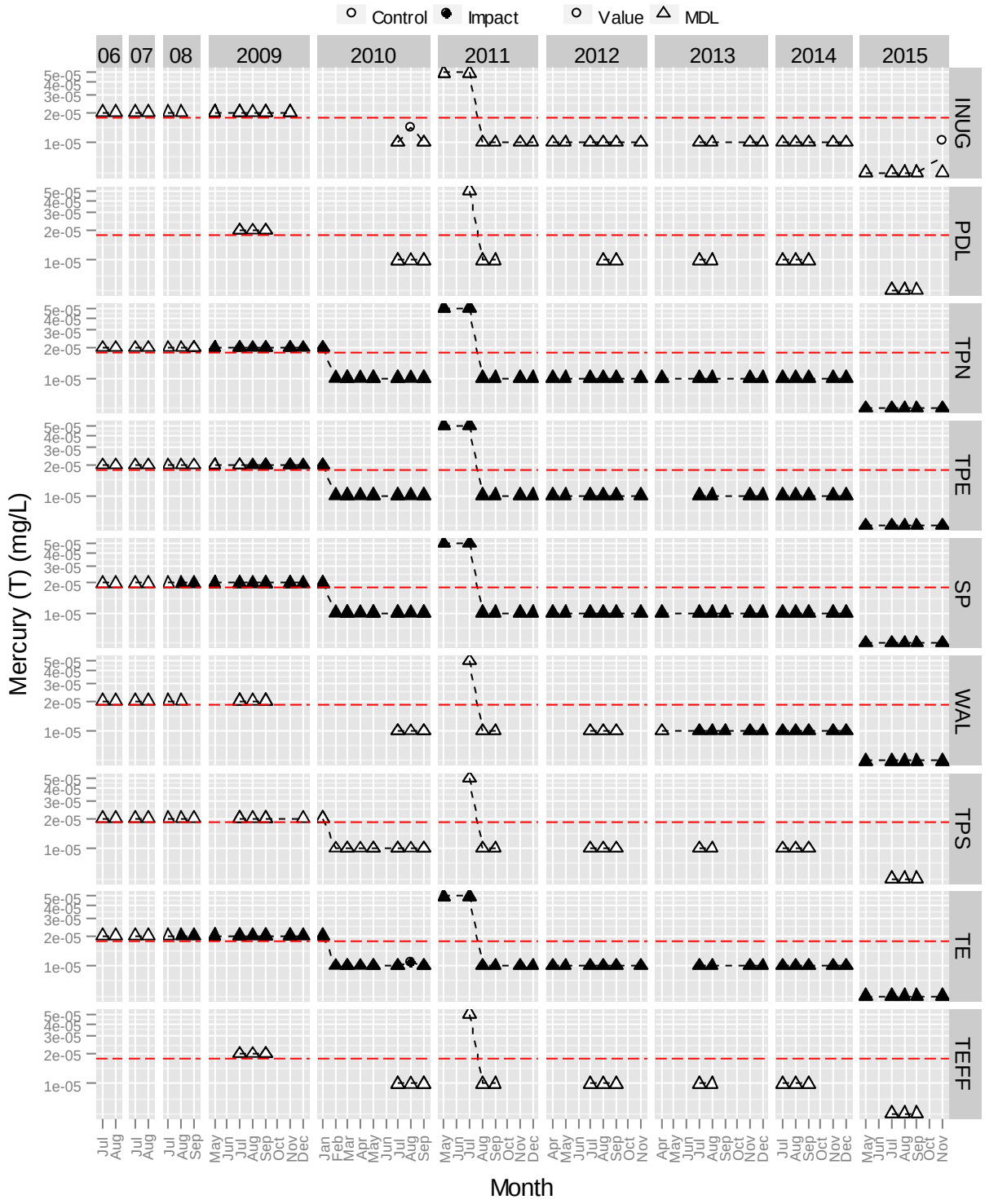


Figure A1–13. Total Nickel (mg/L) in water samples from Meadowbank study lakes since 2006.

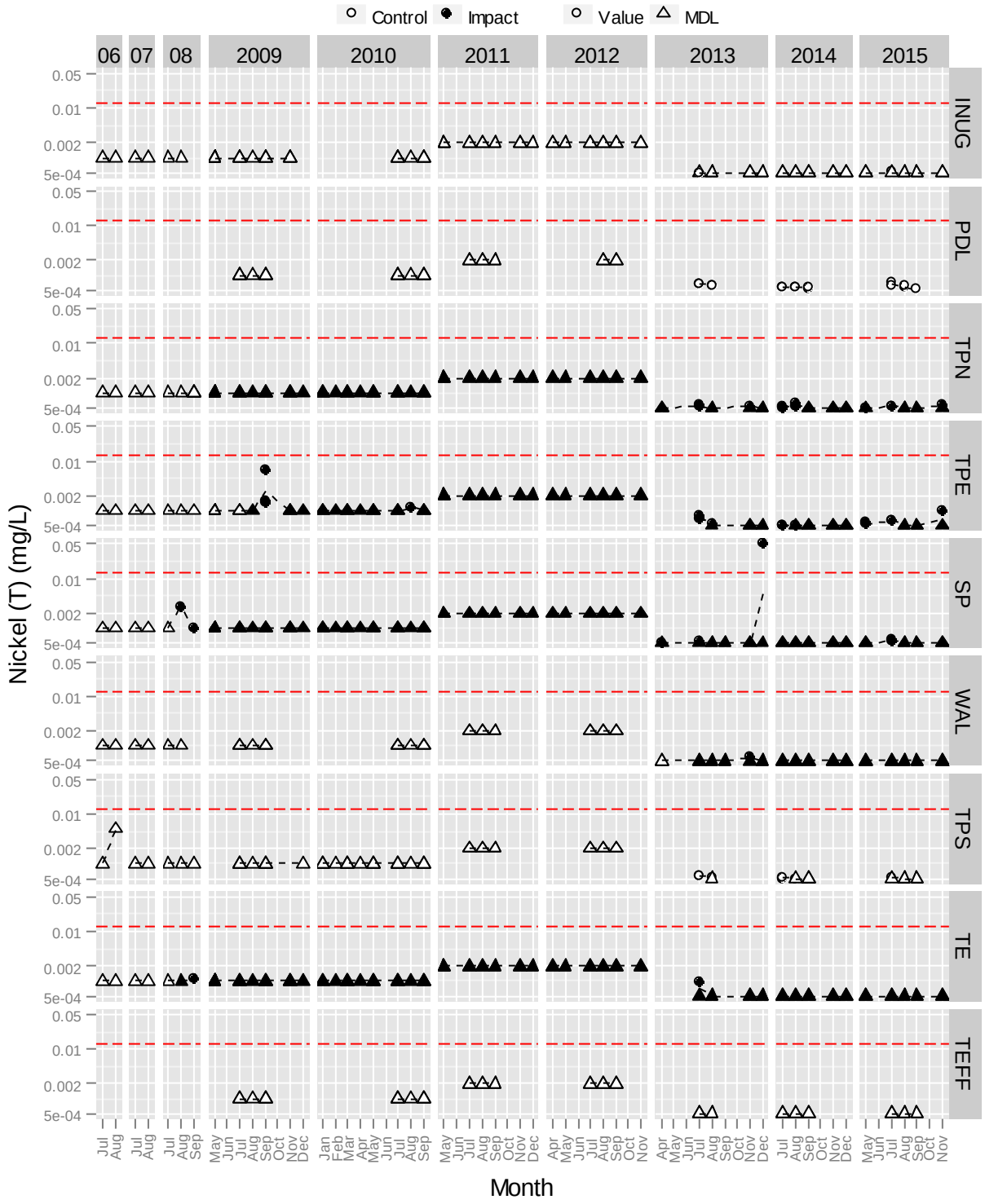


Figure A1–14. Total Selenium (mg/L) in water samples from Meadowbank study lakes since 2006.

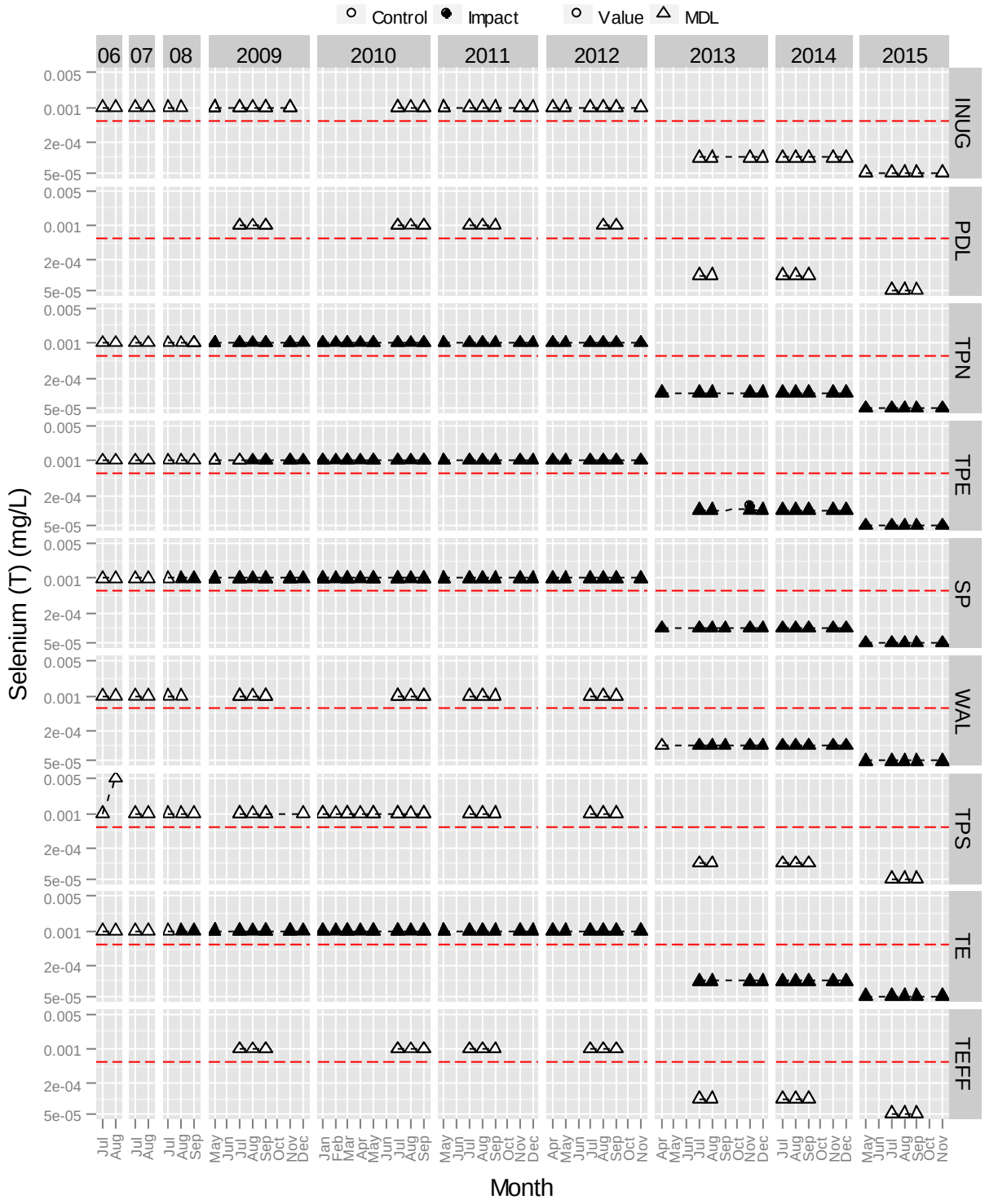


Figure A1–15. Total Thallium (mg/L) in water samples from Meadowbank study lakes since 2006.

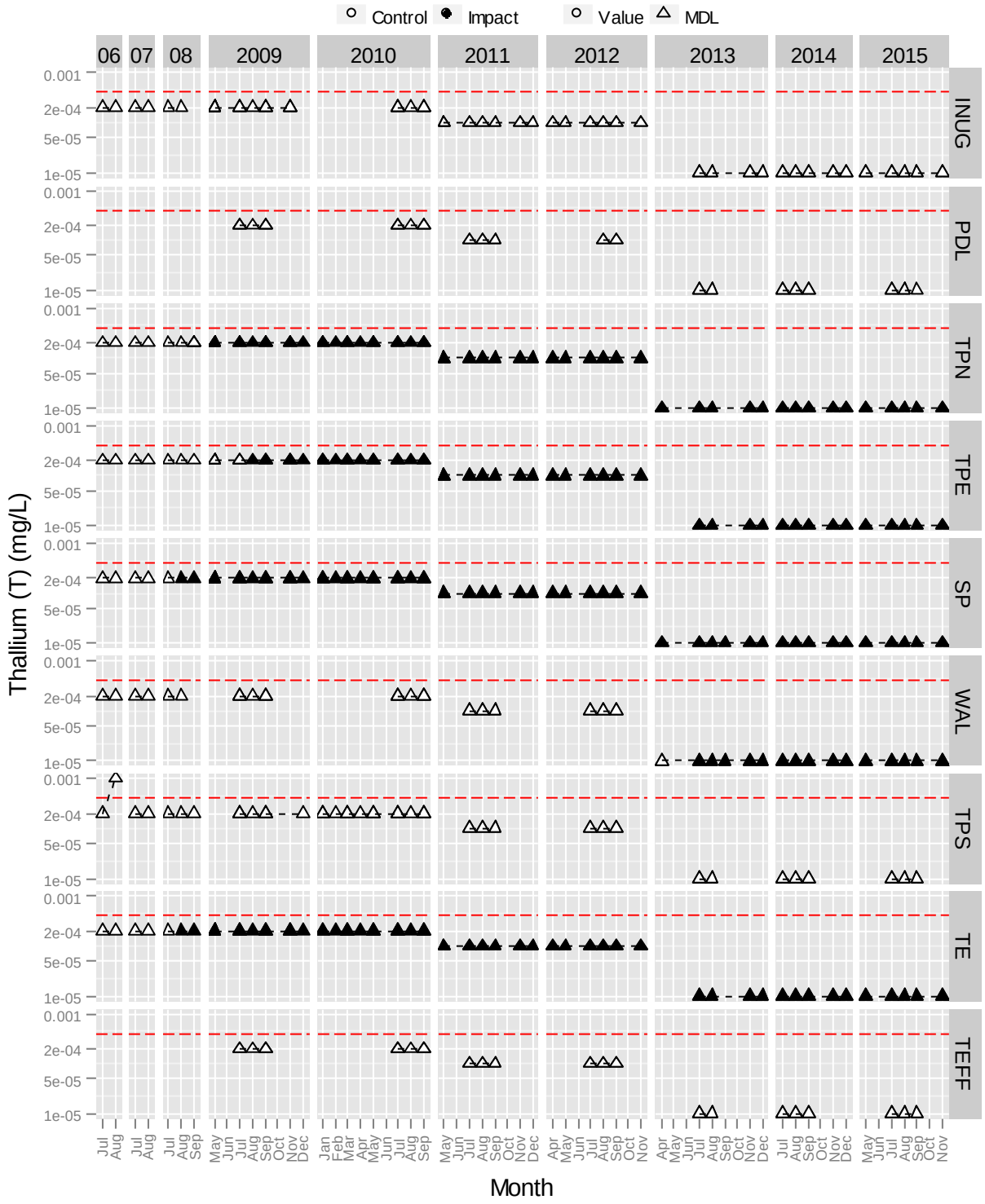


Figure A1–16. Total Tin (mg/L) in water samples from Meadowbank study lakes since 2006.

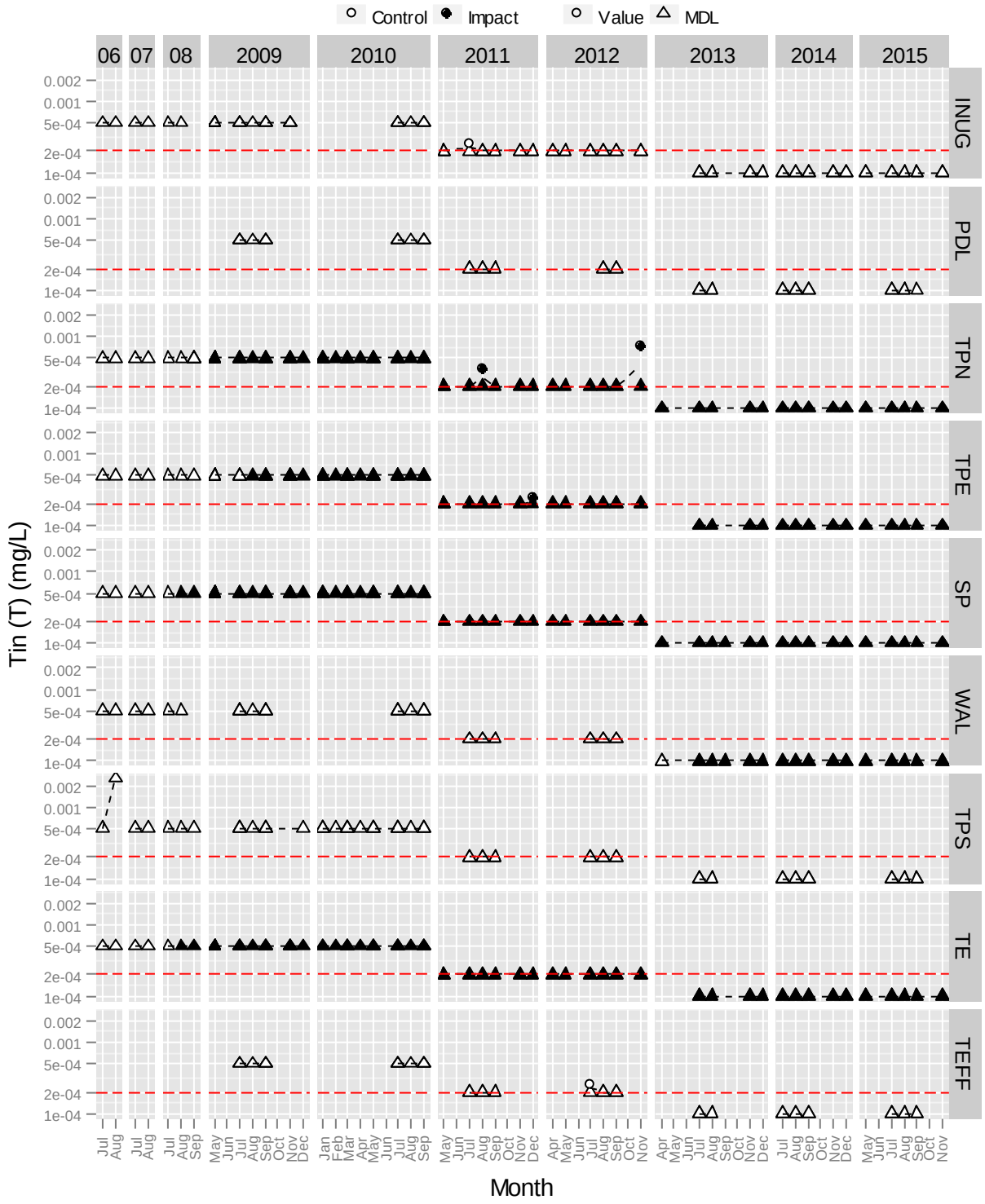


Figure A1–17. Total Titanium (mg/L) in water samples from Meadowbank study lakes since 2006.

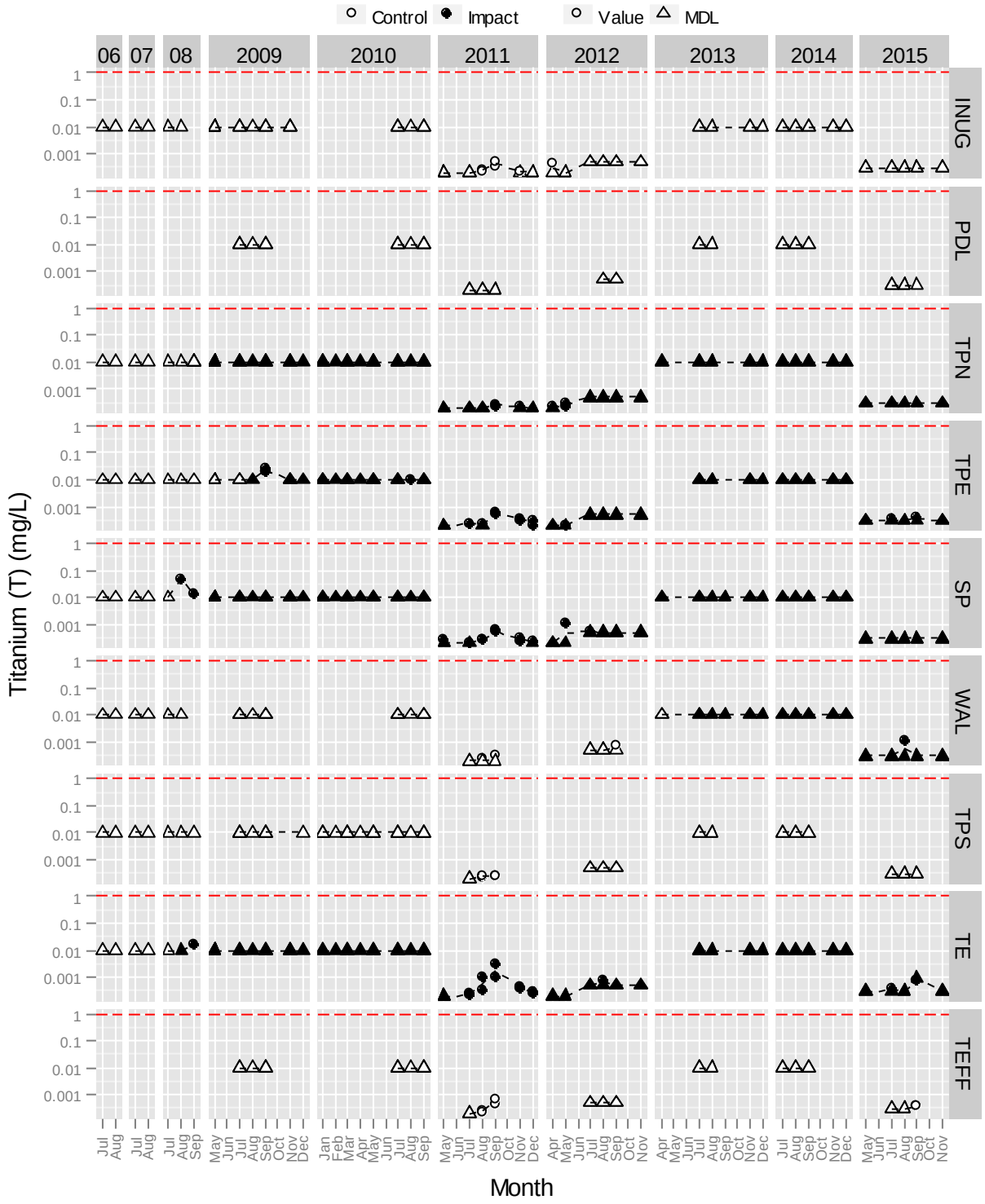


Figure A1–18. Total Vanadium (mg/L) in water samples from Meadowbank study lakes since 2006.

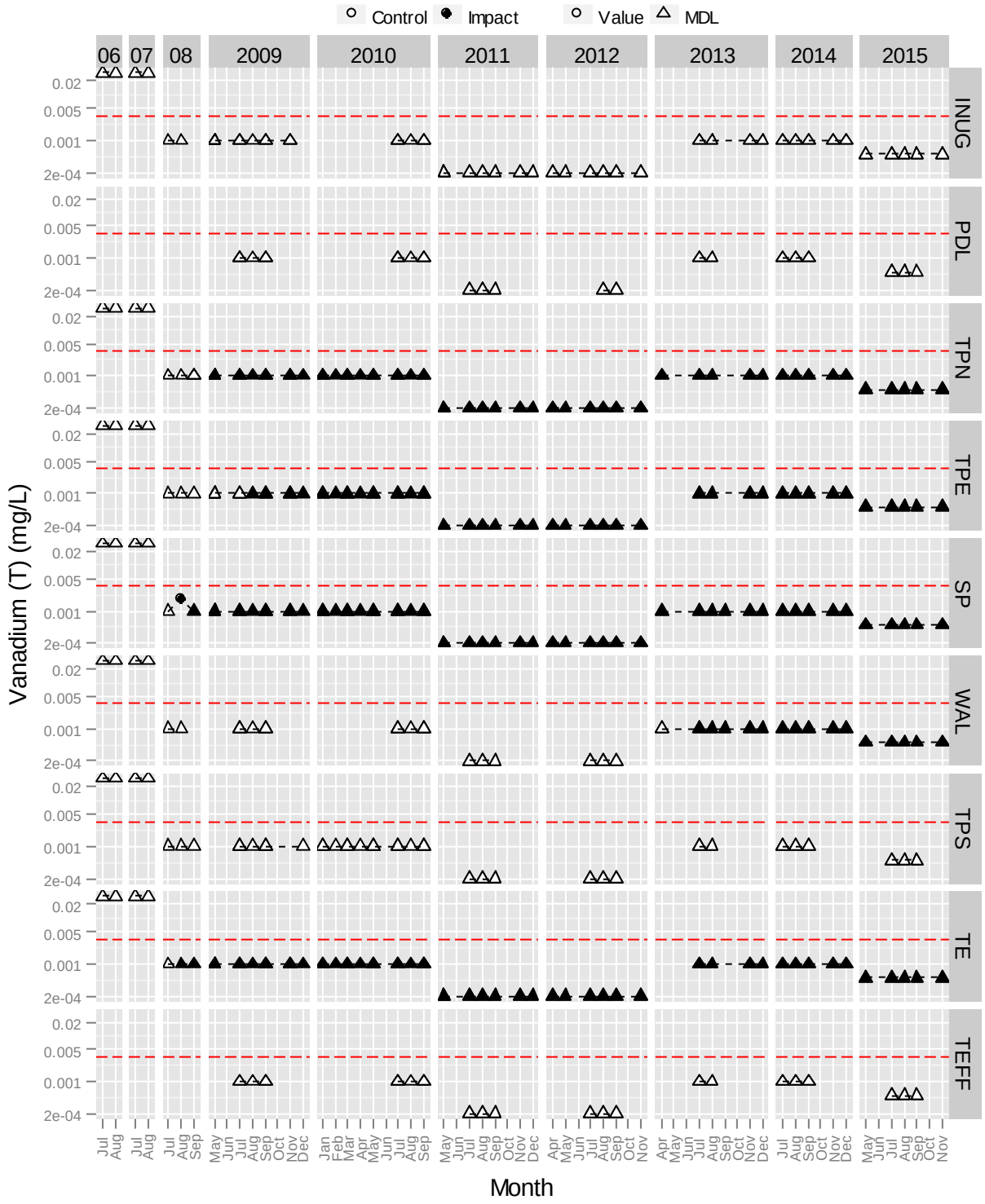


Figure A1–19. Total Zinc (mg/L) in water samples from Meadowbank study lakes since 2006.

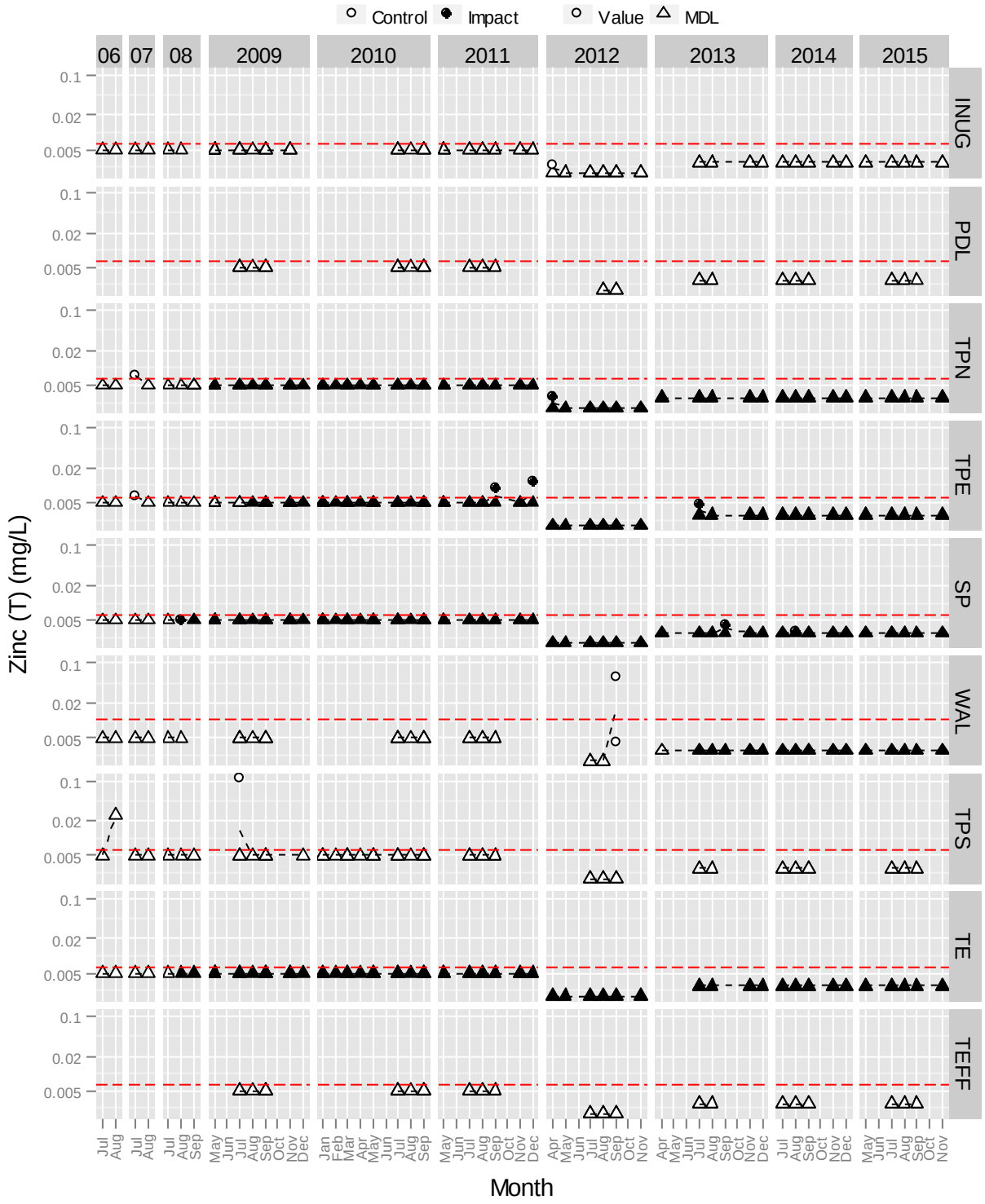


Figure A1–20. Dissolved Antimony (mg/L) in water samples from Meadowbank study lakes since 2006.

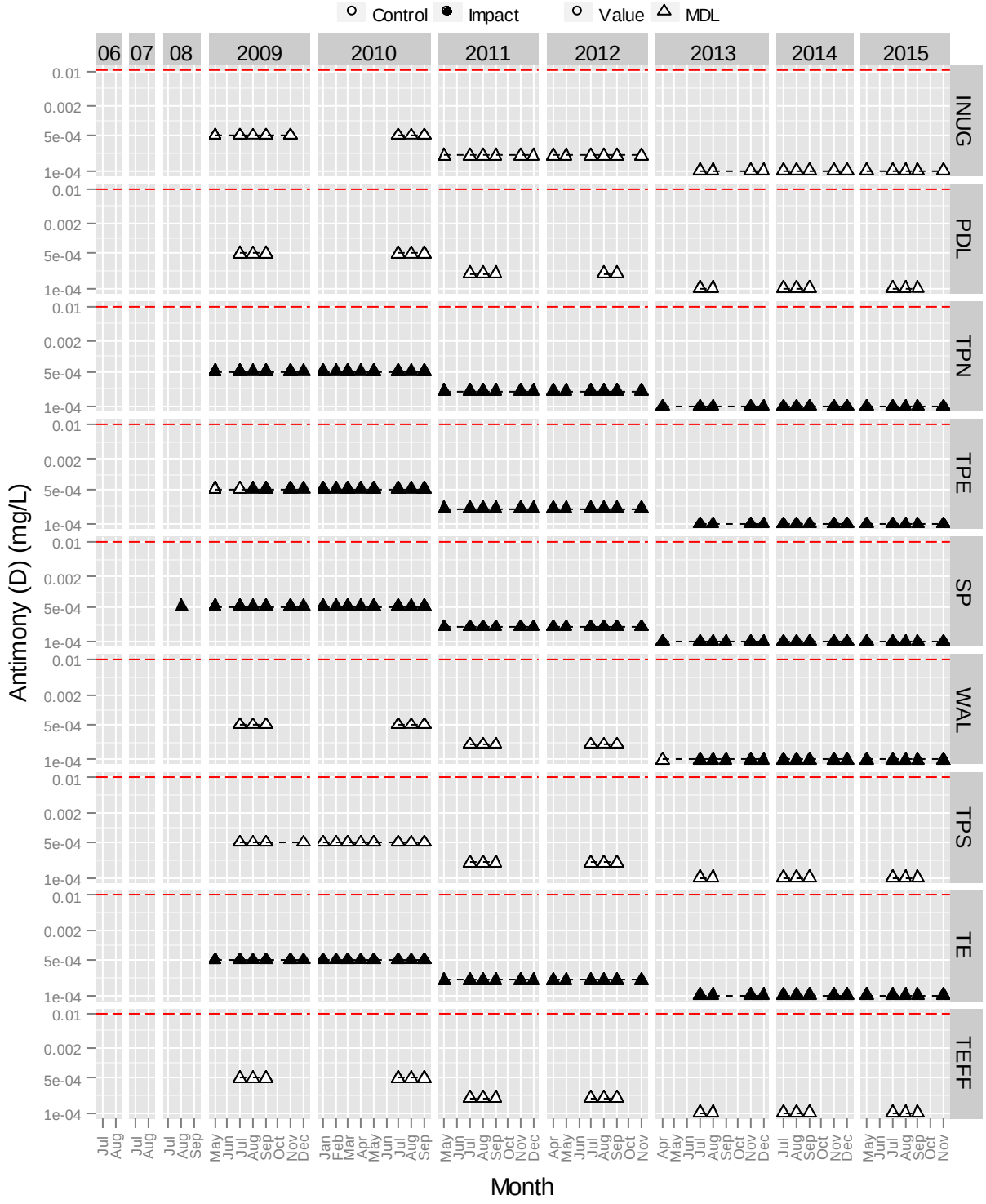


Figure A1–21. Dissolved Beryllium (mg/L) in water samples from Meadowbank study lakes since 2006.

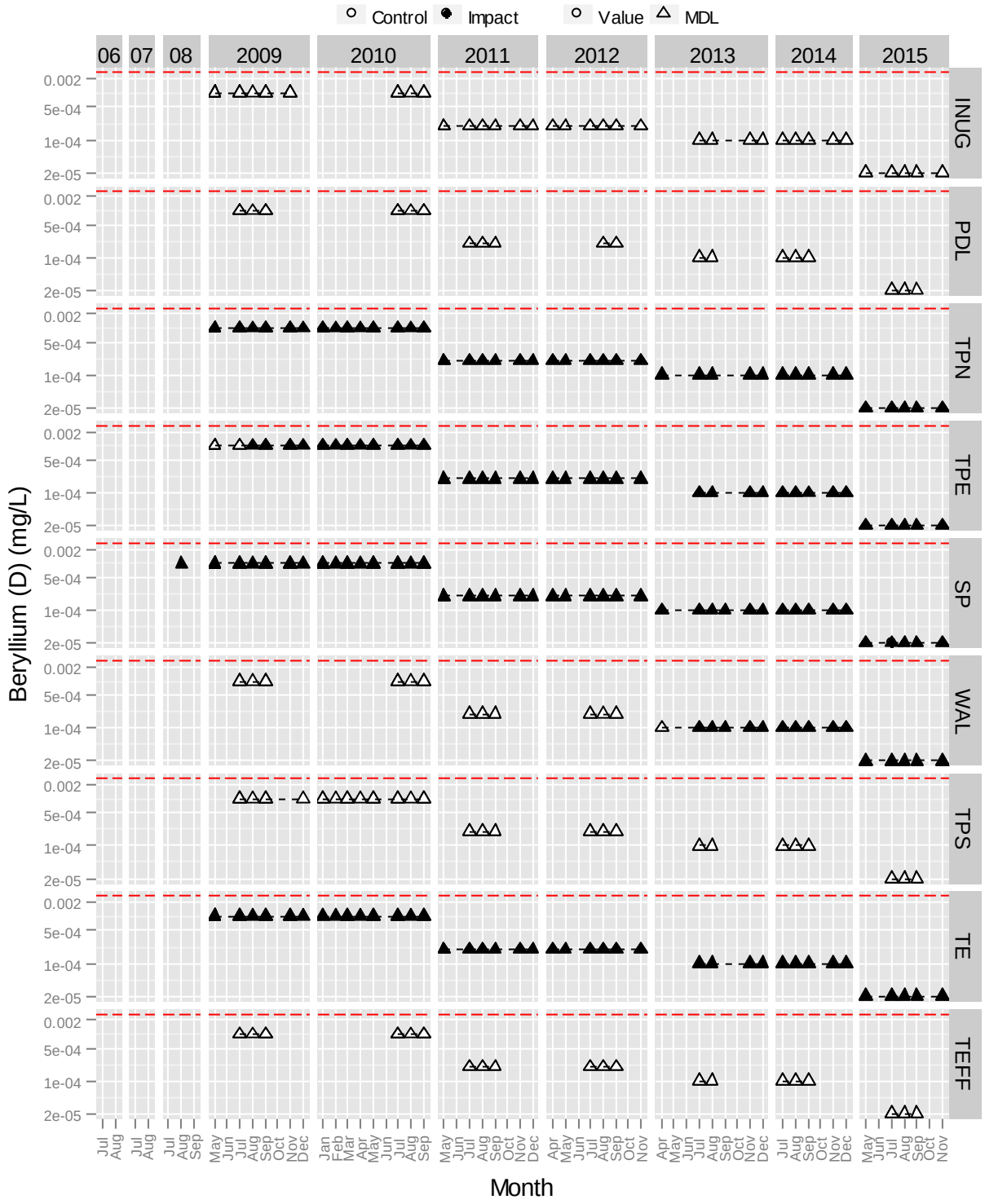


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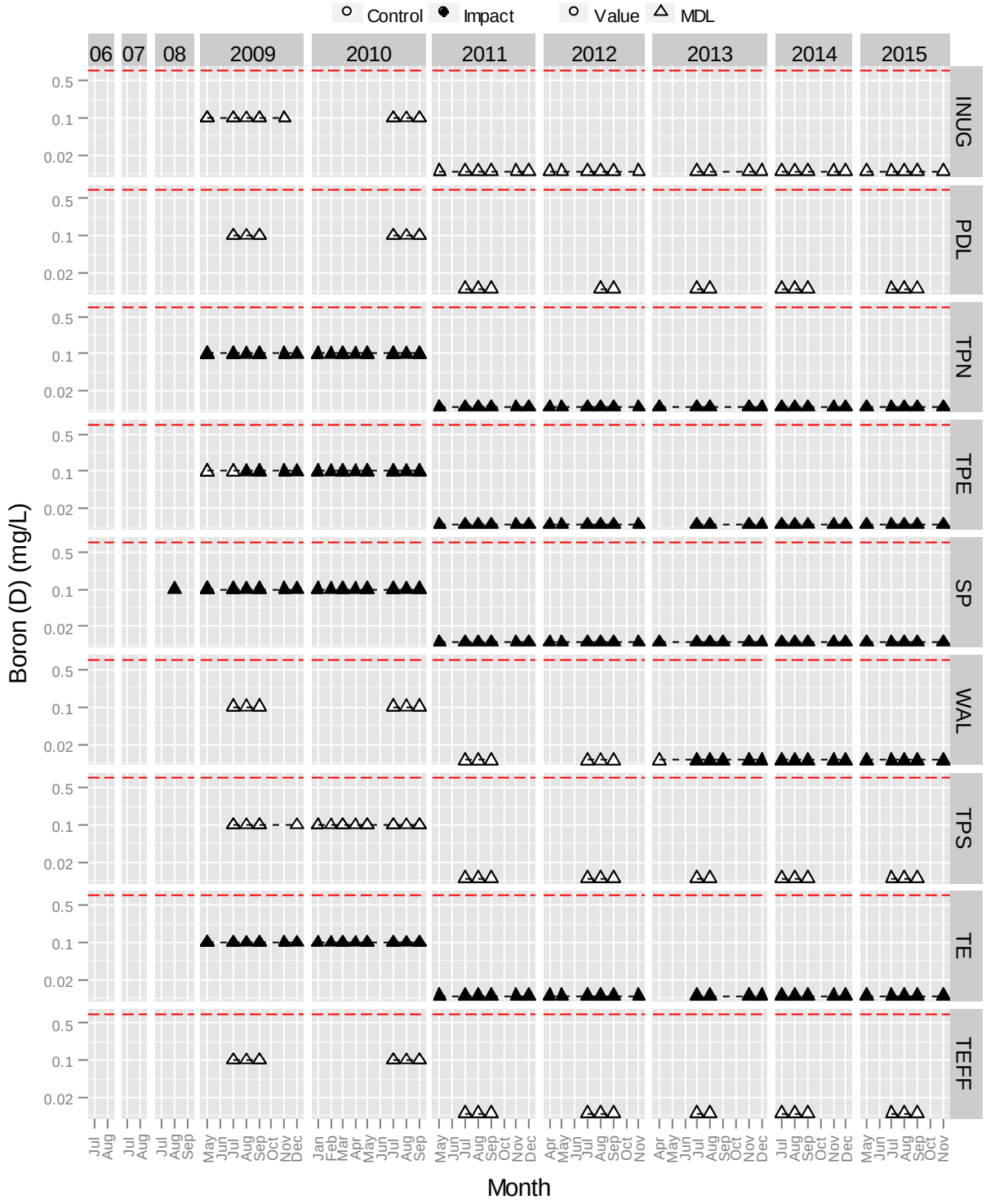


Figure A1–23. Dissolved Cadmium (mg/L) in water samples from Meadowbank study lakes since 2006.

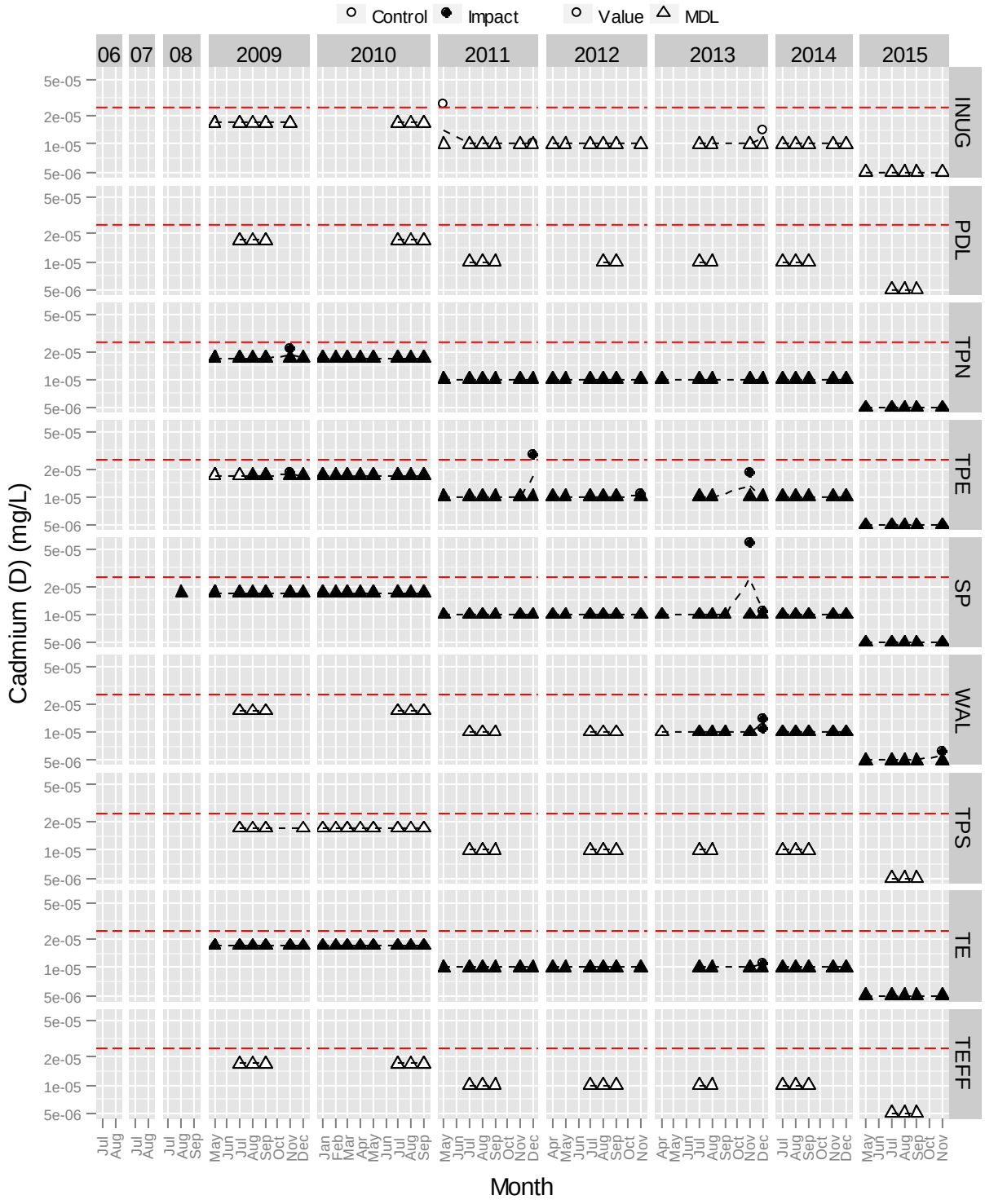


Figure A1–24. Dissolved Chromium (mg/L) in water samples from Meadowbank study lakes since 2006.

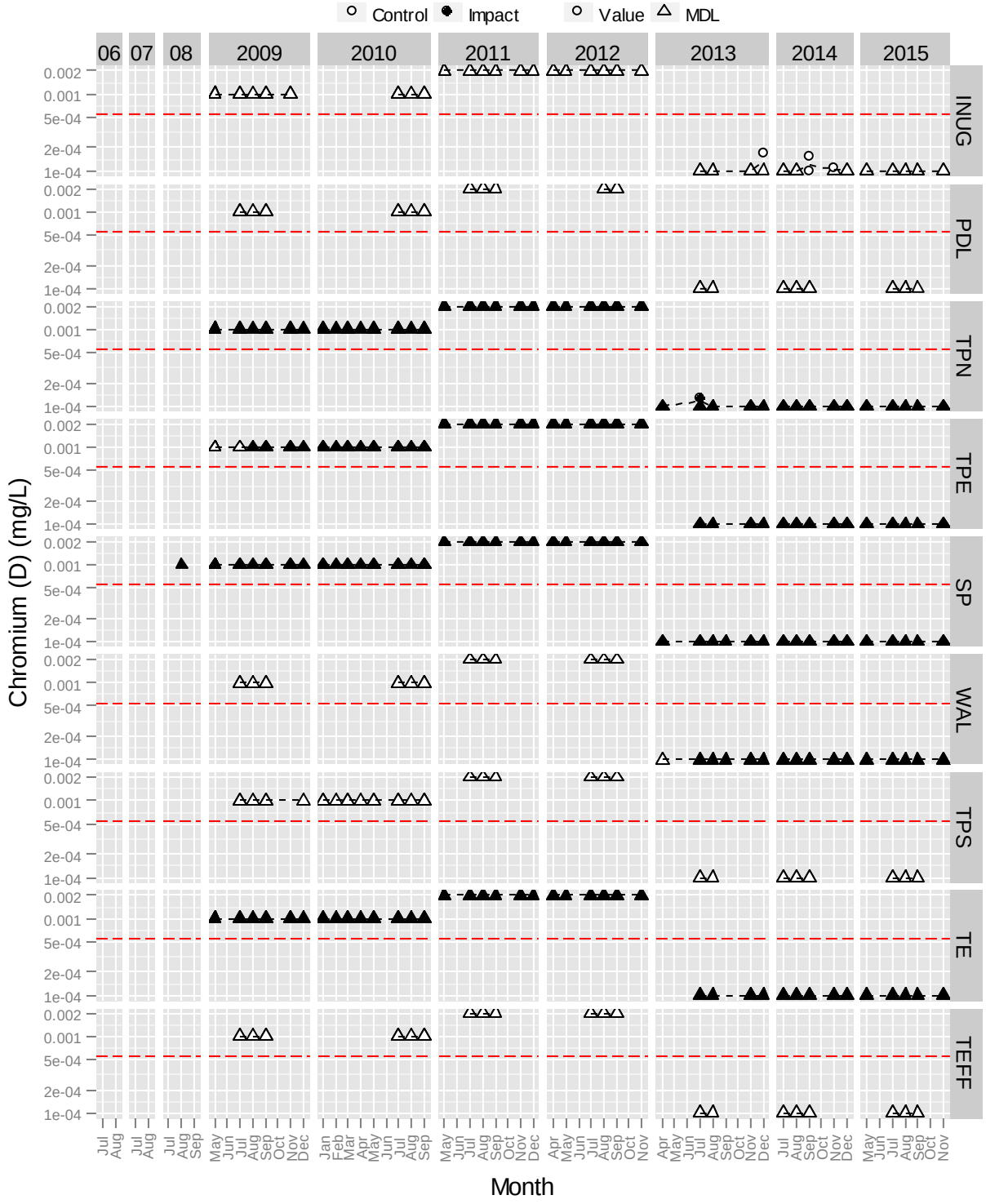


Figure A1–25. Dissolved Iron (mg/L) in water samples from Meadowbank study lakes since 2006.

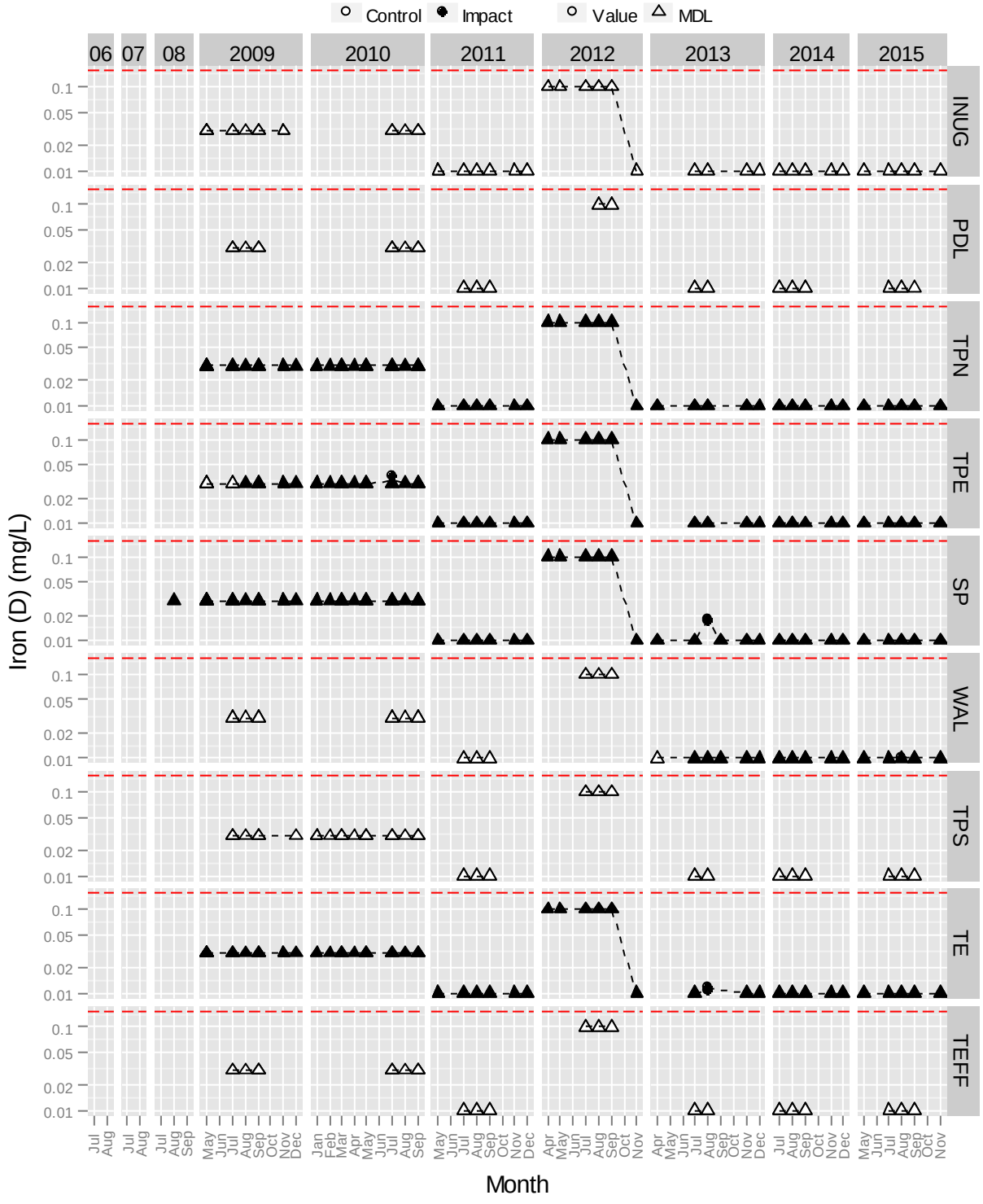


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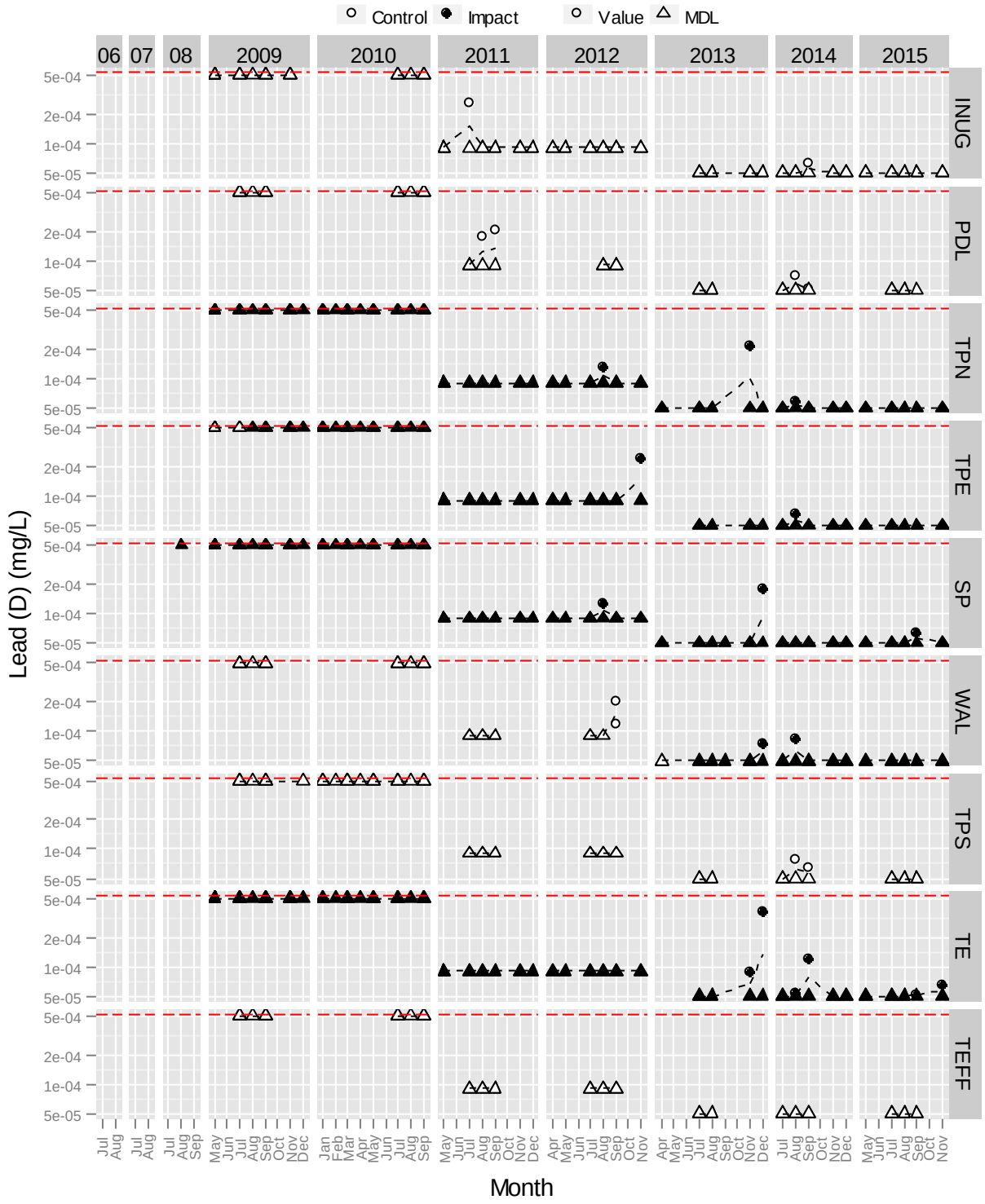


Figure A1–27. Dissolved Lithium (mg/L) in water samples from Meadowbank study lakes since 2006.

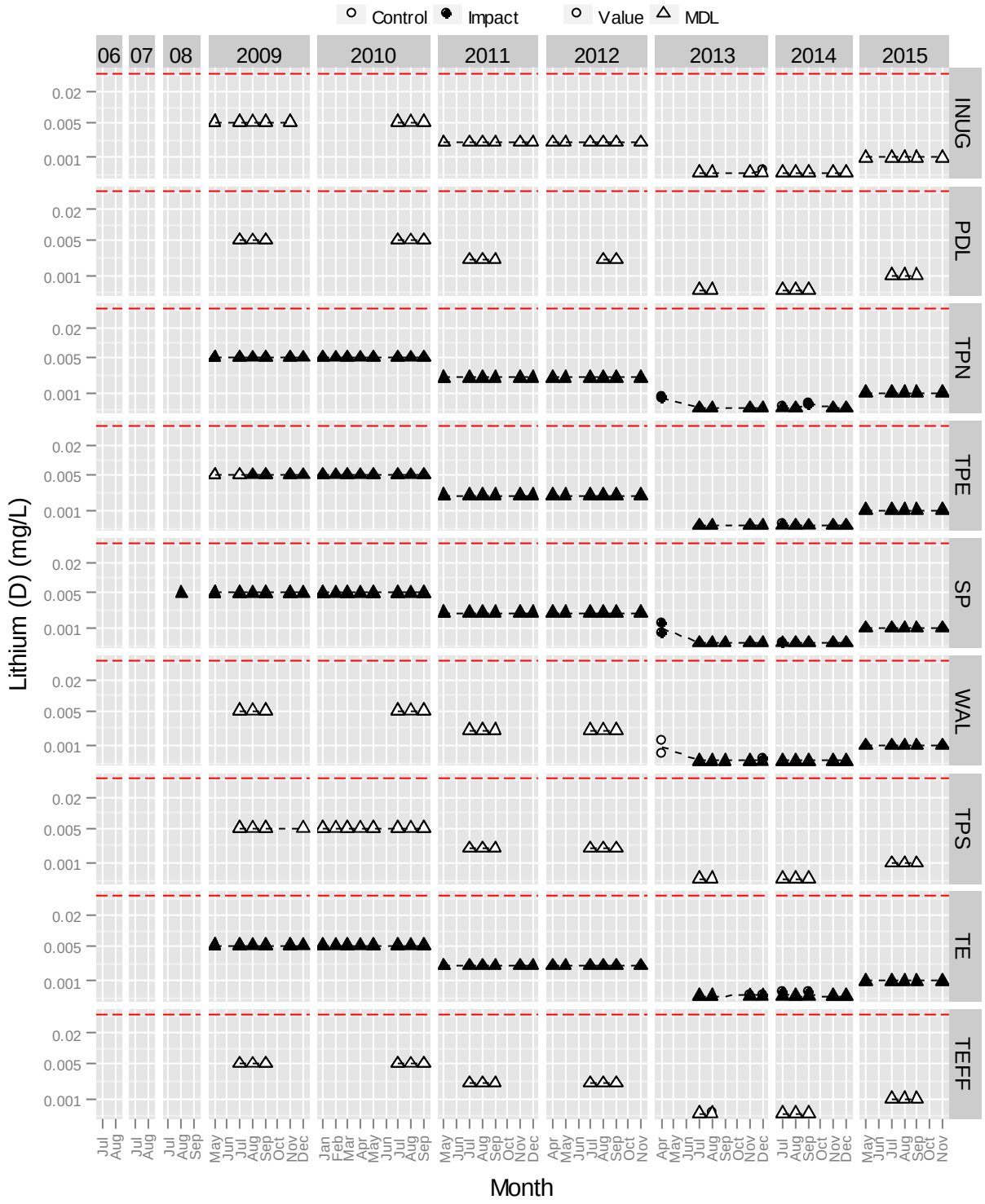


Figure A1–28. Dissolved Mercury (mg/L) in water samples from Meadowbank study lakes since 2006.

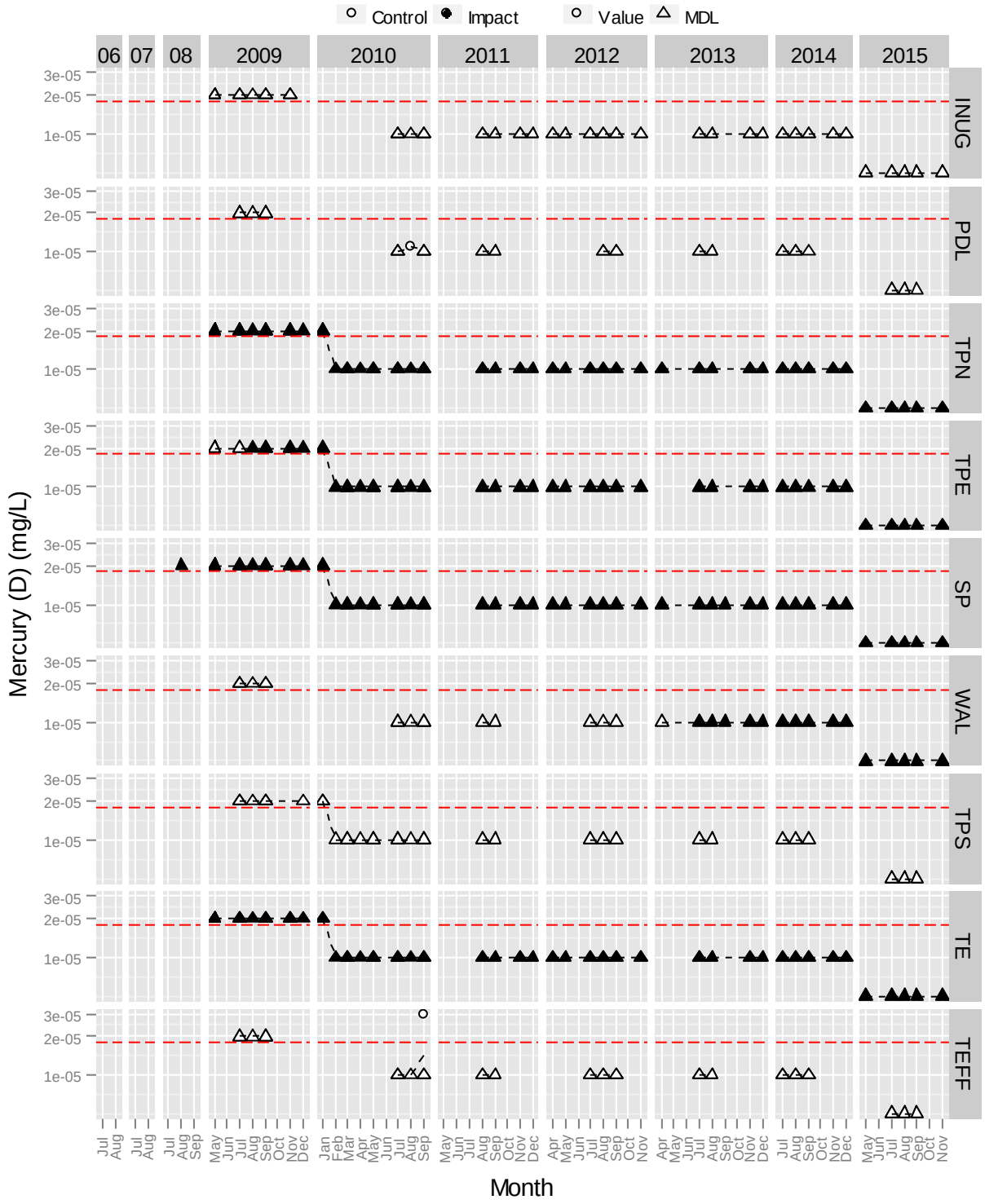


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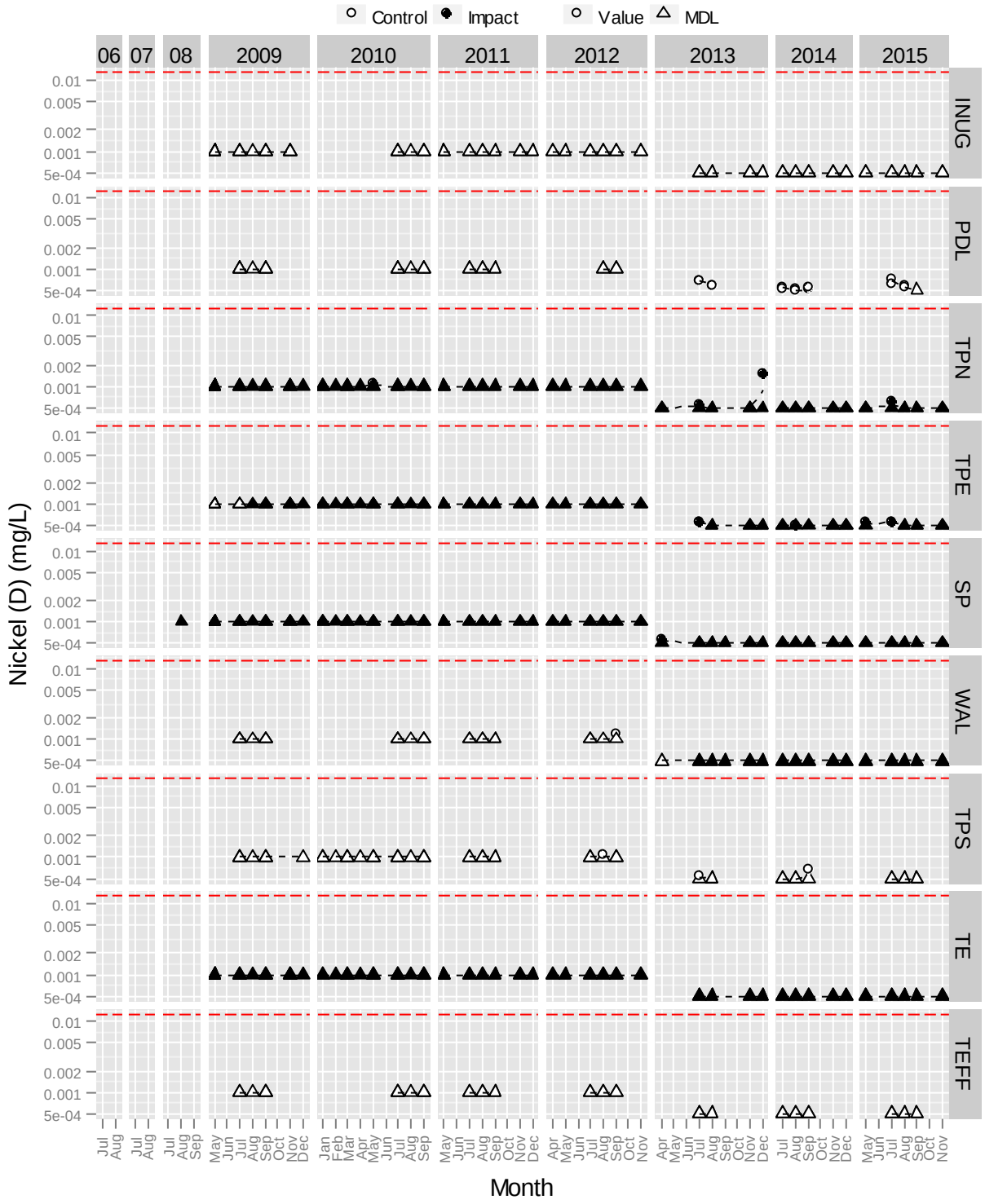


Figure A1–30. Dissolved Selenium (mg/L) in water samples from Meadowbank study lakes since 2006.

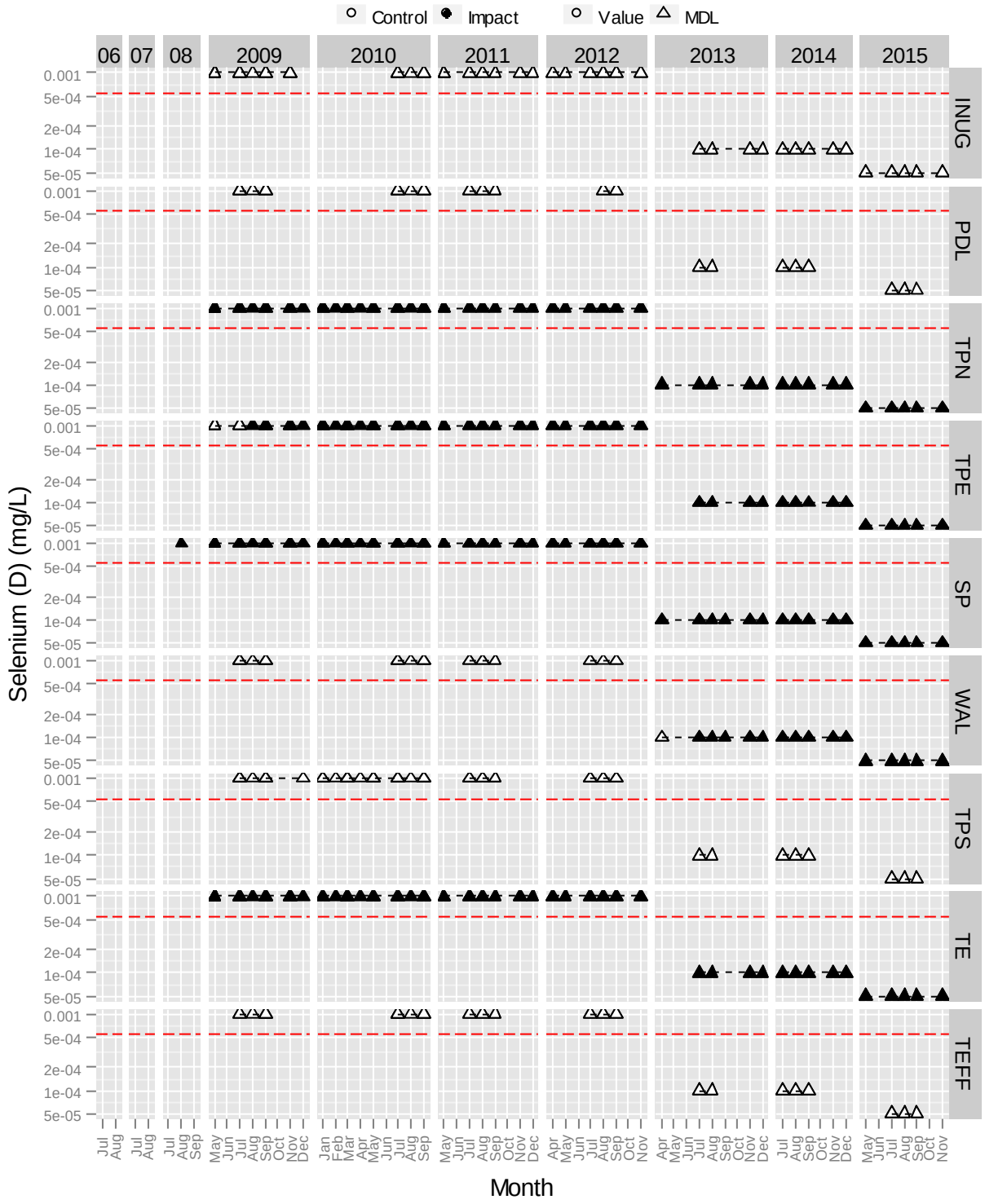


Figure A1–31. Dissolved Thallium (mg/L) in water samples from Meadowbank study lakes since 2006.

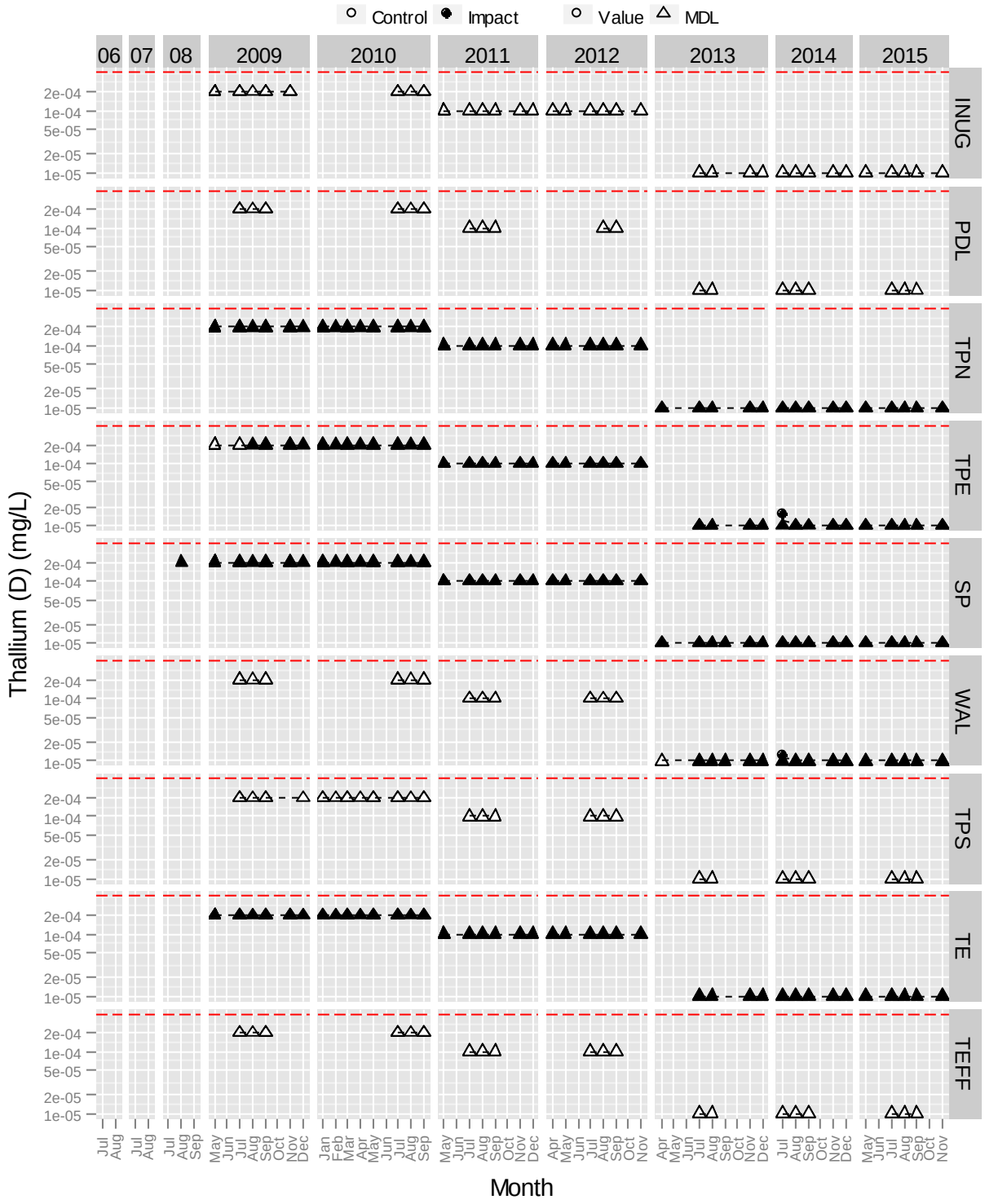


Figure A1–32. Dissolved Tin (mg/L) in water samples from Meadowbank study lakes since 2006.

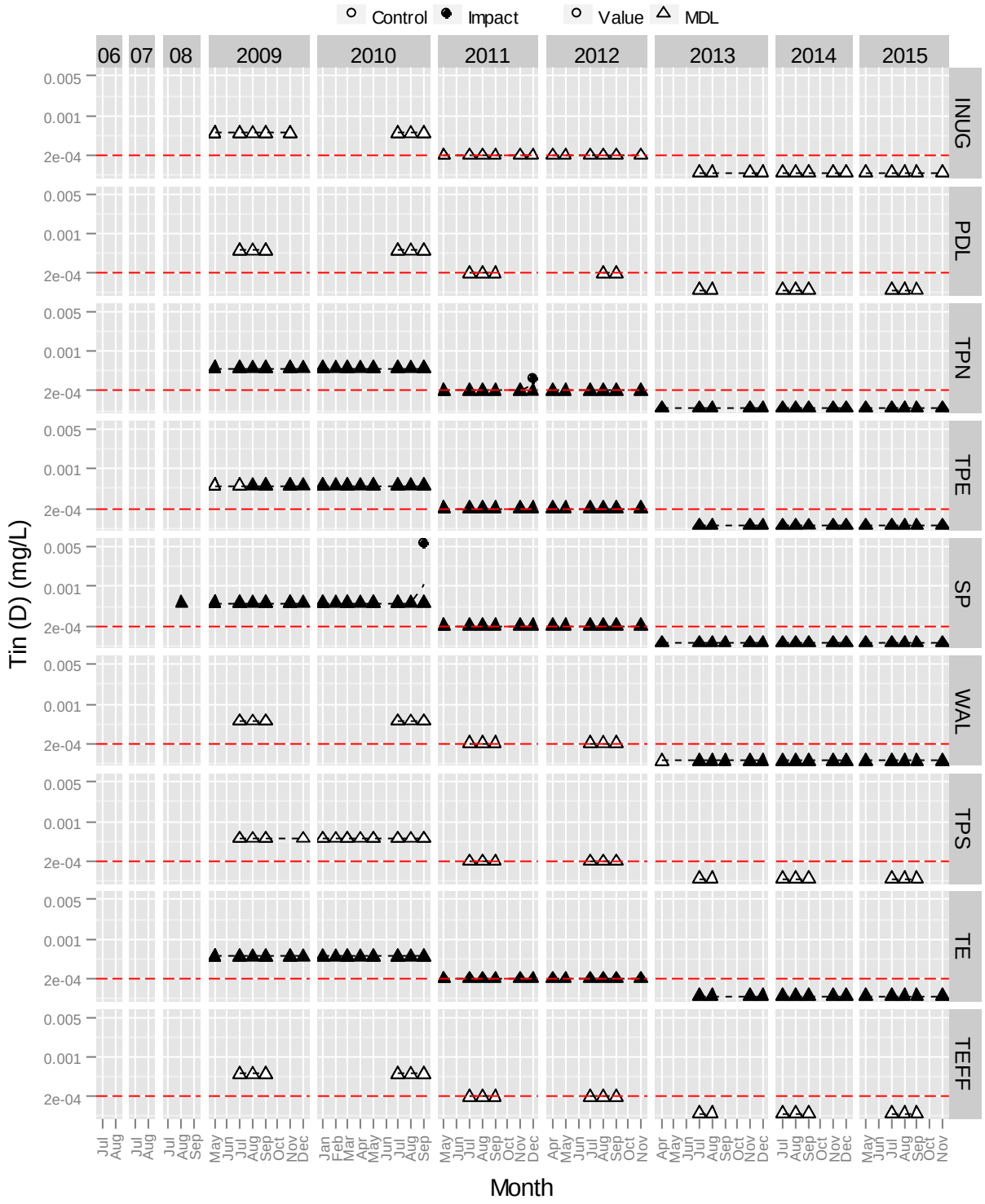


Figure A1–33. Dissolved Titanium (mg/L) in water samples from Meadowbank study lakes since 2006.

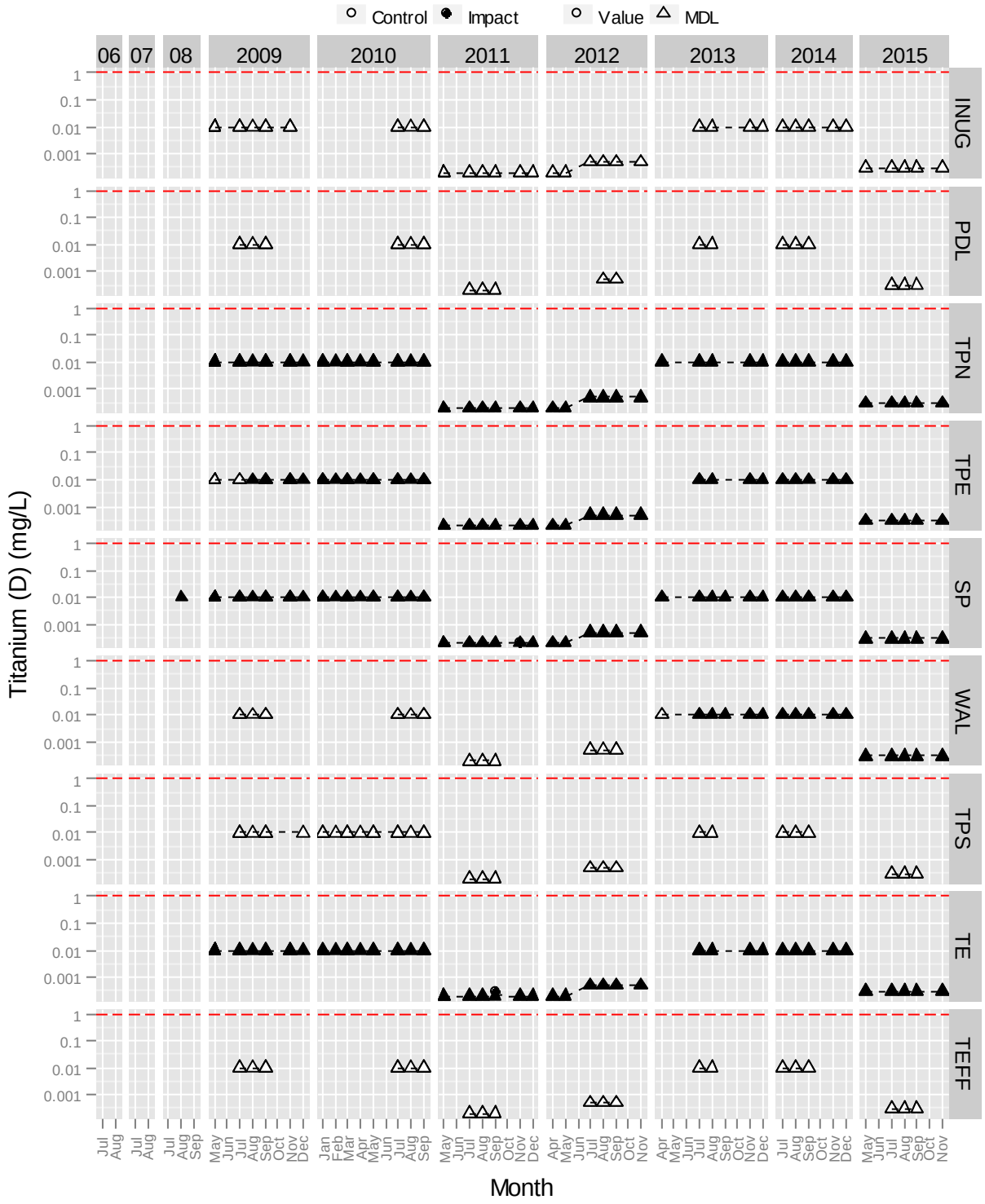


Figure A1–34. Dissolved Vanadium (mg/L) in water samples from Meadowbank study lakes since 2006.

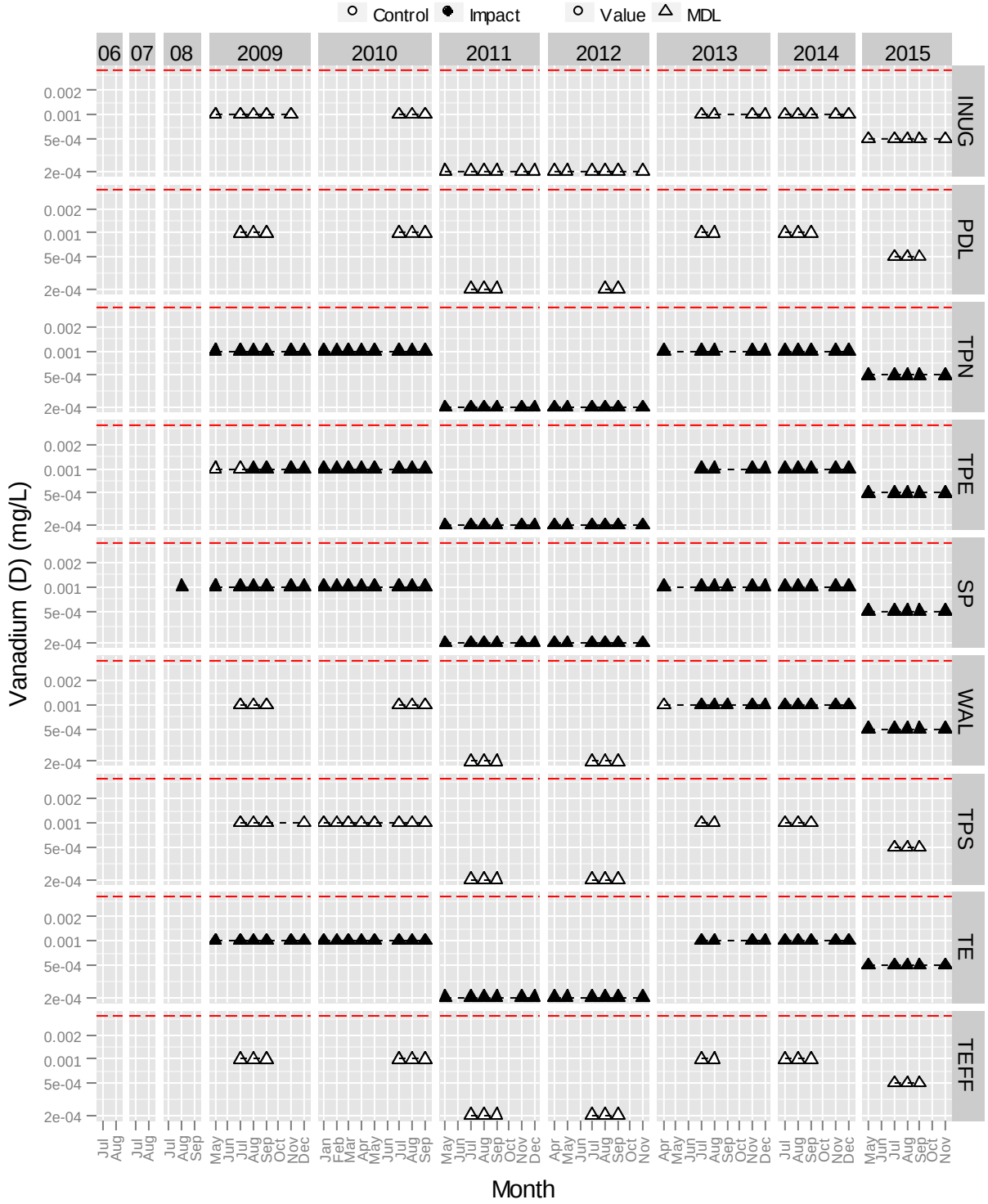
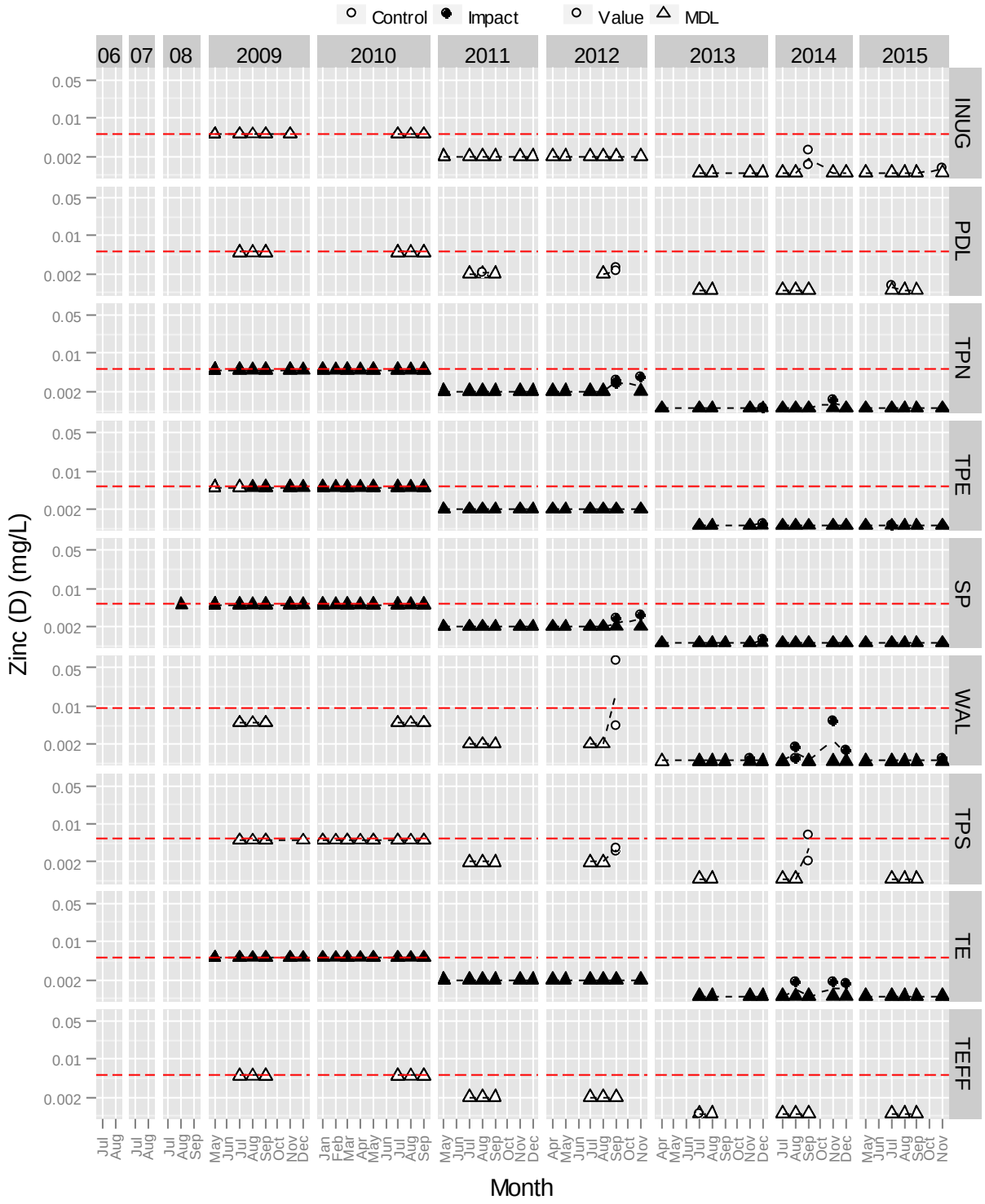


Figure A1–35. Dissolved Zinc (mg/L) in water samples from Meadowbank study lakes since 2006.



APPENDIX A2

Baker Lake Water Quality Plots 2008 – 2015

LIST OF FIGURES – APPENDIX A2

Figure A2–1. Carbonate Alkalinity (mg/L) in water samples from Baker Lake since 2008. 3
Figure A2–2. Nitrite-N (mg/L) in water samples from Baker Lake since 2008. 4
Figure A2–3. Total Cyanide (mg/L) in water samples from Baker Lake since 2014. 5
Figure A2–4. Free Cyanide (mg/L) in water samples from Baker Lake since 2014. 6
Figure A2–5. Total Antimony (mg/L) in water samples from Baker Lake since 2008. 7
Figure A2–6. Total Beryllium (mg/L) in water samples from Baker Lake since 2008. 8
Figure A2–7. Total Cadmium (mg/L) in water samples from Baker Lake since 2008. 9
Figure A2–8. Total Mercury (mg/L) in water samples from Baker Lake since 2008. 10
Figure A2–9. Total Nickel (mg/L) in water samples from Baker Lake since 2008. 11
Figure A2–10. Total Selenium (mg/L) in water samples from Baker Lake since 2008. 12
Figure A2–11. Total Thallium (mg/L) in water samples from Baker Lake since 2008. 13
Figure A2–12. Total Tin (mg/L) in water samples from Baker Lake since 2008. 14
Figure A2–13. Total Vanadium (mg/L) in water samples from Baker Lake since 2008. 15
Figure A2–14. Total Zinc (mg/L) in water samples from Baker Lake since 2008. 16
Figure A2–15. Dissolved Antimony (mg/L) in water samples from Baker Lake since 2008. 17
Figure A2–16. Dissolved Beryllium (mg/L) in water samples from Baker Lake since 2008. 18
Figure A2–17. Dissolved Cadmium (mg/L) in water samples from Baker Lake since 2008. 19
Figure A2–18. Dissolved Chromium (mg/L) in water samples from Baker Lake since 2008. 20
Figure A2–19. Dissolved Iron (mg/L) in water samples from Baker Lake since 2008. 21
Figure A2–20. Dissolved Lead (mg/L) in water samples from Baker Lake since 2008. 22
Figure A2–21. Dissolved Mercury (mg/L) in water samples from Baker Lake since 2008. 23
Figure A2–22. Dissolved Nickel (mg/L) in water samples from Baker Lake since 2008. 24
Figure A2–23. Dissolved Selenium (mg/L) in water samples from Baker Lake since 2008. 25
Figure A2–24. Dissolved Thallium (mg/L) in water samples from Baker Lake since 2008. 26
Figure A2–25. Dissolved Tin (mg/L) in water samples from Baker Lake since 2008. 27
Figure A2–26. Dissolved Titanium (mg/L) in water samples from Baker Lake since 2008. 28
Figure A2–27. Dissolved Vanadium (mg/L) in water samples from Baker Lake since 2008. 29
Figure A2–28. Dissolved Zinc (mg/L) in water samples from Baker Lake since 2008. 30

Figure A2–1. Carbonate Alkalinity (mg/L) in water samples from Baker Lake since 2008.

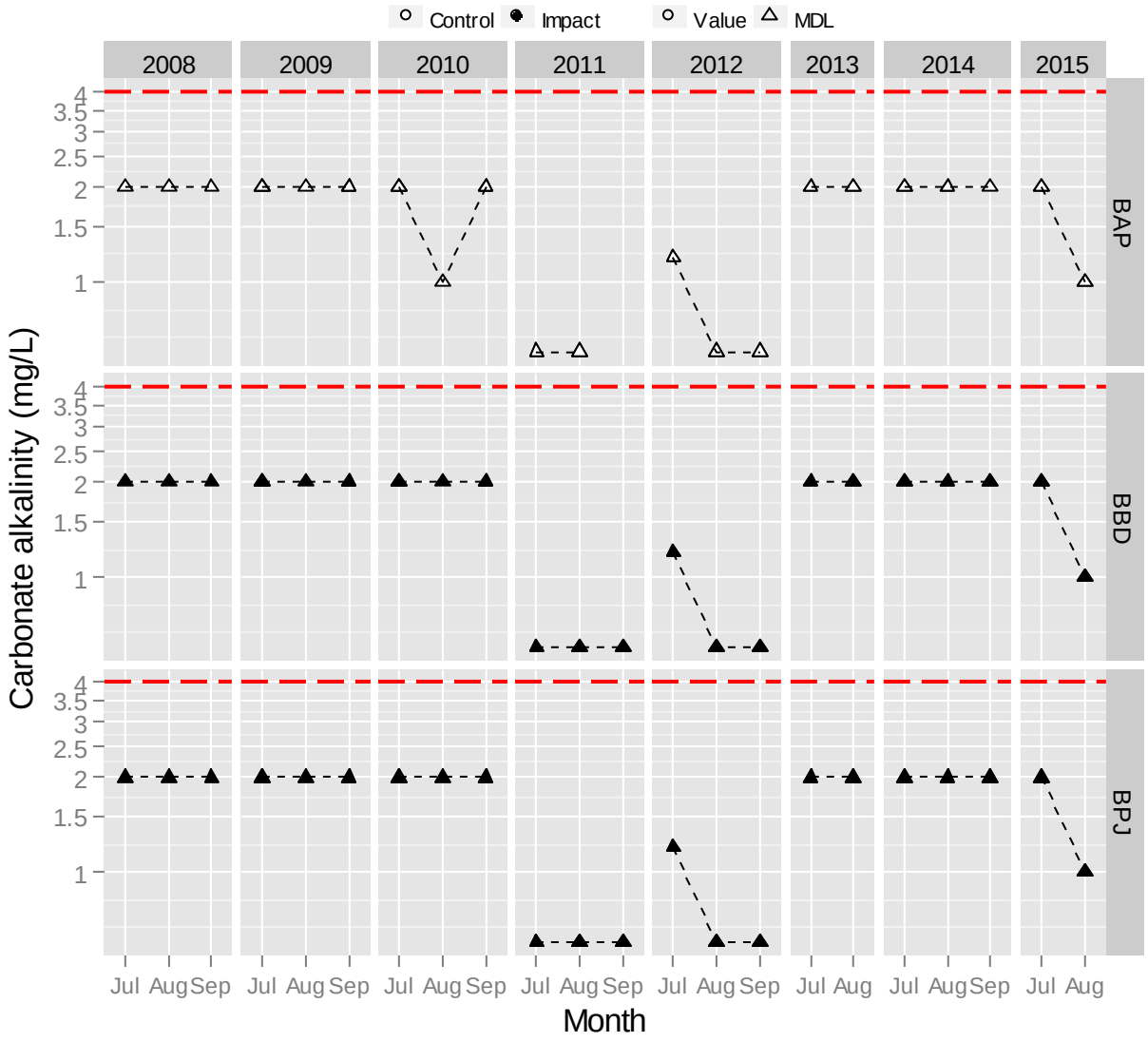


Figure A2–2. Nitrite-N (mg/L) in water samples from Baker Lake since 2008.

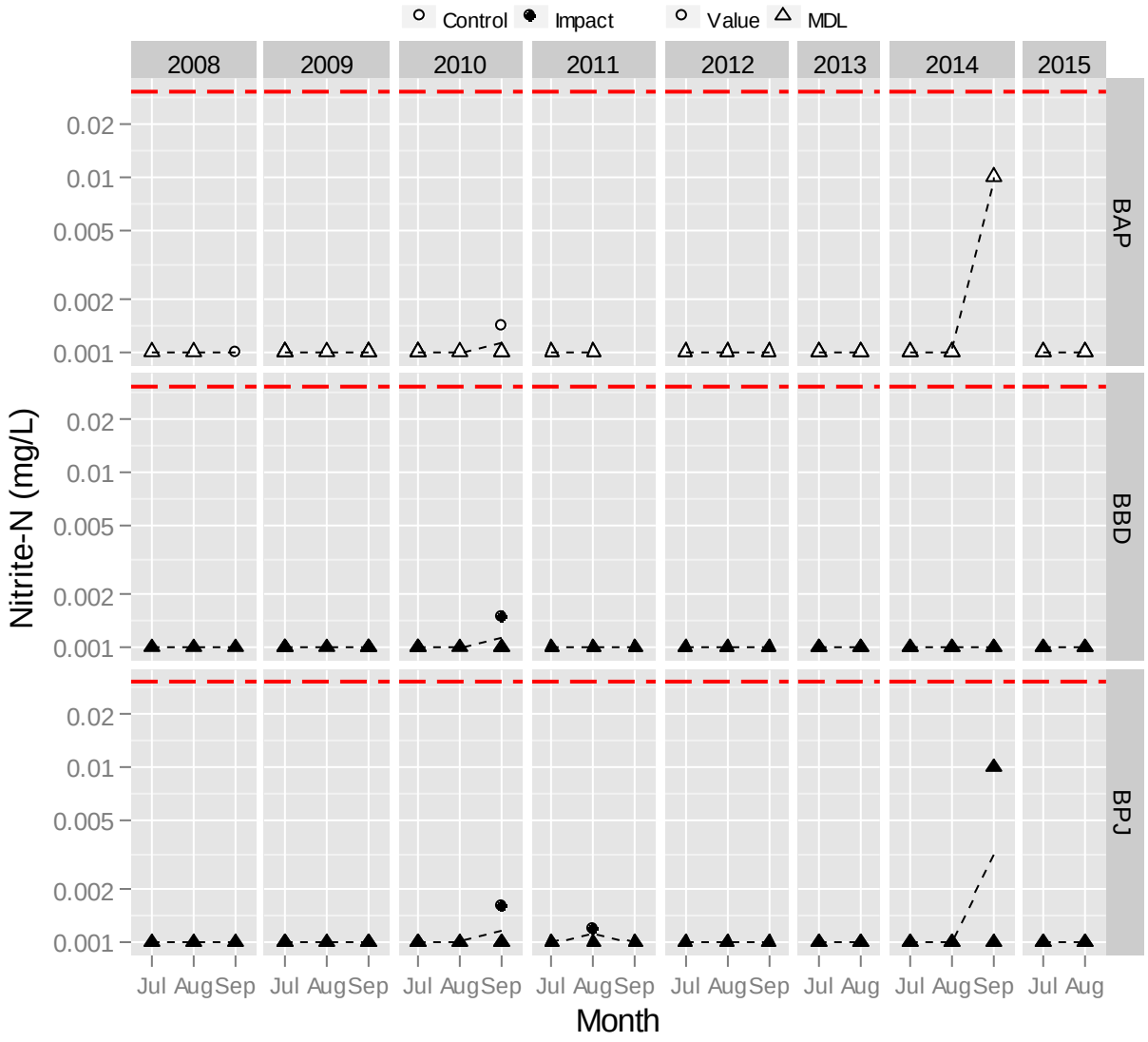


Figure A2–3. Total Cyanide (mg/L) in water samples from Baker Lake since 2014.

Note: No trigger for total cyanide. Detection limit lowered from 0.005 mg/L in 2014 to 0.001 mg/L in 2015.

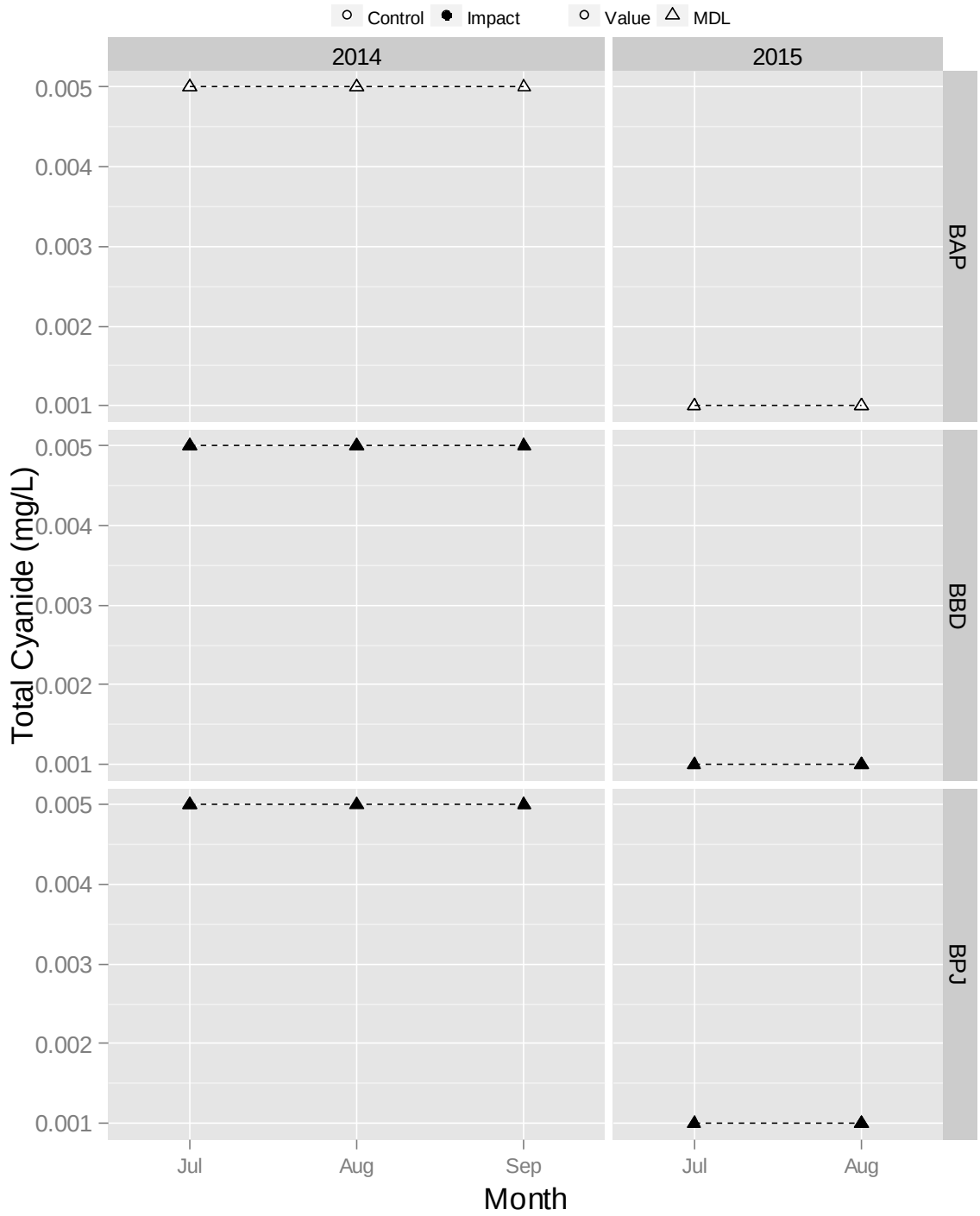


Figure A2–4. Free Cyanide (mg/L) in water samples from Baker Lake since 2014.

Note: No trigger for total cyanide. Detection limit lowered from 0.005 mg/L in 2014 to 0.001 mg/L in 2015.

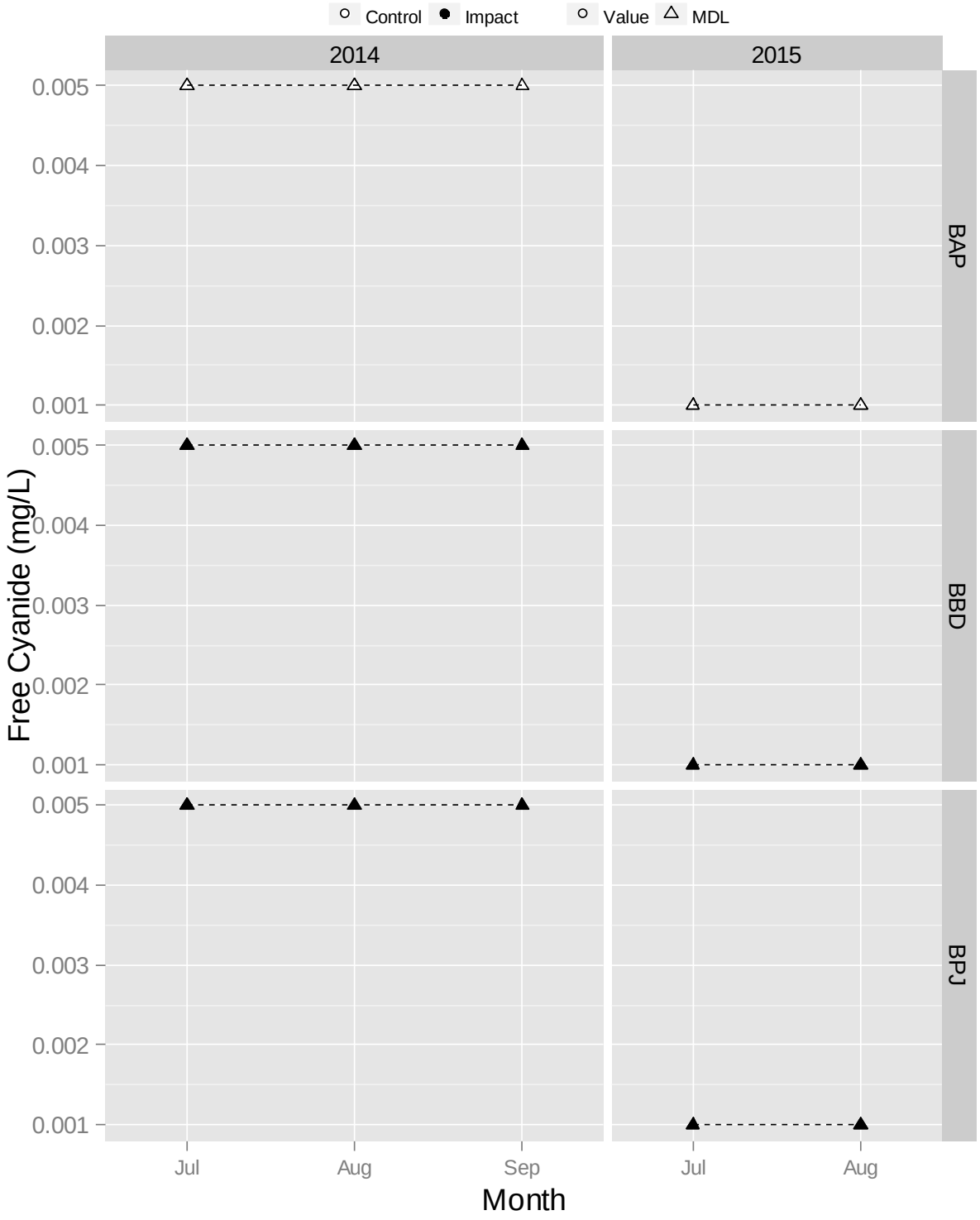


Figure A2–5. Total Antimony (mg/L) in water samples from Baker Lake since 2008.

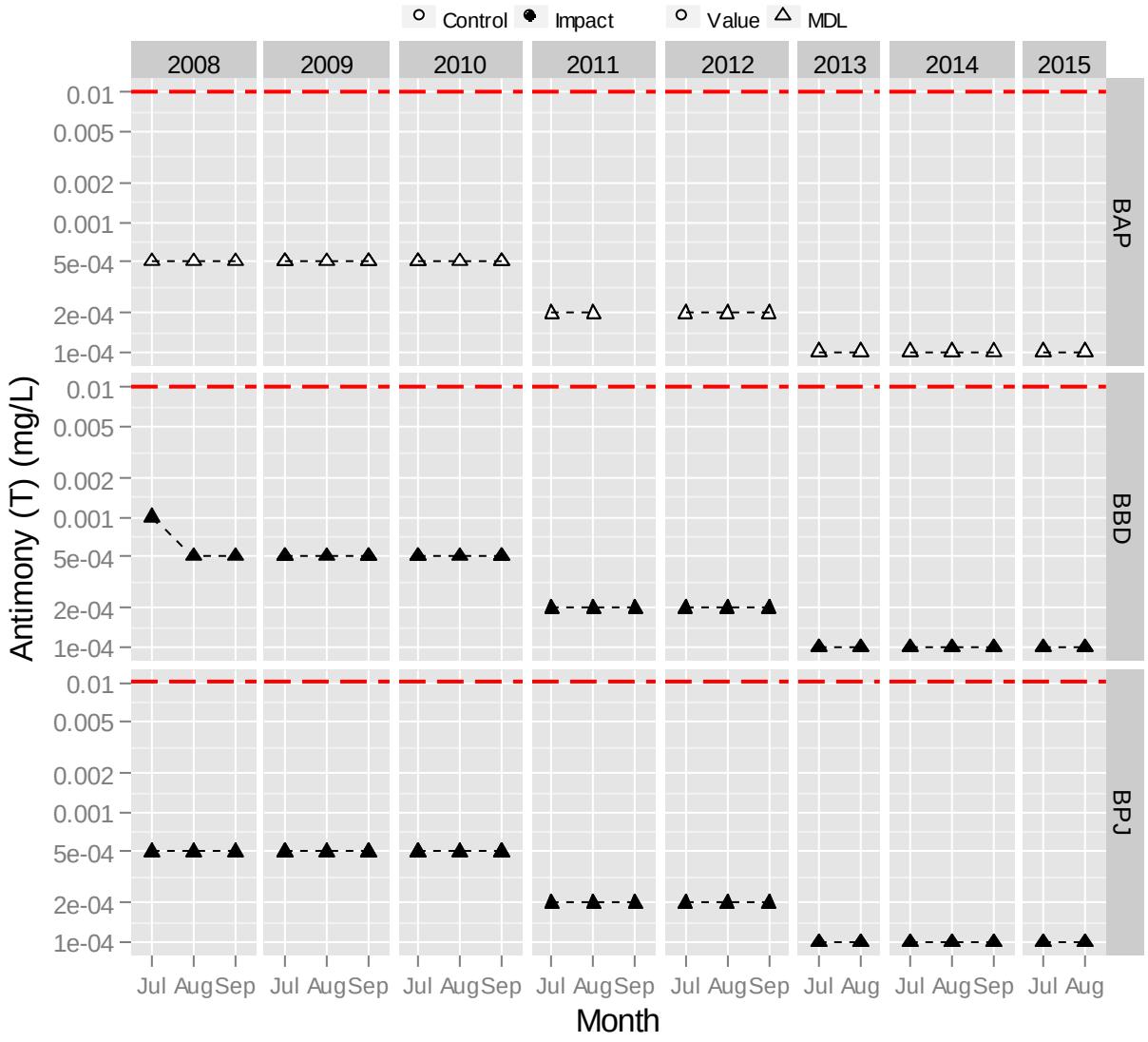


Figure A2–6. Total Beryllium (mg/L) in water samples from Baker Lake since 2008.

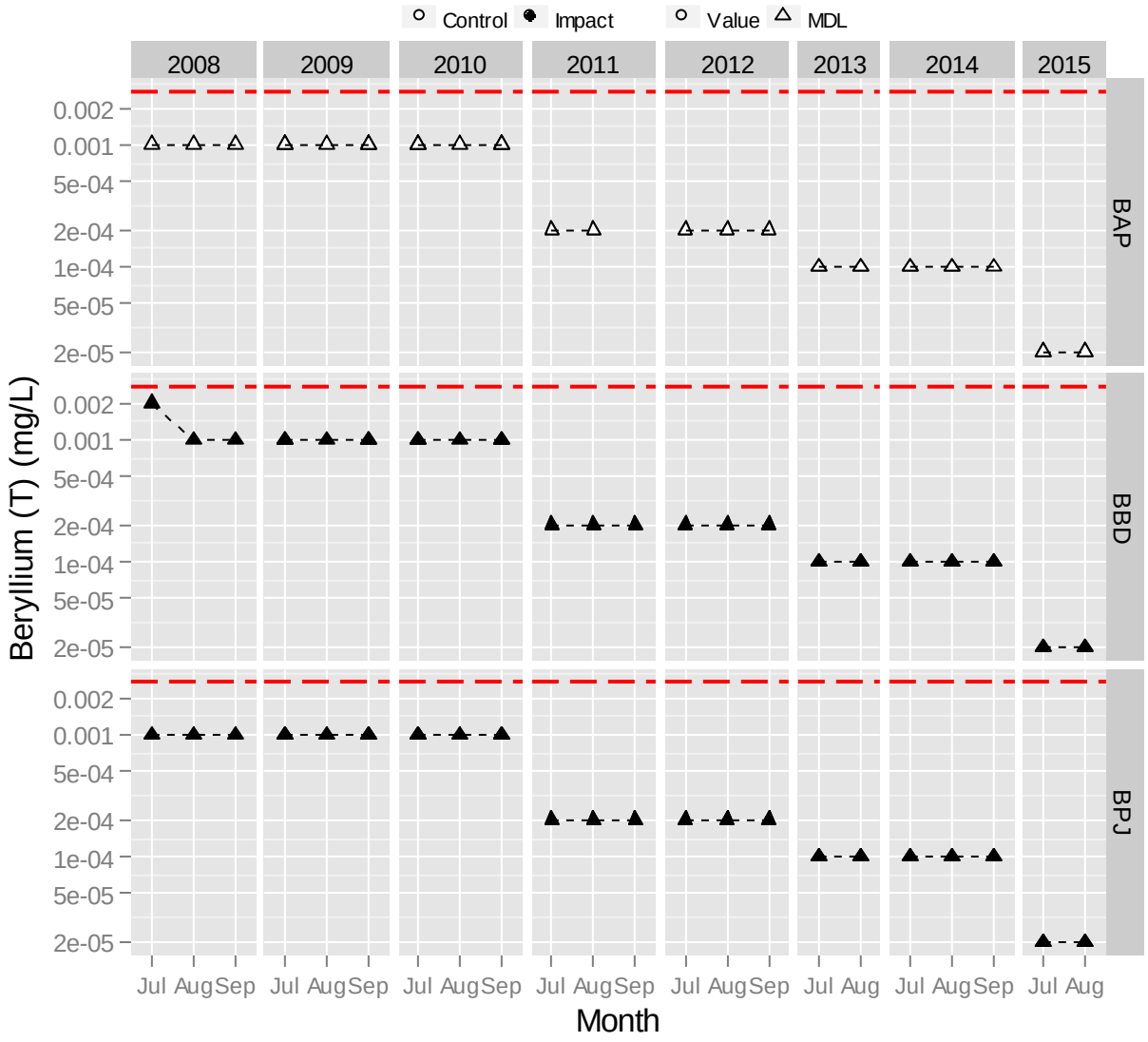


Figure A2–7. Total Cadmium (mg/L) in water samples from Baker Lake since 2008.

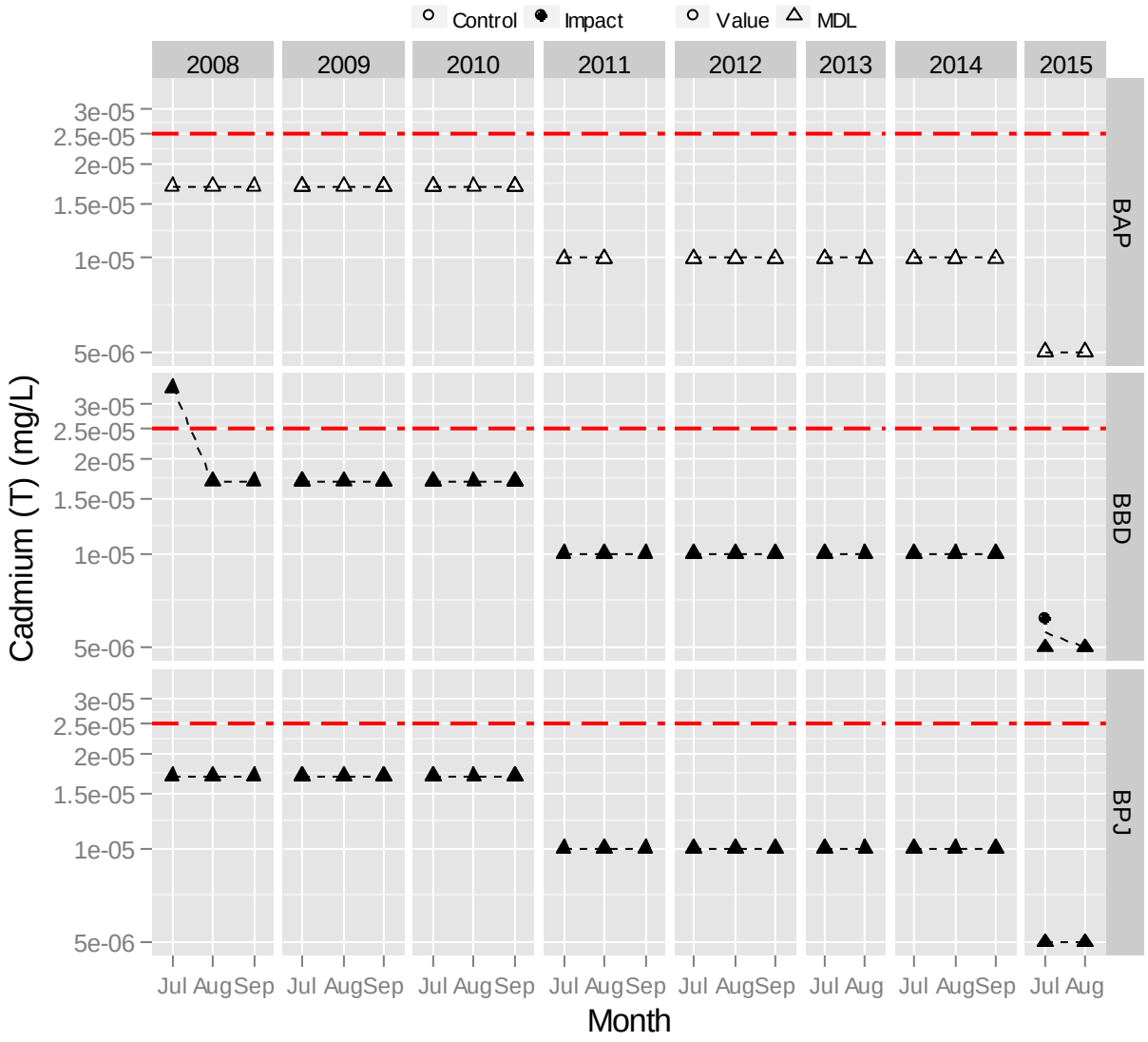


Figure A2–8. Total Mercury (mg/L) in water samples from Baker Lake since 2008.

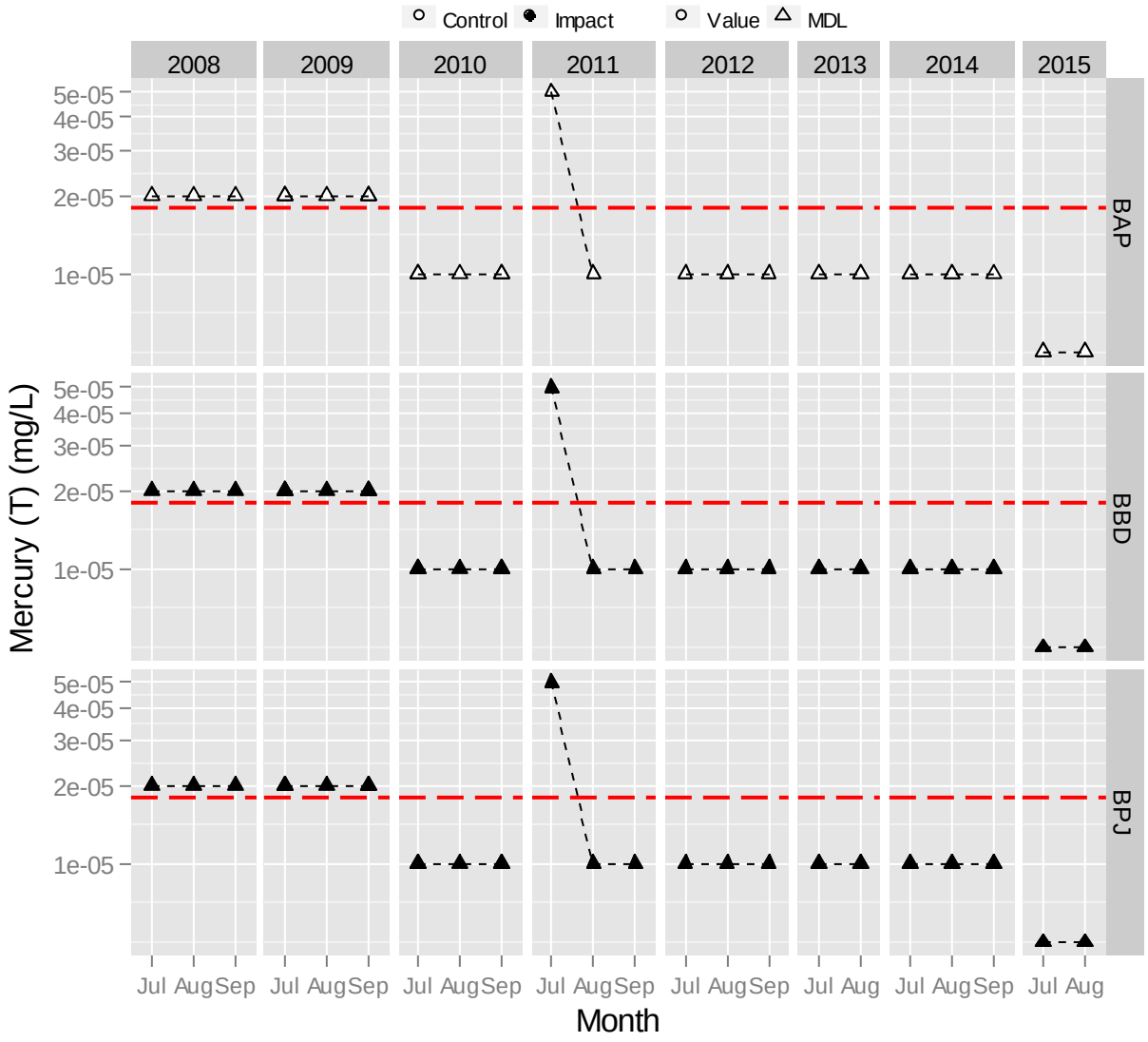


Figure A2–9. Total Nickel (mg/L) in water samples from Baker Lake since 2008.

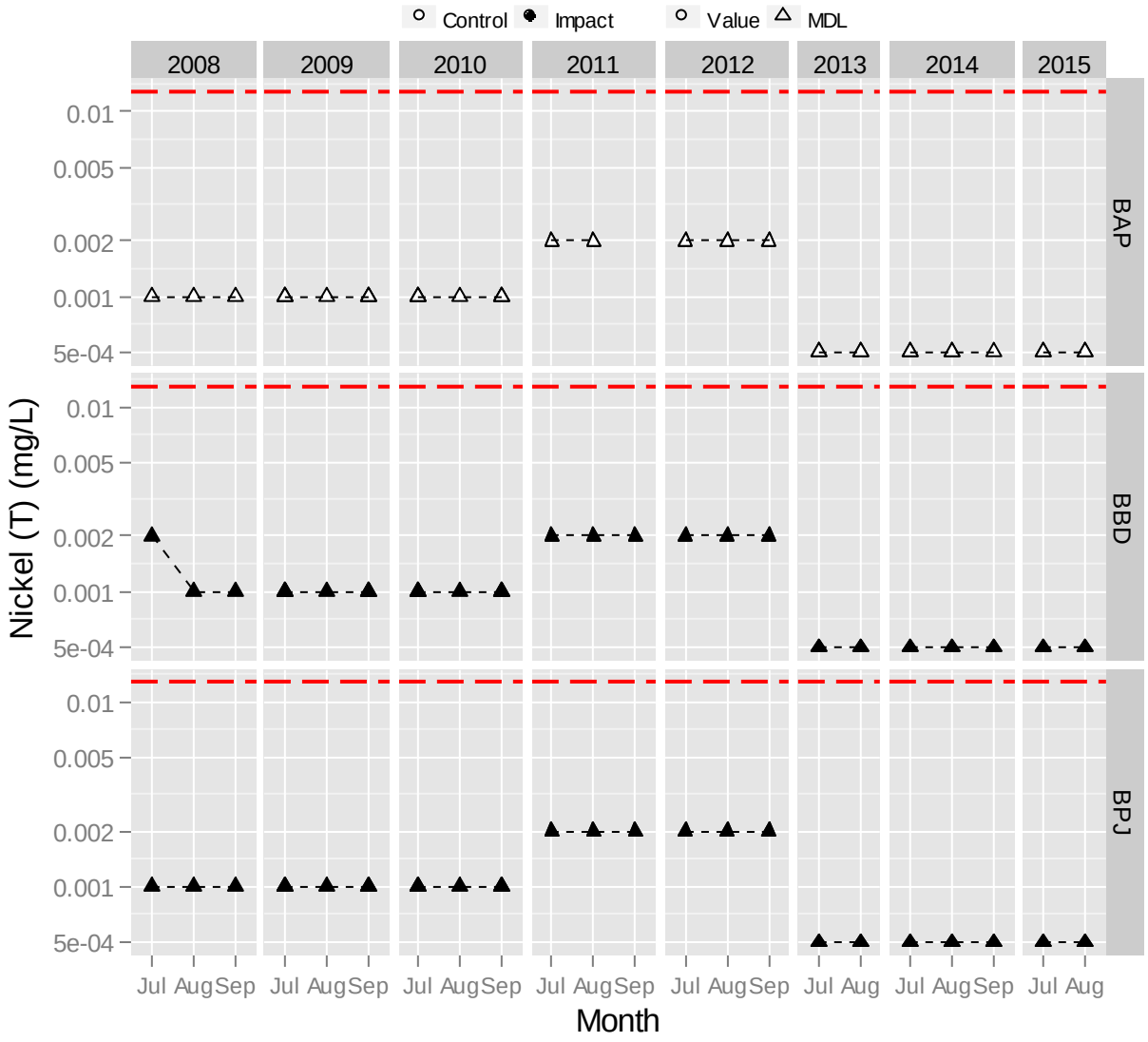


Figure A2–10. Total Selenium (mg/L) in water samples from Baker Lake since 2008.

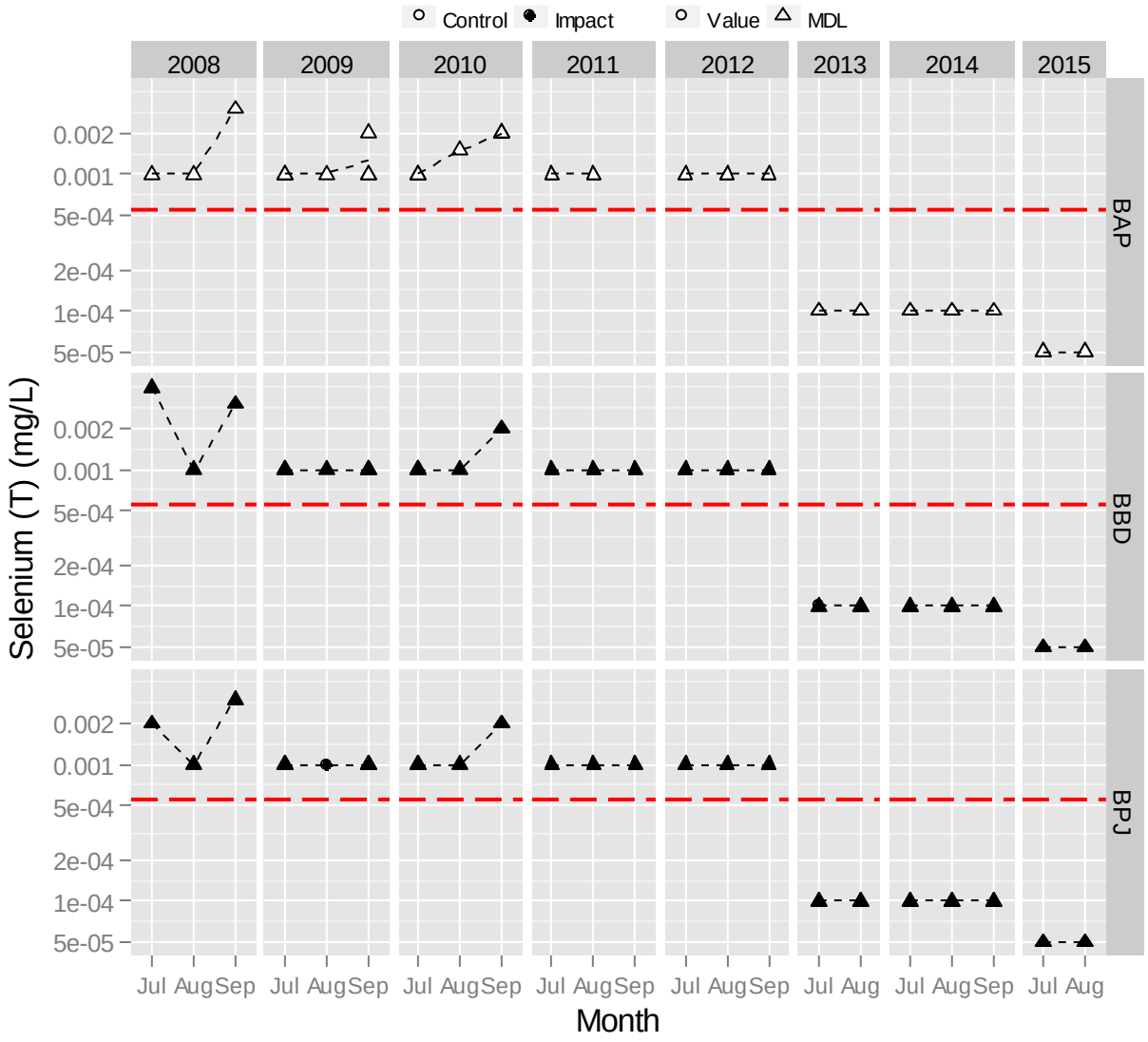


Figure A2–11. Total Thallium (mg/L) in water samples from Baker Lake since 2008.

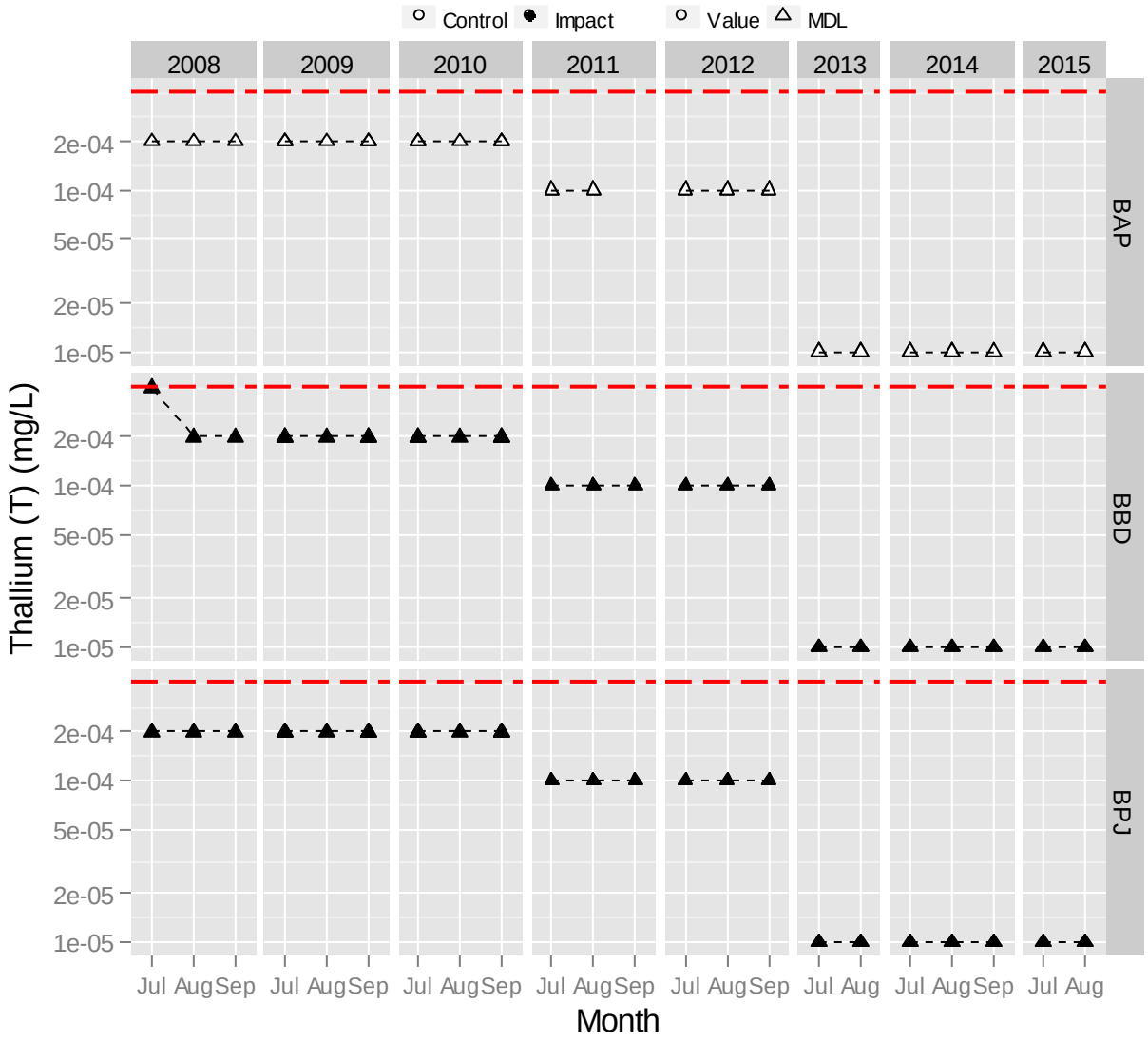


Figure A2–12. Total Tin (mg/L) in water samples from Baker Lake since 2008.

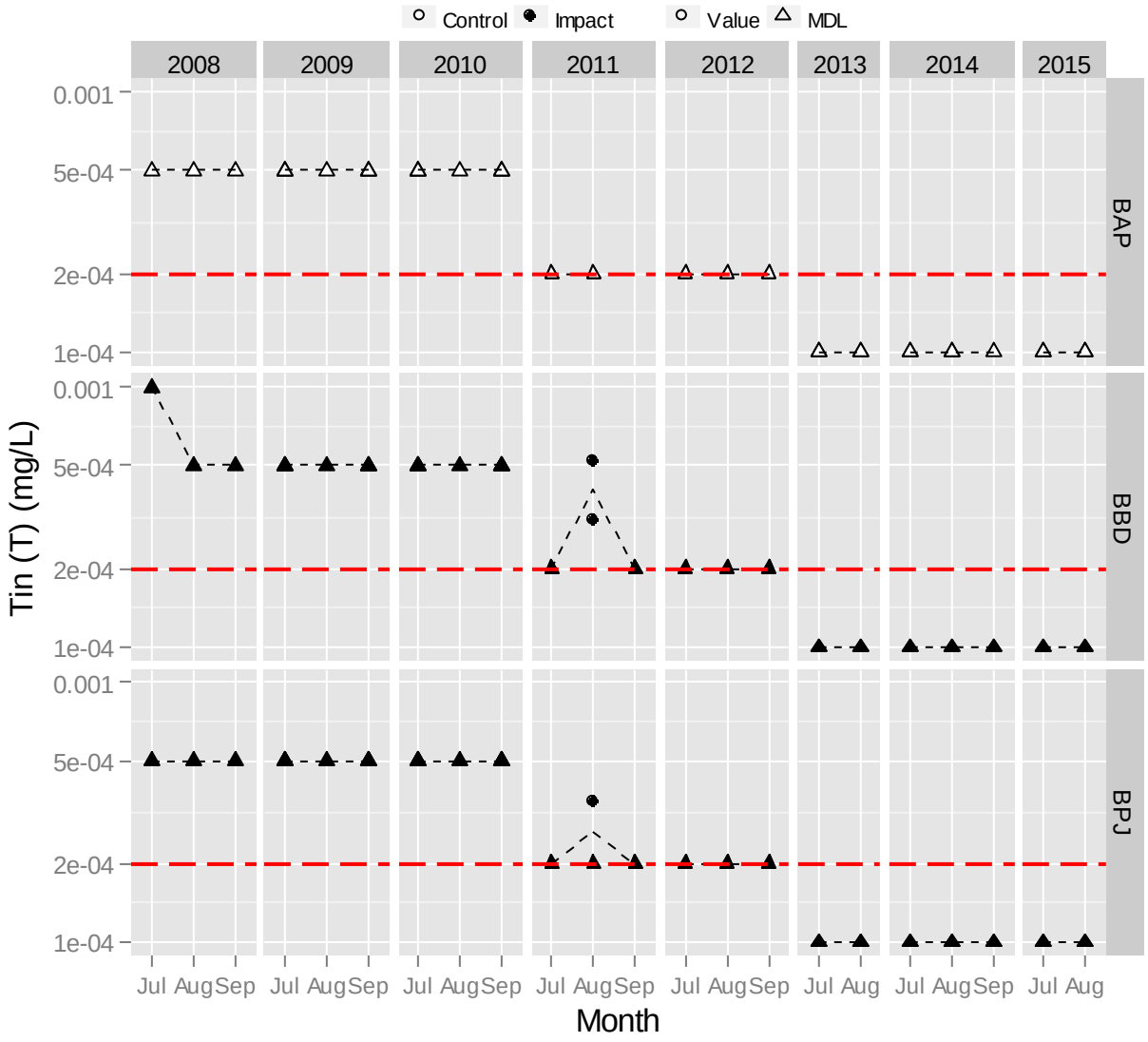


Figure A2–13. Total Vanadium (mg/L) in water samples from Baker Lake since 2008.

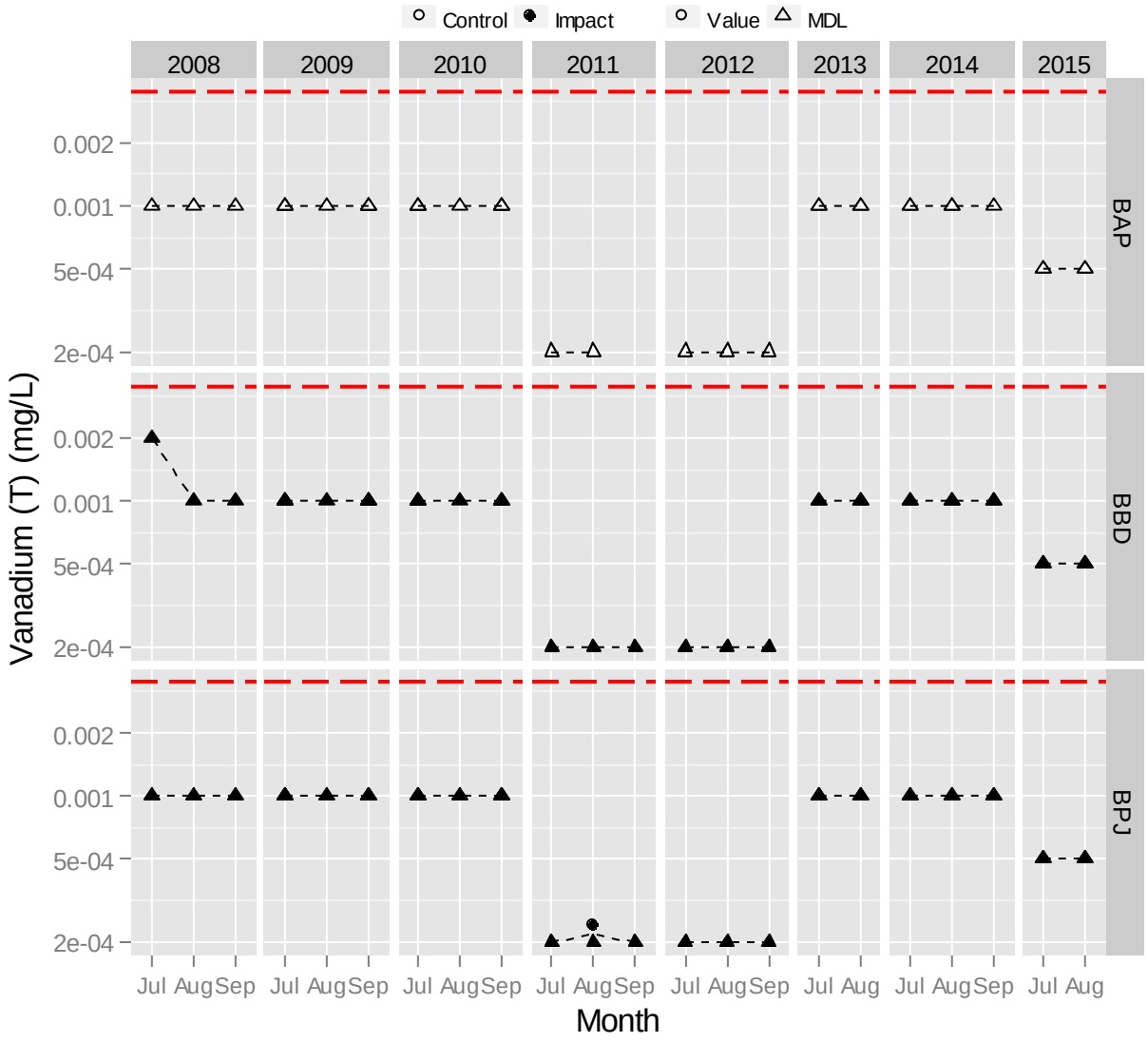


Figure A2–14. Total Zinc (mg/L) in water samples from Baker Lake since 2008.

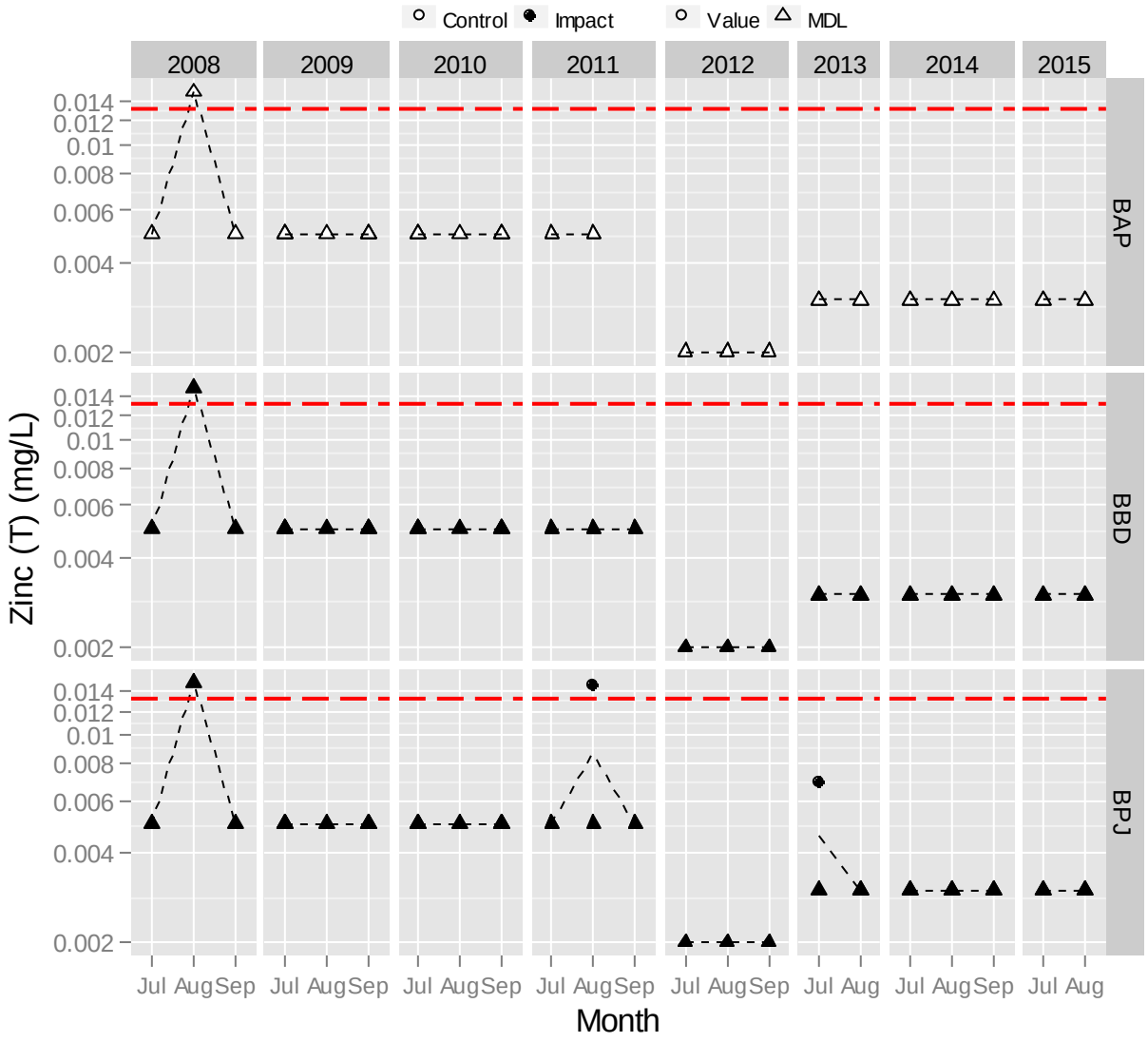


Figure A2–15. Dissolved Antimony (mg/L) in water samples from Baker Lake since 2008.

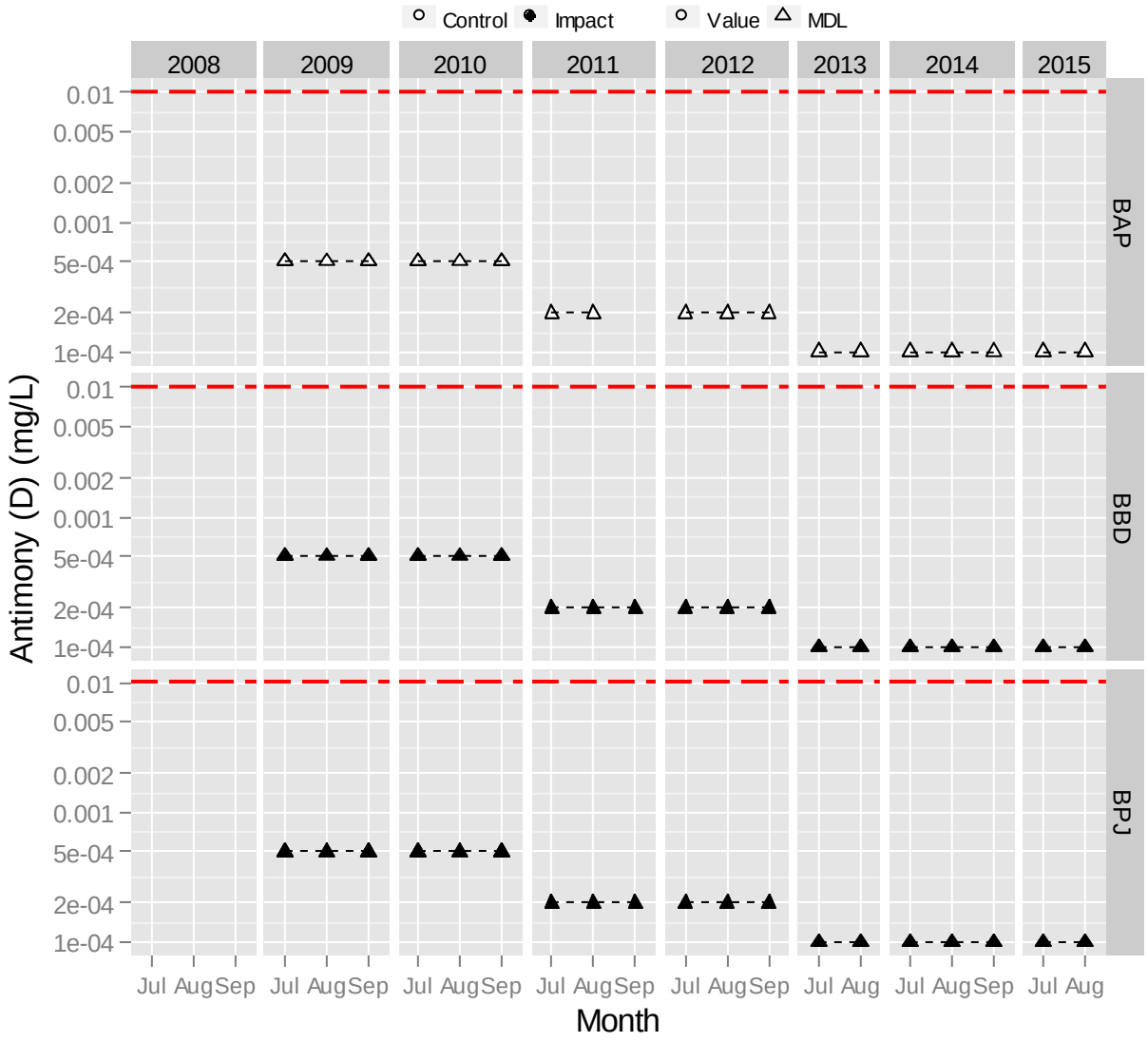


Figure A2–16. Dissolved Beryllium (mg/L) in water samples from Baker Lake since 2008.

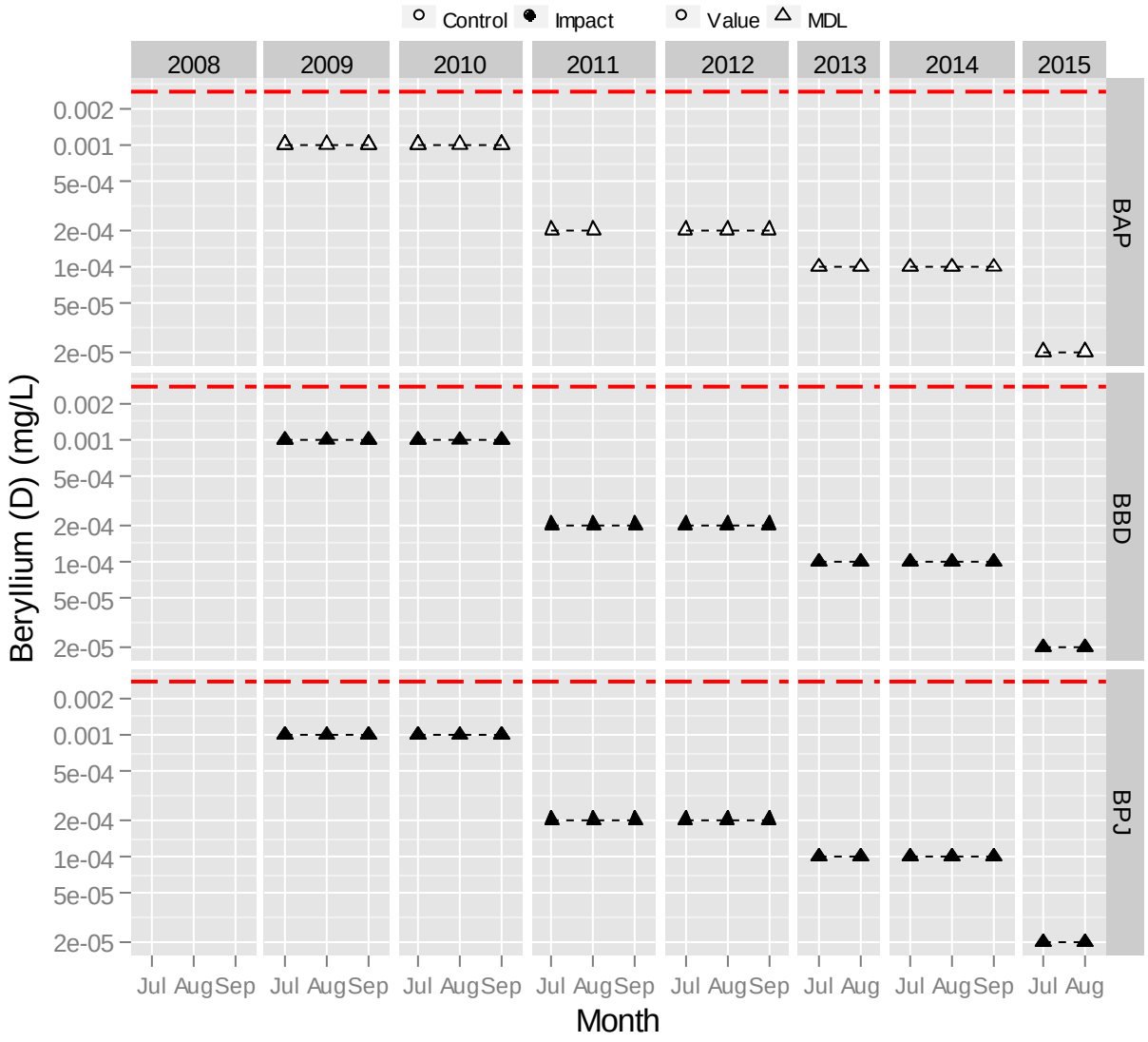


Figure A2–17. Dissolved Cadmium (mg/L) in water samples from Baker Lake since 2008.

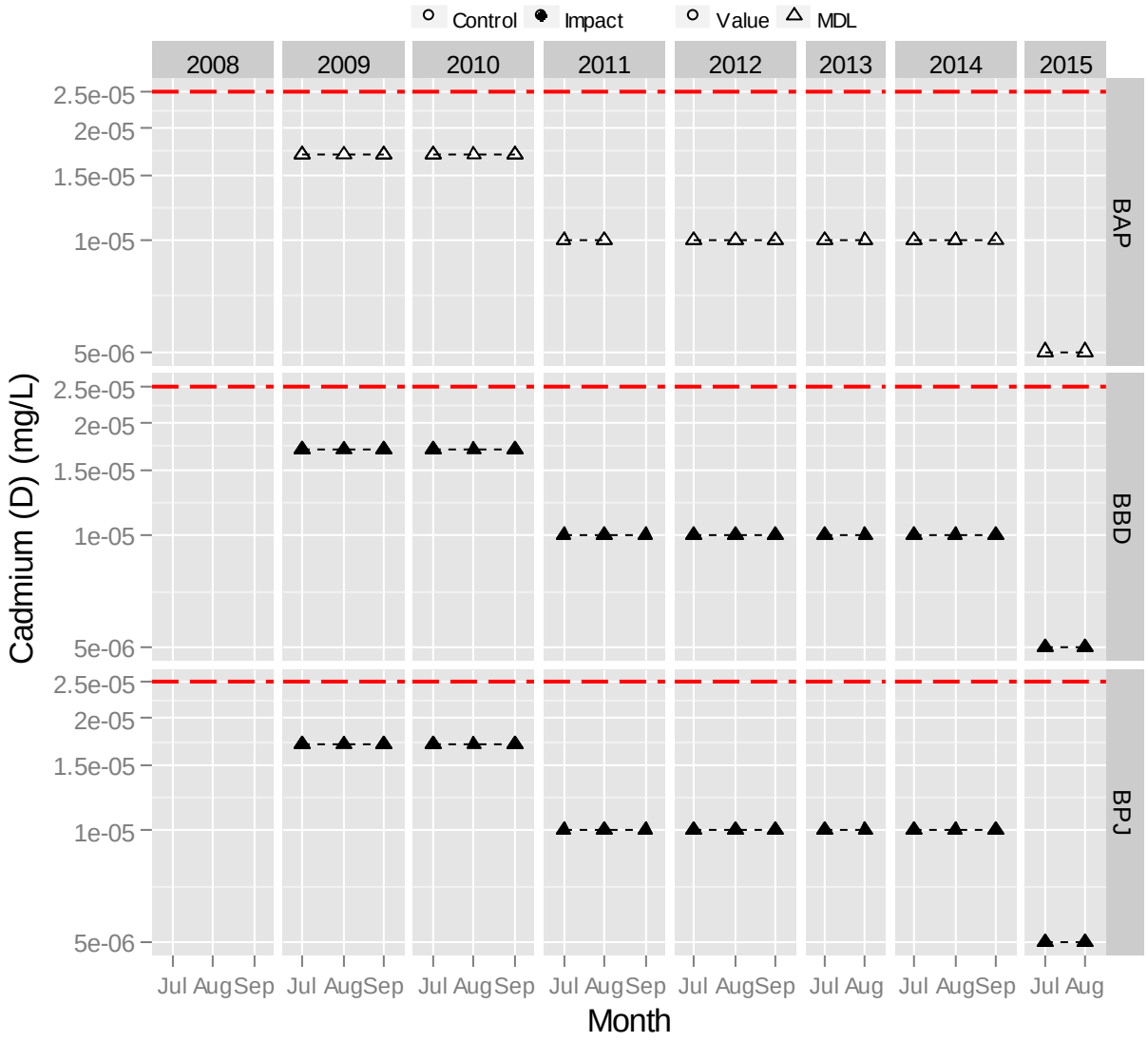


Figure A2–18. Dissolved Chromium (mg/L) in water samples from Baker Lake since 2008.

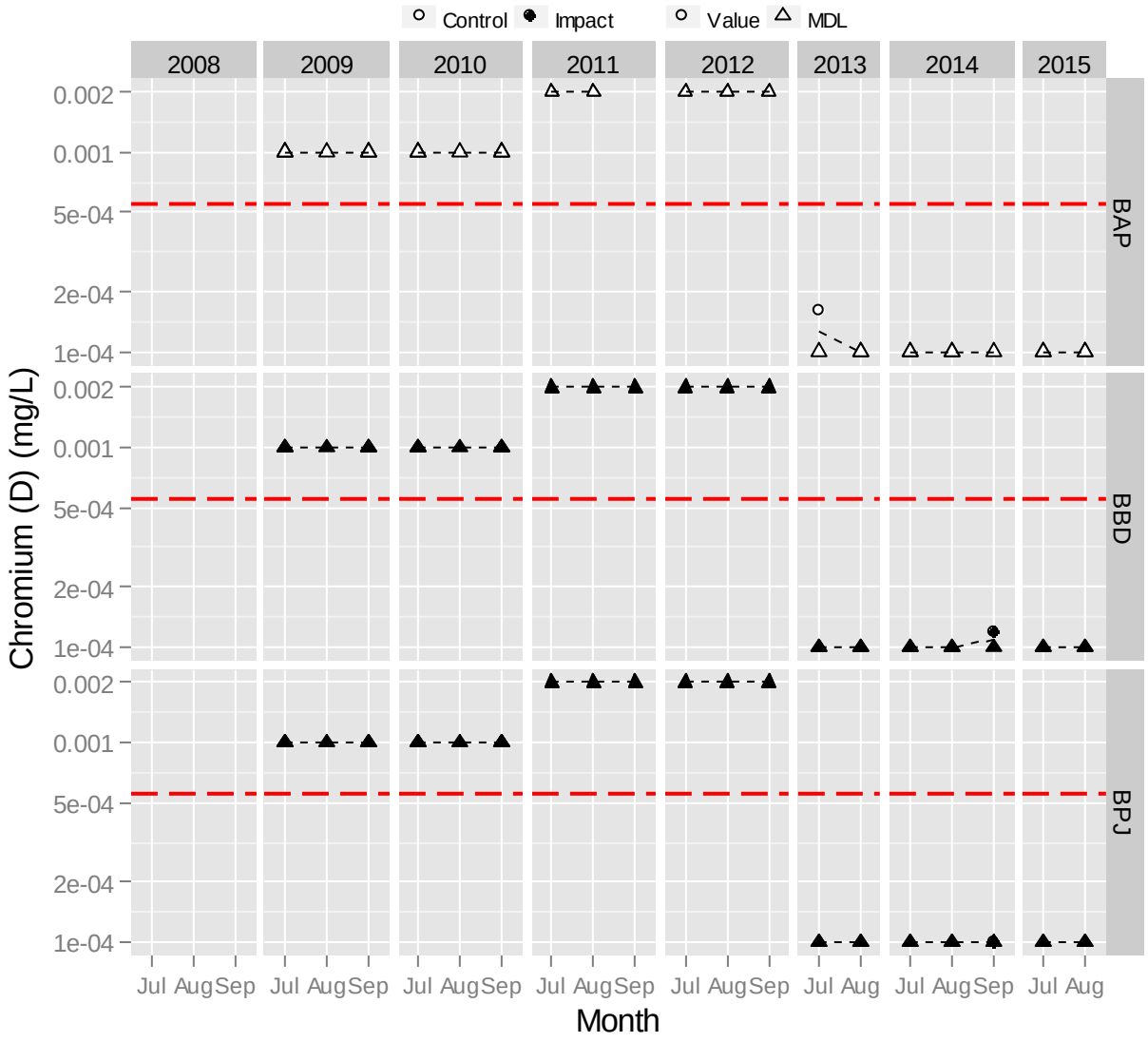


Figure A2–19. Dissolved Iron (mg/L) in water samples from Baker Lake since 2008.

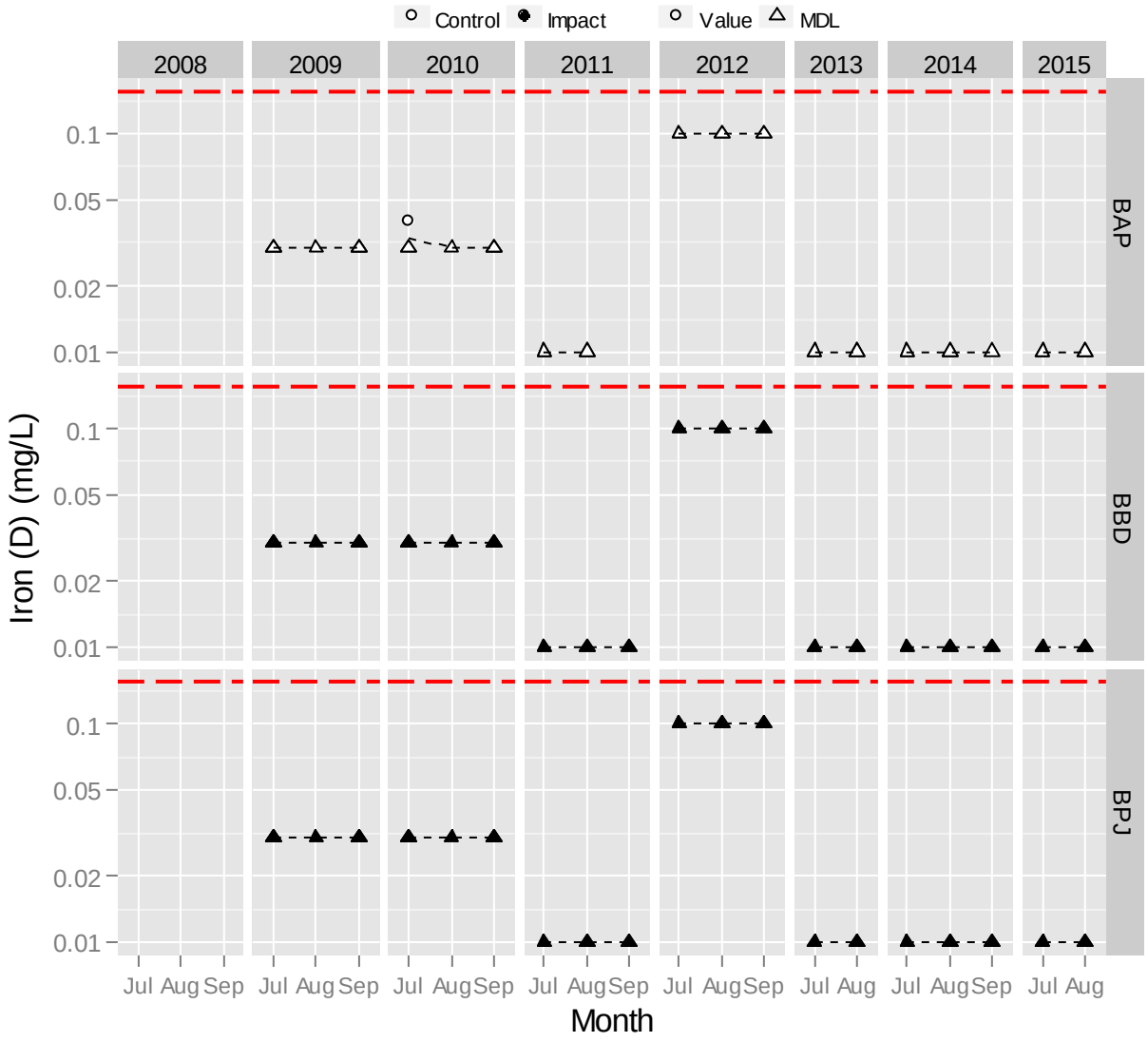


Figure A2–20. Dissolved Lead (mg/L) in water samples from Baker Lake since 2008.

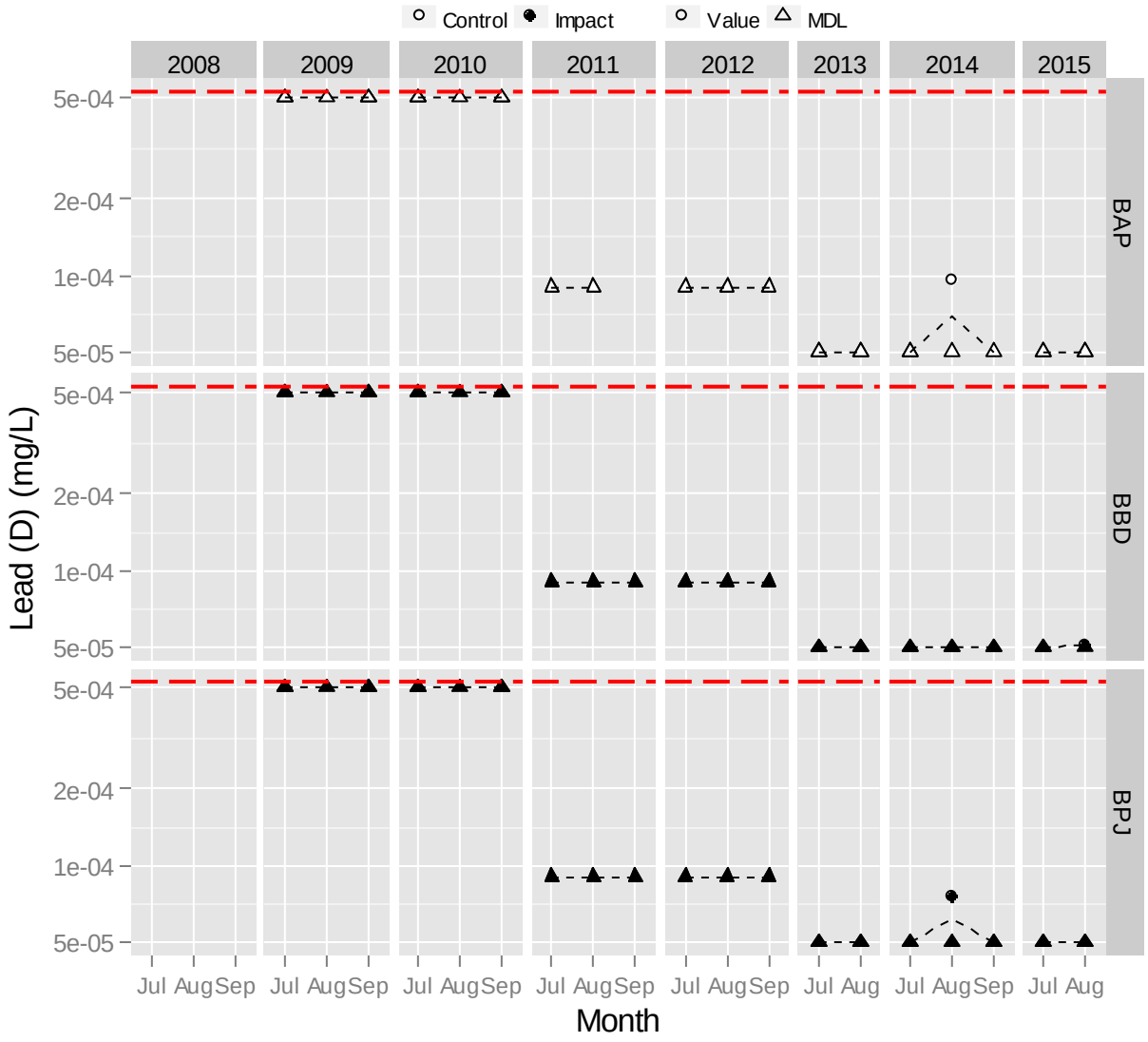


Figure A2–21. Dissolved Mercury (mg/L) in water samples from Baker Lake since 2008.

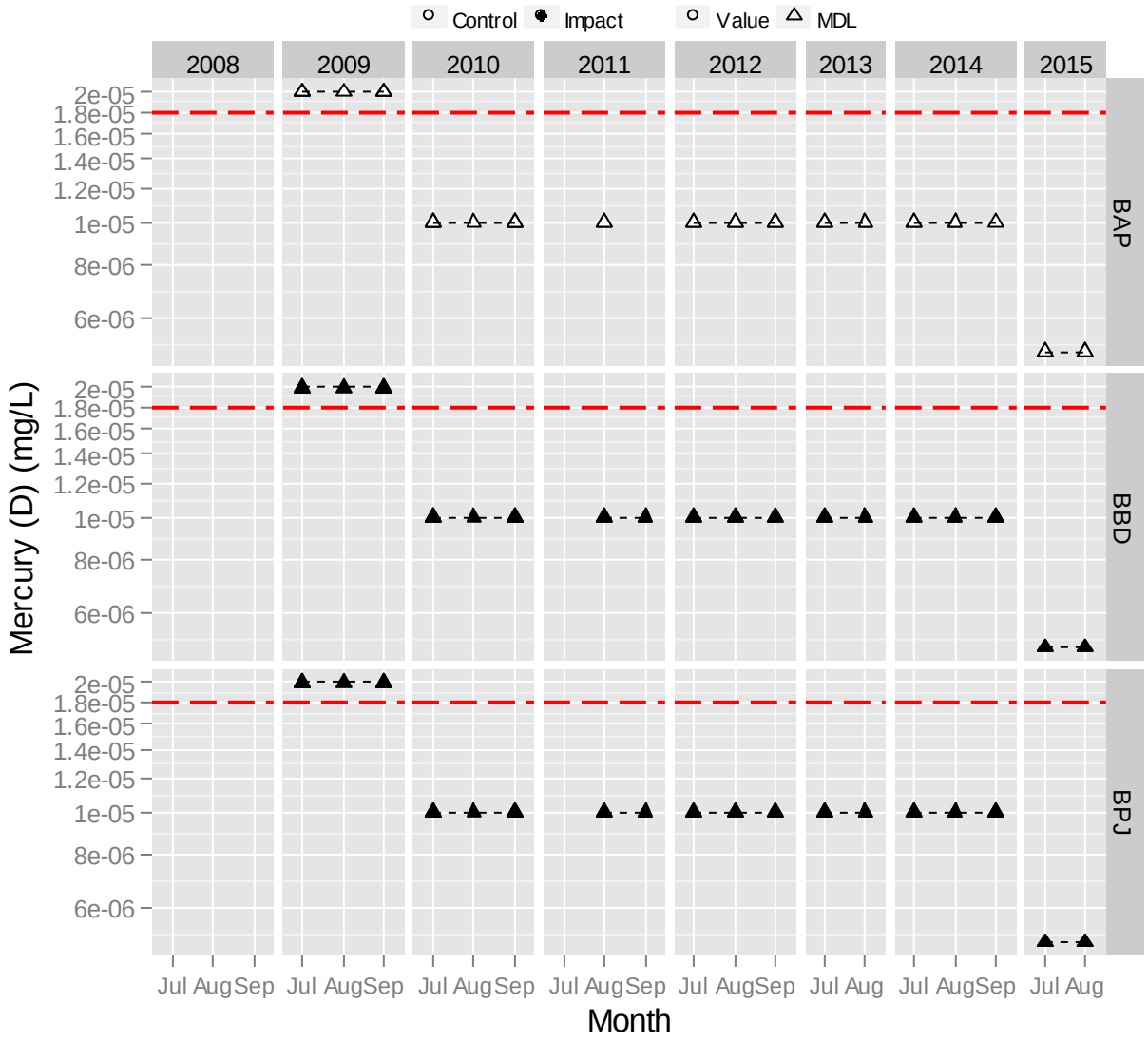


Figure A2–22. Dissolved Nickel (mg/L) in water samples from Baker Lake since 2008.

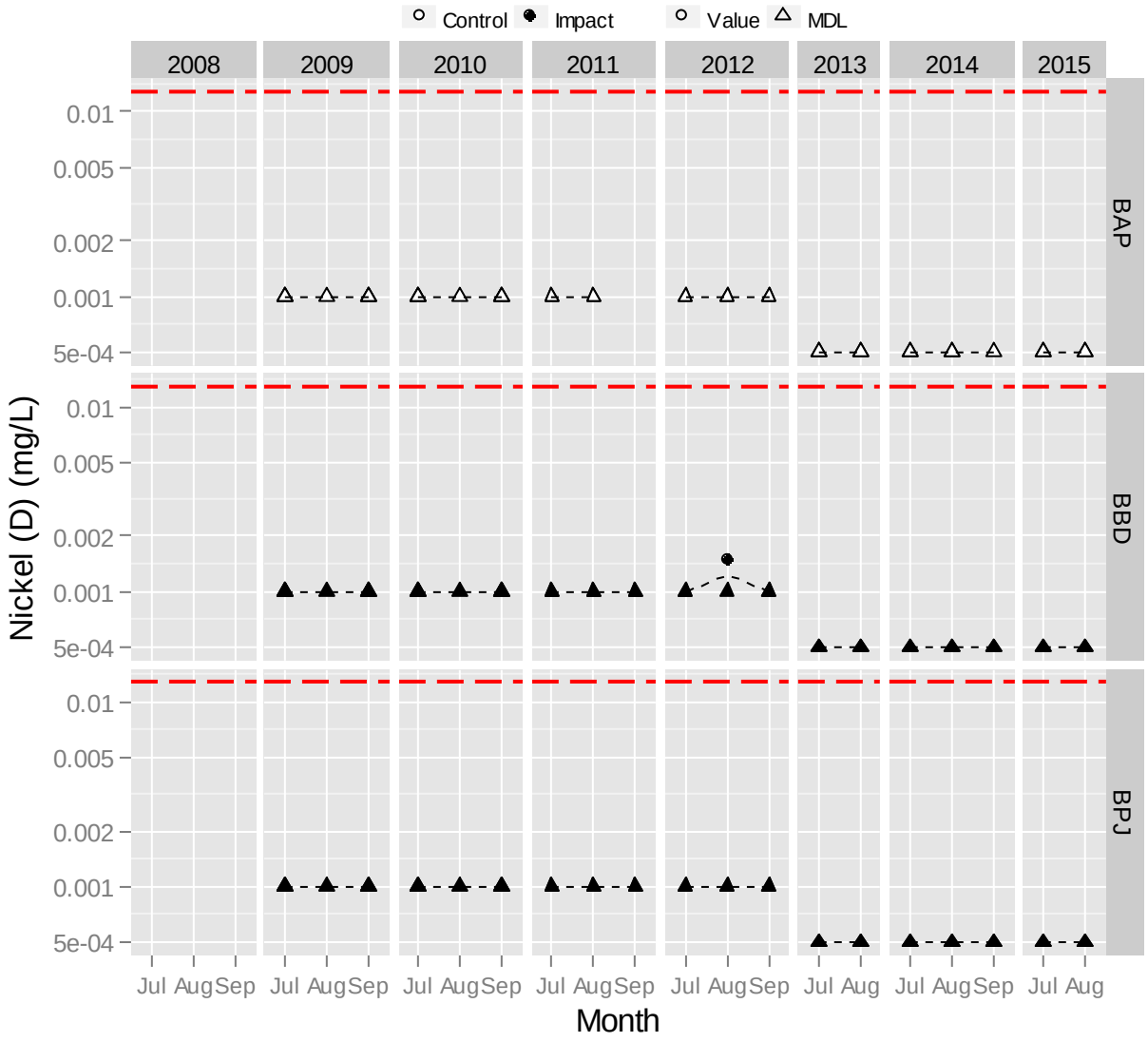


Figure A2–23. Dissolved Selenium (mg/L) in water samples from Baker Lake since 2008.

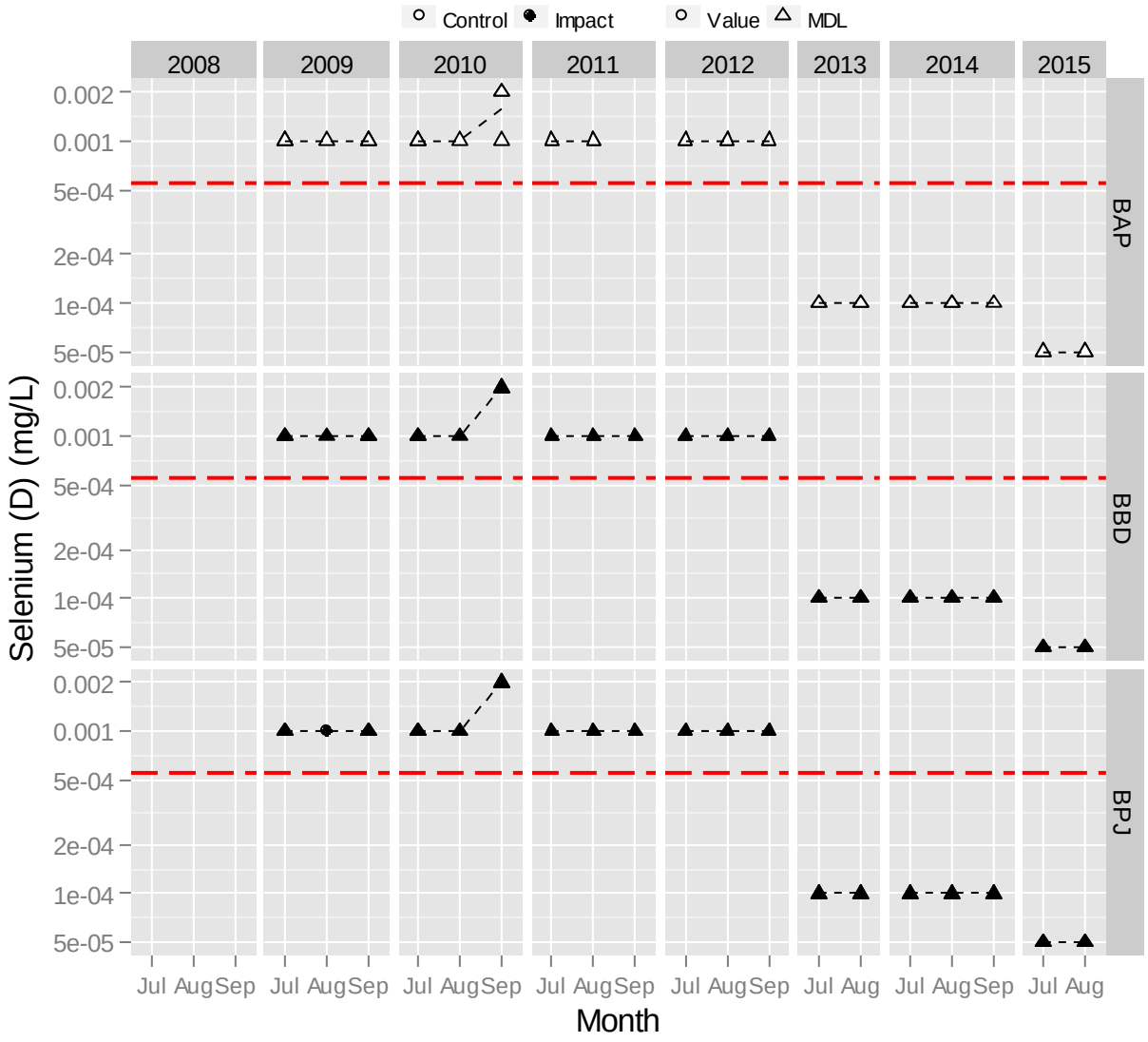


Figure A2–24. Dissolved Thallium (mg/L) in water samples from Baker Lake since 2008.

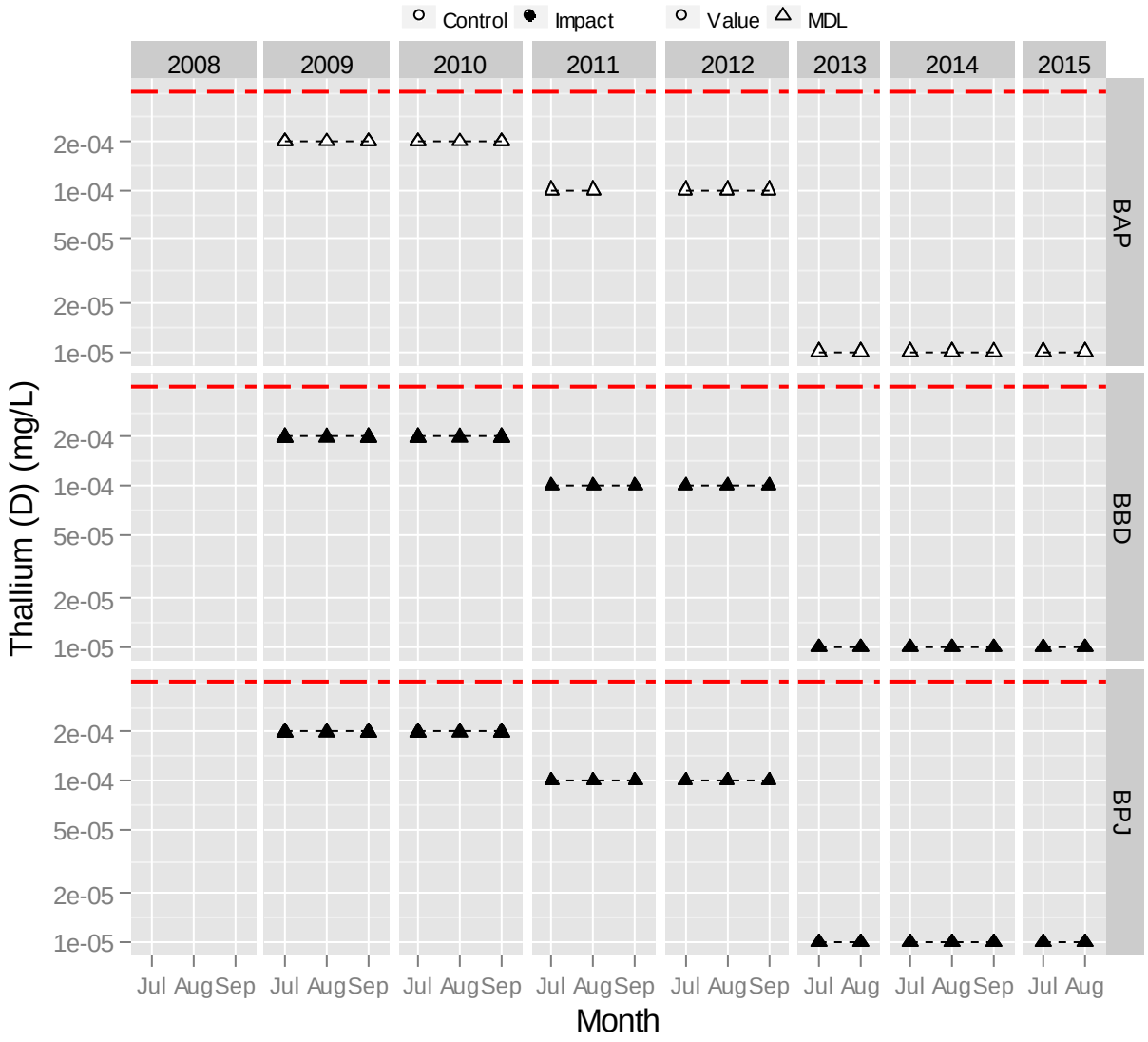


Figure A2–25. Dissolved Tin (mg/L) in water samples from Baker Lake since 2008.

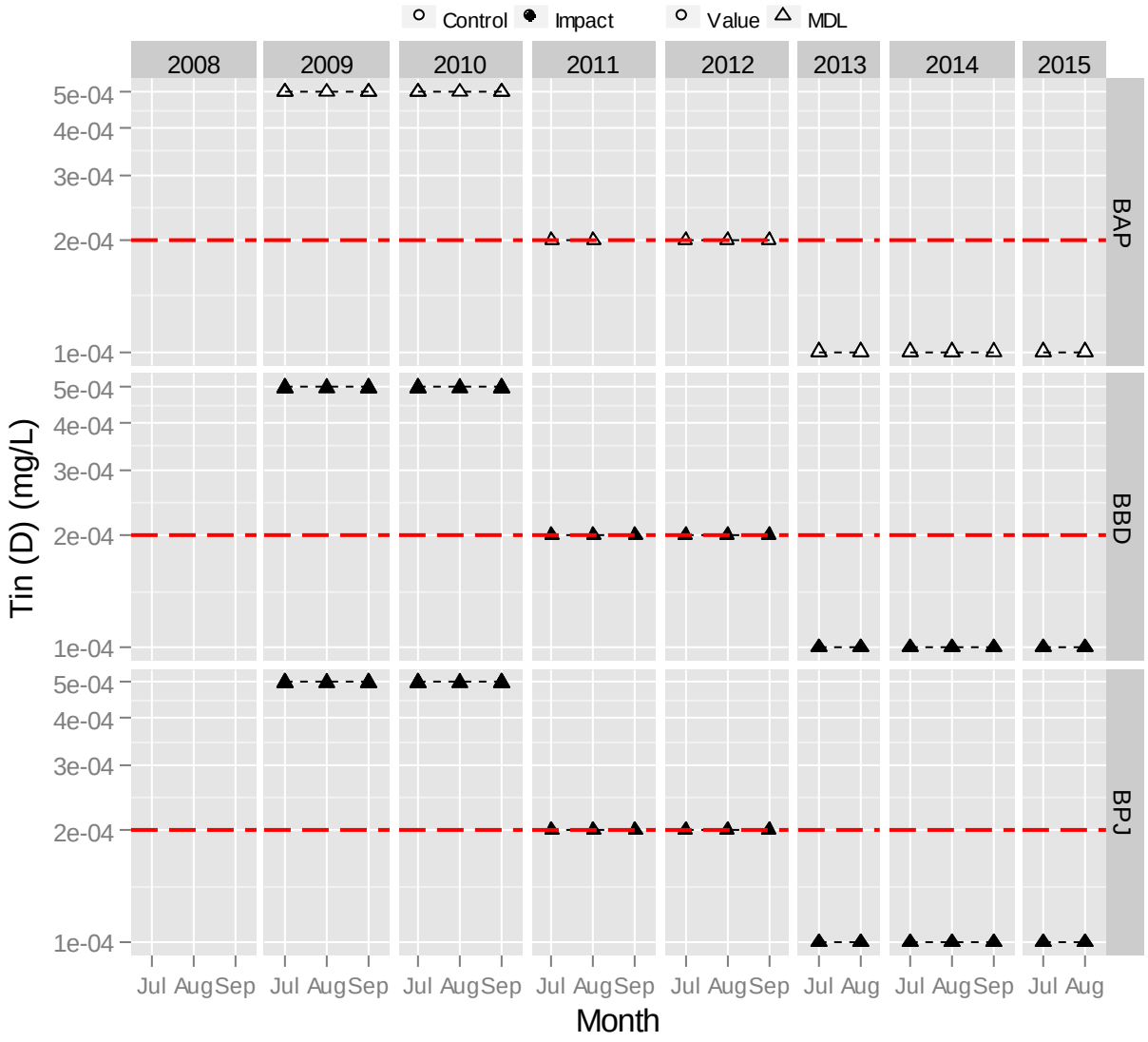


Figure A2–26. Dissolved Titanium (mg/L) in water samples from Baker Lake since 2008.

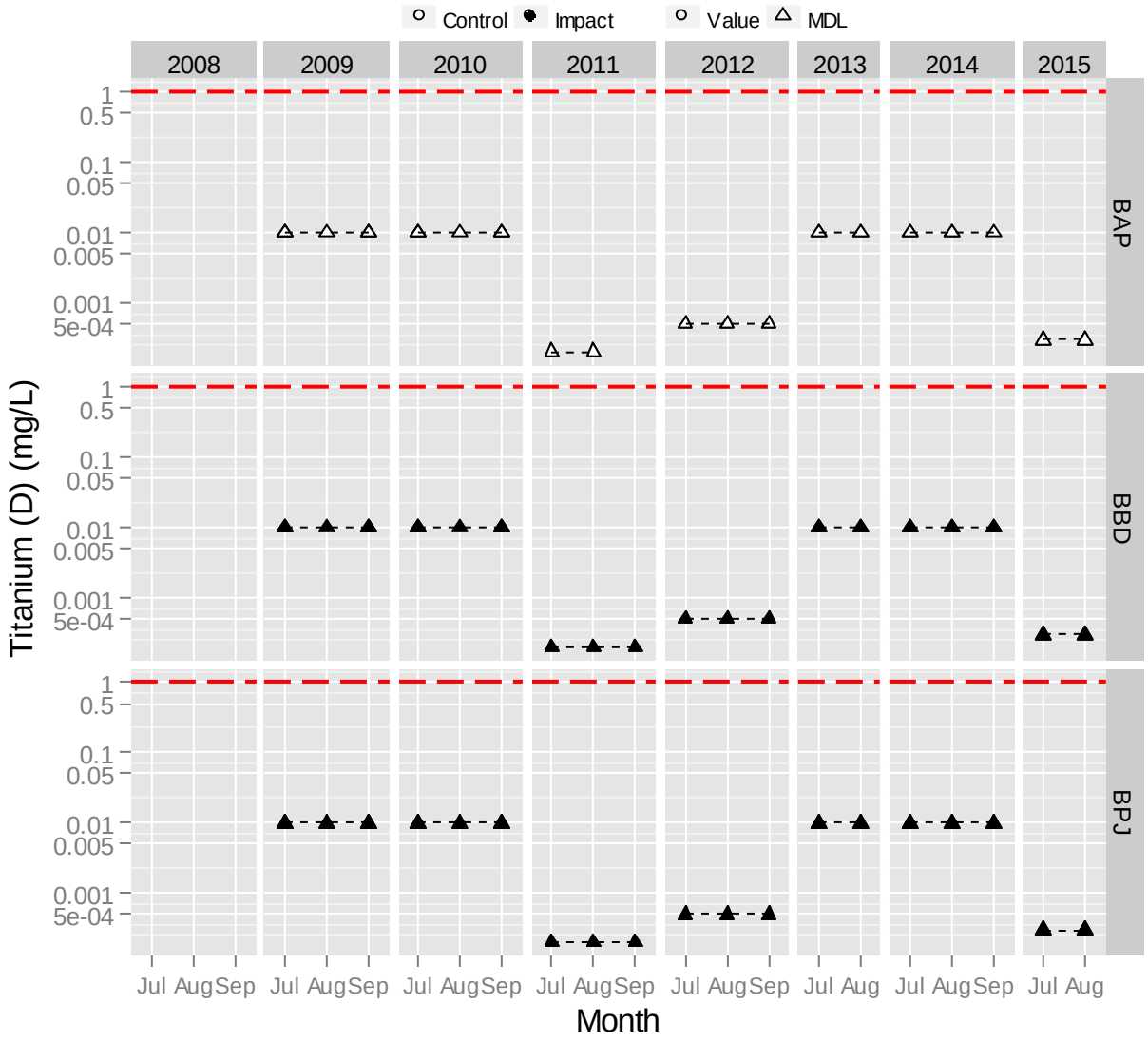


Figure A2–27. Dissolved Vanadium (mg/L) in water samples from Baker Lake since 2008.

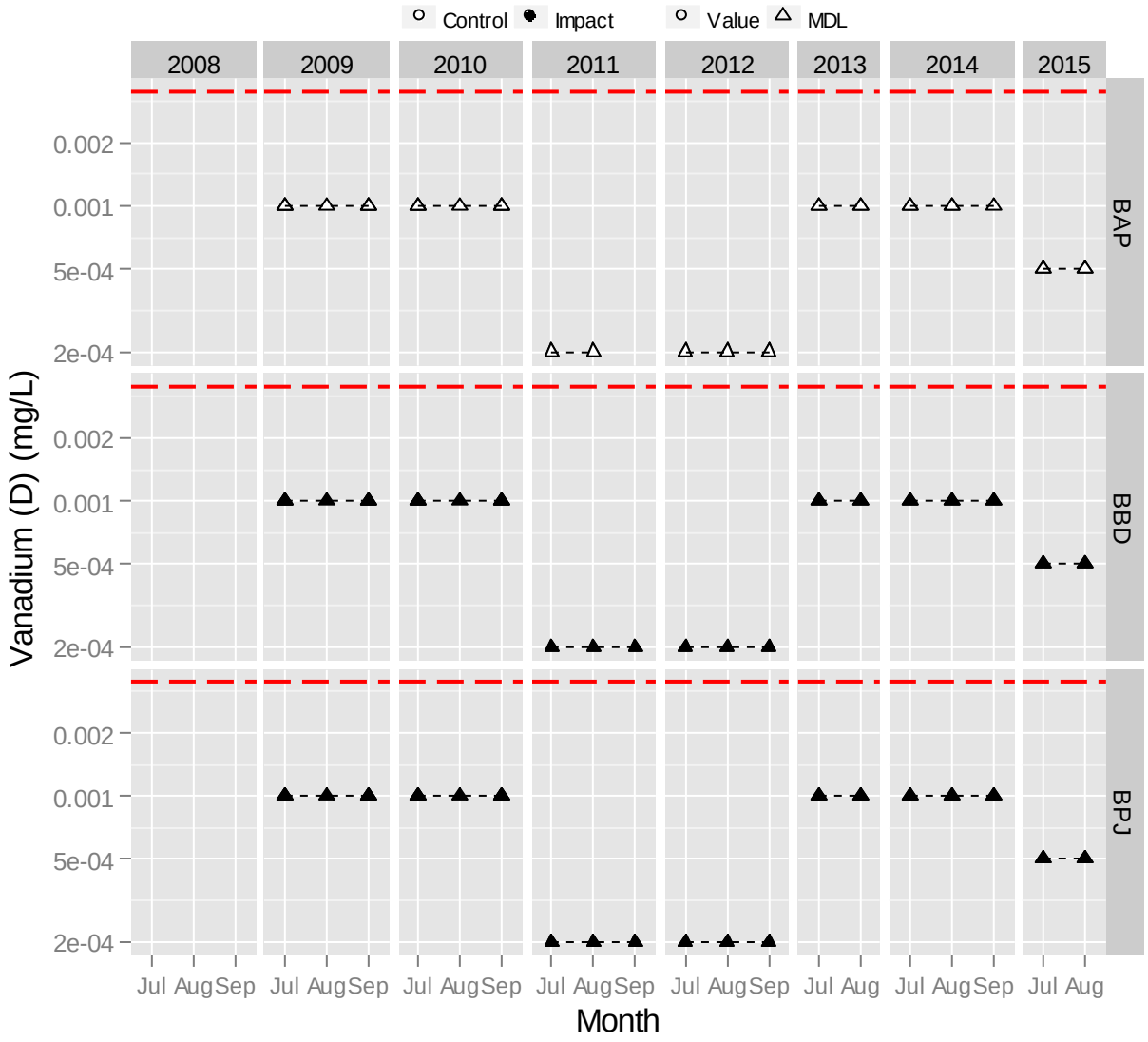
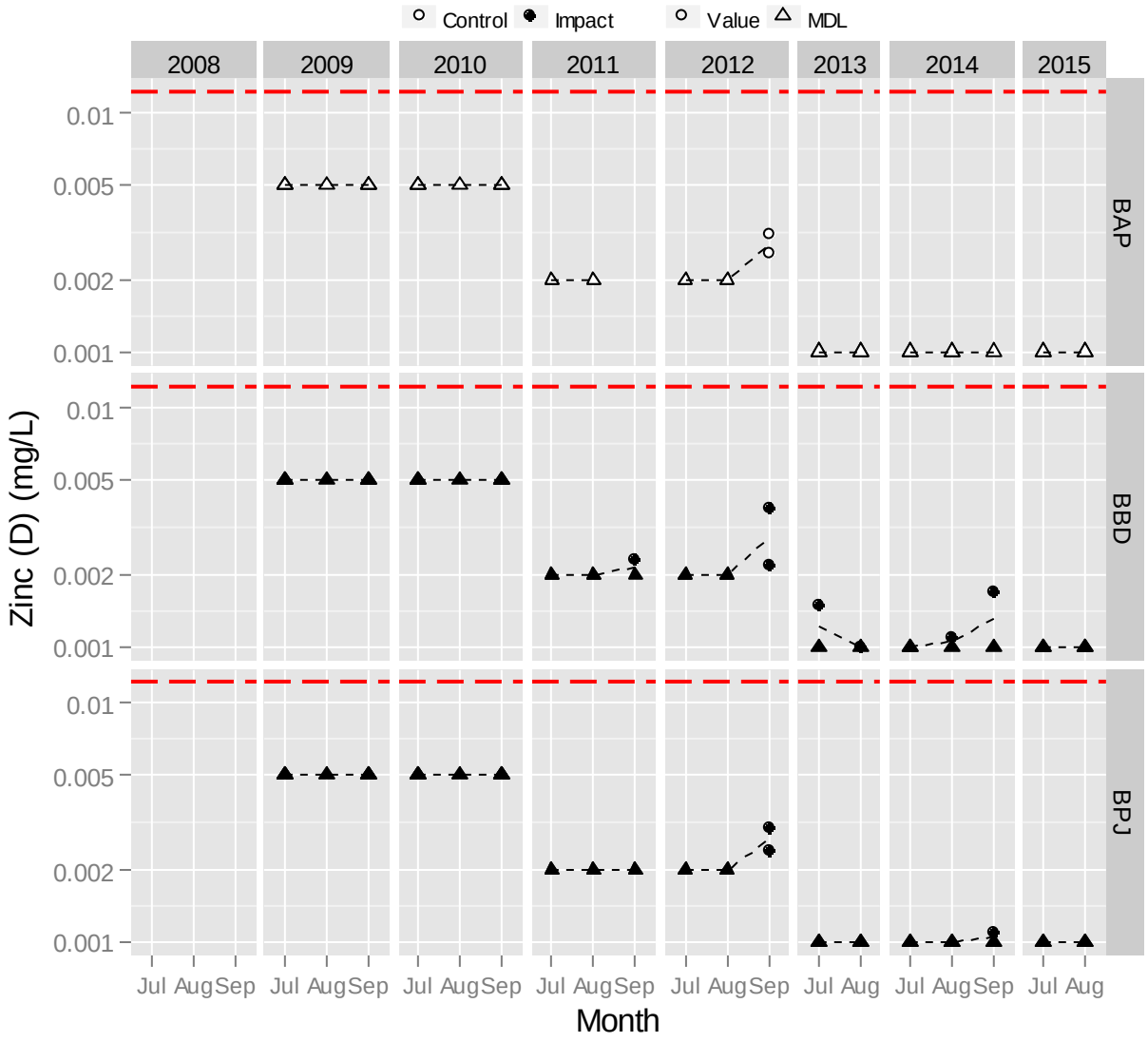


Figure A2–28. Dissolved Zinc (mg/L) in water samples from Baker Lake since 2008.



APPENDIX B

Phytoplankton Raw Data, Meadowbank Study Lakes and Baker Lake, 2015

Seasonal Phytoplankton cell density for CREMP 2015

******** *R=QA\QC sample*

*****All data are in cells L^{-1}*

Station	date	Cyanophyte cells L^{-1}	Chlorophyte cells L^{-1}	Euglenophyte cells L^{-1}	Chrysophyte cells L^{-1}	Diatoms cells L^{-1}	Cryptophytes cells L^{-1}	Dinoflagellates cells L^{-1}	Total density cells L^{-1}
BAP - 38S1	7/21/2015	0	57472	0	1310488	77256	109576	2200	1556992
BAP - 38S2	7/21/2015	0	57472	200	2349584	58104	276592	2000	2743952
BAP - 39S	8/15/2015	0	215520	0	2327632	178344	238088	1600	2961184
BAP - 40S	8/15/2015	0	129712	0	2088760	126440	119344	2200	2466456
BBD - 37S	7/21/2015	0	71840	0	714016	94008	32936	800	913600
BBD - 38S	7/21/2015	0	86208	0	1122304	36536	159264	3600	1407912
BBD - 39S	8/15/2015	0	143880	200	1518624	151560	194984	1600	2010848
BBD - 40S	8/15/2015	0	130312	200	1576096	148744	231920	3200	2090472
BPJ - 37S	7/21/2015	200	179800	200	1022328	75056	90208	2600	1370392
BPJ - 38S	7/21/2015	0	72240	0	1152440	69872	128728	1600	1424880
BPJ - 38SR	7/21/2015	0	86608	0	1138672	90224	130128	2000	1447632
BPJ - 39S	8/15/2015	0	208936	0	2157416	151224	218936	2200	2738712
BPJ - 39SR	8/15/2015	0	237272	0	2107728	127288	245872	2000	2720160
BPJ - 40S	8/15/2015	0	144080	0	1371960	169712	180616	8984	1875352
DUP - 1	5/16/2015	0	0	0	614175	46099	93499	1800	755573
DUP - 1	7/1/2015	0	71840	0	1858472	124544	193584	1400	2249840
DUP - 1	8/1/2015	800	165832	0	1959648	156960	122944	1600	2407784
DUP - 1	11/1/2015	1800	64230	0	497854	182851	50845	100	797680
DUP - 2	7/1/2015	200	57472	0	1532992	160264	250656	800	2002384
DUP - 2	8/1/2015	400	287360	0	970840	1194744	18768	800	2472912
DUP - 2	9/1/2015	600	294544	0	978624	550384	28752	1000	1853904
DUP - 3	8/1/2015	0	122128	0	1354192	605656	24752	16768	2123496
DUP - 3	9/1/2015	18400	251440	0	1134288	240472	7384	600	1652584
INUG - 68S	5/16/2015	0	3746	0	969985	39107	65230	700	1078768
INUG - 69S	5/16/2015	0	3946	0	518531	28469	75468	200	626614
INUG - 70S	7/27/2015	0	172616	0	2061504	296744	140096	800	2671760
INUG - 71S	7/27/2015	0	129712	0	2190616	117144	57688	8784	2503944
INUG - 72S	8/27/2015	400	196768	0	1419448	210336	14768	7184	1848904
INUG - 73S	8/27/2015	7584	211536	0	1671288	260424	114944	8384	2274160
INUG - 74S	10/1/2015	66056	274992	0	1734744	305544	72640	21752	2475728
INUG - 75S	10/1/2015	14968	209736	0	1734144	356232	79424	21552	2416056
INUG - 76S	11/23/2015	28369	159975	0	563830	62584	82760	400	897917
INUG - 77S	11/23/2015	56738	107183	0	720158	54692	43753	400	982924
INUG - 77SR	11/23/2015	14184	138798	0	677505	83160	33815	200	947663
PDL - 37S	7/28/2015	0	36320	0	1790048	225112	59872	1400	2112752
PDL - 38S	7/28/2015	0	14368	0	1986416	207552	38920	10584	2257840
PDL - 39S	8/26/2015	9184	244456	0	1361176	219520	43504	600	1878440
PDL - 40S	8/26/2015	3800	123328	0	1370160	213536	22952	400	1734176
PDL - 41S	10/4/2015	7400	359200	0	939920	219520	22152	14968	1563160
SP - 80S	5/17/2015	0	0	0	1113929	6046	25223	2200	1147398
SP - 81S	5/17/2015	0	0	0	926586	1800	79814	1200	1009400
SP - 82S	7/15/2015	0	86208	0	2076008	375184	55288	800	2593488
SP - 83S	7/15/2015	0	172616	0	4021472	417888	24952	1200	4638128
SP - 84S	8/13/2015	0	330664	0	820176	225520	38320	1000	1415680
SP - 85S	8/13/2015	64856	188584	0	797624	188200	7184	1000	1247448
SP - 85SR	8/13/2015	28736	129912	0	869464	126344	7184	2200	1163840
SP - 86S	9/6/2015	0	209936	0	955872	259840	67656	600	1493904
SP - 87S	9/6/2015	7184	187384	0	1200328	365200	88608	1000	1849704
SP - 88S	11/2/2015	0	71822	0	665521	182667	145998	1000	1067007
SP - 89S	11/2/2015	0	85306	0	415494	60592	25177	300	586868
TE - 80S	5/14/2015	0	3546	0	879433	3746	23984	900	911609
TE - 81S	5/14/2015	0	42553	0	1230897	46199	58399	11238	1389287
TE - 81SR	5/14/2015	0	42553	0	1195436	46099	61745	11138	1356972
TE - 82S	7/27/2015	0	136896	0	2153816	331480	80440	7384	2710016
TE - 83S	7/27/2015	57472	151464	0	2229872	415704	158680	7784	3020976
TE - 84S	8/28/2015	14968	165432	0	1209112	104376	58072	7984	1559944
TE - 85S	8/28/2015	0	180200	0	1181176	176616	400	7784	1546176
TE - 86S	10/4/2015	1400	186784	0	1299720	141296	73640	7784	1710624
TE - 87S	10/4/2015	2000	216120	0	1411680	264224	59472	200	1953696
TE - 88S	11/21/2015	1000	99691	0	486516	46799	15984	500	650490
TE - 89S	11/21/2015	1400	67576	0	539807	79514	43653	700	732651
TEFF - 37S	7/27/2015	0	158848	0	2356184	313112	8184	2600	2838928
TEFF - 38S	7/27/2015	0	288360	0	2479912	268624	30336	1400	3068632
TEFF - 39S	8/28/2015	1800	265808	0	1200144	180800	28936	15168	1692656
TEFF - 40S	8/28/2015	31136	93592	0	1098968	129512	21552	7184	1381944
TEFF - 41S	10/4/2015	3200	496496	0	1370760	290560	29536	7784	2198336
TEFF - 41SR	10/4/2015	4800	331064	0	1391128	274592	50688	400	2052672
TEFF - 42S	10/4/2015	3400	245456	0	1310704	289960	43304	200	1893024
TPE - 80S	5/15/2015	0	10638	0	450355	3846	40607	200	505646
TPE - 81S	5/15/2015	0	21277	0	312057	3946	43353	200	380833
TPE - 82S	7/15/2015	0	64656	0	1168008	51088	7384	400	1291536
TPE - 83S	7/15/2015	0	122328	0	1547576	41920	14568	1400	1727792
TPE - 84S	8/29/2015	1600	280376	0	668912	1208312	200	400	2159800
TPE - 85S	8/29/2015	1000	704432	0	1524608	1460552	28952	21952	3741496
TPE - 86S	9/27/2015	1800	172816	0	1049664	858496	47104	7784	2137664
TPE - 87S	9/27/2015	1200	280376	0	1121304	781872	39320	7584	2231656
TPE - 88S	11/13/2015	100	88653	0	677505	235643	26977	100	1028977
TPE - 89S	11/13/2015	100	124114	0	363202	377441	11438	100	876395
TPN - 80S	5/16/2015	0	0	0	745181	10638	74322	11238	841380
TPN - 81S	5/16/2015	0	0	0	792780	100	137052	400	930332
TPN - 82S	7/24/2015	0	28736	0	1420864	43504	59272	5200	1557576
TPN - 83S	7/24/2015	0	43104	0	1441816	86408	51488	23952	1646768
TPN - 83SR	7/24/2015	0	57472	0	1412680	107960	37920	29936	1645968
TPN - 84S	8/29/2015	200	215520	0	1877424	648360	54288	38520	2834312

Station	date	Cyanophyte cells L^{-1}	Chlorophyte cells L^{-1}	Euglenophyte cells L^{-1}	Chrysophyte cells L^{-1}	Diatoms cells L^{-1}	Cryptophytes cells L^{-1}	Dinoflagellates cells L^{-1}	Total density cells L^{-1}
TPN - 85S	8/29/2015	0	100776	0	2129464	685080	33136	25752	2974208
TPN - 86S	9/27/2015	0	151264	0	785056	864280	33336	400	1834336
TPN - 87S	9/27/2015	0	115544	0	664328	882648	14768	7784	1685072
TPN - 88S	11/13/2015	1500	202128	0	331087	129860	1900	100	666575
TPN - 89S	11/13/2015	2200	131206	0	430678	93399	4846	500	662829
TPS - 49S	7/24/2015	0	64656	0	1025928	50288	40520	3800	1185192
TPS - 50S	7/24/2015	0	43304	0	1306104	44104	13384	3800	1410696
TPS - 51S	8/14/2015	0	309112	0	1486320	194968	16368	2200	2008968
TPS - 52S	8/14/2015	0	96792	0	1286952	116144	15968	9384	1525240
TPS - 52SR	8/14/2015	0	122728	0	1191960	145680	23552	16168	1500088
TPS - 53S	9/27/2015	0	517248	0	1092968	413888	30752	7784	2062640
TPS - 54S	9/27/2015	0	280376	0	676696	731784	19968	8784	1717608
WAL - 49S	5/15/2015	0	17831	0	425632	10546	92753	100	546861
WAL - 50S	5/15/2015	0	14184	0	485816	4500	59338	200	564038
WAL - 51S	7/19/2015	7184	58272	0	2161800	138912	83824	8184	2458176
WAL - 51SR	7/19/2015	0	94392	0	2073392	79240	77440	22552	2347016
WAL - 52S	7/19/2015	0	93792	0	1594064	102992	18968	9584	1819400
WAL - 53S	8/19/2015	800	1316072	0	1689240	460040	129944	600	3596696
WAL - 54S	8/19/2015	7384	1251216	0	1265384	515512	95440	15568	3150504
WAL - 55S	9/26/2015	200	526032	0	2084176	283640	86056	30536	3010640
WAL - 55SR	9/26/2015	7184	489712	0	2064624	288824	77672	30936	2958952
WAL - 56S	9/26/2015	0	476244	0	1875840	428088	154696	29536	2964404
WAL - 57S	11/22/2015	0	39907	0	588653	22084	31969	300	682913
WAL - 58S	11/22/2015	0	53592	0	461293	16692	51599	600	583776

Seasonal Phytoplankton biomass for CREMP 2015

******** *R=QA\QC sample*

*****All data are in (mg m^{-3})*

Station	date	Cyanophyte mg m^{-3}	Chlorophyte mg m^{-3}	Euglenophyte mg m^{-3}	Chrysophyte mg m^{-3}	Diatoms mg m^{-3}	Cryptophytes mg m^{-3}	Dinoflagellates mg m^{-3}	Total biomass mg m^{-3}	# species	Simpsons diversity
BAP - 38S1	21/Jul/15	0.00	1.51	0.00	134.34	5.83	25.80	10.96	178.44	33	0.82
BAP - 38S2	21/Jul/15	0.00	2.07	3.11	225.62	9.00	36.79	16.63	293.21	37	0.80
BAP - 39S	15/Aug/15	0.00	3.81	0.00	185.32	20.80	28.07	7.00	245.00	41	0.88
BAP - 40S	15/Aug/15	0.00	3.87	0.00	177.02	18.74	14.37	13.99	227.99	44	0.84
BBD - 37S	21/Jul/15	0.00	4.47	0.00	62.80	7.85	7.91	8.73	91.76	31	0.82
BBD - 38S	21/Jul/15	0.00	1.63	0.00	98.68	5.87	30.51	28.83	165.51	33	0.86
BBD - 39S	15/Aug/15	0.00	5.08	2.11	127.10	18.58	38.40	3.29	194.55	42	0.90
BBD - 40S	15/Aug/15	0.00	14.28	2.18	128.80	27.40	53.56	9.40	235.62	47	0.89
BPJ - 37S	21/Jul/15	0.44	2.53	1.60	92.06	5.34	13.29	24.30	139.56	39	0.84
BPJ - 38S	21/Jul/15	0.00	2.51	0.00	104.25	9.11	22.38	12.74	150.98	34	0.82
BPJ - 38SR	21/Jul/15	0.00	3.23	0.00	102.66	9.07	22.85	14.88	152.68	33	0.79
BPJ - 39S	15/Aug/15	0.00	6.74	0.00	174.17	29.03	41.41	12.78	264.13	45	0.84
BPJ - 39SR	15/Aug/15	0.00	5.93	0.00	176.93	25.06	44.12	12.21	264.26	43	0.85
BPJ - 40S	15/Aug/15	0.00	7.48	0.00	141.07	27.03	35.96	8.08	219.61	43	0.88
DUP - 1	16/May/15	0.00	0.00	0.00	28.75	3.44	12.64	30.36	75.18	17	0.71
DUP - 1	1/Jul/15	0.00	1.11	0.00	230.45	11.66	23.38	11.07	277.67	33	0.89
DUP - 1	1/Aug/15	0.09	5.57	0.00	174.77	21.98	27.07	9.71	239.21	40	0.88
DUP - 1	1/Nov/15	0.40	0.79	0.00	45.97	5.72	6.47	1.56	60.91	28	0.82
DUP - 2	1/Jul/15	0.03	1.70	0.00	121.49	10.30	38.50	7.48	179.50	33	0.81
DUP - 2	1/Aug/15	0.06	5.56	0.00	89.17	27.38	6.25	8.00	136.42	32	0.81
DUP - 2	1/Sep/15	0.07	10.61	0.00	57.66	22.21	11.81	4.76	107.11	27	0.83
DUP - 3	1/Aug/15	0.00	5.47	0.00	156.65	31.99	4.21	18.45	216.77	33	0.88
DUP - 3	1/Sep/15	5.95	5.32	0.00	113.58	12.10	1.32	6.62	144.88	29	0.90
INUG - 68S	16/May/15	0.00	0.30	0.00	41.69	7.16	9.25	9.05	67.45	25	0.67
INUG - 69S	16/May/15	0.00	0.60	0.00	23.25	5.06	10.15	1.56	40.62	17	0.68
INUG - 70S	27/Jul/15	0.00	2.38	0.00	368.81	13.06	14.99	13.60	412.84	30	0.85
INUG - 71S	27/Jul/15	0.00	2.13	0.00	398.85	6.34	12.17	20.84	440.33	33	0.85
INUG - 72S	27/Aug/15	0.10	5.76	0.00	156.60	13.32	1.02	2.29	179.10	35	0.89
INUG - 73S	27/Aug/15	0.59	6.39	0.00	167.17	11.64	5.78	9.99	201.56	37	0.90
INUG - 74S	1/Oct/15	3.39	6.04	0.00	156.27	20.71	9.65	8.13	204.19	40	0.90
INUG - 75S	1/Oct/15	1.97	8.31	0.00	147.89	18.04	7.03	7.94	191.19	39	0.86
INUG - 76S	23/Nov/15	0.69	6.66	0.00	29.53	3.86	12.99	9.77	63.50	22	0.85
INUG - 77S	23/Nov/15	1.38	3.10	0.00	39.02	4.05	7.48	9.51	64.54	25	0.79
INUG - 77SR	23/Nov/15	0.35	3.66	0.00	41.44	4.38	6.81	0.33	56.97	26	0.81
PDL - 37S	28/Jul/15	0.00	0.59	0.00	198.76	13.66	7.78	6.64	227.43	28	0.72
PDL - 38S	28/Jul/15	0.00	0.07	0.00	230.32	10.16	6.26	15.07	261.88	23	0.71
PDL - 39S	26/Aug/15	0.84	7.83	0.00	127.44	16.64	2.49	2.32	157.57	32	0.84
PDL - 40S	26/Aug/15	0.90	5.35	0.00	134.66	16.33	2.24	2.11	161.59	32	0.85
PDL - 41S	4/Oct/15	2.51	8.95	0.00	97.02	11.44	3.96	13.33	137.20	30	0.91
SP - 80S	17/May/15	0.00	0.00	0.00	125.99	2.45	2.46	6.93	137.83	19	0.65
SP - 81S	17/May/15	0.00	0.00	0.00	93.86	2.36	8.41	7.34	111.97	20	0.60
SP - 82S	15/Jul/15	0.00	1.07	0.00	201.38	27.27	10.28	15.25	255.25	32	0.81
SP - 83S	15/Jul/15	0.00	2.61	0.00	406.57	39.20	6.23	12.55	467.16	33	0.76
SP - 84S	13/Aug/15	0.00	4.81	0.00	71.41	23.29	3.57	2.52	105.61	32	0.89
SP - 85S	13/Aug/15	1.79	4.56	0.00	80.34	27.17	0.36	0.97	115.19	26	0.88
SP - 85SR	13/Aug/15	0.70	2.37	0.00	74.20	27.25	0.36	7.25	112.12	28	0.87
SP - 86S	6/Sep/15	0.00	4.09	0.00	60.83	24.84	8.67	1.51	99.94	32	0.88
SP - 87S	6/Sep/15	0.36	4.80	0.00	71.55	27.21	10.41	2.82	117.14	32	0.86
SP - 88S	2/Nov/15	0.00	1.89	0.00	48.71	34.13	30.38	6.42	121.52	30	0.87
SP - 89S	2/Nov/15	0.00	1.70	0.00	30.06	15.19	9.76	5.31	62.02	24	0.78
TE - 80S	14/May/15	0.00	0.18	0.00	48.77	0.17	14.89	7.91	71.92	17	0.70
TE - 81S	14/May/15	0.00	2.70	0.00	59.77	1.25	24.84	9.19	97.75	17	0.71
TE - 81SR	14/May/15	0.00	2.28	0.00	60.64	1.13	25.76	10.07	99.87	18	0.73
TE - 82S	27/Jul/15	0.00	5.14	0.00	143.01	11.24	17.76	2.35	179.50	32	0.77
TE - 83S	27/Jul/15	1.93	4.52	0.00	225.20	20.73	22.49	13.26	288.12	35	0.84
TE - 84S	28/Aug/15	0.34	3.55	0.00	109.13	9.10	3.31	3.65	129.08	34	0.87
TE - 85S	28/Aug/15	0.00	4.97	0.00	106.75	14.00	0.29	3.23	129.24	31	0.89
TE - 86S	4/Oct/15	0.74	7.15	0.00	122.07	10.65	10.55	2.82	153.99	37	0.85
TE - 87S	4/Oct/15	0.46	3.33	0.00	142.18	22.28	9.22	0.21	177.68	36	0.85
TE - 88S	21/Nov/15	0.18	1.27	0.00	44.63	1.93	4.01	1.98	54.01	25	0.82
TE - 89S	21/Nov/15	0.33	0.59	0.00	41.24	2.83	5.71	10.47	61.16	24	0.78
TEFF - 37S	27/Jul/15	0.00	3.58	0.00	207.41	13.07	1.57	14.14	239.77	34	0.75
TEFF - 38S	27/Jul/15	0.00	7.62	0.00	248.25	13.55	4.06	8.14	281.63	35	0.78
TEFF - 39S	28/Aug/15	0.28	5.90	0.00	116.36	12.34	1.60	7.61	144.09	30	0.87
TEFF - 40S	28/Aug/15	0.90	1.65	0.00	113.46	7.75	1.06	3.41	128.23	30	0.84
TEFF - 41S	4/Oct/15	1.14	12.37	0.00	154.84	16.44	3.21	9.75	197.75	35	0.87
TEFF - 41SR	4/Oct/15	1.54	3.17	0.00	162.37	17.29	4.50	5.64	194.51	36	0.87
TEFF - 42S	4/Oct/15	1.09	4.78	0.00	169.97	16.59	4.75	1.15	198.33	34	0.87
TPE - 80S	15/May/15	0.00	0.42	0.00	23.87	0.66	4.52	1.03	30.50	18	0.66
TPE - 81S	15/May/15	0.00	0.41	0.00	22.19	0.86	3.77	0.49	27.72	17	0.75
TPE - 82S	15/Jul/15	0.00	0.86	0.00	68.62	1.55	0.79	6.70	78.52	23	0.64
TPE - 83S	15/Jul/15	0.00	1.82	0.00	97.34	6.63	1.43	7.88	115.09	29	0.72
TPE - 84S	29/Aug/15	0.38	10.42	0.00	61.15	39.07	0.15	0.43	111.61	25	0.72
TPE - 85S	29/Aug/15	0.13	17.19	0.00	140.66	59.82	13.67	8.99	240.46	37	0.85
TPE - 86S	27/Sep/15	0.25	7.03	0.00	86.95	23.59	11.94	4.87	134.63	33	0.77
TPE - 87S	27/Sep/15	0.14	11.16	0.00	86.08	26.09	10.18	9.16	142.80	32	0.78
TPE - 88S	13/Nov/15	0.03	2.85	0.00	33.43	5.38	7.94	0.10	49.73	19	0.77
TPE - 89S	13/Nov/15	0.02	3.46	0.00	33.66	10.50	1.45	0.16	49.25	26	0.78
TPN - 80S	16/May/15	0.00	0.00	0.00	30.01	0.25	12.54	4.94	47.73	14	0.62
TPN - 81S	16/May/15	0.00	0.00	0.00	38.79	0.12	18.93	7.99	65.83	15	0.67
TPN - 82S	24/Jul/15	0.00	2.51	0.00	109.91	2.47	7.67	29.41	151.98	27	0.81
TPN - 83S	24/Jul/15	0.00	0.73	0.00	145.83	4.40	7.38	19.70	178.04	25	0.84
TPN - 83SR	24/Jul/15	0.00	1.04	0.00	133.71	3.61	6.62	17.36	162.34	24	0.82
TPN - 84S	29/Aug/15	0.03	7.30	0.00	202.68	19.84	5.52	28.01	263.39	31	0.85
TPN - 85S	29/Aug/15	0.00	3.13	0.00	342.01	25.48	4.95	17.95	393.53	32	0.88
TPN - 86S	27/Sep/15	0.00	3.38	0.00	71.49	27.34	9.56	0.42	112.18	29	0.76
TPN - 87S	27/Sep/15	0.00	3.37	0.00	74.22	33.19	1.89	3.28	115.94	30	0.76
TPN - 88S	13/Nov/15	0.34	1.82	0.00	50.39	32.80	2.65	1.56	89.56	22	0.82
TPN - 89S	13/Nov/15	0.54	2.29	0.00	23.18	3.26	2.01	6.40	37.67	21	0.83
TPS - 49S	24/Jul/15	0.00	1.36	0.00	109.16	1.23	10.14	13.97	135.86	25	0.76
TPS - 50S	24/Jul/15	0.00	1.41	0.00	126.61	2.80	8.95	29.78	169.55	29	0.78
TPS - 51S	14/Aug/15	0.00	9.16	0.00	169.60	7.67	2.79	15.10	204.31	33	0.88
TPS - 52S	14/Aug/15	0.00	7.69	0.00	121.30	6.61	2.50	17.19	155.30	35	0.86
TPS - 52SR	14/Aug/15	0.00	3.50	0.00	113.41	8.64	3.43	21.95	150.93	35	0.89
TPS - 53S	27/Sep/15	0.00	11.44	0.00	84.89	14.11	14.55	4.76	129.75	35	0.88
TPS - 54S	27/Sep/15	0.00	4.38	0.00	70.40	33.37	5.60	5.01	118.76	31	0.84
WAL - 49S	15/May/15	0.00	0.13	0.00	19.54	15.69	11.59	0.11	47.06	18	0.73
WAL - 50S	15/May/15	0.00	0.07	0.00	23.26	8.87	7.68	1.01	40.88	16	0.75
WAL - 51S	19/Jul/15	0.29	1.26	0.00	246.03	10.86	10.84	11.59	280.85	35	0.81
WAL - 51SR	19/Jul/15	0.00	1.75	0.00	222.78	9.85	10.49	10.58	255.45	33	0.81
WAL - 52S	19/Jul/15	0.00	3.18	0.00	180.59	11.84	6.90	17.58	220.09	37	0.84
WAL - 53S	19/Aug/15	0.31	24.47	0.00	136.79	81.46	24.23	5.52	272.78	41	0.88
WAL - 54S	19/Aug/15	1.07	20.90	0.00	98.60	81.82	27.24	15.46	245.10	46	0.87

Station	date	Cyanophyte mg m^{-3}	Chlorophyte mg m^{-3}	Euglenophyte mg m^{-3}	Chrysophyte mg m^{-3}	Diatoms mg m^{-3}	Cryptophytes mg m^{-3}	Dinoflagellates mg m^{-3}	Total biomass mg m^{-3}	# species	Simpsons diversity
WAL - 55S	26/Sep/15	0.32	11.58	0.00	183.97	23.13	32.80	34.88	286.69	38	0.86
WAL - 55SR	26/Sep/15	0.47	8.13	0.00	196.60	29.30	30.72	36.73	301.95	40	0.87
WAL - 56S	26/Sep/15	0.00	15.73	0.00	178.64	19.37	35.94	20.98	270.66	36	0.87
WAL - 57S	22/Nov/15	0.00	3.14	0.00	47.10	2.70	8.26	4.22	65.43	23	0.84
WAL - 58S	22/Nov/15	0.00	4.90	0.00	44.60	4.77	12.66	1.83	68.76	24	0.85

Phytoplankton species data for CREMP 2015

** 1st number in **species code** = group 1=cyanophyte 2=chlorophyte
3= Euglenophyte 4=chrysophyte 5=diatoms 6=Cryptophyte 7=Dinoflagellates
***R=QA\QC sample
** total daily biomass is sum of all species on a date.

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
BAP - 38S1	21-Jul-15	2105	Chlamydomonas spp.	7184	0.24	7.00	3.00	33.00
BAP - 38S1	21-Jul-15	2137	Dictyosphaerium simplex Sukja	14368	0.07	2.10	2.10	4.80
BAP - 38S1	21-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
BAP - 38S1	21-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.93	34.00	2.20	64.60
BAP - 38S1	21-Jul-15	2512	Scenedesmus acuminatus Chodat	14368	0.24	7.00	2.60	16.50
BAP - 38S1	21-Jul-15	4351	Small chrysophyceae	251440	4.73	3.30	3.30	18.80
BAP - 38S1	21-Jul-15	4352	Large chrysophyceae	43104	16.45	9.00	9.00	381.70
BAP - 38S1	21-Jul-15	4355	Chrysochromulina parva Lackey	21552	1.41	5.00	5.00	65.40
BAP - 38S1	21-Jul-15	4357	Chrysococcus sp.	567536	37.12	5.00	5.00	65.40
BAP - 38S1	21-Jul-15	4362	Kephyrion sp.	107760	2.03	3.30	3.30	18.80
BAP - 38S1	21-Jul-15	4372	Mallomonas tonsurata Teiling and Krieger	400	0.76	25.10	12.00	1892.50
BAP - 38S1	21-Jul-15	4378	Dinobryon borgei Lemmermann	7184	0.32	8.90	3.10	44.80
BAP - 38S1	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
BAP - 38S1	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	2400	5.16	0.00	0.00	2150.00
BAP - 38S1	21-Jul-15	4390	Dinobryon sociale Ehrenberg	21552	4.88	12.00	6.00	226.20
BAP - 38S1	21-Jul-15	4390	Dinobryon sociale Ehrenberg	200	0.40	0.00	0.00	1990.00
BAP - 38S1	21-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	57472	1.72	5.60	3.20	30.00
BAP - 38S1	21-Jul-15	4400	Ochromonas sp.	7184	0.76	10.00	4.50	106.00
BAP - 38S1	21-Jul-15	4401	Uroglena volvox Ehrenberg	50288	5.69	6.00	6.00	113.10
BAP - 38S1	21-Jul-15	4403	Chrysosphaerella longispina Lauterborn	28736	15.05	10.00	10.00	523.60
BAP - 38S1	21-Jul-15	4413	Chrysochromulina laurentiana Kling	71840	27.42	9.00	9.00	381.70
BAP - 38S1	21-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	28736	0.93	6.00	3.20	32.20
BAP - 38S1	21-Jul-15	4436	Dinobryon attenatum Hill	7184	1.41	10.40	6.00	196.00
BAP - 38S1	21-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.94	10.00	20.00	1570.80
BAP - 38S1	21-Jul-15	5518	Synedra acus Kutzing	4000	0.34	81.00	2.00	84.80
BAP - 38S1	21-Jul-15	5518	Synedra acus Kutzing	4400	0.51	110.00	2.00	115.20
BAP - 38S1	21-Jul-15	5524	Asterionella formosa Hassall	3200	0.32	96.00	2.00	100.50
BAP - 38S1	21-Jul-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	400	2.49	100.00	8.90	6221.10
BAP - 38S1	21-Jul-15	5551	Cyclotella michiganiana Skvortzow	64656	1.23	2.30	4.60	19.10
BAP - 38S1	21-Jul-15	6554	Rhodomonas minuta Skuja	64656	8.53	10.50	6.00	131.90
BAP - 38S1	21-Jul-15	6558	Cryptomonas erosa Ehrenberg	8400	14.31	24.90	14.00	1703.60
BAP - 38S1	21-Jul-15	6565	Cryptomonas rostratiformis Skuja	600	1.23	30.00	14.00	2052.50
BAP - 38S1	21-Jul-15	6568	Katablepharis ovalis Skuja	35920	1.73	8.30	4.00	48.10
BAP - 38S1	21-Jul-15	7632	Gymnodinium sp.	200	1.84	26.00	26.00	9202.80
BAP - 38S1	21-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	1200	1.88	15.30	14.00	1570.20
BAP - 38S1	21-Jul-15	7641	Peridinium aciculiferum Lemmermann	800	7.24	30.00	24.00	9047.80
BAP - 38S2	21-Jul-15	2105	Chlamydomonas spp.	21552	0.61	6.00	3.00	28.30
BAP - 38S2	21-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
BAP - 38S2	21-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.39	34.00	2.20	64.60
BAP - 38S2	21-Jul-15	3301	Euglena acus Ehrenberg	200	3.11	116.00	16.00	15548.80
BAP - 38S2	21-Jul-15	4351	Small chrysophyceae	416672	7.83	3.30	3.30	18.80
BAP - 38S2	21-Jul-15	4352	Large chrysophyceae	35920	13.71	9.00	9.00	381.70
BAP - 38S2	21-Jul-15	4355	Chrysochromulina parva Lackey	64656	4.23	5.00	5.00	65.40
BAP - 38S2	21-Jul-15	4357	Chrysococcus sp.	1099152	71.88	5.00	5.00	65.40
BAP - 38S2	21-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	14368	7.30	9.90	9.90	508.00
BAP - 38S2	21-Jul-15	4362	Kephyrion sp.	186784	3.51	3.30	3.30	18.80
BAP - 38S2	21-Jul-15	4363	Spinifiromonas sirratus**********	7184	0.94	6.30	6.30	130.90
BAP - 38S2	21-Jul-15	4372	Mallomonas tonsurata Teiling and Krieger	400	0.76	25.10	12.00	1892.50
BAP - 38S2	21-Jul-15	4375	Synura sphagnicola Korschikow	200	3.06	0.00	0.00	15300.00
BAP - 38S2	21-Jul-15	4378	Dinobryon borgei Lemmermann	21552	0.97	8.90	3.10	44.80
BAP - 38S2	21-Jul-15	4383	Dinobryon bavaricum Imhof	200	0.40	0.00	0.00	1990.00
BAP - 38S2	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
BAP - 38S2	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	4800	10.32	0.00	0.00	2150.00
BAP - 38S2	21-Jul-15	4390	Dinobryon sociale Ehrenberg	21552	4.88	12.00	6.00	226.20
BAP - 38S2	21-Jul-15	4390	Dinobryon sociale Ehrenberg	1600	3.18	0.00	0.00	1990.00
BAP - 38S2	21-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	179600	5.39	5.60	3.20	30.00
BAP - 38S2	21-Jul-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
BAP - 38S2	21-Jul-15	4403	Chrysosphaerella longispina Lauterborn	21552	11.28	10.00	10.00	523.60
BAP - 38S2	21-Jul-15	4403	Chrysosphaerella longispina Lauterborn	400	7.63	0.00	0.00	19075.00
BAP - 38S2	21-Jul-15	4413	Chrysochromulina laurentiana Kling	136496	52.10	9.00	9.00	381.70
BAP - 38S2	21-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	50288	1.62	6.00	3.20	32.20
BAP - 38S2	21-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	1000	1.57	10.00	20.00	1570.80
BAP - 38S2	21-Jul-15	5511	Rhizosolenia eriense H.L. Smith	7184	0.56	11.00	3.00	77.80
BAP - 38S2	21-Jul-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1000	0.76	81.00	6.00	763.40
BAP - 38S2	21-Jul-15	5518	Synedra acus Kutzing	1800	0.15	81.00	2.00	84.80
BAP - 38S2	21-Jul-15	5518	Synedra acus Kutzing	4200	0.48	110.00	2.00	115.20
BAP - 38S2	21-Jul-15	5524	Asterionella formosa Hassall	4200	0.42	96.00	2.00	100.50
BAP - 38S2	21-Jul-15	5529	Eunotia zazumenensis **********	2000	0.08	46.00	1.80	39.00
BAP - 38S2	21-Jul-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	800	4.28	86.00	8.90	5350.20
BAP - 38S2	21-Jul-15	5551	Cyclotella michiganiana Skvortzow	35920	0.69	2.30	4.60	19.10
BAP - 38S2	21-Jul-15	6554	Rhodomonas minuta Skuja	208336	27.48	10.50	6.00	131.90
BAP - 38S2	21-Jul-15	6558	Cryptomonas erosa Ehrenberg	3400	5.79	24.90	14.00	1703.60
BAP - 38S2	21-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.41	30.00	14.00	2052.50
BAP - 38S2	21-Jul-15	6568	Katablepharis ovalis Skuja	64656	3.11	8.30	4.00	48.10

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
BAP - 38S2	21-Jul-15	7632	Gymnodinium sp.	200	1.84	26.00	26.00	9202.80
BAP - 38S2	21-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.31	15.30	14.00	1570.20
BAP - 38S2	21-Jul-15	7641	Peridinium aciculiferum Lemmermann	1600	14.48	30.00	24.00	9047.80
BAP - 39S	15-Aug-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60
BAP - 39S	15-Aug-15	2121	Oocystis lacustris Chodat	28736	1.17	6.00	3.60	40.70
BAP - 39S	15-Aug-15	2137	Dictyosphaerium simplex Sukja	57472	0.28	2.10	2.10	4.80
BAP - 39S	15-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	79024	0.37	3.00	3.00	4.70
BAP - 39S	15-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.34	36.00	2.10	62.30
BAP - 39S	15-Aug-15	2512	Scenedesmus acuminatus Chodat	14368	0.32	7.00	3.00	22.00
BAP - 39S	15-Aug-15	4351	Small chrysophyceae	466960	7.28	3.10	3.10	15.60
BAP - 39S	15-Aug-15	4352	Large chrysophyceae	71840	11.82	6.80	6.80	164.60
BAP - 39S	15-Aug-15	4357	Chrysococcus sp.	783056	51.21	5.00	5.00	65.40
BAP - 39S	15-Aug-15	4362	Kephyrion sp.	208336	4.29	3.40	3.40	20.60
BAP - 39S	15-Aug-15	4363	Spinifiromonas sirratus**********	14368	2.16	6.60	6.60	150.50
BAP - 39S	15-Aug-15	4364	Mallomonas caudata Ivanov	200	1.07	40.00	16.00	5361.70
BAP - 39S	15-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.68	21.60	10.00	1131.00
BAP - 39S	15-Aug-15	4378	Dinobryon borgei Lemmermann	186784	8.46	9.00	3.10	45.30
BAP - 39S	15-Aug-15	4381	Dinobryon mucronutom Nygaard	28736	3.76	10.00	5.00	130.90
BAP - 39S	15-Aug-15	4383	Dinobryon bavaricum Imhof	28736	6.50	12.00	6.00	226.20
BAP - 39S	15-Aug-15	4383	Dinobryon bavaricum Imhof	600	0.74	0.00	0.00	1225.00
BAP - 39S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	57472	13.00	12.00	6.00	226.20
BAP - 39S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	4200	14.24	0.00	0.00	3390.00
BAP - 39S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	71840	16.25	12.00	6.00	226.20
BAP - 39S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	1600	3.18	0.00	0.00	1990.00
BAP - 39S	15-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	158048	5.31	5.90	3.30	33.60
BAP - 39S	15-Aug-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
BAP - 39S	15-Aug-15	4403	Chrysosphaerella longispina Lauterborn	7184	3.76	10.00	10.00	523.60
BAP - 39S	15-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
BAP - 39S	15-Aug-15	4413	Chrysochromulina laurentiana Kling	57472	21.94	9.00	9.00	381.70
BAP - 39S	15-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	129312	4.42	6.00	3.30	34.20
BAP - 39S	15-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	1400	2.20	10.00	20.00	1570.80
BAP - 39S	15-Aug-15	5509	Cyclotella ocellata Pant.	7184	0.96	4.40	8.80	133.80
BAP - 39S	15-Aug-15	5511	Rhizosolenia eriense H.L. Smith	35920	2.79	11.00	3.00	77.80
BAP - 39S	15-Aug-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	3000	2.35	83.00	6.00	782.30
BAP - 39S	15-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	600	0.80	26.00	14.00	1334.10
BAP - 39S	15-Aug-15	5518	Synedra acus Kutzing	26400	3.04	110.00	2.00	115.20
BAP - 39S	15-Aug-15	5524	Asterionella formosa Hassall	27000	2.71	96.00	2.00	100.50
BAP - 39S	15-Aug-15	5529	Eunotia zazumenensis **********	4000	0.16	46.00	1.80	39.00
BAP - 39S	15-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	800	2.57	86.00	6.90	3215.80
BAP - 39S	15-Aug-15	5551	Cyclotella michiganiana Skvortzow	71840	1.76	2.50	5.00	24.50
BAP - 39S	15-Aug-15	5720	Cyclotella bodanica Eulenst.	200	1.45	16.65	33.30	7250.40
BAP - 39S	15-Aug-15	6554	Rhodomonas minuta Skuja	79024	5.19	9.30	4.50	65.70
BAP - 39S	15-Aug-15	6558	Cryptomonas erosa Ehrenberg	7400	12.66	25.00	14.00	1710.40
BAP - 39S	15-Aug-15	6565	Cryptomonas rostratiformis Skuja	800	1.70	31.00	14.00	2120.90
BAP - 39S	15-Aug-15	6568	Katablepharis ovalis Skuja	150864	8.52	9.00	4.00	56.50
BAP - 39S	15-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1000	1.57	15.30	14.00	1570.20
BAP - 39S	15-Aug-15	7641	Peridinium aciculiferum Lemmermann	600	5.43	30.00	24.00	9047.80
BAP - 40S	15-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.06	12.00	10.00	314.20
BAP - 40S	15-Aug-15	2105	Chlamydomonas spp.	43104	1.02	5.00	3.00	23.60
BAP - 40S	15-Aug-15	2121	Oocystis lacustris Chodat	21552	0.46	6.00	2.60	21.20
BAP - 40S	15-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.13	16.20	14.00	641.30
BAP - 40S	15-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
BAP - 40S	15-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	28736	1.79	36.00	2.10	62.30
BAP - 40S	15-Aug-15	2512	Scenedesmus acuminatus Chodat	14368	0.32	7.00	3.00	22.00
BAP - 40S	15-Aug-15	4351	Small chrysophyceae	474144	7.40	3.10	3.10	15.60
BAP - 40S	15-Aug-15	4352	Large chrysophyceae	14368	2.36	6.80	6.80	164.60
BAP - 40S	15-Aug-15	4357	Chrysococcus sp.	804608	52.62	5.00	5.00	65.40
BAP - 40S	15-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	28736	11.34	9.10	9.10	394.60
BAP - 40S	15-Aug-15	4362	Kephyrion sp.	100576	2.07	3.40	3.40	20.60
BAP - 40S	15-Aug-15	4363	Spinifiromonas sirratus**********	7184	1.08	6.60	6.60	150.50
BAP - 40S	15-Aug-15	4364	Mallomonas caudata Ivanov	200	1.07	40.00	16.00	5361.70
BAP - 40S	15-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.68	21.60	10.00	1131.00
BAP - 40S	15-Aug-15	4375	Synura sphagnicola Korschikow	200	4.33	0.00	0.00	21650.00
BAP - 40S	15-Aug-15	4378	Dinobryon borgei Lemmermann	122128	5.53	9.00	3.10	45.30
BAP - 40S	15-Aug-15	4383	Dinobryon bavaricum Imhof	21552	4.88	12.00	6.00	226.20
BAP - 40S	15-Aug-15	4383	Dinobryon bavaricum Imhof	1800	2.21	0.00	0.00	1225.00
BAP - 40S	15-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.43	0.00	0.00	2150.00
BAP - 40S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	79024	17.88	12.00	6.00	226.20
BAP - 40S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	1600	5.42	0.00	0.00	3390.00
BAP - 40S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	100576	22.75	12.00	6.00	226.20
BAP - 40S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	800	1.59	0.00	0.00	1990.00
BAP - 40S	15-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	158048	5.31	5.90	3.30	33.60
BAP - 40S	15-Aug-15	4401	Uroglena volvox Ehrenberg	93392	10.56	6.00	6.00	113.10
BAP - 40S	15-Aug-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
BAP - 40S	15-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	28736	0.98	6.00	3.30	34.20
BAP - 40S	15-Aug-15	4436	Dinobryon attenatum Hill	14368	2.82	10.40	6.00	196.00
BAP - 40S	15-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	2200	3.46	10.00	20.00	1570.80
BAP - 40S	15-Aug-15	5509	Cyclotella ocellata Pant.	7184	0.96	4.40	8.80	133.80
BAP - 40S	15-Aug-15	5511	Rhizosolenia eriense H.L. Smith	21552	1.68	11.00	3.00	77.80
BAP - 40S	15-Aug-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1000	0.78	83.00	6.00	782.30
BAP - 40S	15-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.33	16.00	14.00	821.00
BAP - 40S	15-Aug-15	5518	Synedra acus Kutzing	17800	2.05	110.00	2.00	115.20
BAP - 40S	15-Aug-15	5524	Asterionella formosa Hassall	29200	2.93	96.00	2.00	100.50
BAP - 40S	15-Aug-15	5529	Eunotia zazumenensis **********	2800	0.11	46.00	1.80	39.00
BAP - 40S	15-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	800	2.48	83.00	6.90	3103.60

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
BAP - 40S	15-Aug-15	5551	Cyclotella michiganiana Skvortzow	43104	1.06	2.50	5.00	24.50
BAP - 40S	15-Aug-15	5720	Cyclotella bodanica Eulenst.	400	2.90	16.65	33.30	7250.40
BAP - 40S	15-Aug-15	6554	Rhodomonas minuta Skuja	14368	0.94	9.30	4.50	65.70
BAP - 40S	15-Aug-15	6558	Cryptomonas erosa Ehrenberg	4000	6.90	25.20	14.00	1724.10
BAP - 40S	15-Aug-15	6565	Cryptomonas rostratiformis Skuja	400	0.85	31.00	14.00	2120.90
BAP - 40S	15-Aug-15	6568	Katablepharis ovalis Skuja	100576	5.68	9.00	4.00	56.50
BAP - 40S	15-Aug-15	7632	Gymnodinium sp.	400	3.68	26.00	26.00	9202.80
BAP - 40S	15-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	800	1.26	15.30	14.00	1570.20
BAP - 40S	15-Aug-15	7641	Peridinium aciculiferum Lemmermann	1000	9.05	30.00	24.00	9047.80
BBD - 37S	21-Jul-15	2101	Carteria spp.	21552	3.25	8.00	6.00	150.80
BBD - 37S	21-Jul-15	2105	Chlamydomonas spp.	21552	0.61	6.00	3.00	28.30
BBD - 37S	21-Jul-15	2137	Dictyosphaerium simplex Sukja	14368	0.07	2.10	2.10	4.80
BBD - 37S	21-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
BBD - 37S	21-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.51	37.00	2.20	70.30
BBD - 37S	21-Jul-15	4351	Small chrysophyceae	57472	1.40	3.60	3.60	24.40
BBD - 37S	21-Jul-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
BBD - 37S	21-Jul-15	4357	Chrysococcus sp.	344832	19.97	4.80	4.80	57.90
BBD - 37S	21-Jul-15	4361	Kephyrion boreale Skuja	7184	0.50	5.10	5.10	69.50
BBD - 37S	21-Jul-15	4362	Kephyrion sp.	64656	0.74	2.80	2.80	11.50
BBD - 37S	21-Jul-15	4378	Dinobryon borgei Lemmermann	21552	1.01	8.20	3.30	46.80
BBD - 37S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
BBD - 37S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	2600	2.51	0.00	0.00	965.00
BBD - 37S	21-Jul-15	4390	Dinobryon sociale Ehrenberg	14368	3.25	12.00	6.00	226.20
BBD - 37S	21-Jul-15	4390	Dinobryon sociale Ehrenberg	200	0.40	0.00	0.00	1990.00
BBD - 37S	21-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	107760	3.05	6.00	3.00	28.30
BBD - 37S	21-Jul-15	4400	Ochromonas sp.	7184	0.44	7.30	4.00	61.20
BBD - 37S	21-Jul-15	4403	Chrysosphaerella longispina Lauterborn	14368	7.52	10.00	10.00	523.60
BBD - 37S	21-Jul-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
BBD - 37S	21-Jul-15	4436	Dinobryon attenatum Hill	7184	1.35	10.00	6.00	188.50
BBD - 37S	21-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	1400	2.55	10.50	21.00	1818.40
BBD - 37S	21-Jul-15	5511	Rhizosolenia eriense H.L. Smith	7184	0.56	11.00	3.00	77.80
BBD - 37S	21-Jul-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	200	0.14	75.00	6.00	706.90
BBD - 37S	21-Jul-15	5518	Synedra acus Kutzing	5000	0.52	100.00	2.00	104.70
BBD - 37S	21-Jul-15	5524	Asterionella formosa Hassall	800	0.08	91.00	2.00	95.30
BBD - 37S	21-Jul-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	400	2.07	103.00	8.00	5177.30
BBD - 37S	21-Jul-15	5551	Cyclotella michiganiana Skvortzow	79024	1.94	2.50	5.00	24.50
BBD - 37S	21-Jul-15	6554	Rhodomonas minuta Skuja	14368	1.99	11.00	6.00	138.20
BBD - 37S	21-Jul-15	6558	Cryptomonas erosa Ehrenberg	4000	4.83	24.00	12.00	1206.40
BBD - 37S	21-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.42	31.00	14.00	2120.90
BBD - 37S	21-Jul-15	6568	Katablepharis ovalis Skuja	14368	0.67	8.20	4.00	46.90
BBD - 37S	21-Jul-15	7632	Gymnodinium sp.	200	3.12	31.00	31.00	15598.50
BBD - 37S	21-Jul-15	7641	Peridinium aciculiferum Lemmermann	600	5.61	31.00	24.00	9349.40
BBD - 38S	21-Jul-15	2105	Chlamydomonas spp.	35920	1.02	6.00	3.00	28.30
BBD - 38S	21-Jul-15	2145	Crucigenia quadrata Morr.	28736	0.14	3.00	3.00	4.70
BBD - 38S	21-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
BBD - 38S	21-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.41	33.00	2.10	57.10
BBD - 38S	21-Jul-15	4351	Small chrysophyceae	301728	7.36	3.60	3.60	24.40
BBD - 38S	21-Jul-15	4352	Large chrysophyceae	86208	15.48	7.00	7.00	179.60
BBD - 38S	21-Jul-15	4355	Chrysochromulina parva Lackey	35920	2.35	5.00	5.00	65.40
BBD - 38S	21-Jul-15	4357	Chrysococcus sp.	366384	21.21	4.80	4.80	57.90
BBD - 38S	21-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.65	8.90	8.90	369.10
BBD - 38S	21-Jul-15	4362	Kephyrion sp.	57472	0.66	2.80	2.80	11.50
BBD - 38S	21-Jul-15	4363	Spinifiromonas sirratus**********	7184	1.08	6.60	6.60	150.50
BBD - 38S	21-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.23	21.60	10.00	1131.00
BBD - 38S	21-Jul-15	4378	Dinobryon borgei Lemmermann	21552	1.03	8.40	3.30	47.90
BBD - 38S	21-Jul-15	4383	Dinobryon bavaricum Imhof	7184	1.76	13.00	6.00	245.00
BBD - 38S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	64656	14.63	12.00	6.00	226.20
BBD - 38S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	1400	1.35	0.00	0.00	965.00
BBD - 38S	21-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	64656	1.83	6.00	3.00	28.30
BBD - 38S	21-Jul-15	4413	Chrysochromulina laurentiana Kling	64656	24.68	9.00	9.00	381.70
BBD - 38S	21-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	28736	0.98	6.00	3.30	34.20
BBD - 38S	21-Jul-15	4436	Dinobryon attenatum Hill	7184	1.40	10.30	6.00	194.20
BBD - 38S	21-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	1000	1.82	10.50	21.00	1818.40
BBD - 38S	21-Jul-15	5509	Cyclotella ocellata Pant.	14368	1.79	4.30	8.60	124.90
BBD - 38S	21-Jul-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	200	0.15	81.00	6.00	763.40
BBD - 38S	21-Jul-15	5514	Tabellaria flocculsa (Roth) Kutzing	800	1.15	28.00	14.00	1436.80
BBD - 38S	21-Jul-15	5518	Synedra acus Kutzing	3400	0.36	100.00	2.00	104.70
BBD - 38S	21-Jul-15	5524	Asterionella formosa Hassall	2400	0.23	91.00	2.00	95.30
BBD - 38S	21-Jul-15	5551	Cyclotella michiganiana Skvortzow	14368	0.37	2.50	5.10	25.50
BBD - 38S	21-Jul-15	6554	Rhodomonas minuta Skuja	129312	18.19	11.20	6.00	140.70
BBD - 38S	21-Jul-15	6558	Cryptomonas erosa Ehrenberg	7200	8.76	24.20	12.00	1216.40
BBD - 38S	21-Jul-15	6565	Cryptomonas rostratiformis Skuja	1200	2.55	31.00	14.00	2120.90
BBD - 38S	21-Jul-15	6568	Katablepharis ovalis Skuja	21552	1.01	8.20	4.00	46.90
BBD - 38S	21-Jul-15	7632	Gymnodinium sp.	600	9.36	31.00	31.00	15598.50
BBD - 38S	21-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	1000	1.37	15.50	13.00	1371.60
BBD - 38S	21-Jul-15	7641	Peridinium aciculiferum Lemmermann	2000	18.10	30.00	24.00	9047.80
BBD - 39S	15-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.10	13.60	12.00	512.70
BBD - 39S	15-Aug-15	2105	Chlamydomonas spp.	21552	1.08	6.00	4.00	50.30
BBD - 39S	15-Aug-15	2121	Oocystis lacustris Chodat	14368	0.34	5.00	3.00	23.60
BBD - 39S	15-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	43104	0.20	3.00	3.00	4.70
BBD - 39S	15-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	35920	2.80	41.00	2.20	77.90
BBD - 39S	15-Aug-15	2512	Scenedesmus acuminatus Chodat	28736	0.55	6.10	3.00	19.20
BBD - 39S	15-Aug-15	3301	Euglena acus Ehrenberg	200	2.11	103.00	14.00	10570.40
BBD - 39S	15-Aug-15	4351	Small chrysophyceae	294544	4.59	3.10	3.10	15.60
BBD - 39S	15-Aug-15	4352	Large chrysophyceae	50288	16.75	8.60	8.60	333.00

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
BBD - 39S	15-Aug-15	4357	Chrysococcus sp.	445408	29.13	5.00	5.00	65.40
BBD - 39S	15-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	14368	4.00	8.10	8.10	278.30
BBD - 39S	15-Aug-15	4361	Kephyrion boreale Skuja	7184	0.63	5.50	5.50	87.10
BBD - 39S	15-Aug-15	4362	Kephyrion sp.	165232	5.54	4.00	4.00	33.50
BBD - 39S	15-Aug-15	4363	Spinifiromonas sirratus**********	21552	2.44	6.00	6.00	113.10
BBD - 39S	15-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.64	20.50	10.00	1073.40
BBD - 39S	15-Aug-15	4378	Dinobryon borgei Lemmermann	64656	4.00	9.10	3.60	61.80
BBD - 39S	15-Aug-15	4383	Dinobryon bavaricum Imhof	14368	3.55	13.10	6.00	246.90
BBD - 39S	15-Aug-15	4383	Dinobryon bavaricum Imhof	200	0.40	0.00	0.00	1990.00
BBD - 39S	15-Aug-15	4386	Dinobryon divergens v. schauinslandii (Lemmermann) Brunr	107760	2.79	5.50	3.00	25.90
BBD - 39S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
BBD - 39S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	1400	3.01	0.00	0.00	2150.00
BBD - 39S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	71840	16.25	12.00	6.00	226.20
BBD - 39S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	600	1.19	0.00	0.00	1990.00
BBD - 39S	15-Aug-15	4394	Epiphyxis sp.	7184	0.56	9.30	4.00	77.90
BBD - 39S	15-Aug-15	4400	Ochromonas sp.	14368	1.08	9.00	4.00	75.40
BBD - 39S	15-Aug-15	4401	Uroglena volvox Ehrenberg	50288	5.69	6.00	6.00	113.10
BBD - 39S	15-Aug-15	4413	Chrysochromulina laurentiana Kling	35920	14.64	9.20	9.20	407.70
BBD - 39S	15-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	122128	3.99	5.10	3.50	32.70
BBD - 39S	15-Aug-15	4436	Dinobryon attenatum Hill	7184	1.35	10.00	6.00	188.50
BBD - 39S	15-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.71	9.10	18.20	1183.70
BBD - 39S	15-Aug-15	5509	Cyclotella ocellata Pant.	14368	2.82	5.00	10.00	196.30
BBD - 39S	15-Aug-15	5511	Rhizosolenia eriense H.L. Smith	50288	3.91	11.00	3.00	77.80
BBD - 39S	15-Aug-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	2600	1.89	77.00	6.00	725.70
BBD - 39S	15-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	200	0.23	22.10	14.00	1134.00
BBD - 39S	15-Aug-15	5518	Synedra acus Kutzing	13600	1.30	91.00	2.00	95.30
BBD - 39S	15-Aug-15	5524	Asterionella formosa Hassall	21600	2.06	91.00	2.00	95.30
BBD - 39S	15-Aug-15	5529	Eunotia zazumenensis **********	4400	0.17	46.00	1.80	39.00
BBD - 39S	15-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	800	4.68	103.00	8.50	5844.70
BBD - 39S	15-Aug-15	5551	Cyclotella michiganiana Skvortzow	43104	0.82	2.30	4.60	19.10
BBD - 39S	15-Aug-15	6554	Rhodomonas minuta Skuja	136496	21.98	12.00	6.20	161.00
BBD - 39S	15-Aug-15	6558	Cryptomonas erosa Ehrenberg	7600	12.27	23.60	14.00	1614.60
BBD - 39S	15-Aug-15	6565	Cryptomonas rostratiformis Skuja	600	1.23	30.00	14.00	2052.50
BBD - 39S	15-Aug-15	6568	Katablepharis ovalis Skuja	50288	2.92	9.00	4.10	58.00
BBD - 39S	15-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1400	1.48	14.00	12.00	1055.60
BBD - 39S	15-Aug-15	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
BBD - 40S	15-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.14	13.60	14.00	697.90
BBD - 40S	15-Aug-15	2101	Carteria spp.	7184	6.50	12.00	12.00	904.80
BBD - 40S	15-Aug-15	2105	Chlamydomonas spp.	28736	1.45	6.00	4.00	50.30
BBD - 40S	15-Aug-15	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
BBD - 40S	15-Aug-15	2193	Staurodesmus paradoxum Meyen	200	0.56	27.00	22.00	2799.20
BBD - 40S	15-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
BBD - 40S	15-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	50288	3.92	41.00	2.20	77.90
BBD - 40S	15-Aug-15	2238	Eudorina sp.	200	0.54	0.00	0.00	2680.00
BBD - 40S	15-Aug-15	2512	Scenedesmus acuminatus Chodat	28736	0.55	6.10	3.00	19.20
BBD - 40S	15-Aug-15	3301	Euglena acus Ehrenberg	200	2.18	106.00	14.00	10878.30
BBD - 40S	15-Aug-15	4351	Small chrysophyceae	445408	6.95	3.10	3.10	15.60
BBD - 40S	15-Aug-15	4352	Large chrysophyceae	21552	7.18	8.60	8.60	333.00
BBD - 40S	15-Aug-15	4355	Chrysochromulina parva Lackey	21552	1.41	5.00	5.00	65.40
BBD - 40S	15-Aug-15	4357	Chrysococcus sp.	409488	26.78	5.00	5.00	65.40
BBD - 40S	15-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	14368	4.00	8.10	8.10	278.30
BBD - 40S	15-Aug-15	4362	Kephyrion sp.	35920	1.20	4.00	4.00	33.50
BBD - 40S	15-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	800	0.86	20.50	10.00	1073.40
BBD - 40S	15-Aug-15	4370	Mallomonas akrokomos Asmund and Kristiansen	7184	2.34	17.30	6.00	326.10
BBD - 40S	15-Aug-15	4372	Mallomonas tonsurata Teiling and Krieger	600	1.13	25.00	12.00	1885.00
BBD - 40S	15-Aug-15	4378	Dinobryon borgei Lemmermann	71840	4.44	9.10	3.60	61.80
BBD - 40S	15-Aug-15	4383	Dinobryon bavaricum Imhof	14368	3.25	12.00	6.00	226.20
BBD - 40S	15-Aug-15	4383	Dinobryon bavaricum Imhof	200	0.40	0.00	0.00	1990.00
BBD - 40S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	107760	24.38	12.00	6.00	226.20
BBD - 40S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	1200	2.58	0.00	0.00	2150.00
BBD - 40S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	35920	8.13	12.00	6.00	226.20
BBD - 40S	15-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	86208	2.23	5.50	3.00	25.90
BBD - 40S	15-Aug-15	4400	Ochromonas sp.	14368	1.25	9.00	4.30	87.10
BBD - 40S	15-Aug-15	4401	Uroglena volvox Ehrenberg	14368	1.63	6.00	6.00	113.10
BBD - 40S	15-Aug-15	4413	Chrysochromulina laurentiana Kling	43104	17.57	9.20	9.20	407.70
BBD - 40S	15-Aug-15	4415	Bicoeca lacustris Clark	7184	0.22	3.90	3.90	31.10
BBD - 40S	15-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	201152	6.58	5.10	3.50	32.70
BBD - 40S	15-Aug-15	4436	Dinobryon attenatum Hill	14368	2.71	10.00	6.00	188.50
BBD - 40S	15-Aug-15	4437	Pteridomonas sp.	7184	1.59	8.60	8.60	222.00
BBD - 40S	15-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.47	9.10	18.20	1183.70
BBD - 40S	15-Aug-15	5509	Cyclotella ocellata Pant.	14368	2.82	5.00	10.00	196.30
BBD - 40S	15-Aug-15	5511	Rhizosolenia eriense H.L. Smith	14368	1.12	11.00	3.00	77.80
BBD - 40S	15-Aug-15	5518	Synedra acus Kutzing	11200	1.07	91.00	2.00	95.30
BBD - 40S	15-Aug-15	5524	Asterionella formosa Hassall	14800	1.41	91.00	2.00	95.30
BBD - 40S	15-Aug-15	5529	Eunotia zazumenensis **********	4200	0.16	46.00	1.80	39.00
BBD - 40S	15-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	3000	17.53	103.00	8.50	5844.70
BBD - 40S	15-Aug-15	5551	Cyclotella michiganiana Skvortzow	86208	1.65	2.30	4.60	19.10
BBD - 40S	15-Aug-15	5720	Cyclotella bodanica Eulenst.	200	1.17	15.50	31.00	5849.40
BBD - 40S	15-Aug-15	6554	Rhodomonas minuta Skuja	136496	21.98	12.00	6.20	161.00
BBD - 40S	15-Aug-15	6558	Cryptomonas erosa Ehrenberg	15200	24.54	23.60	14.00	1614.60
BBD - 40S	15-Aug-15	6565	Cryptomonas rostratiformis Skuja	1200	2.46	30.00	14.00	2052.50
BBD - 40S	15-Aug-15	6568	Katablepharis ovalis Skuja	79024	4.58	9.00	4.10	58.00
BBD - 40S	15-Aug-15	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
BBD - 40S	15-Aug-15	7632	Gymnodinium sp.	400	1.94	21.00	21.00	4849.00
BBD - 40S	15-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	2600	2.74	14.00	12.00	1055.60

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
BPJ - 37S	21-Jul-15	1088	Anabaena solitaria Klebs	200	0.44	100.00	6.50	2212.20
BPJ - 37S	21-Jul-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.06	12.00	10.00	314.20
BPJ - 37S	21-Jul-15	2105	Chlamydomonas spp.	28736	0.68	5.00	3.00	23.60
BPJ - 37S	21-Jul-15	2121	Oocystis lacustris Chodat	7184	0.17	5.10	3.00	24.00
BPJ - 37S	21-Jul-15	2137	Dictyosphaerium simplex Sukja	122128	0.59	2.10	2.10	4.80
BPJ - 37S	21-Jul-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
BPJ - 37S	21-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.49	36.00	2.20	68.40
BPJ - 37S	21-Jul-15	3301	Euglena acus Ehrenberg	200	1.60	106.00	12.00	7992.20
BPJ - 37S	21-Jul-15	4351	Small chrysophyceae	107760	1.52	3.00	3.00	14.10
BPJ - 37S	21-Jul-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
BPJ - 37S	21-Jul-15	4355	Chrysochromulina parva Lackey	7184	0.37	4.60	4.60	51.00
BPJ - 37S	21-Jul-15	4357	Chrysococcus sp.	481328	31.48	5.00	5.00	65.40
BPJ - 37S	21-Jul-15	4362	Kephyrion sp.	79024	1.93	3.60	3.60	24.40
BPJ - 37S	21-Jul-15	4363	Spinifiromonas sirratus**********	14368	1.32	5.60	5.60	92.00
BPJ - 37S	21-Jul-15	4378	Dinobryon borgei Lemmermann	21552	1.11	9.00	3.30	51.30
BPJ - 37S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
BPJ - 37S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	1600	1.54	0.00	0.00	965.00
BPJ - 37S	21-Jul-15	4390	Dinobryon sociale Ehrenberg	600	1.19	0.00	0.00	1990.00
BPJ - 37S	21-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	93392	2.80	5.60	3.20	30.00
BPJ - 37S	21-Jul-15	4399	Ochromonas verrucosa Skuja	14368	3.25	12.00	6.00	226.20
BPJ - 37S	21-Jul-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
BPJ - 37S	21-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.35	5.90	4.00	49.40
BPJ - 37S	21-Jul-15	4413	Chrysochromulina laurentiana Kling	79024	30.16	9.00	9.00	381.70
BPJ - 37S	21-Jul-15	4414	Stichogloea spp.	14368	0.72	6.00	4.00	50.30
BPJ - 37S	21-Jul-15	4415	Bicoeca lacustris Clark	14368	1.12	5.30	5.30	78.00
BPJ - 37S	21-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.25	6.10	3.30	34.80
BPJ - 37S	21-Jul-15	4436	Dinobryon attenatum Hill	14368	3.52	13.00	6.00	245.00
BPJ - 37S	21-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	1800	2.39	9.45	18.90	1325.60
BPJ - 37S	21-Jul-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.53	26.00	14.00	1334.10
BPJ - 37S	21-Jul-15	5518	Synedra acus Kutzing	3200	0.34	100.00	2.00	104.70
BPJ - 37S	21-Jul-15	5524	Asterionella formosa Hassall	5000	0.50	96.00	2.00	100.50
BPJ - 37S	21-Jul-15	5551	Cyclotella michiganiana Skvortzow	64656	1.58	2.50	5.00	24.50
BPJ - 37S	21-Jul-15	6554	Rhodomonas minuta Skuja	35920	4.74	10.50	6.00	131.90
BPJ - 37S	21-Jul-15	6558	Cryptomonas erosa Ehrenberg	3800	4.58	24.00	12.00	1206.40
BPJ - 37S	21-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.41	30.00	14.00	2052.50
BPJ - 37S	21-Jul-15	6568	Katablepharis ovalis Skuja	50288	3.56	9.00	5.00	70.70
BPJ - 37S	21-Jul-15	7631	Gymnodinium helveticum Penard	200	5.03	50.00	31.00	25158.90
BPJ - 37S	21-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	1000	1.35	15.20	13.00	1345.00
BPJ - 37S	21-Jul-15	7640	Peridinium goslaviense Woloszynska	200	6.70	40.00	40.00	33510.30
BPJ - 37S	21-Jul-15	7641	Peridinium aciculiferum Lemmermann	1200	11.22	31.00	24.00	9349.40
BPJ - 38S	21-Jul-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.06	11.90	10.00	311.50
BPJ - 38S	21-Jul-15	2105	Chlamydomonas spp.	21552	0.51	5.00	3.00	23.60
BPJ - 38S	21-Jul-15	2107	Chlorogonium maximum Skuja	200	0.70	91.00	7.00	3502.10
BPJ - 38S	21-Jul-15	2121	Oocystis lacustris Chodat	7184	0.17	5.10	3.00	24.00
BPJ - 38S	21-Jul-15	2137	Dictyosphaerium simplex Sukja	21552	0.10	2.10	2.10	4.80
BPJ - 38S	21-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
BPJ - 38S	21-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.93	34.00	2.20	64.60
BPJ - 38S	21-Jul-15	4351	Small chrysophyceae	136496	1.92	3.00	3.00	14.10
BPJ - 38S	21-Jul-15	4352	Large chrysophyceae	64656	11.61	7.00	7.00	179.60
BPJ - 38S	21-Jul-15	4355	Chrysochromulina parva Lackey	28736	1.47	4.60	4.60	51.00
BPJ - 38S	21-Jul-15	4357	Chrysococcus sp.	538800	35.24	5.00	5.00	65.40
BPJ - 38S	21-Jul-15	4362	Kephyrion sp.	57472	1.40	3.60	3.60	24.40
BPJ - 38S	21-Jul-15	4378	Dinobryon borgei Lemmermann	28736	1.46	8.90	3.30	50.70
BPJ - 38S	21-Jul-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
BPJ - 38S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
BPJ - 38S	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	1400	1.35	0.00	0.00	965.00
BPJ - 38S	21-Jul-15	4390	Dinobryon sociale Ehrenberg	1600	3.18	0.00	0.00	1990.00
BPJ - 38S	21-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	158048	4.74	5.60	3.20	30.00
BPJ - 38S	21-Jul-15	4401	Uroglena volvox Ehrenberg	14368	1.63	6.00	6.00	113.10
BPJ - 38S	21-Jul-15	4403	Chrysosphaerella longispina Lauterborn	7184	3.76	10.00	10.00	523.60
BPJ - 38S	21-Jul-15	4413	Chrysochromulina laurentiana Kling	71840	27.42	9.00	9.00	381.70
BPJ - 38S	21-Jul-15	5509	Cyclotella ocellata Pant.	7184	0.90	4.30	8.60	124.90
BPJ - 38S	21-Jul-15	5511	Rhizosolenia eriense H.L. Smith	7184	0.56	11.00	3.00	77.80
BPJ - 38S	21-Jul-15	5514	Tabellaria flocculsa (Roth) Kutzing	1400	1.87	26.00	14.00	1334.10
BPJ - 38S	21-Jul-15	5518	Synedra acus Kutzing	5200	0.54	100.00	2.00	104.70
BPJ - 38S	21-Jul-15	5524	Asterionella formosa Hassall	4800	0.48	96.00	2.00	100.50
BPJ - 38S	21-Jul-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	1000	3.70	99.00	6.90	3701.90
BPJ - 38S	21-Jul-15	5551	Cyclotella michiganiana Skvortzow	43104	1.06	2.50	5.00	24.50
BPJ - 38S	21-Jul-15	6554	Rhodomonas minuta Skuja	86208	11.37	10.50	6.00	131.90
BPJ - 38S	21-Jul-15	6558	Cryptomonas erosa Ehrenberg	6000	7.24	24.00	12.00	1206.40
BPJ - 38S	21-Jul-15	6565	Cryptomonas rostratiformis Skuja	600	1.23	30.00	14.00	2052.50
BPJ - 38S	21-Jul-15	6568	Katablepharis ovalis Skuja	35920	2.54	9.00	5.00	70.70
BPJ - 38S	21-Jul-15	7632	Gymnodinium sp.	400	3.12	24.60	24.60	7794.80
BPJ - 38S	21-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.27	15.20	13.00	1345.00
BPJ - 38S	21-Jul-15	7641	Peridinium aciculiferum Lemmermann	1000	9.35	31.00	24.00	9349.40
BPJ - 38SR	21-Jul-15	2105	Chlamydomonas spp.	28736	0.68	5.00	3.00	23.60
BPJ - 38SR	21-Jul-15	2107	Chlorogonium maximum Skuja	400	1.40	91.00	7.00	3502.10
BPJ - 38SR	21-Jul-15	2121	Oocystis lacustris Chodat	21552	0.52	5.10	3.00	24.00
BPJ - 38SR	21-Jul-15	2137	Dictyosphaerium simplex Sukja	28736	0.14	2.10	2.10	4.80
BPJ - 38SR	21-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.49	36.00	2.20	68.40
BPJ - 38SR	21-Jul-15	4351	Small chrysophyceae	122128	1.72	3.00	3.00	14.10
BPJ - 38SR	21-Jul-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
BPJ - 38SR	21-Jul-15	4355	Chrysochromulina parva Lackey	7184	0.37	4.60	4.60	51.00
BPJ - 38SR	21-Jul-15	4357	Chrysococcus sp.	617824	40.41	5.00	5.00	65.40
BPJ - 38SR	21-Jul-15	4362	Kephyrion sp.	43104	1.05	3.60	3.60	24.40

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
BPJ - 38SR	21-Jul-15	4370	Mallomonas akrokomos Asmund and Kristiansen	7184	2.03	15.00	6.00	282.70
BPJ - 38SR	21-Jul-15	4378	Dinobryon borgei Lemmermann	14368	0.73	8.90	3.30	50.70
BPJ - 38SR	21-Jul-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
BPJ - 38SR	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	64656	14.63	12.00	6.00	226.20
BPJ - 38SR	21-Jul-15	4388	Dinobryon sertularia Ehrenberg	1400	1.35	0.00	0.00	965.00
BPJ - 38SR	21-Jul-15	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
BPJ - 38SR	21-Jul-15	4390	Dinobryon sociale Ehrenberg	2200	4.38	0.00	0.00	1990.00
BPJ - 38SR	21-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	122128	3.66	5.60	3.20	30.00
BPJ - 38SR	21-Jul-15	4400	Ochromonas sp.	7184	0.86	9.10	5.00	119.10
BPJ - 38SR	21-Jul-15	4401	Uroglena volvox Ehrenberg	50288	5.69	6.00	6.00	113.10
BPJ - 38SR	21-Jul-15	4413	Chrysochromulina laurentiana Kling	57472	21.94	9.00	9.00	381.70
BPJ - 38SR	21-Jul-15	5509	Cyclotella ocellata Pant.	28736	3.11	4.10	8.20	108.30
BPJ - 38SR	21-Jul-15	5511	Rhizosolenia eriense H.L. Smith	21552	1.68	11.00	3.00	77.80
BPJ - 38SR	21-Jul-15	5514	Tabellaria flocculsa (Roth) Kutzing	800	1.07	26.00	14.00	1334.10
BPJ - 38SR	21-Jul-15	5518	Synedra acus Kutzing	6200	0.65	100.00	2.00	104.70
BPJ - 38SR	21-Jul-15	5524	Asterionella formosa Hassall	3800	0.38	96.00	2.00	100.50
BPJ - 38SR	21-Jul-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	400	1.48	99.00	6.90	3701.90
BPJ - 38SR	21-Jul-15	5551	Cyclotella michiganiana Skvortzow	28736	0.70	2.50	5.00	24.50
BPJ - 38SR	21-Jul-15	6554	Rhodomonas minuta Skuja	71840	9.48	10.50	6.00	131.90
BPJ - 38SR	21-Jul-15	6558	Cryptomonas erosa Ehrenberg	7800	9.41	24.00	12.00	1206.40
BPJ - 38SR	21-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.41	30.00	14.00	2052.50
BPJ - 38SR	21-Jul-15	6568	Katablepharis ovalis Skuja	50288	3.56	9.00	5.00	70.70
BPJ - 38SR	21-Jul-15	7632	Gymnodinium sp.	400	3.12	24.60	24.60	7794.80
BPJ - 38SR	21-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.54	15.20	13.00	1345.00
BPJ - 38SR	21-Jul-15	7641	Peridinium aciculiferum Lemmermann	1200	11.22	31.00	24.00	9349.40
BPJ - 39S	15-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	400	0.21	14.00	12.00	527.80
BPJ - 39S	15-Aug-15	2105	Chlamydomonas spp.	7184	0.11	6.00	2.20	15.20
BPJ - 39S	15-Aug-15	2121	Oocystis lacustris Chodat	35920	0.85	5.00	3.00	23.60
BPJ - 39S	15-Aug-15	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.50	11.00	4.00	69.10
BPJ - 39S	15-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	79024	0.37	3.00	3.00	4.70
BPJ - 39S	15-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	50288	3.54	37.00	2.20	70.30
BPJ - 39S	15-Aug-15	2238	Eudorina sp.	200	0.54	0.00	0.00	2680.00
BPJ - 39S	15-Aug-15	2512	Scenedesmus acuminatus Chodat	28736	0.63	7.00	3.00	22.00
BPJ - 39S	15-Aug-15	4351	Small chrysophyceae	495696	7.73	3.10	3.10	15.60
BPJ - 39S	15-Aug-15	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
BPJ - 39S	15-Aug-15	4357	Chrysococcus sp.	933920	61.08	5.00	5.00	65.40
BPJ - 39S	15-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.83	9.10	9.10	394.60
BPJ - 39S	15-Aug-15	4362	Kephyrion sp.	150864	1.93	2.90	2.90	12.80
BPJ - 39S	15-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	800	0.82	19.60	10.00	1026.30
BPJ - 39S	15-Aug-15	4378	Dinobryon borgei Lemmermann	122128	6.34	9.10	3.30	51.90
BPJ - 39S	15-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
BPJ - 39S	15-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
BPJ - 39S	15-Aug-15	4383	Dinobryon bavaricum Imhof	21552	5.28	13.00	6.00	245.00
BPJ - 39S	15-Aug-15	4383	Dinobryon bavaricum Imhof	1800	3.58	0.00	0.00	1990.00
BPJ - 39S	15-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	1.02	0.00	0.00	5085.00
BPJ - 39S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
BPJ - 39S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	4600	23.39	0.00	0.00	5085.00
BPJ - 39S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	50288	11.38	12.00	6.00	226.20
BPJ - 39S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	2000	3.98	0.00	0.00	1990.00
BPJ - 39S	15-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	86208	2.72	5.90	3.20	31.60
BPJ - 39S	15-Aug-15	4400	Ochromonas sp.	7184	0.63	9.00	4.30	87.10
BPJ - 39S	15-Aug-15	4401	Uroglena volvox Ehrenberg	35920	4.06	6.00	6.00	113.10
BPJ - 39S	15-Aug-15	4413	Chrysochromulina laurentiana Kling	57472	21.94	9.00	9.00	381.70
BPJ - 39S	15-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	114944	3.03	5.60	3.00	26.40
BPJ - 39S	15-Aug-15	4437	Pteridomonas sp.	14368	3.42	8.80	8.80	237.90
BPJ - 39S	15-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	2000	3.14	10.00	20.00	1570.80
BPJ - 39S	15-Aug-15	5509	Cyclotella ocellata Pant.	7184	0.99	4.45	8.90	138.40
BPJ - 39S	15-Aug-15	5511	Rhizosolenia eriense H.L. Smith	28736	2.24	11.00	3.00	77.80
BPJ - 39S	15-Aug-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1600	2.04	76.00	8.00	1273.40
BPJ - 39S	15-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	1200	1.60	26.00	14.00	1334.10
BPJ - 39S	15-Aug-15	5518	Synedra acus Kutzing	14200	1.20	81.00	2.00	84.80
BPJ - 39S	15-Aug-15	5524	Asterionella formosa Hassall	36200	3.45	91.00	2.00	95.30
BPJ - 39S	15-Aug-15	5529	Eunotia zazumenensis **********	14400	0.61	50.00	1.80	42.40
BPJ - 39S	15-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	2400	11.22	93.00	8.00	4674.70
BPJ - 39S	15-Aug-15	5551	Cyclotella michiganiana Skvortzow	43104	1.00	2.45	4.90	23.10
BPJ - 39S	15-Aug-15	5720	Cyclotella bodanica Eulenst.	200	1.54	17.00	34.00	7717.30
BPJ - 39S	15-Aug-15	6554	Rhodomonas minuta Skuja	129312	19.50	12.00	6.00	150.80
BPJ - 39S	15-Aug-15	6558	Cryptomonas erosa Ehrenberg	9000	15.39	25.00	14.00	1710.40
BPJ - 39S	15-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.27	19.00	10.00	663.20
BPJ - 39S	15-Aug-15	6565	Cryptomonas rostratiformis Skuja	1200	2.55	31.00	14.00	2120.90
BPJ - 39S	15-Aug-15	6568	Katablepharis ovalis Skuja	79024	3.71	8.00	4.20	46.90
BPJ - 39S	15-Aug-15	7632	Gymnodinium sp.	400	2.90	24.00	24.00	7238.20
BPJ - 39S	15-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	800	0.84	13.90	12.00	1048.00
BPJ - 39S	15-Aug-15	7641	Peridinium aciculiferum Lemmermann	1000	9.05	30.00	24.00	9047.80
BPJ - 39SR	15-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.11	14.00	12.00	527.80
BPJ - 39SR	15-Aug-15	2105	Chlamydomonas spp.	14368	0.22	6.00	2.20	15.20
BPJ - 39SR	15-Aug-15	2121	Oocystis lacustris Chodat	43104	1.02	5.00	3.00	23.60
BPJ - 39SR	15-Aug-15	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.50	11.00	4.00	69.10
BPJ - 39SR	15-Aug-15	2167	Elakatothrix gelatinosa Willen	14368	0.25	11.00	2.00	17.30
BPJ - 39SR	15-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	79024	0.37	3.00	3.00	4.70
BPJ - 39SR	15-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	35920	2.53	37.00	2.20	70.30
BPJ - 39SR	15-Aug-15	2512	Scenedesmus acuminatus Chodat	43104	0.95	7.00	3.00	22.00
BPJ - 39SR	15-Aug-15	4351	Small chrysophyceae	330464	5.16	3.10	3.10	15.60
BPJ - 39SR	15-Aug-15	4352	Large chrysophyceae	28736	5.16	7.00	7.00	179.60
BPJ - 39SR	15-Aug-15	4357	Chrysococcus sp.	905184	59.20	5.00	5.00	65.40

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
BPJ - 39SR	15-Aug-15	4362	Kephyrion sp.	186784	2.39	2.90	2.90	12.80
BPJ - 39SR	15-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.62	19.60	10.00	1026.30
BPJ - 39SR	15-Aug-15	4378	Dinobryon borgei Lemmermann	136496	7.08	9.10	3.30	51.90
BPJ - 39SR	15-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
BPJ - 39SR	15-Aug-15	4383	Dinobryon bavaricum Imhof	35920	8.80	13.00	6.00	245.00
BPJ - 39SR	15-Aug-15	4383	Dinobryon bavaricum Imhof	2200	4.38	0.00	0.00	1990.00
BPJ - 39SR	15-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	1.02	0.00	0.00	5085.00
BPJ - 39SR	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
BPJ - 39SR	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	4000	20.34	0.00	0.00	5085.00
BPJ - 39SR	15-Aug-15	4390	Dinobryon sociale Ehrenberg	35920	8.13	12.00	6.00	226.20
BPJ - 39SR	15-Aug-15	4390	Dinobryon sociale Ehrenberg	3000	5.97	0.00	0.00	1990.00
BPJ - 39SR	15-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	150864	4.77	5.90	3.20	31.60
BPJ - 39SR	15-Aug-15	4400	Ochromonas sp.	14368	1.25	9.00	4.30	87.10
BPJ - 39SR	15-Aug-15	4401	Uroglena volvox Ehrenberg	64656	7.31	6.00	6.00	113.10
BPJ - 39SR	15-Aug-15	4413	Chrysochromulina laurentiana Kling	57472	21.94	9.00	9.00	381.70
BPJ - 39SR	15-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	100576	2.66	5.60	3.00	26.40
BPJ - 39SR	15-Aug-15	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
BPJ - 39SR	15-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	1800	2.83	10.00	20.00	1570.80
BPJ - 39SR	15-Aug-15	5511	Rhizosolenia eriense H.L. Smith	28736	2.24	11.00	3.00	77.80
BPJ - 39SR	15-Aug-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	800	1.02	76.00	8.00	1273.40
BPJ - 39SR	15-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	1600	2.13	26.00	14.00	1334.10
BPJ - 39SR	15-Aug-15	5518	Synedra acus Kutzing	17000	1.44	81.00	2.00	84.80
BPJ - 39SR	15-Aug-15	5524	Asterionella formosa Hassall	40200	3.83	91.00	2.00	95.30
BPJ - 39SR	15-Aug-15	5529	Eunotia zazumenensis **********	13600	0.58	50.00	1.80	42.40
BPJ - 39SR	15-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	1800	8.96	99.00	8.00	4976.30
BPJ - 39SR	15-Aug-15	5551	Cyclotella michiganiana Skvortzow	21552	0.50	2.45	4.90	23.10
BPJ - 39SR	15-Aug-15	5720	Cyclotella bodanica Eulenst.	200	1.54	17.00	34.00	7717.30
BPJ - 39SR	15-Aug-15	6554	Rhodomonas minuta Skuja	172416	26.00	12.00	6.00	150.80
BPJ - 39SR	15-Aug-15	6558	Cryptomonas erosa Ehrenberg	8000	13.68	25.00	14.00	1710.40
BPJ - 39SR	15-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.13	19.00	10.00	663.20
BPJ - 39SR	15-Aug-15	6565	Cryptomonas rostratiformis Skuja	600	1.27	31.00	14.00	2120.90
BPJ - 39SR	15-Aug-15	6568	Katablepharis ovalis Skuja	64656	3.03	8.00	4.20	46.90
BPJ - 39SR	15-Aug-15	7632	Gymnodinium sp.	600	4.34	24.00	24.00	7238.20
BPJ - 39SR	15-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.63	13.90	12.00	1048.00
BPJ - 39SR	15-Aug-15	7641	Peridinium aciculiferum Lemmermann	800	7.24	30.00	24.00	9047.80
BPJ - 40S	15-Aug-15	2105	Chlamydomonas spp.	14368	0.22	6.00	2.20	15.20
BPJ - 40S	15-Aug-15	2112	Sphaerocystis schroeteri Chodat	14368	0.48	4.00	4.00	33.50
BPJ - 40S	15-Aug-15	2121	Oocystis lacustris Chodat	43104	1.02	5.00	3.00	23.60
BPJ - 40S	15-Aug-15	2193	Staurodesmus paradoxum Meyen	200	0.82	30.00	26.00	4084.10
BPJ - 40S	15-Aug-15	2195	Staurodesmus bullardii G.M. Smith	200	2.01	40.00	36.00	10053.10
BPJ - 40S	15-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
BPJ - 40S	15-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	28736	2.24	41.00	2.20	77.90
BPJ - 40S	15-Aug-15	2512	Scenedesmus acuminatus Chodat	28736	0.63	7.00	3.00	22.00
BPJ - 40S	15-Aug-15	4351	Small chrysophyceae	294544	4.59	3.10	3.10	15.60
BPJ - 40S	15-Aug-15	4352	Large chrysophyceae	35920	13.71	9.00	9.00	381.70
BPJ - 40S	15-Aug-15	4357	Chrysococcus sp.	495696	32.42	5.00	5.00	65.40
BPJ - 40S	15-Aug-15	4362	Kephyrion sp.	43104	0.55	2.90	2.90	12.80
BPJ - 40S	15-Aug-15	4363	Spinifiromonas sirratus**********	7184	0.85	6.10	6.10	118.80
BPJ - 40S	15-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.62	19.60	10.00	1026.30
BPJ - 40S	15-Aug-15	4375	Synura sphagnicola Korschikow	200	3.01	0.00	0.00	15050.00
BPJ - 40S	15-Aug-15	4378	Dinobryon borgei Lemmermann	114944	5.97	9.10	3.30	51.90
BPJ - 40S	15-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
BPJ - 40S	15-Aug-15	4383	Dinobryon bavaricum Imhof	7184	1.76	13.00	6.00	245.00
BPJ - 40S	15-Aug-15	4383	Dinobryon bavaricum Imhof	1800	3.58	0.00	0.00	1990.00
BPJ - 40S	15-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	1.02	0.00	0.00	5085.00
BPJ - 40S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	71840	16.25	12.00	6.00	226.20
BPJ - 40S	15-Aug-15	4388	Dinobryon sertularia Ehrenberg	3200	16.27	0.00	0.00	5085.00
BPJ - 40S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	21552	4.88	12.00	6.00	226.20
BPJ - 40S	15-Aug-15	4390	Dinobryon sociale Ehrenberg	1000	1.99	0.00	0.00	1990.00
BPJ - 40S	15-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	143680	4.27	5.90	3.10	29.70
BPJ - 40S	15-Aug-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
BPJ - 40S	15-Aug-15	4413	Chrysochromulina laurentiana Kling	50288	19.19	9.00	9.00	381.70
BPJ - 40S	15-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.19	5.60	3.00	26.40
BPJ - 40S	15-Aug-15	4436	Dinobryon attenatum Hill	7184	1.49	11.00	6.00	207.30
BPJ - 40S	15-Aug-15	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
BPJ - 40S	15-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.94	10.00	20.00	1570.80
BPJ - 40S	15-Aug-15	5511	Rhizosolenia eriense H.L. Smith	35920	2.79	11.00	3.00	77.80
BPJ - 40S	15-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	1200	1.60	26.00	14.00	1334.10
BPJ - 40S	15-Aug-15	5518	Synedra acus Kutzing	3400	0.31	86.00	2.00	90.10
BPJ - 40S	15-Aug-15	5524	Asterionella formosa Hassall	26400	2.52	91.00	2.00	95.30
BPJ - 40S	15-Aug-15	5529	Eunotia zazumenensis **********	5800	0.25	50.00	1.80	42.40
BPJ - 40S	15-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	2800	14.92	106.00	8.00	5328.10
BPJ - 40S	15-Aug-15	5551	Cyclotella michiganiana Skvortzow	93392	2.16	2.45	4.90	23.10
BPJ - 40S	15-Aug-15	5720	Cyclotella bodanica Eulenst.	200	1.54	17.00	34.00	7717.30
BPJ - 40S	15-Aug-15	6554	Rhodomonas minuta Skuja	129312	19.50	12.00	6.00	150.80
BPJ - 40S	15-Aug-15	6558	Cryptomonas erosa Ehrenberg	7200	12.31	25.00	14.00	1710.40
BPJ - 40S	15-Aug-15	6565	Cryptomonas rostratiformis Skuja	1000	2.12	31.00	14.00	2120.90
BPJ - 40S	15-Aug-15	6568	Katablepharis ovalis Skuja	43104	2.02	8.00	4.20	46.90
BPJ - 40S	15-Aug-15	7632	Gymnodinium sp.	7184	3.35	11.00	9.00	466.50
BPJ - 40S	15-Aug-15	7632	Gymnodinium sp.	200	1.45	24.00	24.00	7238.20
BPJ - 40S	15-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1400	1.47	13.90	12.00	1048.00
BPJ - 40S	15-Aug-15	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
DUP - 1	16-May-15	4351	Small chrysophyceae	312056.8	4.40	3.00	3.00	14.10
DUP - 1	16-May-15	4352	Large chrysophyceae	17730.5	3.18	7.00	7.00	179.60
DUP - 1	16-May-15	4357	Chrysococcus sp.	234042.6	18.26	5.30	5.30	78.00

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
DUP - 1	16-May-15	4362	Kephyrion sp.	14184.4	0.20	3.00	3.00	14.10
DUP - 1	16-May-15	4368	Mallomonas crassisquama (Asmund) Fott	100	0.11	21.30	10.00	1115.30
DUP - 1	16-May-15	4390	Dinobryon sociale Ehrenberg	600	0.14	12.30	6.00	231.80
DUP - 1	16-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	3546.1	0.11	5.60	3.20	30.00
DUP - 1	16-May-15	4413	Chrysochromulina laurentiana Kling	3546.1	1.49	9.30	9.30	421.20
DUP - 1	16-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	28368.8	0.86	6.00	3.10	30.20
DUP - 1	16-May-15	5509	Cyclotella ocellata Pant.	14184.4	2.78	5.00	10.00	196.30
DUP - 1	16-May-15	5551	Cyclotella michiganiana Skvortzow	31914.9	0.65	2.35	4.70	20.40
DUP - 1	16-May-15	6554	Rhodomonas minuta Skuja	92198.6	11.10	11.00	5.60	120.40
DUP - 1	16-May-15	6558	Cryptomonas erosa Ehrenberg	1300	1.54	23.60	12.00	1186.30
DUP - 1	16-May-15	7631	Gymnodinium helveticum Penard	100	2.36	50.00	30.00	23561.90
DUP - 1	16-May-15	7632	Gymnodinium sp.	1000	7.79	24.60	24.60	7794.80
DUP - 1	16-May-15	7635	Peridinium willei Huitfeldt-Kaas	600	20.11	40.00	40.00	33510.30
DUP - 1	16-May-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.10	13.20	12.00	995.30
DUP - 1	1-Jul-15	2105	Chlamydomonas spp.	28736	0.68	5.00	3.00	23.60
DUP - 1	1-Jul-15	2121	Oocystis lacustris Chodat	7184	0.16	4.60	3.00	21.70
DUP - 1	1-Jul-15	2137	Dictyosphaerium simplex Sukja	14368	0.08	2.20	2.20	5.60
DUP - 1	1-Jul-15	2167	Elakatothrix gelatinosa Willen	7184	0.12	11.00	2.00	17.30
DUP - 1	1-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
DUP - 1	1-Jul-15	4351	Small chrysophyceae	287360	4.05	3.00	3.00	14.10
DUP - 1	1-Jul-15	4352	Large chrysophyceae	100576	18.06	7.00	7.00	179.60
DUP - 1	1-Jul-15	4357	Chrysococcus sp.	560352	32.44	4.80	4.80	57.90
DUP - 1	1-Jul-15	4362	Kephyrion sp.	86208	1.78	3.40	3.40	20.60
DUP - 1	1-Jul-15	4363	Spinifiromonas sirratus**********	21552	2.56	6.10	6.10	118.80
DUP - 1	1-Jul-15	4367	Mallomonas duerrschmidtiae Siver, Hamer and Kling	200	0.13	19.30	8.00	646.70
DUP - 1	1-Jul-15	4381	Dinobryon mucronutom Nygaard	28736	3.57	9.50	5.00	124.40
DUP - 1	1-Jul-15	4383	Dinobryon bavaricum Imhof	79024	14.31	9.00	6.20	181.10
DUP - 1	1-Jul-15	4388	Dinobryon sertularia Ehrenberg	172416	39.00	12.00	6.00	226.20
DUP - 1	1-Jul-15	4388	Dinobryon sertularia Ehrenberg	1600	3.44	0.00	0.00	2150.00
DUP - 1	1-Jul-15	4390	Dinobryon sociale Ehrenberg	172416	39.00	12.00	6.00	226.20
DUP - 1	1-Jul-15	4390	Dinobryon sociale Ehrenberg	3000	5.97	0.00	0.00	1990.00
DUP - 1	1-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	93392	2.47	5.60	3.00	26.40
DUP - 1	1-Jul-15	4401	Uroglena volvox Ehrenberg	107760	12.19	6.00	6.00	113.10
DUP - 1	1-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	200	0.01	6.00	4.00	50.30
DUP - 1	1-Jul-15	4413	Chrysochromulina laurentiana Kling	129312	51.03	9.10	9.10	394.60
DUP - 1	1-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.44	5.40	3.30	30.80
DUP - 1	1-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	3600	7.12	10.80	21.60	1978.80
DUP - 1	1-Jul-15	5509	Cyclotella ocellata Pant.	7184	1.06	4.55	9.10	148.00
DUP - 1	1-Jul-15	5511	Rhizosolenia eriense H.L. Smith	14368	1.12	11.00	3.00	77.80
DUP - 1	1-Jul-15	5518	Synedra acus Kutzing	6000	0.57	91.00	2.00	95.30
DUP - 1	1-Jul-15	5551	Cyclotella michiganiana Skvortzow	93392	1.78	2.30	4.60	19.10
DUP - 1	1-Jul-15	6554	Rhodomonas minuta Skuja	158048	13.80	10.00	5.00	87.30
DUP - 1	1-Jul-15	6558	Cryptomonas erosa Ehrenberg	5000	5.58	22.20	12.00	1115.90
DUP - 1	1-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	1000	0.68	19.60	10.00	684.20
DUP - 1	1-Jul-15	6565	Cryptomonas rostratiformis Skuja	800	1.70	31.00	14.00	2120.90
DUP - 1	1-Jul-15	6568	Katablepharis ovalis Skuja	28736	1.62	9.00	4.00	56.50
DUP - 1	1-Jul-15	7632	Gymnodinium sp.	600	8.48	30.00	30.00	14137.20
DUP - 1	1-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.78	14.60	13.00	1291.90
DUP - 1	1-Jul-15	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
DUP - 1	1-Aug-15	1054	Planktolyngbya limnetica	800	0.09	103.00	1.20	116.50
DUP - 1	1-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	600	0.32	14.20	12.00	535.30
DUP - 1	1-Aug-15	2105	Chlamydomonas spp.	35920	1.81	6.00	4.00	50.30
DUP - 1	1-Aug-15	2121	Oocystis lacustris Chodat	35920	0.85	5.00	3.00	23.60
DUP - 1	1-Aug-15	2126	Chodatella sp.	7184	0.20	5.90	3.00	27.80
DUP - 1	1-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	35920	0.17	3.00	3.00	4.70
DUP - 1	1-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.68	41.00	2.20	77.90
DUP - 1	1-Aug-15	2512	Scenedesmus acuminatus Chodat	28736	0.55	6.10	3.00	19.20
DUP - 1	1-Aug-15	4351	Small chrysophyceae	301728	4.71	3.10	3.10	15.60
DUP - 1	1-Aug-15	4351	Small chrysophyceae	21552	6.00	8.10	8.10	278.30
DUP - 1	1-Aug-15	4352	Large chrysophyceae	35920	11.96	8.60	8.60	333.00
DUP - 1	1-Aug-15	4357	Chrysococcus sp.	653744	42.75	5.00	5.00	65.40
DUP - 1	1-Aug-15	4362	Kephyrion sp.	237072	7.94	4.00	4.00	33.50
DUP - 1	1-Aug-15	4364	Mallomonas caudata Ivanov	200	1.07	40.00	16.00	5361.70
DUP - 1	1-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	800	0.86	20.50	10.00	1073.40
DUP - 1	1-Aug-15	4378	Dinobryon borgei Lemmermann	150864	9.32	9.10	3.60	61.80
DUP - 1	1-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
DUP - 1	1-Aug-15	4383	Dinobryon bavaricum Imhof	43104	9.75	12.00	6.00	226.20
DUP - 1	1-Aug-15	4383	Dinobryon bavaricum Imhof	2600	5.17	0.00	0.00	1990.00
DUP - 1	1-Aug-15	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
DUP - 1	1-Aug-15	4388	Dinobryon sertularia Ehrenberg	1400	3.01	0.00	0.00	2150.00
DUP - 1	1-Aug-15	4390	Dinobryon sociale Ehrenberg	71840	17.74	13.10	6.00	246.90
DUP - 1	1-Aug-15	4390	Dinobryon sociale Ehrenberg	600	1.19	0.00	0.00	1990.00
DUP - 1	1-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	114944	2.98	5.50	3.00	25.90
DUP - 1	1-Aug-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
DUP - 1	1-Aug-15	4413	Chrysochromulina laurentiana Kling	71840	29.29	9.20	9.20	407.70
DUP - 1	1-Aug-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
DUP - 1	1-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	143680	4.70	5.10	3.50	32.70
DUP - 1	1-Aug-15	4436	Dinobryon attenatum Hill	14368	2.71	10.00	6.00	188.50
DUP - 1	1-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	2000	2.37	9.10	18.20	1183.70
DUP - 1	1-Aug-15	5511	Rhizosolenia eriense H.L. Smith	50288	3.91	11.00	3.00	77.80
DUP - 1	1-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.45	22.10	14.00	1134.00
DUP - 1	1-Aug-15	5518	Synedra acus Kutzing	25600	2.44	91.00	2.00	95.30
DUP - 1	1-Aug-15	5524	Asterionella formosa Hassall	13200	1.26	91.00	2.00	95.30
DUP - 1	1-Aug-15	5529	Eunotia zazumenensis **********	6200	0.24	46.00	1.80	39.00
DUP - 1	1-Aug-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	1800	10.21	100.00	8.50	5674.50

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
DUP - 1	1-Aug-15	5551	Cyclotella michiganiana Skvortzow	57472	1.10	2.30	4.60	19.10
DUP - 1	1-Aug-15	6554	Rhodomonas minuta Skuja	71840	11.57	12.00	6.20	161.00
DUP - 1	1-Aug-15	6558	Cryptomonas erosa Ehrenberg	7800	12.59	23.60	14.00	1614.60
DUP - 1	1-Aug-15	6565	Cryptomonas rostratiformis Skuja	200	0.41	30.00	14.00	2052.50
DUP - 1	1-Aug-15	6568	Katablepharis ovalis Skuja	43104	2.50	9.00	4.10	58.00
DUP - 1	1-Aug-15	7632	Gymnodinium sp.	200	1.84	26.00	26.00	9202.80
DUP - 1	1-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.63	14.00	12.00	1055.60
DUP - 1	1-Aug-15	7641	Peridinium aciculiferum Lemmermann	800	7.24	30.00	24.00	9047.80
DUP - 1	1-Nov-15	1054	Planktolyngbya limnetica	1800	0.40	197.00	1.20	222.80
DUP - 1	1-Nov-15	2137	Dictyosphaerium simplex Sukja	56737.6	0.27	2.10	2.10	4.80
DUP - 1	1-Nov-15	2187	Staurodesmus extensus (Andersson) Teiling	100	0.04	13.60	12.00	387.40
DUP - 1	1-Nov-15	2199	Spondylosium planum (Wolle) W. and G.S. West	3546.1	0.13	6.00	6.00	37.70
DUP - 1	1-Nov-15	2205	Mougeotia sp.	3546.1	0.08	3.00	3.00	21.20
DUP - 1	1-Nov-15	2206	Botryococcus braunii Kutzing	300	0.27	12.00	12.00	904.80
DUP - 1	1-Nov-15	4351	Small chrysophyceae	56737.6	0.65	2.80	2.80	11.50
DUP - 1	1-Nov-15	4352	Large chrysophyceae	10638.3	1.91	7.00	7.00	179.60
DUP - 1	1-Nov-15	4357	Chrysococcus sp.	269503.6	17.63	5.00	5.00	65.40
DUP - 1	1-Nov-15	4358	Chrysostephanospaera globulifera Scherffel	7092.2	2.12	8.30	8.30	299.40
DUP - 1	1-Nov-15	4361	Kephyrion boreale Skuja	14184.4	1.52	5.90	5.90	107.50
DUP - 1	1-Nov-15	4362	Kephyrion sp.	42553.2	0.73	3.20	3.20	17.20
DUP - 1	1-Nov-15	4363	Spinifiromonas sirratus**********	7092.2	0.62	5.50	5.50	87.10
DUP - 1	1-Nov-15	4378	Dinobryon borgei Lemmermann	3546.1	0.16	9.00	3.10	45.30
DUP - 1	1-Nov-15	4381	Dinobryon mucronutom Nygaard	14184.4	1.86	10.00	5.00	130.90
DUP - 1	1-Nov-15	4390	Dinobryon sociale Ehrenberg	49645.4	11.23	12.00	6.00	226.20
DUP - 1	1-Nov-15	4390	Dinobryon sociale Ehrenberg	1400	1.72	0.00	0.00	1225.00
DUP - 1	1-Nov-15	4396	Chrysolkos skuja (Nauwerck) Willen	3546.1	0.12	6.00	3.30	34.20
DUP - 1	1-Nov-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.60	9.10	9.10	394.60
DUP - 1	1-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.11	5.60	3.20	30.00
DUP - 1	1-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.76	9.30	18.60	1263.50
DUP - 1	1-Nov-15	5509	Cyclotella ocellata Pant.	14184.4	1.43	4.00	8.00	100.50
DUP - 1	1-Nov-15	5511	Rhizosolenia eriense H.L. Smith	3546.1	0.28	11.00	3.00	77.80
DUP - 1	1-Nov-15	5518	Synedra acus Kutzing	1400	0.14	96.00	2.00	100.50
DUP - 1	1-Nov-15	5551	Cyclotella michiganiana Skvortzow	163120.6	3.12	2.30	4.60	19.10
DUP - 1	1-Nov-15	6554	Rhodomonas minuta Skuja	31914.9	4.09	10.20	6.00	128.20
DUP - 1	1-Nov-15	6558	Cryptomonas erosa Ehrenberg	1200	1.46	24.20	12.00	1216.40
DUP - 1	1-Nov-15	6568	Katablepharis ovalis Skuja	17730.5	0.91	8.60	4.00	51.60
DUP - 1	1-Nov-15	7632	Gymnodinium sp.	100	1.56	31.00	31.00	15598.50
DUP - 2	1-Jul-15	1054	Planktolyngbya limnetica	200	0.03	141.00	1.20	159.50
DUP - 2	1-Jul-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60
DUP - 2	1-Jul-15	2121	Oocystis lacustris Chodat	14368	0.34	5.10	3.00	24.00
DUP - 2	1-Jul-15	2137	Dictyosphaerium simplex Sukja	14368	0.07	2.10	2.10	4.80
DUP - 2	1-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.95	38.00	2.10	65.80
DUP - 2	1-Jul-15	4351	Small chrysophyceae	201152	2.84	3.00	3.00	14.10
DUP - 2	1-Jul-15	4352	Large chrysophyceae	71840	12.90	7.00	7.00	179.60
DUP - 2	1-Jul-15	4355	Chrysochromulina parva Lackey	7184	0.37	4.60	4.60	51.00
DUP - 2	1-Jul-15	4357	Chrysococcus sp.	783056	51.21	5.00	5.00	65.40
DUP - 2	1-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	400	0.45	21.30	10.00	1115.30
DUP - 2	1-Jul-15	4362	Kephyrion sp.	64656	1.58	3.60	3.60	24.40
DUP - 2	1-Jul-15	4378	Dinobryon borgei Lemmermann	43104	2.19	8.90	3.30	50.70
DUP - 2	1-Jul-15	4388	Dinobryon sertularia Ehrenberg	50288	11.38	12.00	6.00	226.20
DUP - 2	1-Jul-15	4388	Dinobryon sertularia Ehrenberg	2000	1.93	0.00	0.00	965.00
DUP - 2	1-Jul-15	4390	Dinobryon sociale Ehrenberg	400	0.80	0.00	0.00	1990.00
DUP - 2	1-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	122128	3.66	5.60	3.20	30.00
DUP - 2	1-Jul-15	4401	Uroglena volvox Ehrenberg	93392	10.56	6.00	6.00	113.10
DUP - 2	1-Jul-15	4413	Chrysochromulina laurentiana Kling	50288	19.19	9.00	9.00	381.70
DUP - 2	1-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	35920	1.16	6.00	3.20	32.20
DUP - 2	1-Jul-15	4436	Dinobryon attenatum Hill	7184	1.29	9.50	6.00	179.10
DUP - 2	1-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.73	10.50	21.00	1818.40
DUP - 2	1-Jul-15	5509	Cyclotella ocellata Pant.	21552	2.69	4.30	8.60	124.90
DUP - 2	1-Jul-15	5511	Rhizosolenia eriense H.L. Smith	7184	0.56	11.00	3.00	77.80
DUP - 2	1-Jul-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	200	0.15	81.00	6.00	763.40
DUP - 2	1-Jul-15	5518	Synedra acus Kutzing	3800	0.40	100.00	2.00	104.70
DUP - 2	1-Jul-15	5524	Asterionella formosa Hassall	4200	0.42	96.00	2.00	100.50
DUP - 2	1-Jul-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	800	2.35	86.00	6.60	2942.20
DUP - 2	1-Jul-15	5551	Cyclotella michiganiana Skvortzow	122128	2.99	2.50	5.00	24.50
DUP - 2	1-Jul-15	6554	Rhodomonas minuta Skuja	215520	28.43	10.50	6.00	131.90
DUP - 2	1-Jul-15	6558	Cryptomonas erosa Ehrenberg	5800	6.97	23.90	12.00	1201.30
DUP - 2	1-Jul-15	6559	Cryptomonas ovata Ehrenberg	200	0.90	40.00	18.00	4523.90
DUP - 2	1-Jul-15	6565	Cryptomonas rostratiformis Skuja	400	0.82	30.00	14.00	2052.50
DUP - 2	1-Jul-15	6568	Katablepharis ovalis Skuja	28736	1.38	8.30	4.00	48.10
DUP - 2	1-Jul-15	7641	Peridinium aciculiferum Lemmermann	800	7.48	31.00	24.00	9349.40
DUP - 2	1-Aug-15	1054	Planktolyngbya limnetica	400	0.06	131.00	1.20	148.20
DUP - 2	1-Aug-15	2105	Chlamydomonas spp.	7184	0.09	5.00	2.20	12.70
DUP - 2	1-Aug-15	2121	Oocystis lacustris Chodat	93392	2.47	5.60	3.00	26.40
DUP - 2	1-Aug-15	2137	Dictyosphaerium simplex Sukja	100576	0.48	2.10	2.10	4.80
DUP - 2	1-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	28736	1.08	6.00	6.00	37.70
DUP - 2	1-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	35920	0.17	3.00	3.00	4.70
DUP - 2	1-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.27	34.00	2.10	58.90
DUP - 2	1-Aug-15	4351	Small chrysophyceae	107760	1.52	3.00	3.00	14.10
DUP - 2	1-Aug-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
DUP - 2	1-Aug-15	4357	Chrysococcus sp.	409488	26.78	5.00	5.00	65.40
DUP - 2	1-Aug-15	4361	Kephyrion boreale Skuja	7184	0.66	5.60	5.60	92.00
DUP - 2	1-Aug-15	4362	Kephyrion sp.	143680	2.47	3.20	3.20	17.20
DUP - 2	1-Aug-15	4378	Dinobryon borgei Lemmermann	7184	0.33	9.10	3.10	45.80
DUP - 2	1-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
DUP - 2	1-Aug-15	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
DUP - 2	1-Aug-15	4388	Dinobryon sertularia Ehrenberg	400	0.86	0.00	0.00	2150.00
DUP - 2	1-Aug-15	4390	Dinobryon sociale Ehrenberg	165232	37.38	12.00	6.00	226.20
DUP - 2	1-Aug-15	4390	Dinobryon sociale Ehrenberg	600	1.19	0.00	0.00	1990.00
DUP - 2	1-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.43	5.60	3.20	30.00
DUP - 2	1-Aug-15	4413	Chrysochromulina laurentiana Kling	14368	5.67	9.10	9.10	394.60
DUP - 2	1-Aug-15	4414	Stichogloea spp.	35920	1.81	6.00	4.00	50.30
DUP - 2	1-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.41	5.60	3.10	28.20
DUP - 2	1-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.94	10.00	20.00	1570.80
DUP - 2	1-Aug-15	5509	Cyclotella ocellata Pant.	301728	6.97	2.45	4.90	23.10
DUP - 2	1-Aug-15	5518	Synedra acus Kutzing	1600	0.13	79.00	2.00	82.70
DUP - 2	1-Aug-15	5551	Cyclotella michiganiana Skvortzow	890816	19.33	2.40	4.80	21.70
DUP - 2	1-Aug-15	6554	Rhodomonas minuta Skuja	7184	0.42	9.00	4.30	58.10
DUP - 2	1-Aug-15	6558	Cryptomonas erosa Ehrenberg	3800	4.43	23.20	12.00	1166.20
DUP - 2	1-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.13	19.10	10.00	666.70
DUP - 2	1-Aug-15	6565	Cryptomonas rostratiformis Skuja	400	0.85	31.00	14.00	2120.90
DUP - 2	1-Aug-15	6568	Katablepharis ovalis Skuja	7184	0.42	9.10	4.00	57.80
DUP - 2	1-Aug-15	7631	Gymnodinium helveticum Penard	200	5.00	53.00	30.00	24975.70
DUP - 2	1-Aug-15	7632	Gymnodinium sp.	400	2.75	23.60	23.60	6882.30
DUP - 2	1-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.25	14.20	13.00	1256.50
DUP - 2	1-Sep-15	1054	Planktolyngbya limnetica	600	0.07	106.00	1.20	119.90
DUP - 2	1-Sep-15	2105	Chlamydomonas spp.	28736	0.68	5.00	3.00	23.60
DUP - 2	1-Sep-15	2121	Oocystis lacustris Chodat	21552	0.61	6.00	3.00	28.30
DUP - 2	1-Sep-15	2137	Dictyosphaerium simplex Sukja	86208	0.41	2.10	2.10	4.80
DUP - 2	1-Sep-15	2167	Elakatothrix gelatinosa Willen	28736	0.59	13.10	2.00	20.60
DUP - 2	1-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
DUP - 2	1-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	107760	8.21	44.00	2.10	76.20
DUP - 2	1-Sep-15	4351	Small chrysophyceae	222704	3.14	3.00	3.00	14.10
DUP - 2	1-Sep-15	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
DUP - 2	1-Sep-15	4357	Chrysococcus sp.	510064	26.01	4.60	4.60	51.00
DUP - 2	1-Sep-15	4362	Kephyrion sp.	122128	2.98	3.60	3.60	24.40
DUP - 2	1-Sep-15	4363	Spinifiromonas sirratus**********	7184	0.90	6.20	6.20	124.80
DUP - 2	1-Sep-15	4378	Dinobryon borgei Lemmermann	7184	0.35	9.00	3.20	48.30
DUP - 2	1-Sep-15	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
DUP - 2	1-Sep-15	4390	Dinobryon sociale Ehrenberg	1600	3.19	0.00	0.00	1991.00
DUP - 2	1-Sep-15	4394	Epiphyxis sp.	21552	1.63	9.00	4.00	75.40
DUP - 2	1-Sep-15	4413	Chrysochromulina laurentiana Kling	28736	10.97	9.00	9.00	381.70
DUP - 2	1-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.43	5.60	3.20	30.00
DUP - 2	1-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	2000	3.14	10.00	20.00	1570.80
DUP - 2	1-Sep-15	5509	Cyclotella ocellata Pant.	50288	6.73	4.40	8.80	133.80
DUP - 2	1-Sep-15	5518	Synedra acus Kutzing	2400	0.19	76.00	2.00	79.60
DUP - 2	1-Sep-15	5551	Cyclotella michiganiana Skvortzow	495696	12.14	2.50	5.00	24.50
DUP - 2	1-Sep-15	6554	Rhodomonas minuta Skuja	21552	3.25	12.00	6.00	150.80
DUP - 2	1-Sep-15	6558	Cryptomonas erosa Ehrenberg	6400	7.46	23.20	12.00	1166.20
DUP - 2	1-Sep-15	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.27	19.60	10.00	684.20
DUP - 2	1-Sep-15	6565	Cryptomonas rostratiformis Skuja	400	0.82	30.00	14.00	2052.50
DUP - 2	1-Sep-15	7632	Gymnodinium sp.	600	4.34	24.00	24.00	7238.20
DUP - 2	1-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.42	13.80	12.00	1040.50
DUP - 3	1-Aug-15	2105	Chlamydomonas spp.	14368	0.18	5.00	2.20	12.70
DUP - 3	1-Aug-15	2112	Sphaerocystis schroeteri Chodat	21552	0.37	3.20	3.20	17.20
DUP - 3	1-Aug-15	2121	Oocystis lacustris Chodat	28736	0.81	6.00	3.00	28.30
DUP - 3	1-Aug-15	2186	Xanthidium sp.	14368	2.51	10.00	10.00	174.50
DUP - 3	1-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
DUP - 3	1-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
DUP - 3	1-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.98	36.00	2.20	68.40
DUP - 3	1-Aug-15	4351	Small chrysophyceae	193968	2.73	3.00	3.00	14.10
DUP - 3	1-Aug-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
DUP - 3	1-Aug-15	4355	Chrysochromulina parva Lackey	28736	1.66	4.80	4.80	57.90
DUP - 3	1-Aug-15	4357	Chrysococcus sp.	416672	25.67	4.90	4.90	61.60
DUP - 3	1-Aug-15	4362	Kephyrion sp.	165232	2.84	3.20	3.20	17.20
DUP - 3	1-Aug-15	4378	Dinobryon borgei Lemmermann	14368	0.70	9.10	3.20	48.80
DUP - 3	1-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
DUP - 3	1-Aug-15	4388	Dinobryon sertularia Ehrenberg	129312	29.25	12.00	6.00	226.20
DUP - 3	1-Aug-15	4388	Dinobryon sertularia Ehrenberg	1200	2.39	0.00	0.00	1990.00
DUP - 3	1-Aug-15	4390	Dinobryon sociale Ehrenberg	229888	52.00	12.00	6.00	226.20
DUP - 3	1-Aug-15	4390	Dinobryon sociale Ehrenberg	2400	4.78	0.00	0.00	1990.00
DUP - 3	1-Aug-15	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
DUP - 3	1-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	28736	0.86	5.60	3.20	30.00
DUP - 3	1-Aug-15	4401	Uroglena volvox Ehrenberg	21552	2.44	6.00	6.00	113.10
DUP - 3	1-Aug-15	4413	Chrysochromulina laurentiana Kling	50288	19.19	9.00	9.00	381.70
DUP - 3	1-Aug-15	4436	Dinobryon attenatum Hill	28736	5.42	10.00	6.00	188.50
DUP - 3	1-Aug-15	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
DUP - 3	1-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.06	9.45	18.90	1325.60
DUP - 3	1-Aug-15	5509	Cyclotella ocellata Pant.	158048	21.15	4.40	8.80	133.80
DUP - 3	1-Aug-15	5518	Synedra acus Kutzing	1400	0.12	81.00	2.00	84.80
DUP - 3	1-Aug-15	5551	Cyclotella michiganiana Skvortzow	445408	9.67	2.40	4.80	21.70
DUP - 3	1-Aug-15	6554	Rhodomonas minuta Skuja	14368	0.83	9.00	4.30	58.10
DUP - 3	1-Aug-15	6558	Cryptomonas erosa Ehrenberg	2600	2.01	22.10	10.00	771.40
DUP - 3	1-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.60	10.00	684.20
DUP - 3	1-Aug-15	6565	Cryptomonas rostratiformis Skuja	400	0.82	30.00	14.00	2052.50
DUP - 3	1-Aug-15	6568	Katablepharis ovalis Skuja	7184	0.42	9.10	4.00	57.80
DUP - 3	1-Aug-15	7632	Gymnodinium sp.	14368	6.09	10.00	9.00	424.10
DUP - 3	1-Aug-15	7632	Gymnodinium sp.	800	5.79	24.00	24.00	7238.20
DUP - 3	1-Aug-15	7632	Gymnodinium sp.	200	4.81	51.00	30.00	24033.20
DUP - 3	1-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1400	1.76	14.20	13.00	1256.50

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
DUP - 3	1-Sep-15	1054	Planktolyngbya limnetica	18400	5.95	286.00	1.20	323.50
DUP - 3	1-Sep-15	2105	Chlamydomonas spp.	28736	1.45	6.00	4.00	50.30
DUP - 3	1-Sep-15	2112	Sphaerocystis schroeteri Chodat	28736	0.30	2.70	2.70	10.30
DUP - 3	1-Sep-15	2121	Oocystis lacustris Chodat	71840	2.06	6.10	3.00	28.70
DUP - 3	1-Sep-15	2137	Dictyosphaerium simplex Sukja	71840	0.30	2.00	2.00	4.20
DUP - 3	1-Sep-15	2167	Elakatothrix gelatinosa Willen	35920	0.73	13.00	2.00	20.40
DUP - 3	1-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
DUP - 3	1-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.45	36.00	2.10	62.30
DUP - 3	1-Sep-15	4351	Small chrysophyceae	330464	4.66	3.00	3.00	14.10
DUP - 3	1-Sep-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
DUP - 3	1-Sep-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
DUP - 3	1-Sep-15	4357	Chrysococcus sp.	237072	12.09	4.60	4.60	51.00
DUP - 3	1-Sep-15	4362	Kephyrion sp.	186784	4.56	3.60	3.60	24.40
DUP - 3	1-Sep-15	4378	Dinobryon borgei Lemmermann	28736	1.78	9.10	3.60	61.80
DUP - 3	1-Sep-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	400	1.01	0.00	0.00	2525.00
DUP - 3	1-Sep-15	4388	Dinobryon sertularia Ehrenberg	71840	16.25	12.00	6.00	226.20
DUP - 3	1-Sep-15	4388	Dinobryon sertularia Ehrenberg	1400	4.75	0.00	0.00	3390.00
DUP - 3	1-Sep-15	4390	Dinobryon sociale Ehrenberg	150864	34.13	12.00	6.00	226.20
DUP - 3	1-Sep-15	4390	Dinobryon sociale Ehrenberg	4600	15.59	0.00	0.00	3390.00
DUP - 3	1-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.41	5.60	3.10	28.20
DUP - 3	1-Sep-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
DUP - 3	1-Sep-15	4414	Stichogloea spp.	57472	2.89	6.00	4.00	50.30
DUP - 3	1-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	200	0.36	10.50	21.00	1818.40
DUP - 3	1-Sep-15	5509	Cyclotella ocellata Pant.	43104	5.38	4.30	8.60	124.90
DUP - 3	1-Sep-15	5511	Rhizosolenia eriense H.L. Smith	28736	2.24	11.00	3.00	77.80
DUP - 3	1-Sep-15	5518	Synedra acus Kutzing	3200	0.30	88.40	2.00	92.60
DUP - 3	1-Sep-15	5551	Cyclotella michiganiana Skvortzow	165232	3.82	2.45	4.90	23.10
DUP - 3	1-Sep-15	6554	Rhodomonas minuta Skuja	7184	1.08	12.00	6.00	150.80
DUP - 3	1-Sep-15	6558	Cryptomonas erosa Ehrenberg	200	0.24	23.40	12.00	1176.20
DUP - 3	1-Sep-15	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
DUP - 3	1-Sep-15	7632	Gymnodinium sp.	200	0.07	10.40	8.00	348.50
DUP - 3	1-Sep-15	7632	Gymnodinium sp.	200	1.84	26.00	26.00	9202.80
INUG - 68S	16-May-15	2105	Chlamydomonas spp.	3546.1	0.11	5.60	3.20	30.00
INUG - 68S	16-May-15	2187	Staurodesmus extensus (Andersson) Teiling	100	0.05	14.50	13.00	477.00
INUG - 68S	16-May-15	2206	Botryococcus braunii Kutzing	100	0.14	14.00	14.00	1436.80
INUG - 68S	16-May-15	4351	Small chrysophyceae	517730.6	7.30	3.00	3.00	14.10
INUG - 68S	16-May-15	4352	Large chrysophyceae	14184.4	2.55	7.00	7.00	179.60
INUG - 68S	16-May-15	4355	Chrysochromulina parva Lackey	21276.6	1.23	4.80	4.80	57.90
INUG - 68S	16-May-15	4357	Chrysococcus sp.	319149	22.18	5.10	5.10	69.50
INUG - 68S	16-May-15	4362	Kephyrion sp.	17730.5	0.25	3.00	3.00	14.10
INUG - 68S	16-May-15	4363	Spinifiromonas sirratus**********	3546.1	0.42	6.10	6.10	118.80
INUG - 68S	16-May-15	4368	Mallomonas crassisquama (Asmund) Fott	100	0.11	21.00	10.00	1099.60
INUG - 68S	16-May-15	4388	Dinobryon sertularia Ehrenberg	600	1.28	0.00	0.00	2125.00
INUG - 68S	16-May-15	4390	Dinobryon sociale Ehrenberg	1200	0.27	12.00	6.00	226.20
INUG - 68S	16-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	60283.7	1.68	5.90	3.00	27.80
INUG - 68S	16-May-15	4413	Chrysochromulina laurentiana Kling	10638.3	4.34	9.20	9.20	407.70
INUG - 68S	16-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.09	5.60	3.00	26.40
INUG - 68S	16-May-15	5507	Cyclotella stelligera Cleve and Grunow	100	0.11	9.00	18.00	1145.10
INUG - 68S	16-May-15	5509	Cyclotella ocellata Pant.	35461	6.96	5.00	10.00	196.30
INUG - 68S	16-May-15	5551	Cyclotella michiganiana Skvortzow	3546.1	0.08	2.45	4.90	23.10
INUG - 68S	16-May-15	6554	Rhodomonas minuta Skuja	63829.8	7.69	11.00	5.60	120.40
INUG - 68S	16-May-15	6558	Cryptomonas erosa Ehrenberg	1400	1.57	22.30	12.00	1120.90
INUG - 68S	16-May-15	7631	Gymnodinium helveticum Penard	100	2.36	50.00	30.00	23561.90
INUG - 68S	16-May-15	7632	Gymnodinium sp.	300	2.34	24.60	24.60	7794.80
INUG - 68S	16-May-15	7635	Peridinium willei Huitfeldt-Kaas	100	3.35	40.00	40.00	33510.30
INUG - 68S	16-May-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.10	13.20	12.00	995.30
INUG - 68S	16-May-15	7641	Peridinium aciculiferum Lemmermann	100	0.90	30.00	24.00	9047.80
INUG - 69S	16-May-15	2105	Chlamydomonas spp.	3546.1	0.12	6.00	3.30	34.20
INUG - 69S	16-May-15	2187	Staurodesmus extensus (Andersson) Teiling	100	0.05	14.50	13.00	477.00
INUG - 69S	16-May-15	2206	Botryococcus braunii Kutzing	300	0.43	14.00	14.00	1436.80
INUG - 69S	16-May-15	4351	Small chrysophyceae	283688	4.00	3.00	3.00	14.10
INUG - 69S	16-May-15	4352	Large chrysophyceae	14184.4	2.55	7.00	7.00	179.60
INUG - 69S	16-May-15	4357	Chrysococcus sp.	198581.6	13.80	5.10	5.10	69.50
INUG - 69S	16-May-15	4363	Spinifiromonas sirratus**********	3546.1	0.46	6.30	6.30	130.90
INUG - 69S	16-May-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.44	21.00	10.00	1099.60
INUG - 69S	16-May-15	4390	Dinobryon sociale Ehrenberg	400	0.09	12.00	6.00	226.20
INUG - 69S	16-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	14184.4	0.46	5.70	3.30	32.50
INUG - 69S	16-May-15	4413	Chrysochromulina laurentiana Kling	3546.1	1.45	9.20	9.20	407.70
INUG - 69S	16-May-15	5507	Cyclotella stelligera Cleve and Grunow	100	0.11	9.00	18.00	1145.10
INUG - 69S	16-May-15	5509	Cyclotella ocellata Pant.	24822.7	4.87	5.00	10.00	196.30
INUG - 69S	16-May-15	5551	Cyclotella michiganiana Skvortzow	3546.1	0.07	2.35	4.70	20.40
INUG - 69S	16-May-15	6554	Rhodomonas minuta Skuja	74468.1	8.97	11.00	5.60	120.40
INUG - 69S	16-May-15	6558	Cryptomonas erosa Ehrenberg	1000	1.18	23.50	12.00	1181.20
INUG - 69S	16-May-15	7632	Gymnodinium sp.	200	1.56	24.60	24.60	7794.80
INUG - 70S	27-Jul-15	2105	Chlamydomonas spp.	28736	0.36	5.00	2.20	12.70
INUG - 70S	27-Jul-15	2112	Sphaerocystis schroeteri Chodat	136496	1.75	2.90	2.90	12.80
INUG - 70S	27-Jul-15	2121	Oocystis lacustris Chodat	7184	0.16	4.60	3.00	21.70
INUG - 70S	27-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.11	15.30	14.00	572.00
INUG - 70S	27-Jul-15	4351	Small chrysophyceae	409488	7.04	3.20	3.20	17.20
INUG - 70S	27-Jul-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
INUG - 70S	27-Jul-15	4357	Chrysococcus sp.	818976	53.56	5.00	5.00	65.40
INUG - 70S	27-Jul-15	4362	Kephyrion sp.	150864	2.84	3.30	3.30	18.80
INUG - 70S	27-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.44	21.10	10.00	1104.80
INUG - 70S	27-Jul-15	4370	Mallomonas akrokomos Asmund and Kristiansen	7184	1.19	15.00	4.60	166.20
INUG - 70S	27-Jul-15	4378	Dinobryon borgei Lemmermann	28736	2.28	9.00	4.10	79.20

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
INUG - 70S	27-Jul-15	4381	Dinobryon mucronutom Nygaard	21552	2.71	9.60	5.00	125.70
INUG - 70S	27-Jul-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	1600	7.52	0.00	0.00	4700.00
INUG - 70S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	114944	28.60	13.20	6.00	248.80
INUG - 70S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	11000	55.94	0.00	0.00	5085.00
INUG - 70S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	323280	73.13	12.00	6.00	226.20
INUG - 70S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	29800	101.02	0.00	0.00	3390.00
INUG - 70S	27-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.42	5.60	3.10	28.20
INUG - 70S	27-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	14368	0.72	6.00	4.00	50.30
INUG - 70S	27-Jul-15	4413	Chrysochromulina laurentiana Kling	57472	27.47	9.70	9.70	477.90
INUG - 70S	27-Jul-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
INUG - 70S	27-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	200	0.31	10.00	20.00	1570.80
INUG - 70S	27-Jul-15	5509	Cyclotella ocellata Pant.	50288	5.45	4.10	8.20	108.30
INUG - 70S	27-Jul-15	5511	Rhizosolenia eriense H.L. Smith	43104	2.74	9.00	3.00	63.60
INUG - 70S	27-Jul-15	5518	Synedra acus Kutzing	2000	0.20	93.60	2.00	98.00
INUG - 70S	27-Jul-15	5551	Cyclotella michiganiana Skvortzow	201152	4.37	2.40	4.80	21.70
INUG - 70S	27-Jul-15	6554	Rhodomonas minuta Skuja	86208	8.28	11.00	5.00	96.00
INUG - 70S	27-Jul-15	6558	Cryptomonas erosa Ehrenberg	3000	4.00	22.60	13.00	1333.20
INUG - 70S	27-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	600	0.41	19.40	10.00	677.20
INUG - 70S	27-Jul-15	6568	Katablepharis ovalis Skuja	50288	2.30	8.00	4.10	45.80
INUG - 70S	27-Jul-15	7632	Gymnodinium sp.	600	6.90	28.00	28.00	11494.00
INUG - 70S	27-Jul-15	7635	Peridinium willei Huitfeldt-Kaas	200	6.70	40.00	40.00	33510.30
INUG - 71S	27-Jul-15	2105	Chlamydomonas spp.	21552	0.27	5.00	2.20	12.70
INUG - 71S	27-Jul-15	2112	Sphaerocystis schroeteri Chodat	86208	1.10	2.90	2.90	12.80
INUG - 71S	27-Jul-15	2167	Elakatothrix gelatinosa Willen	14368	0.25	11.00	2.00	17.30
INUG - 71S	27-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	400	0.23	15.30	14.00	572.00
INUG - 71S	27-Jul-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
INUG - 71S	27-Jul-15	4351	Small chrysophyceae	438224	7.54	3.20	3.20	17.20
INUG - 71S	27-Jul-15	4352	Large chrysophyceae	43104	7.74	7.00	7.00	179.60
INUG - 71S	27-Jul-15	4357	Chrysococcus sp.	711216	46.51	5.00	5.00	65.40
INUG - 71S	27-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.15	8.30	8.30	299.40
INUG - 71S	27-Jul-15	4362	Kephyrion sp.	114944	2.16	3.30	3.30	18.80
INUG - 71S	27-Jul-15	4363	Spinifiromonas sirratus**********	14368	2.16	6.60	6.60	150.50
INUG - 71S	27-Jul-15	4378	Dinobryon borgei Lemmermann	28736	2.28	9.00	4.10	79.20
INUG - 71S	27-Jul-15	4381	Dinobryon mucronutom Nygaard	57472	7.52	10.00	5.00	130.90
INUG - 71S	27-Jul-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	1800	8.46	0.00	0.00	4700.00
INUG - 71S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	201152	49.28	13.00	6.00	245.00
INUG - 71S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	9000	45.77	0.00	0.00	5085.00
INUG - 71S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	359200	81.25	12.00	6.00	226.20
INUG - 71S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	31800	107.80	0.00	0.00	3390.00
INUG - 71S	27-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.42	5.60	3.10	28.20
INUG - 71S	27-Jul-15	4400	Ochromonas sp.	7184	0.49	8.10	4.00	67.90
INUG - 71S	27-Jul-15	4413	Chrysochromulina laurentiana Kling	57472	23.43	9.20	9.20	407.70
INUG - 71S	27-Jul-15	4414	Stichogloea spp.	57472	2.89	6.00	4.00	50.30
INUG - 71S	27-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.94	10.00	20.00	1570.80
INUG - 71S	27-Jul-15	5509	Cyclotella ocellata Pant.	14368	1.56	4.10	8.20	108.30
INUG - 71S	27-Jul-15	5511	Rhizosolenia eriense H.L. Smith	35920	2.28	9.00	3.00	63.60
INUG - 71S	27-Jul-15	5518	Synedra acus Kutzing	1600	0.16	94.00	2.00	98.40
INUG - 71S	27-Jul-15	5551	Cyclotella michiganiana Skvortzow	64656	1.40	2.40	4.80	21.70
INUG - 71S	27-Jul-15	6554	Rhodomonas minuta Skuja	7184	0.69	11.00	5.00	96.00
INUG - 71S	27-Jul-15	6558	Cryptomonas erosa Ehrenberg	6200	8.41	23.00	13.00	1356.80
INUG - 71S	27-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	1000	0.68	19.60	10.00	684.20
INUG - 71S	27-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.41	30.00	14.00	2052.50
INUG - 71S	27-Jul-15	6568	Katablepharis ovalis Skuja	43104	1.97	8.00	4.10	45.80
INUG - 71S	27-Jul-15	7632	Gymnodinium sp.	7184	2.24	9.30	8.00	311.60
INUG - 71S	27-Jul-15	7632	Gymnodinium sp.	1000	11.49	28.00	28.00	11494.00
INUG - 71S	27-Jul-15	7635	Peridinium willei Huitfeldt-Kaas	200	6.70	40.00	40.00	33510.30
INUG - 71S	27-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.40	13.30	12.00	1002.80
INUG - 72S	27-Aug-15	1054	Planktolyngbya limnetica	400	0.10	229.00	1.20	259.00
INUG - 72S	27-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	400	0.31	15.00	14.00	769.70
INUG - 72S	27-Aug-15	2105	Chlamydomonas spp.	14368	0.25	5.00	2.60	17.70
INUG - 72S	27-Aug-15	2112	Sphaerocystis schroeteri Chodat	57472	0.90	3.10	3.10	15.60
INUG - 72S	27-Aug-15	2121	Oocystis lacustris Chodat	43104	1.02	5.00	3.00	23.60
INUG - 72S	27-Aug-15	2137	Dictyosphaerium simplex Sukja	28736	0.14	2.10	2.10	4.80
INUG - 72S	27-Aug-15	2167	Elakatothrix gelatinosa Willen	28736	0.41	9.00	2.00	14.10
INUG - 72S	27-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	1800	1.07	15.60	14.00	594.60
INUG - 72S	27-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	21552	0.81	6.00	6.00	37.70
INUG - 72S	27-Aug-15	2206	Botryococcus braunii Kutzing	600	0.86	14.00	14.00	1436.80
INUG - 72S	27-Aug-15	4351	Small chrysophyceae	359200	3.70	2.70	2.70	10.30
INUG - 72S	27-Aug-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
INUG - 72S	27-Aug-15	4357	Chrysococcus sp.	323280	21.14	5.00	5.00	65.40
INUG - 72S	27-Aug-15	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
INUG - 72S	27-Aug-15	4362	Kephyrion sp.	129312	1.66	2.90	2.90	12.80
INUG - 72S	27-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	20.50	10.00	1073.40
INUG - 72S	27-Aug-15	4378	Dinobryon borgei Lemmermann	7184	0.31	8.60	3.10	43.30
INUG - 72S	27-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.82	10.00	5.00	130.90
INUG - 72S	27-Aug-15	4383	Dinobryon bavaricum Imhof	79024	17.88	12.00	6.00	226.20
INUG - 72S	27-Aug-15	4383	Dinobryon bavaricum Imhof	3600	12.20	0.00	0.00	3390.00
INUG - 72S	27-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	7184	2.88	15.60	7.00	400.20
INUG - 72S	27-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	400	1.09	0.00	0.00	2725.00
INUG - 72S	27-Aug-15	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
INUG - 72S	27-Aug-15	4390	Dinobryon sociale Ehrenberg	258624	58.50	12.00	6.00	226.20
INUG - 72S	27-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	14368	0.72	6.00	4.00	50.30
INUG - 72S	27-Aug-15	4413	Chrysochromulina laurentiana Kling	50288	19.19	9.00	9.00	381.70
INUG - 72S	27-Aug-15	4414	Stichogloea spp.	114944	5.78	6.00	4.00	50.30
INUG - 72S	27-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.21	5.70	3.10	28.70

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
INUG - 72S	27-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	1200	1.42	9.10	18.20	1183.70
INUG - 72S	27-Aug-15	5509	Cyclotella ocellata Pant.	64656	6.50	4.00	8.00	100.50
INUG - 72S	27-Aug-15	5511	Rhizosolenia eriense H.L. Smith	28736	2.24	11.00	3.00	77.80
INUG - 72S	27-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.47	23.00	14.00	1180.20
INUG - 72S	27-Aug-15	5518	Synedra acus Kutzing	400	0.04	90.00	2.00	94.20
INUG - 72S	27-Aug-15	5551	Cyclotella michiganiana Skvortzow	114944	2.66	2.45	4.90	23.10
INUG - 72S	27-Aug-15	6554	Rhodomonas minuta Skuja	14368	0.72	9.00	4.00	50.30
INUG - 72S	27-Aug-15	6558	Cryptomonas erosa Ehrenberg	400	0.30	21.20	10.00	740.00
INUG - 72S	27-Aug-15	7632	Gymnodinium sp.	7184	2.29	9.50	8.00	318.30
INUG - 73S	27-Aug-15	1008	Aphanocapsa sp.	7184	0.47	0.00	0.00	65.00
INUG - 73S	27-Aug-15	1054	Planktolyngbya limnetica	400	0.12	261.00	1.20	295.20
INUG - 73S	27-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	600	0.46	15.00	14.00	769.70
INUG - 73S	27-Aug-15	2105	Chlamydomonas spp.	14368	0.25	5.00	2.60	17.70
INUG - 73S	27-Aug-15	2112	Sphaerocystis schroeteri Chodat	28736	0.45	3.10	3.10	15.60
INUG - 73S	27-Aug-15	2121	Oocystis lacustris Chodat	93392	2.20	5.00	3.00	23.60
INUG - 73S	27-Aug-15	2137	Dictyosphaerium simplex Sukja	21552	0.09	2.00	2.00	4.20
INUG - 73S	27-Aug-15	2167	Elakatothrix gelatinosa Willen	35920	0.51	9.00	2.00	14.10
INUG - 73S	27-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	2200	1.31	15.60	14.00	594.60
INUG - 73S	27-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
INUG - 73S	27-Aug-15	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
INUG - 73S	27-Aug-15	4351	Small chrysophyceae	330464	3.40	2.70	2.70	10.30
INUG - 73S	27-Aug-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
INUG - 73S	27-Aug-15	4357	Chrysococcus sp.	380752	24.90	5.00	5.00	65.40
INUG - 73S	27-Aug-15	4361	Kephyrion boreale Skuja	21552	3.24	6.60	6.60	150.50
INUG - 73S	27-Aug-15	4362	Kephyrion sp.	208336	2.67	2.90	2.90	12.80
INUG - 73S	27-Aug-15	4378	Dinobryon borgei Lemmermann	21552	0.93	8.60	3.10	43.30
INUG - 73S	27-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
INUG - 73S	27-Aug-15	4383	Dinobryon bavaricum Imhof	4200	0.27	0.00	0.00	65.00
INUG - 73S	27-Aug-15	4383	Dinobryon bavaricum Imhof	57472	13.00	12.00	6.00	226.20
INUG - 73S	27-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	14368	5.60	15.20	7.00	390.00
INUG - 73S	27-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.55	0.00	0.00	2725.00
INUG - 73S	27-Aug-15	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
INUG - 73S	27-Aug-15	4390	Dinobryon sociale Ehrenberg	330464	74.75	12.00	6.00	226.20
INUG - 73S	27-Aug-15	4390	Dinobryon sociale Ehrenberg	200	0.68	0.00	0.00	3390.00
INUG - 73S	27-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.37	5.50	3.00	25.90
INUG - 73S	27-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	43104	1.29	5.60	3.20	30.00
INUG - 73S	27-Aug-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
INUG - 73S	27-Aug-15	4414	Stichogloea spp.	136496	6.87	6.00	4.00	50.30
INUG - 73S	27-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.21	5.70	3.10	28.70
INUG - 73S	27-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	200	0.24	9.10	18.20	1183.70
INUG - 73S	27-Aug-15	5509	Cyclotella ocellata Pant.	57472	5.78	4.00	8.00	100.50
INUG - 73S	27-Aug-15	5511	Rhizosolenia eriense H.L. Smith	7184	0.56	11.00	3.00	77.80
INUG - 73S	27-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.47	23.00	14.00	1180.20
INUG - 73S	27-Aug-15	5518	Synedra acus Kutzing	600	0.06	90.00	2.00	94.20
INUG - 73S	27-Aug-15	5524	Asterionella formosa Hassall	600	0.06	96.00	2.00	100.50
INUG - 73S	27-Aug-15	5551	Cyclotella michiganiana Skvortzow	193968	4.48	2.45	4.90	23.10
INUG - 73S	27-Aug-15	6554	Rhodomonas minuta Skuja	114944	5.78	9.00	4.00	50.30
INUG - 73S	27-Aug-15	7632	Gymnodinium sp.	7184	2.19	9.10	8.00	304.90
INUG - 73S	27-Aug-15	7632	Gymnodinium sp.	800	7.36	26.00	26.00	9202.80
INUG - 73S	27-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.44	14.60	12.00	1100.80
INUG - 74S	1-Oct-15	1012	Aphanothece sp.	7184	0.37	0.00	0.00	52.00
INUG - 74S	1-Oct-15	1014	Chroococcus limneticus Lemmermann	57472	2.74	4.50	4.50	47.70
INUG - 74S	1-Oct-15	1054	Planktolyngbya limnetica	1400	0.27	171.00	1.20	193.40
INUG - 74S	1-Oct-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.11	14.00	12.00	527.80
INUG - 74S	1-Oct-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60
INUG - 74S	1-Oct-15	2121	Oocystis lacustris Chodat	64656	3.03	5.60	4.00	46.90
INUG - 74S	1-Oct-15	2145	Crucigenia quadrata Morr.	114944	0.16	2.00	2.00	1.40
INUG - 74S	1-Oct-15	2167	Elakatothrix gelatinosa Willen	71840	1.13	10.00	2.00	15.70
INUG - 74S	1-Oct-15	2178	Cosmarium sp.	200	0.20	18.00	18.00	1017.90
INUG - 74S	1-Oct-15	2187	Staurodesmus extensus (Andersson) Teiling	1600	1.04	16.30	14.00	649.20
INUG - 74S	1-Oct-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
INUG - 74S	1-Oct-15	4351	Small chrysophyceae	352016	4.96	3.00	3.00	14.10
INUG - 74S	1-Oct-15	4352	Large chrysophyceae	21552	4.39	7.30	7.30	203.70
INUG - 74S	1-Oct-15	4357	Chrysococcus sp.	524432	32.31	4.90	4.90	61.60
INUG - 74S	1-Oct-15	4361	Kephyrion boreale Skuja	28736	2.79	5.70	5.70	97.00
INUG - 74S	1-Oct-15	4362	Kephyrion sp.	150864	3.68	3.60	3.60	24.40
INUG - 74S	1-Oct-15	4363	Spinifiromonas sirratus**********	43104	3.75	5.50	5.50	87.10
INUG - 74S	1-Oct-15	4370	Mallomonas akrokomos Asmund and Kristiansen	7184	1.74	21.00	4.70	242.90
INUG - 74S	1-Oct-15	4378	Dinobryon borgei Lemmermann	21552	1.11	9.60	3.20	51.50
INUG - 74S	1-Oct-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
INUG - 74S	1-Oct-15	4383	Dinobryon bavaricum Imhof	200	0.25	0.00	0.00	1250.00
INUG - 74S	1-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	1.02	0.00	0.00	5085.00
INUG - 74S	1-Oct-15	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
INUG - 74S	1-Oct-15	4390	Dinobryon sociale Ehrenberg	251440	56.88	12.00	6.00	226.20
INUG - 74S	1-Oct-15	4390	Dinobryon sociale Ehrenberg	3000	5.97	0.00	0.00	1991.00
INUG - 74S	1-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.42	5.60	3.10	28.20
INUG - 74S	1-Oct-15	4411	Bitrichia chodatii (Reverdin) Chodat	14368	0.71	5.90	4.00	49.40
INUG - 74S	1-Oct-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
INUG - 74S	1-Oct-15	4414	Stichogloea spp.	150864	7.59	6.00	4.00	50.30
INUG - 74S	1-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.56	5.50	3.00	25.90
INUG - 74S	1-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	1400	2.55	10.50	21.00	1818.40
INUG - 74S	1-Oct-15	5509	Cyclotella ocellata Pant.	50288	6.73	4.40	8.80	133.80
INUG - 74S	1-Oct-15	5511	Rhizosolenia eriense H.L. Smith	28736	1.83	9.00	3.00	63.60
INUG - 74S	1-Oct-15	5514	Tabellaria flocculsa (Roth) Kutzing	3000	3.69	24.00	14.00	1231.50
INUG - 74S	1-Oct-15	5518	Synedra acus Kutzing	6600	0.63	91.00	2.00	95.30

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
INUG - 74S	1-Oct-15	5551	Cyclotella michiganiana Skvortzow	215520	5.28	2.50	5.00	24.50
INUG - 74S	1-Oct-15	6554	Rhodomonas minuta Skuja	57472	7.94	11.00	6.00	138.20
INUG - 74S	1-Oct-15	6558	Cryptomonas erosa Ehrenberg	800	0.97	24.10	12.00	1211.40
INUG - 74S	1-Oct-15	6568	Katablepharis ovalis Skuja	14368	0.74	8.60	4.00	51.60
INUG - 74S	1-Oct-15	7632	Gymnodinium sp.	21552	7.94	11.00	8.00	368.60
INUG - 74S	1-Oct-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.19	12.60	12.00	950.00
INUG - 75S	1-Oct-15	1054	Planktolyngbya limnetica	600	0.10	146.00	1.20	165.10
INUG - 75S	1-Oct-15	1077	Pseudoanabaena sp.	14368	1.87	46.00	1.90	130.40
INUG - 75S	1-Oct-15	2105	Chlamydomonas spp.	7184	0.17	5.00	3.00	23.60
INUG - 75S	1-Oct-15	2121	Oocystis lacustris Chodat	35920	1.68	5.60	4.00	46.90
INUG - 75S	1-Oct-15	2145	Crucigenia quadrata Morr.	57472	0.08	2.00	2.00	1.40
INUG - 75S	1-Oct-15	2167	Elakatothrix gelatinosa Willen	43104	0.68	10.00	2.00	15.70
INUG - 75S	1-Oct-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
INUG - 75S	1-Oct-15	2187	Staurodesmus extensus (Andersson) Teiling	1000	0.65	16.30	14.00	649.20
INUG - 75S	1-Oct-15	2193	Staurodesmus paradoxum Meyen	200	0.75	30.00	24.00	3769.90
INUG - 75S	1-Oct-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
INUG - 75S	1-Oct-15	2235	Ankistrodesmus spiralis Lemmermann	57472	3.98	40.00	2.10	69.30
INUG - 75S	1-Oct-15	4351	Small chrysophyceae	287360	4.05	3.00	3.00	14.10
INUG - 75S	1-Oct-15	4352	Large chrysophyceae	21552	4.39	7.30	7.30	203.70
INUG - 75S	1-Oct-15	4357	Chrysococcus sp.	761504	46.91	4.90	4.90	61.60
INUG - 75S	1-Oct-15	4361	Kephyrion boreale Skuja	28736	2.79	5.70	5.70	97.00
INUG - 75S	1-Oct-15	4362	Kephyrion sp.	129312	3.16	3.60	3.60	24.40
INUG - 75S	1-Oct-15	4363	Spinifiromonas sirratus**********	14368	1.25	5.50	5.50	87.10
INUG - 75S	1-Oct-15	4370	Mallomonas akrokomos Asmund and Kristiansen	14368	3.49	21.00	4.70	242.90
INUG - 75S	1-Oct-15	4378	Dinobryon borgei Lemmermann	21552	1.05	9.10	3.20	48.80
INUG - 75S	1-Oct-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
INUG - 75S	1-Oct-15	4383	Dinobryon bavaricum Imhof	200	0.25	0.00	0.00	1250.00
INUG - 75S	1-Oct-15	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
INUG - 75S	1-Oct-15	4390	Dinobryon sociale Ehrenberg	215520	48.75	12.00	6.00	226.20
INUG - 75S	1-Oct-15	4390	Dinobryon sociale Ehrenberg	2600	5.18	0.00	0.00	1991.00
INUG - 75S	1-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.41	5.60	3.10	28.20
INUG - 75S	1-Oct-15	4411	Bitrichia chodatii (Reverdin) Chodat	14368	0.71	5.90	4.00	49.40
INUG - 75S	1-Oct-15	4413	Chrysochromulina laurentiana Kling	28736	10.97	9.00	9.00	381.70
INUG - 75S	1-Oct-15	4414	Stichogloea spp.	107760	5.42	6.00	4.00	50.30
INUG - 75S	1-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	28736	0.74	5.50	3.00	25.90
INUG - 75S	1-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	1000	1.82	10.50	21.00	1818.40
INUG - 75S	1-Oct-15	5509	Cyclotella ocellata Pant.	14368	1.92	4.40	8.80	133.80
INUG - 75S	1-Oct-15	5511	Rhizosolenia eriense H.L. Smith	57472	3.66	9.00	3.00	63.60
INUG - 75S	1-Oct-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	600	0.45	80.00	6.00	754.00
INUG - 75S	1-Oct-15	5514	Tabellaria flocculsa (Roth) Kutzing	2200	2.78	24.60	14.00	1262.30
INUG - 75S	1-Oct-15	5518	Synedra acus Kutzing	7600	0.72	91.00	2.00	95.30
INUG - 75S	1-Oct-15	5551	Cyclotella michiganiana Skvortzow	272992	6.69	2.50	5.00	24.50
INUG - 75S	1-Oct-15	6554	Rhodomonas minuta Skuja	28736	3.97	11.00	6.00	138.20
INUG - 75S	1-Oct-15	6558	Cryptomonas erosa Ehrenberg	400	0.46	23.10	12.00	1161.10
INUG - 75S	1-Oct-15	6568	Katablepharis ovalis Skuja	50288	2.59	8.60	4.00	51.60
INUG - 75S	1-Oct-15	7632	Gymnodinium sp.	21552	7.94	11.00	8.00	368.60
INUG - 76S	23-Nov-15	1014	Chroococcus limneticus Lemmermann	28368.8	0.69	3.60	3.60	24.40
INUG - 76S	23-Nov-15	2112	Sphaerocystis schroeteri Chodat	14184.4	0.20	3.00	3.00	14.10
INUG - 76S	23-Nov-15	2121	Oocystis lacustris Chodat	24822.7	0.70	6.00	3.00	28.30
INUG - 76S	23-Nov-15	2145	Crucigenia quadrata Morr.	42553.2	0.06	2.00	2.00	1.40
INUG - 76S	23-Nov-15	2206	Botryococcus braunii Kutzing	400	0.36	12.00	12.00	904.80
INUG - 76S	23-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	78014.2	5.34	36.00	2.20	68.40
INUG - 76S	23-Nov-15	4351	Small chrysophyceae	248227	3.18	2.90	2.90	12.80
INUG - 76S	23-Nov-15	4352	Large chrysophyceae	3546.1	0.64	7.00	7.00	179.60
INUG - 76S	23-Nov-15	4357	Chrysococcus sp.	191489.4	11.80	4.90	4.90	61.60
INUG - 76S	23-Nov-15	4362	Kephyrion sp.	70922	1.33	3.30	3.30	18.80
INUG - 76S	23-Nov-15	4378	Dinobryon borgei Lemmermann	3546.1	0.17	9.30	3.10	46.80
INUG - 76S	23-Nov-15	4390	Dinobryon sociale Ehrenberg	21276.6	4.81	12.00	6.00	226.20
INUG - 76S	23-Nov-15	4400	Ochromonas sp.	3546.1	0.27	9.10	4.00	76.20
INUG - 76S	23-Nov-15	4413	Chrysochromulina laurentiana Kling	17730.5	7.23	9.20	9.20	407.70
INUG - 76S	23-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.11	5.60	3.20	30.00
INUG - 76S	23-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	700	1.13	10.10	20.20	1618.40
INUG - 76S	23-Nov-15	5509	Cyclotella ocellata Pant.	10638.3	1.33	4.30	8.60	124.90
INUG - 76S	23-Nov-15	5518	Synedra acus Kutzing	1600	0.18	106.00	2.00	111.00
INUG - 76S	23-Nov-15	5551	Cyclotella michiganiana Skvortzow	49645.4	1.22	2.50	5.00	24.50
INUG - 76S	23-Nov-15	6554	Rhodomonas minuta Skuja	81560.3	11.58	11.30	6.00	142.00
INUG - 76S	23-Nov-15	6558	Cryptomonas erosa Ehrenberg	1200	1.41	23.40	12.00	1176.20
INUG - 76S	23-Nov-15	7632	Gymnodinium sp.	400	9.77	36.00	36.00	24429.00
INUG - 77S	23-Nov-15	1014	Chroococcus limneticus Lemmermann	56737.6	1.38	3.60	3.60	24.40
INUG - 77S	23-Nov-15	2121	Oocystis lacustris Chodat	70922	2.01	6.00	3.00	28.30
INUG - 77S	23-Nov-15	2137	Dictyosphaerium simplex Sukja	31914.9	0.15	2.10	2.10	4.80
INUG - 77S	23-Nov-15	2187	Staurodesmus extensus (Andersson) Teiling	100	0.06	15.60	14.00	594.60
INUG - 77S	23-Nov-15	2206	Botryococcus braunii Kutzing	700	0.63	12.00	12.00	904.80
INUG - 77S	23-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	3546.1	0.24	36.00	2.20	68.40
INUG - 77S	23-Nov-15	4351	Small chrysophyceae	326241.2	4.18	2.90	2.90	12.80
INUG - 77S	23-Nov-15	4352	Large chrysophyceae	10638.3	1.91	7.00	7.00	179.60
INUG - 77S	23-Nov-15	4357	Chrysococcus sp.	276595.8	17.04	4.90	4.90	61.60
INUG - 77S	23-Nov-15	4362	Kephyrion sp.	42553.2	0.80	3.30	3.30	18.80
INUG - 77S	23-Nov-15	4363	Spinifiromonas sirratus**********	3546.1	0.46	6.30	6.30	130.90
INUG - 77S	23-Nov-15	4378	Dinobryon borgei Lemmermann	3546.1	0.17	9.60	3.10	48.30
INUG - 77S	23-Nov-15	4390	Dinobryon sociale Ehrenberg	14184.4	3.21	12.00	6.00	226.20
INUG - 77S	23-Nov-15	4390	Dinobryon sociale Ehrenberg	300	0.60	0.00	0.00	1991.00
INUG - 77S	23-Nov-15	4413	Chrysochromulina laurentiana Kling	24822.7	10.12	9.20	9.20	407.70
INUG - 77S	23-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	17730.5	0.53	5.60	3.20	30.00
INUG - 77S	23-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.58	10.80	21.60	1978.80

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
INUG - 77S	23-Nov-15	5509	Cyclotella ocellata Pant.	3546.1	0.44	4.30	8.60	124.90
INUG - 77S	23-Nov-15	5511	Rhizosolenia eriense H.L. Smith	14184.4	0.90	9.00	3.00	63.60
INUG - 77S	23-Nov-15	5514	Tabellaria flocculsa (Roth) Kutzing	100	0.19	28.00	16.00	1876.60
INUG - 77S	23-Nov-15	5518	Synedra acus Kutzing	600	0.07	105.00	2.00	110.00
INUG - 77S	23-Nov-15	5551	Cyclotella michiganiana Skvortzow	35461	0.87	2.50	5.00	24.50
INUG - 77S	23-Nov-15	6554	Rhodomonas minuta Skuja	42553.2	6.04	11.30	6.00	142.00
INUG - 77S	23-Nov-15	6558	Cryptomonas erosa Ehrenberg	1200	1.44	23.90	12.00	1201.30
INUG - 77S	23-Nov-15	7631	Gymnodinium helveticum Penard	300	7.07	50.00	30.00	23561.90
INUG - 77S	23-Nov-15	7632	Gymnodinium sp.	100	2.44	36.00	36.00	24429.00
INUG - 77SR	23-Nov-15	1014	Chroococcus limneticus Lemmermann	14184.4	0.35	3.60	3.60	24.40
INUG - 77SR	23-Nov-15	2105	Chlamydomonas spp.	7092.2	0.17	5.00	3.00	23.60
INUG - 77SR	23-Nov-15	2121	Oocystis lacustris Chodat	67375.9	1.91	6.00	3.00	28.30
INUG - 77SR	23-Nov-15	2137	Dictyosphaerium simplex Sukja	35461	0.17	2.10	2.10	4.80
INUG - 77SR	23-Nov-15	2145	Crucigenia quadrata Morr.	14184.4	0.02	2.00	2.00	1.40
INUG - 77SR	23-Nov-15	2187	Staurodesmus extensus (Andersson) Teiling	100	0.06	15.60	14.00	594.60
INUG - 77SR	23-Nov-15	2206	Botryococcus braunii Kutzing	400	0.36	12.00	12.00	904.80
INUG - 77SR	23-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	14184.4	0.97	36.00	2.20	68.40
INUG - 77SR	23-Nov-15	4351	Small chrysophyceae	287234.1	3.68	2.90	2.90	12.80
INUG - 77SR	23-Nov-15	4352	Large chrysophyceae	3546.1	0.64	7.00	7.00	179.60
INUG - 77SR	23-Nov-15	4357	Chrysococcus sp.	269503.6	16.60	4.90	4.90	61.60
INUG - 77SR	23-Nov-15	4362	Kephyrion sp.	28368.8	0.53	3.30	3.30	18.80
INUG - 77SR	23-Nov-15	4378	Dinobryon borgei Lemmermann	3546.1	0.17	9.60	3.10	48.30
INUG - 77SR	23-Nov-15	4388	Dinobryon sertularia Ehrenberg	3546.1	0.80	12.00	6.00	226.20
INUG - 77SR	23-Nov-15	4390	Dinobryon sociale Ehrenberg	14184.4	3.21	12.00	6.00	226.20
INUG - 77SR	23-Nov-15	4390	Dinobryon sociale Ehrenberg	200	0.40	0.00	0.00	1991.00
INUG - 77SR	23-Nov-15	4413	Chrysochromulina laurentiana Kling	35461	14.46	9.20	9.20	407.70
INUG - 77SR	23-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	31914.9	0.96	5.60	3.20	30.00
INUG - 77SR	23-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	600	1.19	10.80	21.60	1978.80
INUG - 77SR	23-Nov-15	5509	Cyclotella ocellata Pant.	3546.1	0.44	4.30	8.60	124.90
INUG - 77SR	23-Nov-15	5511	Rhizosolenia eriense H.L. Smith	14184.4	0.90	9.00	3.00	63.60
INUG - 77SR	23-Nov-15	5514	Tabellaria flocculsa (Roth) Kutzing	100	0.19	28.00	16.00	1876.60
INUG - 77SR	23-Nov-15	5518	Synedra acus Kutzing	900	0.10	105.00	2.00	110.00
INUG - 77SR	23-Nov-15	5551	Cyclotella michiganiana Skvortzow	63829.8	1.56	2.50	5.00	24.50
INUG - 77SR	23-Nov-15	6554	Rhodomonas minuta Skuja	31914.9	4.53	11.30	6.00	142.00
INUG - 77SR	23-Nov-15	6558	Cryptomonas erosa Ehrenberg	1900	2.28	23.90	12.00	1201.30
INUG - 77SR	23-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.33	15.90	14.00	1631.70
PDL - 37S	28-Jul-15	2105	Chlamydomonas spp.	21552	0.35	5.00	2.50	16.40
PDL - 37S	28-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	400	0.16	14.00	12.00	410.50
PDL - 37S	28-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
PDL - 37S	28-Jul-15	4351	Small chrysophyceae	316096	3.26	2.70	2.70	10.30
PDL - 37S	28-Jul-15	4352	Large chrysophyceae	43104	7.74	7.00	7.00	179.60
PDL - 37S	28-Jul-15	4357	Chrysococcus sp.	1041680	64.17	4.90	4.90	61.60
PDL - 37S	28-Jul-15	4362	Kephyrion sp.	158048	3.86	3.60	3.60	24.40
PDL - 37S	28-Jul-15	4363	Spinifiromonas sirratus**********	7184	0.90	6.20	6.20	124.80
PDL - 37S	28-Jul-15	4378	Dinobryon borgei Lemmermann	7184	0.33	8.60	3.20	46.10
PDL - 37S	28-Jul-15	4381	Dinobryon mucronutom Nygaard	14368	1.62	8.60	5.00	112.60
PDL - 37S	28-Jul-15	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
PDL - 37S	28-Jul-15	4388	Dinobryon sertularia Ehrenberg	7600	38.65	0.00	0.00	5085.00
PDL - 37S	28-Jul-15	4390	Dinobryon sociale Ehrenberg	50288	11.38	12.00	6.00	226.20
PDL - 37S	28-Jul-15	4390	Dinobryon sociale Ehrenberg	8000	27.12	0.00	0.00	3390.00
PDL - 37S	28-Jul-15	4413	Chrysochromulina laurentiana Kling	71840	29.29	9.20	9.20	407.70
PDL - 37S	28-Jul-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
PDL - 37S	28-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.35	5.20	3.00	24.50
PDL - 37S	28-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.85	9.65	19.30	1411.60
PDL - 37S	28-Jul-15	5509	Cyclotella ocellata Pant.	57472	5.99	4.05	8.10	104.30
PDL - 37S	28-Jul-15	5511	Rhizosolenia eriense H.L. Smith	17960	1.40	11.00	3.00	77.80
PDL - 37S	28-Jul-15	5518	Synedra acus Kutzing	4800	0.48	96.00	2.00	100.50
PDL - 37S	28-Jul-15	5540	Aulacoseira italica v subarctica (O. Muller) Simonsen	600	1.42	69.00	6.60	2360.60
PDL - 37S	28-Jul-15	5551	Cyclotella michiganiana Skvortzow	143680	3.52	2.50	5.00	24.50
PDL - 37S	28-Jul-15	6554	Rhodomonas minuta Skuja	28736	3.64	12.00	5.50	126.70
PDL - 37S	28-Jul-15	6558	Cryptomonas erosa Ehrenberg	2200	2.65	24.00	12.00	1206.40
PDL - 37S	28-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	20.00	10.00	698.10
PDL - 37S	28-Jul-15	6568	Katablepharis ovalis Skuja	28736	1.35	8.20	4.00	46.90
PDL - 37S	28-Jul-15	7632	Gymnodinium sp.	400	2.42	22.60	22.60	6044.00
PDL - 37S	28-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.61	13.40	12.00	1010.30
PDL - 37S	28-Jul-15	7641	Peridinium aciculiferum Lemmermann	400	3.62	30.00	24.00	9047.80
PDL - 38S	28-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
PDL - 38S	28-Jul-15	4351	Small chrysophyceae	280176	2.89	2.70	2.70	10.30
PDL - 38S	28-Jul-15	4352	Large chrysophyceae	43104	7.74	7.00	7.00	179.60
PDL - 38S	28-Jul-15	4357	Chrysococcus sp.	1142256	70.36	4.90	4.90	61.60
PDL - 38S	28-Jul-15	4362	Kephyrion sp.	201152	3.46	3.20	3.20	17.20
PDL - 38S	28-Jul-15	4363	Spinifiromonas sirratus**********	35920	2.80	5.30	5.30	78.00
PDL - 38S	28-Jul-15	4378	Dinobryon borgei Lemmermann	14368	0.66	8.60	3.20	46.10
PDL - 38S	28-Jul-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.93	0.00	0.00	4625.00
PDL - 38S	28-Jul-15	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
PDL - 38S	28-Jul-15	4388	Dinobryon sertularia Ehrenberg	6600	33.56	0.00	0.00	5085.00
PDL - 38S	28-Jul-15	4390	Dinobryon sociale Ehrenberg	79024	17.88	12.00	6.00	226.20
PDL - 38S	28-Jul-15	4390	Dinobryon sociale Ehrenberg	11200	37.97	0.00	0.00	3390.00
PDL - 38S	28-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.20	5.40	3.10	27.20
PDL - 38S	28-Jul-15	4413	Chrysochromulina laurentiana Kling	107760	43.93	9.20	9.20	407.70
PDL - 38S	28-Jul-15	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
PDL - 38S	28-Jul-15	5509	Cyclotella ocellata Pant.	14368	1.50	4.05	8.10	104.30
PDL - 38S	28-Jul-15	5511	Rhizosolenia eriense H.L. Smith	64656	5.03	11.00	3.00	77.80
PDL - 38S	28-Jul-15	5518	Synedra acus Kutzing	6400	0.64	96.00	2.00	100.50
PDL - 38S	28-Jul-15	5551	Cyclotella michiganiana Skvortzow	122128	2.99	2.50	5.00	24.50

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
PDL - 38S	28-Jul-15	6554	Rhodomonas minuta Skuja	14368	1.69	12.00	5.30	117.70
PDL - 38S	28-Jul-15	6558	Cryptomonas erosa Ehrenberg	3000	3.56	23.60	12.00	1186.30
PDL - 38S	28-Jul-15	6568	Katablepharis ovalis Skuja	21552	1.01	8.20	4.00	46.90
PDL - 38S	28-Jul-15	7632	Gymnodinium sp.	7184	2.31	9.60	8.00	321.70
PDL - 38S	28-Jul-15	7632	Gymnodinium sp.	1800	9.50	21.60	21.60	5276.70
PDL - 38S	28-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	1400	1.39	13.20	12.00	995.30
PDL - 38S	28-Jul-15	7641	Peridinium aciculiferum Lemmermann	200	1.87	31.00	24.00	9349.40
PDL - 39S	26-Aug-15	1012	Aphanothece sp.	7184	0.47	0.00	0.00	66.00
PDL - 39S	26-Aug-15	1054	Planktolyngbya limnetica	2000	0.37	163.00	1.20	184.30
PDL - 39S	26-Aug-15	2105	Chlamydomonas spp.	14368	0.24	5.00	2.50	16.40
PDL - 39S	26-Aug-15	2112	Sphaerocystis schroeteri Chodat	86208	3.11	4.10	4.10	36.10
PDL - 39S	26-Aug-15	2121	Oocystis lacustris Chodat	35920	1.81	6.00	4.00	50.30
PDL - 39S	26-Aug-15	2167	Elakatothrix gelatinosa Willen	100576	1.58	10.00	2.00	15.70
PDL - 39S	26-Aug-15	2193	Staurodesmus paradoxum Meyen	200	0.67	28.30	24.00	3354.80
PDL - 39S	26-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.42	31.00	2.20	58.90
PDL - 39S	26-Aug-15	4351	Small chrysophyceae	222704	2.85	2.90	2.90	12.80
PDL - 39S	26-Aug-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
PDL - 39S	26-Aug-15	4357	Chrysococcus sp.	646560	42.29	5.00	5.00	65.40
PDL - 39S	26-Aug-15	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
PDL - 39S	26-Aug-15	4362	Kephyrion sp.	107760	2.22	3.40	3.40	20.60
PDL - 39S	26-Aug-15	4363	Spinifiromonas sirratus**********	14368	1.47	5.80	5.80	102.20
PDL - 39S	26-Aug-15	4378	Dinobryon borgei Lemmermann	14368	0.74	9.00	3.30	51.30
PDL - 39S	26-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.82	10.00	5.00	130.90
PDL - 39S	26-Aug-15	4388	Dinobryon sertularia Ehrenberg	50288	11.38	12.00	6.00	226.20
PDL - 39S	26-Aug-15	4388	Dinobryon sertularia Ehrenberg	1600	3.18	0.00	0.00	1990.00
PDL - 39S	26-Aug-15	4388	Dinobryon sertularia Ehrenberg	1800	3.87	0.00	0.00	2150.00
PDL - 39S	26-Aug-15	4390	Dinobryon sociale Ehrenberg	179600	40.63	12.00	6.00	226.20
PDL - 39S	26-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.40	5.50	3.10	27.70
PDL - 39S	26-Aug-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
PDL - 39S	26-Aug-15	4413	Chrysochromulina laurentiana Kling	21552	8.23	9.00	9.00	381.70
PDL - 39S	26-Aug-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
PDL - 39S	26-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	600	1.09	10.50	21.00	1818.40
PDL - 39S	26-Aug-15	5509	Cyclotella ocellata Pant.	64656	9.57	4.55	9.10	148.00
PDL - 39S	26-Aug-15	5511	Rhizosolenia eriense H.L. Smith	50288	3.20	9.00	3.00	63.60
PDL - 39S	26-Aug-15	5518	Synedra acus Kutzing	3400	0.32	90.00	2.00	94.20
PDL - 39S	26-Aug-15	5551	Cyclotella michiganiana Skvortzow	100576	2.46	2.50	5.00	24.50
PDL - 39S	26-Aug-15	6554	Rhodomonas minuta Skuja	21552	1.14	9.00	4.10	52.80
PDL - 39S	26-Aug-15	6558	Cryptomonas erosa Ehrenberg	400	0.32	22.60	10.00	788.90
PDL - 39S	26-Aug-15	6568	Katablepharis ovalis Skuja	21552	1.04	8.30	4.00	48.10
PDL - 39S	26-Aug-15	7632	Gymnodinium sp.	400	2.11	21.60	21.60	5276.70
PDL - 39S	26-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.21	14.00	12.00	1055.60
PDL - 40S	26-Aug-15	1054	Planktolyngbya limnetica	3800	0.90	210.00	1.20	237.50
PDL - 40S	26-Aug-15	2112	Sphaerocystis schroeteri Chodat	35920	1.30	4.10	4.10	36.10
PDL - 40S	26-Aug-15	2137	Dictyosphaerium simplex Sukja	21552	0.14	2.30	2.30	6.40
PDL - 40S	26-Aug-15	2167	Elakatothrix gelatinosa Willen	14368	0.23	10.00	2.00	15.70
PDL - 40S	26-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.08	13.50	12.00	381.70
PDL - 40S	26-Aug-15	2193	Staurodesmus paradoxum Meyen	200	0.67	28.30	24.00	3354.80
PDL - 40S	26-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
PDL - 40S	26-Aug-15	2206	Botryococcus braunii Kutzing	400	0.21	10.00	10.00	523.60
PDL - 40S	26-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
PDL - 40S	26-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.16	31.00	2.10	53.70
PDL - 40S	26-Aug-15	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
PDL - 40S	26-Aug-15	4351	Small chrysophyceae	337648	4.32	2.90	2.90	12.80
PDL - 40S	26-Aug-15	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
PDL - 40S	26-Aug-15	4357	Chrysococcus sp.	531616	34.77	5.00	5.00	65.40
PDL - 40S	26-Aug-15	4362	Kephyrion sp.	93392	1.92	3.40	3.40	20.60
PDL - 40S	26-Aug-15	4378	Dinobryon borgei Lemmermann	21552	1.11	9.00	3.30	51.30
PDL - 40S	26-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
PDL - 40S	26-Aug-15	4388	Dinobryon sertularia Ehrenberg	93392	21.13	12.00	6.00	226.20
PDL - 40S	26-Aug-15	4388	Dinobryon sertularia Ehrenberg	2600	5.59	0.00	0.00	2150.00
PDL - 40S	26-Aug-15	4390	Dinobryon sociale Ehrenberg	158048	35.75	12.00	6.00	226.20
PDL - 40S	26-Aug-15	4390	Dinobryon sociale Ehrenberg	2600	5.17	0.00	0.00	1990.00
PDL - 40S	26-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.20	5.50	3.10	27.70
PDL - 40S	26-Aug-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
PDL - 40S	26-Aug-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
PDL - 40S	26-Aug-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
PDL - 40S	26-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.73	10.50	21.00	1818.40
PDL - 40S	26-Aug-15	5509	Cyclotella ocellata Pant.	43104	6.38	4.55	9.10	148.00
PDL - 40S	26-Aug-15	5511	Rhizosolenia eriense H.L. Smith	50288	3.20	9.00	3.00	63.60
PDL - 40S	26-Aug-15	5518	Synedra acus Kutzing	4400	0.41	90.00	2.00	94.20
PDL - 40S	26-Aug-15	5551	Cyclotella michiganiana Skvortzow	114944	2.82	2.50	5.00	24.50
PDL - 40S	26-Aug-15	5720	Cyclotella bodanica Eulenst.	400	2.80	16.45	32.90	6992.30
PDL - 40S	26-Aug-15	6554	Rhodomonas minuta Skuja	21552	1.14	9.00	4.10	52.80
PDL - 40S	26-Aug-15	6558	Cryptomonas erosa Ehrenberg	1400	1.10	22.60	10.00	788.90
PDL - 40S	26-Aug-15	7632	Gymnodinium sp.	400	2.11	21.60	21.60	5276.70
PDL - 41S	4-Oct-15	1054	Planktolyngbya limnetica	7400	2.51	300.00	1.20	339.30
PDL - 41S	4-Oct-15	2105	Chlamydomonas spp.	14368	0.72	6.00	4.00	50.30
PDL - 41S	4-Oct-15	2112	Sphaerocystis schroeteri Chodat	64656	0.67	2.70	2.70	10.30
PDL - 41S	4-Oct-15	2121	Oocystis lacustris Chodat	136496	3.92	6.10	3.00	28.70
PDL - 41S	4-Oct-15	2130	Scenedesmus quadricauda (Turp.) Brebisson	14368	1.50	12.00	5.00	104.70
PDL - 41S	4-Oct-15	2137	Dictyosphaerium simplex Sukja	86208	0.36	2.00	2.00	4.20
PDL - 41S	4-Oct-15	2167	Elakatothrix gelatinosa Willen	21552	0.44	13.00	2.00	20.40
PDL - 41S	4-Oct-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.34	36.00	2.10	62.30
PDL - 41S	4-Oct-15	4351	Small chrysophyceae	272992	3.85	3.00	3.00	14.10
PDL - 41S	4-Oct-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
PDL - 41S	4-Oct-15	4355	Chrysochromulina parva Lackey	14368	0.94	5.00	5.00	65.40
PDL - 41S	4-Oct-15	4357	Chrysococcus sp.	215520	10.99	4.60	4.60	51.00
PDL - 41S	4-Oct-15	4362	Kephyrion sp.	122128	2.98	3.60	3.60	24.40
PDL - 41S	4-Oct-15	4378	Dinobryon borgei Lemmermann	28736	1.78	9.10	3.60	61.80
PDL - 41S	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.51	0.00	0.00	2525.00
PDL - 41S	4-Oct-15	4388	Dinobryon sertularia Ehrenberg	50288	11.38	12.00	6.00	226.20
PDL - 41S	4-Oct-15	4388	Dinobryon sertularia Ehrenberg	1000	3.39	0.00	0.00	3390.00
PDL - 41S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	114944	26.00	12.00	6.00	226.20
PDL - 41S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	4800	16.27	0.00	0.00	3390.00
PDL - 41S	4-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	21552	0.61	5.60	3.10	28.20
PDL - 41S	4-Oct-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
PDL - 41S	4-Oct-15	4414	Stichogloea spp.	35920	1.81	6.00	4.00	50.30
PDL - 41S	4-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.23	6.00	3.20	32.20
PDL - 41S	4-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	1400	2.55	10.50	21.00	1818.40
PDL - 41S	4-Oct-15	5509	Cyclotella ocellata Pant.	21552	2.69	4.30	8.60	124.90
PDL - 41S	4-Oct-15	5518	Synedra acus Kutzing	2400	0.23	91.00	2.00	95.30
PDL - 41S	4-Oct-15	5551	Cyclotella michiganiana Skvortzow	193968	4.48	2.45	4.90	23.10
PDL - 41S	4-Oct-15	5720	Cyclotella bodanica Eulenst.	200	1.49	16.80	33.60	7448.10
PDL - 41S	4-Oct-15	6554	Rhodomonas minuta Skuja	21552	3.25	12.00	6.00	150.80
PDL - 41S	4-Oct-15	6558	Cryptomonas erosa Ehrenberg	600	0.71	23.40	12.00	1176.20
PDL - 41S	4-Oct-15	7631	Gymnodinium helveticum Penard	200	4.81	51.00	30.00	24033.20
PDL - 41S	4-Oct-15	7632	Gymnodinium sp.	14368	5.01	10.40	8.00	348.50
PDL - 41S	4-Oct-15	7632	Gymnodinium sp.	400	3.51	25.60	25.60	8784.50
SP - 80S	17-May-15	4351	Small chrysophyceae	120567.4	1.70	3.00	3.00	14.10
SP - 80S	17-May-15	4352	Large chrysophyceae	3546.1	0.64	7.00	7.00	179.60
SP - 80S	17-May-15	4355	Chrysochromulina parva Lackey	3546.1	0.18	4.60	4.60	51.00
SP - 80S	17-May-15	4357	Chrysococcus sp.	652482.4	50.89	5.30	5.30	78.00
SP - 80S	17-May-15	4362	Kephyrion sp.	31914.9	0.50	3.10	3.10	15.60
SP - 80S	17-May-15	4363	Spinifiromonas sirratus**********	17730.5	1.81	5.80	5.80	102.20
SP - 80S	17-May-15	4388	Dinobryon sertularia Ehrenberg	28368.8	6.42	12.00	6.00	226.20
SP - 80S	17-May-15	4388	Dinobryon sertularia Ehrenberg	2000	2.05	0.00	0.00	1025.00
SP - 80S	17-May-15	4390	Dinobryon sociale Ehrenberg	99290.8	22.46	12.00	6.00	226.20
SP - 80S	17-May-15	4390	Dinobryon sociale Ehrenberg	2000	2.53	0.00	0.00	1265.00
SP - 80S	17-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	63829.8	1.99	5.80	3.20	31.10
SP - 80S	17-May-15	4413	Chrysochromulina laurentiana Kling	85106.4	34.70	9.20	9.20	407.70
SP - 80S	17-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.13	6.00	3.40	36.30
SP - 80S	17-May-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.81	11.30	22.60	2266.50
SP - 80S	17-May-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	500	0.41	88.00	6.00	829.40
SP - 80S	17-May-15	5518	Synedra acus Kutzing	1200	0.14	110.00	2.00	115.20
SP - 80S	17-May-15	5551	Cyclotella michiganiana Skvortzow	3546.1	0.09	2.50	5.00	24.50
SP - 80S	17-May-15	6554	Rhodomonas minuta Skuja	24822.7	2.02	9.30	5.00	81.20
SP - 80S	17-May-15	6558	Cryptomonas erosa Ehrenberg	400	0.44	21.90	12.00	1100.80
SP - 80S	17-May-15	7632	Gymnodinium sp.	1700	6.40	19.30	19.30	3764.20
SP - 80S	17-May-15	7639	Peridinium pusillum (Penard) Lemmermann	500	0.53	14.00	12.00	1055.60
SP - 81S	17-May-15	4351	Small chrysophyceae	120567.4	1.70	3.00	3.00	14.10
SP - 81S	17-May-15	4352	Large chrysophyceae	3546.1	0.64	7.00	7.00	179.60
SP - 81S	17-May-15	4355	Chrysochromulina parva Lackey	10638.3	0.54	4.60	4.60	51.00
SP - 81S	17-May-15	4357	Chrysococcus sp.	613475.3	47.85	5.30	5.30	78.00
SP - 81S	17-May-15	4362	Kephyrion sp.	21276.6	0.33	3.10	3.10	15.60
SP - 81S	17-May-15	4363	Spinifiromonas sirratus**********	3546.1	0.36	5.80	5.80	102.20
SP - 81S	17-May-15	4368	Mallomonas crassisquama (Asmund) Fott	100	0.11	20.20	10.00	1057.70
SP - 81S	17-May-15	4378	Dinobryon borgei Lemmermann	3546.1	0.18	9.40	3.20	50.40
SP - 81S	17-May-15	4388	Dinobryon sertularia Ehrenberg	7092.2	1.60	12.00	6.00	226.20
SP - 81S	17-May-15	4388	Dinobryon sertularia Ehrenberg	2500	2.56	0.00	0.00	1025.00
SP - 81S	17-May-15	4390	Dinobryon sociale Ehrenberg	63829.8	14.44	12.00	6.00	226.20
SP - 81S	17-May-15	4390	Dinobryon sociale Ehrenberg	2000	2.53	0.00	0.00	1265.00
SP - 81S	17-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	24822.7	0.77	5.80	3.20	31.10
SP - 81S	17-May-15	4413	Chrysochromulina laurentiana Kling	49645.4	20.24	9.20	9.20	407.70
SP - 81S	17-May-15	5507	Cyclotella stelligera Cleve and Grunow	1000	2.27	11.30	22.60	2266.50
SP - 81S	17-May-15	5518	Synedra acus Kutzing	800	0.09	110.00	2.00	115.20
SP - 81S	17-May-15	6554	Rhodomonas minuta Skuja	78014.2	6.33	9.30	5.00	81.20
SP - 81S	17-May-15	6558	Cryptomonas erosa Ehrenberg	1700	1.87	21.90	12.00	1100.80
SP - 81S	17-May-15	6565	Cryptomonas rostratiformis Skuja	100	0.21	30.00	14.00	2052.50
SP - 81S	17-May-15	7632	Gymnodinium sp.	1000	3.88	19.50	19.50	3882.40
SP - 81S	17-May-15	7635	Peridinium willei Huitfeldt-Kaas	100	3.35	40.00	40.00	33510.30
SP - 81S	17-May-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.11	14.00	12.00	1055.60
SP - 82S	15-Jul-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60
SP - 82S	15-Jul-15	2121	Oocystis lacustris Chodat	14368	0.28	5.10	2.70	19.50
SP - 82S	15-Jul-15	2137	Dictyosphaerium simplex Sukja	28736	0.12	2.00	2.00	4.20
SP - 82S	15-Jul-15	2167	Elakatothrix gelatinosa Willen	14368	0.26	11.60	2.00	18.20
SP - 82S	15-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
SP - 82S	15-Jul-15	4351	Small chrysophyceae	366384	4.69	2.90	2.90	12.80
SP - 82S	15-Jul-15	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
SP - 82S	15-Jul-15	4355	Chrysochromulina parva Lackey	21552	1.41	5.00	5.00	65.40
SP - 82S	15-Jul-15	4357	Chrysococcus sp.	984208	60.63	4.90	4.90	61.60
SP - 82S	15-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.56	8.80	8.80	356.80
SP - 82S	15-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	14368	7.52	10.00	10.00	523.60
SP - 82S	15-Jul-15	4361	Kephyrion boreale Skuja	7184	0.66	5.60	5.60	92.00
SP - 82S	15-Jul-15	4362	Kephyrion sp.	100576	2.45	3.60	3.60	24.40
SP - 82S	15-Jul-15	4363	Spinifiromonas sirratus**********	7184	0.66	5.60	5.60	92.00
SP - 82S	15-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.46	22.10	10.00	1157.20
SP - 82S	15-Jul-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
SP - 82S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	114944	26.00	12.00	6.00	226.20
SP - 82S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	7200	6.95	0.00	0.00	965.00
SP - 82S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	100576	22.75	12.00	6.00	226.20

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
SP - 82S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	6600	13.13	0.00	0.00	1990.00
SP - 82S	15-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	57472	1.72	5.60	3.20	30.00
SP - 82S	15-Jul-15	4401	Uroglena volvox Ehrenberg	172416	19.50	6.00	6.00	113.10
SP - 82S	15-Jul-15	4413	Chrysochromulina laurentiana Kling	57472	21.94	9.00	9.00	381.70
SP - 82S	15-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.63	10.00	20.00	1570.80
SP - 82S	15-Jul-15	5509	Cyclotella ocellata Pant.	93392	14.75	4.65	9.30	157.90
SP - 82S	15-Jul-15	5518	Synedra acus Kutzing	7600	0.72	91.00	2.00	95.30
SP - 82S	15-Jul-15	5551	Cyclotella michiganiana Skvortzow	272992	5.21	2.30	4.60	19.10
SP - 82S	15-Jul-15	5720	Cyclotella bodanica Eulenst.	800	5.96	16.80	33.60	7448.10
SP - 82S	15-Jul-15	6554	Rhodomonas minuta Skuja	28736	2.51	10.00	5.00	87.30
SP - 82S	15-Jul-15	6558	Cryptomonas erosa Ehrenberg	4000	4.66	23.20	12.00	1166.20
SP - 82S	15-Jul-15	6565	Cryptomonas rostratiformis Skuja	1000	2.12	31.00	14.00	2120.90
SP - 82S	15-Jul-15	6568	Katablepharis ovalis Skuja	21552	0.99	8.10	4.00	45.80
SP - 82S	15-Jul-15	7631	Gymnodinium helveticum Penard	200	4.81	51.00	30.00	24033.20
SP - 82S	15-Jul-15	7635	Peridinium willei Huitfeldt-Kaas	200	6.70	40.00	40.00	33510.30
SP - 82S	15-Jul-15	7641	Peridinium aciculiferum Lemmermann	400	3.74	31.00	24.00	9349.40
SP - 83S	15-Jul-15	2105	Chlamydomonas spp.	21552	0.51	5.00	3.00	23.60
SP - 83S	15-Jul-15	2121	Oocystis lacustris Chodat	21552	0.42	5.10	2.70	19.50
SP - 83S	15-Jul-15	2137	Dictyosphaerium simplex Sukja	79024	0.38	2.10	2.10	4.80
SP - 83S	15-Jul-15	2167	Elakatothrix gelatinosa Willen	14368	0.26	11.60	2.00	18.20
SP - 83S	15-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.09	14.00	13.00	444.70
SP - 83S	15-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
SP - 83S	15-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.85	34.00	2.10	58.90
SP - 83S	15-Jul-15	4351	Small chrysophyceae	352016	4.51	2.90	2.90	12.80
SP - 83S	15-Jul-15	4352	Large chrysophyceae	50288	9.03	7.00	7.00	179.60
SP - 83S	15-Jul-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
SP - 83S	15-Jul-15	4357	Chrysococcus sp.	2155200	132.76	4.90	4.90	61.60
SP - 83S	15-Jul-15	4362	Kephyrion sp.	244256	5.96	3.60	3.60	24.40
SP - 83S	15-Jul-15	4378	Dinobryon borgei Lemmermann	64656	3.12	9.00	3.20	48.30
SP - 83S	15-Jul-15	4381	Dinobryon mucronutom Nygaard	35920	4.70	10.00	5.00	130.90
SP - 83S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	244256	55.25	12.00	6.00	226.20
SP - 83S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	6800	6.56	0.00	0.00	965.00
SP - 83S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	366384	82.88	12.00	6.00	226.20
SP - 83S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	5800	11.54	0.00	0.00	1990.00
SP - 83S	15-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	64656	1.69	5.20	3.10	26.20
SP - 83S	15-Jul-15	4401	Uroglena volvox Ehrenberg	251440	28.44	6.00	6.00	113.10
SP - 83S	15-Jul-15	4401	Uroglena volvox Ehrenberg	200	2.26	0.00	0.00	11300.00
SP - 83S	15-Jul-15	4413	Chrysochromulina laurentiana Kling	136496	53.86	9.10	9.10	394.60
SP - 83S	15-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.56	5.50	3.00	25.90
SP - 83S	15-Jul-15	4436	Dinobryon attenatum Hill	14368	2.98	11.00	6.00	207.30
SP - 83S	15-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	200	0.31	10.00	20.00	1570.80
SP - 83S	15-Jul-15	5509	Cyclotella ocellata Pant.	165232	26.09	4.65	9.30	157.90
SP - 83S	15-Jul-15	5518	Synedra acus Kutzing	7200	0.69	91.00	2.00	95.30
SP - 83S	15-Jul-15	5551	Cyclotella michiganiana Skvortzow	244256	4.67	2.30	4.60	19.10
SP - 83S	15-Jul-15	5720	Cyclotella bodanica Eulenst.	1000	7.45	16.80	33.60	7448.10
SP - 83S	15-Jul-15	6554	Rhodomonas minuta Skuja	21552	1.88	10.00	5.00	87.30
SP - 83S	15-Jul-15	6558	Cryptomonas erosa Ehrenberg	3000	3.50	23.20	12.00	1166.20
SP - 83S	15-Jul-15	6565	Cryptomonas rostratiformis Skuja	400	0.85	31.00	14.00	2120.90
SP - 83S	15-Jul-15	7631	Gymnodinium helveticum Penard	200	5.00	53.00	30.00	24975.70
SP - 83S	15-Jul-15	7632	Gymnodinium sp.	400	5.11	29.00	29.00	12770.10
SP - 83S	15-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.64	15.50	14.00	1590.70
SP - 83S	15-Jul-15	7640	Peridinium goslaviense Woloszynska	200	1.81	30.00	24.00	9047.80
SP - 84S	13-Aug-15	2105	Chlamydomonas spp.	14368	0.84	7.00	4.00	58.60
SP - 84S	13-Aug-15	2121	Oocystis lacustris Chodat	93392	2.42	5.50	3.00	25.90
SP - 84S	13-Aug-15	2137	Dictyosphaerium simplex Sukja	150864	0.97	2.30	2.30	6.40
SP - 84S	13-Aug-15	2167	Elakatothrix gelatinosa Willen	14368	0.20	9.00	2.00	14.10
SP - 84S	13-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.11	15.30	14.00	572.00
SP - 84S	13-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	57472	0.27	3.00	3.00	4.70
SP - 84S	13-Aug-15	4351	Small chrysophyceae	165232	2.33	3.00	3.00	14.10
SP - 84S	13-Aug-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
SP - 84S	13-Aug-15	4357	Chrysococcus sp.	301728	19.73	5.00	5.00	65.40
SP - 84S	13-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.39	8.60	8.60	333.00
SP - 84S	13-Aug-15	4361	Kephyrion boreale Skuja	7184	0.63	5.50	5.50	87.10
SP - 84S	13-Aug-15	4362	Kephyrion sp.	93392	2.28	3.60	3.60	24.40
SP - 84S	13-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.53	21.00	9.00	890.60
SP - 84S	13-Aug-15	4378	Dinobryon borgei Lemmermann	7184	0.35	8.60	3.30	49.00
SP - 84S	13-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.73	10.00	4.80	120.60
SP - 84S	13-Aug-15	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
SP - 84S	13-Aug-15	4388	Dinobryon sertularia Ehrenberg	400	0.80	0.00	0.00	1990.00
SP - 84S	13-Aug-15	4390	Dinobryon sociale Ehrenberg	79024	16.83	11.30	6.00	213.00
SP - 84S	13-Aug-15	4390	Dinobryon sociale Ehrenberg	200	0.25	0.00	0.00	1225.00
SP - 84S	13-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.38	5.60	3.00	26.40
SP - 84S	13-Aug-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
SP - 84S	13-Aug-15	4414	Stichogloea spp.	64656	3.25	6.00	4.00	50.30
SP - 84S	13-Aug-15	4415	Bicoeca lacustris Clark	7184	0.56	5.30	5.30	78.00
SP - 84S	13-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	8000	14.55	10.50	21.00	1818.40
SP - 84S	13-Aug-15	5509	Cyclotella ocellata Pant.	7184	1.03	4.50	9.00	143.10
SP - 84S	13-Aug-15	5511	Rhizosolenia eriense H.L. Smith	7184	0.46	9.00	3.00	63.60
SP - 84S	13-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.47	23.00	14.00	1180.20
SP - 84S	13-Aug-15	5518	Synedra acus Kutzing	1200	0.12	96.00	2.00	100.50
SP - 84S	13-Aug-15	5551	Cyclotella michiganiana Skvortzow	201152	3.60	2.25	4.50	17.90
SP - 84S	13-Aug-15	5720	Cyclotella bodanica Eulenst.	400	3.06	16.95	33.90	7649.40
SP - 84S	13-Aug-15	6554	Rhodomonas minuta Skuja	35920	1.81	9.00	4.00	50.30
SP - 84S	13-Aug-15	6558	Cryptomonas erosa Ehrenberg	2400	1.77	21.10	10.00	736.50
SP - 84S	13-Aug-15	7632	Gymnodinium sp.	400	1.94	21.00	21.00	4849.00

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
SP - 84S	13-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.58	12.90	12.00	972.60
SP - 85S	13-Aug-15	1008	Aphanocapsa sp.	7184	0.35	0.00	0.00	49.00
SP - 85S	13-Aug-15	1014	Chroococcus limneticus Lemmermann	57472	1.40	3.60	3.60	24.40
SP - 85S	13-Aug-15	1054	Planktolyngbya limnetica	200	0.03	136.00	1.20	153.80
SP - 85S	13-Aug-15	2121	Oocystis lacustris Chodat	64656	1.67	5.50	3.00	25.90
SP - 85S	13-Aug-15	2137	Dictyosphaerium simplex Sukja	86208	0.55	2.30	2.30	6.40
SP - 85S	13-Aug-15	2178	Cosmarium sp.	600	0.84	20.00	20.00	1396.30
SP - 85S	13-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
SP - 85S	13-Aug-15	2206	Botryococcus braunii Kutzing	1200	1.09	12.00	12.00	904.80
SP - 85S	13-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	28736	0.14	3.00	3.00	4.70
SP - 85S	13-Aug-15	4351	Small chrysophyceae	107760	1.52	3.00	3.00	14.10
SP - 85S	13-Aug-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
SP - 85S	13-Aug-15	4357	Chrysococcus sp.	323280	21.14	5.00	5.00	65.40
SP - 85S	13-Aug-15	4362	Kephyrion sp.	71840	1.75	3.60	3.60	24.40
SP - 85S	13-Aug-15	4378	Dinobryon borgei Lemmermann	35920	1.76	8.60	3.30	49.00
SP - 85S	13-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.60	10.00	4.80	120.60
SP - 85S	13-Aug-15	4390	Dinobryon sociale Ehrenberg	150864	32.13	11.30	6.00	213.00
SP - 85S	13-Aug-15	4390	Dinobryon sociale Ehrenberg	200	0.40	0.00	0.00	1990.00
SP - 85S	13-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	21552	0.57	5.60	3.00	26.40
SP - 85S	13-Aug-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
SP - 85S	13-Aug-15	4414	Stichogloea spp.	14368	0.72	6.00	4.00	50.30
SP - 85S	13-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	6600	12.00	10.50	21.00	1818.40
SP - 85S	13-Aug-15	5509	Cyclotella ocellata Pant.	21552	3.08	4.50	9.00	143.10
SP - 85S	13-Aug-15	5518	Synedra acus Kutzing	800	0.08	96.00	2.00	100.50
SP - 85S	13-Aug-15	5551	Cyclotella michiganiana Skvortzow	158048	2.83	2.25	4.50	17.90
SP - 85S	13-Aug-15	5720	Cyclotella bodanica Eulenst.	1200	9.18	16.95	33.90	7649.40
SP - 85S	13-Aug-15	6554	Rhodomonas minuta Skuja	7184	0.36	9.00	4.00	50.30
SP - 85S	13-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1000	0.97	12.90	12.00	972.60
SP - 85SR	13-Aug-15	1014	Chroococcus limneticus Lemmermann	28736	0.70	3.60	3.60	24.40
SP - 85SR	13-Aug-15	2105	Chlamydomonas spp.	7184	0.11	5.60	2.30	15.50
SP - 85SR	13-Aug-15	2121	Oocystis lacustris Chodat	21552	0.56	5.50	3.00	25.90
SP - 85SR	13-Aug-15	2137	Dictyosphaerium simplex Sukja	64656	0.41	2.30	2.30	6.40
SP - 85SR	13-Aug-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
SP - 85SR	13-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
SP - 85SR	13-Aug-15	2206	Botryococcus braunii Kutzing	400	0.36	12.00	12.00	904.80
SP - 85SR	13-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
SP - 85SR	13-Aug-15	4351	Small chrysophyceae	165232	2.33	3.00	3.00	14.10
SP - 85SR	13-Aug-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
SP - 85SR	13-Aug-15	4357	Chrysococcus sp.	323280	21.14	5.00	5.00	65.40
SP - 85SR	13-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.00	8.10	8.10	278.30
SP - 85SR	13-Aug-15	4362	Kephyrion sp.	86208	2.10	3.60	3.60	24.40
SP - 85SR	13-Aug-15	4378	Dinobryon borgei Lemmermann	43104	2.11	8.60	3.30	49.00
SP - 85SR	13-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.87	10.00	4.80	120.60
SP - 85SR	13-Aug-15	4390	Dinobryon sociale Ehrenberg	129312	27.54	11.30	6.00	213.00
SP - 85SR	13-Aug-15	4390	Dinobryon sociale Ehrenberg	200	0.40	0.00	0.00	1990.00
SP - 85SR	13-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.19	5.60	3.00	26.40
SP - 85SR	13-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
SP - 85SR	13-Aug-15	4413	Chrysochromulina laurentiana Kling	28736	10.97	9.00	9.00	381.70
SP - 85SR	13-Aug-15	4414	Stichogloea spp.	57472	2.89	6.00	4.00	50.30
SP - 85SR	13-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	8200	14.91	10.50	21.00	1818.40
SP - 85SR	13-Aug-15	5509	Cyclotella ocellata Pant.	7184	1.03	4.50	9.00	143.10
SP - 85SR	13-Aug-15	5518	Synedra acus Kutzing	2000	0.20	96.00	2.00	100.50
SP - 85SR	13-Aug-15	5551	Cyclotella michiganiana Skvortzow	107760	1.93	2.25	4.50	17.90
SP - 85SR	13-Aug-15	5720	Cyclotella bodanica Eulenst.	1200	9.18	16.95	33.90	7649.40
SP - 85SR	13-Aug-15	6554	Rhodomonas minuta Skuja	7184	0.36	9.00	4.00	50.30
SP - 85SR	13-Aug-15	7635	Peridinium willei Huitfeldt-Kaas	200	5.30	37.00	37.00	26521.80
SP - 85SR	13-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	2000	1.95	12.90	12.00	972.60
SP - 86S	6-Sep-15	2105	Chlamydomonas spp.	7184	0.17	4.90	3.00	23.10
SP - 86S	6-Sep-15	2121	Oocystis lacustris Chodat	64656	1.83	6.00	3.00	28.30
SP - 86S	6-Sep-15	2137	Dictyosphaerium simplex Sukja	79024	0.38	2.10	2.10	4.80
SP - 86S	6-Sep-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
SP - 86S	6-Sep-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.12	15.50	14.00	587.00
SP - 86S	6-Sep-15	2206	Botryococcus braunii Kutzing	1200	0.63	10.00	10.00	523.60
SP - 86S	6-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	50288	0.24	3.00	3.00	4.70
SP - 86S	6-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.45	33.30	2.20	63.30
SP - 86S	6-Sep-15	4351	Small chrysophyceae	294544	4.59	3.10	3.10	15.60
SP - 86S	6-Sep-15	4352	Large chrysophyceae	7184	2.74	9.00	9.00	381.70
SP - 86S	6-Sep-15	4357	Chrysococcus sp.	294544	15.02	4.60	4.60	51.00
SP - 86S	6-Sep-15	4362	Kephyrion sp.	122128	1.91	3.10	3.10	15.60
SP - 86S	6-Sep-15	4363	Spinifiromonas sirratus**********	7184	1.08	6.60	6.60	150.50
SP - 86S	6-Sep-15	4378	Dinobryon borgei Lemmermann	21552	0.93	8.60	3.10	43.30
SP - 86S	6-Sep-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
SP - 86S	6-Sep-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
SP - 86S	6-Sep-15	4390	Dinobryon sociale Ehrenberg	100576	22.75	12.00	6.00	226.20
SP - 86S	6-Sep-15	4390	Dinobryon sociale Ehrenberg	400	0.80	0.00	0.00	1990.00
SP - 86S	6-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.41	5.60	3.10	28.20
SP - 86S	6-Sep-15	4413	Chrysochromulina laurentiana Kling	7184	2.83	9.10	9.10	394.60
SP - 86S	6-Sep-15	4414	Stichogloea spp.	43104	2.17	6.00	4.00	50.30
SP - 86S	6-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.46	6.00	3.20	32.20
SP - 86S	6-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	6400	12.66	10.80	21.60	1978.80
SP - 86S	6-Sep-15	5509	Cyclotella ocellata Pant.	28736	4.11	4.50	9.00	143.10
SP - 86S	6-Sep-15	5518	Synedra acus Kutzing	1600	0.14	86.00	2.00	90.10
SP - 86S	6-Sep-15	5551	Cyclotella michiganiana Skvortzow	222704	4.83	2.40	4.80	21.70
SP - 86S	6-Sep-15	5720	Cyclotella bodanica Eulenst.	400	3.09	17.00	34.00	7717.30
SP - 86S	6-Sep-15	6554	Rhodomonas minuta Skuja	43104	4.14	11.00	5.00	96.00

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
SP - 86S	6-Sep-15	6558	Cryptomonas erosa Ehrenberg	2600	2.99	22.90	12.00	1151.10
SP - 86S	6-Sep-15	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.29	21.00	10.00	733.00
SP - 86S	6-Sep-15	6568	Katablepharis ovalis Skuja	21552	1.25	9.10	4.00	57.80
SP - 86S	6-Sep-15	7632	Gymnodinium sp.	200	1.10	21.90	21.90	5499.60
SP - 86S	6-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.41	13.60	12.00	1025.40
SP - 87S	6-Sep-15	1008	Aphanocapsa sp.	7184	0.36	0.00	0.00	50.00
SP - 87S	6-Sep-15	2105	Chlamydomonas spp.	7184	0.17	4.90	3.00	23.10
SP - 87S	6-Sep-15	2121	Oocystis lacustris Chodat	86208	2.44	6.00	3.00	28.30
SP - 87S	6-Sep-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.12	15.90	14.00	617.70
SP - 87S	6-Sep-15	2206	Botryococcus braunii Kutzing	400	0.21	10.00	10.00	523.60
SP - 87S	6-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	71840	0.34	3.00	3.00	4.70
SP - 87S	6-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.53	37.30	2.20	70.90
SP - 87S	6-Sep-15	4351	Small chrysophyceae	445408	6.95	3.10	3.10	15.60
SP - 87S	6-Sep-15	4355	Chrysochromulina parva Lackey	21552	1.41	5.00	5.00	65.40
SP - 87S	6-Sep-15	4357	Chrysococcus sp.	387936	19.78	4.60	4.60	51.00
SP - 87S	6-Sep-15	4361	Kephyrion boreale Skuja	7184	0.50	5.10	5.10	69.50
SP - 87S	6-Sep-15	4362	Kephyrion sp.	57472	0.90	3.10	3.10	15.60
SP - 87S	6-Sep-15	4370	Mallomonas akrokomos Asmund and Kristiansen	7184	2.03	15.00	6.00	282.70
SP - 87S	6-Sep-15	4378	Dinobryon borgei Lemmermann	21552	1.04	9.60	3.10	48.30
SP - 87S	6-Sep-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
SP - 87S	6-Sep-15	4390	Dinobryon sociale Ehrenberg	64656	14.63	12.00	6.00	226.20
SP - 87S	6-Sep-15	4390	Dinobryon sociale Ehrenberg	600	1.19	0.00	0.00	1990.00
SP - 87S	6-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.20	5.60	3.10	28.20
SP - 87S	6-Sep-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.29	6.00	3.60	40.70
SP - 87S	6-Sep-15	4413	Chrysochromulina laurentiana Kling	35920	15.62	9.40	9.40	434.90
SP - 87S	6-Sep-15	4414	Stichogloea spp.	71840	3.61	6.00	4.00	50.30
SP - 87S	6-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	50288	1.51	5.60	3.20	30.00
SP - 87S	6-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	4800	9.50	10.80	21.60	1978.80
SP - 87S	6-Sep-15	5509	Cyclotella ocellata Pant.	43104	6.17	4.50	9.00	143.10
SP - 87S	6-Sep-15	5518	Synedra acus Kutzing	600	0.05	86.00	2.00	90.10
SP - 87S	6-Sep-15	5551	Cyclotella michiganiana Skvortzow	316096	6.86	2.40	4.80	21.70
SP - 87S	6-Sep-15	5720	Cyclotella bodanica Eulenst.	600	4.63	17.00	34.00	7717.30
SP - 87S	6-Sep-15	6554	Rhodomonas minuta Skuja	71840	6.90	11.00	5.00	96.00
SP - 87S	6-Sep-15	6558	Cryptomonas erosa Ehrenberg	2200	2.53	22.90	12.00	1151.10
SP - 87S	6-Sep-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.15	21.00	10.00	733.00
SP - 87S	6-Sep-15	6568	Katablepharis ovalis Skuja	14368	0.83	9.10	4.00	57.80
SP - 87S	6-Sep-15	7632	Gymnodinium sp.	400	2.20	21.90	21.90	5499.60
SP - 87S	6-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.62	13.60	12.00	1025.40
SP - 88S	2-Nov-15	2105	Chlamydomonas spp.	7092.2	0.17	5.00	3.00	23.60
SP - 88S	2-Nov-15	2121	Oocystis lacustris Chodat	10638.3	0.30	6.00	3.00	28.30
SP - 88S	2-Nov-15	2137	Dictyosphaerium simplex Sukja	35461	0.20	2.20	2.20	5.60
SP - 88S	2-Nov-15	2167	Elakatothrix gelatinosa Willen	14184.4	0.22	10.00	2.00	15.70
SP - 88S	2-Nov-15	2187	Staurodesmus extensus (Andersson) Teiling	600	0.37	15.90	14.00	617.70
SP - 88S	2-Nov-15	2206	Botryococcus braunii Kutzing	300	0.43	14.00	14.00	1436.80
SP - 88S	2-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	3546.1	0.20	33.00	2.10	57.10
SP - 88S	2-Nov-15	4351	Small chrysophyceae	191489.4	1.76	2.60	2.60	9.20
SP - 88S	2-Nov-15	4352	Large chrysophyceae	10638.3	1.91	7.00	7.00	179.60
SP - 88S	2-Nov-15	4357	Chrysococcus sp.	198581.6	11.50	4.80	4.80	57.90
SP - 88S	2-Nov-15	4358	Chrysostephanospaera globulifera Scherffel	3546.1	1.18	8.60	8.60	333.00
SP - 88S	2-Nov-15	4361	Kephyrion boreale Skuja	14184.4	0.24	3.20	3.20	17.20
SP - 88S	2-Nov-15	4368	Mallomonas crassisquama (Asmund) Fott	300	0.34	21.60	10.00	1131.00
SP - 88S	2-Nov-15	4390	Dinobryon sociale Ehrenberg	56737.6	12.83	12.00	6.00	226.20
SP - 88S	2-Nov-15	4390	Dinobryon sociale Ehrenberg	2100	1.94	0.00	0.00	925.00
SP - 88S	2-Nov-15	4396	Chrysolkos skuja (Nauwerck) Willen	3546.1	0.09	5.60	3.00	26.40
SP - 88S	2-Nov-15	4413	Chrysochromulina laurentiana Kling	28368.8	11.57	9.20	9.20	407.70
SP - 88S	2-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	156028.4	5.34	6.00	3.30	34.20
SP - 88S	2-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	10000	18.18	10.50	21.00	1818.40
SP - 88S	2-Nov-15	5509	Cyclotella ocellata Pant.	24822.7	2.69	4.10	8.20	108.30
SP - 88S	2-Nov-15	5518	Synedra acus Kutzing	4600	0.53	111.00	2.00	116.20
SP - 88S	2-Nov-15	5551	Cyclotella michiganiana Skvortzow	141844	1.91	2.05	4.10	13.50
SP - 88S	2-Nov-15	5720	Cyclotella bodanica Eulenst.	1400	10.80	17.00	34.00	7717.30
SP - 88S	2-Nov-15	6554	Rhodomonas minuta Skuja	127659.6	16.05	10.00	6.00	125.70
SP - 88S	2-Nov-15	6558	Cryptomonas erosa Ehrenberg	6600	11.74	26.00	14.00	1778.80
SP - 88S	2-Nov-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.13	19.00	10.00	663.20
SP - 88S	2-Nov-15	6565	Cryptomonas rostratiformis Skuja	900	2.03	33.00	14.00	2257.80
SP - 88S	2-Nov-15	6568	Katablepharis ovalis Skuja	10638.3	0.43	7.60	4.00	40.30
SP - 88S	2-Nov-15	7631	Gymnodinium helveticum Penard	100	2.36	50.00	30.00	23561.90
SP - 88S	2-Nov-15	7635	Peridinium willei Huitfeldt-Kaas	100	2.24	35.00	35.00	22449.30
SP - 88S	2-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	800	1.81	16.30	16.30	2267.60
SP - 89S	2-Nov-15	2105	Chlamydomonas spp.	7092.2	0.17	5.00	3.00	23.60
SP - 89S	2-Nov-15	2121	Oocystis lacustris Chodat	35461	1.00	6.00	3.00	28.30
SP - 89S	2-Nov-15	2137	Dictyosphaerium simplex Sukja	42553.2	0.24	2.20	2.20	5.60
SP - 89S	2-Nov-15	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
SP - 89S	2-Nov-15	4351	Small chrysophyceae	99290.8	0.91	2.60	2.60	9.20
SP - 89S	2-Nov-15	4352	Large chrysophyceae	3546.1	0.64	7.00	7.00	179.60
SP - 89S	2-Nov-15	4357	Chrysococcus sp.	241134.8	13.96	4.80	4.80	57.90
SP - 89S	2-Nov-15	4362	Kephyrion sp.	7092.2	0.12	3.20	3.20	17.20
SP - 89S	2-Nov-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.23	21.60	10.00	1131.00
SP - 89S	2-Nov-15	4390	Dinobryon sociale Ehrenberg	53191.5	12.03	12.00	6.00	226.20
SP - 89S	2-Nov-15	4390	Dinobryon sociale Ehrenberg	400	0.37	0.00	0.00	925.00
SP - 89S	2-Nov-15	4400	Ochromonas sp.	3546.1	0.23	7.90	4.00	66.20
SP - 89S	2-Nov-15	4413	Chrysochromulina laurentiana Kling	3546.1	1.45	9.20	9.20	407.70
SP - 89S	2-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.12	6.00	3.30	34.20
SP - 89S	2-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	6200	11.27	10.50	21.00	1818.40
SP - 89S	2-Nov-15	5509	Cyclotella ocellata Pant.	10638.3	1.15	4.10	8.20	108.30

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
SP - 89S	2-Nov-15	5518	Synedra acus Kutzing	1000	0.12	110.00	2.00	115.20
SP - 89S	2-Nov-15	5551	Cyclotella michiganiana Skvortzow	42553.2	1.11	2.55	5.10	26.00
SP - 89S	2-Nov-15	5720	Cyclotella bodanica Eulenst.	200	1.54	17.00	34.00	7717.30
SP - 89S	2-Nov-15	6554	Rhodomonas minuta Skuja	21276.6	2.67	10.00	6.00	125.70
SP - 89S	2-Nov-15	6558	Cryptomonas erosa Ehrenberg	3600	6.40	26.00	14.00	1778.80
SP - 89S	2-Nov-15	6565	Cryptomonas rostratiformis Skuja	300	0.68	33.00	14.00	2257.80
SP - 89S	2-Nov-15	7631	Gymnodinium helveticum Penard	100	2.45	52.00	30.00	24504.40
SP - 89S	2-Nov-15	7635	Peridinium willei Huitfeldt-Kaas	100	2.63	36.90	36.90	26307.40
SP - 89S	2-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.23	16.30	16.30	2267.60
TE - 80S	14-May-15	2105	Chlamydomonas spp.	3546.1	0.18	6.00	4.00	50.30
TE - 80S	14-May-15	4351	Small chrysophyceae	333333.4	4.70	3.00	3.00	14.10
TE - 80S	14-May-15	4352	Large chrysophyceae	21276.6	3.82	7.00	7.00	179.60
TE - 80S	14-May-15	4357	Chrysococcus sp.	365248.3	23.89	5.00	5.00	65.40
TE - 80S	14-May-15	4362	Kephyrion sp.	28368.8	0.53	3.30	3.30	18.80
TE - 80S	14-May-15	4388	Dinobryon sertularia Ehrenberg	3546.1	0.80	12.00	6.00	226.20
TE - 80S	14-May-15	4390	Dinobryon sociale Ehrenberg	21276.6	4.81	12.00	6.00	226.20
TE - 80S	14-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	78014.2	2.64	5.60	3.40	33.90
TE - 80S	14-May-15	4413	Chrysochromulina laurentiana Kling	17730.5	7.23	9.20	9.20	407.70
TE - 80S	14-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	10638.3	0.34	6.00	3.20	32.20
TE - 80S	14-May-15	5511	Rhizosolenia eriense H.L. Smith	100	0.01	11.00	3.00	77.80
TE - 80S	14-May-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	100	0.08	81.00	6.00	763.40
TE - 80S	14-May-15	5551	Cyclotella michiganiana Skvortzow	3546.1	0.09	2.50	5.00	24.50
TE - 80S	14-May-15	6554	Rhodomonas minuta Skuja	14184.4	2.14	12.00	6.00	150.80
TE - 80S	14-May-15	6558	Cryptomonas erosa Ehrenberg	9000	10.95	24.20	12.00	1216.40
TE - 80S	14-May-15	6565	Cryptomonas rostratiformis Skuja	800	1.81	33.00	14.00	2257.80
TE - 80S	14-May-15	7632	Gymnodinium sp.	900	7.91	25.60	25.60	8784.50
TE - 81S	14-May-15	2105	Chlamydomonas spp.	35461	1.37	6.00	3.50	38.50
TE - 81S	14-May-15	2105	Chlamydomonas spp.	7092.2	1.34	10.00	6.00	188.50
TE - 81S	14-May-15	4351	Small chrysophyceae	517730.6	7.30	3.00	3.00	14.10
TE - 81S	14-May-15	4352	Large chrysophyceae	10638.3	1.91	7.00	7.00	179.60
TE - 81S	14-May-15	4357	Chrysococcus sp.	517730.6	33.86	5.00	5.00	65.40
TE - 81S	14-May-15	4362	Kephyrion sp.	42553.2	0.60	3.00	3.00	14.10
TE - 81S	14-May-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.41	19.40	10.00	1015.80
TE - 81S	14-May-15	4388	Dinobryon sertularia Ehrenberg	14184.4	3.21	12.00	6.00	226.20
TE - 81S	14-May-15	4390	Dinobryon sociale Ehrenberg	42553.2	9.63	12.00	6.00	226.20
TE - 81S	14-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	67375.9	2.28	5.60	3.40	33.90
TE - 81S	14-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	17730.5	0.57	6.00	3.20	32.20
TE - 81S	14-May-15	5507	Cyclotella stelligera Cleve and Grunow	100	0.12	9.15	18.30	1203.30
TE - 81S	14-May-15	5551	Cyclotella michiganiana Skvortzow	46099.3	1.13	2.50	5.00	24.50
TE - 81S	14-May-15	6554	Rhodomonas minuta Skuja	42553.2	6.42	12.00	6.00	150.80
TE - 81S	14-May-15	6558	Cryptomonas erosa Ehrenberg	11500	16.42	24.20	13.00	1427.60
TE - 81S	14-May-15	6565	Cryptomonas rostratiformis Skuja	800	1.81	33.00	14.00	2257.80
TE - 81S	14-May-15	6568	Katablepharis ovalis Skuja	3546.1	0.20	8.80	4.10	55.40
TE - 81S	14-May-15	7632	Gymnodinium sp.	10638.3	3.92	11.00	8.00	368.60
TE - 81S	14-May-15	7632	Gymnodinium sp.	600	5.27	25.60	25.60	8784.50
TE - 81SR	14-May-15	2105	Chlamydomonas spp.	28368.8	1.09	6.00	3.50	38.50
TE - 81SR	14-May-15	2105	Chlamydomonas spp.	14184.4	1.19	10.00	4.00	83.80
TE - 81SR	14-May-15	4351	Small chrysophyceae	500000.1	7.05	3.00	3.00	14.10
TE - 81SR	14-May-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
TE - 81SR	14-May-15	4357	Chrysococcus sp.	482269.6	31.54	5.00	5.00	65.40
TE - 81SR	14-May-15	4362	Kephyrion sp.	35461	0.50	3.00	3.00	14.10
TE - 81SR	14-May-15	4363	Spinifiromonas sirratus**********	7092.2	0.84	6.10	6.10	118.80
TE - 81SR	14-May-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.41	19.40	10.00	1015.80
TE - 81SR	14-May-15	4370	Mallomonas akrokomos Asmund and Kristiansen	53191.5	12.03	12.00	6.00	226.20
TE - 81SR	14-May-15	4378	Dinobryon borgei Lemmermann	3546.1	0.18	9.00	3.30	51.30
TE - 81SR	14-May-15	4388	Dinobryon sertularia Ehrenberg	17730.5	4.01	12.00	6.00	226.20
TE - 81SR	14-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	78014.2	2.46	5.20	3.40	31.50
TE - 81SR	14-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	10638.3	0.34	6.00	3.20	32.20
TE - 81SR	14-May-15	5551	Cyclotella michiganiana Skvortzow	46099.3	1.13	2.50	5.00	24.50
TE - 81SR	14-May-15	6554	Rhodomonas minuta Skuja	49645.4	7.49	12.00	6.00	150.80
TE - 81SR	14-May-15	6558	Cryptomonas erosa Ehrenberg	10900	15.56	24.20	13.00	1427.60
TE - 81SR	14-May-15	6565	Cryptomonas rostratiformis Skuja	1200	2.71	33.00	14.00	2257.80
TE - 81SR	14-May-15	7632	Gymnodinium sp.	10638.3	3.92	11.00	8.00	368.60
TE - 81SR	14-May-15	7632	Gymnodinium sp.	400	3.51	25.60	25.60	8784.50
TE - 81SR	14-May-15	7635	Peridinium willei Huitfeldt-Kaas	100	2.63	36.90	36.90	26307.40
TE - 82S	27-Jul-15	2105	Chlamydomonas spp.	35920	0.59	5.00	2.50	16.40
TE - 82S	27-Jul-15	2121	Oocystis lacustris Chodat	50288	2.53	6.00	4.00	50.30
TE - 82S	27-Jul-15	2138	Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova	14368	1.12	46.00	1.80	78.00
TE - 82S	27-Jul-15	2167	Elakatothrix gelatinosa Willen	7184	0.11	10.00	2.00	15.70
TE - 82S	27-Jul-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
TE - 82S	27-Jul-15	2182	Euastrum spp.	200	0.37	22.00	22.00	1858.40
TE - 82S	27-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	28736	0.14	3.00	3.00	4.70
TE - 82S	27-Jul-15	4351	Small chrysophyceae	466960	3.83	2.50	2.50	8.20
TE - 82S	27-Jul-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
TE - 82S	27-Jul-15	4357	Chrysococcus sp.	1127888	57.52	4.60	4.60	51.00
TE - 82S	27-Jul-15	4362	Kephyrion sp.	186784	2.63	3.00	3.00	14.10
TE - 82S	27-Jul-15	4363	Spinifiromonas sirratus**********	14368	1.12	5.30	5.30	78.00
TE - 82S	27-Jul-15	4378	Dinobryon borgei Lemmermann	21552	1.11	9.00	3.30	51.30
TE - 82S	27-Jul-15	4381	Dinobryon mucronutom Nygaard	28736	3.61	9.60	5.00	125.70
TE - 82S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	93392	21.13	12.00	6.00	226.20
TE - 82S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	800	1.62	0.00	0.00	2025.00
TE - 82S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	136496	30.88	12.00	6.00	226.20
TE - 82S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	5000	6.13	0.00	0.00	1225.00
TE - 82S	27-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.42	5.80	3.10	29.20
TE - 82S	27-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TE - 82S	27-Jul-15	4413	Chrysochromulina laurentiana Kling	21552	8.23	9.00	9.00	381.70
TE - 82S	27-Jul-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
TE - 82S	27-Jul-15	4436	Dinobryon attenatum Hill	7184	1.49	11.00	6.00	207.30
TE - 82S	27-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.81	9.50	19.00	1346.80
TE - 82S	27-Jul-15	5509	Cyclotella ocellata Pant.	21552	2.25	4.05	8.10	104.30
TE - 82S	27-Jul-15	5518	Synedra acus Kutzing	7600	0.79	99.00	2.00	103.70
TE - 82S	27-Jul-15	5551	Cyclotella michiganiana Skvortzow	301728	7.39	2.50	5.00	24.50
TE - 82S	27-Jul-15	6554	Rhodomonas minuta Skuja	64656	5.25	9.30	5.00	81.20
TE - 82S	27-Jul-15	6558	Cryptomonas erosa Ehrenberg	6400	7.46	23.20	12.00	1166.20
TE - 82S	27-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	600	0.53	21.00	11.00	887.00
TE - 82S	27-Jul-15	6565	Cryptomonas rostratiformis Skuja	1600	4.15	33.00	15.00	2591.80
TE - 82S	27-Jul-15	6568	Katablepharis ovalis Skuja	7184	0.37	8.60	4.00	51.60
TE - 82S	27-Jul-15	7632	Gymnodinium sp.	7184	2.15	9.90	7.60	299.40
TE - 82S	27-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.20	13.20	12.00	995.30
TE - 83S	27-Jul-15	1014	Chroococcus limneticus Lemmermann	57472	1.93	4.00	4.00	33.50
TE - 83S	27-Jul-15	2105	Chlamydomonas spp.	28736	0.47	5.00	2.50	16.40
TE - 83S	27-Jul-15	2121	Oocystis lacustris Chodat	35920	1.81	6.00	4.00	50.30
TE - 83S	27-Jul-15	2138	Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova	14368	1.12	46.00	1.80	78.00
TE - 83S	27-Jul-15	2167	Elakatothrix gelatinosa Willen	50288	0.79	10.00	2.00	15.70
TE - 83S	27-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	600	0.23	13.40	12.00	376.10
TE - 83S	27-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
TE - 83S	27-Jul-15	4351	Small chrysophyceae	387936	3.18	2.50	2.50	8.20
TE - 83S	27-Jul-15	4352	Large chrysophyceae	57472	10.32	7.00	7.00	179.60
TE - 83S	27-Jul-15	4357	Chrysococcus sp.	1005760	51.29	4.60	4.60	51.00
TE - 83S	27-Jul-15	4362	Kephyrion sp.	107760	1.52	3.00	3.00	14.10
TE - 83S	27-Jul-15	4378	Dinobryon borgei Lemmermann	35920	1.87	8.60	3.40	52.10
TE - 83S	27-Jul-15	4381	Dinobryon mucronutom Nygaard	43104	5.64	10.00	5.00	130.90
TE - 83S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	93392	21.13	12.00	6.00	226.20
TE - 83S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	3200	6.48	0.00	0.00	2025.00
TE - 83S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	294544	66.63	12.00	6.00	226.20
TE - 83S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	14000	17.15	0.00	0.00	1225.00
TE - 83S	27-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	64656	2.14	5.80	3.30	33.10
TE - 83S	27-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.26	6.00	3.40	36.30
TE - 83S	27-Jul-15	4413	Chrysochromulina laurentiana Kling	93392	35.65	9.00	9.00	381.70
TE - 83S	27-Jul-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
TE - 83S	27-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.23	5.60	3.30	31.90
TE - 83S	27-Jul-15	4436	Dinobryon attenatum Hill	7184	1.35	10.00	6.00	188.50
TE - 83S	27-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	1800	2.42	9.50	19.00	1346.80
TE - 83S	27-Jul-15	5509	Cyclotella ocellata Pant.	71840	7.49	4.05	8.10	104.30
TE - 83S	27-Jul-15	5511	Rhizosolenia eriense H.L. Smith	7184	0.46	9.00	3.00	63.60
TE - 83S	27-Jul-15	5514	Tabellaria flocculsa (Roth) Kutzing	1000	1.33	26.00	14.00	1334.10
TE - 83S	27-Jul-15	5518	Synedra acus Kutzing	10600	1.10	99.00	2.00	103.70
TE - 83S	27-Jul-15	5551	Cyclotella michiganiana Skvortzow	323280	7.92	2.50	5.00	24.50
TE - 83S	27-Jul-15	6554	Rhodomonas minuta Skuja	79024	6.42	9.30	5.00	81.20
TE - 83S	27-Jul-15	6558	Cryptomonas erosa Ehrenberg	11600	7.58	13.00	12.00	653.50
TE - 83S	27-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	2200	1.95	21.00	11.00	887.00
TE - 83S	27-Jul-15	6565	Cryptomonas rostratiformis Skuja	1200	3.20	34.00	15.00	2670.40
TE - 83S	27-Jul-15	6568	Katablepharis ovalis Skuja	64656	3.34	8.60	4.00	51.60
TE - 83S	27-Jul-15	7632	Gymnodinium sp.	7184	2.24	9.30	8.00	311.60
TE - 83S	27-Jul-15	7632	Gymnodinium sp.	200	4.12	34.00	34.00	20579.50
TE - 83S	27-Jul-15	7635	Peridinium willei Huitfeldt-Kaas	200	6.70	40.00	40.00	33510.30
TE - 83S	27-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.20	13.20	12.00	995.30
TE - 84S	28-Aug-15	1014	Chroococcus limneticus Lemmermann	14368	0.27	3.30	3.30	18.80
TE - 84S	28-Aug-15	1054	Planktolyngbya limnetica	600	0.07	103.00	1.20	116.50
TE - 84S	28-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.10	12.90	12.00	486.30
TE - 84S	28-Aug-15	2121	Oocystis lacustris Chodat	71840	1.90	5.60	3.00	26.40
TE - 84S	28-Aug-15	2137	Dictyosphaerium simplex Sukja	57472	0.28	2.10	2.10	4.80
TE - 84S	28-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TE - 84S	28-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
TE - 84S	28-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.95	38.00	2.10	65.80
TE - 84S	28-Aug-15	4351	Small chrysophyceae	330464	4.66	3.00	3.00	14.10
TE - 84S	28-Aug-15	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
TE - 84S	28-Aug-15	4354	Chromulina spp.	7184	0.21	6.10	3.00	28.70
TE - 84S	28-Aug-15	4357	Chrysococcus sp.	373568	20.32	4.70	4.70	54.40
TE - 84S	28-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.83	9.10	9.10	394.60
TE - 84S	28-Aug-15	4362	Kephyrion sp.	114944	1.79	3.10	3.10	15.60
TE - 84S	28-Aug-15	4378	Dinobryon borgei Lemmermann	21552	1.04	9.00	3.20	48.30
TE - 84S	28-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.77	9.80	5.00	128.30
TE - 84S	28-Aug-15	4383	Dinobryon bavaricum Imhof	200	0.68	0.00	0.00	3390.00
TE - 84S	28-Aug-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
TE - 84S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	172416	39.00	12.00	6.00	226.20
TE - 84S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	2000	4.30	0.00	0.00	2150.00
TE - 84S	28-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	21552	0.65	6.00	3.10	30.20
TE - 84S	28-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.26	6.00	3.40	36.30
TE - 84S	28-Aug-15	4413	Chrysochromulina laurentiana Kling	50288	19.84	9.10	9.10	394.60
TE - 84S	28-Aug-15	4414	Stichogloea spp.	14368	0.72	6.00	4.00	50.30
TE - 84S	28-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.35	5.20	3.00	24.50
TE - 84S	28-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	2200	3.46	10.00	20.00	1570.80
TE - 84S	28-Aug-15	5509	Cyclotella ocellata Pant.	7184	0.90	4.30	8.60	124.90
TE - 84S	28-Aug-15	5518	Synedra acus Kutzing	1200	0.11	91.00	2.00	95.30
TE - 84S	28-Aug-15	5551	Cyclotella michiganiana Skvortzow	93392	1.78	2.30	4.60	19.10
TE - 84S	28-Aug-15	5720	Cyclotella bodanica Eulenst.	400	2.85	16.55	33.10	7120.60
TE - 84S	28-Aug-15	6554	Rhodomonas minuta Skuja	57472	2.89	9.00	4.00	50.30
TE - 84S	28-Aug-15	6558	Cryptomonas erosa Ehrenberg	200	0.15	21.00	10.00	733.00
TE - 84S	28-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.27	19.60	10.00	684.20

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TE - 84S	28-Aug-15	7632	Gymnodinium sp.	7184	2.41	10.00	8.00	335.10
TE - 84S	28-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	800	1.24	15.10	14.00	1549.60
TE - 85S	28-Aug-15	2105	Chlamydomonas spp.	14368	0.47	7.00	3.00	33.00
TE - 85S	28-Aug-15	2121	Oocystis lacustris Chodat	57472	1.52	5.60	3.00	26.40
TE - 85S	28-Aug-15	2137	Dictyosphaerium simplex Sukja	57472	0.28	2.10	2.10	4.80
TE - 85S	28-Aug-15	2186	Xanthidium sp.	7184	1.25	10.00	10.00	174.50
TE - 85S	28-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	400	0.26	16.30	14.00	649.20
TE - 85S	28-Aug-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TE - 85S	28-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	28736	0.14	3.00	3.00	4.70
TE - 85S	28-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.95	38.00	2.10	65.80
TE - 85S	28-Aug-15	4351	Small chrysophyceae	222704	3.14	3.00	3.00	14.10
TE - 85S	28-Aug-15	4352	Large chrysophyceae	28736	5.16	7.00	7.00	179.60
TE - 85S	28-Aug-15	4357	Chrysococcus sp.	301728	16.41	4.70	4.70	54.40
TE - 85S	28-Aug-15	4362	Kephyrion sp.	150864	2.35	3.10	3.10	15.60
TE - 85S	28-Aug-15	4378	Dinobryon borgei Lemmermann	50288	2.43	9.00	3.20	48.30
TE - 85S	28-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.77	9.80	5.00	128.30
TE - 85S	28-Aug-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
TE - 85S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	244256	55.25	12.00	6.00	226.20
TE - 85S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	3000	6.45	0.00	0.00	2150.00
TE - 85S	28-Aug-15	4394	Epiphyxis sp.	7184	0.56	9.30	4.00	77.90
TE - 85S	28-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.37	5.10	3.10	25.70
TE - 85S	28-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.26	6.00	3.40	36.30
TE - 85S	28-Aug-15	4413	Chrysochromulina laurentiana Kling	7184	2.93	9.20	9.20	407.70
TE - 85S	28-Aug-15	4414	Stichogloea spp.	107760	5.42	6.00	4.00	50.30
TE - 85S	28-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	2000	3.14	10.00	20.00	1570.80
TE - 85S	28-Aug-15	5509	Cyclotella ocellata Pant.	14368	1.79	4.30	8.60	124.90
TE - 85S	28-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	200	0.23	22.00	14.00	1128.90
TE - 85S	28-Aug-15	5518	Synedra acus Kutzing	600	0.06	91.00	2.00	95.30
TE - 85S	28-Aug-15	5524	Asterionella formosa Hassall	600	0.06	100.00	2.00	104.70
TE - 85S	28-Aug-15	5551	Cyclotella michiganiana Skvortzow	158048	3.02	2.30	4.60	19.10
TE - 85S	28-Aug-15	5720	Cyclotella bodanica Eulenst.	800	5.70	16.55	33.10	7120.60
TE - 85S	28-Aug-15	6558	Cryptomonas erosa Ehrenberg	400	0.29	21.00	10.00	733.00
TE - 85S	28-Aug-15	7632	Gymnodinium sp.	7184	2.31	9.60	8.00	321.70
TE - 85S	28-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.92	15.00	14.00	1539.40
TE - 86S	4-Oct-15	1054	Planktolyngbya limnetica	800	0.14	156.00	1.20	176.40
TE - 86S	4-Oct-15	1073	Snowella sp	600	0.60	0.00	0.00	1000.00
TE - 86S	4-Oct-15	2105	Chlamydomonas spp.	28736	5.42	10.00	6.00	188.50
TE - 86S	4-Oct-15	2112	Sphaerocystis schroeteri Chodat	57472	0.47	2.50	2.50	8.20
TE - 86S	4-Oct-15	2121	Oocystis lacustris Chodat	21552	0.56	5.50	3.00	25.90
TE - 86S	4-Oct-15	2137	Dictyosphaerium simplex Sukja	64656	0.31	2.10	2.10	4.80
TE - 86S	4-Oct-15	2167	Elakatothrix gelatinosa Willen	7184	0.12	11.00	2.00	17.30
TE - 86S	4-Oct-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TE - 86S	4-Oct-15	4351	Small chrysophyceae	337648	5.27	3.10	3.10	15.60
TE - 86S	4-Oct-15	4352	Large chrysophyceae	28736	5.16	7.00	7.00	179.60
TE - 86S	4-Oct-15	4355	Chrysochromulina parva Lackey	14368	0.94	5.00	5.00	65.40
TE - 86S	4-Oct-15	4357	Chrysococcus sp.	531616	34.77	5.00	5.00	65.40
TE - 86S	4-Oct-15	4362	Kephyrion sp.	107760	2.03	3.30	3.30	18.80
TE - 86S	4-Oct-15	4363	Spinifiromonas sirratus**********	14368	1.71	6.10	6.10	118.80
TE - 86S	4-Oct-15	4378	Dinobryon borgei Lemmermann	7184	0.37	9.00	3.30	51.30
TE - 86S	4-Oct-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TE - 86S	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	600	1.52	0.00	0.00	2525.00
TE - 86S	4-Oct-15	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
TE - 86S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	114944	26.00	12.00	6.00	226.20
TE - 86S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	6000	20.34	0.00	0.00	3390.00
TE - 86S	4-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	35920	0.93	5.50	3.00	25.90
TE - 86S	4-Oct-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
TE - 86S	4-Oct-15	4413	Chrysochromulina laurentiana Kling	50288	19.19	9.00	9.00	381.70
TE - 86S	4-Oct-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
TE - 86S	4-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.57	5.60	3.00	26.40
TE - 86S	4-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	1800	2.83	10.00	20.00	1570.80
TE - 86S	4-Oct-15	5509	Cyclotella ocellata Pant.	28736	4.25	4.55	9.10	148.00
TE - 86S	4-Oct-15	5511	Rhizosolenia eriense H.L. Smith	14368	0.91	9.00	3.00	63.60
TE - 86S	4-Oct-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.53	25.60	14.00	1313.60
TE - 86S	4-Oct-15	5518	Synedra acus Kutzing	2600	0.23	83.00	2.00	86.90
TE - 86S	4-Oct-15	5551	Cyclotella michiganiana Skvortzow	93392	1.91	2.35	4.70	20.40
TE - 86S	4-Oct-15	6554	Rhodomonas minuta Skuja	64656	8.13	10.00	6.00	125.70
TE - 86S	4-Oct-15	6558	Cryptomonas erosa Ehrenberg	1400	1.59	22.60	12.00	1136.00
TE - 86S	4-Oct-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.13	19.00	10.00	663.20
TE - 86S	4-Oct-15	6565	Cryptomonas rostratiformis Skuja	200	0.41	30.00	14.00	2052.50
TE - 86S	4-Oct-15	6568	Katablepharis ovalis Skuja	7184	0.29	7.60	4.00	40.30
TE - 86S	4-Oct-15	7632	Gymnodinium sp.	7184	2.19	9.10	8.00	304.90
TE - 86S	4-Oct-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.63	14.00	12.00	1055.60
TE - 87S	4-Oct-15	1054	Planktolyngbya limnetica	2000	0.46	202.00	1.20	228.50
TE - 87S	4-Oct-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.11	14.00	12.00	527.80
TE - 87S	4-Oct-15	2105	Chlamydomonas spp.	14368	0.27	1.00	6.00	18.80
TE - 87S	4-Oct-15	2121	Oocystis lacustris Chodat	64656	1.67	5.50	3.00	25.90
TE - 87S	4-Oct-15	2137	Dictyosphaerium simplex Sukja	107760	0.52	2.10	2.10	4.80
TE - 87S	4-Oct-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.13	16.00	14.00	625.50
TE - 87S	4-Oct-15	2193	Staurodesmus paradoxum Meyen	200	0.50	25.60	22.00	2516.40
TE - 87S	4-Oct-15	2215	Tetraedron caudatum (Corda) Hansgrig	28736	0.14	3.00	3.00	4.70
TE - 87S	4-Oct-15	4351	Small chrysophyceae	344832	5.38	3.10	3.10	15.60
TE - 87S	4-Oct-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
TE - 87S	4-Oct-15	4357	Chrysococcus sp.	603456	39.47	5.00	5.00	65.40
TE - 87S	4-Oct-15	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
TE - 87S	4-Oct-15	4362	Kephyrion sp.	71840	1.35	3.30	3.30	18.80

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TE - 87S	4-Oct-15	4363	Spinifiromonas sirratus**********	7184	1.08	6.60	6.60	150.50
TE - 87S	4-Oct-15	4370	Mallomonas akrokomos Asmund and Kristiansen	7184	1.44	15.30	5.00	200.30
TE - 87S	4-Oct-15	4378	Dinobryon borgei Lemmermann	14368	0.74	9.00	3.30	51.30
TE - 87S	4-Oct-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TE - 87S	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	2000	5.05	0.00	0.00	2525.00
TE - 87S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	172416	39.00	12.00	6.00	226.20
TE - 87S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	8800	29.83	0.00	0.00	3390.00
TE - 87S	4-Oct-15	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
TE - 87S	4-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.37	5.50	3.00	25.90
TE - 87S	4-Oct-15	4411	Bitrichia chodatii (Reverdin) Chodat	14368	0.72	6.00	4.00	50.30
TE - 87S	4-Oct-15	4413	Chrysochromulina laurentiana Kling	28736	10.97	9.00	9.00	381.70
TE - 87S	4-Oct-15	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
TE - 87S	4-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	64656	1.71	5.60	3.00	26.40
TE - 87S	4-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	2200	3.46	10.00	20.00	1570.80
TE - 87S	4-Oct-15	5509	Cyclotella ocellata Pant.	71840	10.63	4.55	9.10	148.00
TE - 87S	4-Oct-15	5511	Rhizosolenia eriense H.L. Smith	21552	1.37	9.00	3.00	63.60
TE - 87S	4-Oct-15	5518	Synedra acus Kutzing	3000	0.29	91.00	2.00	95.30
TE - 87S	4-Oct-15	5551	Cyclotella michiganiana Skvortzow	165232	3.37	2.35	4.70	20.40
TE - 87S	4-Oct-15	5720	Cyclotella bodanica Eulenst.	400	3.17	17.15	34.30	7923.40
TE - 87S	4-Oct-15	6554	Rhodomonas minuta Skuja	50288	6.32	10.00	6.00	125.70
TE - 87S	4-Oct-15	6558	Cryptomonas erosa Ehrenberg	1600	1.79	22.20	12.00	1115.90
TE - 87S	4-Oct-15	6565	Cryptomonas rostratiformis Skuja	400	0.82	30.00	14.00	2052.50
TE - 87S	4-Oct-15	6568	Katablepharis ovalis Skuja	7184	0.29	7.60	4.00	40.30
TE - 87S	4-Oct-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.21	14.00	12.00	1055.60
TE - 88S	21-Nov-15	1054	Planktolyngbya limnetica	1000	0.18	163.00	1.20	184.30
TE - 88S	21-Nov-15	2121	Oocystis lacustris Chodat	10638.3	0.26	5.10	3.00	24.00
TE - 88S	21-Nov-15	2137	Dictyosphaerium simplex Sukja	85106.4	0.41	2.10	2.10	4.80
TE - 88S	21-Nov-15	2206	Botryococcus braunii Kutzing	400	0.36	12.00	12.00	904.80
TE - 88S	21-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	3546.1	0.24	36.00	2.20	68.40
TE - 88S	21-Nov-15	4351	Small chrysophyceae	99290.8	1.14	2.80	2.80	11.50
TE - 88S	21-Nov-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
TE - 88S	21-Nov-15	4357	Chrysococcus sp.	226950.4	14.84	5.00	5.00	65.40
TE - 88S	21-Nov-15	4358	Chrysostephanospaera globulifera Scherffel	10638.3	3.19	8.30	8.30	299.40
TE - 88S	21-Nov-15	4361	Kephyrion boreale Skuja	7092.2	0.76	5.90	5.90	107.50
TE - 88S	21-Nov-15	4362	Kephyrion sp.	35461	0.61	3.20	3.20	17.20
TE - 88S	21-Nov-15	4378	Dinobryon borgei Lemmermann	7092.2	0.32	9.00	3.10	45.30
TE - 88S	21-Nov-15	4381	Dinobryon mucronutom Nygaard	3546.1	0.46	10.00	5.00	130.90
TE - 88S	21-Nov-15	4390	Dinobryon sociale Ehrenberg	67375.9	15.24	12.00	6.00	226.20
TE - 88S	21-Nov-15	4390	Dinobryon sociale Ehrenberg	700	0.86	0.00	0.00	1225.00
TE - 88S	21-Nov-15	4400	Ochromonas sp.	3546.1	0.23	7.60	4.00	63.70
TE - 88S	21-Nov-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.60	9.10	9.10	394.60
TE - 88S	21-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.11	5.70	3.20	30.60
TE - 88S	21-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	100	0.13	9.30	18.60	1263.50
TE - 88S	21-Nov-15	5509	Cyclotella ocellata Pant.	10638.3	1.07	4.00	8.00	100.50
TE - 88S	21-Nov-15	5518	Synedra acus Kutzing	600	0.06	96.00	2.00	100.50
TE - 88S	21-Nov-15	5551	Cyclotella michiganiana Skvortzow	35461	0.68	2.30	4.60	19.10
TE - 88S	21-Nov-15	6554	Rhodomonas minuta Skuja	14184.4	1.82	10.20	6.00	128.20
TE - 88S	21-Nov-15	6558	Cryptomonas erosa Ehrenberg	1800	2.19	24.20	12.00	1216.40
TE - 88S	21-Nov-15	7632	Gymnodinium sp.	100	1.56	31.00	31.00	15598.50
TE - 88S	21-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.42	14.00	12.00	1055.60
TE - 89S	21-Nov-15	1054	Planktolyngbya limnetica	1400	0.33	206.00	1.20	233.00
TE - 89S	21-Nov-15	2105	Chlamydomonas spp.	3546.1	0.10	6.00	3.00	28.30
TE - 89S	21-Nov-15	2137	Dictyosphaerium simplex Sukja	63829.8	0.31	2.10	2.10	4.80
TE - 89S	21-Nov-15	2206	Botryococcus braunii Kutzing	200	0.18	12.00	12.00	904.80
TE - 89S	21-Nov-15	4351	Small chrysophyceae	156028.4	1.79	2.80	2.80	11.50
TE - 89S	21-Nov-15	4352	Large chrysophyceae	17730.5	3.18	7.00	7.00	179.60
TE - 89S	21-Nov-15	4357	Chrysococcus sp.	283688	18.55	5.00	5.00	65.40
TE - 89S	21-Nov-15	4358	Chrysostephanospaera globulifera Scherffel	3546.1	1.06	8.30	8.30	299.40
TE - 89S	21-Nov-15	4361	Kephyrion boreale Skuja	14184.4	0.24	3.20	3.20	17.20
TE - 89S	21-Nov-15	4361	Kephyrion boreale Skuja	3546.1	0.38	5.90	5.90	107.50
TE - 89S	21-Nov-15	4378	Dinobryon borgei Lemmermann	3546.1	0.16	9.00	3.10	45.30
TE - 89S	21-Nov-15	4381	Dinobryon mucronutom Nygaard	3546.1	0.46	10.00	5.00	130.90
TE - 89S	21-Nov-15	4390	Dinobryon sociale Ehrenberg	39007.1	8.82	12.00	6.00	226.20
TE - 89S	21-Nov-15	4390	Dinobryon sociale Ehrenberg	800	0.98	0.00	0.00	1225.00
TE - 89S	21-Nov-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.60	9.10	9.10	394.60
TE - 89S	21-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	100	0.13	9.30	18.60	1263.50
TE - 89S	21-Nov-15	5509	Cyclotella ocellata Pant.	10638.3	1.07	4.00	8.00	100.50
TE - 89S	21-Nov-15	5511	Rhizosolenia eriense H.L. Smith	3546.1	0.28	11.00	3.00	77.80
TE - 89S	21-Nov-15	5518	Synedra acus Kutzing	1400	0.14	96.00	2.00	100.50
TE - 89S	21-Nov-15	5551	Cyclotella michiganiana Skvortzow	63829.8	1.22	2.30	4.60	19.10
TE - 89S	21-Nov-15	6554	Rhodomonas minuta Skuja	28368.8	3.64	10.20	6.00	128.20
TE - 89S	21-Nov-15	6558	Cryptomonas erosa Ehrenberg	1100	1.34	24.20	12.00	1216.40
TE - 89S	21-Nov-15	6568	Katablepharis ovalis Skuja	14184.4	0.73	8.60	4.00	51.60
TE - 89S	21-Nov-15	7632	Gymnodinium sp.	500	7.80	31.00	31.00	15598.50
TE - 89S	21-Nov-15	7635	Peridinium willei Huitfeldt-Kaas	100	2.50	36.30	36.30	25044.90
TE - 89S	21-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.16	16.00	14.00	1642.00
TEFF - 37S	27-Jul-15	2105	Chlamydomonas spp.	14368	0.22	6.00	2.20	15.20
TEFF - 37S	27-Jul-15	2112	Sphaerocystis schroeteri Chodat	43104	0.97	3.50	3.50	22.40
TEFF - 37S	27-Jul-15	2137	Dictyosphaerium simplex Sukja	43104	0.21	2.10	2.10	4.80
TEFF - 37S	27-Jul-15	2138	Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova	14368	1.00	41.00	1.80	69.60
TEFF - 37S	27-Jul-15	2167	Elakatothrix gelatinosa Willen	35920	0.52	9.30	2.00	14.60
TEFF - 37S	27-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.08	13.80	12.00	398.90
TEFF - 37S	27-Jul-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TEFF - 37S	27-Jul-15	2206	Botryococcus braunii Kutzing	600	0.31	10.00	10.00	523.60
TEFF - 37S	27-Jul-15	4351	Small chrysophyceae	323280	4.56	3.00	3.00	14.10

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^3
TEFF - 37S	27-Jul-15	4352	Large chrysophyceae	28736	5.16	7.00	7.00	179.60
TEFF - 37S	27-Jul-15	4357	Chrysococcus sp.	1336224	87.39	5.00	5.00	65.40
TEFF - 37S	27-Jul-15	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
TEFF - 37S	27-Jul-15	4362	Kephyrion sp.	237072	4.46	3.30	3.30	18.80
TEFF - 37S	27-Jul-15	4363	Spinifiromonas sirratus**********	7184	0.66	5.60	5.60	92.00
TEFF - 37S	27-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.42	20.20	10.00	1057.70
TEFF - 37S	27-Jul-15	4378	Dinobryon borgei Lemmermann	50288	2.58	9.00	3.30	51.30
TEFF - 37S	27-Jul-15	4381	Dinobryon mucronutom Nygaard	14368	1.56	9.40	4.70	108.70
TEFF - 37S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	79024	19.36	13.00	6.00	245.00
TEFF - 37S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	2400	8.14	0.00	0.00	3390.00
TEFF - 37S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	143680	32.50	12.00	6.00	226.20
TEFF - 37S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	11400	22.70	0.00	0.00	1991.00
TEFF - 37S	27-Jul-15	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
TEFF - 37S	27-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	57472	1.74	6.00	3.10	30.20
TEFF - 37S	27-Jul-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
TEFF - 37S	27-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.21	5.20	3.30	29.70
TEFF - 37S	27-Jul-15	4436	Dinobryon attenatum Hill	7184	0.87	9.30	5.00	121.70
TEFF - 37S	27-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	600	1.11	10.55	21.10	1844.50
TEFF - 37S	27-Jul-15	5509	Cyclotella ocellata Pant.	35920	3.75	4.05	8.10	104.30
TEFF - 37S	27-Jul-15	5511	Rhizosolenia eriense H.L. Smith	21552	1.68	11.00	3.00	77.80
TEFF - 37S	27-Jul-15	5518	Synedra acus Kutzing	3600	0.38	100.00	2.00	104.70
TEFF - 37S	27-Jul-15	5551	Cyclotella michiganiana Skvortzow	251440	6.16	2.50	5.00	24.50
TEFF - 37S	27-Jul-15	6558	Cryptomonas erosa Ehrenberg	1000	1.16	23.00	12.00	1156.10
TEFF - 37S	27-Jul-15	6568	Katablepharis ovalis Skuja	7184	0.42	9.00	4.10	58.00
TEFF - 37S	27-Jul-15	7632	Gymnodinium sp.	400	2.02	21.30	21.30	5059.80
TEFF - 37S	27-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	1000	1.26	14.20	13.00	1256.50
TEFF - 37S	27-Jul-15	7641	Peridinium aciculiferum Lemmermann	1200	10.86	30.00	24.00	9047.80
TEFF - 38S	27-Jul-15	2105	Chlamydomonas spp.	28736	0.44	6.00	2.20	15.20
TEFF - 38S	27-Jul-15	2112	Sphaerocystis schroeteri Chodat	237072	5.31	3.50	3.50	22.40
TEFF - 38S	27-Jul-15	2138	Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova	14368	1.00	41.00	1.80	69.60
TEFF - 38S	27-Jul-15	2167	Elakatothrix gelatinosa Willen	7184	0.10	9.30	2.00	14.60
TEFF - 38S	27-Jul-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
TEFF - 38S	27-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	400	0.16	13.80	12.00	398.90
TEFF - 38S	27-Jul-15	2193	Staurodesmus paradoxum Meyen	200	0.22	20.00	16.00	1117.00
TEFF - 38S	27-Jul-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TEFF - 38S	27-Jul-15	4351	Small chrysophyceae	431040	6.08	3.00	3.00	14.10
TEFF - 38S	27-Jul-15	4352	Large chrysophyceae	64656	11.61	7.00	7.00	179.60
TEFF - 38S	27-Jul-15	4357	Chrysococcus sp.	1293120	84.57	5.00	5.00	65.40
TEFF - 38S	27-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	14368	7.52	10.00	10.00	523.60
TEFF - 38S	27-Jul-15	4361	Kephyrion boreale Skuja	7184	0.66	5.60	5.60	92.00
TEFF - 38S	27-Jul-15	4362	Kephyrion sp.	143680	2.70	3.30	3.30	18.80
TEFF - 38S	27-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.13	19.00	8.00	636.70
TEFF - 38S	27-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	20.20	10.00	1057.70
TEFF - 38S	27-Jul-15	4378	Dinobryon borgei Lemmermann	50288	2.58	9.00	3.30	51.30
TEFF - 38S	27-Jul-15	4381	Dinobryon mucronutom Nygaard	35920	3.90	9.40	4.70	108.70
TEFF - 38S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	100576	24.64	13.00	6.00	245.00
TEFF - 38S	27-Jul-15	4388	Dinobryon sertularia Ehrenberg	4800	16.27	0.00	0.00	3390.00
TEFF - 38S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	136496	30.88	12.00	6.00	226.20
TEFF - 38S	27-Jul-15	4390	Dinobryon sociale Ehrenberg	10600	21.10	0.00	0.00	1991.00
TEFF - 38S	27-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	71840	2.17	6.00	3.10	30.20
TEFF - 38S	27-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.25	6.00	3.30	34.20
TEFF - 38S	27-Jul-15	4413	Chrysochromulina laurentiana Kling	79024	30.16	9.00	9.00	381.70
TEFF - 38S	27-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.19	5.20	3.10	26.20
TEFF - 38S	27-Jul-15	4436	Dinobryon attenatum Hill	21552	2.62	9.30	5.00	121.70
TEFF - 38S	27-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.48	10.55	21.10	1844.50
TEFF - 38S	27-Jul-15	5509	Cyclotella ocellata Pant.	50288	5.25	4.05	8.10	104.30
TEFF - 38S	27-Jul-15	5511	Rhizosolenia eriense H.L. Smith	14368	1.12	11.00	3.00	77.80
TEFF - 38S	27-Jul-15	5518	Synedra acus Kutzing	9200	0.96	100.00	2.00	104.70
TEFF - 38S	27-Jul-15	5551	Cyclotella michiganiana Skvortzow	193968	4.75	2.50	5.00	24.50
TEFF - 38S	27-Jul-15	6554	Rhodomonas minuta Skuja	7184	1.08	12.00	6.00	150.80
TEFF - 38S	27-Jul-15	6558	Cryptomonas erosa Ehrenberg	1400	1.59	22.60	12.00	1136.00
TEFF - 38S	27-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	20.00	10.00	698.10
TEFF - 38S	27-Jul-15	6568	Katablepharis ovalis Skuja	21552	1.25	9.00	4.10	58.00
TEFF - 38S	27-Jul-15	7632	Gymnodinium sp.	1000	5.06	21.30	21.30	5059.80
TEFF - 38S	27-Jul-15	7632	Gymnodinium sp.	200	2.83	30.00	30.00	14137.20
TEFF - 38S	27-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.25	14.20	13.00	1256.50
TEFF - 39S	28-Aug-15	1054	Planktolyngbya limnetica	1800	0.28	136.00	1.20	153.80
TEFF - 39S	28-Aug-15	2112	Sphaerocystis schroeteri Chodat	86208	1.34	3.10	3.10	15.60
TEFF - 39S	28-Aug-15	2121	Oocystis lacustris Chodat	21552	0.51	5.00	3.00	23.60
TEFF - 39S	28-Aug-15	2137	Dictyosphaerium simplex Sukja	93392	0.45	2.10	2.10	4.80
TEFF - 39S	28-Aug-15	2186	Xanthidium sp.	7184	1.25	10.00	10.00	174.50
TEFF - 39S	28-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	50288	1.90	6.00	6.00	37.70
TEFF - 39S	28-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.45	33.00	2.20	62.70
TEFF - 39S	28-Aug-15	4351	Small chrysophyceae	308912	5.81	3.30	3.30	18.80
TEFF - 39S	28-Aug-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
TEFF - 39S	28-Aug-15	4357	Chrysococcus sp.	423856	27.72	5.00	5.00	65.40
TEFF - 39S	28-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	3.33	9.60	9.60	463.20
TEFF - 39S	28-Aug-15	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
TEFF - 39S	28-Aug-15	4362	Kephyrion sp.	114944	2.16	3.30	3.30	18.80
TEFF - 39S	28-Aug-15	4378	Dinobryon borgei Lemmermann	35920	1.63	9.00	3.10	45.30
TEFF - 39S	28-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.75	9.30	5.00	121.70
TEFF - 39S	28-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	1.02	0.00	0.00	5085.00
TEFF - 39S	28-Aug-15	4388	Dinobryon sertularia Ehrenberg	193968	43.88	12.00	6.00	226.20
TEFF - 39S	28-Aug-15	4388	Dinobryon sertularia Ehrenberg	200	0.40	0.00	0.00	1990.00
TEFF - 39S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TEFF - 39S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	7200	9.00	0.00	0.00	1250.00
TEFF - 39S	28-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	28736	0.91	5.90	3.20	31.60
TEFF - 39S	28-Aug-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
TEFF - 39S	28-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.73	10.50	21.00	1818.40
TEFF - 39S	28-Aug-15	5509	Cyclotella ocellata Pant.	43104	5.38	4.30	8.60	124.90
TEFF - 39S	28-Aug-15	5511	Rhizosolenia eriense H.L. Smith	50288	3.91	11.00	3.00	77.80
TEFF - 39S	28-Aug-15	5518	Synedra acus Kutzing	800	0.08	91.00	2.00	95.30
TEFF - 39S	28-Aug-15	5551	Cyclotella michiganiana Skvortzow	86208	2.24	2.55	5.10	26.00
TEFF - 39S	28-Aug-15	6554	Rhodomonas minuta Skuja	7184	0.34	9.00	3.90	47.80
TEFF - 39S	28-Aug-15	6558	Cryptomonas erosa Ehrenberg	200	0.15	21.10	10.00	736.50
TEFF - 39S	28-Aug-15	6568	Katablepharis ovalis Skuja	21552	1.11	8.60	4.00	51.60
TEFF - 39S	28-Aug-15	7632	Gymnodinium sp.	14368	6.82	11.20	9.00	475.00
TEFF - 39S	28-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	800	0.78	13.00	12.00	980.20
TEFF - 40S	28-Aug-15	1014	Chroococcus limneticus Lemmermann	28736	0.45	3.10	3.10	15.60
TEFF - 40S	28-Aug-15	1054	Planktolyngbya limnetica	2400	0.45	166.10	1.20	187.90
TEFF - 40S	28-Aug-15	2105	Chlamydomonas spp.	7184	0.15	6.00	2.60	21.20
TEFF - 40S	28-Aug-15	2137	Dictyosphaerium simplex Sukja	43104	0.21	2.10	2.10	4.80
TEFF - 40S	28-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	28736	1.08	6.00	6.00	37.70
TEFF - 40S	28-Aug-15	2206	Botryococcus braunii Kutzing	200	0.14	11.00	11.00	696.90
TEFF - 40S	28-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
TEFF - 40S	28-Aug-15	4351	Small chrysophyceae	208336	3.92	3.30	3.30	18.80
TEFF - 40S	28-Aug-15	4357	Chrysococcus sp.	459776	30.07	5.00	5.00	65.40
TEFF - 40S	28-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	3.33	9.60	9.60	463.20
TEFF - 40S	28-Aug-15	4362	Kephyrion sp.	64656	1.22	3.30	3.30	18.80
TEFF - 40S	28-Aug-15	4363	Spinifiromonas sirratus**********	7184	0.85	6.10	6.10	118.80
TEFF - 40S	28-Aug-15	4378	Dinobryon borgei Lemmermann	14368	0.65	9.00	3.10	45.30
TEFF - 40S	28-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.62	9.30	5.00	121.70
TEFF - 40S	28-Aug-15	4383	Dinobryon bavaricum Imhof	14368	3.25	12.00	6.00	226.20
TEFF - 40S	28-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	400	2.03	0.00	0.00	5085.00
TEFF - 40S	28-Aug-15	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
TEFF - 40S	28-Aug-15	4388	Dinobryon sertularia Ehrenberg	400	0.80	0.00	0.00	1990.00
TEFF - 40S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	186784	42.25	12.00	6.00	226.20
TEFF - 40S	28-Aug-15	4390	Dinobryon sociale Ehrenberg	6200	7.75	0.00	0.00	1250.00
TEFF - 40S	28-Aug-15	4394	Epiphyxis sp.	21552	1.37	7.60	4.00	63.70
TEFF - 40S	28-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	21552	0.68	5.90	3.20	31.60
TEFF - 40S	28-Aug-15	4413	Chrysochromulina laurentiana Kling	7184	2.74	9.00	9.00	381.70
TEFF - 40S	28-Aug-15	4414	Stichogloea spp.	14368	0.72	6.00	4.00	50.30
TEFF - 40S	28-Aug-15	4436	Dinobryon attenatum Hill	14368	2.71	10.00	6.00	188.50
TEFF - 40S	28-Aug-15	5509	Cyclotella ocellata Pant.	21552	2.69	4.30	8.60	124.90
TEFF - 40S	28-Aug-15	5511	Rhizosolenia eriense H.L. Smith	43104	3.35	11.00	3.00	77.80
TEFF - 40S	28-Aug-15	5518	Synedra acus Kutzing	200	0.02	91.00	2.00	95.30
TEFF - 40S	28-Aug-15	5551	Cyclotella michiganiana Skvortzow	64656	1.68	2.55	5.10	26.00
TEFF - 40S	28-Aug-15	6554	Rhodomonas minuta Skuja	14368	0.69	9.00	3.90	47.80
TEFF - 40S	28-Aug-15	6568	Katablepharis ovalis Skuja	7184	0.37	8.60	4.00	51.60
TEFF - 40S	28-Aug-15	7632	Gymnodinium sp.	7184	3.41	11.20	9.00	475.00
TEFF - 41S	4-Oct-15	1054	Planktolyngbya limnetica	3200	1.14	316.00	1.20	357.40
TEFF - 41S	4-Oct-15	2105	Chlamydomonas spp.	308912	7.29	5.00	3.00	23.60
TEFF - 41S	4-Oct-15	2112	Sphaerocystis schroeteri Chodat	57472	1.08	3.30	3.30	18.80
TEFF - 41S	4-Oct-15	2121	Oocystis lacustris Chodat	79024	2.24	6.00	3.00	28.30
TEFF - 41S	4-Oct-15	2137	Dictyosphaerium simplex Sukja	14368	0.07	2.10	2.10	4.80
TEFF - 41S	4-Oct-15	2187	Staurodesmus extensus (Andersson) Teiling	600	0.24	13.90	12.00	404.70
TEFF - 41S	4-Oct-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TEFF - 41S	4-Oct-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TEFF - 41S	4-Oct-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
TEFF - 41S	4-Oct-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.98	36.00	3.10	135.90
TEFF - 41S	4-Oct-15	4351	Small chrysophyceae	459776	4.23	2.60	2.60	9.20
TEFF - 41S	4-Oct-15	4352	Large chrysophyceae	21552	8.23	9.00	9.00	381.70
TEFF - 41S	4-Oct-15	4357	Chrysococcus sp.	402304	23.29	4.80	4.80	57.90
TEFF - 41S	4-Oct-15	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
TEFF - 41S	4-Oct-15	4363	Spinifiromonas sirratus**********	7184	0.85	6.10	6.10	118.80
TEFF - 41S	4-Oct-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	19.80	10.00	1036.70
TEFF - 41S	4-Oct-15	4378	Dinobryon borgei Lemmermann	43104	2.08	9.60	3.10	48.30
TEFF - 41S	4-Oct-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TEFF - 41S	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	7184	2.86	15.50	7.00	397.70
TEFF - 41S	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	1000	2.53	0.00	0.00	2525.00
TEFF - 41S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	280176	66.01	12.50	6.00	235.60
TEFF - 41S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	4600	15.59	0.00	0.00	3390.00
TEFF - 41S	4-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	28736	0.81	5.60	3.10	28.20
TEFF - 41S	4-Oct-15	4413	Chrysochromulina laurentiana Kling	64656	24.68	9.00	9.00	381.70
TEFF - 41S	4-Oct-15	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
TEFF - 41S	4-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.23	6.00	3.20	32.20
TEFF - 41S	4-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	600	1.19	10.80	21.60	1978.80
TEFF - 41S	4-Oct-15	5508	Cyclotella pseudostelligera	57472	7.18	4.30	8.60	124.90
TEFF - 41S	4-Oct-15	5511	Rhizosolenia eriense H.L. Smith	28736	2.24	11.00	3.00	77.80
TEFF - 41S	4-Oct-15	5514	Tabellaria flocculsa (Roth) Kutzing	600	0.71	23.00	14.00	1180.20
TEFF - 41S	4-Oct-15	5518	Synedra acus Kutzing	2000	0.20	96.00	2.00	100.50
TEFF - 41S	4-Oct-15	5551	Cyclotella michiganiana Skvortzow	201152	4.93	2.50	5.00	24.50
TEFF - 41S	4-Oct-15	6554	Rhodomonas minuta Skuja	14368	1.50	12.00	5.00	104.70
TEFF - 41S	4-Oct-15	6558	Cryptomonas erosa Ehrenberg	800	0.97	24.10	12.00	1211.40
TEFF - 41S	4-Oct-15	6568	Katablepharis ovalis Skuja	14368	0.74	8.60	4.00	51.60
TEFF - 41S	4-Oct-15	7631	Gymnodinium helveticum Penard	200	4.81	51.00	30.00	24033.20
TEFF - 41S	4-Oct-15	7632	Gymnodinium sp.	7184	2.65	11.00	8.00	368.60
TEFF - 41S	4-Oct-15	7632	Gymnodinium sp.	400	2.29	22.20	22.20	5728.70
TEFF - 41SR	4-Oct-15	1054	Planktolyngbya limnetica	4800	1.54	284.00	1.20	321.20
TEFF - 41SR	4-Oct-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TEFF - 41SR	4-Oct-15	2121	Oocystis lacustris Chodat	28736	0.81	6.00	3.00	28.30
TEFF - 41SR	4-Oct-15	2137	Dictyosphaerium simplex Sukja	258624	1.24	2.10	2.10	4.80
TEFF - 41SR	4-Oct-15	2187	Staurodesmus extensus (Andersson) Teiling	400	0.16	13.90	12.00	404.70
TEFF - 41SR	4-Oct-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TEFF - 41SR	4-Oct-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
TEFF - 41SR	4-Oct-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.41	36.00	2.00	56.50
TEFF - 41SR	4-Oct-15	4351	Small chrysophyceae	366384	3.37	2.60	2.60	9.20
TEFF - 41SR	4-Oct-15	4352	Large chrysophyceae	28736	5.16	7.00	7.00	179.60
TEFF - 41SR	4-Oct-15	4357	Chrysococcus sp.	524432	30.36	4.80	4.80	57.90
TEFF - 41SR	4-Oct-15	4361	Kephyrion boreale Skuja	35920	4.27	6.10	6.10	118.80
TEFF - 41SR	4-Oct-15	4362	Kephyrion sp.	28736	0.54	3.30	3.30	18.80
TEFF - 41SR	4-Oct-15	4363	Spinifiromonas sirratus**********	7184	0.85	6.10	6.10	118.80
TEFF - 41SR	4-Oct-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	19.90	10.00	1042.00
TEFF - 41SR	4-Oct-15	4378	Dinobryon borgei Lemmermann	14368	0.69	9.60	3.10	48.30
TEFF - 41SR	4-Oct-15	4381	Dinobryon mucronutom Nygaard	21552	2.82	10.00	5.00	130.90
TEFF - 41SR	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	14368	5.71	15.50	7.00	397.70
TEFF - 41SR	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	800	2.02	0.00	0.00	2525.00
TEFF - 41SR	4-Oct-15	4388	Dinobryon sertularia Ehrenberg	600	2.03	0.00	0.00	3390.00
TEFF - 41SR	4-Oct-15	4390	Dinobryon sociale Ehrenberg	172416	40.62	12.50	6.00	235.60
TEFF - 41SR	4-Oct-15	4390	Dinobryon sociale Ehrenberg	10200	34.58	0.00	0.00	3390.00
TEFF - 41SR	4-Oct-15	4394	Epiphyxis sp.	14368	1.03	8.60	4.00	72.00
TEFF - 41SR	4-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	28736	0.86	5.60	3.20	30.00
TEFF - 41SR	4-Oct-15	4413	Chrysochromulina laurentiana Kling	64656	24.68	9.00	9.00	381.70
TEFF - 41SR	4-Oct-15	4414	Stichogloea spp.	43104	2.17	6.00	4.00	50.30
TEFF - 41SR	4-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.38	5.60	3.00	26.40
TEFF - 41SR	4-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.79	10.80	21.60	1978.80
TEFF - 41SR	4-Oct-15	5509	Cyclotella ocellata Pant.	64656	8.08	4.30	8.60	124.90
TEFF - 41SR	4-Oct-15	5511	Rhizosolenia eriense H.L. Smith	43104	3.35	11.00	3.00	77.80
TEFF - 41SR	4-Oct-15	5514	Tabellaria flocculsa (Roth) Kutzing	800	0.99	24.00	14.00	1231.50
TEFF - 41SR	4-Oct-15	5518	Synedra acus Kutzing	400	0.04	96.00	2.00	100.50
TEFF - 41SR	4-Oct-15	5551	Cyclotella michiganiana Skvortzow	165232	4.05	2.50	5.00	24.50
TEFF - 41SR	4-Oct-15	6554	Rhodomonas minuta Skuja	28736	3.01	12.00	5.00	104.70
TEFF - 41SR	4-Oct-15	6558	Cryptomonas erosa Ehrenberg	400	0.48	24.00	12.00	1206.40
TEFF - 41SR	4-Oct-15	6568	Katablepharis ovalis Skuja	21552	1.01	8.20	4.00	46.90
TEFF - 41SR	4-Oct-15	7632	Gymnodinium sp.	200	1.15	22.20	22.20	5728.70
TEFF - 41SR	4-Oct-15	7635	Peridinium willei Huitfeldt-Kaas	200	4.49	35.00	35.00	22449.30
TEFF - 42S	4-Oct-15	1054	Planktolyngbya limnetica	3400	1.09	284.00	1.20	321.20
TEFF - 42S	4-Oct-15	2105	Chlamydomonas spp.	21552	0.51	5.00	3.00	23.60
TEFF - 42S	4-Oct-15	2121	Oocystis lacustris Chodat	64656	1.83	6.00	3.00	28.30
TEFF - 42S	4-Oct-15	2137	Dictyosphaerium simplex Sukja	136496	0.66	2.10	2.10	4.80
TEFF - 42S	4-Oct-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
TEFF - 42S	4-Oct-15	2187	Staurodesmus extensus (Andersson) Teiling	800	0.32	13.90	12.00	404.70
TEFF - 42S	4-Oct-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TEFF - 42S	4-Oct-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TEFF - 42S	4-Oct-15	2235	Ankistrodesmus spiralis Lemmermann	14368	0.81	36.00	2.00	56.50
TEFF - 42S	4-Oct-15	4351	Small chrysophyceae	287360	2.64	2.60	2.60	9.20
TEFF - 42S	4-Oct-15	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
TEFF - 42S	4-Oct-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
TEFF - 42S	4-Oct-15	4357	Chrysococcus sp.	495696	28.70	4.80	4.80	57.90
TEFF - 42S	4-Oct-15	4361	Kephyrion boreale Skuja	21552	2.56	6.10	6.10	118.80
TEFF - 42S	4-Oct-15	4363	Spinifiromonas sirratus**********	14368	1.71	6.10	6.10	118.80
TEFF - 42S	4-Oct-15	4378	Dinobryon borgei Lemmermann	35920	1.73	9.60	3.10	48.30
TEFF - 42S	4-Oct-15	4381	Dinobryon mucronutom Nygaard	35920	4.70	10.00	5.00	130.90
TEFF - 42S	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	21552	8.57	15.50	7.00	397.70
TEFF - 42S	4-Oct-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	1400	3.54	0.00	0.00	2525.00
TEFF - 42S	4-Oct-15	4388	Dinobryon sertularia Ehrenberg	200	0.68	0.00	0.00	3390.00
TEFF - 42S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	179600	42.31	12.50	6.00	235.60
TEFF - 42S	4-Oct-15	4390	Dinobryon sociale Ehrenberg	8800	29.83	0.00	0.00	3390.00
TEFF - 42S	4-Oct-15	4394	Epiphyxis sp.	14368	1.03	8.60	4.00	72.00
TEFF - 42S	4-Oct-15	4396	Chrysolkos skuja (Nauwerck) Willen	43104	1.22	5.60	3.10	28.20
TEFF - 42S	4-Oct-15	4413	Chrysochromulina laurentiana Kling	86208	32.91	9.00	9.00	381.70
TEFF - 42S	4-Oct-15	4414	Stichogloea spp.	14368	0.72	6.00	4.00	50.30
TEFF - 42S	4-Oct-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.19	5.60	3.00	26.40
TEFF - 42S	4-Oct-15	5507	Cyclotella stelligera Cleve and Grunow	600	1.19	10.80	21.60	1978.80
TEFF - 42S	4-Oct-15	5509	Cyclotella ocellata Pant.	64656	8.08	4.30	8.60	124.90
TEFF - 42S	4-Oct-15	5511	Rhizosolenia eriense H.L. Smith	14368	1.12	11.00	3.00	77.80
TEFF - 42S	4-Oct-15	5514	Tabellaria flocculsa (Roth) Kutzing	800	0.99	24.00	14.00	1231.50
TEFF - 42S	4-Oct-15	5518	Synedra acus Kutzing	1200	0.12	96.00	2.00	100.50
TEFF - 42S	4-Oct-15	5551	Cyclotella michiganiana Skvortzow	208336	5.10	2.50	5.00	24.50
TEFF - 42S	4-Oct-15	6554	Rhodomonas minuta Skuja	43104	4.51	12.00	5.00	104.70
TEFF - 42S	4-Oct-15	6558	Cryptomonas erosa Ehrenberg	200	0.24	24.00	12.00	1206.40
TEFF - 42S	4-Oct-15	7632	Gymnodinium sp.	200	1.15	22.20	22.20	5728.70
TPE - 80S	15-May-15	2138	Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova	3546.1	0.27	36.80	2.00	77.10
TPE - 80S	15-May-15	2167	Elakatothrix gelatinosa Willen	7092.2	0.15	12.00	2.10	20.80
TPE - 80S	15-May-15	4351	Small chrysophyceae	255319.2	3.60	3.00	3.00	14.10
TPE - 80S	15-May-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
TPE - 80S	15-May-15	4355	Chrysochromulina parva Lackey	3546.1	0.23	5.00	5.00	65.40
TPE - 80S	15-May-15	4357	Chrysococcus sp.	145390.1	10.70	5.20	5.20	73.60
TPE - 80S	15-May-15	4362	Kephyrion sp.	14184.4	0.22	3.10	3.10	15.60
TPE - 80S	15-May-15	4388	Dinobryon sertularia Ehrenberg	3546.1	0.89	13.30	6.00	250.70
TPE - 80S	15-May-15	4390	Dinobryon sociale Ehrenberg	3546.1	0.80	12.00	6.00	226.20
TPE - 80S	15-May-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.97	9.30	9.30	421.20
TPE - 80S	15-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.18	6.00	4.00	50.30
TPE - 80S	15-May-15	5507	Cyclotella stelligera Cleve and Grunow	300	0.59	10.80	21.60	1978.80
TPE - 80S	15-May-15	5551	Cyclotella michiganiana Skvortzow	3546.1	0.07	2.30	4.60	19.10

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPE - 80S	15-May-15	6554	Rhodomonas minuta Skuja	35461	2.47	11.30	4.20	69.60
TPE - 80S	15-May-15	6558	Cryptomonas erosa Ehrenberg	1600	1.87	23.20	12.00	1166.20
TPE - 80S	15-May-15	6568	Katablepharis ovalis Skuja	3546.1	0.18	8.60	4.00	51.60
TPE - 80S	15-May-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.13	14.20	13.00	1256.50
TPE - 80S	15-May-15	7641	Peridinium aciculiferum Lemmermann	100	0.90	30.00	24.00	9047.80
TPE - 81S	15-May-15	2121	Oocystis lacustris Chodat	3546.1	0.09	5.60	3.00	26.40
TPE - 81S	15-May-15	2167	Elakatothrix gelatinosa Willen	14184.4	0.30	12.00	2.10	20.80
TPE - 81S	15-May-15	2215	Tetraedron caudatum (Corda) Hansgrig	3546.1	0.02	3.00	3.00	4.70
TPE - 81S	15-May-15	4351	Small chrysophyceae	120567.4	1.70	3.00	3.00	14.10
TPE - 81S	15-May-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
TPE - 81S	15-May-15	4357	Chrysococcus sp.	141844	10.44	5.20	5.20	73.60
TPE - 81S	15-May-15	4362	Kephyrion sp.	14184.4	0.22	3.10	3.10	15.60
TPE - 81S	15-May-15	4390	Dinobryon sociale Ehrenberg	10638.3	2.41	12.00	6.00	226.20
TPE - 81S	15-May-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.97	9.30	9.30	421.20
TPE - 81S	15-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.18	6.00	4.00	50.30
TPE - 81S	15-May-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.79	10.80	21.60	1978.80
TPE - 81S	15-May-15	5551	Cyclotella michiganiana Skvortzow	3546.1	0.07	2.30	4.60	19.10
TPE - 81S	15-May-15	6554	Rhodomonas minuta Skuja	35461	2.47	11.30	4.20	69.60
TPE - 81S	15-May-15	6558	Cryptomonas erosa Ehrenberg	800	0.93	23.20	12.00	1166.20
TPE - 81S	15-May-15	6568	Katablepharis ovalis Skuja	7092.2	0.37	8.60	4.00	51.60
TPE - 81S	15-May-15	7632	Gymnodinium sp.	100	0.36	19.10	19.10	3648.40
TPE - 81S	15-May-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.13	14.20	13.00	1256.50
TPE - 82S	15-Jul-15	2121	Oocystis lacustris Chodat	7184	0.17	5.00	3.00	23.60
TPE - 82S	15-Jul-15	2137	Dictyosphaerium simplex Sukja	28736	0.14	2.10	2.10	4.80
TPE - 82S	15-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
TPE - 82S	15-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.45	36.00	2.10	62.30
TPE - 82S	15-Jul-15	4351	Small chrysophyceae	86208	1.62	3.30	3.30	18.80
TPE - 82S	15-Jul-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
TPE - 82S	15-Jul-15	4357	Chrysococcus sp.	732768	37.37	4.60	4.60	51.00
TPE - 82S	15-Jul-15	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
TPE - 82S	15-Jul-15	4362	Kephyrion sp.	193968	4.73	3.60	3.60	24.40
TPE - 82S	15-Jul-15	4363	Spinifiromonas sirratus**********	7184	0.66	5.60	5.60	92.00
TPE - 82S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
TPE - 82S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	3000	6.45	0.00	0.00	2150.00
TPE - 82S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
TPE - 82S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	1200	2.58	0.00	0.00	2150.00
TPE - 82S	15-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	79024	2.39	6.00	3.10	30.20
TPE - 82S	15-Jul-15	4413	Chrysochromulina laurentiana Kling	7184	2.74	9.00	9.00	381.70
TPE - 82S	15-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.19	5.60	3.00	26.40
TPE - 82S	15-Jul-15	4436	Dinobryon attenatum Hill	14368	2.87	10.60	6.00	199.80
TPE - 82S	15-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	200	0.26	9.40	18.80	1304.70
TPE - 82S	15-Jul-15	5518	Synedra acus Kutzing	600	0.05	83.00	2.00	86.90
TPE - 82S	15-Jul-15	5551	Cyclotella michiganiana Skvortzow	50288	1.23	2.50	5.00	24.50
TPE - 82S	15-Jul-15	6554	Rhodomonas minuta Skuja	7184	0.64	10.60	4.90	88.80
TPE - 82S	15-Jul-15	6558	Cryptomonas erosa Ehrenberg	200	0.15	21.60	10.00	754.00
TPE - 82S	15-Jul-15	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
TPE - 82S	15-Jul-15	7641	Peridinium aciculiferum Lemmermann	200	1.99	33.00	24.00	9952.60
TPE - 83S	15-Jul-15	2105	Chlamydomonas spp.	7184	0.13	5.00	2.60	17.70
TPE - 83S	15-Jul-15	2121	Oocystis lacustris Chodat	35920	0.85	5.00	3.00	23.60
TPE - 83S	15-Jul-15	2137	Dictyosphaerium simplex Sukja	43104	0.21	2.10	2.10	4.80
TPE - 83S	15-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.08	13.60	12.00	387.40
TPE - 83S	15-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	28736	0.14	3.00	3.00	4.70
TPE - 83S	15-Jul-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.42	34.00	2.10	58.90
TPE - 83S	15-Jul-15	4351	Small chrysophyceae	222704	4.19	3.30	3.30	18.80
TPE - 83S	15-Jul-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
TPE - 83S	15-Jul-15	4355	Chrysochromulina parva Lackey	14368	0.94	5.00	5.00	65.40
TPE - 83S	15-Jul-15	4357	Chrysococcus sp.	826160	42.13	4.60	4.60	51.00
TPE - 83S	15-Jul-15	4362	Kephyrion sp.	287360	7.01	3.60	3.60	24.40
TPE - 83S	15-Jul-15	4378	Dinobryon borgei Lemmermann	14368	0.69	9.00	3.20	48.30
TPE - 83S	15-Jul-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TPE - 83S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
TPE - 83S	15-Jul-15	4388	Dinobryon sertularia Ehrenberg	6800	14.62	0.00	0.00	2150.00
TPE - 83S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	21552	4.88	12.00	6.00	226.20
TPE - 83S	15-Jul-15	4390	Dinobryon sociale Ehrenberg	3400	4.30	0.00	0.00	1265.00
TPE - 83S	15-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	64656	1.07	3.16	3.16	16.50
TPE - 83S	15-Jul-15	4413	Chrysochromulina laurentiana Kling	14368	5.48	9.00	9.00	381.70
TPE - 83S	15-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.38	5.60	3.00	26.40
TPE - 83S	15-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	400	0.53	9.45	18.90	1325.60
TPE - 83S	15-Jul-15	5509	Cyclotella ocellata Pant.	7184	0.90	4.30	8.60	124.90
TPE - 83S	15-Jul-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	5200	4.46	91.00	6.00	857.70
TPE - 83S	15-Jul-15	5518	Synedra acus Kutzing	200	0.02	83.00	2.00	86.90
TPE - 83S	15-Jul-15	5524	Asterionella formosa Hassall	200	0.02	96.00	2.00	100.50
TPE - 83S	15-Jul-15	5551	Cyclotella michiganiana Skvortzow	28736	0.70	2.50	5.00	24.50
TPE - 83S	15-Jul-15	6554	Rhodomonas minuta Skuja	14368	1.28	10.60	4.90	88.80
TPE - 83S	15-Jul-15	6558	Cryptomonas erosa Ehrenberg	200	0.15	21.60	10.00	754.00
TPE - 83S	15-Jul-15	7632	Gymnodinium sp.	200	1.27	23.00	23.00	6370.60
TPE - 83S	15-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.63	14.00	12.00	1055.60
TPE - 83S	15-Jul-15	7641	Peridinium aciculiferum Lemmermann	600	5.97	33.00	24.00	9952.60
TPE - 84S	29-Aug-15	1054	Planktolyngbya limnetica	1600	0.38	210.00	1.20	237.50
TPE - 84S	29-Aug-15	2121	Oocystis lacustris Chodat	143680	7.23	6.00	4.00	50.30
TPE - 84S	29-Aug-15	2137	Dictyosphaerium simplex Sukja	57472	0.32	2.20	2.20	5.60
TPE - 84S	29-Aug-15	2167	Elakatothrix gelatinosa Willen	21552	0.37	11.00	2.00	17.30
TPE - 84S	29-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.13	16.00	14.00	625.50
TPE - 84S	29-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	28736	0.14	3.00	3.00	4.70
TPE - 84S	29-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	28736	2.24	41.00	2.20	77.90

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPE - 84S	29-Aug-15	4351	Small chrysophyceae	93392	1.61	3.20	3.20	17.20
TPE - 84S	29-Aug-15	4357	Chrysococcus sp.	208336	11.33	4.70	4.70	54.40
TPE - 84S	29-Aug-15	4361	Kephyrion boreale Skuja	100576	2.25	3.50	3.50	22.40
TPE - 84S	29-Aug-15	4361	Kephyrion boreale Skuja	21552	2.56	6.10	6.10	118.80
TPE - 84S	29-Aug-15	4378	Dinobryon borgei Lemmermann	21552	1.63	9.00	4.00	75.40
TPE - 84S	29-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.82	10.00	5.00	130.90
TPE - 84S	29-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.43	0.00	0.00	2125.00
TPE - 84S	29-Aug-15	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
TPE - 84S	29-Aug-15	4388	Dinobryon sertularia Ehrenberg	400	0.85	0.00	0.00	2125.00
TPE - 84S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	93392	21.13	12.00	6.00	226.20
TPE - 84S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	200	0.40	0.00	0.00	1990.00
TPE - 84S	29-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.46	6.00	3.20	32.20
TPE - 84S	29-Aug-15	4413	Chrysochromulina laurentiana Kling	14368	5.67	9.10	9.10	394.60
TPE - 84S	29-Aug-15	4414	Stichogloea spp.	43104	2.17	6.00	4.00	50.30
TPE - 84S	29-Aug-15	4436	Dinobryon attenatum Hill	7184	1.35	10.00	6.00	188.50
TPE - 84S	29-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	1000	1.41	9.65	19.30	1411.60
TPE - 84S	29-Aug-15	5509	Cyclotella ocellata Pant.	122128	16.90	4.45	8.90	138.40
TPE - 84S	29-Aug-15	5518	Synedra acus Kutzing	400	0.04	91.00	2.00	95.30
TPE - 84S	29-Aug-15	5551	Cyclotella michiganiana Skvortzow	1084784	20.72	2.30	4.60	19.10
TPE - 84S	29-Aug-15	6558	Cryptomonas erosa Ehrenberg	200	0.15	22.20	10.00	774.90
TPE - 84S	29-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.43	14.20	12.00	1070.70
TPE - 85S	29-Aug-15	1054	Planktolyngbya limnetica	1000	0.13	111.00	1.20	125.50
TPE - 85S	29-Aug-15	2105	Chlamydomonas spp.	28736	0.36	5.00	2.20	12.70
TPE - 85S	29-Aug-15	2112	Sphaerocystis schroeteri Chodat	114944	3.85	4.00	4.00	33.50
TPE - 85S	29-Aug-15	2121	Oocystis lacustris Chodat	150864	4.27	6.00	3.00	28.30
TPE - 85S	29-Aug-15	2137	Dictyosphaerium simplex Sukja	237072	1.00	2.00	2.00	4.20
TPE - 85S	29-Aug-15	2145	Crucigenia quadrata Morr.	28736	0.04	2.00	2.00	1.40
TPE - 85S	29-Aug-15	2167	Elakatothrix gelatinosa Willen	35920	0.64	11.40	2.00	17.90
TPE - 85S	29-Aug-15	2206	Botryococcus braunii Kutzing	400	0.21	10.00	10.00	523.60
TPE - 85S	29-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
TPE - 85S	29-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	86208	6.72	41.00	2.20	77.90
TPE - 85S	29-Aug-15	4351	Small chrysophyceae	301728	4.25	3.00	3.00	14.10
TPE - 85S	29-Aug-15	4352	Large chrysophyceae	21552	2.44	6.00	6.00	113.10
TPE - 85S	29-Aug-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
TPE - 85S	29-Aug-15	4357	Chrysococcus sp.	538800	27.48	4.60	4.60	51.00
TPE - 85S	29-Aug-15	4362	Kephyrion sp.	28736	0.59	3.40	3.40	20.60
TPE - 85S	29-Aug-15	4363	Spinifiromonas sirratus**********	14368	1.25	5.50	5.50	87.10
TPE - 85S	29-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.23	21.60	10.00	1131.00
TPE - 85S	29-Aug-15	4378	Dinobryon borgei Lemmermann	64656	3.12	9.00	3.20	48.30
TPE - 85S	29-Aug-15	4381	Dinobryon mucronutom Nygaard	43104	5.64	10.00	5.00	130.90
TPE - 85S	29-Aug-15	4383	Dinobryon bavaricum Imhof	400	0.86	0.00	0.00	2150.00
TPE - 85S	29-Aug-15	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
TPE - 85S	29-Aug-15	4388	Dinobryon sertularia Ehrenberg	800	1.59	0.00	0.00	1990.00
TPE - 85S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	308912	69.88	12.00	6.00	226.20
TPE - 85S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	200	0.25	0.00	0.00	1250.00
TPE - 85S	29-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.41	5.60	3.10	28.20
TPE - 85S	29-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	14368	0.72	6.00	4.00	50.30
TPE - 85S	29-Aug-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
TPE - 85S	29-Aug-15	4414	Stichogloea spp.	122128	6.14	6.00	4.00	50.30
TPE - 85S	29-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	1000	1.57	10.00	20.00	1570.80
TPE - 85S	29-Aug-15	5509	Cyclotella ocellata Pant.	244256	34.95	4.50	9.00	143.10
TPE - 85S	29-Aug-15	5518	Synedra acus Kutzing	1200	0.11	88.00	2.00	92.20
TPE - 85S	29-Aug-15	5551	Cyclotella michiganiana Skvortzow	1214096	23.19	2.30	4.60	19.10
TPE - 85S	29-Aug-15	6554	Rhodomonas minuta Skuja	14368	0.84	10.00	4.10	58.70
TPE - 85S	29-Aug-15	6558	Cryptomonas erosa Ehrenberg	5000	8.55	25.00	14.00	1710.40
TPE - 85S	29-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	800	0.55	19.60	10.00	684.20
TPE - 85S	29-Aug-15	6565	Cryptomonas rostratiformis Skuja	1600	3.39	31.00	14.00	2120.90
TPE - 85S	29-Aug-15	6568	Katablepharis ovalis Skuja	7184	0.34	8.20	4.00	46.90
TPE - 85S	29-Aug-15	7632	Gymnodinium sp.	21552	7.22	10.00	8.00	335.10
TPE - 85S	29-Aug-15	7632	Gymnodinium sp.	200	1.56	24.60	24.60	7794.80
TPE - 85S	29-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.21	13.80	12.00	1040.50
TPE - 86S	27-Sep-15	1054	Planktolyngbya limnetica	1800	0.25	121.00	1.20	136.80
TPE - 86S	27-Sep-15	2105	Chlamydomonas spp.	7184	0.20	6.00	3.00	28.30
TPE - 86S	27-Sep-15	2112	Sphaerocystis schroeteri Chodat	28736	0.59	3.40	3.40	20.60
TPE - 86S	27-Sep-15	2121	Oocystis lacustris Chodat	71840	3.37	5.60	4.00	46.90
TPE - 86S	27-Sep-15	2167	Elakatothrix gelatinosa Willen	14368	0.25	11.00	2.00	17.30
TPE - 86S	27-Sep-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.13	16.00	14.00	625.50
TPE - 86S	27-Sep-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TPE - 86S	27-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	21552	0.10	3.00	3.00	4.70
TPE - 86S	27-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	28736	2.29	46.00	2.10	79.70
TPE - 86S	27-Sep-15	4351	Small chrysophyceae	150864	2.13	3.00	3.00	14.10
TPE - 86S	27-Sep-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
TPE - 86S	27-Sep-15	4357	Chrysococcus sp.	617824	40.41	5.00	5.00	65.40
TPE - 86S	27-Sep-15	4362	Kephyrion sp.	43104	0.89	3.40	3.40	20.60
TPE - 86S	27-Sep-15	4362	Kephyrion sp.	14368	1.25	5.50	5.50	87.10
TPE - 86S	27-Sep-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.43	20.30	10.00	1062.90
TPE - 86S	27-Sep-15	4378	Dinobryon borgei Lemmermann	21552	1.11	9.00	3.30	51.30
TPE - 86S	27-Sep-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TPE - 86S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
TPE - 86S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
TPE - 86S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	400	0.80	0.00	0.00	1991.00
TPE - 86S	27-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.43	6.00	3.10	30.20
TPE - 86S	27-Sep-15	4400	Ochromonas sp.	7184	0.54	8.10	4.20	74.80
TPE - 86S	27-Sep-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
TPE - 86S	27-Sep-15	4413	Chrysochromulina laurentiana Kling	71840	29.29	9.20	9.20	407.70

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPE - 86S	27-Sep-15	4414	Stichogloea spp.	43104	2.17	6.00	4.00	50.30
TPE - 86S	27-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.36	5.30	3.00	25.00
TPE - 86S	27-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	1.32	5.60	5.60	92.00
TPE - 86S	27-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.09	9.55	19.10	1368.10
TPE - 86S	27-Sep-15	5509	Cyclotella ocellata Pant.	57472	5.99	4.05	8.10	104.30
TPE - 86S	27-Sep-15	5518	Synedra acus Kutzing	2800	0.23	80.00	2.00	83.80
TPE - 86S	27-Sep-15	5551	Cyclotella michiganiana Skvortzow	797424	16.27	2.35	4.70	20.40
TPE - 86S	27-Sep-15	6554	Rhodomonas minuta Skuja	43104	6.50	12.00	6.00	150.80
TPE - 86S	27-Sep-15	6558	Cryptomonas erosa Ehrenberg	3200	3.64	22.60	12.00	1136.00
TPE - 86S	27-Sep-15	6565	Cryptomonas rostratiformis Skuja	800	1.81	33.00	14.00	2257.80
TPE - 86S	27-Sep-15	7632	Gymnodinium sp.	7184	2.38	9.90	8.00	331.80
TPE - 86S	27-Sep-15	7632	Gymnodinium sp.	200	2.06	27.00	27.00	10306.00
TPE - 86S	27-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.42	14.00	12.00	1055.60
TPE - 87S	27-Sep-15	1054	Planktolyngbya limnetica	1200	0.14	106.00	1.20	119.90
TPE - 87S	27-Sep-15	2105	Chlamydomonas spp.	14368	0.41	6.00	3.00	28.30
TPE - 87S	27-Sep-15	2112	Sphaerocystis schroeteri Chodat	35920	0.74	3.40	3.40	20.60
TPE - 87S	27-Sep-15	2121	Oocystis lacustris Chodat	100576	4.72	5.60	4.00	46.90
TPE - 87S	27-Sep-15	2167	Elakatothrix gelatinosa Willen	21552	0.37	11.00	2.00	17.30
TPE - 87S	27-Sep-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TPE - 87S	27-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	50288	0.24	3.00	3.00	4.70
TPE - 87S	27-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	57472	4.58	46.00	2.10	79.70
TPE - 87S	27-Sep-15	4351	Small chrysophyceae	208336	3.25	3.10	3.10	15.60
TPE - 87S	27-Sep-15	4357	Chrysococcus sp.	732768	47.92	5.00	5.00	65.40
TPE - 87S	27-Sep-15	4361	Kephyrion boreale Skuja	7184	0.63	5.50	5.50	87.10
TPE - 87S	27-Sep-15	4362	Kephyrion sp.	14368	0.30	3.40	3.40	20.60
TPE - 87S	27-Sep-15	4363	Spinifiromonas sirratus**********	14368	1.32	5.60	5.60	92.00
TPE - 87S	27-Sep-15	4378	Dinobryon borgei Lemmermann	21552	1.11	9.00	3.30	51.30
TPE - 87S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
TPE - 87S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
TPE - 87S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	600	1.19	0.00	0.00	1991.00
TPE - 87S	27-Sep-15	4394	Epiphyxis sp.	7184	0.60	9.90	4.00	82.90
TPE - 87S	27-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.20	5.60	3.10	28.20
TPE - 87S	27-Sep-15	4413	Chrysochromulina laurentiana Kling	57472	23.43	9.20	9.20	407.70
TPE - 87S	27-Sep-15	4414	Stichogloea spp.	21552	1.08	6.00	4.00	50.30
TPE - 87S	27-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.17	5.10	3.00	24.00
TPE - 87S	27-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	1600	2.19	9.55	19.10	1368.10
TPE - 87S	27-Sep-15	5509	Cyclotella ocellata Pant.	71840	7.49	4.05	8.10	104.30
TPE - 87S	27-Sep-15	5514	Tabellaria flocculsa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
TPE - 87S	27-Sep-15	5518	Synedra acus Kutzing	4000	0.37	88.00	2.00	92.20
TPE - 87S	27-Sep-15	5551	Cyclotella michiganiana Skvortzow	704032	14.36	2.35	4.70	20.40
TPE - 87S	27-Sep-15	5720	Cyclotella bodanica Eulenst.	200	1.41	16.50	33.00	7056.20
TPE - 87S	27-Sep-15	6554	Rhodomonas minuta Skuja	35920	5.42	12.00	6.00	150.80
TPE - 87S	27-Sep-15	6558	Cryptomonas erosa Ehrenberg	2600	2.95	22.60	12.00	1136.00
TPE - 87S	27-Sep-15	6565	Cryptomonas rostratiformis Skuja	800	1.81	33.00	14.00	2257.80
TPE - 87S	27-Sep-15	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
TPE - 87S	27-Sep-15	7632	Gymnodinium sp.	7184	2.38	9.90	8.00	331.80
TPE - 87S	27-Sep-15	7632	Gymnodinium sp.	200	2.06	27.00	27.00	10306.00
TPE - 88S	13-Nov-15	1054	Planktolyngbya limnetica	100	0.03	246.00	1.20	278.20
TPE - 88S	13-Nov-15	2105	Chlamydomonas spp.	3546.1	0.09	5.20	3.00	24.50
TPE - 88S	13-Nov-15	2121	Oocystis lacustris Chodat	28368.8	0.67	5.00	3.00	23.60
TPE - 88S	13-Nov-15	2137	Dictyosphaerium simplex Sukja	24822.7	0.10	2.00	2.00	4.20
TPE - 88S	13-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	31914.9	1.99	36.00	2.10	62.30
TPE - 88S	13-Nov-15	4351	Small chrysophyceae	326241.2	2.68	2.50	2.50	8.20
TPE - 88S	13-Nov-15	4352	Large chrysophyceae	3546.1	2.47	11.00	11.00	696.90
TPE - 88S	13-Nov-15	4357	Chrysococcus sp.	287234.1	17.69	4.90	4.90	61.60
TPE - 88S	13-Nov-15	4364	Mallomonas caudata Ivanov	100	0.54	40.00	16.00	5361.70
TPE - 88S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	35461	8.02	12.00	6.00	226.20
TPE - 88S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	100	0.09	0.00	0.00	925.00
TPE - 88S	13-Nov-15	4413	Chrysochromulina laurentiana Kling	3546.1	1.49	9.30	9.30	421.20
TPE - 88S	13-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21276.6	0.45	5.50	2.70	21.00
TPE - 88S	13-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	600	1.09	10.50	21.00	1818.40
TPE - 88S	13-Nov-15	5518	Synedra acus Kutzing	1000	0.10	96.00	2.00	100.50
TPE - 88S	13-Nov-15	5551	Cyclotella michiganiana Skvortzow	234042.6	4.19	2.25	4.50	17.90
TPE - 88S	13-Nov-15	6558	Cryptomonas erosa Ehrenberg	5600	6.73	23.90	12.00	1201.30
TPE - 88S	13-Nov-15	6565	Cryptomonas rostratiformis Skuja	100	0.21	31.00	14.00	2120.90
TPE - 88S	13-Nov-15	6568	Katablepharis ovalis Skuja	21276.6	1.00	8.20	4.00	46.90
TPE - 88S	13-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.10	13.30	12.00	1002.80
TPE - 89S	13-Nov-15	1054	Planktolyngbya limnetica	100	0.02	200.00	1.20	226.20
TPE - 89S	13-Nov-15	2105	Chlamydomonas spp.	17730.5	0.50	6.00	3.00	28.30
TPE - 89S	13-Nov-15	2121	Oocystis lacustris Chodat	14184.4	0.33	5.00	3.00	23.60
TPE - 89S	13-Nov-15	2137	Dictyosphaerium simplex Sukja	39007.1	0.19	2.10	2.10	4.80
TPE - 89S	13-Nov-15	2215	Tetraedron caudatum (Corda) Hansgrig	3546.1	0.02	3.00	3.00	4.70
TPE - 89S	13-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	49645.4	2.42	31.00	2.00	48.70
TPE - 89S	13-Nov-15	4351	Small chrysophyceae	42553.2	0.35	2.50	2.50	8.20
TPE - 89S	13-Nov-15	4352	Large chrysophyceae	14184.4	2.55	7.00	7.00	179.60
TPE - 89S	13-Nov-15	4355	Chrysochromulina parva Lackey	3546.1	0.23	5.00	5.00	65.40
TPE - 89S	13-Nov-15	4357	Chrysococcus sp.	205673.8	12.67	4.90	4.90	61.60
TPE - 89S	13-Nov-15	4361	Kephyrion boreale Skuja	3546.1	0.42	6.10	6.10	118.80
TPE - 89S	13-Nov-15	4362	Kephyrion sp.	21276.6	0.37	3.20	3.20	17.20
TPE - 89S	13-Nov-15	4378	Dinobryon borgei Lemmermann	3546.1	0.16	9.40	3.00	44.30
TPE - 89S	13-Nov-15	4381	Dinobryon mucronutom Nygaard	3546.1	0.42	9.00	5.00	117.80
TPE - 89S	13-Nov-15	4388	Dinobryon sertularia Ehrenberg	100	0.20	0.00	0.00	1991.00
TPE - 89S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	35461	8.02	12.00	6.00	226.20
TPE - 89S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	1400	1.72	0.00	0.00	1225.00
TPE - 89S	13-Nov-15	4400	Ochromonas sp.	3546.1	0.30	9.10	4.20	84.10

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPE - 89S	13-Nov-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.97	9.30	9.30	421.20
TPE - 89S	13-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	10638.3	0.29	5.10	3.20	27.30
TPE - 89S	13-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	700	1.03	9.80	19.60	1478.40
TPE - 89S	13-Nov-15	5509	Cyclotella ocellata Pant.	24822.7	2.79	4.15	8.30	112.30
TPE - 89S	13-Nov-15	5518	Synedra acus Kutzing	4400	0.46	100.00	2.00	104.70
TPE - 89S	13-Nov-15	5551	Cyclotella michiganiana Skvortzow	347517.8	6.22	2.25	4.50	17.90
TPE - 89S	13-Nov-15	6558	Cryptomonas erosa Ehrenberg	800	0.90	22.30	12.00	1120.90
TPE - 89S	13-Nov-15	6568	Katablepharis ovalis Skuja	10638.3	0.55	8.60	4.00	51.60
TPE - 89S	13-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.16	15.60	14.00	1601.00
TPN - 80S	16-May-15	4351	Small chrysophyceae	464539.1	6.55	3.00	3.00	14.10
TPN - 80S	16-May-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
TPN - 80S	16-May-15	4355	Chrysochromulina parva Lackey	3546.1	0.18	4.60	4.60	51.00
TPN - 80S	16-May-15	4357	Chrysococcus sp.	216312.1	15.03	5.10	5.10	69.50
TPN - 80S	16-May-15	4362	Kephyrion sp.	28368.8	0.40	3.00	3.00	14.10
TPN - 80S	16-May-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.44	21.00	10.00	1099.60
TPN - 80S	16-May-15	4388	Dinobryon sertularia Ehrenberg	100	0.02	13.00	6.00	245.00
TPN - 80S	16-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	10638.3	0.32	6.00	3.10	30.20
TPN - 80S	16-May-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.78	9.20	9.20	407.70
TPN - 80S	16-May-15	5551	Cyclotella michiganiana Skvortzow	10638.3	0.25	2.45	4.90	23.10
TPN - 80S	16-May-15	6554	Rhodomonas minuta Skuja	70922	8.54	11.00	5.60	120.40
TPN - 80S	16-May-15	6558	Cryptomonas erosa Ehrenberg	3400	4.00	23.40	12.00	1176.20
TPN - 80S	16-May-15	7632	Gymnodinium sp.	10638.3	3.67	10.30	8.00	345.20
TPN - 80S	16-May-15	7632	Gymnodinium sp.	100	0.78	24.60	24.60	7794.80
TPN - 80S	16-May-15	7639	Peridinium pusillum (Penard) Lemmermann	500	0.49	12.90	12.00	972.60
TPN - 81S	16-May-15	4351	Small chrysophyceae	446808.6	6.30	3.00	3.00	14.10
TPN - 81S	16-May-15	4352	Large chrysophyceae	21276.6	3.82	7.00	7.00	179.60
TPN - 81S	16-May-15	4355	Chrysochromulina parva Lackey	3546.1	0.21	4.80	4.80	57.90
TPN - 81S	16-May-15	4357	Chrysococcus sp.	251773.1	17.50	5.10	5.10	69.50
TPN - 81S	16-May-15	4362	Kephyrion sp.	21276.6	0.30	3.00	3.00	14.10
TPN - 81S	16-May-15	4363	Spinifiromonas sirratus**********	10638.3	1.26	6.10	6.10	118.80
TPN - 81S	16-May-15	4368	Mallomonas crassisquama (Asmund) Fott	1400	1.54	21.00	10.00	1099.60
TPN - 81S	16-May-15	4390	Dinobryon sociale Ehrenberg	600	0.14	12.00	6.00	226.20
TPN - 81S	16-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	17730.5	0.50	6.00	3.00	28.30
TPN - 81S	16-May-15	4413	Chrysochromulina laurentiana Kling	17730.5	7.23	9.20	9.20	407.70
TPN - 81S	16-May-15	5507	Cyclotella stelligera Cleve and Grunow	100	0.12	9.05	18.10	1164.30
TPN - 81S	16-May-15	6554	Rhodomonas minuta Skuja	134751.8	16.22	11.00	5.60	120.40
TPN - 81S	16-May-15	6558	Cryptomonas erosa Ehrenberg	2300	2.71	23.40	12.00	1176.20
TPN - 81S	16-May-15	7631	Gymnodinium helveticum Penard	300	7.21	51.00	30.00	24033.20
TPN - 81S	16-May-15	7632	Gymnodinium sp.	100	0.78	24.60	24.60	7794.80
TPN - 82S	24-Jul-15	2101	Carteria spp.	14368	2.17	8.00	6.00	150.80
TPN - 82S	24-Jul-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60
TPN - 82S	24-Jul-15	4351	Small chrysophyceae	387936	5.47	3.00	3.00	14.10
TPN - 82S	24-Jul-15	4352	Large chrysophyceae	57472	10.32	7.00	7.00	179.60
TPN - 82S	24-Jul-15	4357	Chrysococcus sp.	495696	25.28	4.60	4.60	51.00
TPN - 82S	24-Jul-15	4362	Kephyrion sp.	193968	2.48	2.90	2.90	12.80
TPN - 82S	24-Jul-15	4363	Spinifiromonas sirratus**********	21552	2.56	6.10	6.10	118.80
TPN - 82S	24-Jul-15	4378	Dinobryon borgei Lemmermann	7184	0.35	8.60	3.30	49.00
TPN - 82S	24-Jul-15	4381	Dinobryon mucronutom Nygaard	7184	0.90	9.60	5.00	125.70
TPN - 82S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
TPN - 82S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	6800	13.95	0.00	0.00	2052.00
TPN - 82S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	50288	11.38	12.00	6.00	226.20
TPN - 82S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	6000	7.35	0.00	0.00	1225.00
TPN - 82S	24-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	57472	1.72	5.60	3.20	30.00
TPN - 82S	24-Jul-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
TPN - 82S	24-Jul-15	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
TPN - 82S	24-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.49	6.00	3.30	34.20
TPN - 82S	24-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	200	0.27	9.45	18.90	1325.60
TPN - 82S	24-Jul-15	5509	Cyclotella ocellata Pant.	7184	1.41	5.00	10.00	196.30
TPN - 82S	24-Jul-15	5518	Synedra acus Kutzing	200	0.02	96.00	2.00	100.50
TPN - 82S	24-Jul-15	5551	Cyclotella michiganiana Skvortzow	35920	0.78	2.40	4.80	21.70
TPN - 82S	24-Jul-15	6554	Rhodomonas minuta Skuja	35920	4.17	11.00	5.50	116.20
TPN - 82S	24-Jul-15	6558	Cryptomonas erosa Ehrenberg	1600	1.82	22.60	12.00	1136.00
TPN - 82S	24-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.40	29.00	14.00	1984.10
TPN - 82S	24-Jul-15	6568	Katablepharis ovalis Skuja	21552	1.28	9.00	4.20	59.40
TPN - 82S	24-Jul-15	7632	Gymnodinium sp.	1400	7.39	21.60	21.60	5276.70
TPN - 82S	24-Jul-15	7632	Gymnodinium sp.	400	5.65	30.00	30.00	14137.20
TPN - 82S	24-Jul-15	7635	Peridinium willei Huitfeldt-Kaas	200	5.13	36.60	36.60	25670.90
TPN - 82S	24-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	2200	2.19	13.20	12.00	995.30
TPN - 82S	24-Jul-15	7641	Peridinium aciculiferum Lemmermann	1000	9.05	30.00	24.00	9047.80
TPN - 83S	24-Jul-15	2105	Chlamydomonas spp.	7184	0.16	4.60	3.00	21.70
TPN - 83S	24-Jul-15	2112	Sphaerocystis schroeteri Chodat	28736	0.41	3.00	3.00	14.10
TPN - 83S	24-Jul-15	2167	Elakatothrix gelatinosa Willen	7184	0.17	15.00	2.00	23.60
TPN - 83S	24-Jul-15	4351	Small chrysophyceae	323280	4.56	3.00	3.00	14.10
TPN - 83S	24-Jul-15	4352	Large chrysophyceae	50288	9.03	7.00	7.00	179.60
TPN - 83S	24-Jul-15	4357	Chrysococcus sp.	510064	26.01	4.60	4.60	51.00
TPN - 83S	24-Jul-15	4362	Kephyrion sp.	122128	1.56	2.90	2.90	12.80
TPN - 83S	24-Jul-15	4363	Spinifiromonas sirratus**********	14368	1.71	6.10	6.10	118.80
TPN - 83S	24-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.23	21.60	10.00	1131.00
TPN - 83S	24-Jul-15	4378	Dinobryon borgei Lemmermann	28736	1.41	8.60	3.30	49.00
TPN - 83S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
TPN - 83S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	6000	12.31	0.00	0.00	2052.00
TPN - 83S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	143680	32.50	12.00	6.00	226.20
TPN - 83S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	6000	7.35	0.00	0.00	1225.00
TPN - 83S	24-Jul-15	4394	Epiphyxis sp.	7184	0.56	9.30	4.00	77.90
TPN - 83S	24-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	71840	2.12	5.50	3.20	29.50

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPN - 83S	24-Jul-15	4413	Chrysochromulina laurentiana Kling	93392	35.65	9.00	9.00	381.70
TPN - 83S	24-Jul-15	4414	Stichogloea spp.	21552	1.08	6.00	4.00	50.30
TPN - 83S	24-Jul-15	5509	Cyclotella ocellata Pant.	14368	2.82	5.00	10.00	196.30
TPN - 83S	24-Jul-15	5518	Synedra acus Kutzing	200	0.02	96.00	2.00	100.50
TPN - 83S	24-Jul-15	5551	Cyclotella michiganiana Skvortzow	71840	1.56	2.40	4.80	21.70
TPN - 83S	24-Jul-15	6554	Rhodomonas minuta Skuja	50288	5.84	11.00	5.50	116.20
TPN - 83S	24-Jul-15	6558	Cryptomonas erosa Ehrenberg	1000	1.14	22.60	12.00	1136.00
TPN - 83S	24-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.40	29.00	14.00	1984.10
TPN - 83S	24-Jul-15	7632	Gymnodinium sp.	21552	7.44	10.30	8.00	345.20
TPN - 83S	24-Jul-15	7632	Gymnodinium sp.	800	4.22	21.60	21.60	5276.70
TPN - 83S	24-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	800	0.80	13.30	12.00	1002.80
TPN - 83S	24-Jul-15	7641	Peridinium aciculiferum Lemmermann	800	7.24	30.00	24.00	9047.80
TPN - 83SR	24-Jul-15	2105	Chlamydomonas spp.	21552	0.47	4.60	3.00	21.70
TPN - 83SR	24-Jul-15	2112	Sphaerocystis schroeteri Chodat	28736	0.41	3.00	3.00	14.10
TPN - 83SR	24-Jul-15	2167	Elakatothrix gelatinosa Willen	7184	0.17	15.00	2.00	23.60
TPN - 83SR	24-Jul-15	4351	Small chrysophyceae	258624	3.65	3.00	3.00	14.10
TPN - 83SR	24-Jul-15	4352	Large chrysophyceae	28736	5.16	7.00	7.00	179.60
TPN - 83SR	24-Jul-15	4357	Chrysococcus sp.	596272	30.41	4.60	4.60	51.00
TPN - 83SR	24-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.00	8.10	8.10	278.30
TPN - 83SR	24-Jul-15	4362	Kephyrion sp.	172416	2.21	2.90	2.90	12.80
TPN - 83SR	24-Jul-15	4363	Spinifiromonas sirratus**********	7184	0.85	6.10	6.10	118.80
TPN - 83SR	24-Jul-15	4378	Dinobryon borgei Lemmermann	35920	1.76	8.60	3.30	49.00
TPN - 83SR	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
TPN - 83SR	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	6600	13.54	0.00	0.00	2052.00
TPN - 83SR	24-Jul-15	4390	Dinobryon sociale Ehrenberg	114944	26.00	12.00	6.00	226.20
TPN - 83SR	24-Jul-15	4390	Dinobryon sociale Ehrenberg	5200	6.37	0.00	0.00	1225.00
TPN - 83SR	24-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.48	5.50	3.20	29.50
TPN - 83SR	24-Jul-15	4413	Chrysochromulina laurentiana Kling	79024	30.16	9.00	9.00	381.70
TPN - 83SR	24-Jul-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
TPN - 83SR	24-Jul-15	5509	Cyclotella ocellata Pant.	7184	1.41	5.00	10.00	196.30
TPN - 83SR	24-Jul-15	5518	Synedra acus Kutzing	200	0.02	96.00	2.00	100.50
TPN - 83SR	24-Jul-15	5551	Cyclotella michiganiana Skvortzow	100576	2.18	2.40	4.80	21.70
TPN - 83SR	24-Jul-15	6554	Rhodomonas minuta Skuja	35920	4.17	11.00	5.50	116.20
TPN - 83SR	24-Jul-15	6558	Cryptomonas erosa Ehrenberg	1800	2.04	22.60	12.00	1136.00
TPN - 83SR	24-Jul-15	6565	Cryptomonas rostratiformis Skuja	200	0.40	29.00	14.00	1984.10
TPN - 83SR	24-Jul-15	7632	Gymnodinium sp.	28736	9.92	10.30	8.00	345.20
TPN - 83SR	24-Jul-15	7632	Gymnodinium sp.	400	2.11	21.60	21.60	5276.70
TPN - 83SR	24-Jul-15	7635	Peridinium willei Huitfeldt-Kaas	200	4.72	35.60	35.60	23623.70
TPN - 83SR	24-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.60	13.30	12.00	1002.80
TPN - 84S	29-Aug-15	1054	Planktolyngbya limnetica	200	0.03	141.00	1.20	159.50
TPN - 84S	29-Aug-15	2105	Chlamydomonas spp.	21552	0.71	7.00	3.00	33.00
TPN - 84S	29-Aug-15	2121	Oocystis lacustris Chodat	35920	0.54	5.00	2.40	15.10
TPN - 84S	29-Aug-15	2137	Dictyosphaerium simplex Sukja	107760	0.45	2.00	2.00	4.20
TPN - 84S	29-Aug-15	2186	Xanthidium sp.	28736	5.01	10.00	10.00	174.50
TPN - 84S	29-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
TPN - 84S	29-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
TPN - 84S	29-Aug-15	4351	Small chrysophyceae	294544	3.03	2.70	2.70	10.30
TPN - 84S	29-Aug-15	4352	Large chrysophyceae	14368	5.48	9.00	9.00	381.70
TPN - 84S	29-Aug-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
TPN - 84S	29-Aug-15	4357	Chrysococcus sp.	747136	48.86	5.00	5.00	65.40
TPN - 84S	29-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	3.03	9.30	9.30	421.20
TPN - 84S	29-Aug-15	4361	Kephyrion boreale Skuja	14368	1.32	5.60	5.60	92.00
TPN - 84S	29-Aug-15	4362	Kephyrion sp.	208336	3.25	3.10	3.10	15.60
TPN - 84S	29-Aug-15	4363	Spinifiromonas sirratus**********	7184	0.85	6.10	6.10	118.80
TPN - 84S	29-Aug-15	4378	Dinobryon borgei Lemmermann	7184	0.35	9.00	3.20	48.30
TPN - 84S	29-Aug-15	4381	Dinobryon mucronutom Nygaard	21552	2.82	10.00	5.00	130.90
TPN - 84S	29-Aug-15	4388	Dinobryon sertularia Ehrenberg	129312	29.25	12.00	6.00	226.20
TPN - 84S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	359200	81.25	12.00	6.00	226.20
TPN - 84S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	1000	0.97	0.00	0.00	965.00
TPN - 84S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	1400	1.72	0.00	0.00	1225.00
TPN - 84S	29-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.19	5.60	3.00	26.40
TPN - 84S	29-Aug-15	4413	Chrysochromulina laurentiana Kling	50288	19.84	9.10	9.10	394.60
TPN - 84S	29-Aug-15	5509	Cyclotella ocellata Pant.	86208	8.99	4.05	8.10	104.30
TPN - 84S	29-Aug-15	5518	Synedra acus Kutzing	1800	0.14	76.00	2.00	79.60
TPN - 84S	29-Aug-15	5551	Cyclotella michiganiana Skvortzow	560352	10.70	2.30	4.60	19.10
TPN - 84S	29-Aug-15	6554	Rhodomonas minuta Skuja	21552	1.31	9.00	4.40	60.80
TPN - 84S	29-Aug-15	6558	Cryptomonas erosa Ehrenberg	3400	2.53	21.30	10.00	743.50
TPN - 84S	29-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	600	0.40	19.10	10.00	666.70
TPN - 84S	29-Aug-15	6568	Katablepharis ovalis Skuja	28736	1.28	8.10	3.90	44.70
TPN - 84S	29-Aug-15	7631	Gymnodinium helveticum Penard	400	10.37	55.00	30.00	25918.10
TPN - 84S	29-Aug-15	7632	Gymnodinium sp.	35920	11.11	9.00	8.10	309.20
TPN - 84S	29-Aug-15	7632	Gymnodinium sp.	1000	4.99	21.20	21.20	4988.90
TPN - 84S	29-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1200	1.55	14.60	13.00	1291.90
TPN - 85S	29-Aug-15	2105	Chlamydomonas spp.	21552	0.71	7.00	3.00	33.00
TPN - 85S	29-Aug-15	2121	Oocystis lacustris Chodat	14368	0.22	5.00	2.40	15.10
TPN - 85S	29-Aug-15	2137	Dictyosphaerium simplex Sukja	28736	0.12	2.00	2.00	4.20
TPN - 85S	29-Aug-15	2167	Elakatothrix gelatinosa Willen	14368	0.25	11.00	2.00	17.30
TPN - 85S	29-Aug-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
TPN - 85S	29-Aug-15	2186	Xanthidium sp.	7184	1.25	10.00	10.00	174.50
TPN - 85S	29-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TPN - 85S	29-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
TPN - 85S	29-Aug-15	4351	Small chrysophyceae	344832	3.55	2.70	2.70	10.30
TPN - 85S	29-Aug-15	4352	Large chrysophyceae	510064	194.69	9.00	9.00	381.70
TPN - 85S	29-Aug-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
TPN - 85S	29-Aug-15	4357	Chrysococcus sp.	510064	33.36	5.00	5.00	65.40

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPN - 85S	29-Aug-15	4361	Kephyrion boreale Skuja	14368	1.32	5.60	5.60	92.00
TPN - 85S	29-Aug-15	4362	Kephyrion sp.	222704	3.47	3.10	3.10	15.60
TPN - 85S	29-Aug-15	4378	Dinobryon borgei Lemmermann	50288	2.43	9.00	3.20	48.30
TPN - 85S	29-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TPN - 85S	29-Aug-15	4388	Dinobryon sertularia Ehrenberg	93392	21.13	12.00	6.00	226.20
TPN - 85S	29-Aug-15	4388	Dinobryon sertularia Ehrenberg	1400	1.35	0.00	0.00	965.00
TPN - 85S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	244256	55.25	12.00	6.00	226.20
TPN - 85S	29-Aug-15	4390	Dinobryon sociale Ehrenberg	1600	1.96	0.00	0.00	1225.00
TPN - 85S	29-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	57472	1.52	5.60	3.00	26.40
TPN - 85S	29-Aug-15	4413	Chrysochromulina laurentiana Kling	50288	19.84	9.10	9.10	394.60
TPN - 85S	29-Aug-15	4414	Stichogloea spp.	14368	0.72	6.00	4.00	50.30
TPN - 85S	29-Aug-15	5509	Cyclotella ocellata Pant.	143680	14.99	4.05	8.10	104.30
TPN - 85S	29-Aug-15	5518	Synedra acus Kutzing	2600	0.21	76.00	2.00	79.60
TPN - 85S	29-Aug-15	5551	Cyclotella michiganiana Skvortzow	538800	10.29	2.30	4.60	19.10
TPN - 85S	29-Aug-15	6554	Rhodomonas minuta Skuja	14368	0.87	9.00	4.40	60.80
TPN - 85S	29-Aug-15	6558	Cryptomonas erosa Ehrenberg	3400	2.53	21.30	10.00	743.50
TPN - 85S	29-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	800	0.53	19.10	10.00	666.70
TPN - 85S	29-Aug-15	6565	Cryptomonas rostratiformis Skuja	200	0.38	27.60	14.00	1888.30
TPN - 85S	29-Aug-15	6568	Katablepharis ovalis Skuja	14368	0.64	8.10	3.90	44.70
TPN - 85S	29-Aug-15	7632	Gymnodinium sp.	21552	7.94	11.00	8.00	368.60
TPN - 85S	29-Aug-15	7632	Gymnodinium sp.	400	2.00	21.20	21.20	4988.90
TPN - 85S	29-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	3400	4.39	14.60	13.00	1291.90
TPN - 85S	29-Aug-15	7641	Peridinium aciculiferum Lemmermann	400	3.62	30.00	24.00	9047.80
TPN - 86S	27-Sep-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60
TPN - 86S	27-Sep-15	2112	Sphaerocystis schroeteri Chodat	50288	1.23	3.60	3.60	24.40
TPN - 86S	27-Sep-15	2121	Oocystis lacustris Chodat	35920	0.85	5.00	3.00	23.60
TPN - 86S	27-Sep-15	2137	Dictyosphaerium simplex Sukja	28736	0.14	2.10	2.10	4.80
TPN - 86S	27-Sep-15	2206	Botryococcus braunii Kutzing	400	0.21	10.00	10.00	523.60
TPN - 86S	27-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
TPN - 86S	27-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.55	44.00	2.10	76.20
TPN - 86S	27-Sep-15	4351	Small chrysophyceae	107760	1.52	3.00	3.00	14.10
TPN - 86S	27-Sep-15	4357	Chrysococcus sp.	359200	17.13	4.50	4.50	47.70
TPN - 86S	27-Sep-15	4361	Kephyrion boreale Skuja	14368	1.71	6.10	6.10	118.80
TPN - 86S	27-Sep-15	4362	Kephyrion sp.	43104	1.05	3.60	3.60	24.40
TPN - 86S	27-Sep-15	4378	Dinobryon borgei Lemmermann	14368	0.61	9.00	3.00	42.40
TPN - 86S	27-Sep-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TPN - 86S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
TPN - 86S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	200	0.25	0.00	0.00	1225.00
TPN - 86S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	71840	16.25	12.00	6.00	226.20
TPN - 86S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	1800	3.58	0.00	0.00	1991.00
TPN - 86S	27-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	14368	0.43	5.60	3.20	30.00
TPN - 86S	27-Sep-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
TPN - 86S	27-Sep-15	4414	Stichogloea spp.	64656	3.25	6.00	4.00	50.30
TPN - 86S	27-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.19	5.50	3.00	25.90
TPN - 86S	27-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	600	1.09	10.50	21.00	1818.40
TPN - 86S	27-Sep-15	5509	Cyclotella ocellata Pant.	71840	7.49	4.05	8.10	104.30
TPN - 86S	27-Sep-15	5518	Synedra acus Kutzing	1400	0.12	81.00	2.00	84.80
TPN - 86S	27-Sep-15	5551	Cyclotella michiganiana Skvortzow	790240	17.15	2.40	4.80	21.70
TPN - 86S	27-Sep-15	5720	Cyclotella bodanica Eulenst.	200	1.49	16.80	33.60	7448.10
TPN - 86S	27-Sep-15	6554	Rhodomonas minuta Skuja	21552	3.25	12.00	6.00	150.80
TPN - 86S	27-Sep-15	6558	Cryptomonas erosa Ehrenberg	4000	4.75	23.60	12.00	1186.30
TPN - 86S	27-Sep-15	6565	Cryptomonas rostratiformis Skuja	600	1.23	30.00	14.00	2052.50
TPN - 86S	27-Sep-15	6568	Katablepharis ovalis Skuja	7184	0.33	8.10	4.00	45.80
TPN - 86S	27-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.42	14.00	12.00	1055.60
TPN - 87S	27-Sep-15	2105	Chlamydomonas spp.	21552	0.61	6.00	3.00	28.30
TPN - 87S	27-Sep-15	2112	Sphaerocystis schroeteri Chodat	7184	0.21	3.80	3.80	28.70
TPN - 87S	27-Sep-15	2121	Oocystis lacustris Chodat	21552	0.47	5.00	2.90	22.00
TPN - 87S	27-Sep-15	2137	Dictyosphaerium simplex Sukja	21552	0.10	2.10	2.10	4.80
TPN - 87S	27-Sep-15	2186	Xanthidium sp.	7184	1.25	10.00	10.00	174.50
TPN - 87S	27-Sep-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TPN - 87S	27-Sep-15	2206	Botryococcus braunii Kutzing	600	0.31	10.00	10.00	523.60
TPN - 87S	27-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	28736	0.14	3.00	3.00	4.70
TPN - 87S	27-Sep-15	4351	Small chrysophyceae	35920	0.51	3.00	3.00	14.10
TPN - 87S	27-Sep-15	4352	Large chrysophyceae	14368	2.58	7.00	7.00	179.60
TPN - 87S	27-Sep-15	4357	Chrysococcus sp.	265808	12.68	4.50	4.50	47.70
TPN - 87S	27-Sep-15	4361	Kephyrion boreale Skuja	14368	1.71	6.10	6.10	118.80
TPN - 87S	27-Sep-15	4362	Kephyrion sp.	57472	1.40	3.60	3.60	24.40
TPN - 87S	27-Sep-15	4378	Dinobryon borgei Lemmermann	14368	0.61	9.00	3.00	42.40
TPN - 87S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
TPN - 87S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	600	0.74	0.00	0.00	1225.00
TPN - 87S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	2800	5.57	0.00	0.00	1991.00
TPN - 87S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	165232	37.38	12.00	6.00	226.20
TPN - 87S	27-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	28736	0.86	5.60	3.20	30.00
TPN - 87S	27-Sep-15	4413	Chrysochromulina laurentiana Kling	14368	5.48	9.00	9.00	381.70
TPN - 87S	27-Sep-15	4414	Stichogloea spp.	21552	1.08	6.00	4.00	50.30
TPN - 87S	27-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.37	5.50	3.00	25.90
TPN - 87S	27-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	1200	2.18	10.50	21.00	1818.40
TPN - 87S	27-Sep-15	5509	Cyclotella ocellata Pant.	122128	12.74	4.05	8.10	104.30
TPN - 87S	27-Sep-15	5518	Synedra acus Kutzing	4800	0.41	81.00	2.00	84.80
TPN - 87S	27-Sep-15	5551	Cyclotella michiganiana Skvortzow	754320	16.37	2.40	4.80	21.70
TPN - 87S	27-Sep-15	5720	Cyclotella bodanica Eulenst.	200	1.49	16.80	33.60	7448.10
TPN - 87S	27-Sep-15	6554	Rhodomonas minuta Skuja	7184	1.08	12.00	6.00	150.80
TPN - 87S	27-Sep-15	6558	Cryptomonas erosa Ehrenberg	400	0.47	23.60	12.00	1186.30
TPN - 87S	27-Sep-15	6568	Katablepharis ovalis Skuja	7184	0.33	8.10	4.00	45.80
TPN - 87S	27-Sep-15	7632	Gymnodinium sp.	7184	2.65	11.00	8.00	368.60

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPN - 87S	27-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.63	14.00	12.00	1055.60
TPN - 88S	13-Nov-15	1054	Planktolyngbya limnetica	1500	0.34	200.00	1.20	226.20
TPN - 88S	13-Nov-15	2105	Chlamydomonas spp.	7092.2	0.17	5.20	3.00	24.50
TPN - 88S	13-Nov-15	2121	Oocystis lacustris Chodat	10638.3	0.30	6.00	3.00	28.30
TPN - 88S	13-Nov-15	2137	Dictyosphaerium simplex Sukja	173758.9	0.97	2.20	2.20	5.60
TPN - 88S	13-Nov-15	2167	Elakatothrix gelatinosa Willen	7092.2	0.17	15.00	2.00	23.60
TPN - 88S	13-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	3546.1	0.20	33.00	2.10	57.10
TPN - 88S	13-Nov-15	4351	Small chrysophyceae	109929.1	28.38	7.90	7.90	258.20
TPN - 88S	13-Nov-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
TPN - 88S	13-Nov-15	4357	Chrysococcus sp.	138297.9	9.04	5.00	5.00	65.40
TPN - 88S	13-Nov-15	4363	Spinifiromonas sirratus**********	31914.9	0.60	3.30	3.30	18.80
TPN - 88S	13-Nov-15	4364	Mallomonas caudata Ivanov	100	0.54	40.00	16.00	5361.70
TPN - 88S	13-Nov-15	4388	Dinobryon sertularia Ehrenberg	7092.2	1.60	12.00	6.00	226.20
TPN - 88S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	21276.6	4.81	12.00	6.00	226.20
TPN - 88S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	1200	1.11	0.00	0.00	925.00
TPN - 88S	13-Nov-15	4413	Chrysochromulina laurentiana Kling	7092.2	2.80	9.10	9.10	394.60
TPN - 88S	13-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7092.2	0.23	6.00	3.20	32.20
TPN - 88S	13-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	300	0.47	10.00	20.00	1570.80
TPN - 88S	13-Nov-15	5509	Cyclotella ocellata Pant.	7092.2	1.08	4.60	9.20	152.90
TPN - 88S	13-Nov-15	5518	Synedra acus Kutzing	1900	28.29	91.00	25.00	14889.80
TPN - 88S	13-Nov-15	5551	Cyclotella michiganiana Skvortzow	120567.4	2.95	2.50	5.00	24.50
TPN - 88S	13-Nov-15	6558	Cryptomonas erosa Ehrenberg	1500	1.80	23.90	12.00	1201.30
TPN - 88S	13-Nov-15	6565	Cryptomonas rostratiformis Skuja	400	0.85	31.00	14.00	2120.90
TPN - 88S	13-Nov-15	7632	Gymnodinium sp.	100	1.56	31.00	31.00	15598.50
TPN - 89S	13-Nov-15	1054	Planktolyngbya limnetica	2200	0.54	216.00	1.20	244.30
TPN - 89S	13-Nov-15	2121	Oocystis lacustris Chodat	35461	1.00	6.00	3.00	28.30
TPN - 89S	13-Nov-15	2137	Dictyosphaerium simplex Sukja	74468.1	0.42	2.20	2.20	5.60
TPN - 89S	13-Nov-15	2167	Elakatothrix gelatinosa Willen	10638.3	0.25	15.00	2.00	23.60
TPN - 89S	13-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	10638.3	0.61	33.30	2.10	57.70
TPN - 89S	13-Nov-15	4351	Small chrysophyceae	184397.2	2.36	2.90	2.90	12.80
TPN - 89S	13-Nov-15	4352	Large chrysophyceae	3546.1	0.64	7.00	7.00	179.60
TPN - 89S	13-Nov-15	4357	Chrysococcus sp.	145390.1	9.51	5.00	5.00	65.40
TPN - 89S	13-Nov-15	4362	Kephyrion sp.	49645.4	0.93	3.30	3.30	18.80
TPN - 89S	13-Nov-15	4388	Dinobryon sertularia Ehrenberg	3546.1	0.80	12.00	6.00	226.20
TPN - 89S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	3546.1	0.80	12.00	6.00	226.20
TPN - 89S	13-Nov-15	4390	Dinobryon sociale Ehrenberg	1600	1.48	0.00	0.00	925.00
TPN - 89S	13-Nov-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.60	9.10	9.10	394.60
TPN - 89S	13-Nov-15	4414	Stichogloea spp.	14184.4	0.71	6.00	4.00	50.30
TPN - 89S	13-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	10638.3	0.34	6.00	3.20	32.20
TPN - 89S	13-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.94	10.00	20.00	1570.80
TPN - 89S	13-Nov-15	5518	Synedra acus Kutzing	600	0.06	91.00	2.00	95.30
TPN - 89S	13-Nov-15	5551	Cyclotella michiganiana Skvortzow	92198.6	2.26	2.50	5.00	24.50
TPN - 89S	13-Nov-15	6554	Rhodomonas minuta Skuja	3546.1	0.45	10.00	6.00	125.70
TPN - 89S	13-Nov-15	6558	Cryptomonas erosa Ehrenberg	1300	1.56	23.90	12.00	1201.30
TPN - 89S	13-Nov-15	7632	Gymnodinium sp.	400	6.24	31.00	31.00	15598.50
TPN - 89S	13-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.16	15.90	14.00	1631.70
TPS - 49S	24-Jul-15	2105	Chlamydomonas spp.	7184	0.09	5.00	2.20	12.70
TPS - 49S	24-Jul-15	2121	Oocystis lacustris Chodat	35920	0.86	5.10	3.00	24.00
TPS - 49S	24-Jul-15	2167	Elakatothrix gelatinosa Willen	21552	0.41	12.00	2.00	18.80
TPS - 49S	24-Jul-15	4351	Small chrysophyceae	172416	1.78	2.70	2.70	10.30
TPS - 49S	24-Jul-15	4352	Large chrysophyceae	21552	7.18	8.60	8.60	333.00
TPS - 49S	24-Jul-15	4357	Chrysococcus sp.	538800	35.24	5.00	5.00	65.40
TPS - 49S	24-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	3.03	9.30	9.30	421.20
TPS - 49S	24-Jul-15	4362	Kephyrion sp.	50288	0.71	3.00	3.00	14.10
TPS - 49S	24-Jul-15	4363	Spinifiromonas sirratus**********	50288	3.92	5.30	5.30	78.00
TPS - 49S	24-Jul-15	4378	Dinobryon borgei Lemmermann	7184	0.35	9.00	3.20	48.30
TPS - 49S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
TPS - 49S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	5000	16.95	0.00	0.00	3390.00
TPS - 49S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
TPS - 49S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	800	0.98	0.00	0.00	1225.00
TPS - 49S	24-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.33	5.60	3.00	26.40
TPS - 49S	24-Jul-15	4413	Chrysochromulina laurentiana Kling	71840	29.29	9.20	9.20	407.70
TPS - 49S	24-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.43	5.60	3.20	30.00
TPS - 49S	24-Jul-15	4436	Dinobryon attenatum Hill	7184	1.49	11.00	6.00	207.30
TPS - 49S	24-Jul-15	5551	Cyclotella michiganiana Skvortzow	50288	1.23	2.50	5.00	24.50
TPS - 49S	24-Jul-15	6554	Rhodomonas minuta Skuja	28736	3.01	12.00	5.00	104.70
TPS - 49S	24-Jul-15	6558	Cryptomonas erosa Ehrenberg	2800	3.38	24.00	12.00	1206.40
TPS - 49S	24-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.27	19.10	10.00	666.70
TPS - 49S	24-Jul-15	6565	Cryptomonas rostratiformis Skuja	1400	3.16	33.00	14.00	2257.80
TPS - 49S	24-Jul-15	6568	Katablepharis ovalis Skuja	7184	0.33	8.10	4.00	45.80
TPS - 49S	24-Jul-15	7632	Gymnodinium sp.	600	4.03	23.40	23.40	6708.80
TPS - 49S	24-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	2400	2.46	13.60	12.00	1025.40
TPS - 49S	24-Jul-15	7641	Peridinium aciculiferum Lemmermann	800	7.48	31.00	24.00	9349.40
TPS - 50S	24-Jul-15	2105	Chlamydomonas spp.	7184	0.33	5.00	4.20	46.20
TPS - 50S	24-Jul-15	2167	Elakatothrix gelatinosa Willen	28736	0.72	16.00	2.00	25.10
TPS - 50S	24-Jul-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TPS - 50S	24-Jul-15	2206	Botryococcus braunii Kutzing	200	0.08	9.30	9.30	421.20
TPS - 50S	24-Jul-15	4351	Small chrysophyceae	316096	3.26	2.70	2.70	10.30
TPS - 50S	24-Jul-15	4352	Large chrysophyceae	14368	4.78	8.60	8.60	333.00
TPS - 50S	24-Jul-15	4357	Chrysococcus sp.	560352	36.65	5.00	5.00	65.40
TPS - 50S	24-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.15	8.30	8.30	299.40
TPS - 50S	24-Jul-15	4361	Kephyrion boreale Skuja	7184	0.63	5.50	5.50	87.10
TPS - 50S	24-Jul-15	4362	Kephyrion sp.	64656	0.91	3.00	3.00	14.10
TPS - 50S	24-Jul-15	4363	Spinifiromonas sirratus**********	43104	3.36	5.30	5.30	78.00
TPS - 50S	24-Jul-15	4378	Dinobryon borgei Lemmermann	14368	0.69	9.00	3.20	48.30

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPS - 50S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
TPS - 50S	24-Jul-15	4388	Dinobryon sertularia Ehrenberg	5400	18.31	0.00	0.00	3390.00
TPS - 50S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	35920	8.13	12.00	6.00	226.20
TPS - 50S	24-Jul-15	4390	Dinobryon sociale Ehrenberg	400	0.49	0.00	0.00	1225.00
TPS - 50S	24-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	64656	1.71	5.60	3.00	26.40
TPS - 50S	24-Jul-15	4413	Chrysochromulina laurentiana Kling	93392	38.08	9.20	9.20	407.70
TPS - 50S	24-Jul-15	4414	Stichogloea spp.	43104	2.17	6.00	4.00	50.30
TPS - 50S	24-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.43	5.60	3.20	30.00
TPS - 50S	24-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.15	9.70	19.40	1433.60
TPS - 50S	24-Jul-15	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
TPS - 50S	24-Jul-15	5518	Synedra acus Kutzing	200	0.02	100.00	2.00	104.70
TPS - 50S	24-Jul-15	5551	Cyclotella michiganiana Skvortzow	35920	0.88	2.50	5.00	24.50
TPS - 50S	24-Jul-15	6554	Rhodomonas minuta Skuja	7184	0.75	12.00	5.00	104.70
TPS - 50S	24-Jul-15	6558	Cryptomonas erosa Ehrenberg	4000	4.83	24.00	12.00	1206.40
TPS - 50S	24-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	1000	0.67	19.10	10.00	666.70
TPS - 50S	24-Jul-15	6565	Cryptomonas rostratiformis Skuja	1200	2.71	33.00	14.00	2257.80
TPS - 50S	24-Jul-15	7632	Gymnodinium sp.	1600	13.09	25.00	25.00	8181.20
TPS - 50S	24-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.40	13.40	12.00	1010.30
TPS - 50S	24-Jul-15	7641	Peridinium aciculiferum Lemmermann	1800	16.29	30.00	24.00	9047.80
TPS - 51S	14-Aug-15	2105	Chlamydomonas spp.	28736	0.36	5.00	2.20	12.70
TPS - 51S	14-Aug-15	2112	Sphaerocystis schroeteri Chodat	165232	5.54	4.00	4.00	33.50
TPS - 51S	14-Aug-15	2121	Oocystis lacustris Chodat	79024	2.24	6.00	3.00	28.30
TPS - 51S	14-Aug-15	2167	Elakatothrix gelatinosa Willen	21552	0.37	11.00	2.00	17.30
TPS - 51S	14-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
TPS - 51S	14-Aug-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TPS - 51S	14-Aug-15	4351	Small chrysophyceae	280176	4.37	3.10	3.10	15.60
TPS - 51S	14-Aug-15	4352	Large chrysophyceae	35920	13.71	9.00	9.00	381.70
TPS - 51S	14-Aug-15	4357	Chrysococcus sp.	466960	30.54	5.00	5.00	65.40
TPS - 51S	14-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	3.33	9.60	9.60	463.20
TPS - 51S	14-Aug-15	4361	Kephyrion boreale Skuja	7184	0.77	5.90	5.90	107.50
TPS - 51S	14-Aug-15	4362	Kephyrion sp.	208336	3.92	3.30	3.30	18.80
TPS - 51S	14-Aug-15	4378	Dinobryon borgei Lemmermann	50288	2.58	9.00	3.30	51.30
TPS - 51S	14-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TPS - 51S	14-Aug-15	4388	Dinobryon sertularia Ehrenberg	122128	27.63	12.00	6.00	226.20
TPS - 51S	14-Aug-15	4388	Dinobryon sertularia Ehrenberg	7400	14.99	0.00	0.00	2025.00
TPS - 51S	14-Aug-15	4390	Dinobryon sociale Ehrenberg	193968	43.88	12.00	6.00	226.20
TPS - 51S	14-Aug-15	4390	Dinobryon sociale Ehrenberg	6200	12.34	0.00	0.00	1990.00
TPS - 51S	14-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	57472	1.52	5.60	3.00	26.40
TPS - 51S	14-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
TPS - 51S	14-Aug-15	4413	Chrysochromulina laurentiana Kling	21552	8.50	9.10	9.10	394.60
TPS - 51S	14-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.23	6.00	3.20	32.20
TPS - 51S	14-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.06	9.45	18.90	1325.60
TPS - 51S	14-Aug-15	5509	Cyclotella ocellata Pant.	7184	1.03	4.50	9.00	143.10
TPS - 51S	14-Aug-15	5511	Rhizosolenia eriense H.L. Smith	14368	1.12	11.00	3.00	77.80
TPS - 51S	14-Aug-15	5551	Cyclotella michiganiana Skvortzow	172416	3.29	2.30	4.60	19.10
TPS - 51S	14-Aug-15	5720	Cyclotella bodanica Eulenst.	200	1.17	15.50	31.00	5849.40
TPS - 51S	14-Aug-15	6554	Rhodomonas minuta Skuja	7184	0.69	11.00	5.00	96.00
TPS - 51S	14-Aug-15	6558	Cryptomonas erosa Ehrenberg	1600	1.17	21.00	10.00	733.00
TPS - 51S	14-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	20.20	10.00	705.10
TPS - 51S	14-Aug-15	6565	Cryptomonas rostratiformis Skuja	200	0.38	27.60	14.00	1888.30
TPS - 51S	14-Aug-15	6568	Katablepharis ovalis Skuja	7184	0.41	9.00	4.00	56.50
TPS - 51S	14-Aug-15	7632	Gymnodinium sp.	200	1.45	24.00	24.00	7238.20
TPS - 51S	14-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.99	16.00	14.00	1642.00
TPS - 51S	14-Aug-15	7641	Peridinium aciculiferum Lemmermann	1400	12.67	30.00	24.00	9047.80
TPS - 52S	14-Aug-15	2105	Chlamydomonas spp.	7184	0.09	5.00	2.20	12.70
TPS - 52S	14-Aug-15	2112	Sphaerocystis schroeteri Chodat	57472	1.93	4.00	4.00	33.50
TPS - 52S	14-Aug-15	2121	Oocystis lacustris Chodat	21552	0.61	6.00	3.00	28.30
TPS - 52S	14-Aug-15	2182	Euastrum spp.	200	0.37	22.00	22.00	1858.40
TPS - 52S	14-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.11	15.00	14.00	549.80
TPS - 52S	14-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TPS - 52S	14-Aug-15	2206	Botryococcus braunii Kutzing	3000	4.31	14.00	14.00	1436.80
TPS - 52S	14-Aug-15	4351	Small chrysophyceae	272992	4.26	3.10	3.10	15.60
TPS - 52S	14-Aug-15	4352	Large chrysophyceae	7184	2.74	9.00	9.00	381.70
TPS - 52S	14-Aug-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
TPS - 52S	14-Aug-15	4357	Chrysococcus sp.	416672	27.25	5.00	5.00	65.40
TPS - 52S	14-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	3.33	9.60	9.60	463.20
TPS - 52S	14-Aug-15	4361	Kephyrion boreale Skuja	7184	0.77	5.90	5.90	107.50
TPS - 52S	14-Aug-15	4362	Kephyrion sp.	179600	3.38	3.30	3.30	18.80
TPS - 52S	14-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	20.20	10.00	1057.70
TPS - 52S	14-Aug-15	4378	Dinobryon borgei Lemmermann	57472	2.95	9.00	3.30	51.30
TPS - 52S	14-Aug-15	4381	Dinobryon mucronutom Nygaard	28736	3.76	10.00	5.00	130.90
TPS - 52S	14-Aug-15	4388	Dinobryon sertularia Ehrenberg	57472	13.00	12.00	6.00	226.20
TPS - 52S	14-Aug-15	4388	Dinobryon sertularia Ehrenberg	4200	8.51	0.00	0.00	2025.00
TPS - 52S	14-Aug-15	4390	Dinobryon sociale Ehrenberg	143680	32.50	12.00	6.00	226.20
TPS - 52S	14-Aug-15	4390	Dinobryon sociale Ehrenberg	3800	7.56	0.00	0.00	1990.00
TPS - 52S	14-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	57472	1.52	5.60	3.00	26.40
TPS - 52S	14-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
TPS - 52S	14-Aug-15	4413	Chrysochromulina laurentiana Kling	21552	8.50	9.10	9.10	394.60
TPS - 52S	14-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.23	6.00	3.20	32.20
TPS - 52S	14-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.80	9.45	18.90	1325.60
TPS - 52S	14-Aug-15	5509	Cyclotella ocellata Pant.	28736	4.11	4.50	9.00	143.10
TPS - 52S	14-Aug-15	5518	Synedra acus Kutzing	600	0.06	94.00	2.00	98.40
TPS - 52S	14-Aug-15	5551	Cyclotella michiganiana Skvortzow	86208	1.65	2.30	4.60	19.10
TPS - 52S	14-Aug-15	6554	Rhodomonas minuta Skuja	7184	0.69	11.00	5.00	96.00
TPS - 52S	14-Aug-15	6558	Cryptomonas erosa Ehrenberg	1400	1.03	21.00	10.00	733.00

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPS - 52S	14-Aug-15	6565	Cryptomonas rostratiformis Skuja	200	0.38	27.60	14.00	1888.30
TPS - 52S	14-Aug-15	6568	Katablepharis ovalis Skuja	7184	0.41	9.00	4.00	56.50
TPS - 52S	14-Aug-15	7631	Gymnodinium helveticum Penard	200	5.00	53.00	30.00	24975.70
TPS - 52S	14-Aug-15	7632	Gymnodinium sp.	7184	3.35	11.00	9.00	466.50
TPS - 52S	14-Aug-15	7632	Gymnodinium sp.	200	1.45	24.00	24.00	7238.20
TPS - 52S	14-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1200	1.97	16.00	14.00	1642.00
TPS - 52S	14-Aug-15	7641	Peridinium aciculiferum Lemmermann	600	5.43	30.00	24.00	9047.80
TPS - 52SR	14-Aug-15	2105	Chlamydomonas spp.	21552	0.27	5.00	2.20	12.70
TPS - 52SR	14-Aug-15	2112	Sphaerocystis schroeteri Chodat	28736	0.96	4.00	4.00	33.50
TPS - 52SR	14-Aug-15	2121	Oocystis lacustris Chodat	50288	1.42	6.00	3.00	28.30
TPS - 52SR	14-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.11	15.00	14.00	549.80
TPS - 52SR	14-Aug-15	2206	Botryococcus braunii Kutzing	400	0.21	10.00	10.00	523.60
TPS - 52SR	14-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
TPS - 52SR	14-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.45	33.00	2.20	62.70
TPS - 52SR	14-Aug-15	4351	Small chrysophyceae	244256	3.81	3.10	3.10	15.60
TPS - 52SR	14-Aug-15	4352	Large chrysophyceae	14368	5.48	9.00	9.00	381.70
TPS - 52SR	14-Aug-15	4357	Chrysococcus sp.	308912	20.20	5.00	5.00	65.40
TPS - 52SR	14-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	21552	8.50	9.10	9.10	394.60
TPS - 52SR	14-Aug-15	4361	Kephyrion boreale Skuja	222704	4.19	3.30	3.30	18.80
TPS - 52SR	14-Aug-15	4361	Kephyrion boreale Skuja	14368	1.54	5.90	5.90	107.50
TPS - 52SR	14-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	20.20	10.00	1057.70
TPS - 52SR	14-Aug-15	4378	Dinobryon borgei Lemmermann	71840	3.69	9.00	3.30	51.30
TPS - 52SR	14-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
TPS - 52SR	14-Aug-15	4383	Dinobryon bavaricum Imhof	7184	1.63	12.00	6.00	226.20
TPS - 52SR	14-Aug-15	4388	Dinobryon sertularia Ehrenberg	57472	13.00	12.00	6.00	226.20
TPS - 52SR	14-Aug-15	4388	Dinobryon sertularia Ehrenberg	3400	6.89	0.00	0.00	2025.00
TPS - 52SR	14-Aug-15	4390	Dinobryon sociale Ehrenberg	114944	26.00	12.00	6.00	226.20
TPS - 52SR	14-Aug-15	4390	Dinobryon sociale Ehrenberg	3000	5.97	0.00	0.00	1990.00
TPS - 52SR	14-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	43104	1.14	5.60	3.00	26.40
TPS - 52SR	14-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
TPS - 52SR	14-Aug-15	4413	Chrysochromulina laurentiana Kling	21552	8.23	9.00	9.00	381.70
TPS - 52SR	14-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.69	6.00	3.20	32.20
TPS - 52SR	14-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	800	1.06	9.45	18.90	1325.60
TPS - 52SR	14-Aug-15	5509	Cyclotella ocellata Pant.	28736	4.11	4.50	9.00	143.10
TPS - 52SR	14-Aug-15	5518	Synedra acus Kutzing	1000	0.10	94.00	2.00	98.40
TPS - 52SR	14-Aug-15	5551	Cyclotella michiganiana Skvortzow	114944	2.20	2.30	4.60	19.10
TPS - 52SR	14-Aug-15	5720	Cyclotella bodanica Eulenst.	200	1.17	15.50	31.00	5849.40
TPS - 52SR	14-Aug-15	6554	Rhodomonas minuta Skuja	7184	0.69	11.00	5.00	96.00
TPS - 52SR	14-Aug-15	6558	Cryptomonas erosa Ehrenberg	1600	1.17	21.00	10.00	733.00
TPS - 52SR	14-Aug-15	6565	Cryptomonas rostratiformis Skuja	400	0.76	27.60	14.00	1888.30
TPS - 52SR	14-Aug-15	6568	Katablepharis ovalis Skuja	14368	0.81	9.00	4.00	56.50
TPS - 52SR	14-Aug-15	7631	Gymnodinium helveticum Penard	400	9.99	53.00	30.00	24975.70
TPS - 52SR	14-Aug-15	7632	Gymnodinium sp.	14368	6.70	11.00	9.00	466.50
TPS - 52SR	14-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	1000	1.64	16.00	14.00	1642.00
TPS - 52SR	14-Aug-15	7641	Peridinium aciculiferum Lemmermann	400	3.62	30.00	24.00	9047.80
TPS - 53S	27-Sep-15	2105	Chlamydomonas spp.	7184	0.17	5.00	3.00	23.60
TPS - 53S	27-Sep-15	2112	Sphaerocystis schroeteri Chodat	316096	7.71	3.60	3.60	24.40
TPS - 53S	27-Sep-15	2121	Oocystis lacustris Chodat	57472	1.41	5.20	3.00	24.50
TPS - 53S	27-Sep-15	2137	Dictyosphaerium simplex Sukja	100576	0.48	2.10	2.10	4.80
TPS - 53S	27-Sep-15	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
TPS - 53S	27-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
TPS - 53S	27-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	14368	1.09	44.00	2.10	76.20
TPS - 53S	27-Sep-15	4351	Small chrysophyceae	352016	4.96	3.00	3.00	14.10
TPS - 53S	27-Sep-15	4352	Large chrysophyceae	7184	2.74	9.00	9.00	381.70
TPS - 53S	27-Sep-15	4357	Chrysococcus sp.	337648	18.37	4.70	4.70	54.40
TPS - 53S	27-Sep-15	4362	Kephyrion sp.	107760	2.41	3.50	3.50	22.40
TPS - 53S	27-Sep-15	4378	Dinobryon borgei Lemmermann	14368	0.74	9.00	3.30	51.30
TPS - 53S	27-Sep-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TPS - 53S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
TPS - 53S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	400	0.49	0.00	0.00	1225.00
TPS - 53S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	122128	27.63	12.00	6.00	226.20
TPS - 53S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	600	1.19	0.00	0.00	1991.00
TPS - 53S	27-Sep-15	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
TPS - 53S	27-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.20	5.20	3.20	27.90
TPS - 53S	27-Sep-15	4400	Ochromonas sp.	14368	1.29	9.70	4.20	89.60
TPS - 53S	27-Sep-15	4413	Chrysochromulina laurentiana Kling	35920	13.71	9.00	9.00	381.70
TPS - 53S	27-Sep-15	4414	Stichogloea spp.	21552	1.08	6.00	4.00	50.30
TPS - 53S	27-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.69	6.00	3.20	32.20
TPS - 53S	27-Sep-15	4436	Dinobryon attenatum Hill	7184	1.40	10.30	6.00	194.20
TPS - 53S	27-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.94	10.00	20.00	1570.80
TPS - 53S	27-Sep-15	5509	Cyclotella ocellata Pant.	35920	4.49	4.30	8.60	124.90
TPS - 53S	27-Sep-15	5514	Tabellaria flocculsa (Roth) Kutzing	200	0.25	24.00	14.00	1231.50
TPS - 53S	27-Sep-15	5518	Synedra acus Kutzing	3600	0.33	88.00	2.00	92.20
TPS - 53S	27-Sep-15	5551	Cyclotella michiganiana Skvortzow	373568	8.11	2.40	4.80	21.70
TPS - 53S	27-Sep-15	6554	Rhodomonas minuta Skuja	14368	2.17	12.00	6.00	150.80
TPS - 53S	27-Sep-15	6558	Cryptomonas erosa Ehrenberg	7200	8.43	23.30	12.00	1171.20
TPS - 53S	27-Sep-15	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.27	19.60	10.00	684.20
TPS - 53S	27-Sep-15	6565	Cryptomonas rostratiformis Skuja	1600	3.28	30.00	14.00	2052.50
TPS - 53S	27-Sep-15	6568	Katablepharis ovalis Skuja	7184	0.39	8.80	4.00	54.10
TPS - 53S	27-Sep-15	7632	Gymnodinium sp.	7184	2.55	10.60	8.00	355.20
TPS - 53S	27-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.40	13.30	12.00	1002.80
TPS - 53S	27-Sep-15	7642	Peridinium wisconsiense Eddy	200	1.81	30.00	24.00	9047.80
TPS - 54S	27-Sep-15	2112	Sphaerocystis schroeteri Chodat	71840	1.75	3.60	3.60	24.40
TPS - 54S	27-Sep-15	2121	Oocystis lacustris Chodat	28736	0.70	5.20	3.00	24.50
TPS - 54S	27-Sep-15	2137	Dictyosphaerium simplex Sukja	143680	0.69	2.10	2.10	4.80

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
TPS - 54S	27-Sep-15	2167	Elakatothrix gelatinosa Willen	7184	0.12	11.00	2.00	17.30
TPS - 54S	27-Sep-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
TPS - 54S	27-Sep-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
TPS - 54S	27-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.19	5.00	3.00	13.10
TPS - 54S	27-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.55	44.00	2.10	76.20
TPS - 54S	27-Sep-15	4351	Small chrysophyceae	71840	1.01	3.00	3.00	14.10
TPS - 54S	27-Sep-15	4357	Chrysococcus sp.	251440	13.68	4.70	4.70	54.40
TPS - 54S	27-Sep-15	4362	Kephyrion sp.	71840	1.61	3.50	3.50	22.40
TPS - 54S	27-Sep-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.63	20.10	10.00	1052.40
TPS - 54S	27-Sep-15	4378	Dinobryon borgei Lemmermann	14368	0.74	9.00	3.30	51.30
TPS - 54S	27-Sep-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
TPS - 54S	27-Sep-15	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
TPS - 54S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	86208	19.50	12.00	6.00	226.20
TPS - 54S	27-Sep-15	4390	Dinobryon sociale Ehrenberg	800	1.59	0.00	0.00	1991.00
TPS - 54S	27-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	21552	0.56	5.20	3.10	26.20
TPS - 54S	27-Sep-15	4413	Chrysochromulina laurentiana Kling	57472	21.94	9.00	9.00	381.70
TPS - 54S	27-Sep-15	4414	Stichogloea spp.	57472	2.89	6.00	4.00	50.30
TPS - 54S	27-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.43	5.60	3.20	30.00
TPS - 54S	27-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	1200	1.88	10.00	20.00	1570.80
TPS - 54S	27-Sep-15	5509	Cyclotella ocellata Pant.	143680	17.95	4.30	8.60	124.90
TPS - 54S	27-Sep-15	5514	Tabellaria flocculsa (Roth) Kutzing	400	0.49	24.00	14.00	1231.50
TPS - 54S	27-Sep-15	5518	Synedra acus Kutzing	4600	0.42	88.00	2.00	92.20
TPS - 54S	27-Sep-15	5551	Cyclotella michiganiana Skvortzow	581904	12.63	2.40	4.80	21.70
TPS - 54S	27-Sep-15	6554	Rhodomonas minuta Skuja	7184	1.08	12.00	6.00	150.80
TPS - 54S	27-Sep-15	6558	Cryptomonas erosa Ehrenberg	600	0.70	23.30	12.00	1171.20
TPS - 54S	27-Sep-15	6565	Cryptomonas rostratiformis Skuja	5000	3.42	19.60	10.00	684.20
TPS - 54S	27-Sep-15	6568	Katablepharis ovalis Skuja	7184	0.39	8.80	4.00	54.10
TPS - 54S	27-Sep-15	7632	Gymnodinium sp.	7184	2.55	10.60	8.00	355.20
TPS - 54S	27-Sep-15	7632	Gymnodinium sp.	200	1.06	21.60	21.60	5276.70
TPS - 54S	27-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	1400	1.40	13.30	12.00	1002.80
WAL - 49S	15-May-15	2100	Pyramidomonas tetrarhynchus Schmarda	100	0.05	13.60	12.00	512.70
WAL - 49S	15-May-15	2215	Tetraedron caudatum (Corda) Hansgrig	17730.5	0.08	3.00	3.00	4.70
WAL - 49S	15-May-15	4351	Small chrysophyceae	184397.2	2.60	3.00	3.00	14.10
WAL - 49S	15-May-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
WAL - 49S	15-May-15	4357	Chrysococcus sp.	202127.7	13.22	5.00	5.00	65.40
WAL - 49S	15-May-15	4388	Dinobryon sertularia Ehrenberg	100	0.10	0.00	0.00	1025.00
WAL - 49S	15-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	14184.4	0.42	5.90	3.10	29.70
WAL - 49S	15-May-15	4413	Chrysochromulina laurentiana Kling	3546.1	1.45	9.20	9.20	407.70
WAL - 49S	15-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14184.4	0.48	5.60	3.40	33.90
WAL - 49S	15-May-15	5507	Cyclotella stelligera Cleve and Grunow	6600	15.56	11.45	22.90	2358.00
WAL - 49S	15-May-15	5518	Synedra acus Kutzing	400	0.04	103.00	2.00	107.90
WAL - 49S	15-May-15	5551	Cyclotella michiganiana Skvortzow	3546.1	0.09	2.50	5.00	24.50
WAL - 49S	15-May-15	6554	Rhodomonas minuta Skuja	78014.2	5.03	10.00	4.30	64.50
WAL - 49S	15-May-15	6558	Cryptomonas erosa Ehrenberg	3200	5.23	23.90	14.00	1635.20
WAL - 49S	15-May-15	6562	Cryptomonas reflexa (Marsson) Skuja	800	0.52	18.60	10.00	649.30
WAL - 49S	15-May-15	6565	Cryptomonas rostratiformis Skuja	100	0.21	31.00	14.00	2120.90
WAL - 49S	15-May-15	6568	Katablepharis ovalis Skuja	10638.3	0.59	8.80	4.10	55.40
WAL - 49S	15-May-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.11	14.00	12.00	1055.60
WAL - 50S	15-May-15	2215	Tetraedron caudatum (Corda) Hansgrig	14184.4	0.07	3.00	3.00	4.70
WAL - 50S	15-May-15	4351	Small chrysophyceae	212766	3.00	3.00	3.00	14.10
WAL - 50S	15-May-15	4352	Large chrysophyceae	14184.4	2.55	7.00	7.00	179.60
WAL - 50S	15-May-15	4357	Chrysococcus sp.	163120.6	10.67	5.00	5.00	65.40
WAL - 50S	15-May-15	4396	Chrysolkos skuja (Nauwerck) Willen	42553.2	1.26	5.90	3.10	29.70
WAL - 50S	15-May-15	4413	Chrysochromulina laurentiana Kling	10638.3	4.34	9.20	9.20	407.70
WAL - 50S	15-May-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	42553.2	1.44	5.60	3.40	33.90
WAL - 50S	15-May-15	5507	Cyclotella stelligera Cleve and Grunow	3600	8.49	11.45	22.90	2358.00
WAL - 50S	15-May-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	400	0.32	86.00	6.00	810.50
WAL - 50S	15-May-15	5518	Synedra acus Kutzing	500	0.05	103.00	2.00	107.90
WAL - 50S	15-May-15	6554	Rhodomonas minuta Skuja	53191.5	3.43	10.00	4.30	64.50
WAL - 50S	15-May-15	6558	Cryptomonas erosa Ehrenberg	2400	3.92	23.90	14.00	1635.20
WAL - 50S	15-May-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.13	18.60	10.00	649.30
WAL - 50S	15-May-15	6568	Katablepharis ovalis Skuja	3546.1	0.20	8.80	4.10	55.40
WAL - 50S	15-May-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.11	14.00	12.00	1055.60
WAL - 50S	15-May-15	7641	Peridinium aciculiferum Lemmermann	100	0.90	30.00	24.00	9047.80
WAL - 51S	19-Jul-15	1008	Aphanocapsa sp.	7184	0.29	0.00	0.00	40.00
WAL - 51S	19-Jul-15	2105	Chlamydomonas spp.	7184	0.17	5.00	3.00	23.60
WAL - 51S	19-Jul-15	2137	Dictyosphaerium simplex Sukja	14368	0.08	2.20	2.20	5.60
WAL - 51S	19-Jul-15	2167	Elakatothrix gelatinosa Willen	14368	0.25	11.00	2.00	17.30
WAL - 51S	19-Jul-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
WAL - 51S	19-Jul-15	2206	Botryococcus braunii Kutzing	800	0.42	10.00	10.00	523.60
WAL - 51S	19-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
WAL - 51S	19-Jul-15	4351	Small chrysophyceae	272992	3.85	3.00	3.00	14.10
WAL - 51S	19-Jul-15	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
WAL - 51S	19-Jul-15	4357	Chrysococcus sp.	984208	56.99	4.80	4.80	57.90
WAL - 51S	19-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	14368	4.78	8.60	8.60	333.00
WAL - 51S	19-Jul-15	4361	Kephyrion boreale Skuja	28736	3.41	6.10	6.10	118.80
WAL - 51S	19-Jul-15	4362	Kephyrion sp.	129312	2.66	3.40	3.40	20.60
WAL - 51S	19-Jul-15	4363	Spinifiromonas sirratus**********	7184	0.85	6.10	6.10	118.80
WAL - 51S	19-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.13	19.30	8.00	646.70
WAL - 51S	19-Jul-15	4378	Dinobryon borgei Lemmermann	57472	2.78	9.00	3.20	48.30
WAL - 51S	19-Jul-15	4381	Dinobryon mucronutom Nygaard	28736	3.57	9.50	5.00	124.40
WAL - 51S	19-Jul-15	4388	Dinobryon sertularia Ehrenberg	143680	32.50	12.00	6.00	226.20
WAL - 51S	19-Jul-15	4388	Dinobryon sertularia Ehrenberg	3800	8.17	0.00	0.00	2150.00
WAL - 51S	19-Jul-15	4390	Dinobryon sociale Ehrenberg	201152	45.50	12.00	6.00	226.20
WAL - 51S	19-Jul-15	4390	Dinobryon sociale Ehrenberg	2600	5.17	0.00	0.00	1990.00

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^3
WAL - 51S	19-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	43104	1.14	5.60	3.00	26.40
WAL - 51S	19-Jul-15	4401	Uroglena volvox Ehrenberg	35920	4.06	6.00	6.00	113.10
WAL - 51S	19-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
WAL - 51S	19-Jul-15	4413	Chrysochromulina laurentiana Kling	158048	62.37	9.10	9.10	394.60
WAL - 51S	19-Jul-15	4436	Dinobryon attenatum Hill	7184	1.27	9.40	6.00	177.20
WAL - 51S	19-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	2000	3.96	10.80	21.60	1978.80
WAL - 51S	19-Jul-15	5509	Cyclotella ocellata Pant.	28736	4.25	4.55	9.10	148.00
WAL - 51S	19-Jul-15	5518	Synedra acus Kutzing	7600	0.72	91.00	2.00	95.30
WAL - 51S	19-Jul-15	5551	Cyclotella michiganiana Skvortzow	100576	1.92	2.30	4.60	19.10
WAL - 51S	19-Jul-15	6554	Rhodomonas minuta Skuja	35920	3.14	10.00	5.00	87.30
WAL - 51S	19-Jul-15	6558	Cryptomonas erosa Ehrenberg	4600	5.13	22.20	12.00	1115.90
WAL - 51S	19-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.60	10.00	684.20
WAL - 51S	19-Jul-15	6568	Katablepharis ovalis Skuja	43104	2.44	9.00	4.00	56.50
WAL - 51S	19-Jul-15	7632	Gymnodinium sp.	7184	2.24	9.30	8.00	311.60
WAL - 51S	19-Jul-15	7632	Gymnodinium sp.	200	2.83	30.00	30.00	14137.20
WAL - 51S	19-Jul-15	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
WAL - 51S	19-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	600	0.78	14.60	13.00	1291.90
WAL - 51SR	19-Jul-15	2121	Oocystis lacustris Chodat	28736	0.70	5.20	3.00	24.50
WAL - 51SR	19-Jul-15	2137	Dictyosphaerium simplex Sukja	43104	0.24	2.20	2.20	5.60
WAL - 51SR	19-Jul-15	2167	Elakatothrix gelatinosa Willen	14368	0.25	11.00	2.00	17.30
WAL - 51SR	19-Jul-15	2206	Botryococcus braunii Kutzing	1000	0.52	10.00	10.00	523.60
WAL - 51SR	19-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
WAL - 51SR	19-Jul-15	4351	Small chrysophyceae	330464	4.66	3.00	3.00	14.10
WAL - 51SR	19-Jul-15	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
WAL - 51SR	19-Jul-15	4357	Chrysococcus sp.	905184	52.41	4.80	4.80	57.90
WAL - 51SR	19-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.15	8.30	8.30	299.40
WAL - 51SR	19-Jul-15	4361	Kephyrion boreale Skuja	14368	1.71	6.10	6.10	118.80
WAL - 51SR	19-Jul-15	4362	Kephyrion sp.	100576	2.07	3.40	3.40	20.60
WAL - 51SR	19-Jul-15	4363	Spinifiromonas sirratus**********	14368	1.71	6.10	6.10	118.80
WAL - 51SR	19-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.13	19.60	8.00	656.80
WAL - 51SR	19-Jul-15	4378	Dinobryon borgei Lemmermann	50288	2.43	9.00	3.20	48.30
WAL - 51SR	19-Jul-15	4381	Dinobryon mucronutom Nygaard	14368	1.79	9.50	5.00	124.40
WAL - 51SR	19-Jul-15	4388	Dinobryon sertularia Ehrenberg	136496	30.88	12.00	6.00	226.20
WAL - 51SR	19-Jul-15	4388	Dinobryon sertularia Ehrenberg	2400	5.16	0.00	0.00	2150.00
WAL - 51SR	19-Jul-15	4390	Dinobryon sociale Ehrenberg	222704	50.38	12.00	6.00	226.20
WAL - 51SR	19-Jul-15	4390	Dinobryon sociale Ehrenberg	1800	3.58	0.00	0.00	1990.00
WAL - 51SR	19-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	64656	1.71	5.60	3.00	26.40
WAL - 51SR	19-Jul-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
WAL - 51SR	19-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	14368	0.72	6.00	4.00	50.30
WAL - 51SR	19-Jul-15	4413	Chrysochromulina laurentiana Kling	136496	53.86	9.10	9.10	394.60
WAL - 51SR	19-Jul-15	4436	Dinobryon attenatum Hill	7184	1.27	9.40	6.00	177.20
WAL - 51SR	19-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	2000	3.96	10.80	21.60	1978.80
WAL - 51SR	19-Jul-15	5509	Cyclotella ocellata Pant.	21552	3.19	4.55	9.10	148.00
WAL - 51SR	19-Jul-15	5518	Synedra acus Kutzing	5200	0.50	91.00	2.00	95.30
WAL - 51SR	19-Jul-15	5551	Cyclotella michiganiana Skvortzow	50288	0.96	2.30	4.60	19.10
WAL - 51SR	19-Jul-15	5720	Cyclotella bodanica Eulenst.	200	1.25	15.85	31.70	6254.70
WAL - 51SR	19-Jul-15	6554	Rhodomonas minuta Skuja	14368	1.25	10.00	5.00	87.30
WAL - 51SR	19-Jul-15	6558	Cryptomonas erosa Ehrenberg	5000	5.58	22.20	12.00	1115.90
WAL - 51SR	19-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	600	0.41	19.60	10.00	684.20
WAL - 51SR	19-Jul-15	6568	Katablepharis ovalis Skuja	57472	3.25	9.00	4.00	56.50
WAL - 51SR	19-Jul-15	7632	Gymnodinium sp.	21552	6.72	9.30	8.00	311.60
WAL - 51SR	19-Jul-15	7632	Gymnodinium sp.	200	2.83	30.00	30.00	14137.20
WAL - 51SR	19-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	800	1.03	14.60	13.00	1291.90
WAL - 52S	19-Jul-15	2105	Chlamydomonas spp.	14368	0.34	5.00	3.00	23.60
WAL - 52S	19-Jul-15	2121	Oocystis lacustris Chodat	14368	0.38	5.60	3.00	26.40
WAL - 52S	19-Jul-15	2138	Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova	14368	1.12	46.00	1.80	78.00
WAL - 52S	19-Jul-15	2167	Elakatothrix gelatinosa Willen	14368	0.25	11.00	2.00	17.30
WAL - 52S	19-Jul-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.11	15.00	14.00	549.80
WAL - 52S	19-Jul-15	2199	Spondylosium planum (Wolle) W. and G.S. West	21552	0.81	6.00	6.00	37.70
WAL - 52S	19-Jul-15	2206	Botryococcus braunii Kutzing	200	0.10	10.00	10.00	523.60
WAL - 52S	19-Jul-15	2215	Tetraedron caudatum (Corda) Hansgrig	14368	0.07	3.00	3.00	4.70
WAL - 52S	19-Jul-15	4351	Small chrysophyceae	172416	2.43	3.00	3.00	14.10
WAL - 52S	19-Jul-15	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
WAL - 52S	19-Jul-15	4357	Chrysococcus sp.	632192	36.60	4.80	4.80	57.90
WAL - 52S	19-Jul-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.83	9.10	9.10	394.60
WAL - 52S	19-Jul-15	4362	Kephyrion sp.	114944	2.37	3.40	3.40	20.60
WAL - 52S	19-Jul-15	4368	Mallomonas crassisquama (Asmund) Fott	400	0.26	19.30	8.00	646.70
WAL - 52S	19-Jul-15	4378	Dinobryon borgei Lemmermann	35920	1.73	9.00	3.20	48.30
WAL - 52S	19-Jul-15	4381	Dinobryon mucronutom Nygaard	35920	4.47	9.50	5.00	124.40
WAL - 52S	19-Jul-15	4388	Dinobryon sertularia Ehrenberg	122128	27.63	12.00	6.00	226.20
WAL - 52S	19-Jul-15	4388	Dinobryon sertularia Ehrenberg	2400	5.16	0.00	0.00	2150.00
WAL - 52S	19-Jul-15	4390	Dinobryon sociale Ehrenberg	179600	40.63	12.00	6.00	226.20
WAL - 52S	19-Jul-15	4390	Dinobryon sociale Ehrenberg	3600	7.16	0.00	0.00	1990.00
WAL - 52S	19-Jul-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.51	5.60	3.20	30.00
WAL - 52S	19-Jul-15	4401	Uroglena volvox Ehrenberg	93392	10.56	6.00	6.00	113.10
WAL - 52S	19-Jul-15	4403	Chrysosphaerella longispina Lauterborn	7184	3.76	10.00	10.00	523.60
WAL - 52S	19-Jul-15	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.19	5.60	3.00	26.40
WAL - 52S	19-Jul-15	4413	Chrysochromulina laurentiana Kling	64656	24.68	9.00	9.00	381.70
WAL - 52S	19-Jul-15	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
WAL - 52S	19-Jul-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.44	5.40	3.30	30.80
WAL - 52S	19-Jul-15	4436	Dinobryon attenatum Hill	7184	1.35	10.00	6.00	188.50
WAL - 52S	19-Jul-15	5507	Cyclotella stelligera Cleve and Grunow	2400	4.75	10.80	21.60	1978.80
WAL - 52S	19-Jul-15	5509	Cyclotella ocellata Pant.	35920	5.32	4.55	9.10	148.00
WAL - 52S	19-Jul-15	5518	Synedra acus Kutzing	7200	0.68	90.00	2.00	94.20
WAL - 52S	19-Jul-15	5551	Cyclotella michiganiana Skvortzow	57472	1.10	2.30	4.60	19.10

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
WAL - 52S	19-Jul-15	6554	Rhodomonas minuta Skuja	14368	1.25	10.00	5.00	87.30
WAL - 52S	19-Jul-15	6558	Cryptomonas erosa Ehrenberg	3800	4.24	22.20	12.00	1115.90
WAL - 52S	19-Jul-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.60	10.00	684.20
WAL - 52S	19-Jul-15	6565	Cryptomonas rostratiformis Skuja	600	1.27	31.00	14.00	2120.90
WAL - 52S	19-Jul-15	7632	Gymnodinium sp.	7184	2.65	11.00	8.00	368.60
WAL - 52S	19-Jul-15	7632	Gymnodinium sp.	800	11.31	30.00	30.00	14137.20
WAL - 52S	19-Jul-15	7639	Peridinium pusillum (Penard) Lemmermann	1400	1.81	14.60	13.00	1291.90
WAL - 52S	19-Jul-15	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
WAL - 53S	19-Aug-15	1054	Planktolyngbya limnetica	600	0.07	103.00	1.20	116.50
WAL - 53S	19-Aug-15	1073	Snowella sp	200	0.24	0.00	0.00	1200.00
WAL - 53S	19-Aug-15	2100	Pyramidomonas tetrarhynchus Schmarda	200	0.15	15.00	14.00	769.70
WAL - 53S	19-Aug-15	2105	Chlamydomonas spp.	35920	0.85	5.00	3.00	23.60
WAL - 53S	19-Aug-15	2112	Sphaerocystis schroeteri Chodat	57472	1.08	3.30	3.30	18.80
WAL - 53S	19-Aug-15	2121	Oocystis lacustris Chodat	258624	13.01	6.00	4.00	50.30
WAL - 53S	19-Aug-15	2137	Dictyosphaerium simplex Sukja	653744	3.66	2.20	2.20	5.60
WAL - 53S	19-Aug-15	2167	Elakatothrix gelatinosa Willen	86208	1.22	9.00	2.00	14.10
WAL - 53S	19-Aug-15	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
WAL - 53S	19-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.10	15.00	13.00	510.50
WAL - 53S	19-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
WAL - 53S	19-Aug-15	2206	Botryococcus braunii Kutzing	800	0.72	12.00	12.00	904.80
WAL - 53S	19-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	172416	0.81	3.00	3.00	4.70
WAL - 53S	19-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	43104	2.31	31.00	2.10	53.70
WAL - 53S	19-Aug-15	4351	Small chrysophyceae	229888	3.24	3.00	3.00	14.10
WAL - 53S	19-Aug-15	4352	Large chrysophyceae	57472	10.32	7.00	7.00	179.60
WAL - 53S	19-Aug-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
WAL - 53S	19-Aug-15	4357	Chrysococcus sp.	811792	53.09	5.00	5.00	65.40
WAL - 53S	19-Aug-15	4358	Chrysostephanospaera globulifera Scherffel	7184	2.65	8.90	8.90	369.10
WAL - 53S	19-Aug-15	4362	Kephyrion sp.	122128	2.74	3.50	3.50	22.40
WAL - 53S	19-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	19.60	10.00	1026.30
WAL - 53S	19-Aug-15	4378	Dinobryon borgei Lemmermann	21552	1.04	9.00	3.20	48.30
WAL - 53S	19-Aug-15	4381	Dinobryon mucronutom Nygaard	14368	1.88	10.00	5.00	130.90
WAL - 53S	19-Aug-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	400	2.03	0.00	0.00	5085.00
WAL - 53S	19-Aug-15	4390	Dinobryon sociale Ehrenberg	136496	30.88	12.00	6.00	226.20
WAL - 53S	19-Aug-15	4390	Dinobryon sociale Ehrenberg	400	0.80	0.00	0.00	1990.00
WAL - 53S	19-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	21552	1.08	6.00	4.00	50.30
WAL - 53S	19-Aug-15	4413	Chrysochromulina laurentiana Kling	43104	16.45	9.00	9.00	381.70
WAL - 53S	19-Aug-15	4414	Stichogloea spp.	179600	9.03	6.00	4.00	50.30
WAL - 53S	19-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	35920	0.88	5.20	3.00	24.50
WAL - 53S	19-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	26400	58.26	11.20	22.40	2206.90
WAL - 53S	19-Aug-15	5509	Cyclotella ocellata Pant.	7184	0.81	4.15	8.30	112.30
WAL - 53S	19-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	1000	1.18	23.00	14.00	1180.20
WAL - 53S	19-Aug-15	5518	Synedra acus Kutzing	200	0.02	91.00	2.00	95.30
WAL - 53S	19-Aug-15	5551	Cyclotella michiganiana Skvortzow	423856	10.38	2.50	5.00	24.50
WAL - 53S	19-Aug-15	5720	Cyclotella bodanica Eulenst.	1400	10.80	17.00	34.00	7717.30
WAL - 53S	19-Aug-15	6554	Rhodomonas minuta Skuja	86208	9.66	11.00	5.40	112.00
WAL - 53S	19-Aug-15	6558	Cryptomonas erosa Ehrenberg	11200	9.07	23.20	10.00	809.80
WAL - 53S	19-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	3000	2.09	20.00	10.00	698.10
WAL - 53S	19-Aug-15	6565	Cryptomonas rostratiformis Skuja	800	1.75	32.00	14.00	2189.30
WAL - 53S	19-Aug-15	6568	Katablepharis ovalis Skuja	28736	1.66	9.10	4.00	57.80
WAL - 53S	19-Aug-15	7632	Gymnodinium sp.	600	5.52	26.00	26.00	9202.80
WAL - 54S	19-Aug-15	1008	Aphanocapsa sp.	7184	0.83	0.00	0.00	115.00
WAL - 54S	19-Aug-15	1073	Snowella sp	200	0.24	0.00	0.00	1200.00
WAL - 54S	19-Aug-15	2105	Chlamydomonas spp.	7184	0.17	5.00	3.00	23.60
WAL - 54S	19-Aug-15	2112	Sphaerocystis schroeteri Chodat	57472	0.99	3.20	3.20	17.20
WAL - 54S	19-Aug-15	2121	Oocystis lacustris Chodat	229888	11.56	6.00	4.00	50.30
WAL - 54S	19-Aug-15	2137	Dictyosphaerium simplex Sukja	783056	4.39	2.20	2.20	5.60
WAL - 54S	19-Aug-15	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.50	11.00	4.00	69.10
WAL - 54S	19-Aug-15	2167	Elakatothrix gelatinosa Willen	7184	0.10	9.00	2.00	14.10
WAL - 54S	19-Aug-15	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
WAL - 54S	19-Aug-15	2182	Euastrum spp.	200	0.37	22.00	22.00	1858.40
WAL - 54S	19-Aug-15	2187	Staurodesmus extensus (Andersson) Teiling	200	0.10	15.00	13.00	510.50
WAL - 54S	19-Aug-15	2199	Spondylosium planum (Wolle) W. and G.S. West	21552	0.81	6.00	6.00	37.70
WAL - 54S	19-Aug-15	2206	Botryococcus braunii Kutzing	400	0.36	12.00	12.00	904.80
WAL - 54S	19-Aug-15	2215	Tetraedron caudatum (Corda) Hansgrig	129312	0.61	3.00	3.00	4.70
WAL - 54S	19-Aug-15	2235	Ankistrodesmus spiralis Lemmermann	7184	0.39	31.00	2.10	53.70
WAL - 54S	19-Aug-15	4351	Small chrysophyceae	272992	3.85	3.00	3.00	14.10
WAL - 54S	19-Aug-15	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
WAL - 54S	19-Aug-15	4357	Chrysococcus sp.	545984	27.85	4.60	4.60	51.00
WAL - 54S	19-Aug-15	4362	Kephyrion sp.	93392	2.09	3.50	3.50	22.40
WAL - 54S	19-Aug-15	4368	Mallomonas crassisquama (Asmund) Fott	200	0.21	19.60	10.00	1026.30
WAL - 54S	19-Aug-15	4378	Dinobryon borgei Lemmermann	14368	0.69	9.00	3.20	48.30
WAL - 54S	19-Aug-15	4381	Dinobryon mucronutom Nygaard	7184	0.94	10.00	5.00	130.90
WAL - 54S	19-Aug-15	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
WAL - 54S	19-Aug-15	4390	Dinobryon sociale Ehrenberg	129312	29.25	12.00	6.00	226.20
WAL - 54S	19-Aug-15	4390	Dinobryon sociale Ehrenberg	800	1.59	0.00	0.00	1990.00
WAL - 54S	19-Aug-15	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
WAL - 54S	19-Aug-15	4396	Chrysolkos skuja (Nauwerck) Willen	7184	0.23	6.00	3.20	32.20
WAL - 54S	19-Aug-15	4401	Uroglena volvox Ehrenberg	28736	3.25	6.00	6.00	113.10
WAL - 54S	19-Aug-15	4411	Bitrichia chodatii (Reverdin) Chodat	28736	1.45	6.00	4.00	50.30
WAL - 54S	19-Aug-15	4413	Chrysochromulina laurentiana Kling	50288	19.19	9.00	9.00	381.70
WAL - 54S	19-Aug-15	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
WAL - 54S	19-Aug-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.53	5.20	3.00	24.50
WAL - 54S	19-Aug-15	5507	Cyclotella stelligera Cleve and Grunow	19200	42.37	11.20	22.40	2206.90
WAL - 54S	19-Aug-15	5509	Cyclotella ocellata Pant.	14368	1.61	4.15	8.30	112.30
WAL - 54S	19-Aug-15	5514	Tabellaria flocculsa (Roth) Kutzing	1000	1.18	23.00	14.00	1180.20

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
WAL - 54S	19-Aug-15	5518	Synedra acus Kutzing	3200	0.30	91.00	2.00	95.30
WAL - 54S	19-Aug-15	5524	Asterionella formosa Hassall	400	0.04	96.00	2.00	100.50
WAL - 54S	19-Aug-15	5551	Cyclotella michiganiana Skvortzow	474144	11.62	2.50	5.00	24.50
WAL - 54S	19-Aug-15	5720	Cyclotella bodanica Eulenst.	3200	24.70	17.00	34.00	7717.30
WAL - 54S	19-Aug-15	6554	Rhodomonas minuta Skuja	57472	6.44	11.00	5.40	112.00
WAL - 54S	19-Aug-15	6558	Cryptomonas erosa Ehrenberg	18000	14.58	23.20	10.00	809.80
WAL - 54S	19-Aug-15	6562	Cryptomonas reflexa (Marsson) Skuja	4600	3.21	20.00	10.00	698.10
WAL - 54S	19-Aug-15	6565	Cryptomonas rostratiformis Skuja	1000	2.19	32.00	14.00	2189.30
WAL - 54S	19-Aug-15	6568	Katablepharis ovalis Skuja	14368	0.83	9.10	4.00	57.80
WAL - 54S	19-Aug-15	7631	Gymnodinium helveticum Penard	200	4.81	51.00	30.00	24033.20
WAL - 54S	19-Aug-15	7632	Gymnodinium sp.	14368	4.62	9.60	8.00	321.70
WAL - 54S	19-Aug-15	7632	Gymnodinium sp.	600	5.52	26.00	26.00	9202.80
WAL - 54S	19-Aug-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.51	14.50	13.00	1283.10
WAL - 55S	26-Sep-15	1073	Snowella sp	200	0.32	0.00	0.00	1600.00
WAL - 55S	26-Sep-15	2105	Chlamydomonas spp.	64656	1.53	5.00	3.00	23.60
WAL - 55S	26-Sep-15	2121	Oocystis lacustris Chodat	86208	4.04	5.60	4.00	46.90
WAL - 55S	26-Sep-15	2137	Dictyosphaerium simplex Sukja	258624	1.09	2.00	2.00	4.20
WAL - 55S	26-Sep-15	2178	Cosmarium sp.	800	1.12	20.00	20.00	1396.30
WAL - 55S	26-Sep-15	2185	Micrasterias sp.	200	0.20	18.00	18.00	1017.90
WAL - 55S	26-Sep-15	2187	Staurodesmus extensus (Andersson) Teiling	600	0.39	16.30	14.00	649.20
WAL - 55S	26-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	71840	0.34	3.00	3.00	4.70
WAL - 55S	26-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	43104	2.88	35.10	2.20	66.70
WAL - 55S	26-Sep-15	4351	Small chrysophyceae	452592	7.78	3.20	3.20	17.20
WAL - 55S	26-Sep-15	4352	Large chrysophyceae	28736	5.16	7.00	7.00	179.60
WAL - 55S	26-Sep-15	4357	Chrysococcus sp.	905184	62.91	5.10	5.10	69.50
WAL - 55S	26-Sep-15	4361	Kephyrion boreale Skuja	71840	9.40	6.30	6.30	130.90
WAL - 55S	26-Sep-15	4362	Kephyrion sp.	150864	3.68	3.60	3.60	24.40
WAL - 55S	26-Sep-15	4363	Spinifiromonas sirratus**********	14368	1.25	5.50	5.50	87.10
WAL - 55S	26-Sep-15	4378	Dinobryon borgei Lemmermann	35920	1.81	10.00	3.10	50.30
WAL - 55S	26-Sep-15	4381	Dinobryon mucronutom Nygaard	7184	0.93	9.90	5.00	129.60
WAL - 55S	26-Sep-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	1.02	0.00	0.00	5085.00
WAL - 55S	26-Sep-15	4390	Dinobryon sociale Ehrenberg	179600	40.63	12.00	6.00	226.20
WAL - 55S	26-Sep-15	4390	Dinobryon sociale Ehrenberg	7800	15.53	0.00	0.00	1991.00
WAL - 55S	26-Sep-15	4394	Epiphyxis sp.	14368	1.21	9.10	4.20	84.10
WAL - 55S	26-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.33	5.60	3.00	26.40
WAL - 55S	26-Sep-15	4401	Uroglena volvox Ehrenberg	28736	3.41	6.10	6.10	118.80
WAL - 55S	26-Sep-15	4413	Chrysochromulina laurentiana Kling	64656	24.68	9.00	9.00	381.70
WAL - 55S	26-Sep-15	4414	Stichogloea spp.	57472	2.89	6.00	4.00	50.30
WAL - 55S	26-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	14368	0.35	5.20	3.00	24.50
WAL - 55S	26-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	3000	5.46	10.50	21.00	1818.40
WAL - 55S	26-Sep-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	400	0.33	88.00	6.00	829.40
WAL - 55S	26-Sep-15	5518	Synedra acus Kutzing	27600	2.63	91.00	2.00	95.30
WAL - 55S	26-Sep-15	5551	Cyclotella michiganiana Skvortzow	251440	5.46	2.40	4.80	21.70
WAL - 55S	26-Sep-15	5720	Cyclotella bodanica Eulenst.	1200	9.26	17.00	34.00	7717.30
WAL - 55S	26-Sep-15	6554	Rhodomonas minuta Skuja	35920	4.55	12.00	5.50	126.70
WAL - 55S	26-Sep-15	6558	Cryptomonas erosa Ehrenberg	20000	23.73	23.60	12.00	1186.30
WAL - 55S	26-Sep-15	6565	Cryptomonas rostratiformis Skuja	1400	2.97	31.00	14.00	2120.90
WAL - 55S	26-Sep-15	6568	Katablepharis ovalis Skuja	28736	1.55	8.80	4.00	54.10
WAL - 55S	26-Sep-15	7631	Gymnodinium helveticum Penard	400	9.61	51.00	30.00	24033.20
WAL - 55S	26-Sep-15	7632	Gymnodinium sp.	28736	11.13	10.00	8.60	387.30
WAL - 55S	26-Sep-15	7632	Gymnodinium sp.	1000	8.18	25.00	25.00	8181.20
WAL - 55S	26-Sep-15	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
WAL - 55S	26-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	200	0.21	14.00	12.00	1055.60
WAL - 55SR	26-Sep-15	1012	Aphanothece sp.	7184	0.47	0.00	0.00	65.00
WAL - 55SR	26-Sep-15	2105	Chlamydomonas spp.	28736	0.68	5.00	3.00	23.60
WAL - 55SR	26-Sep-15	2121	Oocystis lacustris Chodat	64656	3.03	5.60	4.00	46.90
WAL - 55SR	26-Sep-15	2137	Dictyosphaerium simplex Sukja	287360	1.21	2.00	2.00	4.20
WAL - 55SR	26-Sep-15	2178	Cosmarium sp.	800	1.12	20.00	20.00	1396.30
WAL - 55SR	26-Sep-15	2187	Staurodesmus extensus (Andersson) Teiling	400	0.26	16.30	14.00	649.20
WAL - 55SR	26-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	86208	0.41	3.00	3.00	4.70
WAL - 55SR	26-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	21552	1.43	35.00	2.20	66.50
WAL - 55SR	26-Sep-15	4351	Small chrysophyceae	409488	10.85	3.70	3.70	26.50
WAL - 55SR	26-Sep-15	4352	Large chrysophyceae	57472	10.32	7.00	7.00	179.60
WAL - 55SR	26-Sep-15	4357	Chrysococcus sp.	833344	57.92	5.10	5.10	69.50
WAL - 55SR	26-Sep-15	4361	Kephyrion boreale Skuja	43104	5.64	6.30	6.30	130.90
WAL - 55SR	26-Sep-15	4362	Kephyrion sp.	186784	4.56	3.60	3.60	24.40
WAL - 55SR	26-Sep-15	4363	Spinifiromonas sirratus**********	21552	1.88	5.50	5.50	87.10
WAL - 55SR	26-Sep-15	4368	Mallomonas crassisquama (Asmund) Fott	600	0.69	22.00	10.00	1151.90
WAL - 55SR	26-Sep-15	4378	Dinobryon borgei Lemmermann	35920	1.81	10.00	3.10	50.30
WAL - 55SR	26-Sep-15	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	600	3.05	0.00	0.00	5085.00
WAL - 55SR	26-Sep-15	4390	Dinobryon sociale Ehrenberg	172416	39.00	12.00	6.00	226.20
WAL - 55SR	26-Sep-15	4390	Dinobryon sociale Ehrenberg	8800	17.52	0.00	0.00	1991.00
WAL - 55SR	26-Sep-15	4394	Epiphyxis sp.	28736	2.42	9.10	4.20	84.10
WAL - 55SR	26-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	35920	0.95	5.60	3.00	26.40
WAL - 55SR	26-Sep-15	4401	Uroglena volvox Ehrenberg	43104	4.88	6.00	6.00	113.10
WAL - 55SR	26-Sep-15	4413	Chrysochromulina laurentiana Kling	79024	30.16	9.00	9.00	381.70
WAL - 55SR	26-Sep-15	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
WAL - 55SR	26-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	64656	1.58	5.20	3.00	24.50
WAL - 55SR	26-Sep-15	4435	Porochrysis sp.	7184	0.47	5.00	5.00	65.40
WAL - 55SR	26-Sep-15	4436	Dinobryon attenatum Hill	7184	1.46	10.80	6.00	203.60
WAL - 55SR	26-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	3600	6.55	10.50	21.00	1818.40
WAL - 55SR	26-Sep-15	5509	Cyclotella ocellata Pant.	21552	2.88	4.40	8.80	133.80
WAL - 55SR	26-Sep-15	5518	Synedra acus Kutzing	25000	2.38	91.00	2.00	95.30
WAL - 55SR	26-Sep-15	5551	Cyclotella michiganiana Skvortzow	237072	5.14	2.40	4.80	21.70
WAL - 55SR	26-Sep-15	5720	Cyclotella bodanica Eulenst.	1600	12.35	17.00	34.00	7717.30

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
WAL - 55SR	26-Sep-15	6554	Rhodomonas minuta Skuja	35920	4.55	12.00	5.50	126.70
WAL - 55SR	26-Sep-15	6558	Cryptomonas erosa Ehrenberg	18800	22.30	23.60	12.00	1186.30
WAL - 55SR	26-Sep-15	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.15	22.00	10.00	767.90
WAL - 55SR	26-Sep-15	6565	Cryptomonas rostratiformis Skuja	1200	2.55	31.00	14.00	2120.90
WAL - 55SR	26-Sep-15	6568	Katablepharis ovalis Skuja	21552	1.17	8.80	4.00	54.10
WAL - 55SR	26-Sep-15	7631	Gymnodinium helveticum Penard	400	9.61	51.00	30.00	24033.20
WAL - 55SR	26-Sep-15	7632	Gymnodinium sp.	28736	11.13	10.00	8.60	387.30
WAL - 55SR	26-Sep-15	7632	Gymnodinium sp.	1200	9.82	25.00	25.00	8181.20
WAL - 55SR	26-Sep-15	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
WAL - 55SR	26-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.42	14.00	12.00	1055.60
WAL - 56S	26-Sep-15	2105	Chlamydomonas spp.	43104	1.02	5.00	3.00	23.60
WAL - 56S	26-Sep-15	2121	Oocystis lacustris Chodat	107760	5.05	5.60	4.00	46.90
WAL - 56S	26-Sep-15	2137	Dictyosphaerium simplex Sukja	150864	0.63	2.00	2.00	4.20
WAL - 56S	26-Sep-15	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.50	11.00	4.00	69.10
WAL - 56S	26-Sep-15	2178	Cosmarium sp.	1000	1.40	20.00	20.00	1396.30
WAL - 56S	26-Sep-15	2185	Micrasterias sp.	200	0.20	18.00	18.00	1017.90
WAL - 56S	26-Sep-15	2187	Staurodesmus extensus (Andersson) Teiling	700	0.44	16.00	14.00	625.50
WAL - 56S	26-Sep-15	2193	Staurodesmus paradoxum Meyen	200	0.82	30.00	26.00	4084.10
WAL - 56S	26-Sep-15	2215	Tetraedron caudatum (Corda) Hansgrig	86208	0.41	3.00	3.00	4.70
WAL - 56S	26-Sep-15	2235	Ankistrodesmus spiralis Lemmermann	79024	5.27	35.10	2.20	66.70
WAL - 56S	26-Sep-15	4351	Small chrysophyceae	316096	5.44	3.20	3.20	17.20
WAL - 56S	26-Sep-15	4352	Large chrysophyceae	79024	14.19	7.00	7.00	179.60
WAL - 56S	26-Sep-15	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
WAL - 56S	26-Sep-15	4357	Chrysococcus sp.	890816	61.91	5.10	5.10	69.50
WAL - 56S	26-Sep-15	4361	Kephyrion boreale Skuja	50288	6.58	6.30	6.30	130.90
WAL - 56S	26-Sep-15	4362	Kephyrion sp.	114944	2.80	3.60	3.60	24.40
WAL - 56S	26-Sep-15	4363	Spinifiromonas sirratus**********	14368	1.25	5.50	5.50	87.10
WAL - 56S	26-Sep-15	4368	Mallomonas crassisquama (Asmund) Fott	800	0.90	21.60	10.00	1131.00
WAL - 56S	26-Sep-15	4378	Dinobryon borgei Lemmermann	50288	2.53	10.00	3.10	50.30
WAL - 56S	26-Sep-15	4381	Dinobryon mucronutom Nygaard	7184	0.93	9.90	5.00	129.60
WAL - 56S	26-Sep-15	4390	Dinobryon sociale Ehrenberg	143680	32.50	12.00	6.00	226.20
WAL - 56S	26-Sep-15	4390	Dinobryon sociale Ehrenberg	7200	14.34	0.00	0.00	1991.00
WAL - 56S	26-Sep-15	4394	Epiphyxis sp.	28736	2.42	9.10	4.20	84.10
WAL - 56S	26-Sep-15	4396	Chrysolkos skuja (Nauwerck) Willen	50288	1.33	5.60	3.00	26.40
WAL - 56S	26-Sep-15	4413	Chrysochromulina laurentiana Kling	79024	30.16	9.00	9.00	381.70
WAL - 56S	26-Sep-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	35920	0.88	5.20	3.00	24.50
WAL - 56S	26-Sep-15	5507	Cyclotella stelligera Cleve and Grunow	2400	4.36	10.50	21.00	1818.40
WAL - 56S	26-Sep-15	5518	Synedra acus Kutzing	15600	1.49	91.00	2.00	95.30
WAL - 56S	26-Sep-15	5551	Cyclotella michiganiana Skvortzow	409488	8.89	2.40	4.80	21.70
WAL - 56S	26-Sep-15	5720	Cyclotella bodanica Eulenst.	600	4.63	17.00	34.00	7717.30
WAL - 56S	26-Sep-15	6554	Rhodomonas minuta Skuja	93392	11.83	12.00	5.50	126.70
WAL - 56S	26-Sep-15	6558	Cryptomonas erosa Ehrenberg	18000	21.35	23.60	12.00	1186.30
WAL - 56S	26-Sep-15	6565	Cryptomonas rostratiformis Skuja	200	0.42	31.00	14.00	2120.90
WAL - 56S	26-Sep-15	6568	Katablepharis ovalis Skuja	43104	2.33	8.80	4.00	54.10
WAL - 56S	26-Sep-15	7631	Gymnodinium helveticum Penard	400	9.42	50.00	30.00	23561.90
WAL - 56S	26-Sep-15	7632	Gymnodinium sp.	28736	11.13	10.00	8.60	387.30
WAL - 56S	26-Sep-15	7639	Peridinium pusillum (Penard) Lemmermann	400	0.42	14.00	12.00	1055.60
WAL - 57S	22-Nov-15	2105	Chlamydomonas spp.	3546.1	1.19	10.00	8.00	335.10
WAL - 57S	22-Nov-15	2121	Oocystis lacustris Chodat	7092.2	0.19	5.60	3.00	26.40
WAL - 57S	22-Nov-15	2137	Dictyosphaerium simplex Sukja	14184.4	0.07	2.10	2.10	4.80
WAL - 57S	22-Nov-15	2178	Cosmarium sp.	100	0.14	20.00	20.00	1396.30
WAL - 57S	22-Nov-15	2206	Botryococcus braunii Kutzing	800	0.72	12.00	12.00	904.80
WAL - 57S	22-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	14184.4	0.84	34.00	2.10	58.90
WAL - 57S	22-Nov-15	4351	Small chrysophyceae	170212.8	2.40	3.00	3.00	14.10
WAL - 57S	22-Nov-15	4352	Large chrysophyceae	14184.4	2.55	7.00	7.00	179.60
WAL - 57S	22-Nov-15	4357	Chrysococcus sp.	124113.5	7.65	4.90	4.90	61.60
WAL - 57S	22-Nov-15	4362	Kephyrion sp.	99290.8	1.55	3.10	3.10	15.60
WAL - 57S	22-Nov-15	4390	Dinobryon sociale Ehrenberg	134751.8	30.48	12.00	6.00	226.20
WAL - 57S	22-Nov-15	4413	Chrysochromulina laurentiana Kling	3546.1	1.40	9.10	9.10	394.60
WAL - 57S	22-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	42553.2	1.08	5.40	3.00	25.40
WAL - 57S	22-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	600	0.94	10.00	20.00	1570.80
WAL - 57S	22-Nov-15	5513	Tabellaria fenestrata (Lyngbye) Kutzing	100	0.08	82.00	6.00	772.80
WAL - 57S	22-Nov-15	5514	Tabellaria flocculsa (Roth) Kutzing	500	0.64	25.00	14.00	1282.80
WAL - 57S	22-Nov-15	5518	Synedra acus Kutzing	6700	0.77	110.00	2.00	115.20
WAL - 57S	22-Nov-15	5551	Cyclotella michiganiana Skvortzow	14184.4	0.27	2.30	4.60	19.10
WAL - 57S	22-Nov-15	6554	Rhodomonas minuta Skuja	28368.8	3.99	11.20	6.00	140.70
WAL - 57S	22-Nov-15	6558	Cryptomonas erosa Ehrenberg	3600	4.27	23.60	12.00	1186.30
WAL - 57S	22-Nov-15	7631	Gymnodinium helveticum Penard	100	2.36	50.00	30.00	23561.90
WAL - 57S	22-Nov-15	7632	Gymnodinium sp.	100	1.56	31.00	31.00	15598.50
WAL - 57S	22-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	100	0.31	18.00	18.00	3053.60
WAL - 58S	22-Nov-15	2105	Chlamydomonas spp.	7092.2	2.38	10.00	8.00	335.10
WAL - 58S	22-Nov-15	2121	Oocystis lacustris Chodat	17730.5	0.47	5.60	3.00	26.40
WAL - 58S	22-Nov-15	2178	Cosmarium sp.	100	0.14	20.00	20.00	1396.30
WAL - 58S	22-Nov-15	2187	Staurodesmus extensus (Andersson) Teiling	100	0.06	15.90	14.00	617.70
WAL - 58S	22-Nov-15	2206	Botryococcus braunii Kutzing	200	0.18	12.00	12.00	904.80
WAL - 58S	22-Nov-15	2235	Ankistrodesmus spiralis Lemmermann	28368.8	1.67	34.00	2.10	58.90
WAL - 58S	22-Nov-15	4351	Small chrysophyceae	145390.1	2.05	3.00	3.00	14.10
WAL - 58S	22-Nov-15	4352	Large chrysophyceae	7092.2	1.27	7.00	7.00	179.60
WAL - 58S	22-Nov-15	4357	Chrysococcus sp.	106383	6.55	4.90	4.90	61.60
WAL - 58S	22-Nov-15	4362	Kephyrion sp.	56737.6	0.89	3.10	3.10	15.60
WAL - 58S	22-Nov-15	4378	Dinobryon borgei Lemmermann	3546.1	0.15	8.60	3.10	43.30
WAL - 58S	22-Nov-15	4388	Dinobryon sertularia Ehrenberg	7092.2	1.60	12.00	6.00	226.20
WAL - 58S	22-Nov-15	4390	Dinobryon sociale Ehrenberg	113475.2	25.67	12.00	6.00	226.20
WAL - 58S	22-Nov-15	4390	Dinobryon sociale Ehrenberg	300	0.60	0.00	0.00	1991.00
WAL - 58S	22-Nov-15	4396	Chrysolkos skuja (Nauwerck) Willen	3546.1	0.12	5.60	3.40	33.90

Station	Date	Species code	Speceis name	density cells/L^{-1}	biomass mg/m^{-3}	length µ	width µ	cell volume µ^{3}
WAL - 58S	22-Nov-15	4413	Chrysochromulina laurentiana Kling	14184.4	5.60	9.10	9.10	394.60
WAL - 58S	22-Nov-15	4418	Salpingoeca frequentissima (Zach.) Lemmermann	3546.1	0.10	5.60	3.10	28.20
WAL - 58S	22-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	7092.2	0.14	2.30	4.60	19.10
WAL - 58S	22-Nov-15	5507	Cyclotella stelligera Cleve and Grunow	900	1.41	10.00	20.00	1570.80
WAL - 58S	22-Nov-15	5514	Tabellaria flocculsa (Roth) Kutzing	600	0.77	25.00	14.00	1282.80
WAL - 58S	22-Nov-15	5518	Synedra acus Kutzing	7900	0.91	110.00	2.00	115.20
WAL - 58S	22-Nov-15	5720	Cyclotella bodanica Eulenst.	200	1.54	17.00	34.00	7717.30
WAL - 58S	22-Nov-15	6554	Rhodomonas minuta Skuja	42553.2	5.88	11.00	6.00	138.20
WAL - 58S	22-Nov-15	6558	Cryptomonas erosa Ehrenberg	5500	6.64	24.00	12.00	1206.40
WAL - 58S	22-Nov-15	6568	Katablepharis ovalis Skuja	3546.1	0.14	7.60	4.00	40.30
WAL - 58S	22-Nov-15	7639	Peridinium pusillum (Penard) Lemmermann	600	1.83	18.00	18.00	3053.60

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	Species Name	Area-Replicate ID	BAP - 38S1 21-Jul-15	BAP - 38S2 21-Jul-15	BAP - 39S 15-Aug-15	BAP - 40S 15-Aug-15	BBD - 37S 21-Jul-15	BBD - 38S 21-Jul-15	BBD - 39S 15-Aug-15	BBD - 40S 15-Aug-15	BPJ - 37S 21-Jul-15	BPJ - 38S 21-Jul-15	BPJ - 39S 15-Aug-15	BPJ - 40S 15-Aug-15
	Cyanophyte													
1008	*Aphanocapsa sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*		-	-	-	-	-	-	-	-	-	-	-	-
1073	*Snowella sp*		-	-	-	-	-	-	-	-	-	-	-	-
1077	*Pseudoanabaena sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-	-	-	-	+	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	+	-	-	+	+	+	+	+	-
2101	*Carteria spp.*		-	-	-	-	+	-	-	+	-	-	-	-
2105	*Chlamydomonas spp.*		+	+	+	+	+	+	+	+	+	+	+	+
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-	-	-	-	-	+	-	-
2112	*Sphaerocystis schroeteri* Chodat		-	-	-	-	-	-	-	-	-	-	-	+
2121	*Oocystis lacustris* Chodat		-	-	+	+	-	-	+	-	+	+	+	+
2126	*Chodatella sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		+	-	+	-	+	-	-	-	+	+	-	-
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	+	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-	+	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa* Willen		-	-	-	-	-	-	-	-	-	-	-	-
2178	*Cosmarium sp.*		-	-	-	-	-	-	-	+	-	-	-	-
2182	*Euastrum spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2185	*Micrasterias sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2186	*Xanthidium sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2187	*Staurodesmus extensus* (Andersson) Teiling		-	-	-	+	-	-	-	-	-	-	-	-
2193	*Staurodesmus paradoxum* Meyen		-	-	-	-	-	-	-	+	-	-	-	+
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-	-	-	-	-	-	-	+
2199	*Spondylosium planum* (Wolle) W. and G.S. West		-	-	-	-	-	-	-	-	+	-	-	-
2205	*Mougeotia sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		-	-	-	-	-	-	-	-	-	-	-	-
2215	*Tetraedron caudatum* (Corda) Hansgrig		+	+	+	+	+	+	+	+	-	+	+	+
2235	*Ankistrodesmus spiralis* Lemmermann		+	+	+	+	+	+	+	+	+	+	+	+
2238	*Eudorina sp.*		-	-	-	-	-	-	-	+	-	-	+	-
2247	*Oocystis gigas* Archer		-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		+	-	+	+	-	-	+	+	-	-	+	+
	Euglenophyte													
3301	*Euglena acus* Ehrenberg		-	+	-	-	-	-	+	+	+	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4354	*Chromulina spp.*		-	-	-	-	-	-	-	-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		+	+	-	-	-	+	-	+	+	+	-	-
4357	*Chrysococcus sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		-	+	-	+	-	+	+	+	-	-	+	-
4361	*Kephyrion boreale* Skuja		-	-	-	-	+	-	+	-	-	-	-	-
4362	*Kephyrion sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********		-	+	+	+	-	+	+	-	+	-	-	+
4364	*Mallomonas caudata Ivanov*		-	-	+	+	-	-	-	-	-	-	-	-
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		-	-	+	+	-	+	+	+	-	-	+	+
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	-	-	-	-	-	+	-	-	-	-
4372	*Mallomonas tonsurata* Teiling and Krieger		+	+	-	-	-	-	-	+	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	+	-	+	-	-	-	-	-	-	-	+
4378	*Dinobryon borgei* Lemmermann		+	+	+	+	+	+	+	+	+	+	+	+
4381	*Dinobryon mucronutom* Nygaard		-	-	+	-	-	-	-	-	-	+	-	+
4383	*Dinobryon bavaricum* Imhof		-	+	-	-	-	+	-	-	-	-	-	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	-	-	+	-	-	-	-	-	-	+	+
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-	-	+	-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
4390	*Dinobryon sociale* Ehrenberg		-	-	-	-	-	-	-	+	+	+	-	-
4394	*Epiphyxis sp.*		-	-	-	-	-	-	+	-	-	-	-	-
4396	*Chrysolkos skuja* (Nauwerck) Willen		+	+	+	+	+	+	-	+	+	+	+	+
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-	-	-	-	+	-	-	-
4400	*Ochromonas sp.*		+	-	-	-	+	-	+	+	-	-	+	-
4401	*Uroglena volvox* Ehrenberg		+	+	+	+	-	-	+	+	+	+	+	+
4403	*Chrysosphaerella longispina* Lauterborn		+	-	+	-	+	-	-	-	-	+	-	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		-	-	+	-	-	-	-	-	+	-	-	-
4413	*Chrysochromulina laurentiana* Kling		+	+	+	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*		-	-	-	-	-	-	-	-	+	-	-	-
4415	*Bicoeca lacustris* Clark		-	-	-	-	-	-	-	+	+	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		+	+	+	+	-	+	+	+	+	-	+	+
4435	*Porochrysis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4436	*Dinobryon attenatum* Hill		+	-	-	+	+	+	+	+	+	-	-	+
4437	*Pteridomonas sp.*		-	-	-	-	-	-	-	+	-	-	+	+
	Diatoms													
5507	*Cyclotella stelligera* Cleve and Grunow		+	+	+	+	+	+	+	+	+	-	+	+
5508	*Cyclotella pseudostelligera*		-	-	-	-	-	-	-	-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		-	-	+	+	-	+	+	+	-	+	+	-
5511	*Rhizosolenia eriense* H.L. Smith		-	+	+	+	+	-	+	+	-	+	+	+
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	+	+	+	+	+	+	-	-	-	+	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		-	-	+	+	-	+	+	-	+	+	+	+
5518	*Synedra acus* Kutzing		-	-	+	+	+	+	+	+	+	+	+	+
5524	*Asterionella formosa* Hassall		+	+	+	+	+	+	+	+	+	+	+	+
5529	*Eunotia zazumenensis* **********		-	+	+	+	-	-	+	+	-	-	+	+
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		+	+	+	+	+	-	+	+	-	+	+	+
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica* Eulenst.		-	-	+	+	-	-	-	+	-	-	+	+
	Cryptophyes													
6554	*Rhodomonas minuta* Skuja		+	+	+	+	+	+	+	+	+	+	+	+
6558	*Cryptomonas erosa* Ehrenberg		+	+	+	+	+	+	+	+	+	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		-	-	-	-	-	-	-	-	-	-	+	-
6565	*Cryptomonas rostratiformis* Skuja		+	+	+	+	+	+	+	+	+	+	+	+
6568	*Katablepharis ovalis* Skuja		+	+	+	+	+	+	+	+	+	+	+	+
	Dinoflagellates													
7631	*Gymnodinium helveticum* Penard		-	-	-	-	-	-	-	+	+	-	-	-
7632	*Gymnodinium sp.*		+	+	-	+	+	+	-	+	-	+	+	-
7635	*Peridinium willei* Huitfeldt-Kaas		-	-	-	-	-	-	-	-	-	-	-	-
7639	*Peridinium pusillum* (Penard) Lemmermann		+	+	+	+	-	+	+	+	+	+	+	+
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-	-	-	-	+	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		+	+	+	+	+	+	+	-	+	+	+	+
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-	-	-	-	-	-	-	-
	Taxa Richness per Sample		**30**	**33**	**38**	**41**	**29**	**32**	**39**	**45**	**38**	**33**	**41**	**39**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	Species Name	Area-Replicate ID	INUG - 68S	INUG - 69S	INUG - 70S	INUG - 71S	INUG - 72S	INUG - 73S	INUG - 74S	INUG - 75S	INUG - 76S	INUG - 77S	PDL - 37S	PDL - 38S
			16-May-15	16-May-15	27-Jul-15	27-Jul-15	27-Aug-15	27-Aug-15	1-Oct-15	1-Oct-15	23-Nov-15	23-Nov-15	28-Jul-15	28-Jul-15
	Cyanophyte													
1008	*Aphanocapsa sp.*		-	-	-	-	-	+	-	-	-	-	-	-
1012	*Aphanothece sp.*		-	-	-	-	-	-	+	-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	-	-	-	-	+	-	+	+	-	-
1054	*Planktolyngbya limnetica*		-	-	-	-	+	+	+	+	-	-	-	-
1073	*Snowella sp*		-	-	-	-	-	-	-	-	-	-	-	-
1077	*Pseudoanabaena sp.*		-	-	-	-	-	-	-	+	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	-	+	+	+	-	-	-	-	-
2101	*Carteria spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*		+	+	+	+	+	+	+	+	-	-	+	-
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
2112	*Sphaerocystis schroeteri* Chodat		-	-	+	+	+	+	-	-	+	-	-	-
2121	*Oocystis lacustris* Chodat		-	-	+	-	+	+	+	+	+	+	-	-
2126	*Chodatella sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		-	-	-	-	+	+	-	-	-	+	-	-
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-	-	+	+	+	-	-	-
2167	*Elakatothrix gelatinosa* Willen		-	-	-	+	+	+	+	+	-	-	-	-
2178	*Cosmarium sp.*		-	-	-	-	-	-	+	+	-	-	-	-
2182	*Euastrum spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2185	*Micrasterias sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2186	*Xanthidium sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2187	*Staurodesmus extensus* (Andersson) Teiling		+	+	+	+	+	+	+	+	-	+	+	-
2193	*Staurodesmus paradoxum* Meyen		-	-	-	-	-	-	-	+	-	-	-	-
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-	-	-	-	-	-	-	-
2199	*Spondylosium planum* (Wolle) W. and G.S. West		-	-	-	+	+	+	-	-	-	-	-	-
2205	*Mougeotia sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		+	+	-	-	+	+	-	-	+	+	-	-
2215	*Tetraedron caudatum* (Corda) Hansgrig		-	-	-	-	-	-	+	+	-	-	+	+
2235	*Ankistrodesmus spiralis* Lemmermann		-	-	-	-	-	-	-	+	+	+	-	-
2238	*Eudorina sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2247	*Oocystis gigas* Archer		-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		-	-	-	-	-	-	-	-	-	-	-	-
	Euglenophyte													
3301	*Euglena acus* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4354	*Chromulina spp.*		-	-	-	-	-	-	-	-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		+	-	-	-	-	-	-	-	-	-	-	-
4357	*Chrysococcus sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		-	-	-	+	-	-	-	-	-	-	-	-
4361	*Kephyrion boreale* Skuja		-	-	-	-	+	+	+	+	-	-	-	-
4362	*Kephyrion sp.*		+	-	+	+	+	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********		+	+	-	+	-	-	+	+	-	+	+	+
4364	*Mallomonas caudata Ivanov*		-	-	-	-	-	-	-	-	-	-	-	-
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		+	+	+	-	+	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	+	-	-	-	+	+	-	-	-	-
4372	*Mallomonas tonsurata* Teiling and Krieger		-	-	-	-	-	-	-	-	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei* Lemmermann		-	-	+	+	+	+	+	+	+	+	+	+
4381	*Dinobryon mucronutom* Nygaard		-	-	+	+	+	+	+	+	-	-	+	-
4383	*Dinobryon bavaricum* Imhof		-	-	-	-	-	-	+	+	-	-	-	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	-	+	+	-	-	+	-	-	-	-	+
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		+	-	-	-	+	+	+	+	-	-	-	-
4390	*Dinobryon sociale* Ehrenberg		+	+	-	-	+	-	-	-	+	-	-	-
4394	*Epiphyxis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4396	*Chrysolkos skuja* (Nauwerck) Willen		+	+	+	+	-	+	+	+	-	-	-	+
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
4400	*Ochromonas sp.*		-	-	-	+	-	-	-	-	+	-	-	-
4401	*Uroglena volvox* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
4403	*Chrysosphaerella longispina* Lauterborn		-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		-	-	+	-	+	+	+	+	-	-	-	-
4413	*Chrysochromulina laurentiana* Kling		+	+	+	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*		-	-	+	+	+	+	+	+	-	-	+	+
4415	*Bicoeca lacustris* Clark		-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		+	-	-	-	+	+	+	+	+	+	+	-
4435	*Porochrysis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4436	*Dinobryon attenatum* Hill		-	-	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*		-	-	-	-	-	-	-	-	-	-	-	-
	Diatoms													
5507	*Cyclotella stelligera* Cleve and Grunow		+	+	+	+	+	+	+	+	+	+	+	-
5508	*Cyclotella pseudostelligera*		-	-	-	-	-	-	-	-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		+	+	+	+	+	+	+	+	+	+	+	+
5511	*Rhizosolenia eriense* H.L. Smith		-	-	+	+	+	+	+	+	-	+	+	+
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	-	-	-	-	-	-	+	-	-	-	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		-	-	-	-	+	+	+	+	-	+	-	-
5518	*Synedra acus* Kutzing		-	-	+	+	+	+	+	+	+	+	+	+
5524	*Asterionella formosa* Hassall		-	-	-	-	-	+	-	-	-	-	-	-
5529	*Eunotia zazumenensis* **********		-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		-	-	-	-	-	-	-	-	-	-	+	-
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica* Eulenst.		-	-	-	-	-	-	-	-	-	-	-	-
	Cryptophyes													
6554	*Rhodomonas minuta* Skuja		+	+	+	+	+	+	+	+	+	+	+	+
6558	*Cryptomonas erosa* Ehrenberg		+	+	+	+	+	-	+	+	+	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		-	-	+	+	-	-	-	-	-	-	+	-
6565	*Cryptomonas rostratiformis* Skuja		-	-	-	+	-	-	-	-	-	-	-	-
6568	*Katablepharis ovalis* Skuja		-	-	+	+	-	-	+	+	-	-	+	+
	Dinoflagellates													
7631	*Gymnodinium helveticum* Penard		+	-	-	-	-	-	-	-	-	+	-	-
7632	*Gymnodinium sp.*		+	+	+	-	+	-	+	+	+	+	+	-
7635	*Peridinium willei* Huitfeldt-Kaas		+	-	+	+	-	-	-	-	-	-	-	-
7639	*Peridinium pusillum* (Penard) Lemmermann		+	-	-	+	-	+	+	-	-	-	+	+
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-	-	-	-	-	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		+	-	-	-	-	-	-	-	-	-	+	+
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-	-	-	-	-	-	-	-
	Taxa Richness per Sample		**25**	**17**	**28**	**30**	**33**	**33**	**39**	**38**	**22**	**24**	**26**	**20**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	Species Name	Area-Replicate ID	PDL - 39S	PDL - 40S	PDL - 41S	SP - 80S	SP - 81S	SP - 82S	SP - 83S	SP - 84S	SP - 85S	SP - 86S	SP - 87S	SP - 88S
			26-Aug-15	26-Aug-15	4-Oct-15	17-May-15	17-May-15	15-Jul-15	15-Jul-15	13-Aug-15	13-Aug-15	6-Sep-15	6-Sep-15	2-Nov-15
	Cyanophyte													
1008	*Aphanocapsa sp.*		-	-	-	-	-	-	-	-	+	-	+	-
1012	*Aphanothece sp.*		+	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	-	-	-	-	-	-	+	-	-	-
1054	*Planktolyngbya limnetica*		+	+	+	-	-	-	-	-	+	-	-	-
1073	*Snowella sp*		-	-	-	-	-	-	-	-	-	-	-	-
1077	*Pseudoanabaena sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	-	-	-	-	-	-	-	-	-
2101	*Carteria spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*		+	-	+	-	-	+	+	+	-	+	+	+
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
2112	*Sphaerocystis schroeteri* Chodat		+	+	+	-	-	-	-	-	-	-	-	-
2121	*Oocystis lacustris* Chodat		+	-	+	-	-	+	+	+	+	+	+	+
2126	*Chodatella sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	+	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		-	+	+	-	-	+	+	+	+	+	-	+
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa* Willen		+	+	+	-	-	+	+	+	-	-	-	+
2178	*Cosmarium sp.*		-	-	-	-	-	-	-	-	+	+	-	-
2182	*Euastrum spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2185	*Micrasterias sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2186	*Xanthidium sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2187	*Staurodesmus extensus* (Andersson) Teiling		-	+	-	-	-	-	+	+	-	+	+	+
2193	*Staurodesmus paradoxum* Meyen		+	+	-	-	-	-	-	-	-	-	-	-
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-	-	-	-	-	-	-	-
2199	*Spondylosium planum* (Wolle) W. and G.S. West		-	+	-	-	-	-	-	-	+	-	-	-
2205	*Mougeotia sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		-	+	-	-	-	-	-	-	+	+	+	+
2215	*Tetraedron caudatum* (Corda) Hansgrig		-	+	-	-	-	+	+	+	+	+	+	-
2235	*Ankistrodesmus spiralis* Lemmermann		+	+	+	-	-	-	+	-	-	+	+	+
2238	*Eudorina sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2247	*Oocystis gigas* Archer		-	+	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		-	-	-	-	-	-	-	-	-	-	-	-
	Euglenophyte													
3301	*Euglena acus* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*		+	+	+	+	+	+	+	+	+	+	-	+
4354	*Chromulina spp.*		-	-	-	-	-	-	-	-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		-	-	+	+	+	+	+	-	-	-	+	-
4357	*Chrysococcus sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		-	-	-	-	-	-	-	+	-	-	-	+
4361	*Kephyrion boreale* Skuja		+	-	-	-	-	+	-	+	-	-	+	+
4362	*Kephyrion sp.*		+	+	+	+	+	+	+	+	+	+	+	-
4363	*Spinifiromonas sirratus***********		+	-	-	+	+	+	-	-	-	+	-	-
4364	*Mallomonas caudata Ivanov*		-	-	-	-	-	-	-	-	-	-	-	-
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		-	-	-	-	+	+	-	+	-	-	-	+
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	-	-	-	-	-	-	-	-	+	-
4372	*Mallomonas tonsurata* Teiling and Krieger		-	-	-	-	-	-	-	-	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei* Lemmermann		+	+	+	-	+	-	+	+	+	+	+	-
4381	*Dinobryon mucronutom* Nygaard		+	+	-	-	-	+	+	+	+	+	+	-
4383	*Dinobryon bavaricum* Imhof		-	-	-	-	-	-	-	-	-	-	-	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	-	+	-	-	-	-	-	-	-	-	-
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		-	-	-	-	-	-	-	-	-	+	-	-
4390	*Dinobryon sociale* Ehrenberg		+	-	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4396	*Chrysolkos skuja* (Nauwerck) Willen		+	+	+	+	+	+	+	+	+	+	+	+
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
4400	*Ochromonas sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4401	*Uroglena volvox* Ehrenberg		+	+	-	-	-	+	-	-	-	-	-	-
4403	*Chrysosphaerella longispina* Lauterborn		-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		-	-	-	-	-	-	-	-	-	-	+	-
4413	*Chrysochromulina laurentiana* Kling		+	+	+	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*		+	+	+	-	-	-	-	+	+	+	+	-
4415	*Bicoeca lacustris* Clark		-	-	-	-	-	-	-	+	-	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		-	-	+	+	-	-	+	-	-	+	+	+
4435	*Porochrysis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4436	*Dinobryon attenatum* Hill		-	-	-	-	-	-	+	-	-	-	-	-
4437	*Pteridomonas sp.*		-	-	-	-	-	-	-	-	-	-	-	-
	Diatoms													
5507	*Cyclotella stelligera* Cleve and Grunow		+	+	+	+	+	+	+	+	+	+	+	+
5508	*Cyclotella pseudostelligera*		-	-	-	-	-	-	-	-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		+	+	+	-	-	+	+	+	+	+	+	+
5511	*Rhizosolenia eriense* H.L. Smith		+	+	-	-	-	-	-	+	-	-	-	-
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	-	-	+	-	-	-	-	-	-	-	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		-	-	-	-	-	-	-	+	-	-	-	-
5518	*Synedra acus* Kutzing		+	+	+	+	+	+	+	+	+	+	+	+
5524	*Asterionella formosa* Hassall		-	-	-	-	-	-	-	-	-	-	-	-
5529	*Eunotia zazumenensis* **********		-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	-	+	+	+	+	+	+	+
5720	*Cyclotella bodanica* Eulenst.		-	+	+	-	-	+	+	+	+	+	+	+
	Cryptophyes													
6554	*Rhodomonas minuta* Skuja		+	+	+	+	+	+	+	+	+	+	+	+
6558	*Cryptomonas erosa* Ehrenberg		+	+	+	+	+	+	+	+	-	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		-	-	-	-	-	-	-	-	-	+	+	+
6565	*Cryptomonas rostratiformis* Skuja		-	-	-	-	+	+	+	-	-	-	-	+
6568	*Katablepharis ovalis* Skuja		+	-	-	-	-	+	-	-	-	+	+	+
	Dinoflagellates													
7631	*Gymnodinium helveticum* Penard		-	-	+	-	-	+	+	-	-	-	-	+
7632	*Gymnodinium sp.*		+	+	-	+	+	-	+	+	-	+	+	-
7635	*Peridinium willei* Huitfeldt-Kaas		-	-	-	-	+	+	-	-	-	-	-	+
7639	*Peridinium pusillum* (Penard) Lemmermann		+	-	-	+	+	-	+	+	+	+	+	+
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-	-	+	-	-	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		-	-	-	-	-	+	-	-	-	-	-	-
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-	-	-	-	-	-	-	-
	Taxa Richness per Sample		**31**	**30**	**27**	**17**	**18**	**29**	**30**	**30**	**25**	**31**	**31**	**29**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	Species Name	Area-Replicate ID	SP - 89S	TE - 80S	TE - 81S	TE - 82S	TE - 83S	TE - 84S	TE - 85S	TE - 86S	TE - 87S	TE - 88S	TE - 89S	TEFF - 37S
			2-Nov-15	14-May-15	14-May-15	27-Jul-15	27-Jul-15	28-Aug-15	28-Aug-15	4-Oct-15	4-Oct-15	21-Nov-15	21-Nov-15	27-Jul-15
	Cyanophyte													
1008	*Aphanocapsa sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	-	-	+	+	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*		-	-	-	-	-	+	-	+	+	+	+	-
1073	*Snowella sp*		-	-	-	-	-	-	-	+	-	-	-	-
1077	*Pseudoanabaena sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	-	-	+	-	-	+	-	-	-
2101	*Carteria spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*		+	+	-	+	+	-	+	+	+	-	+	+
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
2112	*Sphaerocystis schroeteri* Chodat		-	-	-	-	-	-	-	+	-	-	-	+
2121	*Oocystis lacustris* Chodat		+	-	-	+	+	+	+	+	+	+	-	-
2126	*Chodatella sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		+	-	-	-	-	+	+	+	+	+	+	+
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		-	-	-	+	+	-	-	-	-	-	-	+
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa* Willen		-	-	-	+	+	-	-	+	-	-	-	+
2178	*Cosmarium sp.*		-	-	-	+	-	-	-	-	-	-	-	-
2182	*Euastrum spp.*		-	-	-	+	-	-	-	-	-	-	-	-
2185	*Micrasterias sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2186	*Xanthidium sp.*		-	-	-	-	-	-	+	-	-	-	-	-
2187	*Staurodesmus extensus* (Andersson) Teiling		-	-	-	-	+	-	+	-	+	-	-	+
2193	*Staurodesmus paradoxum* Meyen		-	-	-	-	-	-	-	-	+	-	-	-
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-	-	-	-	-	-	-	-
2199	*Spondylosium planum* (Wolle) W. and G.S. West		-	-	-	-	-	+	-	+	-	-	-	+
2205	*Mougeotia sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		+	-	-	-	-	-	+	-	-	+	+	+
2215	*Tetraedron caudatum* (Corda) Hansgrig		-	-	-	+	+	+	+	-	+	-	-	-
2235	*Ankistrodesmus spiralis* Lemmermann		-	-	-	-	-	+	+	-	-	+	-	-
2238	*Eudorina sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2247	*Oocystis gigas* Archer		-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		-	-	-	-	-	-	-	-	-	-	-	-
	Euglenophyte													
3301	*Euglena acus* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4354	*Chromulina spp.*		-	-	-	-	-	+	-	-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		-	-	-	-	-	-	-	+	-	-	-	-
4357	*Chrysococcus sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		-	-	-	-	-	+	-	-	-	+	+	-
4361	*Kephyrion boreale* Skuja		-	-	-	-	-	-	-	-	+	+	-	+
4362	*Kephyrion sp.*		+	+	+	+	+	+	+	+	+	+	-	+
4363	*Spinifiromonas sirratus***********		-	-	-	+	-	-	-	+	+	-	-	+
4364	*Mallomonas caudata Ivanov*		-	-	-	-	-	-	-	-	-	-	-	-
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		+	-	+	-	-	-	-	-	-	-	-	+
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	-	-	-	-	-	-	+	-	-	-
4372	*Mallomonas tonsurata* Teiling and Krieger		-	-	-	-	-	-	-	-	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei* Lemmermann		-	-	-	+	+	+	+	+	+	+	+	+
4381	*Dinobryon mucronutom* Nygaard		-	-	-	+	+	+	+	+	+	+	+	+
4383	*Dinobryon bavaricum* Imhof		-	-	-	-	-	+	-	-	-	-	-	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	-	-	-	-	-	-	+	+	-	-	-
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		-	+	+	-	-	+	+	+	-	-	-	-
4390	*Dinobryon sociale* Ehrenberg		-	+	+	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*		-	-	-	-	-	-	+	-	+	-	-	+
4396	*Chrysolkos skuja* (Nauwerck) Willen		-	+	+	+	+	+	+	+	+	-	-	+
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
4400	*Ochromonas sp.*		+	-	-	-	-	-	-	-	-	+	-	-
4401	*Uroglena volvox* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
4403	*Chrysosphaerella longispina* Lauterborn		-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		-	-	-	+	+	+	+	+	+	-	-	-
4413	*Chrysochromulina laurentiana* Kling		+	+	-	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*		-	-	-	+	+	+	+	+	+	-	-	-
4415	*Bicoeca lacustris* Clark		-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		+	+	+	-	+	+	-	+	+	+	-	+
4435	*Porochrysis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4436	*Dinobryon attenatum* Hill		-	-	-	+	+	-	-	-	-	-	-	+
4437	*Pteridomonas sp.*		-	-	-	-	-	-	-	-	-	-	-	-
	Diatoms													
5507	*Cyclotella stelligera* Cleve and Grunow		+	-	+	+	+	+	+	+	+	+	+	+
5508	*Cyclotella pseudostelligera*		-	-	-	-	-	-	-	-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		+	-	-	+	+	+	+	+	+	+	+	+
5511	*Rhizosolenia eriense* H.L. Smith		-	+	-	-	+	-	-	+	+	-	+	+
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	+	-	-	-	-	-	-	-	-	-	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		-	-	-	-	+	-	+	+	-	-	-	-
5518	*Synedra acus* Kutzing		+	-	-	+	+	+	+	+	+	+	+	+
5524	*Asterionella formosa* Hassall		-	-	-	-	-	-	+	-	-	-	-	-
5529	*Eunotia zazumenensis* **********		-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica* Eulenst.		+	-	-	-	-	+	+	-	+	-	-	-
	Cryptophyes													
6554	*Rhodomonas minuta* Skuja		+	+	+	+	+	+	-	+	+	+	+	-
6558	*Cryptomonas erosa* Ehrenberg		+	+	+	+	+	+	+	+	+	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		-	-	-	+	+	+	-	+	-	-	-	-
6565	*Cryptomonas rostratiformis* Skuja		+	+	+	+	+	-	-	+	+	-	-	-
6568	*Katablepharis ovalis* Skuja		-	-	+	+	+	-	-	+	+	-	+	+
	Dinoflagellates													
7631	*Gymnodinium helveticum* Penard		+	-	-	-	-	-	-	-	-	-	-	-
7632	*Gymnodinium sp.*		-	+	-	+	-	+	+	+	-	+	+	+
7635	*Peridinium willei* Huitfeldt-Kaas		+	-	-	-	+	-	-	-	-	-	+	-
7639	*Peridinium pusillum* (Penard) Lemmermann		+	-	-	+	+	+	+	+	+	+	+	+
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-	-	-	-	-	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		-	-	-	-	-	-	-	-	-	-	-	+
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-	-	-	-	-	-	-	-
	Taxa Richness per Sample		**23**	**17**	**15**	**30**	**32**	**33**	**30**	**36**	**35**	**24**	**22**	**32**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	Species Name	Area-Replicate ID	TEFF - 38S 27-Jul-15	TEFF - 39S 28-Aug-15	TEFF - 40S 28-Aug-15	TEFF - 41S 4-Oct-15	TEFF - 42S 4-Oct-15	TPE - 80S 15-May-15	TPE - 81S 15-May-15	TPE - 82S 15-Jul-15	TPE - 83S 15-Jul-15	TPE - 84S 29-Aug-15	TPE - 85S 29-Aug-15	TPE - 86S 27-Sep-15
	Cyanophyte													
1008	*Aphanocapsa sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	+	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*		-	+	+	+	+	-	-	-	-	+	+	+
1073	*Snowella sp*		-	-	-	-	-	-	-	-	-	-	-	-
1077	*Pseudoanabaena sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	-	-	-	-	-	-	-	-	-
2101	*Carteria spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*		+	-	+	+	+	-	-	-	+	-	+	+
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
2112	*Sphaerocystis schroeteri* Chodat		+	+	-	+	-	-	-	-	-	-	+	+
2121	*Oocystis lacustris* Chodat		-	+	-	+	+	-	+	+	+	+	+	+
2126	*Chodatella sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		-	+	+	+	+	-	-	+	+	+	+	-
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		+	-	-	-	-	+	-	-	-	-	-	-
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-	-	-	-	-	-	+	-
2167	*Elakatothrix gelatinosa* Willen		+	-	-	-	-	+	+	-	-	+	+	+
2178	*Cosmarium sp.*		+	-	-	-	+	-	-	-	-	-	-	-
2182	*Euastrum spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2185	*Micrasterias sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2186	*Xanthidium sp.*		-	+	-	-	-	-	-	-	-	-	-	-
2187	*Staurodesmus extensus* (Andersson) Teiling		+	-	-	+	+	-	-	-	+	+	-	+
2193	*Staurodesmus paradoxum* Meyen		+	-	-	-	-	-	-	-	-	-	-	-
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-	-	-	-	-	-	-	-
2199	*Spondylosium planum* (Wolle) W. and G.S. West		-	+	+	+	+	-	-	-	-	-	-	-
2205	*Mougeotia sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		+	-	+	+	+	-	-	-	-	-	+	+
2215	*Tetraedron caudatum* (Corda) Hansgrig		-	-	+	+	-	-	+	+	+	+	+	+
2235	*Ankistrodesmus spiralis* Lemmermann		-	+	-	+	+	-	-	+	+	+	+	+
2238	*Eudorina sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2247	*Oocystis gigas* Archer		-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		-	-	-	-	-	-	-	-	-	-	-	-
	Euglenophyte													
3301	*Euglena acus* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*		+	+	-	+	+	+	+	+	+	-	+	+
4354	*Chromulina spp.*		-	-	-	-	-	-	-	-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		-	-	-	-	+	+	-	-	+	-	+	-
4357	*Chrysococcus sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		+	+	+	-	-	-	-	-	-	-	-	-
4361	*Kephyrion boreale* Skuja		+	+	-	+	+	-	-	+	-	-	-	-
4362	*Kephyrion sp.*		+	+	+	-	-	+	+	+	+	-	+	-
4363	*Spinifiromonas sirratus***********		-	-	+	+	+	-	-	+	-	-	+	-
4364	*Mallomonas caudata Ivanov*		-	-	-	-	-	-	-	-	-	-	-	-
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		-	-	-	+	-	-	-	-	-	-	+	+
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	-	-	-	-	-	-	-	-	-	-
4372	*Mallomonas tonsurata* Teiling and Krieger		-	-	-	-	-	-	-	-	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei* Lemmermann		+	+	+	+	+	-	-	-	+	+	+	+
4381	*Dinobryon mucronutom* Nygaard		+	+	+	+	+	-	-	-	+	+	+	+
4383	*Dinobryon bavaricum* Imhof		-	-	+	-	-	-	-	-	-	-	+	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	+	+	-	-	-	-	-	-	+	-	-
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		-	-	-	-	+	+	-	-	-	-	-	+
4390	*Dinobryon sociale* Ehrenberg		-	-	-	-	-	+	+	-	-	-	-	-
4394	*Epiphyxis sp.*		-	-	+	-	+	-	-	-	-	-	-	-
4396	*Chrysolkos skuja* (Nauwerck) Willen		+	+	+	+	+	-	-	+	+	+	+	+
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
4400	*Ochromonas sp.*		-	-	-	-	-	-	-	-	-	-	-	+
4401	*Uroglena volvox* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
4403	*Chrysosphaerella longispina* Lauterborn		-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		+	-	-	-	-	-	-	-	-	-	+	+
4413	*Chrysochromulina laurentiana* Kling		+	+	+	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*		-	-	+	+	+	-	-	-	-	+	+	+
4415	*Bicoeca lacustris* Clark		-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		+	-	-	+	+	+	+	+	+	-	-	-
4435	*Porochrysis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4436	*Dinobryon attenatum* Hill		+	-	+	-	-	-	-	+	-	+	-	-
4437	*Pteridomonas sp.*		-	-	-	-	-	-	-	-	-	-	-	-
	Diatoms													
5507	*Cyclotella stelligera* Cleve and Grunow		+	+	-	+	+	+	+	+	+	+	+	+
5508	*Cyclotella pseudostelligera*		-	-	-	+	-	-	-	-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		+	+	+	-	+	-	-	-	+	+	+	+
5511	*Rhizosolenia eriense* H.L. Smith		+	+	+	+	+	-	-	-	-	-	-	-
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	-	-	-	-	-	-	-	+	-	-	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		-	-	-	+	+	-	-	-	-	-	-	-
5518	*Synedra acus* Kutzing		+	+	+	+	+	-	-	+	+	+	+	+
5524	*Asterionella formosa* Hassall		-	-	-	-	-	-	-	-	+	-	-	-
5529	*Eunotia zazumenensis* **********		-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica* Eulenst.		-	-	-	-	-	-	-	-	-	-	-	-
	Cryptophyes													
6554	*Rhodomonas minuta* Skuja		+	+	+	+	+	+	+	+	+	-	+	+
6558	*Cryptomonas erosa* Ehrenberg		+	+	-	+	+	+	+	+	+	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		+	-	-	-	-	-	-	-	-	-	+	-
6565	*Cryptomonas rostratiformis* Skuja		-	-	-	-	-	-	-	-	-	-	+	+
6568	*Katablepharis ovalis* Skuja		+	+	+	+	-	+	+	-	-	-	+	-
	Dinoflagellates													
7631	*Gymnodinium helveticum* Penard		-	-	-	+	-	-	-	+	-	-	-	-
7632	*Gymnodinium sp.*		-	+	+	-	+	-	+	-	+	-	-	-
7635	*Peridinium willei* Huitfeldt-Kaas		-	-	-	-	-	-	-	-	-	-	-	-
7639	*Peridinium pusillum* (Penard) Lemmermann		+	+	-	-	-	+	+	-	+	+	+	+
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-	-	-	-	-	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		-	-	-	-	-	+	-	+	+	-	-	-
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-	-	-	-	-	-	-	-
	Taxa Richness per Sample		**31**	**28**	**28**	**32**	**32**	**18**	**17**	**21**	**27**	**22**	**34**	**29**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	Species Name	Area-Replicate ID	TPE - 87S 27-Sep-15	TPE - 88S 13-Nov-15	TPE - 89S 13-Nov-15	TPN - 80S 16-May-15	TPN - 81S 16-May-15	TPN - 82S 24-Jul-15	TPN - 83S 24-Jul-15	TPN - 84S 29-Aug-15	TPN - 85S 29-Aug-15	TPN - 86S 27-Sep-15	TPN - 87S 27-Sep-15	TPN - 88S 13-Nov-15
	Cyanophyte													
1008	*Aphanocapsa sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*		+	+	+	-	-	-	-	+	-	-	-	+
1073	*Snowella sp*		-	-	-	-	-	-	-	-	-	-	-	-
1077	*Pseudoanabaena sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	-	-	-	-	-	-	-	-	-
2101	*Carteria spp.*		-	-	-	-	-	+	-	-	-	-	-	-
2105	*Chlamydomonas spp.*		+	+	+	-	-	+	+	+	+	+	+	+
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
2112	*Sphaerocystis schroeteri* Chodat		+	-	-	-	-	-	+	-	-	+	+	-
2121	*Oocystis lacustris* Chodat		+	+	+	-	-	-	-	+	+	+	+	+
2126	*Chodatella sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		-	+	+	-	-	-	-	+	+	+	+	+
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa* Willen		+	-	-	-	-	-	+	-	+	-	-	+
2178	*Cosmarium sp.*		-	-	-	-	-	-	-	-	+	-	-	-
2182	*Euastrum spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2185	*Micrasterias sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2186	*Xanthidium sp.*		-	-	-	-	-	-	-	+	+	-	+	-
2187	*Staurodesmus extensus* (Andersson) Teiling		-	-	-	-	-	-	-	-	-	-	-	-
2193	*Staurodesmus paradoxum* Meyen		-	-	-	-	-	-	-	-	-	-	-	-
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-	-	-	-	-	-	-	-
2199	*Spondylosium planum* (Wolle) W. and G.S. West		-	-	-	-	-	-	-	+	+	-	+	-
2205	*Mougeotia sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		+	-	-	-	-	-	-	-	-	+	+	-
2215	*Tetraedron caudatum* (Corda) Hansgrig		+	-	+	-	-	-	-	+	+	+	+	-
2235	*Ankistrodesmus spiralis* Lemmermann		+	+	+	-	-	-	-	-	-	+	-	+
2238	*Eudorina sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2247	*Oocystis gigas* Archer		-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		-	-	-	-	-	-	-	-	-	-	-	-
	Euglenophyte													
3301	*Euglena acus* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*		-	+	+	+	+	+	+	+	+	-	+	+
4354	*Chromulina spp.*		-	-	-	-	-	-	-	-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		-	-	+	+	+	-	-	+	+	-	-	-
4357	*Chrysococcus sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		-	-	-	-	-	-	-	+	-	-	-	-
4361	*Kephyrion boreale* Skuja		+	-	+	-	-	-	-	+	+	+	+	-
4362	*Kephyrion sp.*		+	-	+	+	+	+	+	+	+	+	+	-
4363	*Spinifiromonas sirratus***********		+	-	-	-	+	+	+	+	-	-	-	+
4364	*Mallomonas caudata Ivanov*		-	+	-	-	-	-	-	-	-	-	-	+
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		-	-	-	+	+	-	+	-	-	-	-	-
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	-	-	-	-	-	-	-	-	-	-
4372	*Mallomonas tonsurata* Teiling and Krieger		-	-	-	-	-	-	-	-	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei* Lemmermann		+	-	+	-	-	+	+	+	+	+	+	-
4381	*Dinobryon mucronutom* Nygaard		-	-	+	-	-	+	-	+	+	+	-	-
4383	*Dinobryon bavaricum* Imhof		-	-	-	-	-	-	-	-	-	-	-	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	-	-	-	-	-	-	-	-	-	-	-
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		+	-	+	+	-	-	-	+	-	-	-	+
4390	*Dinobryon sociale* Ehrenberg		-	-	-	-	+	-	-	-	-	-	+	-
4394	*Epiphyxis sp.*		+	-	-	-	-	-	+	-	-	-	-	-
4396	*Chrysolkos skuja* (Nauwerck) Willen		+	-	-	+	+	+	+	+	+	+	+	-
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
4400	*Ochromonas sp.*		-	-	+	-	-	-	-	-	-	-	-	-
4401	*Uroglena volvox* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
4403	*Chrysosphaerella longispina* Lauterborn		-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		-	-	-	-	-	-	-	-	-	-	-	-
4413	*Chrysochromulina laurentiana* Kling		+	+	+	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*		+	-	-	-	-	+	+	-	+	+	+	-
4415	*Bicoeca lacustris* Clark		-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		+	+	+	-	-	+	-	-	-	+	+	+
4435	*Porochrysis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4436	*Dinobryon attenatum* Hill		-	-	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*		-	-	-	-	-	-	-	-	-	-	-	-
	Diatoms													
5507	*Cyclotella stelligera* Cleve and Grunow		+	+	+	-	+	+	-	-	-	+	+	+
5508	*Cyclotella pseudostelligera*		-	-	-	-	-	-	-	-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		+	-	+	-	-	+	+	+	+	+	+	+
5511	*Rhizosolenia eriense* H.L. Smith		-	-	-	-	-	-	-	-	-	-	-	-
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	-	-	-	-	-	-	-	-	-	-	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		+	-	-	-	-	-	-	-	-	-	-	-
5518	*Synedra acus* Kutzing		+	+	+	-	-	+	+	+	+	+	+	+
5524	*Asterionella formosa* Hassall		-	-	-	-	-	-	-	-	-	-	-	-
5529	*Eunotia zazumenensis* **********		-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	-	+	+	+	+	+	+	+
5720	*Cyclotella bodanica* Eulenst.		+	-	-	-	-	-	-	-	-	+	+	-
	Cryptophyes													
6554	*Rhodomonas minuta* Skuja		+	-	-	+	+	+	+	+	+	+	+	-
6558	*Cryptomonas erosa* Ehrenberg		+	+	+	+	+	+	+	+	+	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		-	-	-	-	-	-	-	+	+	-	-	-
6565	*Cryptomonas rostratiformis* Skuja		+	+	-	-	-	+	+	-	+	+	-	+
6568	*Katablepharis ovalis* Skuja		-	+	+	-	-	+	-	+	+	+	+	-
	Dinoflagellates													
7631	*Gymnodinium helveticum* Penard		+	-	-	-	+	-	-	+	-	-	-	-
7632	*Gymnodinium sp.*		-	-	-	-	+	-	-	-	-	-	+	+
7635	*Peridinium willei* Huitfeldt-Kaas		-	-	-	-	-	+	-	-	-	-	-	-
7639	*Peridinium pusillum* (Penard) Lemmermann		-	+	+	+	-	+	+	+	+	+	+	-
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-	-	-	-	-	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		-	-	-	-	-	+	+	-	+	-	-	-
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-	-	-	-	-	-	-	-
	Taxa Richness per Sample		**30**	**18**	**25**	**13**	**15**	**24**	**22**	**29**	**29**	**27**	**29**	**21**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	Species Name	Area-Replicate ID	TPN - 89S	TPS - 49S	TPS - 50S	TPS - 51S	TPS - 52S	TPS - 53S	TPS - 54S	WAL - 49S	WAL - 50S	WAL - 51S	WAL - 52S	WAL - 53S
			13-Nov-15	24-Jul-15	24-Jul-15	14-Aug-15	14-Aug-15	27-Sep-15	27-Sep-15	15-May-15	15-May-15	19-Jul-15	19-Jul-15	19-Aug-15
	Cyanophyte													
1008	*Aphanocapsa sp.*		-	-	-	-	-	-	-	-	-	+	-	-
1012	*Aphanothece sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*		+	-	-	-	-	-	-	-	-	-	-	+
1073	*Snowella sp*		-	-	-	-	-	-	-	-	-	-	-	+
1077	*Pseudoanabaena sp.*		-	-	-	-	-	-	-	-	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	-	-	-	-	+	-	-	-	+
2101	*Carteria spp.*		-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*		-	+	+	+	+	+	-	-	-	+	+	+
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
2112	*Sphaerocystis schroeteri* Chodat		-	-	-	+	+	+	+	-	-	-	-	+
2121	*Oocystis lacustris* Chodat		+	+	-	+	+	+	+	-	-	-	+	+
2126	*Chodatella sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		+	-	-	-	-	+	+	-	-	+	-	+
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	+	-
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa* Willen		+	+	+	+	-	-	+	-	-	+	+	+
2178	*Cosmarium sp.*		-	-	-	-	-	-	-	-	-	-	-	+
2182	*Euastrum spp.*		-	-	-	-	+	-	-	-	-	-	-	-
2185	*Micrasterias sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2186	*Xanthidium sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2187	*Staurodesmus extensus* (Andersson) Teiling		-	-	-	-	+	-	-	-	-	-	+	+
2193	*Staurodesmus paradoxum* Meyen		-	-	-	-	-	-	-	-	-	-	-	-
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-	-	-	-	-	-	-	-
2199	*Spondylosium planum* (Wolle) W. and G.S. West		-	-	+	+	+	+	+	-	-	+	+	+
2205	*Mougeotia sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		-	-	+	+	+	-	+	-	-	+	+	+
2215	*Tetraedron caudatum* (Corda) Hansgrig		-	-	-	-	-	+	+	+	+	+	+	+
2235	*Ankistrodesmus spiralis* Lemmermann		+	-	-	-	-	+	+	-	-	-	-	+
2238	*Eudorina sp.*		-	-	-	-	-	-	-	-	-	-	-	-
2247	*Oocystis gigas* Archer		-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		-	-	-	-	-	-	-	-	-	-	-	-
	Euglenophyte													
3301	*Euglena acus* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*		+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*		+	+	+	+	+	+	-	+	+	+	+	+
4354	*Chromulina spp.*		-	-	-	-	-	-	-	-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		-	-	-	-	+	-	-	-	-	-	-	+
4357	*Chrysococcus sp.*		+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		-	+	+	+	+	-	-	-	-	+	+	+
4361	*Kephyrion boreale* Skuja		-	-	+	+	+	-	-	-	-	+	-	-
4362	*Kephyrion sp.*		+	+	+	+	+	+	+	-	-	+	+	+
4363	*Spinifiromonas sirratus***********		-	+	+	-	-	-	-	-	-	+	-	-
4364	*Mallomonas caudata Ivanov*		-	-	-	-	-	-	-	-	-	-	-	-
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		-	-	-	-	+	-	+	-	-	+	+	+
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	-	-	-	-	-	-	-	-	-	-
4372	*Mallomonas tonsurata* Teiling and Krieger		-	-	-	-	-	-	-	-	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei* Lemmermann		-	+	+	+	+	+	+	-	-	+	+	+
4381	*Dinobryon mucronutom* Nygaard		-	-	-	+	+	+	+	-	-	+	+	+
4383	*Dinobryon bavaricum* Imhof		-	-	-	-	-	-	-	-	-	-	-	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	-	-	-	-	-	-	-	-	-	-	+
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		+	-	-	-	-	-	+	+	-	-	-	-
4390	*Dinobryon sociale* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*		-	-	-	-	-	+	-	-	-	-	-	-
4396	*Chrysolkos skuja* (Nauwerck) Willen		-	+	+	+	+	+	+	+	+	+	+	-
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-	-	-	-	-	-	-	-
4400	*Ochromonas sp.*		-	-	-	-	-	+	-	-	-	-	-	-
4401	*Uroglena volvox* Ehrenberg		-	-	-	-	-	-	-	-	-	+	+	-
4403	*Chrysosphaerella longispina* Lauterborn		-	-	-	-	-	-	-	-	-	-	+	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		-	-	-	+	+	-	-	-	-	+	+	+
4413	*Chrysochromulina laurentiana* Kling		+	+	+	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*		+	-	+	-	-	+	+	-	-	+	+	+
4415	*Bicoeca lacustris* Clark		-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		+	+	+	+	+	+	+	+	+	-	+	+
4435	*Porochrysis sp.*		-	-	-	-	-	-	-	-	-	-	-	-
4436	*Dinobryon attenatum* Hill		-	+	-	-	-	+	-	-	-	+	+	-
4437	*Pteridomonas sp.*		-	-	-	-	-	-	-	-	-	-	-	-
	Diatoms													
5507	*Cyclotella stelligera* Cleve and Grunow		+	-	+	+	+	+	+	+	+	+	+	+
5508	*Cyclotella pseudostelligera*		-	-	-	-	-	-	-	-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		-	-	+	+	+	+	+	-	-	+	+	+
5511	*Rhizosolenia eriense* H.L. Smith		-	-	-	+	-	-	-	-	-	-	-	-
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	-	-	-	-	-	-	-	+	-	-	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		-	-	-	-	-	+	+	-	-	-	-	+
5518	*Synedra acus* Kutzing		+	-	+	-	+	+	+	+	+	+	+	+
5524	*Asterionella formosa* Hassall		-	-	-	-	-	-	-	-	-	-	-	-
5529	*Eunotia zazumenensis* **********		-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	+	+	+	+	-	+	+	+
5720	*Cyclotella bodanica* Eulenst.		-	-	-	+	-	-	-	-	-	-	-	+
	Cryptophyes													
6554	*Rhodomonas minuta* Skuja		+	+	+	+	+	+	+	+	+	+	+	+
6558	*Cryptomonas erosa* Ehrenberg		+	+	+	+	+	+	+	+	+	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-	-	-	-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		-	+	+	+	-	+	-	+	+	+	+	+
6565	*Cryptomonas rostratiformis* Skuja		-	+	+	+	+	+	+	+	-	-	+	+
6568	*Katablepharis ovalis* Skuja		-	+	-	+	+	+	+	+	+	+	-	+
	Dinoflagellates													
7631	*Gymnodinium helveticum* Penard		-	-	-	-	+	-	-	-	-	-	-	-
7632	*Gymnodinium sp.*		+	+	+	+	-	+	-	-	-	-	-	+
7635	*Peridinium willei* Huitfeldt-Kaas		-	-	-	-	-	-	-	-	-	+	-	-
7639	*Peridinium pusillum* (Penard) Lemmermann		+	+	+	+	+	+	+	+	+	+	+	-
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-	-	-	-	-	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		-	+	+	+	+	-	-	-	+	-	+	-
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-	+	-	-	-	-	-	-
	Taxa Richness per Sample		**20**	**23**	**27**	**31**	**32**	**33**	**29**	**18**	**16**	**32**	**34**	**40**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

Appendix B. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2015.

Code	*Species Name*	*Area-Replicate ID*	WAL - 54S	WAL - 55S	WAL - 56S	WAL - 57S	WAL - 58S
			19-Aug-15	26-Sep-15	26-Sep-15	22-Nov-15	22-Nov-15
	Cyanophyte						
1008	*Aphanocapsa sp.*		+	-	-	-	-
1012	*Aphanothece sp.*		-	-	-	-	-
1014	*Chroococcus limneticus* Lemmermann		-	-	-	-	-
1054	*Planktolyngbya limnetica*		-	-	-	-	-
1073	*Snowella sp*		+	+	-	-	-
1077	*Pseudoanabaena sp.*		-	-	-	-	-
1088	*Anabaena solitaria* Klebs		-	-	-	-	-
	Chlorophyte						
2100	*Pyramidomonas tetrarhynchus* Schmarda		-	-	-	-	-
2101	*Carteria spp.*		-	-	-	-	-
2105	*Chlamydomonas spp.*		+	+	+	+	+
2107	*Chlorogonium maximum* Skuja		-	-	-	-	-
2112	*Sphaerocystis schroeteri* Chodat		+	-	-	-	-
2121	*Oocystis lacustris* Chodat		+	+	+	+	+
2126	*Chodatella sp.*		-	-	-	-	-
2130	*Scenedesmus quadricauda* (Turp.) Brebisson		-	-	-	-	-
2137	*Dictyosphaerium simplex* Sukja		+	+	+	+	-
2138	*Monoraphidium komarkovae* (Nyg.) Komarkova-Legnerova		-	-	-	-	-
2143	*Monoraphidium minutum* (Nag.) Komarkova-Legnerova		+	-	+	-	-
2145	*Crucigenia quadrata* Morr.		-	-	-	-	-
2167	*Elakatothrix gelatinosa* Willen		+	-	-	-	-
2178	*Cosmarium sp.*		+	+	+	+	+
2182	*Euastrum spp.*		+	-	-	-	-
2185	*Micrasterias sp.*		-	+	+	-	-
2186	*Xanthidium sp.*		-	-	-	-	-
2187	*Staurodesmus extensus* (Andersson) Teiling		+	+	+	-	+
2193	*Staurodesmus paradoxum* Meyen		-	-	+	-	-
2195	*Staurodesmus bullardii* G.M. Smith		-	-	-	-	-
2199	*Spondylosium planum* (Wolle) W. and G.S. West		+	-	-	-	-
2205	*Mougeotia sp.*		-	-	-	-	-
2206	*Botryococcus braunii* Kutzing		+	-	-	+	+
2215	*Tetraedron caudatum* (Corda) Hansgrig		+	+	+	-	-
2235	*Ankistrodesmus spiralis* Lemmermann		+	+	+	+	+
2238	*Eudorina sp.*		-	-	-	-	-
2247	*Oocystis gigas* Archer		-	-	-	-	-
2512	*Scenedesmus acuminatus* Chodat		-	-	-	-	-
	Euglenophyte						
3301	*Euglena acus* Ehrenberg		-	-	-	-	-
	Chrysophyte						
4351	*Small chrysophyceae*		+	+	+	+	+
4352	*Large chrysophyceae*		+	+	+	+	+
4354	*Chromulina spp.*		-	-	-	-	-
4355	*Chrysochromulina parva* Lackey		-	-	+	-	-
4357	*Chrysococcus sp.*		+	+	+	+	+
4358	*Chrysostephanospaera globulifera* Scherffel		-	-	-	-	-
4361	*Kephyrion boreale* Skuja		-	+	+	-	-
4362	*Kephyrion sp.*		+	+	+	+	+
4363	*Spinifiromonas sirratus***********		-	+	+	-	-
4364	*Mallomonas caudata Ivanov*		-	-	-	-	-
4367	*Mallomonas duerrschmidtiae* Siver, Hamer and Kling		-	-	-	-	-
4368	*Mallomonas crassisquama* (Asmund) Fott		+	-	+	-	-
4370	*Mallomonas akrokomos* Asmund and Kristiansen		-	-	-	-	-
4372	*Mallomonas tonsurata* Teiling and Krieger		-	-	-	-	-
4375	*Synura sphagnicola* Korschikow		-	-	-	-	-
4378	*Dinobryon borgei* Lemmermann		+	+	+	-	+
4381	*Dinobryon mucronutom* Nygaard		+	+	+	-	-
4383	*Dinobryon bavaricum* Imhof		-	-	-	-	-
4384	*Dinobryon bavaricum* v. vanhoeffenii (Bachmann) Krieger		-	+	-	-	-
4386	*Dinobryon divergens* v. schauinslandii (Lemmermann) Brunnthaler.		-	-	-	-	-
4388	*Dinobryon sertularia* Ehrenberg		+	-	-	-	+
4390	*Dinobryon sociale* Ehrenberg		-	-	-	+	-
4394	*Epiphyxis sp.*		+	+	+	-	-
4396	*Chrysolkos skuja* (Nauwerck) Willen		+	+	+	-	+
4399	*Ochromonas verrucosa* Skuja		-	-	-	-	-
4400	*Ochromonas sp.*		-	-	-	-	-
4401	*Uroglena volvox* Ehrenberg		+	+	-	-	-
4403	*Chrysosphaerella longispina* Lauterborn		-	-	-	-	-
4411	*Bitrichia chodatii* (Reverdin) Chodat		+	-	-	-	-
4413	*Chrysochromulina laurentiana* Kling		+	+	+	+	+
4414	*Stichogloea spp.*		+	+	-	-	-
4415	*Bicoeca lacustris* Clark		-	-	-	-	-
4418	*Salpingoeca frequentissima* (Zach.) Lemmermann		+	+	+	+	+
4435	*Porochrysis sp.*		-	-	-	-	-
4436	*Dinobryon attenatum* Hill		-	-	-	-	-
4437	*Pteridomonas sp.*		-	-	-	-	-
	Diatoms						
5507	*Cyclotella stelligera* Cleve and Grunow		+	+	+	+	-
5508	*Cyclotella pseudostelligera*		-	-	-	-	-
5509	*Cyclotella ocellata* Pant.		+	-	-	-	-
5511	*Rhizosolenia eriense* H.L. Smith		-	-	-	-	-
5513	*Tabellaria fenestrata* (Lyngbye) Kutzing		-	+	-	+	-
5514	*Tabellaria flocculsa* (Roth) Kutzing		+	-	-	+	+
5518	*Synedra acus* Kutzing		+	+	+	+	+
5524	*Asterionella formosa* Hassall		+	-	-	-	-
5529	*Eunotia zazumenensis* **********		-	-	-	-	-
5540	*Aulacoseira italica* v. subarctica (O. Muller) Simonsen		-	-	-	-	-
5551	*Cyclotella michiganiana* Skvortzow		+	+	+	+	-
5720	*Cyclotella bodanica* Eulenst.		+	+	+	-	+
	Cryptophyes						
6554	*Rhodomonas minuta* Skuja		+	+	+	+	+
6558	*Cryptomonas erosa* Ehrenberg		+	+	+	+	+
6559	*Cryptomonas ovata* Ehrenberg		-	-	-	-	-
6562	*Cryptomonas reflexa* (Marsson) Skuja		+	-	-	-	-
6565	*Cryptomonas rostratiformis* Skuja		+	+	+	-	-
6568	*Katablepharis ovalis* Skuja		+	+	+	-	+
	Dinoflagellates						
7631	*Gymnodinium helveticum* Penard		+	+	+	+	-
7632	*Gymnodinium sp.*		-	-	+	+	-
7635	*Peridinium willei* Huitfeldt-Kaas		-	+	-	-	-
7639	*Peridinium pusillum* (Penard) Lemmermann		+	+	+	+	+
7640	*Peridinium goslaviense* Woloszynska		-	-	-	-	-
7641	*Peridinium aciculiferum* Lemmermann		-	-	-	-	-
7642	*Peridinium wisconsiense* Eddy		-	-	-	-	-
	Taxa Richness per Sample		**44**	**36**	**35**	**23**	**22**

Notes:

The BAP samples collected in July were both assigned BAP-38 IDs. BAP-38-S1 was changed to BAP-37 and BAP-38S2 was renamed BAP-38.

APPENDIX C

Phytoplankton Plots

APPENDIX C1

Meadowbank Phytoplankton Plots 2006 – 2015

LIST OF FIGURES – APPENDIX C1

Figure C1–1. Total phytoplankton density (cells/L) from Meadowbank study lakes since 2006. 3

Figure C1–2. Cyanophyte biomass (mg/m^3) from Meadowbank study lakes since 2006. 4

Figure C1–3. Chlorophyte biomass (mg/m^3) from Meadowbank study lakes since 2006..... 5

Figure C1–4. Chrysophyte biomass (mg/m^3) from Meadowbank study lakes since 2006. 6

Figure C1–5. Diatom biomass (mg/m^3) from Meadowbank study lakes since 2006..... 7

Figure C1–6. Cryptophyte biomass (mg/m^3) from Meadowbank study lakes since 2006. 8

Figure C1–7. Dinoflagellate biomass (mg/m^3) from Meadowbank study lakes since 2006. 9

Figure C1–8. Phytoplankton density (cells/L) by major taxa group from Meadowbank study lakes since 2006. 10

Figure C1–9. Relative phytoplankton density by major taxa group from Meadowbank study lakes since 2006. 11

Figure C1–10. Cyanophyte density (cells/L) from Meadowbank study lakes since 2006. 12

Figure C1–11. Chlorophyte density (cells/L) from Meadowbank study lakes since 2006..... 13

Figure C1–12. Chrysophyte density (cells/L) from Meadowbank study lakes since 2006. 14

Figure C1–13. Diatom density (cells/L) from Meadowbank study lakes since 2006..... 15

Figure C1–14. Cryptophytes density (cells/L) from Meadowbank study lakes since 2006. 16

Figure C1–15. Dinoflagellates density (cells/L) from Meadowbank study lakes since 2006. 17

Figure C1–16. Simpson's Diversity for the phytoplankton community from Meadowbank study lakes since 2006. 18

Figure C1–1. Total phytoplankton density (cells/L) from Meadowbank study lakes since 2006.

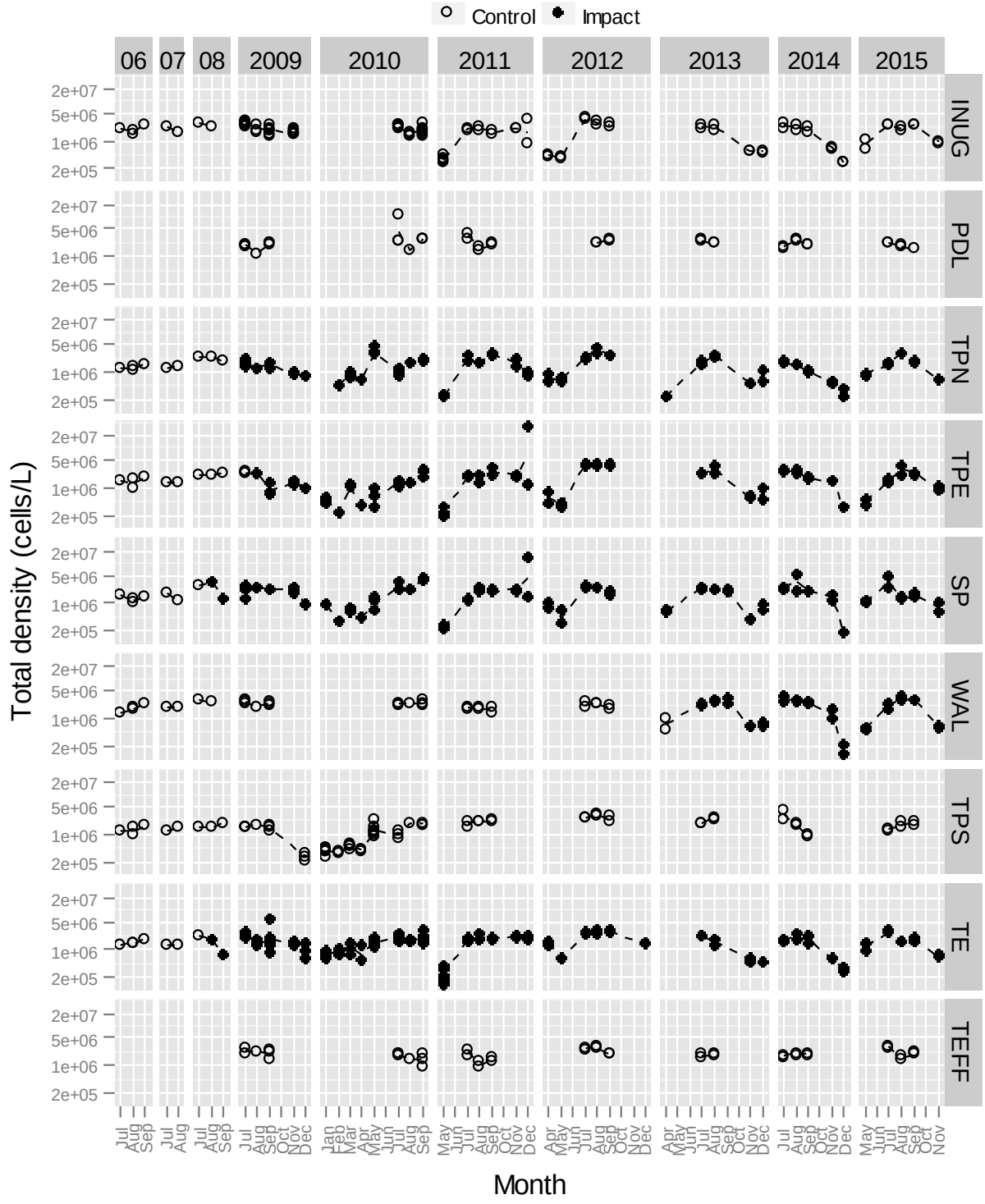


Figure C1–2. Cyanophyte biomass (mg/m^3) from Meadowbank study lakes since 2006.

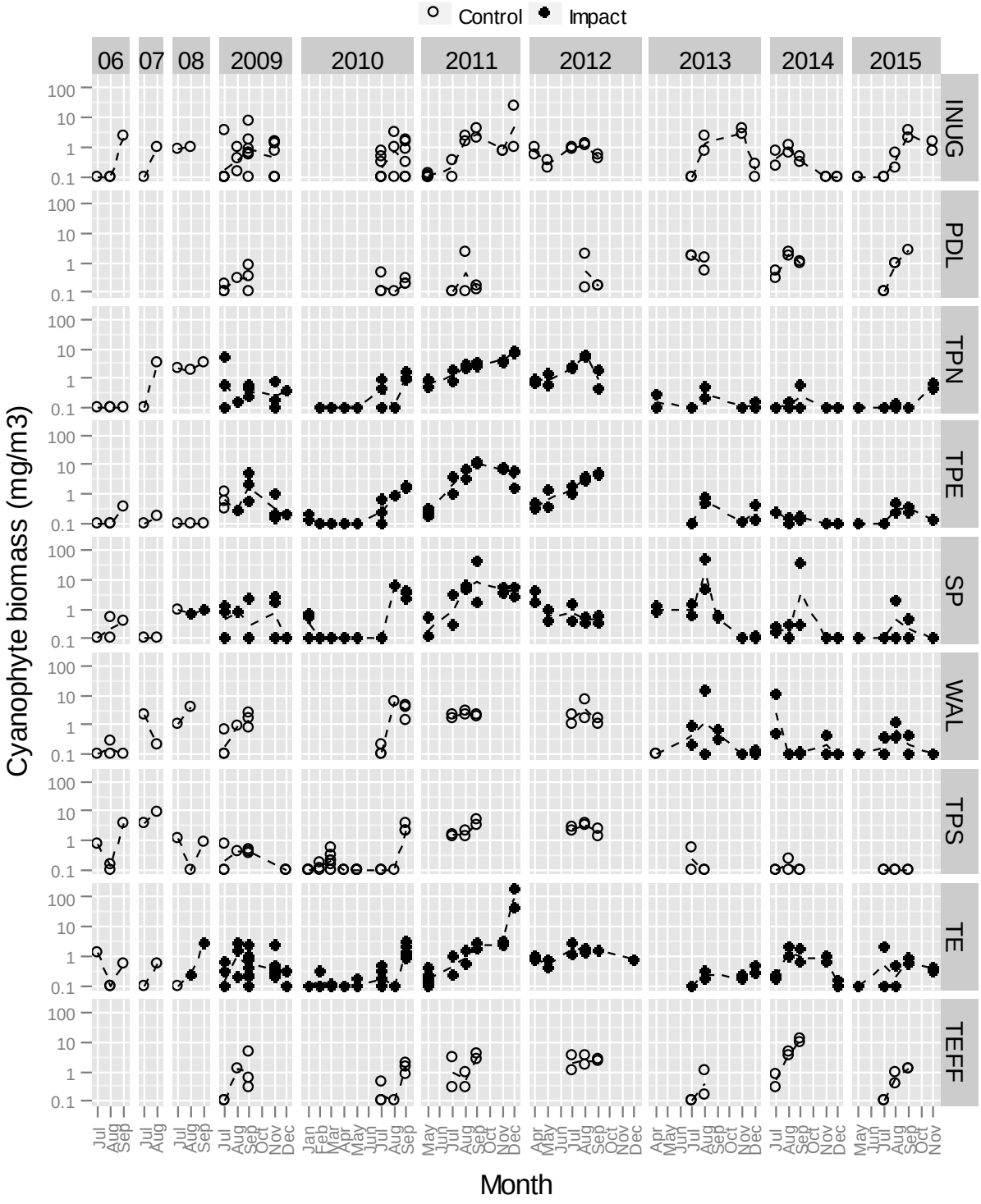


Figure C1–3. Chlorophyte biomass (mg/m^3) from Meadowbank study lakes since 2006.

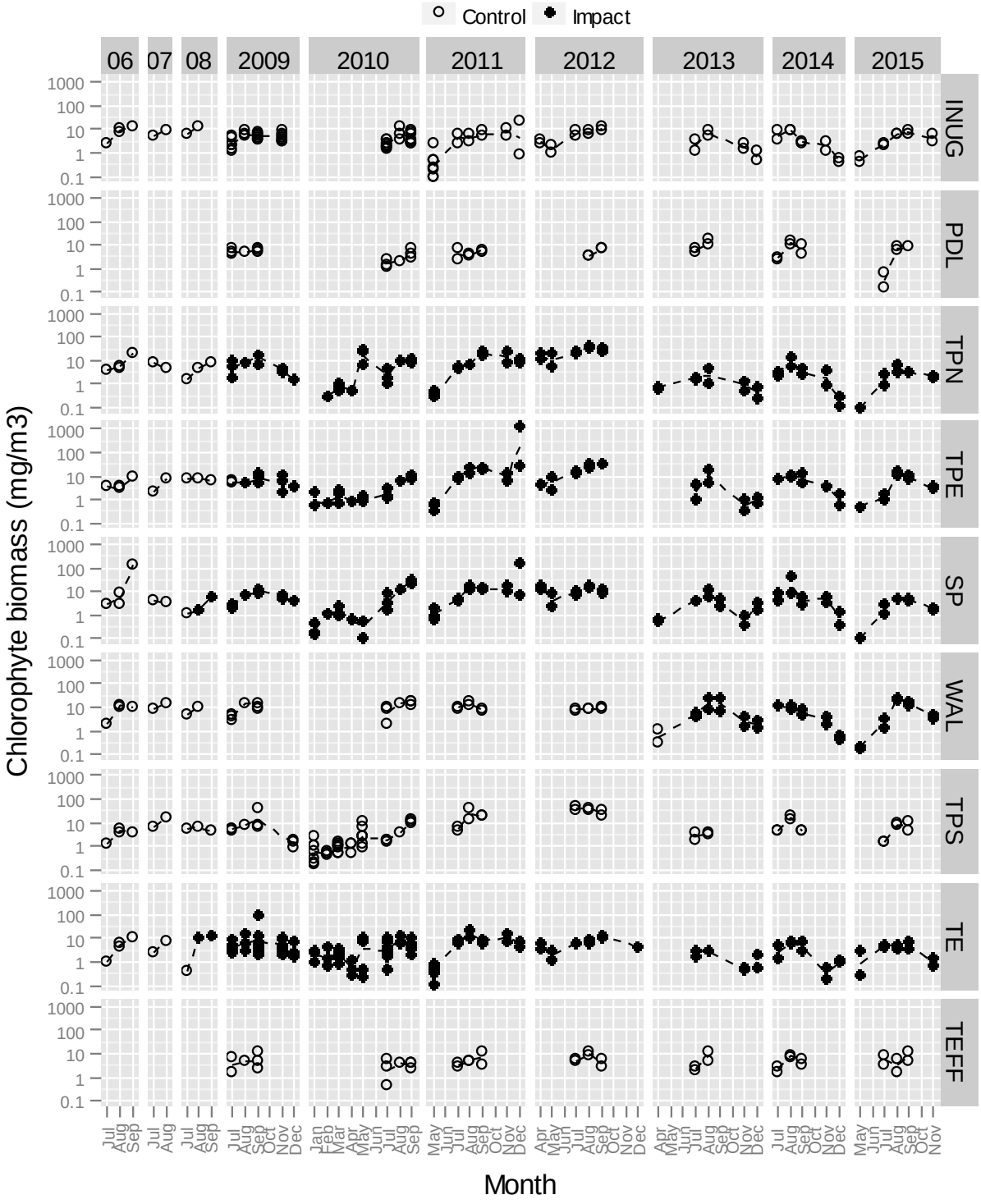


Figure C1–4. Chrysophyte biomass (mg/m^3) from Meadowbank study lakes since 2006.

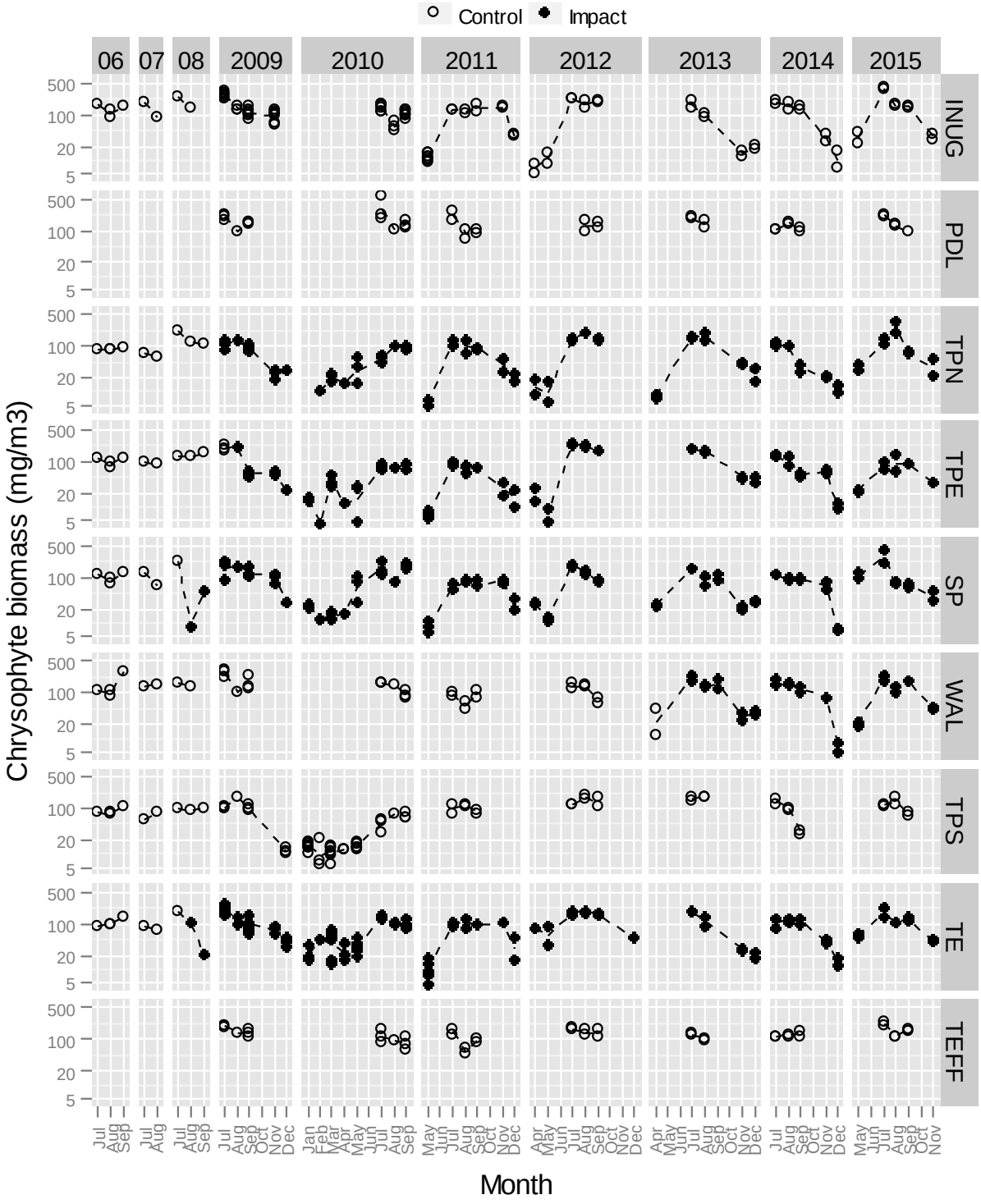


Figure C1–5. Diatom biomass (mg/m^3) from Meadowbank study lakes since 2006.

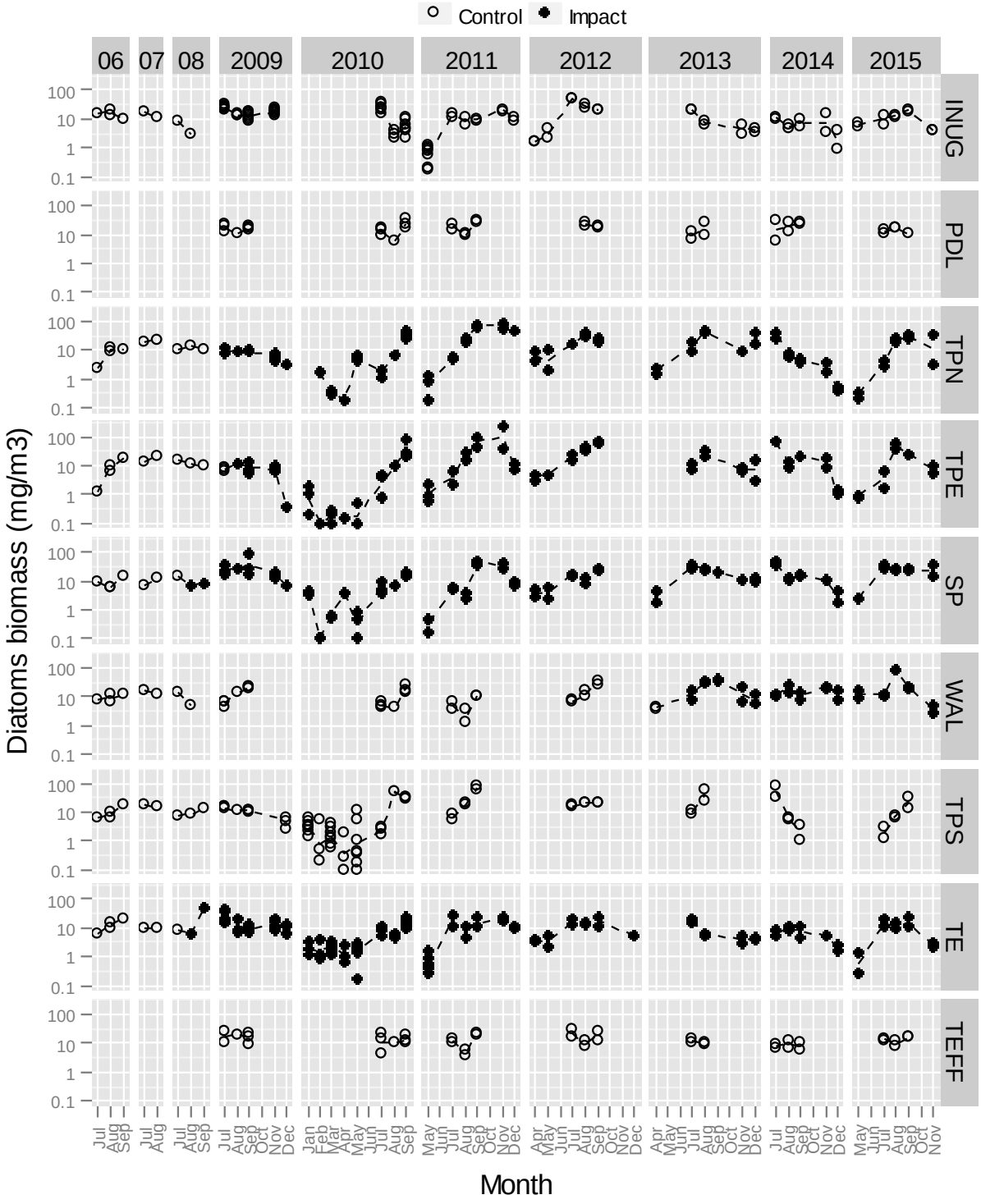


Figure C1–6. Cryptophyte biomass (mg/m^3) from Meadowbank study lakes since 2006.

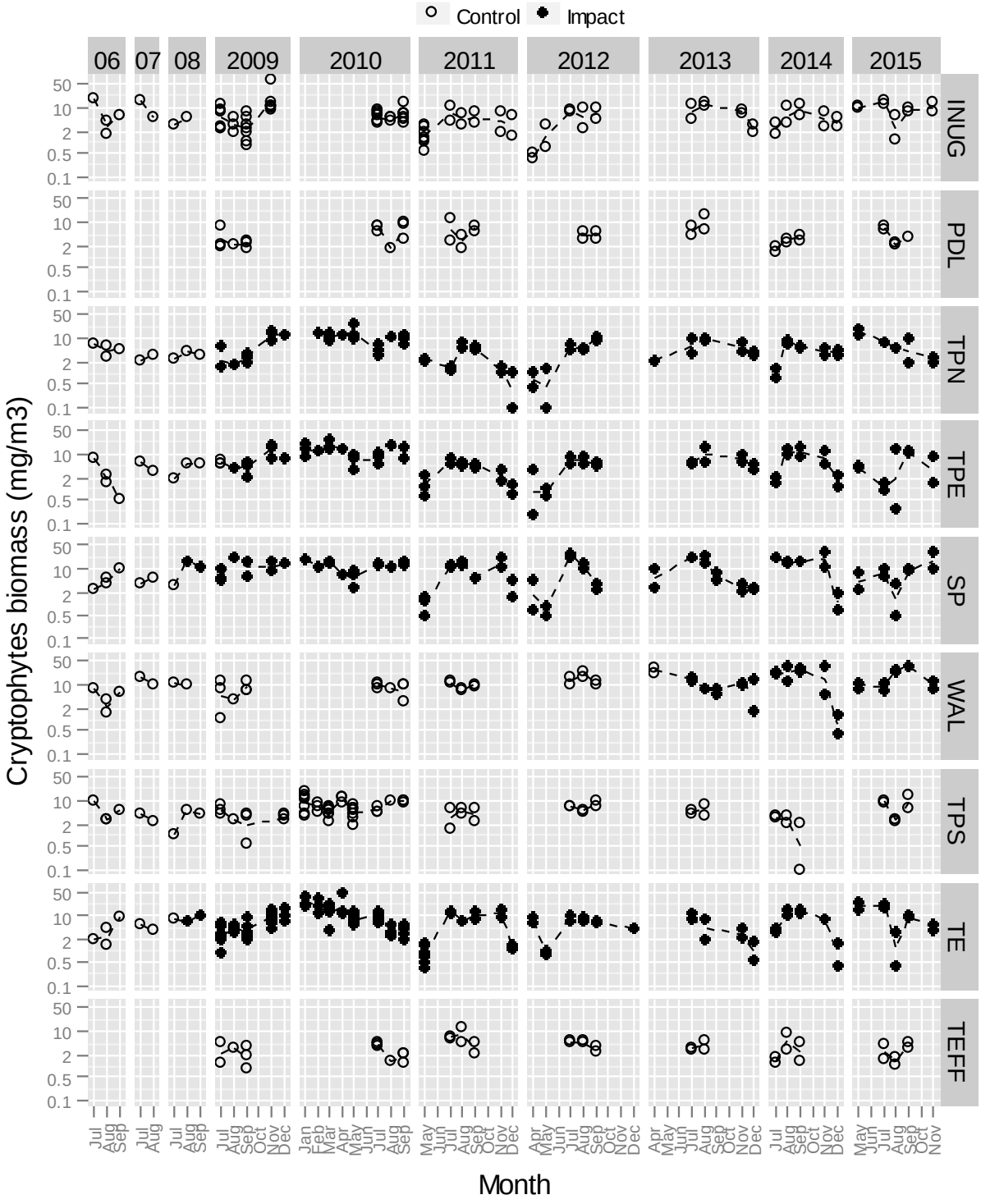


Figure C1–7. Dinoflagellate biomass (mg/m^3) from Meadowbank study lakes since 2006.

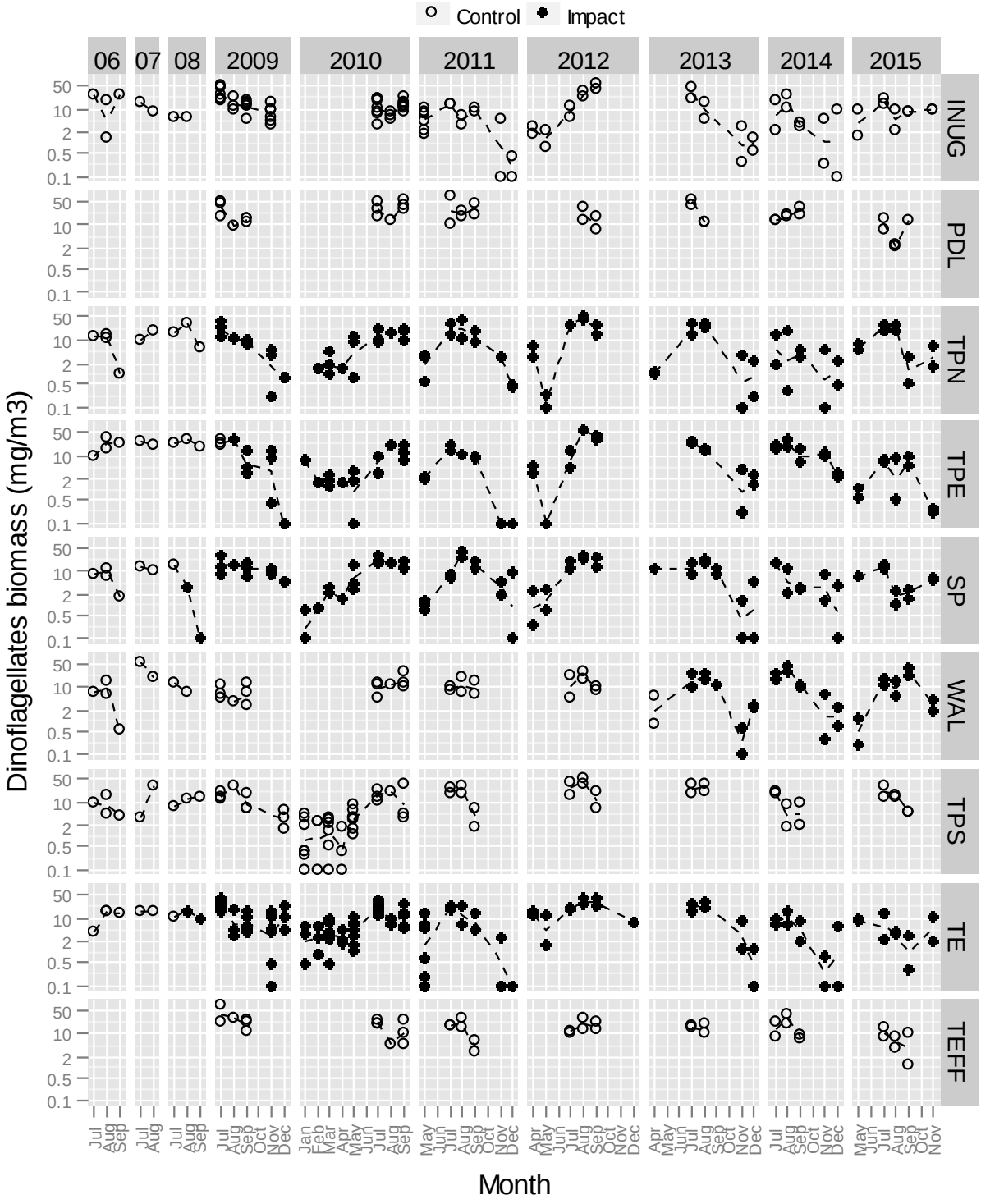


Figure C1–8. Phytoplankton density (cells/L) by major taxa group from Meadowbank study lakes since 2006.



Figure C1–9. Relative phytoplankton density by major taxa group from Meadowbank study lakes since 2006.

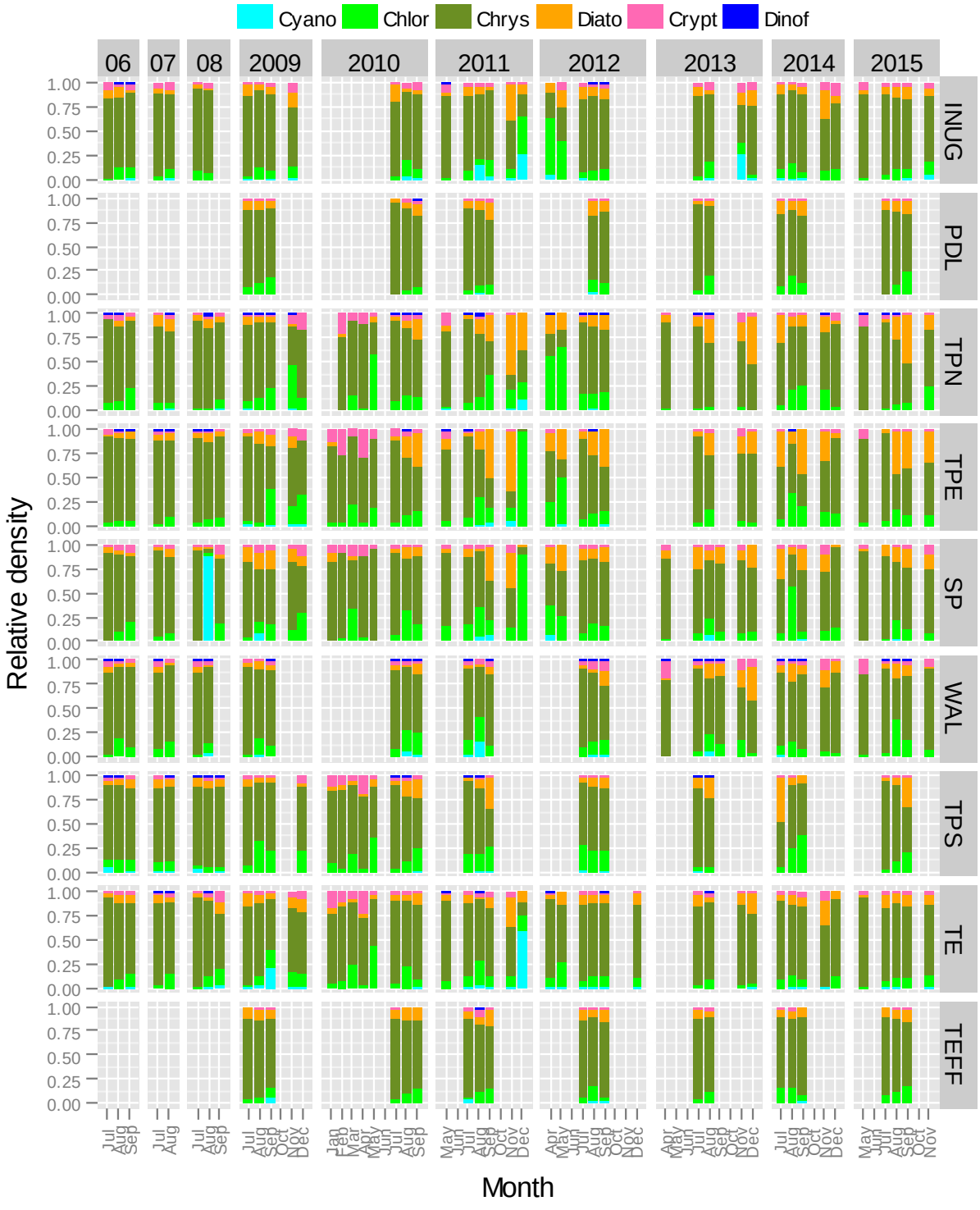


Figure C1–10. Cyanophyte density (cells/L) from Meadowbank study lakes since 2006.

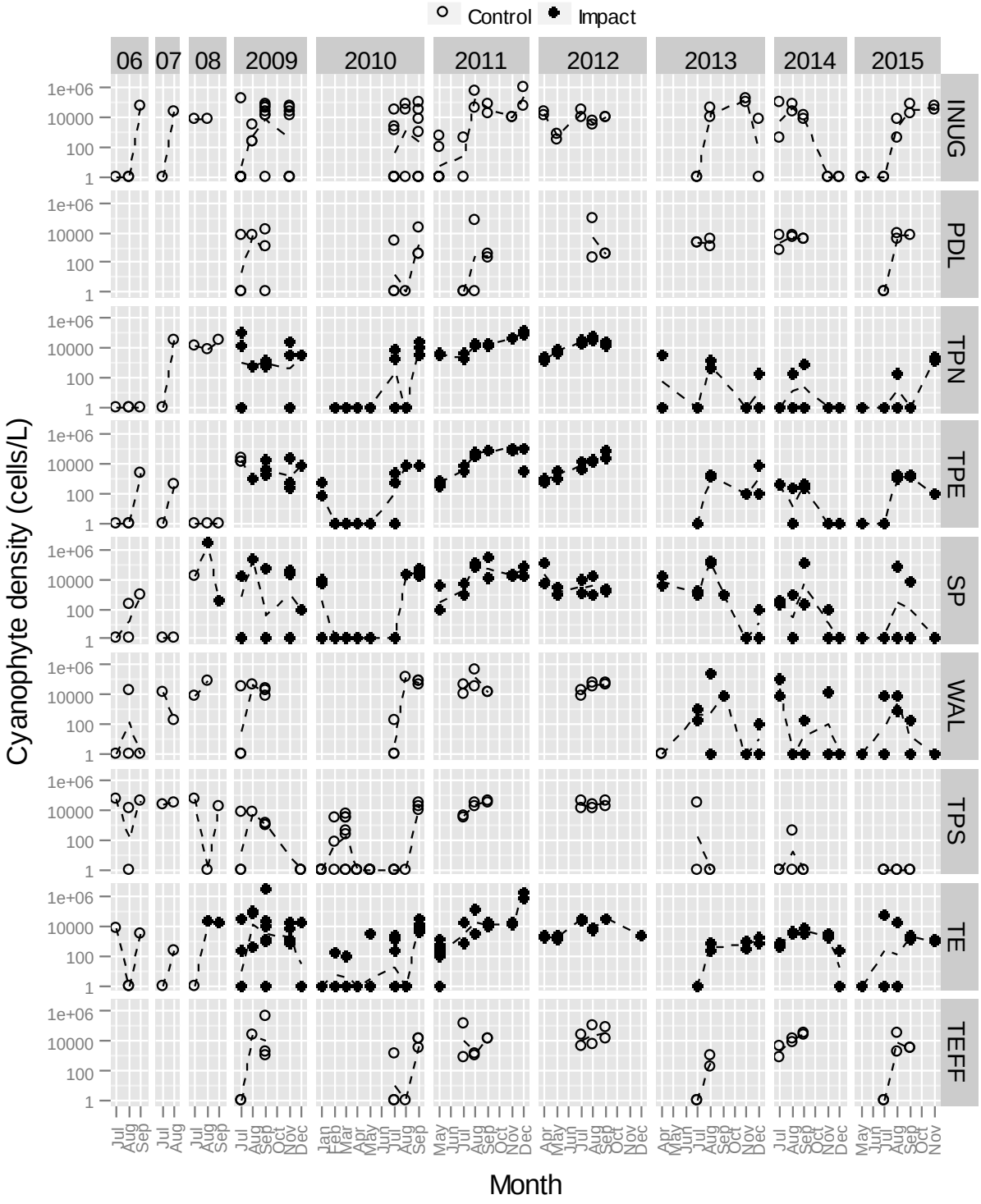


Figure C1–11. Chlorophyte density (cells/L) from Meadowbank study lakes since 2006.

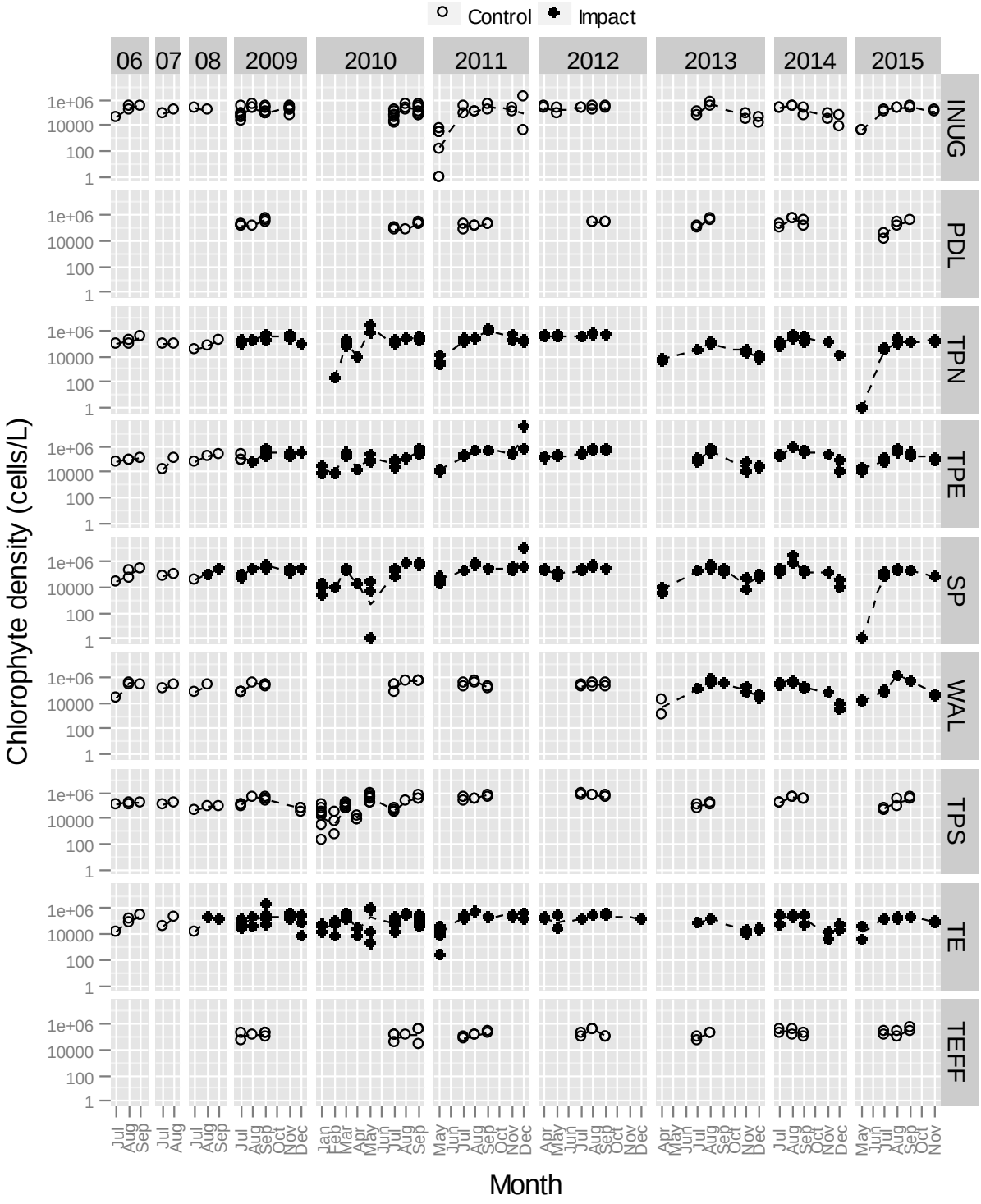


Figure C1–12. Chrysophyte density (cells/L) from Meadowbank study lakes since 2006.

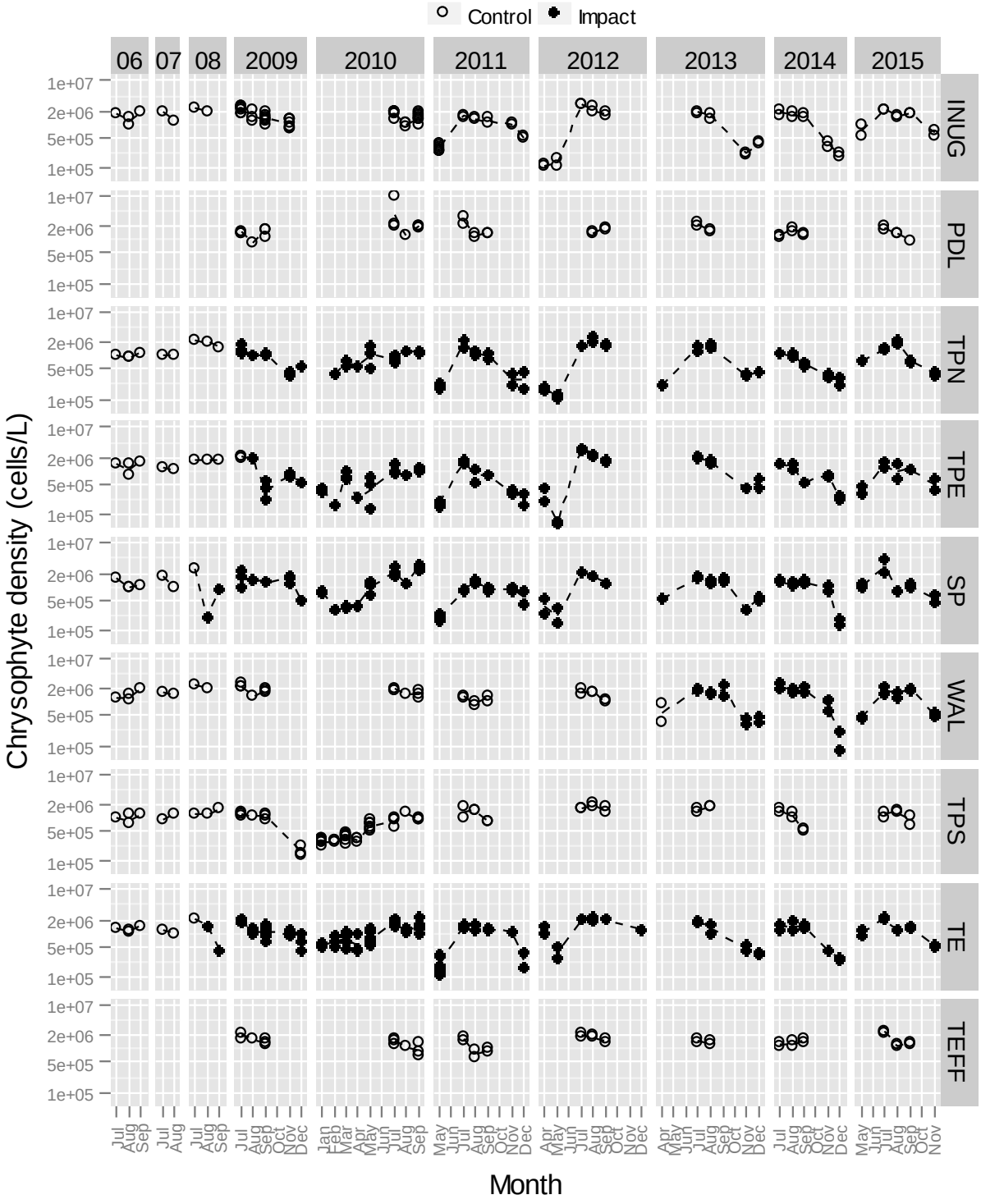


Figure C1–13. Diatom density (cells/L) from Meadowbank study lakes since 2006.

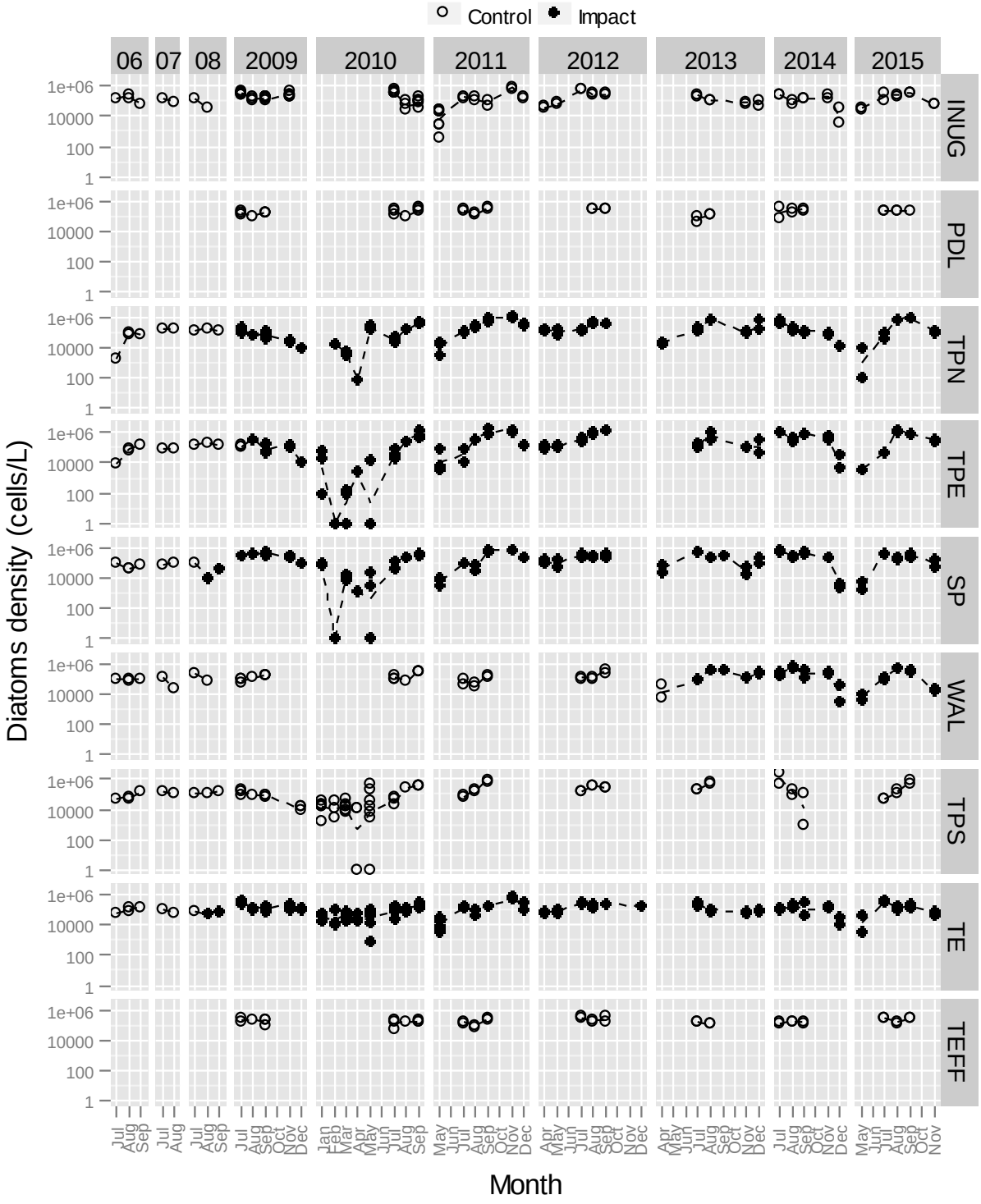


Figure C1–14. Cryptophytes density (cells/L) from Meadowbank study lakes since 2006.

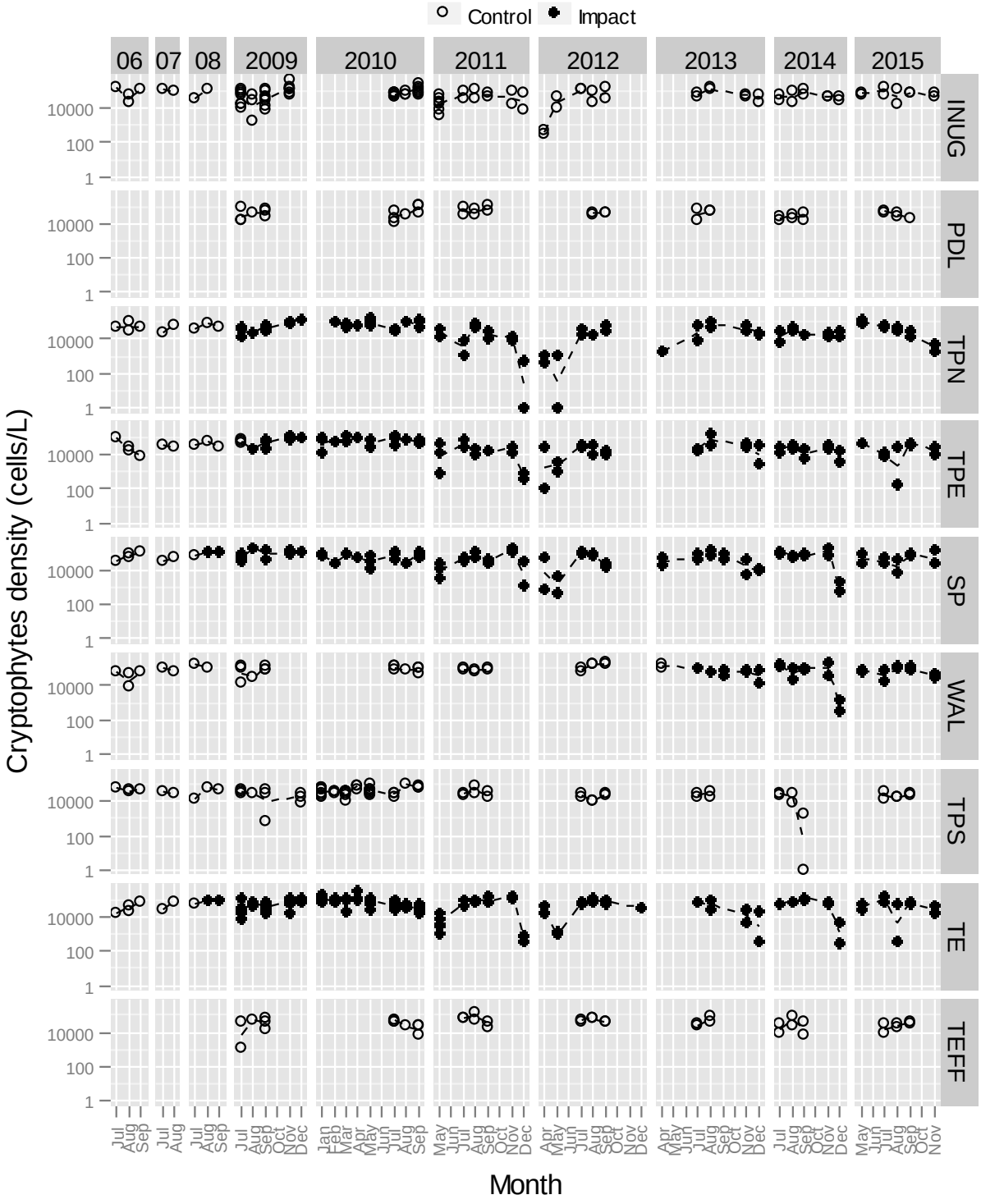


Figure C1–15. Dinoflagellates density (cells/L) from Meadowbank study lakes since 2006.

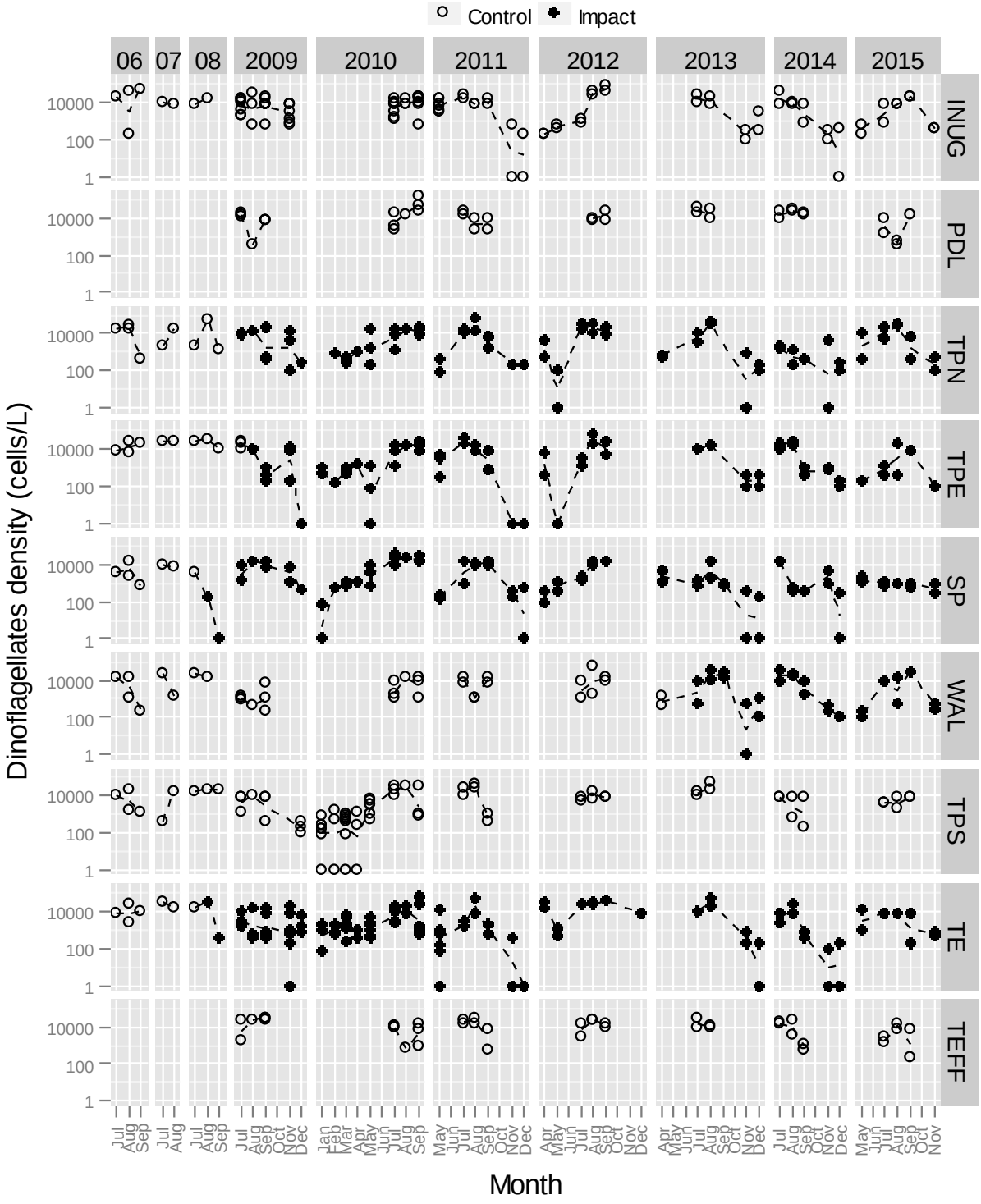
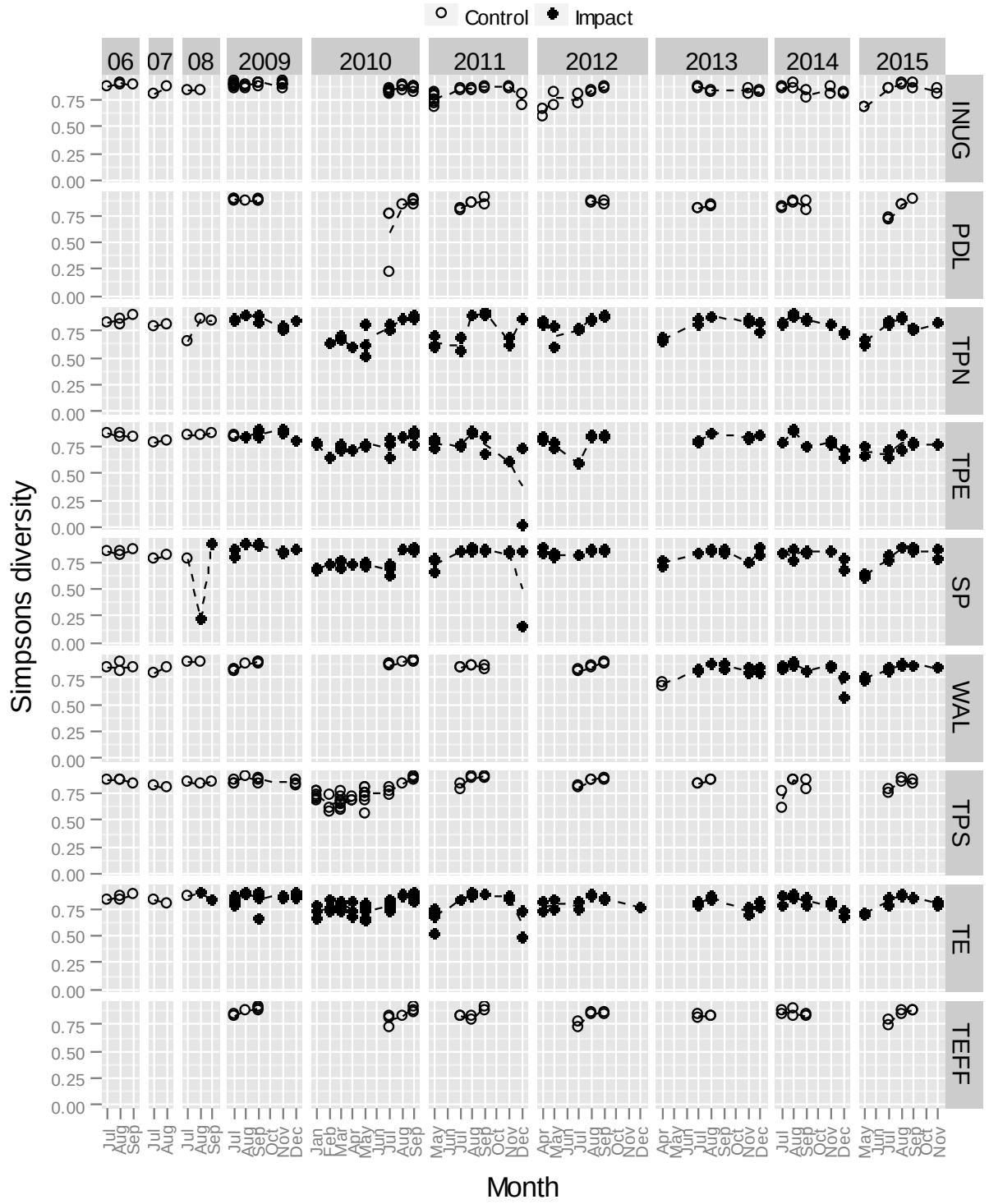


Figure C1–16. Simpson's Diversity for the phytoplankton community from Meadowbank study lakes since 2006.



APPENDIX C2

Baker Lake Phytoplankton Plots 2008 – 2015

LIST OF FIGURES – APPENDIX C2

Figure C2–1. Total phytoplankton density (cells/L) from Baker Lake since 2008. 3
Figure C2–2. Cyanophyte biomass (mg/m^3) from Baker Lake since 2008. 4
Figure C2–3. Chlorophyte biomass (mg/m^3) from Baker Lake since 2008. 5
Figure C2–4. Chrysophyte biomass (mg/m^3) from Baker Lake since 2008. 6
Figure C2–5. Diatom biomass (mg/m^3) from Baker Lake since 2008. 7
Figure C2–6. Cryptophyte biomass (mg/m^3) from Baker Lake since 2008. 8
Figure C2–7. Dinoflagellate biomass (mg/m^3) from Baker Lake since 2008. 9
Figure C2–8. Phytoplankton density (cells/L) by major taxa group from Baker Lake since 2008. 10
Figure C2–9. Relative phytoplankton density by major taxa group from Baker Lake since 2008. 11
Figure C2–10. Cyanophyte density (cells/L) from Baker Lake since 2008. 12
Figure C2–11. Chlorophyte density (cells/L) from Baker Lake since 2008. 13
Figure C2–12. Chrysophyte density (cells/L) from Baker Lake since 2008. 14
Figure C2–13. Diatom density (cells/L) from Baker Lake since 2008. 15
Figure C2–14. Cryptophytes density (cells/L) from Baker Lake since 2008. 16
Figure C2–15. Dinoflagellates density (cells/L) from Baker Lake since 2008. 17
Figure C2–16. Simpson's Diversity for the phytoplankton community from Baker Lake since 2008. 18

Figure C2–1. Total phytoplankton density (cells/L) from Baker Lake since 2008.

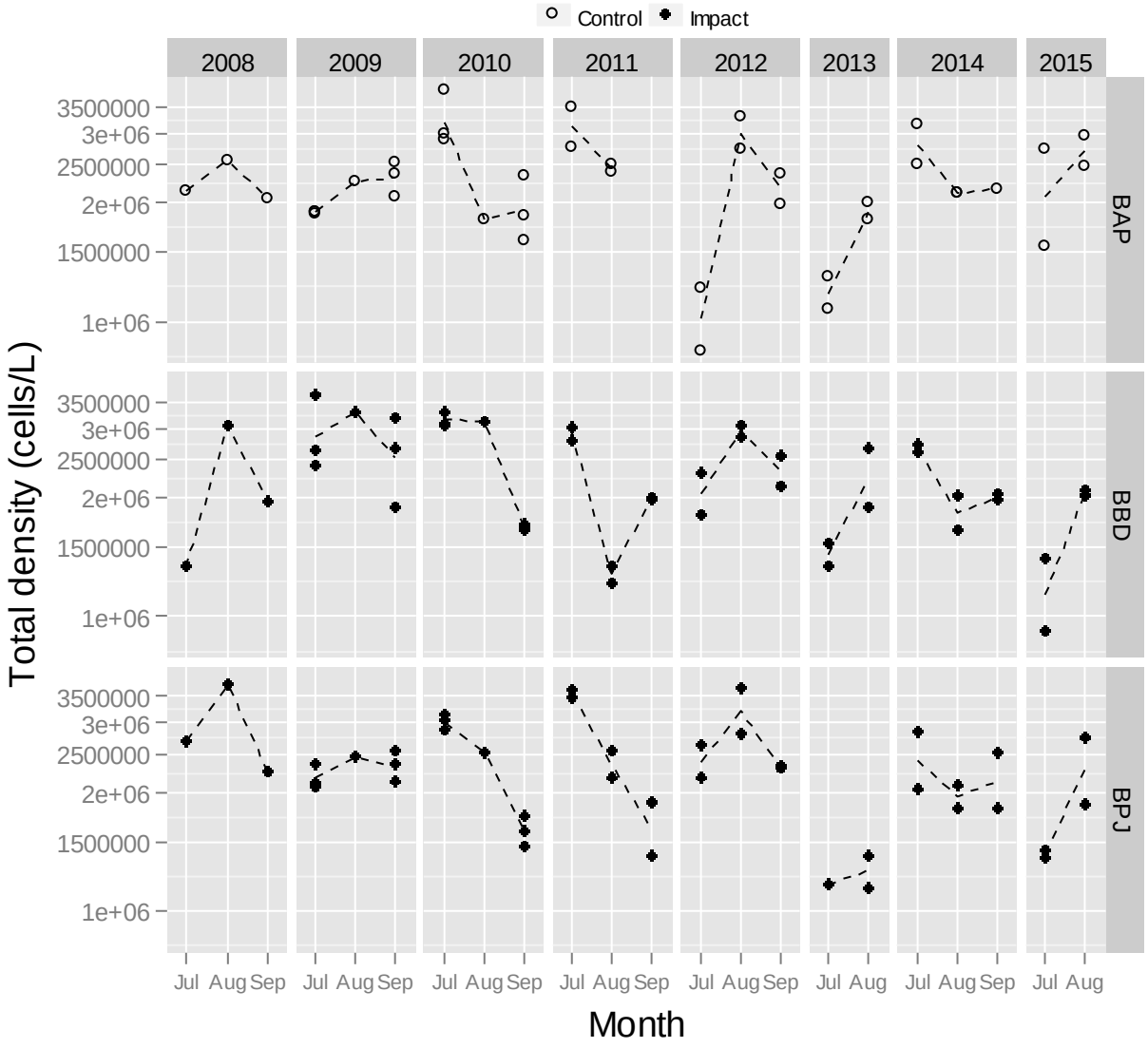


Figure C2–2. Cyanophyte biomass (mg/m^3) from Baker Lake since 2008.

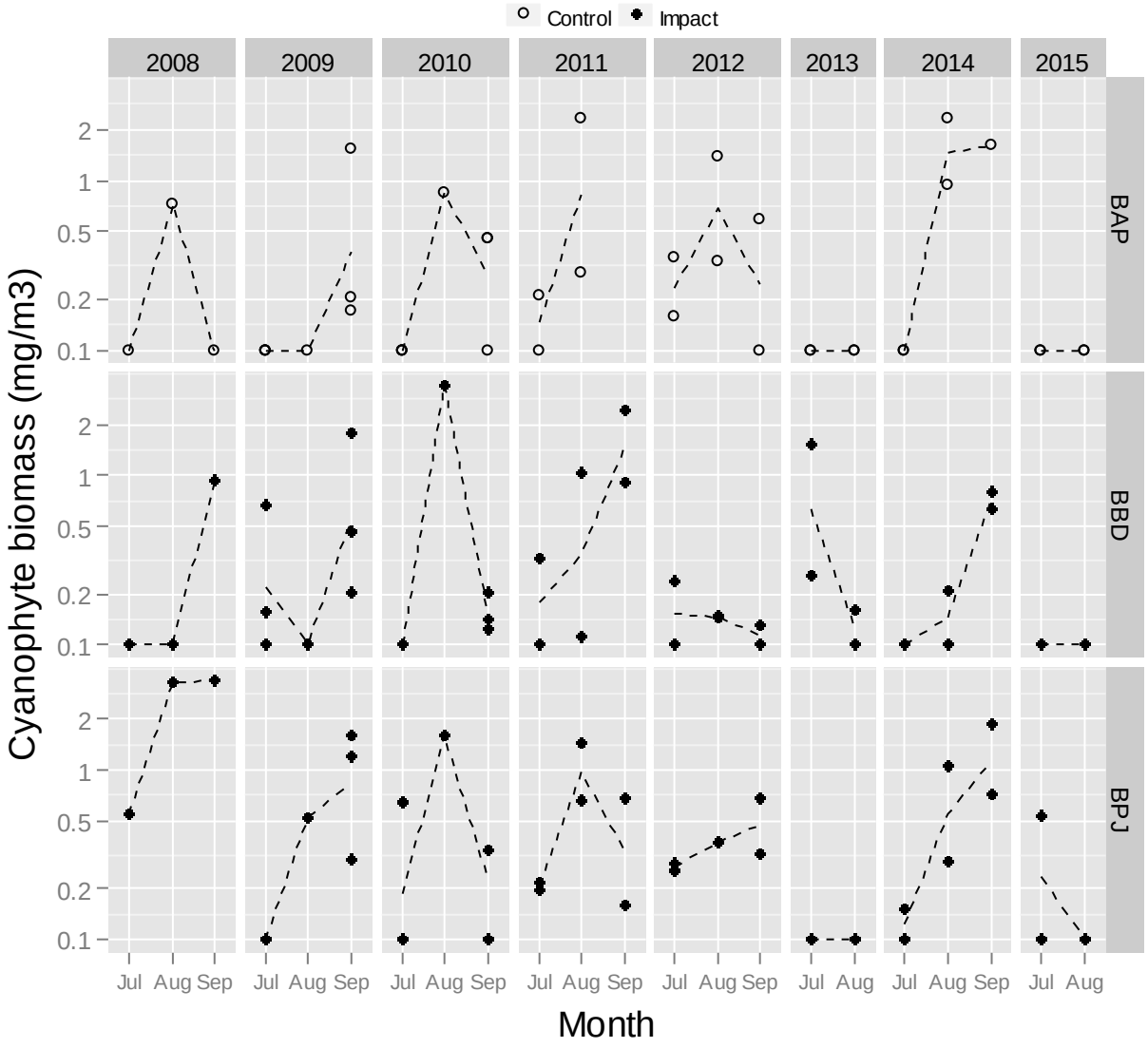


Figure C2–3. Chlorophyte biomass (mg/m^3) from Baker Lake since 2008.

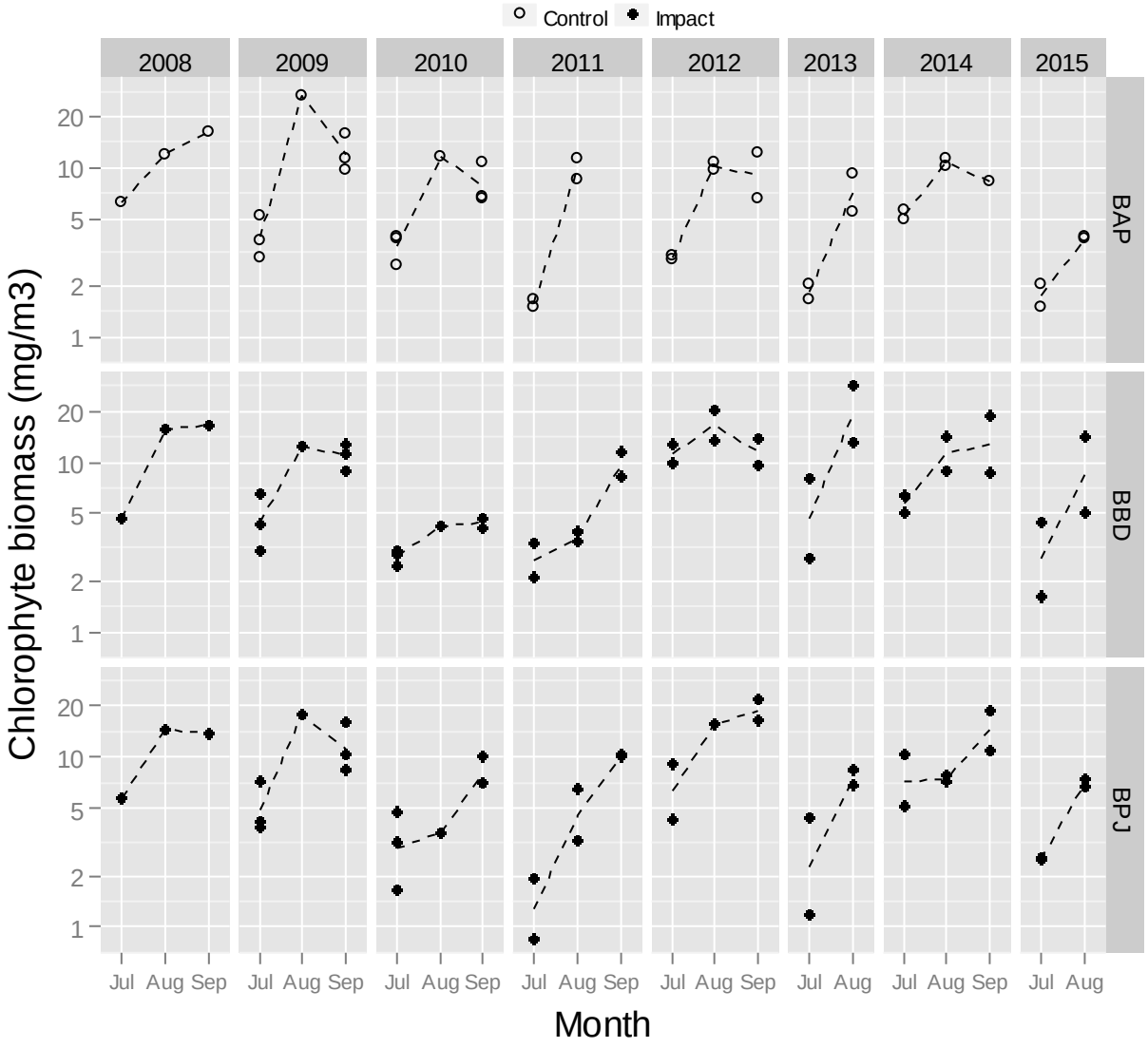


Figure C2–4. Chrysophyte biomass (mg/m^3) from Baker Lake since 2008.

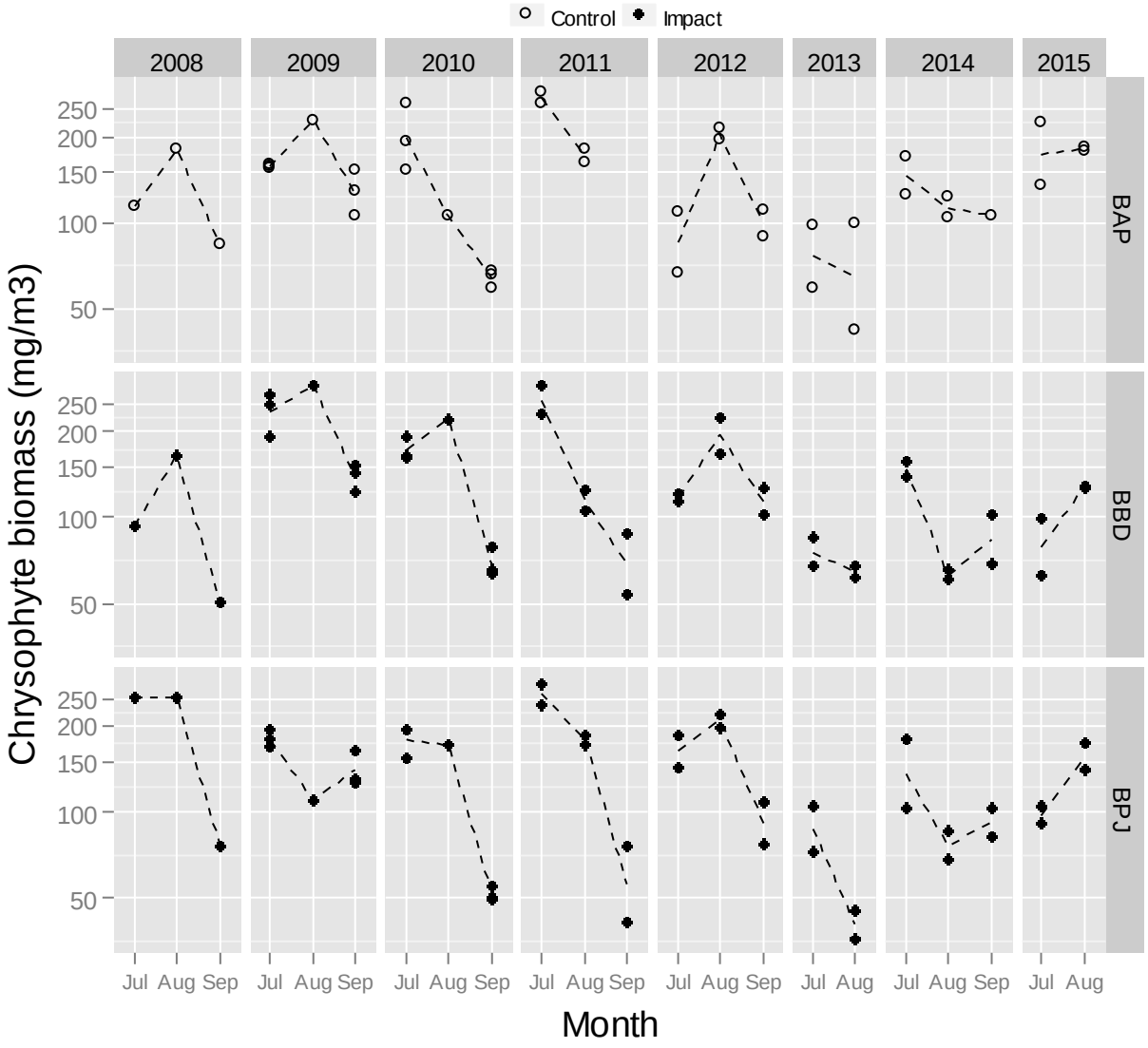


Figure C2–5. Diatom biomass (mg/m^3) from Baker Lake since 2008.

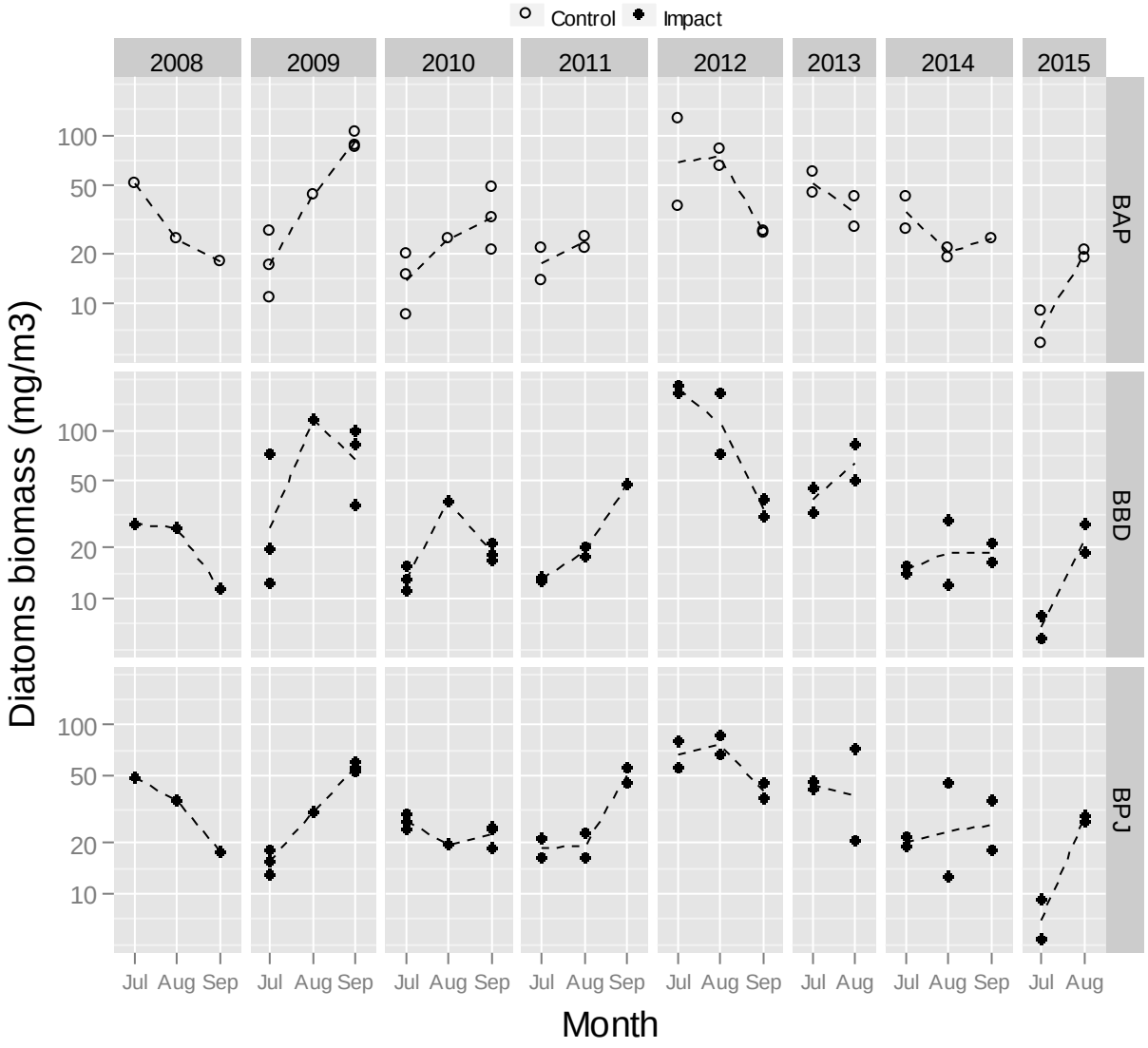


Figure C2–6. Cryptophyte biomass (mg/m^3) from Baker Lake since 2008.

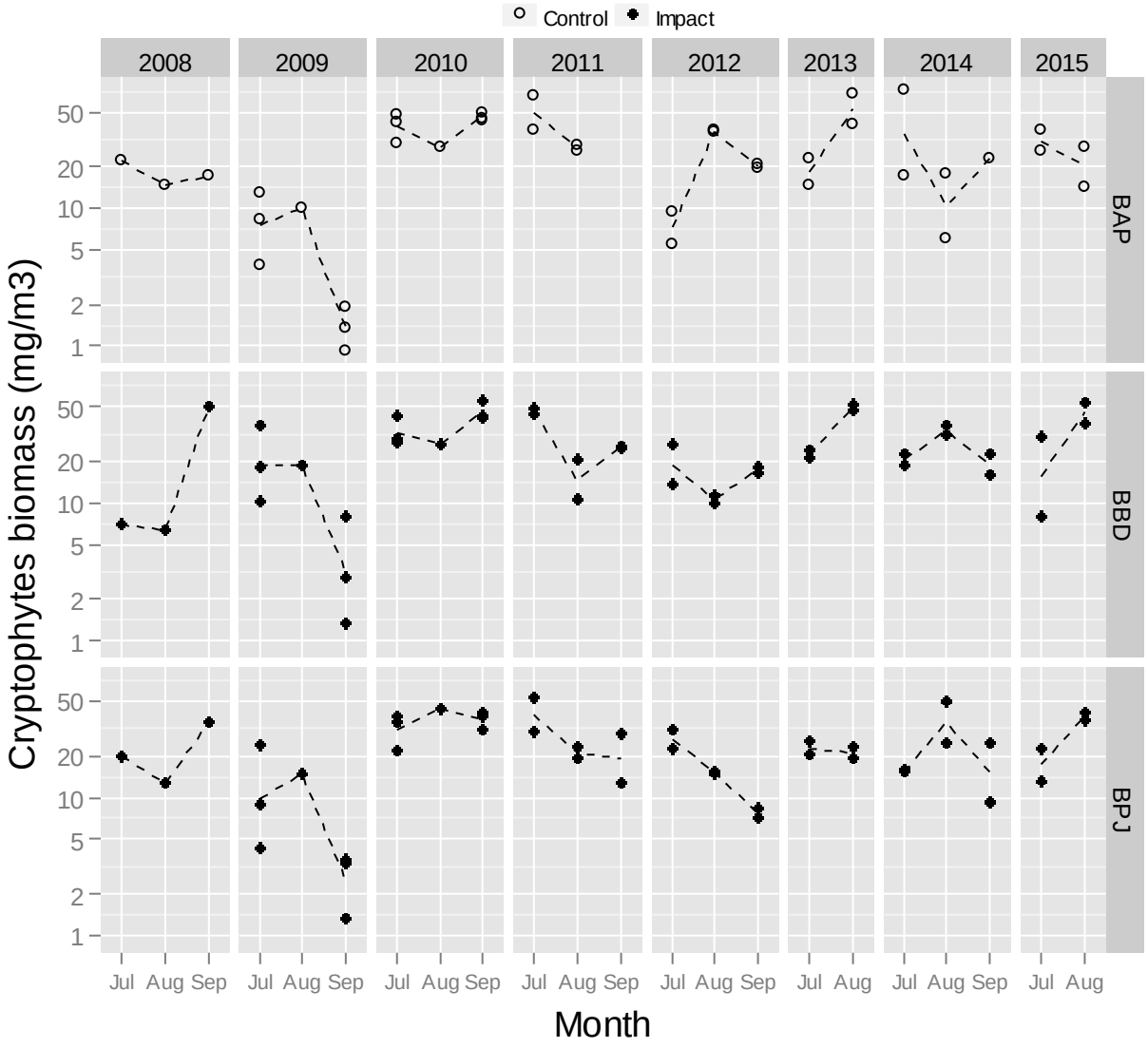


Figure C2–7. Dinoflagellate biomass (mg/m^3) from Baker Lake since 2008.

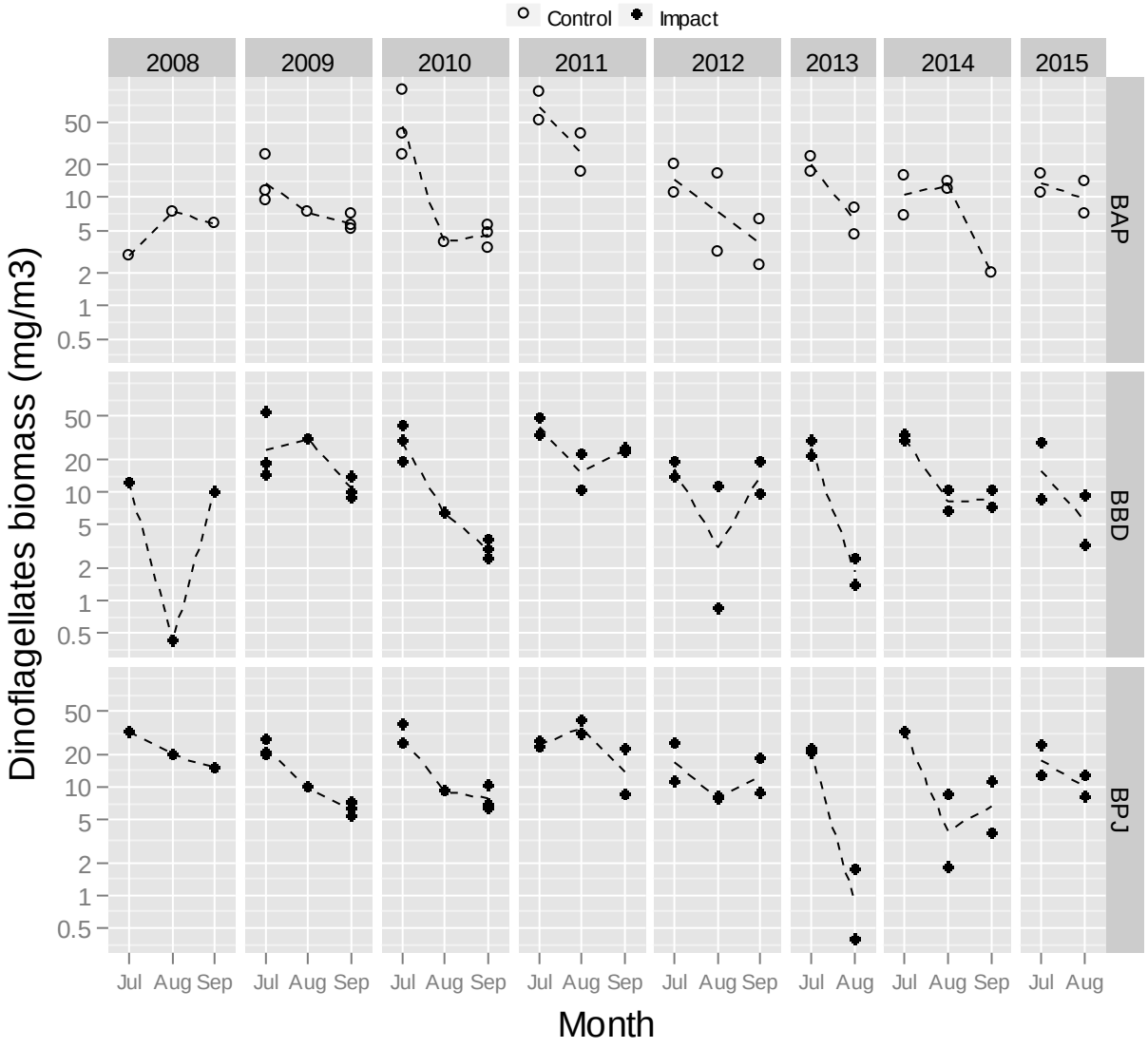


Figure C2–8. Phytoplankton density (cells/L) by major taxa group from Baker Lake since 2008.

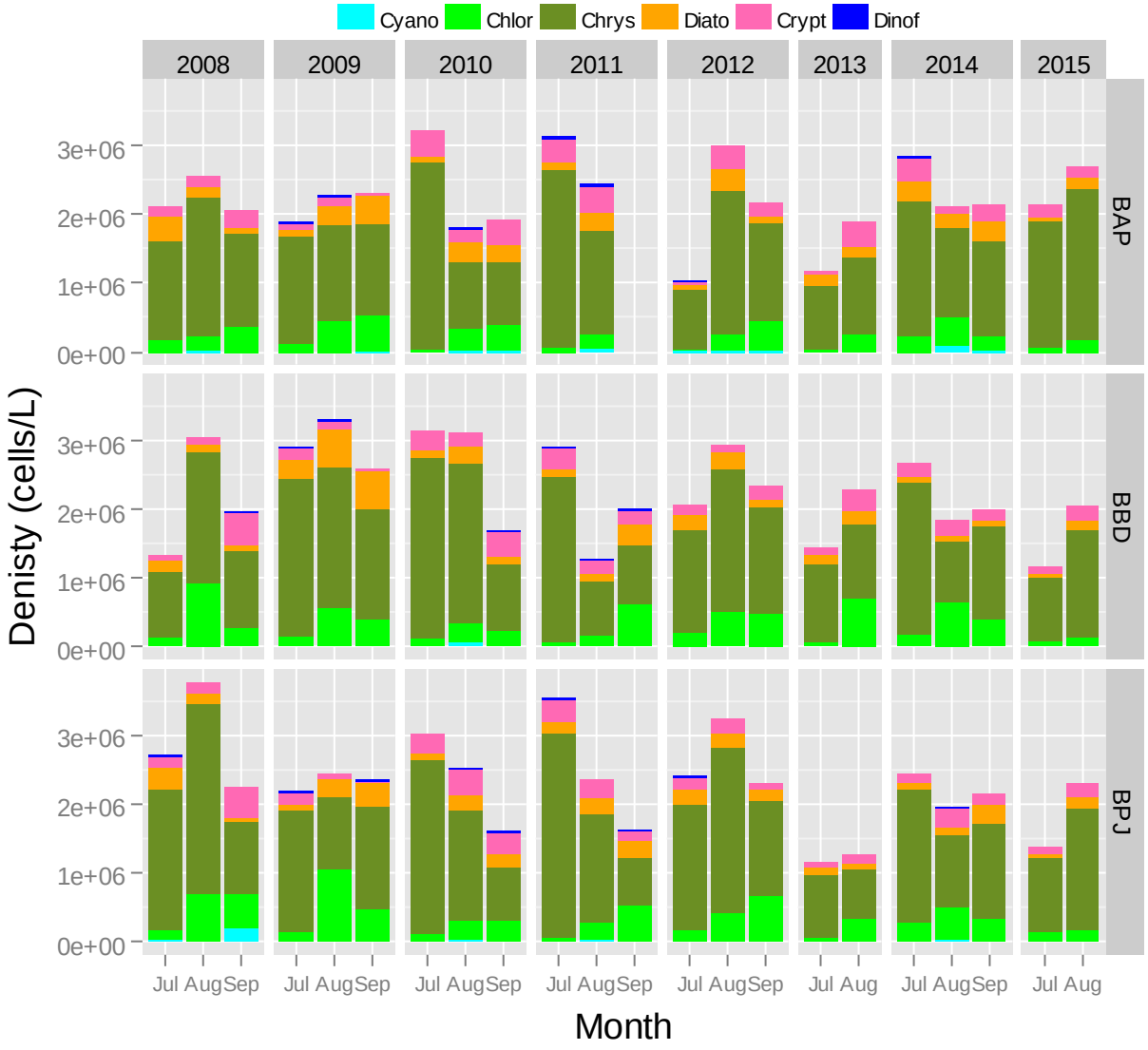


Figure C2–9. Relative phytoplankton density by major taxa group from Baker Lake since 2008.

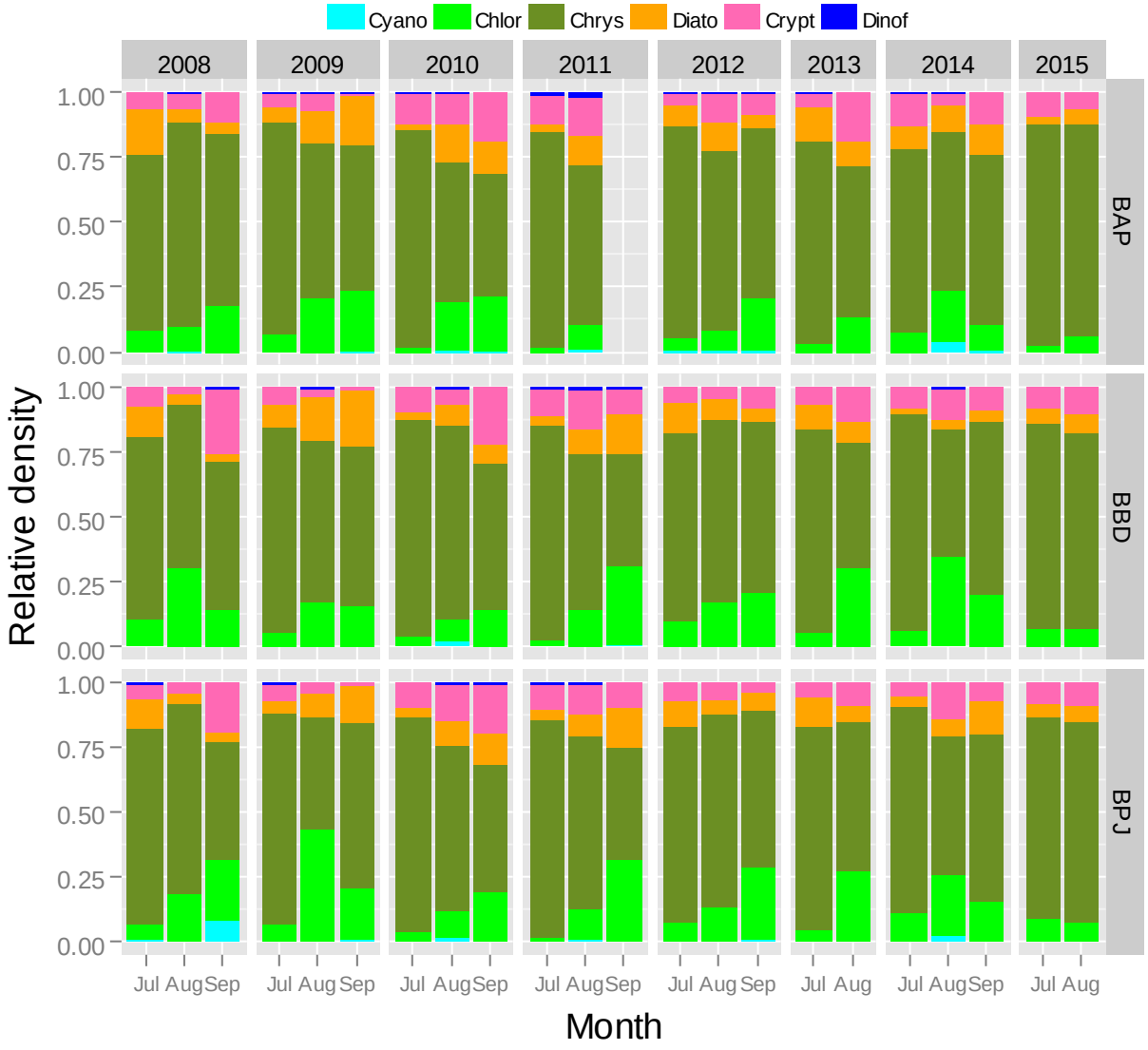


Figure C2–10. Cyanophyte density (cells/L) from Baker Lake since 2008.

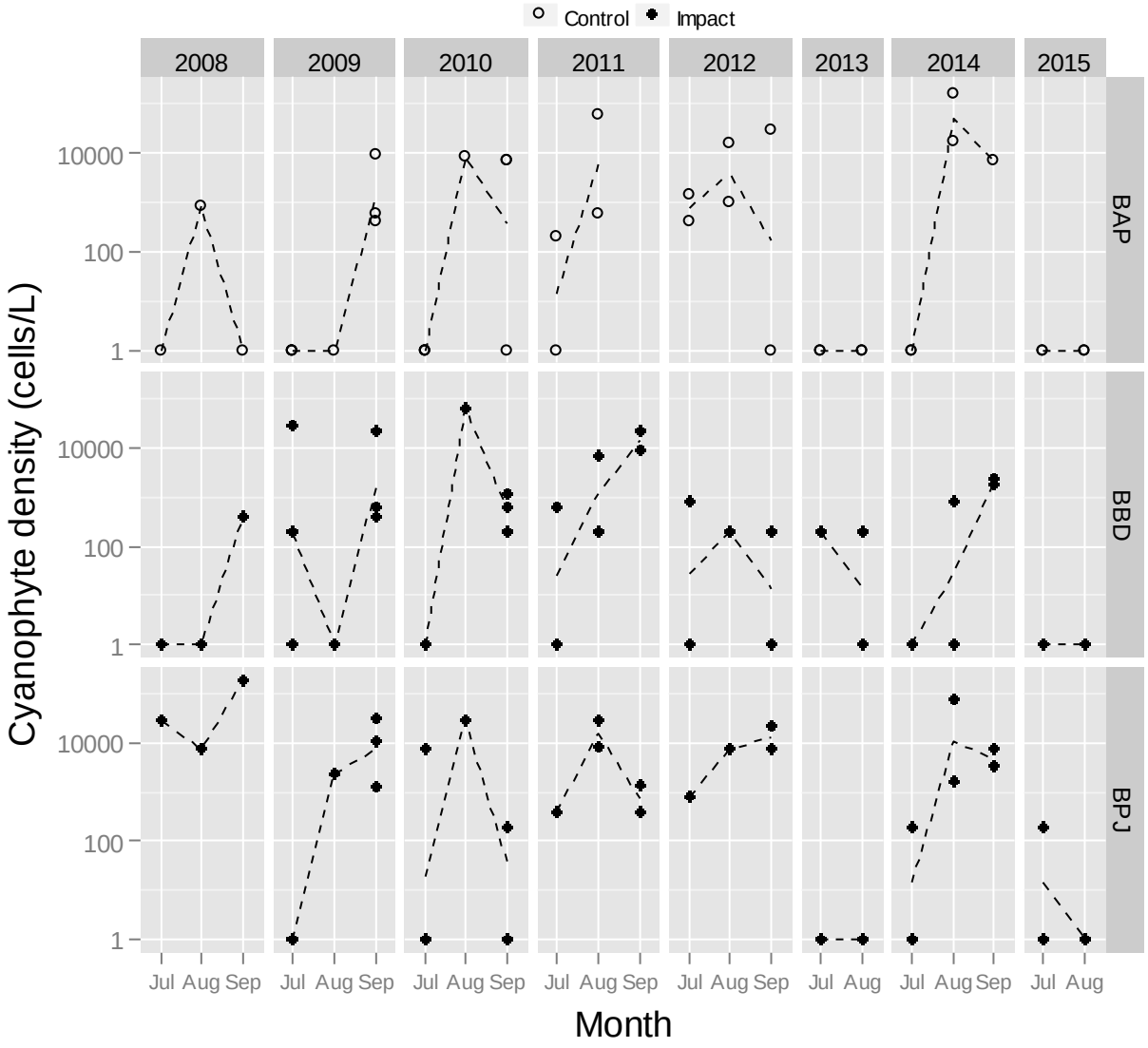


Figure C2–11. Chlorophyte density (cells/L) from Baker Lake since 2008.

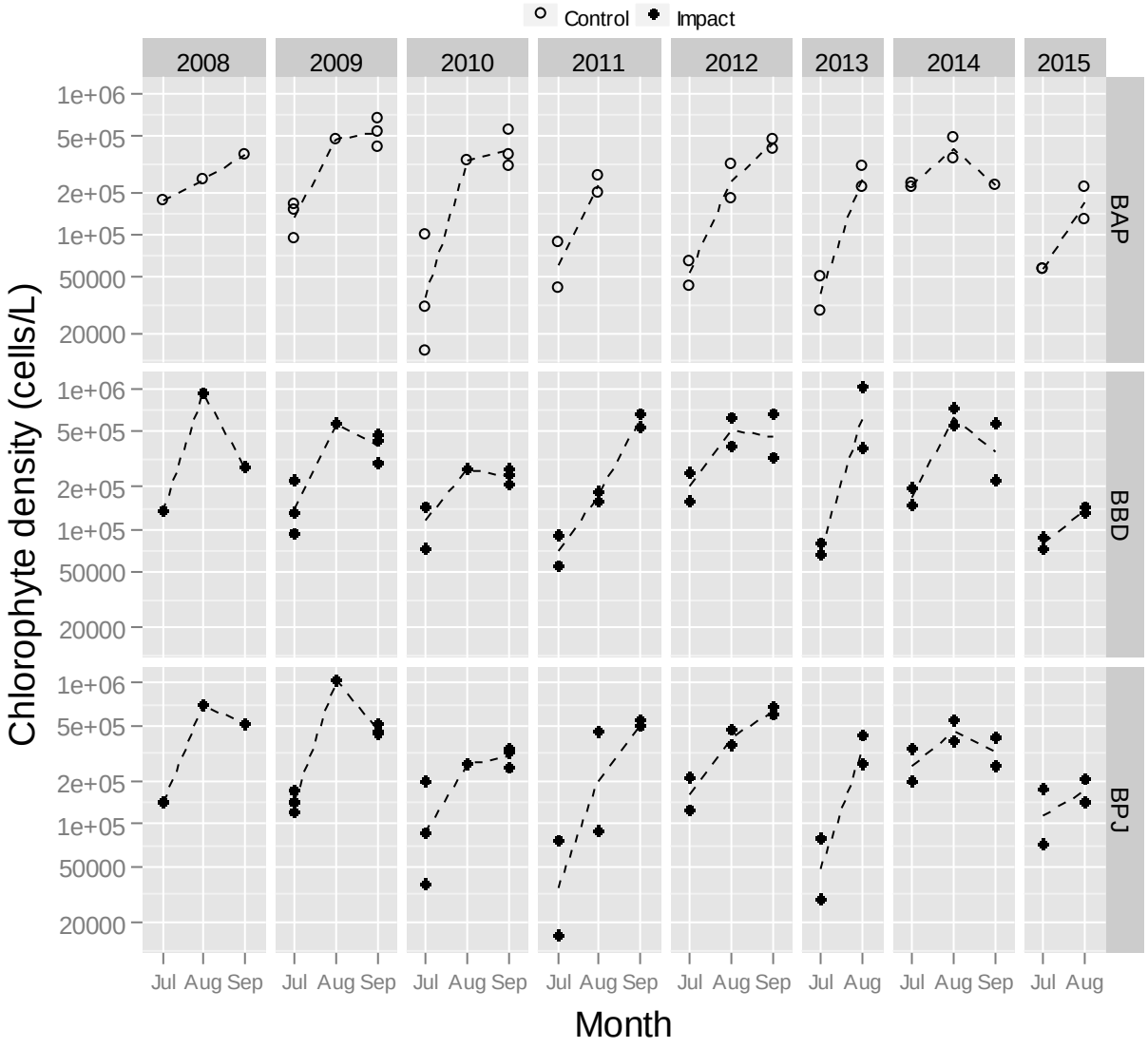


Figure C2–12. Chrysophyte density (cells/L) from Baker Lake since 2008.

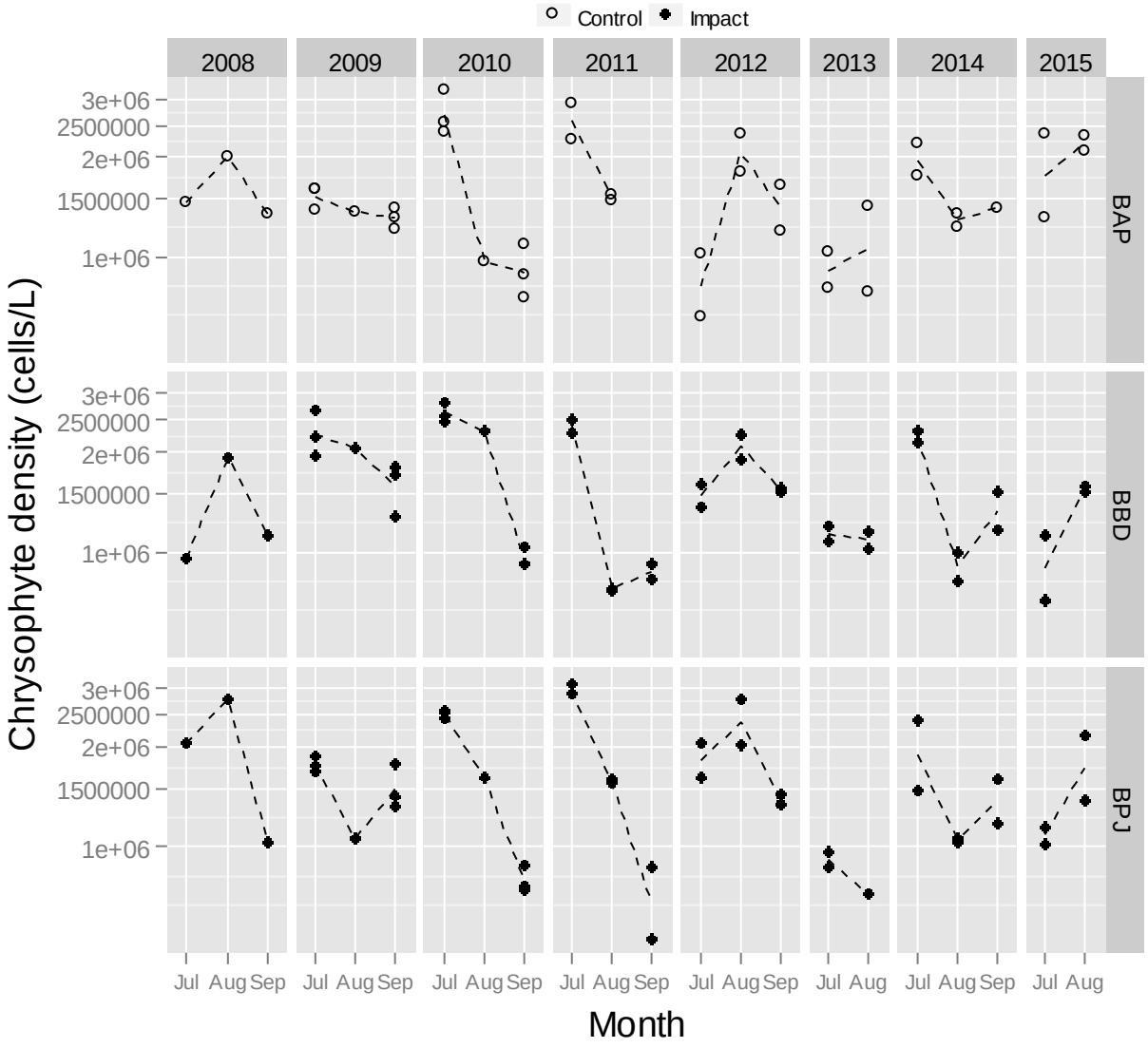


Figure C2–13. Diatom density (cells/L) from Baker Lake since 2008.

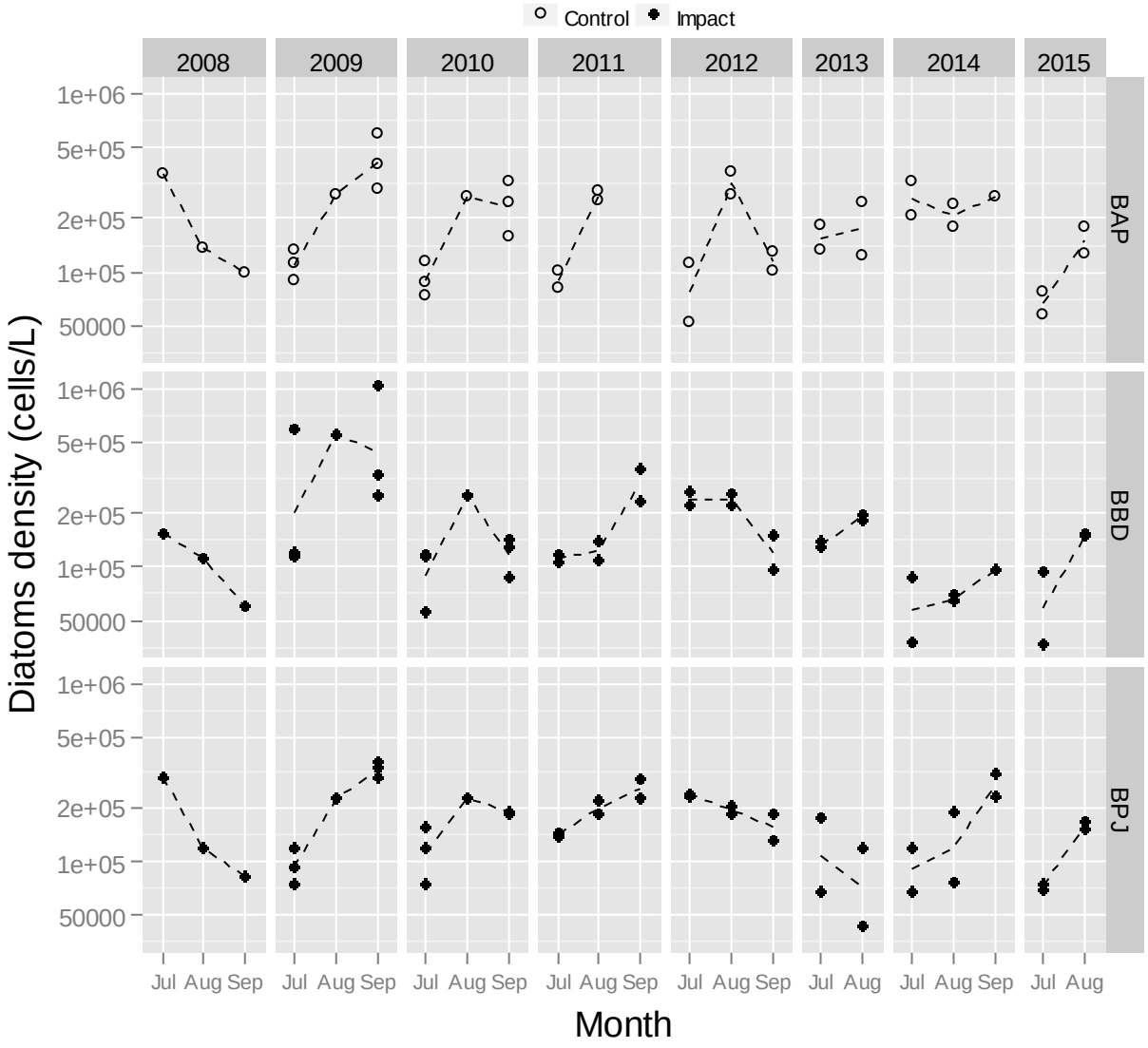


Figure C2–14. Cryptophytes density (cells/L) from Baker Lake since 2008.

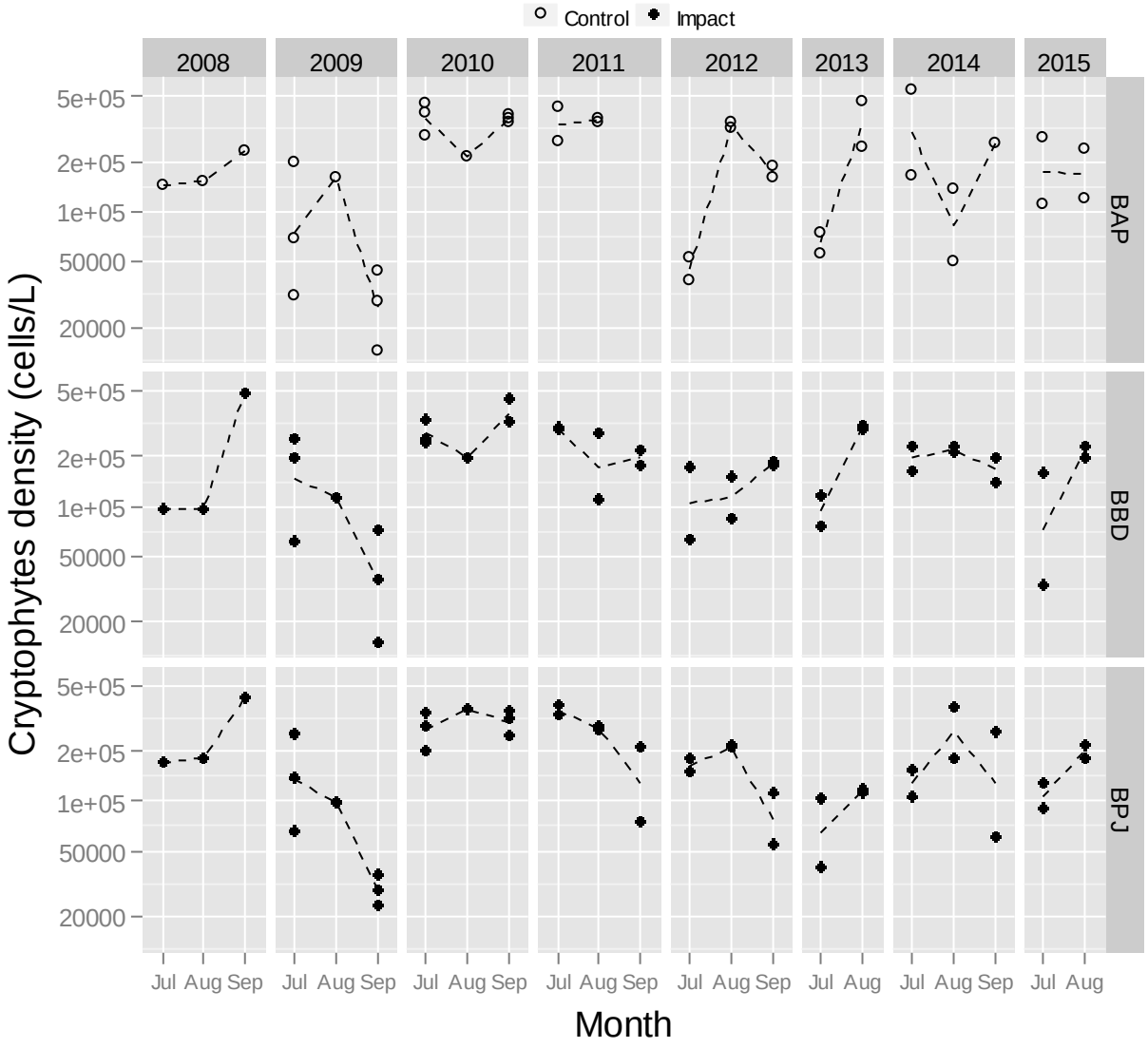


Figure C2–15. Dinoflagellates density (cells/L) from Baker Lake since 2008.

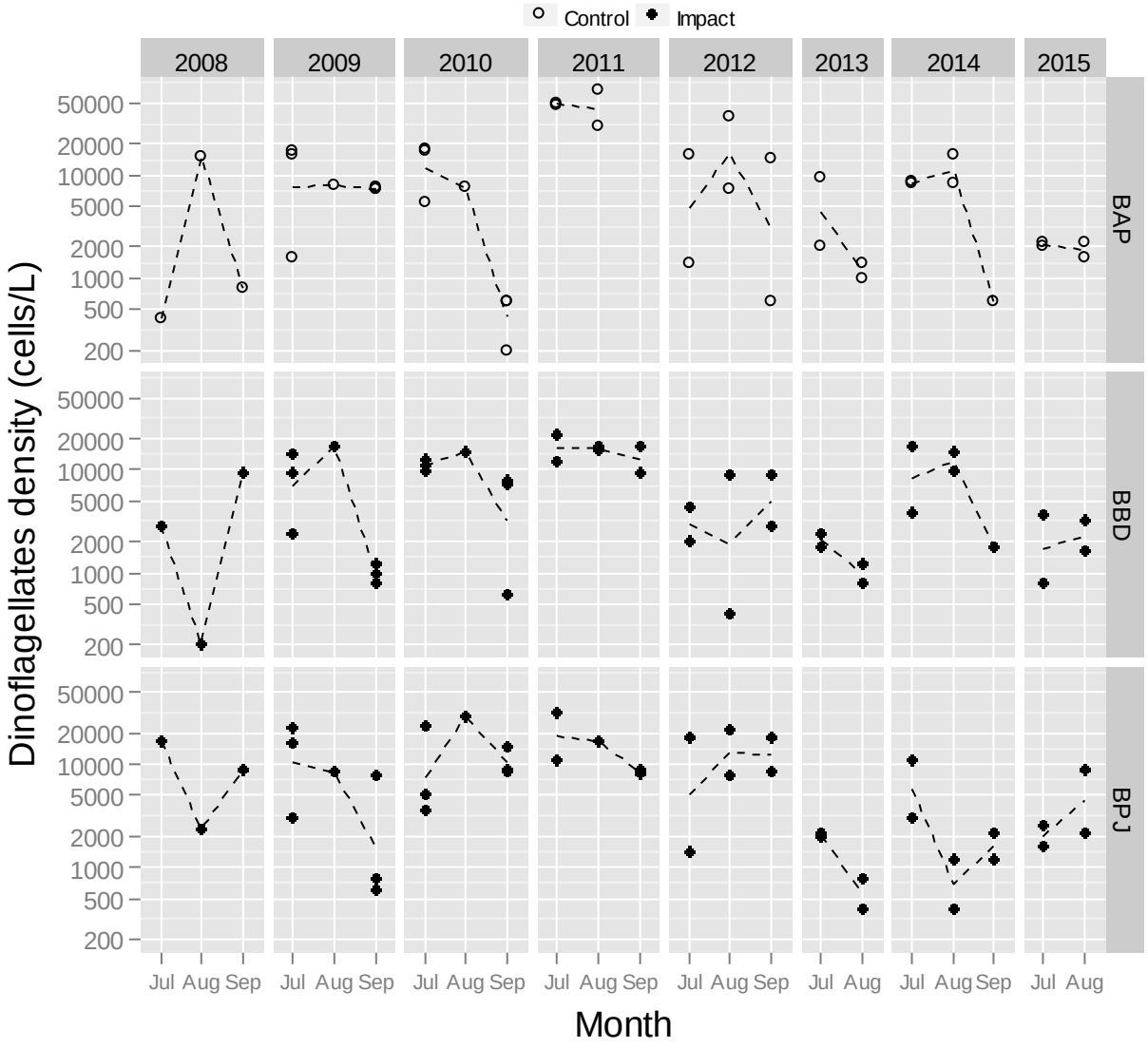
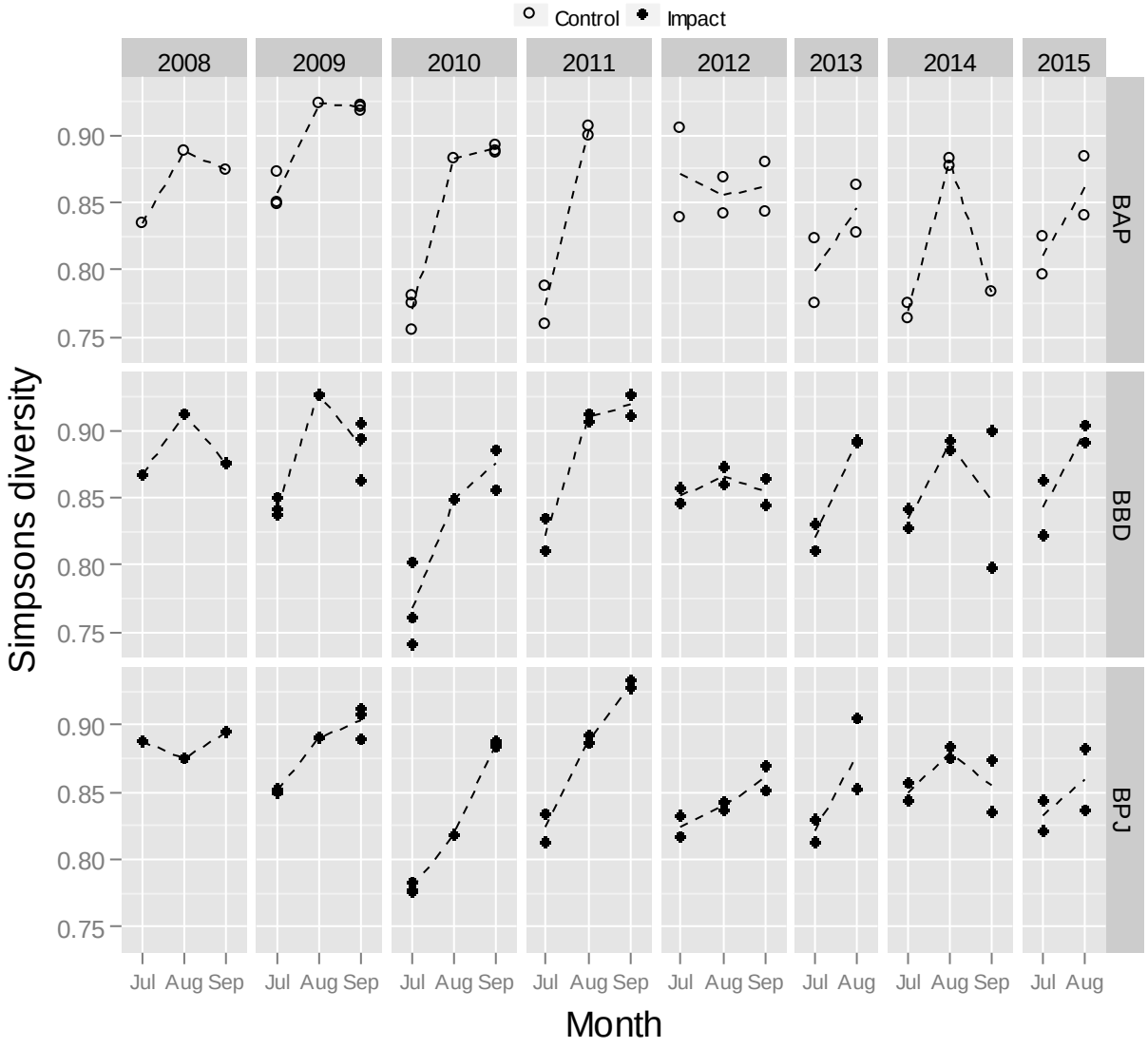


Figure C2–16. Simpson's Diversity for the phytoplankton community from Baker Lake since 2008.



APPENDIX D

Benthic Invertebrate Raw Data, Meadowbank Study Lakes and Baker Lake, 2015

Appendix D. Benthic Invertebrate Raw Data, Meadowbank Study Lakes and Baker Lake, 2015.

Location	Baker Akilahaarjuk Point					Baker Barge Dock					Baker East Shore				
Station	BAP					BBD					BES				
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Baker or Meadowbank?	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker	Baker
Depth of Sample (m)	7.9	8	8.1	8.7	9.1	8.5	9.4	8.6	8.4	8.2	9.5	9.3	9.3	9.4	9.2
# Grabs/sample	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mesh Size (µm)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Date	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15
ROUNDWORMS															
P. Nemata	28	24	28	38	15	1	8	4	1	3	8	23	20	15	23
FLATWORMS															
P. Platyhelminthes															
Cl. Turbellaria															
indeterminate	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae	6	4	6	6	4	-	-	-	-	-	2	8	1	3	2
F. Naididae															
S.F. Naidinae															
Nais	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-
S.F. Tubificinae															
Limnodrilus hoffmeisteri	54	-	6	-	-	-	-	-	-	-	-	-	-	-	-
Potamothrix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tasserkidrilus americanus	-	-	6	13	-	-	-	-	-	-	-	-	-	-	-
immatures with hair chaetae	-	11	20	41	-	-	-	-	-	-	-	-	-	-	-
immatures without hair chaetae	12	7	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Rhyacodrilinae															
Rhyacodrilus coccineus	12	4	6	-	-	-	-	-	-	-	-	-	-	-	-
Rhyacodrilus montana	61	32	97	96	6	-	8	2	-	-	2	5	1	5	5
Rhyacodrilus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae															
Lumbriculus	-	-	13	21	-	-	-	-	-	-	-	-	-	-	-
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Acalyptonotidae															
Acalyptonotus	10	2	5	-	2	-	-	3	-	-	1	2	3	2	9
F. Hygrobatidae															
Hygrobates	2	2	-	-	-	-	-	-	1	8	1	-	-	-	2
F. Lebertiidae															
Lebertia	4	24	4	2	2	1	2	2	1	42	11	7	8	4	3
F. Oxidae															
Frontipoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxus	1	2	-	3	1	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS															
Cl. Ostracoda	5	3	7	6	-	1	17	10	2	5	-	1	1	1	1
FAIRY SHRIMP															
O. Notostraca															
Lepidurus arcticus	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-
INSECTS															
Cl. Insecta															
CADDISFLIES															
O. Trichoptera															
F. Apataniidae															
Apatania	2	1	9	1	-	-	1	1	1	-	-	-	-	1	-
F. Limnephilidae															
Grensia praeterita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRUE FLIES															
O. Diptera															
MIDGES															
F. Chironomidae															
chironomid pupae	29	26	22	28	42	18	20	10	20	16	13	14	23	11	17
S.F. Chironominae															
Cladotanytarsus	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
Constempellina	3	5	2	20	10	-	6	3	3	2	3	1	-	2	2
Corynocera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicrotendipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micropsectra	17	8	40	22	41	15	58	38	10	16	8	8	16	9	8
Microtendipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parachironomus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paracladopelma	6	2	-	-	3	-	-	-	-	1	-	1	-	1	2
Paratanytarsus	14	29	39	5	11	-	-	-	5	-	-	9	2	-	5
Sergentia	4	-	12	3	-	-	-	-	-	-	-	-	-	-	-
Stempellinella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stictochironomus	23	18	68	50	1	103	293	112	-	45	-	-	-	-	-
Tanytarsus	36	23	19	35	13	39	41	44	14	33	5	24	6	8	6
S.F. Diamesinae															
Pagastia	-	-	-	-	-	1	-	1	-	4	-	-	-	-	-
Protanypus	-	-	-	-	1	-	3	4	3	2	-	-	-	-	-
Potthastia	-	-	-	-	1	1	1	-	-	-	-	1	-	-	-
Pseudodiamesa	6	9	-	10	5	-	-	-	-	-	-	1	7	-	2
S.F. Orthocladiinae															
Abiskomyia	-	-	3	31	-	1	40	101	2	12	-	1	-	6	2
Corynoneura	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Cricotopus/Orthocladius	-	-	-	5	-	-	-	-	1	-	-	-	-	-	-
Heterotrissocladius	2	10	2	5	7	14	30	3	12	44	5	-	4	3	2
Hydrobaenus	2	3	-	-	-	-	-	-	-	-	-	1	-	-	-
Mesocricotopus	2	1	-	-	5	-	-	-	-	-	4	5	5	5	3
Nanocladius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paracladius	2	6	2	-	8	-	-	-	2	3	10	9	9	10	7
Parakiefferiella	2	1	-	-	1	-	-	-	-	2	-	5	-	-	-
Psectrocladius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zalutschia	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-
Orthocladiinae *Genus "Greenland"*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Prodiamesinae															
Monodiamesa	6	14	-	24	4	11	10	31	3	3	13	15	7	5	6
S.F. Tanypodinae															
Ablabesmyia	28	42	-	-	11	-	-	-	-	-	1	-	2	5	-
Procladius	3	7	8	10	4	23	19	11	15	15	11	9	6	9	5
Thienemannimyia complex	2	-	4	2	-	1	-	-	-	2	-	-	-	-	-
F. Empididae															
Chelifera/Neoplasta	-	2	-	3	1	1	-	4	-	-	-	1	-	2	-
Wiedemannia	-	3	2	2	-	1	-	-	-	-	-	1	-	-	1
pupae	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
MOLLUSCS															
P. Mollusca															
CLAMS															
Cl. Bivalvia															
F. Sphaeriidae															
Cyclocalyx/Neopisidium	6	3	6	3	21	-	12	17	-	2	15	11	4	13	15
Cyclocalyx	-	5	23	-	-	-	-	1	-	-	-	-	-	-	-
Sphaerium nitidum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Richness - totals [1]															
Total	29	30	24	24	23	15	15	18	15	19	16	21	16	19	19
Oligochaete	5	5	7	5	2	0	1	1	0	0	2	2	3	3	2
Insect	18	19	13	16	17	13	12	12	13	16	10	16	10	13	13
Mollusc	1	2	2	1	1	0	1	2	0	1	1	1	1	1	1
Other[3]	5	4	2	2	3	2	1	3	2	2	3	2	2	2	3
Abundance (raw) - totals [2]															
Total	359	307	424	441	205	232	546	390	94	259	106	139	106	106	104
Oligochaete	145	58	154	177	10	0	8	2	0	0	4	13	4	10	7
Insect	189	211	232	256	169	230	523	364	92	206	74	106	87	77	68
Mollusc	6	8	29	3	21	0	12	18	0	2	15	11	4	13	15
Other[3]	19	30	9	5	5	2	3	6	2	51	13	9	11	6	14
Abundance - totals (#/m^2)															
Total	7804	6674	9217	9587	4457	5043	11870	8478	2043	5630	2304	3022	2304	2304	2261
Oligochaete	3152	1261	3348	3848	217	0	174	43	0	0	87	283	87	217	152
Insect	4109	4587	5043	5565	3674	5000	11370	7913	2000	4478	1609	2304	1891	1674	1478
Mollusc	130	174	630	65	457	0	261	391	0	43	326	239	87	283	326
Other[3]	413	652	196	109	109	43	65	130	43	1109	283	196	239	130	304

Notes:

[1] Richness totals exclude P. Nemata and Cl. Ostracoda, pupae and indeterminates (Acarina). Pupae are included in the richness totals if no other life stages are present in the replicate sample.

[2] Abundance totals exclude P. Nemata and Cl. Ostracoda.

Raw abundance from two grabs (grab area = 0.023 m^2).

[3] Other taxa = Cl. Turbellaria, F. Acalyptonotidae, F. Hygrobatidae, F. Lebertiidae, F. Oxidae, and O. Notostraca.

Appendix D. Benthic Invertebrate Raw Data, Meadowbank Study Lakes and Baker Lake, 2015.

Location	Baker Proposed Jetty					Inuggugayualik Lake					Pipedream Lake				
Station	BPJ					INUG					PDL				
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Baker or Meadowbank?	Baker	Baker	Baker	Baker	Baker	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank
Depth of Sample (m)	9.3	7.8	8	8.8	8.3	6.9	7.1	7.6	8.9	8.1	6.8	6.6	8	7.8	8.7
# Grabs/sample	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mesh Size (µm)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Date	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	18-Aug-15	27-Aug-15	27-Aug-15	27-Aug-15	27-Aug-15	27-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15
ROUNDWORMS															
P. Nemata	11	22	15	2	3	8	2	5	5	5	3	6	1	2	2
FLATWORMS															
P. Platyhelminthes															
Cl. Turbellaria															
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
F. Naididae															
S.F. Naidinae															
Nais	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Tubificinae															
Limnodrilus hoffmeisteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potamothrix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tasserkidrilus americanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
immatures with hair chaetae	-	-	-	-	-	-	-	-	1	-	-	3	-	-	-
immatures without hair chaetae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Rhyacodrilinae															
Rhyacodrilus coccineus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhyacodrilus montana	7	8	3	-	8	-	-	-	-	-	-	-	-	-	-
Rhyacodrilus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae															
Lumbriculus	-	-	-	-	-	1	2	6	-	2	-	1	-	2	-
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Acalyptonotidae															
Acalyptonotus	4	6	1	-	-	-	-	1	-	-	-	1	-	-	-
F. Hygrobatidae															
Hygrobates	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-
F. Lebertiidae															
Lebertia	12	6	12	2	-	-	-	-	-	-	-	-	1	-	2
F. Oxidae															
Frontipoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS															
Cl. Ostracoda	8	4	4	-	-	1	6	6	2	1	21	5	4	2	3
FAIRY SHRIMP															
O. Notostraca															
Lepidurus arcticus	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
INSECTS															
Cl. Insecta															
CADDISFLIES															
O. Trichoptera															
F. Apataniidae															
Apatania	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae															
Grensia praeterita	-	-	-	-	-	-	-	1	-	-	4	-	-	1	1
TRUE FLIES															
O. Diptera															
MIDGES															
F. Chironomidae															
chironomid pupae	27	29	14	5	16	-	-	-	-	-	-	-	-	-	-
S.F. Chironominae															
Cladotanytarsus	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-
Constempellina	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-
Corynocera	-	-	-	-	-	-	4	3	5	-	-	-	-	-	-
Dicrotendipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micropsectra	25	54	29	-	6	-	18	-	-	2	-	-	-	-	-
Microtendipes	-	-	-	-	-	3	22	19	31	13	-	-	-	-	-
Parachironomus	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Paracladopelma	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Paratanytarsus	-	-	3	3	-	2	3	6	1	2	6	-	-	-	-
Sergentia	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Stempellinella	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Stictochironomus	25	16	1	1	12	5	9	26	5	7	20	13	20	6	21
Tanytarsus	25	34	28	1	1	-	7	11	8	8	9	-	-	-	-
S.F. Diamesinae															
Pagastia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protanypus	2	-	2	-	-	1	1	-	-	-	-	-	-	-	-
Potthastia	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Pseudodiamesa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Orthocladiinae															
Abiskomyia	-	16	12	-	1	-	-	-	-	-	-	-	-	-	-
Corynoneura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cricotopus/Orthocladius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heterotrissocladius	3	14	9	2	4	-	-	-	1	-	1	-	-	-	2
Hydrobaenus	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Mesocricotopus	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Nanocladius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paracladius	13	15	8	3	4	-	-	-	-	-	-	2	-	-	-
Parakiefferiella	-	2	1	-	-	-	-	-	-	-	-	1	-	-	-
Psectrocladius	-	-	-	-	-	2	4	1	-	-	7	9	3	1	2
Zalutschia	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Orthocladiinae *Genus "Greenland"*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
indeterminate	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Prodiamesinae															
Monodiamesa	2	6	6	-	5	3	2	1	4	-	-	2	2	-	2
S.F. Tanypodinae															
Ablabesmyia	3	-	-	-	-	-	1	-	-	-	-	-	1	-	-
Procladius	13	20	11	3	3	10	4	5	4	11	6	15	14	9	8
Thienemannimyia complex	-	1	-	-	-	-	-	-	-	-	3	2	-	-	-
F. Empididae															
Chelifera/Neoplasta	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wiedemannia	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLLUSCS															
P. Mollusca															
CLAMS															
Cl. Bivalvia															
F. Sphaeriidae															
Cyclocalyx/Neopisidium	26	15	-	-	2	14	23	15	16	17	2	14	20	9	13
Cyclocalyx	-	-	-	-	-	-	2	4	-	-	7	-	-	-	-
Sphaerium nitidum	-	-	-	-	-	2	4	2	2	3	-	-	-	-	-
Richness - totals [1]															
Total	15	19	16	8	15	10	17	16	12	9	11	11	9	6	8
Oligochaete	1	1	1	0	2	1	1	1	1	1	0	2	0	1	0
Insect	11	14	13	7	12	7	13	10	9	6	9	7	6	4	6
Mollusc	1	1	0	0	1	2	3	3	2	2	2	1	1	1	1
Other[3]	2	3	2	1	0	0	0	2	0	0	0	1	2	0	1
Abundance (raw) - totals [2]															
Total	189	247	142	23	67	43	109	104	79	65	66	63	63	28	51
Oligochaete	7	8	3	0	9	1	2	6	1	2	0	4	0	2	0
Insect	140	211	126	21	56	26	78	74	60	43	57	44	41	17	36
Mollusc	26	15	0	0	2	16	29	21	18	20	9	14	20	9	13
Other[3]	16	13	13	2	0	0	0	3	0	0	0	1	2	0	2
Abundance - totals (#/m^2)															
Total	4109	5370	3087	500	1457	935	2370	2261	1717	1413	1435	1370	1370	609	1109
Oligochaete	152	174	65	0	196	22	43	130	22	43	0	87	0	43	0
Insect	3043	4587	2739	457	1217	565	1696	1609	1304	935	1239	957	891	370	783
Mollusc	565	326	0	0	43	348	630	457	391	435	196	304	435	196	283
Other[3]	348	283	283	43	0	0	0	65	0	0	0	22	43	0	43

Notes:

[1] Number of taxa totals exclude P. Nemata and Cl. Ostracoda, pupae and indeterminates (Acarina). Pupae are included in the richness totals if no other life stages are present in the replicate sample.

[2] Number of organisms totals exclude P. Nemata and Cl. Ostracoda.

Raw abundance from two grabs (grab area = 0.023 m^2).

[3] Other taxa = Cl. Turbellaria, F. Acalyptonotidae, F. Hygrobatidae, F. Lebertiidae, F. Oxidae, and O. Notostraca.

Appendix D. Benthic Invertebrate Raw Data, Meadowbank Study Lakes and Baker Lake, 2015.

Location	Second Portage Lake					Tehek Lake					Tehek Lake - Farfield				
Station	SP					TE					TEFF				
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Baker or Meadowbank?	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank
Depth of Sample (m)	8.9	9.1	8.3	7.6	7.8	7.7	7.4	7.9	7.2	7.2	8.2	7.9	7.7	7.8	7.4
# Grabs/sample	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mesh Size (µm)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Date	13-Aug-15	13-Aug-15	13-Aug-15	13-Aug-15	13-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15	28-Aug-15
ROUNDWORMS															
P. Nemata	4	4	3	6	2	12	5	5	2	3	2	2	-	2	1
FLATWORMS															
P. Platyhelminthes															
Cl. Turbellaria															
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Naididae															
S.F. Naidinae															
Nais	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Tubificinae															
Limnodrilus hoffmeisteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potamothrix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tasserkidrilus americanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
immatures with hair chaetae	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
immatures without hair chaetae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Rhyacodrilinae															
Rhyacodrilus coccineus	1	-	-	1	1	-	1	-	-	-	-	-	-	-	-
Rhyacodrilus montana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhyacodrilus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae															
Lumbriculus	1	-	1	-	-	2	-	1	3	1	-	-	-	-	-
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Acalyptonotidae															
Acalyptonotus	1	-	-	2	-	1	-	-	1	-	1	-	4	5	2
F. Hygrobatidae															
Hygrobates	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
F. Lebertiidae															
Lebertia	-	1	-	-	1	-	-	1	3	1	2	-	1	1	-
F. Oxidae						1									
Frontipoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxus	-	4	-	6	1	-	3	5	3	-	-	-	-	-	-
SEED SHRIMPS															
Cl. Ostracoda	4	4	2	17	14	28	9	3	6	6	25	16	17	11	16
FAIRY SHRIMP															
O. Notostraca															
Lepidurus arcticus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INSECTS															
Cl. Insecta															
CADDISFLIES															
O. Trichoptera															
F. Apataniidae															
Apatania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae															
Grensia praeterita	-	-	-	-	-	-	-	-	1	-	-	-	3	-	-
TRUE FLIES															
O. Diptera															
MIDGES															
F. Chironomidae															
chironomid pupae	4	1	-	2	1	-	-	-	-	-	1	-	-	1	-
S.F. Chironominae															
Cladotanytarsus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Constempellina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corynocera	-	-	-	-	-	4	5	-	2	2	-	-	-	-	-
Dicrotendipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micropsectra	15	17	37	11	22	-	2	-	10	33	2	-	-	1	2
Microtendipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parachironomus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paracladopelma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paratanytarsus	-	-	-	1	-	-	2	6	-	-	-	2	2	-	3
Sergentia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stempellinella	2	-	-	5	-	-	-	-	-	-	-	-	-	-	-
Stictochironomus	3	5	6	8	4	2	6	-	3	2	-	1	6	-	15
Tanytarsus	4	-	2	1	-	1	6	1	2	-	2	6	2	-	4
S.F. Diamesinae															
Pagastia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protanypus	-	-	-	2	2	2	1	1	1	1	-	1	-	1	1
Potthastia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudodiamesa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Orthocladiinae															
Abiskomyia	-	4	-	-	-	-	1	-	-	-	-	-	-	-	-
Corynoneura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cricotopus/Orthocladius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heterotrissocladius	3	3	-	2	3	1	-	-	-	-	16	7	-	1	6
Hydrobaenus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mesocricotopus	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-
Nanocladius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paracladius	-	-	-	1	-	1	1	-	-	-	-	1	-	-	-
Parakiefferiella	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-
Psectrocladius	6	2	7	5	1	1	5	5	1	1	2	3	-	2	2
Zalutschia	-	-	-	-	1	-	-	-	-	-	5	2	1	2	-
Orthocladiinae *Genus "Greenland"*	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Prodiamesinae															
Monodiamesa	-	1	-	1	3	-	-	-	-	3	-	1	2	-	1
S.F. Tanypodinae															
Ablabesmyia	11	-	2	5	1	-	2	-	-	-	-	-	-	1	-
Procladius	10	14	18	16	12	15	23	21	18	10	2	1	5	5	3
Thienemannimyia complex	-	-	-	-	-	-	1	2	-	-	1	2	-	-	-
F. Empididae															
Chelifera/Neoplasta	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Wiedemannia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLLUSCS															
P. Mollusca															
CLAMS															
Cl. Bivalvia															
F. Sphaeriidae															
Cyclocalyx/Neopisidium	12	12	15	9	7	29	29	20	24	12	9	17	1	8	8
Cyclocalyx	19	14	8	17	22	4	-	-	1	-	-	-	-	-	-
Sphaerium nitidum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Richness - totals [1]															
Total	13	11	10	18	14	12	15	10	16	12	12	13	11	10	11
Oligochaete	2	0	1	1	1	1	1	1	2	1	0	0	0	0	0
Insect	8	7	7	13	9	8	12	6	9	9	8	12	8	7	9
Mollusc	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1
Other[3]	1	2	0	2	2	1	1	2	3	1	3	0	2	2	1
Abundance (raw) - totals [2]															
Total	92	78	97	96	82	63	88	63	77	68	45	45	28	28	47
Oligochaete	2	0	1	1	1	2	1	1	6	1	0	0	0	0	0
Insect	58	47	73	61	50	27	55	36	39	54	32	28	22	14	37
Mollusc	31	26	23	26	29	33	29	20	25	12	9	17	1	8	8
Other[3]	1	5	0	8	2	1	3	6	7	1	4	0	5	6	2
Abundance - totals (#/m^2)															
Total	2000	1696	2109	2087	1783	1370	1913	1370	1674	1478	978	978	609	609	1022
Oligochaete	43	0	22	22	22	43	22	22	130	22	0	0	0	0	0
Insect	1261	1022	1587	1326	1087	587	1196	783	848	1174	696	609	478	304	804
Mollusc	674	565	500	565	630	717	630	435	543	261	196	370	22	174	174
Other[3]	22	109	0	174	43	22	65	130	152	22	87	0	109	130	43

Notes:

[1] Number of taxa totals exclude P. Nemata and Cl. Ostracoda, pupae and indeterminates (Acarina). Pupae are included in the richness totals if no other life stages are present in the replicate sample.

[2] Number of organisms totals exclude P. Nemata and Cl. Ostracoda.

Raw abundance from two grabs (grab area = 0.023 m^2).

[3] Other taxa = Cl. Turbellaria, F. Acalyptonotidae, F. Hygrobatidae, F. Lebertiidae, F. Oxidae, and O. Notostraca.

Appendix D. Benthic Invertebrate Raw Data, Meadowbank Study Lakes and Baker Lake, 2015.

Location	Third Portage Lake - East Basin					Third Portage Lake - North Basin					Third Portage Lake - South Basin				
Station	TPE					TPN					TPS				
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Baker or Meadowbank?	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank
Depth of Sample (m)	8.5	9	6.8	6.8	7.1	8.6	8.7	8.3	8.4	10.5	8.3	9	7	9.5	8.2
# Grabs/sample	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mesh Size (µm)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Date	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	30-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15
ROUNDWORMS															
P. Nemata	2	2	-	2	2	2	-	1	-	-	11	28	20	5	17
FLATWORMS															
P. Platyhelminthes															
Cl. Turbellaria															
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Naididae															
S.F. Naidinae															
Nais	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Tubificinae															
Limnodrilus hoffmeisteri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potamothrix	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Tasserkidrilus americanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
immatures with hair chaetae	-	-	-	1	-	-	-	-	-	-	13	2	1	-	4
immatures without hair chaetae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Rhyacodrilinae															
Rhyacodrilus coccineus	2	3	3	2	5	-	-	-	-	-	3	-	2	-	-
Rhyacodrilus montana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhyacodrilus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae															
Lumbriculus	2	2	1	2	-	-	3	1	-	-	10	1	1	1	1
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Acalyptonotidae															
Acalyptonotus	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-
F. Hygrobatidae															
Hygrobates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae															
Lebertia	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Oxidae															
Frontipoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxus	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS															
Cl. Ostracoda	46	21	85	74	52	5	4	6	10	4	56	26	23	15	10
FAIRY SHRIMP															
O. Notostraca															
Lepidurus arcticus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INSECTS															
Cl. Insecta															
CADDISFLIES															
O. Trichoptera															
F. Apataniidae															
Apatania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae															
Grensia praeterita	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
TRUE FLIES															
O. Diptera															
MIDGES															
F. Chironomidae															
chironomid pupae	1	-	-	-	-	26	20	42	12	28	55	36	28	14	30
S.F. Chironominae															
Cladotanytarsus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Constempellina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corynocera	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicrotendipes	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Micropsectra	1	3	7	11	3	9	-	5	3	4	82	56	81	12	10
Microtendipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parachironomus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paracladopelma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paratanytarsus	25	43	29	41	27	17	28	25	19	15	116	55	51	19	22
Sergentia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stempellinella	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Stictochironomus	5	3	1	1	2	24	50	11	18	4	8	-	1	5	1
Tanytarsus	7	8	6	8	12	4	9	-	13	8	7	31	7	12	5
S.F. Diamesinae															
Pagastia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protanypus	1	-	1	-	-	-	-	-	-	-	-	-	1	1	1
Potthastia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudodiamesa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Orthocladiinae															
Abiskomyia	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-
Corynoneura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cricotopus/Orthocladius	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Heterotrissocladius	8	7	5	4	9	23	12	14	20	23	77	31	46	35	25
Hydrobaenus	-	-	-	-	-	-	-	3	-	1	1	7	-	3	1
Mesocricotopus	-	-	-	-	-	-	-	-	-	-	6	4	1	1	-
Nanocladius	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Paracladius	-	-	-	-	-	-	-	-	-	1	1	-	2	-	-
Parakiefferiella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psectrocladius	9	4	11	3	4	21	16	10	15	3	44	21	12	18	8
Zalutschia	-	-	-	-	-	-	-	-	1	1	-	-	2	1	1
Orthocladiinae *Genus "Greenland"*	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Prodiamesinae															
Monodiamesa	4	1	5	1	-	-	-	2	-	1	-	6	-	1	4
S.F. Tanypodinae															
Ablabesmyia	4	1	-	-	2	-	-	-	-	-	-	-	3	1	2
Procladius	15	11	10	17	13	6	3	4	8	1	-	8	2	2	3
Thienemannimyia complex	6	5	17	15	20	7	9	10	6	3	34	12	30	12	5
F. Empididae															
Chelifera/Neoplasta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wiedemannia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLLUSCS															
P. Mollusca															
CLAMS															
Cl. Bivalvia															
F. Sphaeriidae															
Cyclocalyx/Neopisidium	24	15	31	33	49	32	9	24	15	4	119	35	39	19	49
Cyclocalyx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sphaerium nitidum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Richness - totals [1]															
Total	17	14	14	15	11	9	10	12	10	13	16	14	20	17	18
Oligochaete	2	2	2	3	1	0	1	1	0	0	4	2	3	1	3
Insect	12	10	10	10	9	8	8	10	9	12	11	11	16	14	14
Mollusc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Other[3]	2	1	1	1	0	0	0	0	0	0	0	0	0	1	0
Abundance (raw) - totals [2]															
Total	118	107	128	141	146	169	161	152	130	97	578	306	313	158	174
Oligochaete	4	5	4	5	5	0	3	1	0	0	27	3	4	1	6
Insect	87	86	92	102	92	137	149	127	115	93	432	268	270	137	119
Mollusc	24	15	31	33	49	32	9	24	15	4	119	35	39	19	49
Other[3]	3	1	1	1	0	0	0	0	0	0	0	0	0	1	0
Abundance - totals (#/m^2)															
Total	2565	2326	2783	3065	3174	3674	3500	3304	2826	2109	12565	6652	6804	3435	3783
Oligochaete	87	109	87	109	109	0	65	22	0	0	587	65	87	22	130
Insect	1891	1870	2000	2217	2000	2978	3239	2761	2500	2022	9391	5826	5870	2978	2587
Mollusc	522	326	674	717	1065	696	196	522	326	87	2587	761	848	413	1065
Other[3]	65	22	22	22	0	0	0	0	0	0	0	0	0	22	0

Notes:

[1] Number of taxa totals exclude P. Nemata and Cl. Ostracoda, pupae and indeterminates (Acarina). Pupae are included in the richness totals if no other life stages are present in the replicate sample.

[2] Number of organisms totals exclude P. Nemata and Cl. Ostracoda.

Raw abundance from two grabs (grab area = 0.023 m^2).

[3] Other taxa = Cl. Turbellaria, F. Acalyptonotidae, F. Hygrobatidae, F. Lebertiidae, F. Oxidae, and O. Notostraca.

Appendix D. Benthic Invertebrate Raw Data, Meadowbank Study Lakes and Baker Lake, 2015.

Location	Wally Lake				
Station	WAL				
Replicate	1	2	3	4	5
Baker or Meadowbank?	Meadowbank	Meadowbank	Meadowbank	Meadowbank	Meadowbank
Depth of Sample (m)	8.7	8.3	8.8	8.9	8.4
# Grabs/sample	2	2	2	2	2
Mesh Size (µm)	500	500	500	500	500
Date	19-Aug-15	19-Aug-15	19-Aug-15	19-Aug-15	19-Aug-15
ROUNDWORMS					
P. Nemata	-	2	3	2	6
FLATWORMS					
P. Platyhelminthes					
Cl. Turbellaria					
indeterminate	-	-	-	-	1
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	-	-	-	-	-
F. Naididae					
S.F. Naidinae					
Nais	-	-	-	-	-
S.F. Tubificinae					
Limnodrilus hoffmeisteri	-	-	-	-	-
Potamothrix	-	-	-	-	-
Tasserkidrilus americanus	-	-	-	-	-
immatures with hair chaetae	-	-	-	-	-
immatures without hair chaetae	-	-	-	-	-
S.F. Rhyacodrilinae					
Rhyacodrilus coccineus	-	-	-	-	-
Rhyacodrilus montana	-	-	-	-	-
Rhyacodrilus	-	-	-	-	-
F. Lumbriculidae					
Lumbriculus	2	2	2	2	1
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
indeterminate	-	-	-	-	-
F. Acalyptonotidae					
Acalyptonotus	-	-	-	2	1
F. Hygrobatidae					
Hygrobates	-	-	-	-	-
F. Lebertiidae					
Lebertia	-	1	-	2	-
F. Oxidae					
Frontipoda	-	-	-	-	-
Oxus	-	-	-	1	-
SEED SHRIMPS					
Cl. Ostracoda	21	26	6	24	27
FAIRY SHRIMP					
O. Notostraca					
Lepidurus arcticus	-	-	-	-	-
INSECTS					
Cl. Insecta					
CADDISFLIES					
O. Trichoptera					
F. Apataniidae					
Apatania	-	-	-	-	-
F. Limnephilidae					
Grensia praeterita	1	1	-	-	-
TRUE FLIES					
O. Diptera					
MIDGES					
F. Chironomidae					
chironomid pupae	-	1	-	-	2
S.F. Chironominae					
Cladotanytarsus	4	10	-	25	7
Constempellina	-	-	-	-	-
Corynocera	-	-	-	-	-
Dicrotendipes	-	-	-	-	1
Micropsectra	-	-	-	-	-
Microtendipes	-	-	-	-	-
Parachironomus	-	-	-	-	-
Paracladopelma	-	-	-	-	-
Paratanytarsus	1	-	-	1	-
Sergentia	-	-	-	-	-
Stempellinella	-	-	-	-	-
Stictochironomus	7	11	3	23	14
Tanytarsus	4	49	-	44	36
S.F. Diamesinae					
Pagastia	-	-	-	-	-
Protanypus	-	-	-	1	-
Potthastia	-	-	-	-	-
Pseudodiamesa	-	-	-	-	-
S.F. Orthocladiinae					
Abiskomyia	-	-	-	-	-
Corynoneura	-	-	-	5	-
Cricotopus/Orthocladius	-	-	-	-	-
Heterotrissocladius	-	-	-	-	-
Hydrobaenus	-	-	-	-	-
Mesocricotopus	-	-	-	-	-
Nanocladius	-	-	-	-	-
Paracladius	-	-	-	-	-
Parakiefferiella	-	-	-	-	-
Psectrocladius	2	3	1	4	2
Zalutschia	1	-	-	-	-
Orthocladiinae *Genus "Greenland"*	-	-	-	-	-
indeterminate	-	-	-	-	-
S.F. Prodiamesinae					
Monodiamesa	1	1	-	-	-
S.F. Tanypodinae					
Ablabesmyia	-	-	-	-	-
Procladius	5	13	7	12	12
Thienemannimyia complex	-	1	-	2	-
F. Empididae					
Chelifera/Neoplasta	-	-	-	-	-
Wiedemannia	-	-	-	-	-
pupae	-	-	-	-	-
MOLLUSCS					
P. Mollusca					
CLAMS					
Cl. Bivalvia					
F. Sphaeriidae					
Cyclocalyx/Neopisidium	8	5	11	8	8
Cyclocalyx	6	22	-	23	19
Sphaerium nitidum	-	-	-	-	-
Richness - totals [1]					
Total	12	12	5	15	10
Oligochaete	1	1	1	1	1
Insect	9	8	3	9	6
Mollusc	2	2	1	2	2
Other[3]	0	1	0	3	1
Abundance (raw) - totals [2]					
Total	42	120	24	155	104
Oligochaete	2	2	2	2	1
Insect	26	90	11	117	74
Mollusc	14	27	11	31	27
Other[3]	0	1	0	5	2
Abundance - totals (#/m^2)					
Total	913	2609	522	3370	2261
Oligochaete	43	43	43	43	22
Insect	565	1957	239	2543	1609
Mollusc	304	587	239	674	587
Other[3]	0	22	0	109	43

Notes:

[1] Number of taxa totals exclude P. Nemata and Cl. Ostracoda, pupae and indeterminates (Acarina). Pupae are included in the richness totals if no other life stages are present in the replicate sample.

[2] Number of organisms totals exclude P. Nemata and Cl. Ostracoda.

Raw abundance from two grabs (grab area = 0.023 m^2).

[3] Other taxa = Cl. Turbellaria, F. Acalyptonotidae, F. Hygrobatidae, F. Lebertiidae, F. Oxidae, and O. Notostraca.

APPENDIX E

Benthic Invertebrate Plots

APPENDIX E1

Meadowbank Benthic Invertebrate Plots 2006 – 2015

LIST OF FIGURES – APPENDIX E1

Figure E1–1. Oligochaete abundance (#/m^2) from Meadowbank study lakes since 2006. 3

Figure E1–2. Insect abundance (#/m^2) from Meadowbank study lakes since 2006. 4

Figure E1–3. Mollusc abundance (#/m^2) from Meadowbank study lakes since 2006. 5

Figure E1–4. Other taxa abundance (#/m^2) from Meadowbank study lakes since 2006. 6

Figure E1–5. Oligochaete richness (# of taxa) from Meadowbank study lakes since 2006. 7

Figure E1–6. Insect richness (# of taxa) from Meadowbank study lakes since 2006. 8

Figure E1–7. Mollusc richness (# of taxa) from Meadowbank study lakes since 2006. 9

Figure E1–8. Other taxa richness (# of taxa) from Meadowbank study lakes since 2006. 10

Figure E1–9. Simpson's Diversity for the benthic invertebrate community at the Meadowbank study lakes since 2006. 11

Figure E1–10. Bray-Curtis Index for the benthic invertebrate community at the Meadowbank study lakes since 2006. 12

Figure E1–1. Oligochaete abundance (#/m^2) from Meadowbank study lakes since 2006.

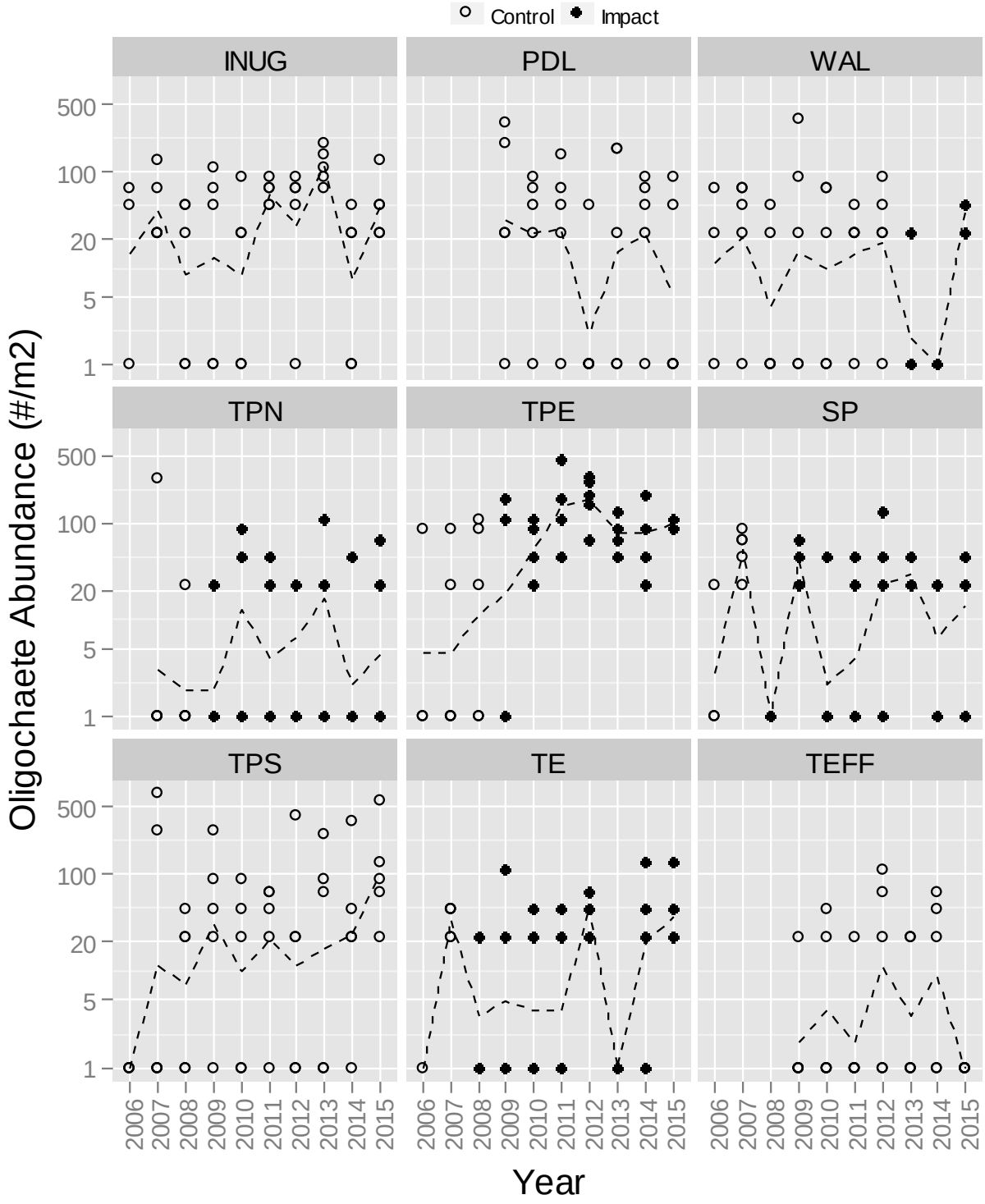


Figure E1–2. Insect abundance (#/m^2) from Meadowbank study lakes since 2006.

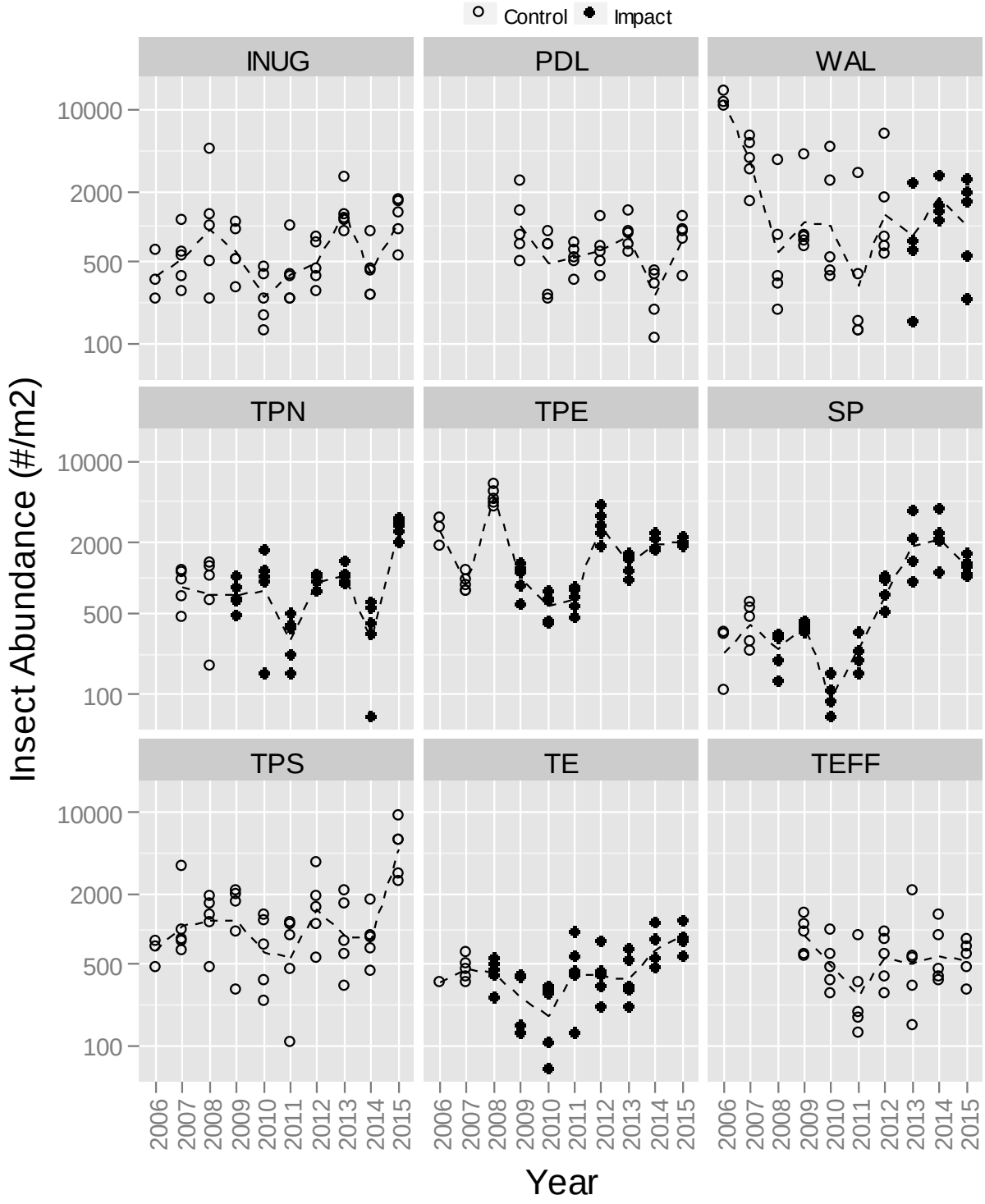


Figure E1–3. Mollusc abundance (#/m^2) from Meadowbank study lakes since 2006.

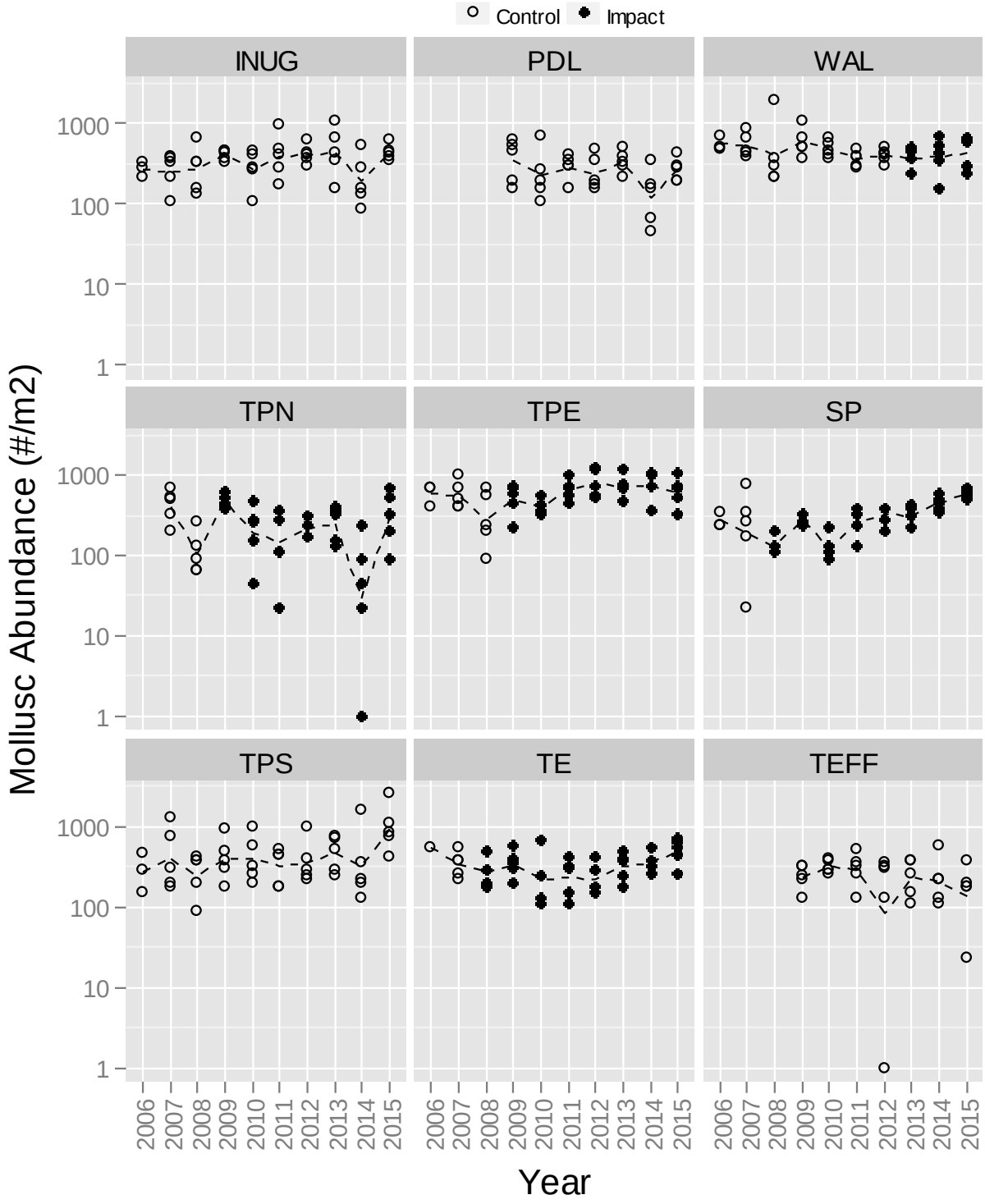


Figure E1–4. Other taxa abundance (#/m^2) from Meadowbank study lakes since 2006.

Note: "Other taxa" includes flatworms (Turbellaria) and arthropods (Acalyptonotidae, Hygrobatidae, Lebertiidae, Oxidae, and O. Notostraca).

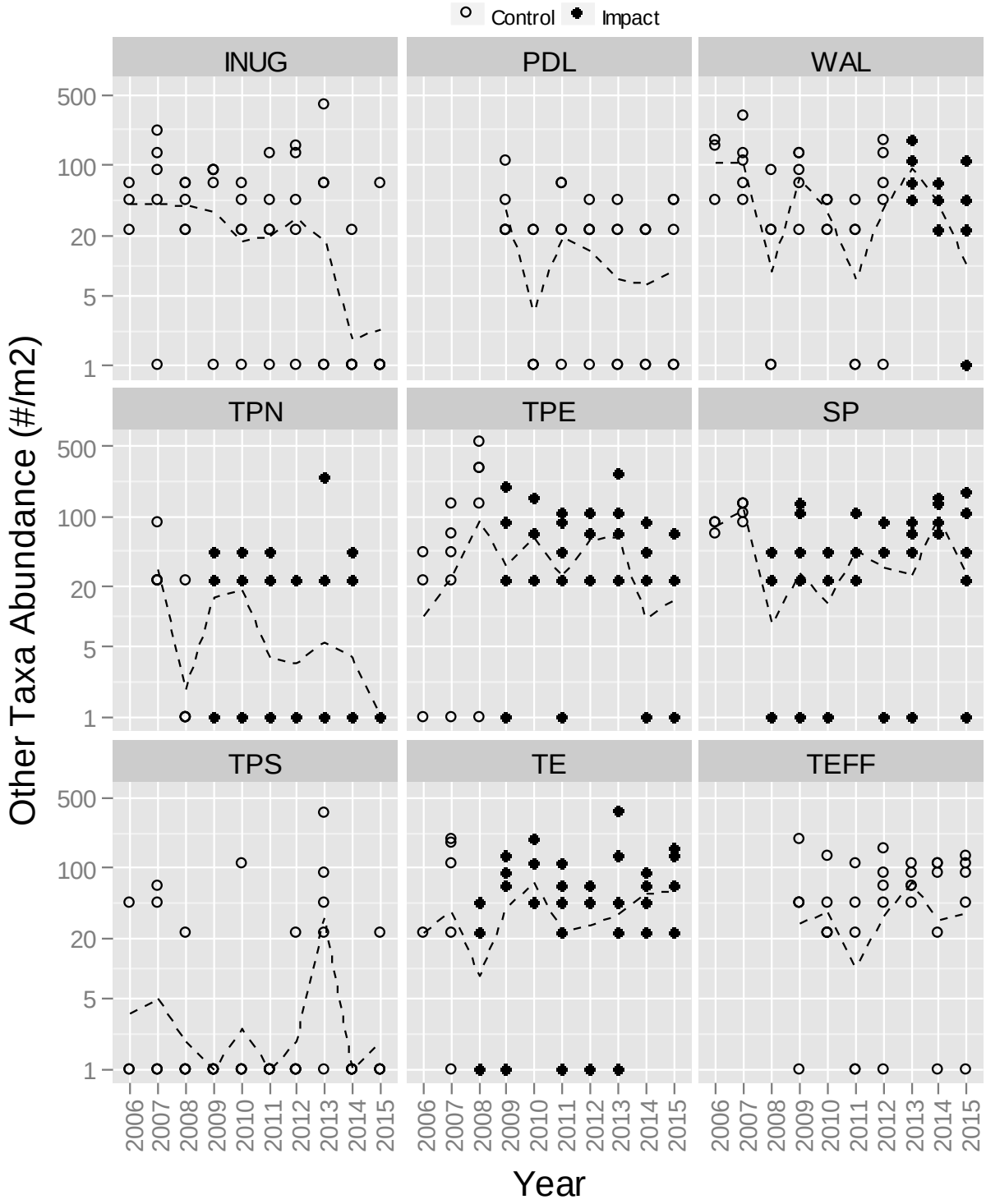


Figure E1–5. Oligochaete richness (# of taxa) from Meadowbank study lakes since 2006.

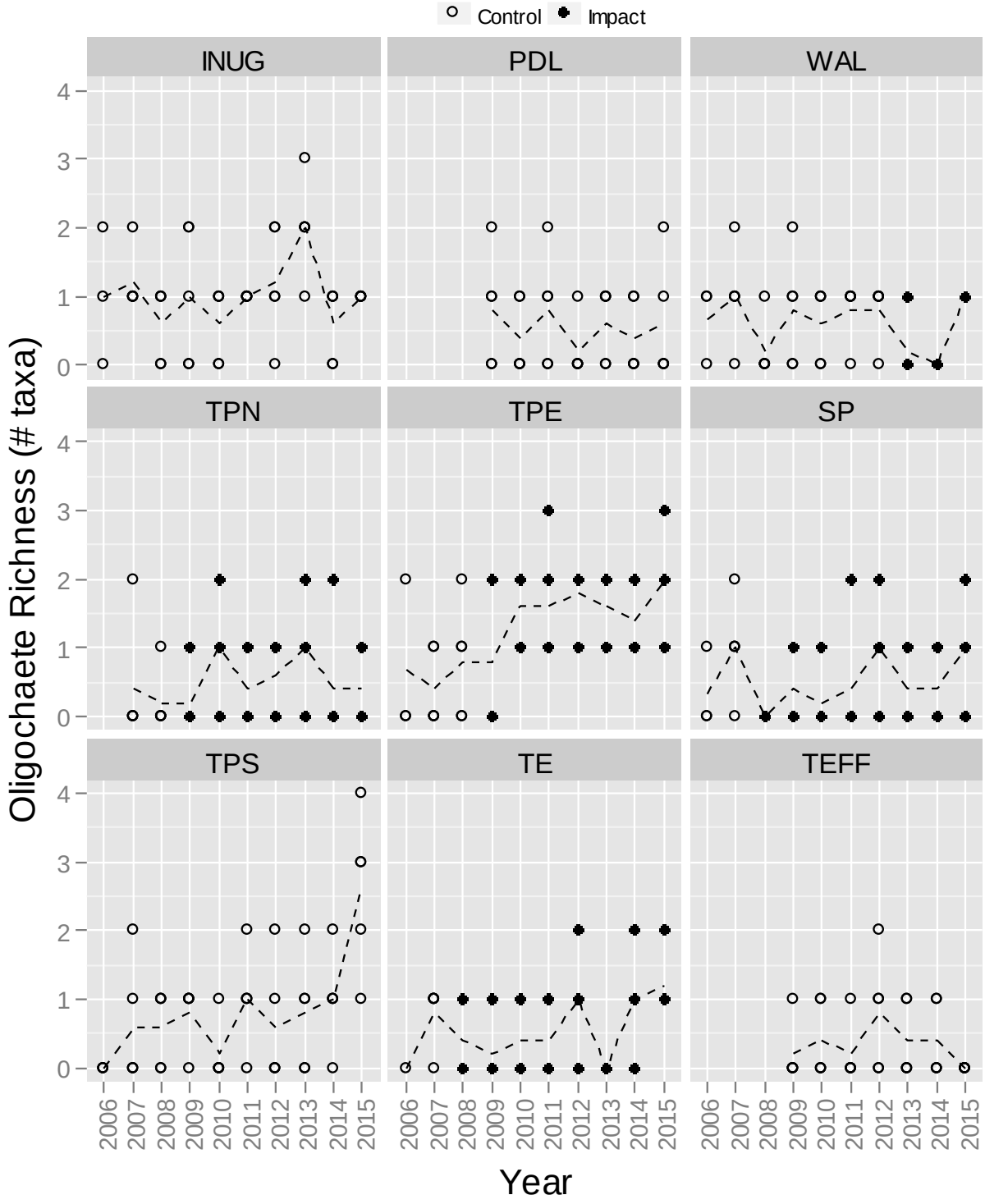


Figure E1–6. Insect richness (# of taxa) from Meadowbank study lakes since 2006.

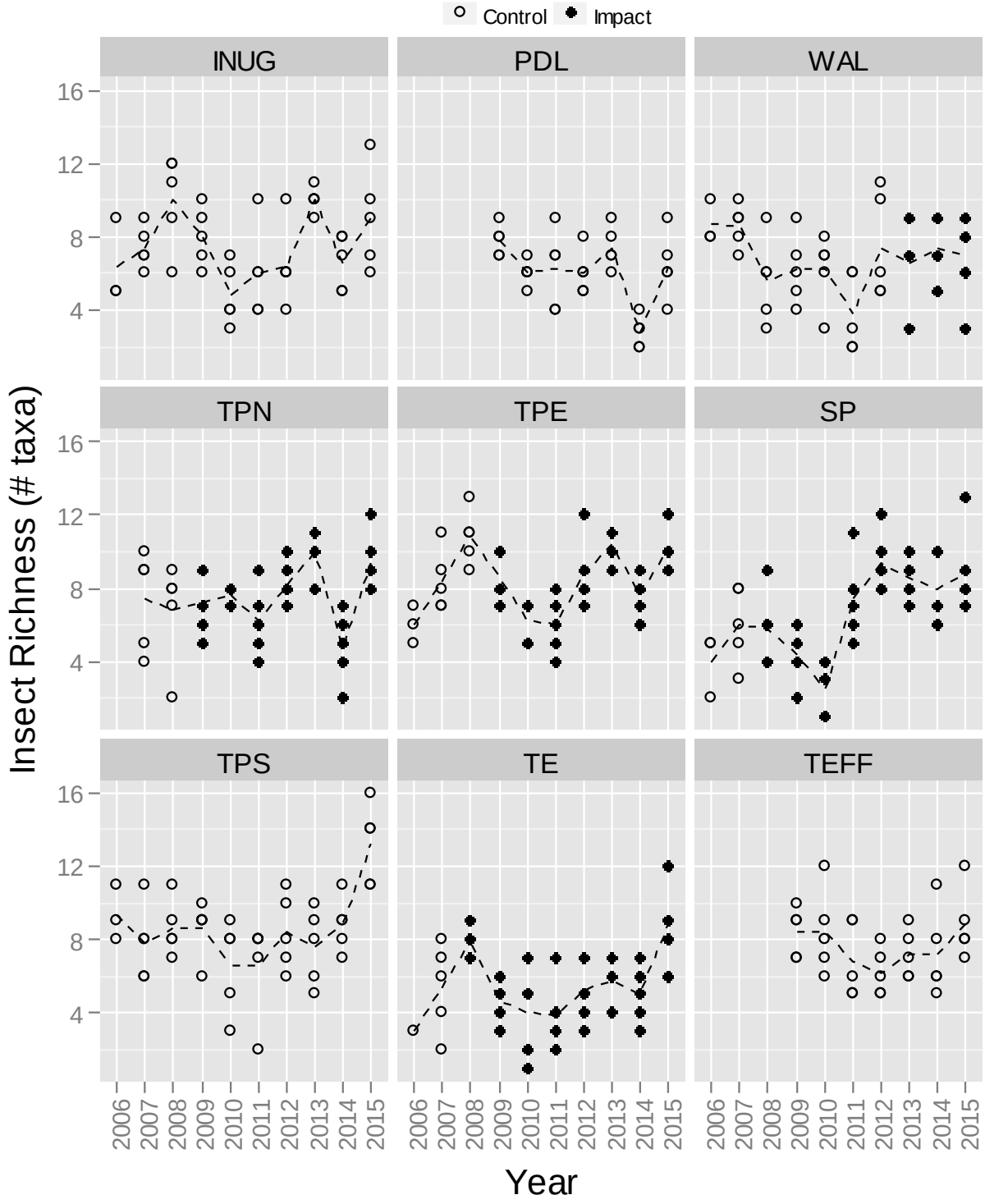


Figure E1–7. Mollusc richness (# of taxa) from Meadowbank study lakes since 2006.

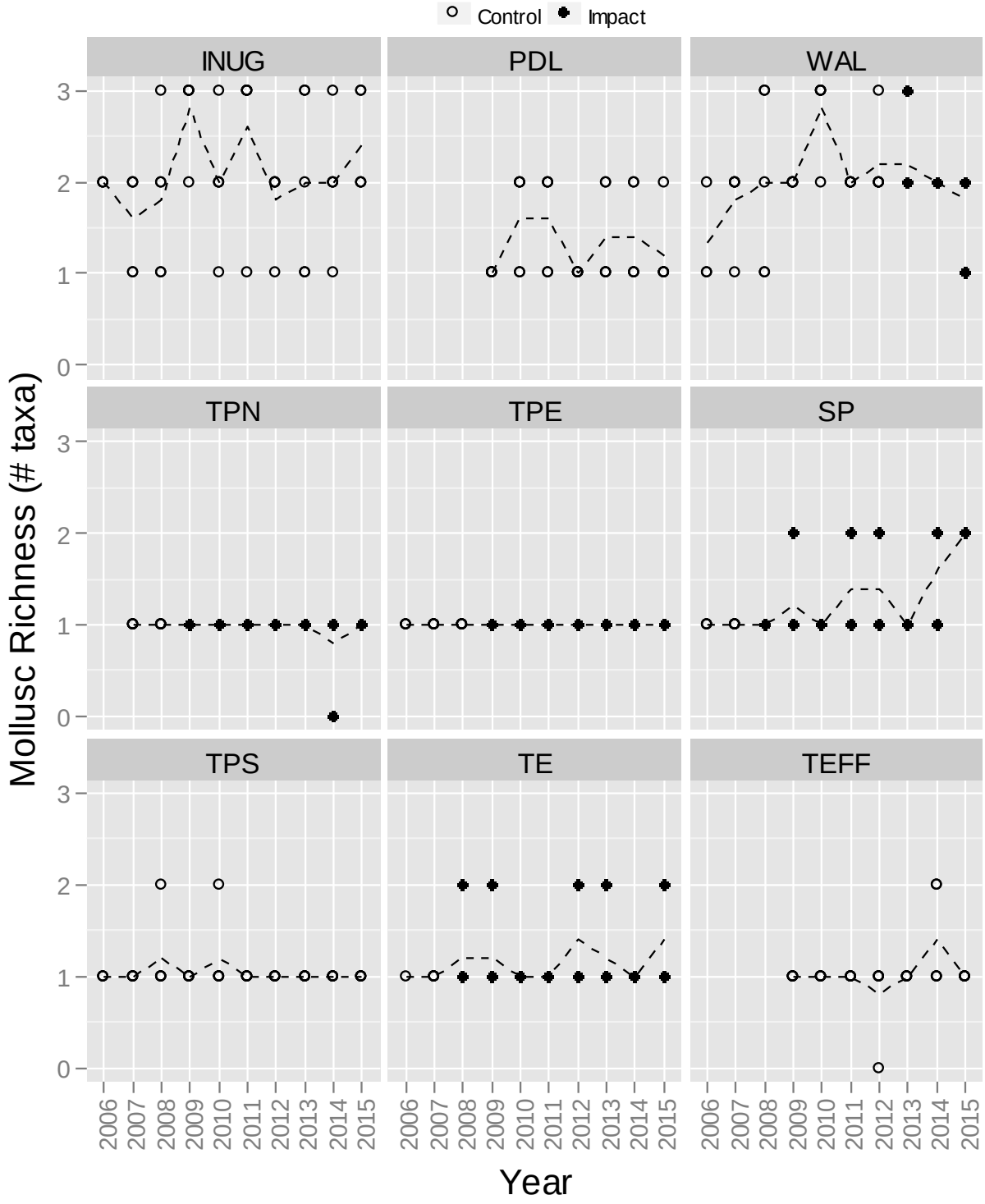


Figure E1–8. Other taxa richness (# of taxa) from Meadowbank study lakes since 2006.

Note: "Other taxa" includes flatworms (Turbellaria) and arthropods (Acalyptonotidae, Hygrobatidae, Lebertiidae, Oxidae, and O. Notostraca).

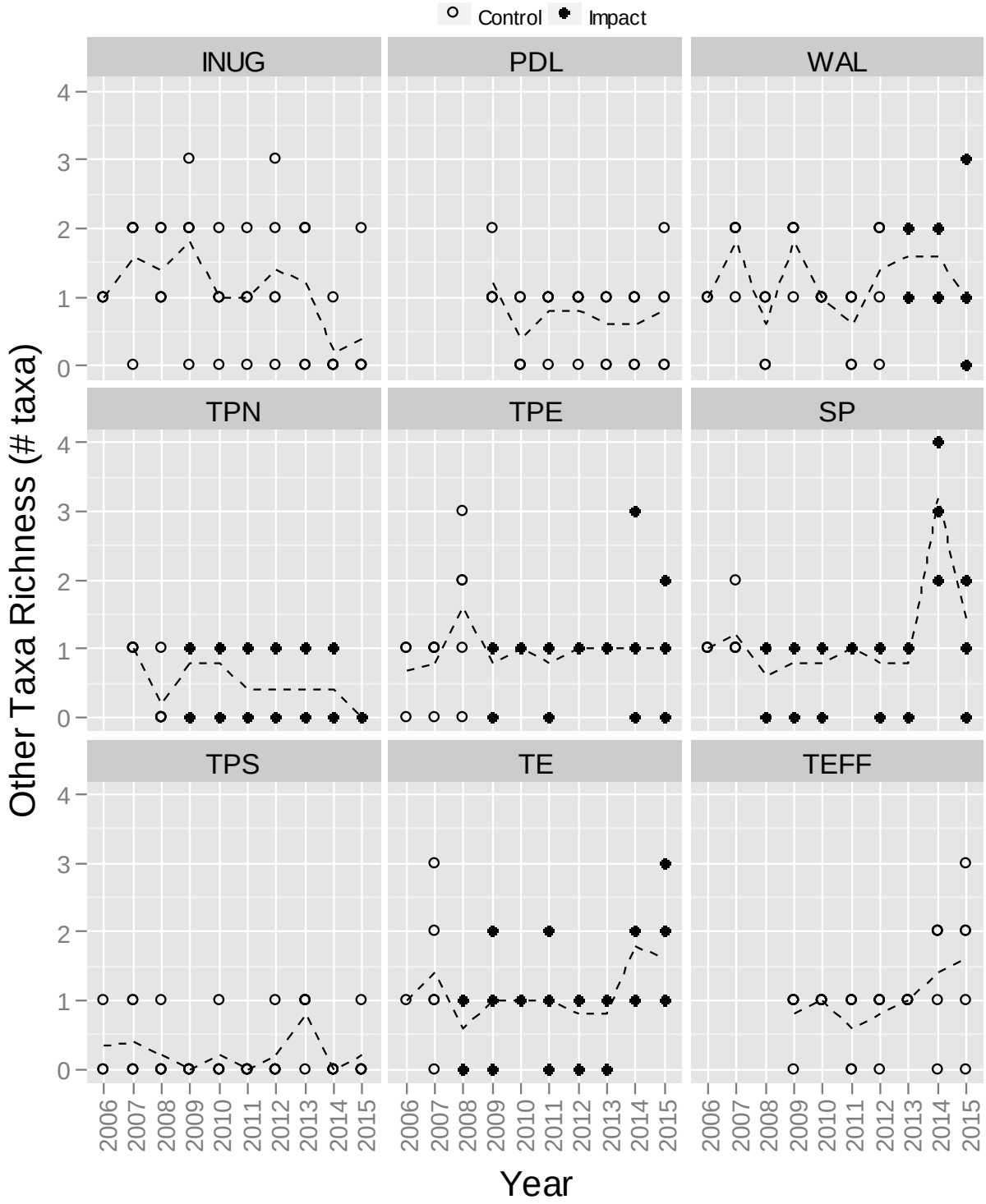


Figure E1–9. Simpson's Diversity for the benthic invertebrate community at the Meadowbank study lakes since 2006.

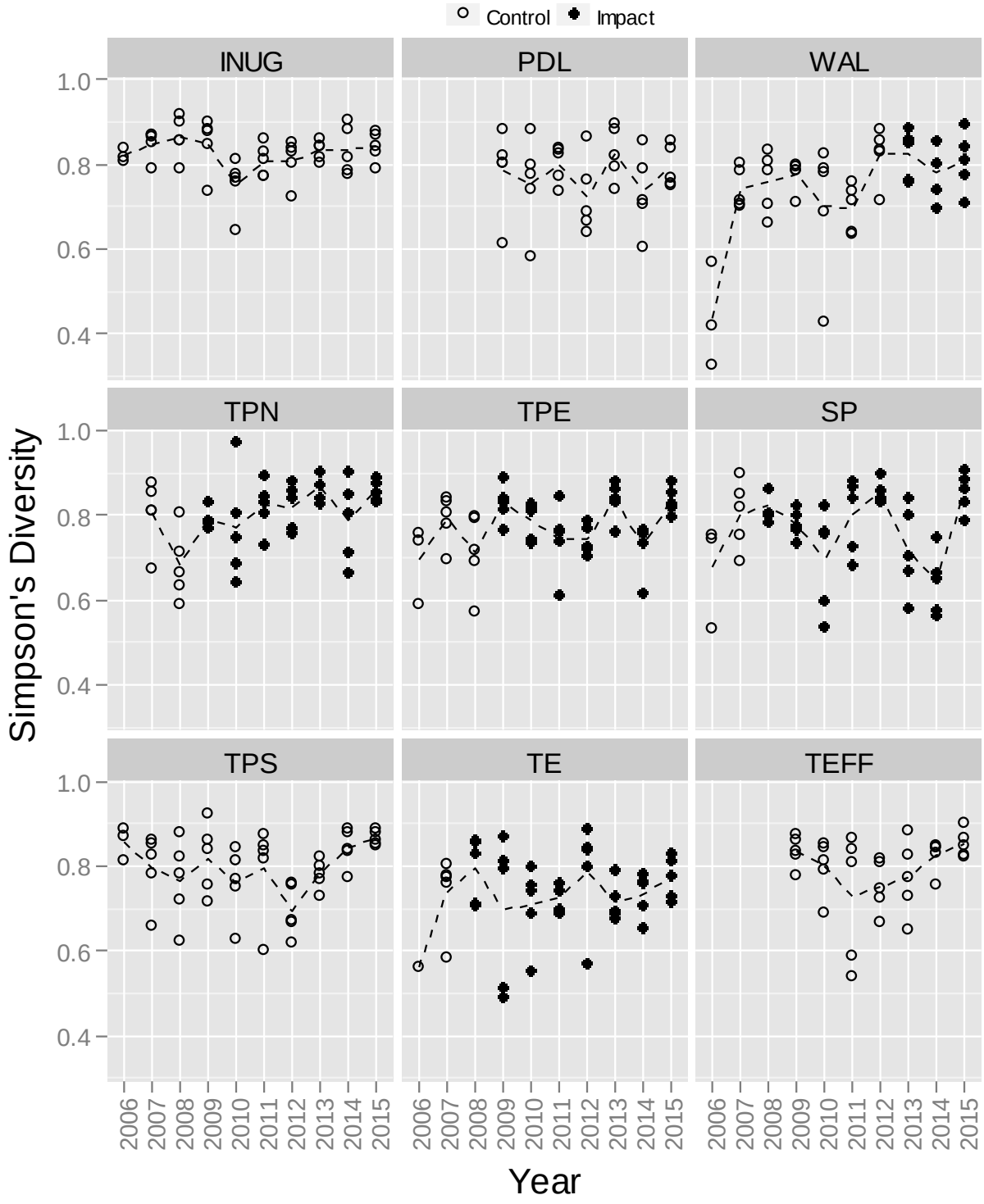
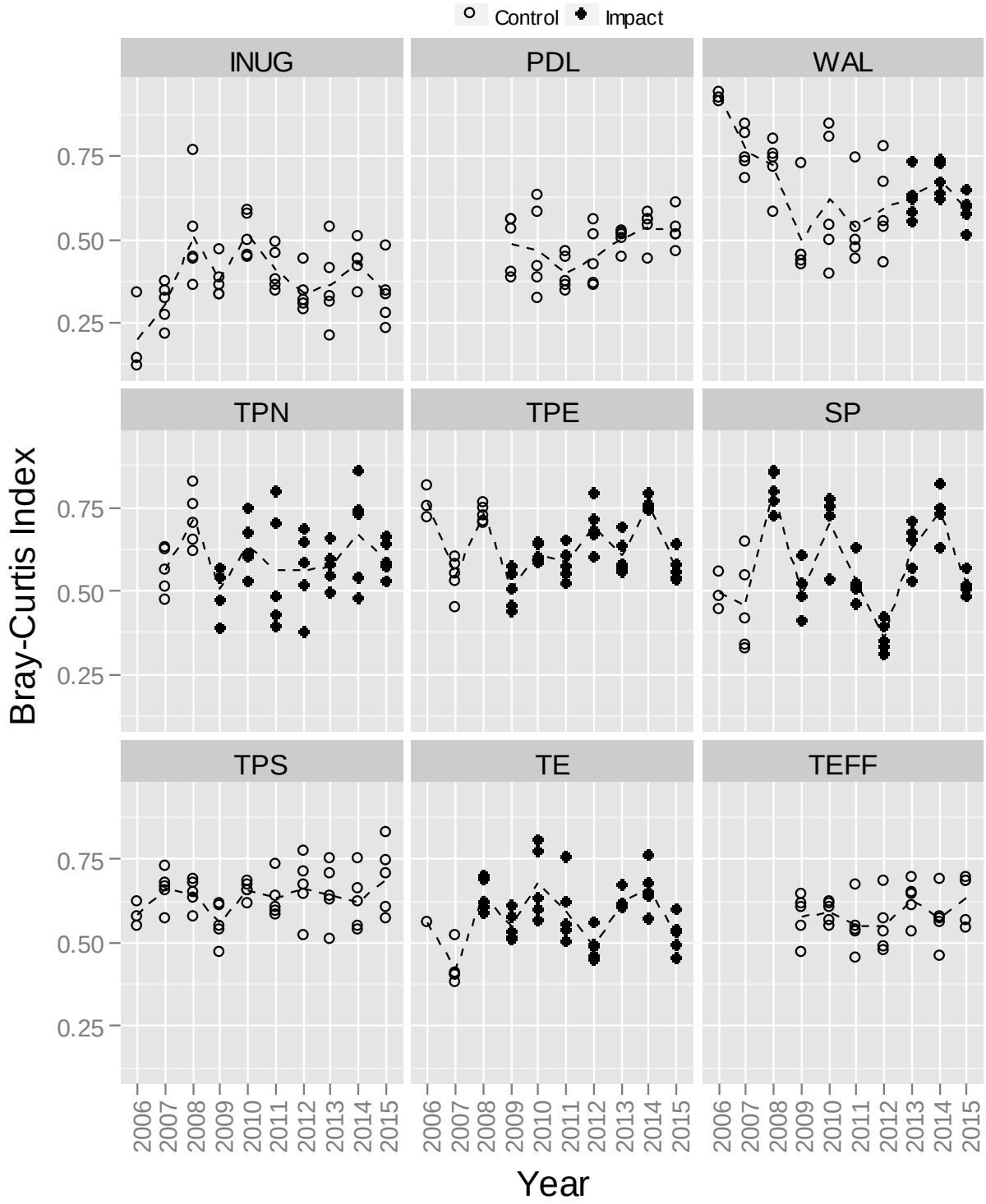


Figure E1–10. Bray-Curtis Index for the benthic invertebrate community at the Meadowbank study lakes since 2006.



APPENDIX E2

Baker Lake Benthic Invertebrate Plots 2006 – 2015

LIST OF FIGURES – APPENDIX E2

Figure E2–1. Oligochaete abundance (#/m^2) from Baker Lake since 2008. 3
Figure E2–2. Insect abundance (#/m^2) from Baker Lake since 2008. 4
Figure E2–3. Mollusc abundance (#/m^2) from Baker Lake since 2008..... 5
Figure E2–4. Other taxa abundance (#/m^2) from Baker Lake since 2008. 6
Figure E2–5. Oligochaete richness (# of taxa) from Baker Lake since 2008. 7
Figure E2–6. Insect richness (# of taxa) from Baker Lake since 2008..... 8
Figure E2–7. Mollusc richness (# of taxa) from Baker Lake since 2008. 9
Figure E2–8. Other taxa richness (# of taxa) from Baker Lake since 2008. 10
Figure E2–9. Simpson's Diversity for the benthic invertebrate community at Baker Lake since 2006.. 11
Figure E2–10. Bray-Curtis Index for the benthic invertebrate community at Baker Lake since 2008. . 12

Figure E2–1. Oligochaete abundance (#/m^2) from Baker Lake since 2008.

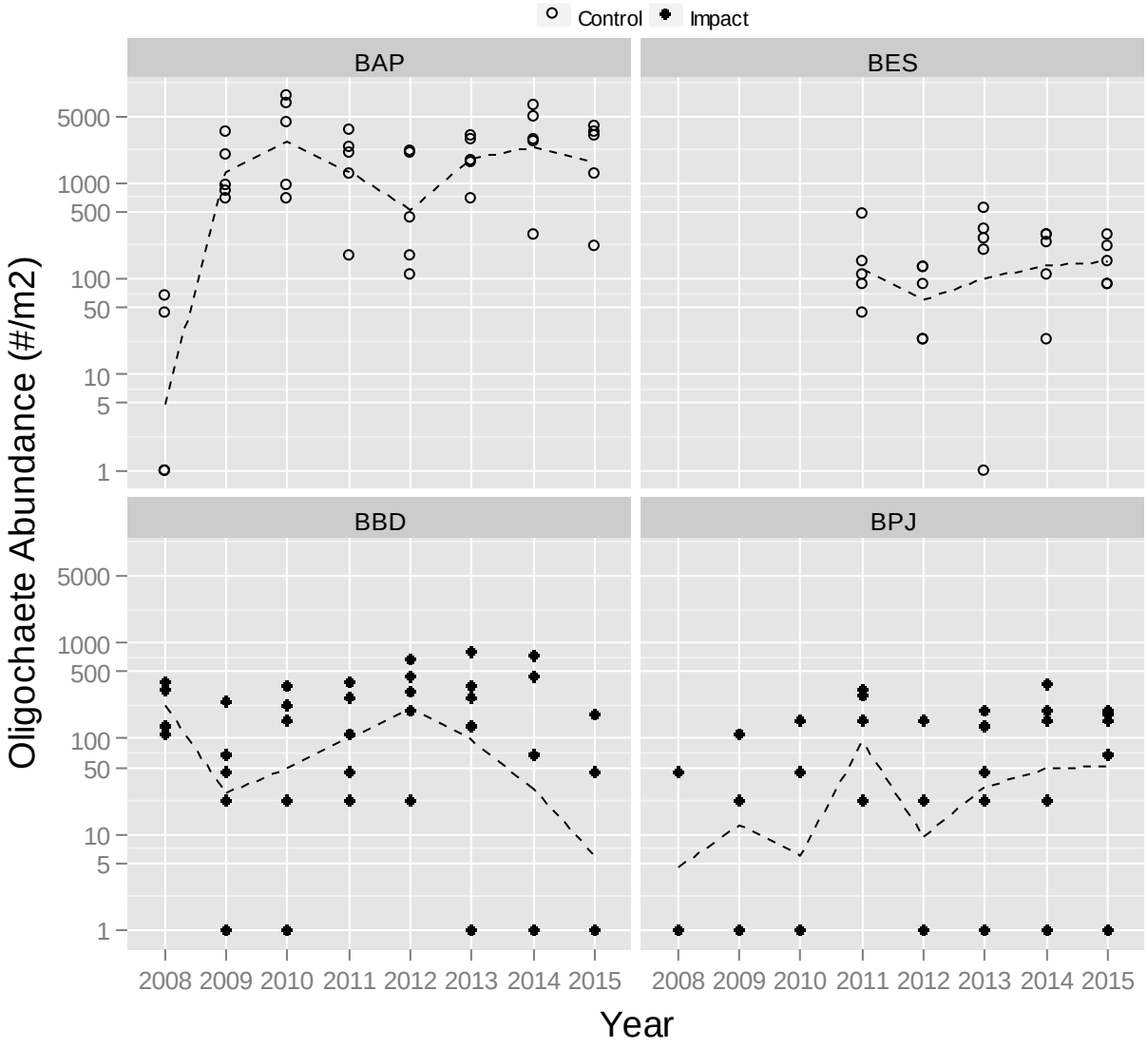


Figure E2–2. Insect abundance (#/m^2) from Baker Lake since 2008.

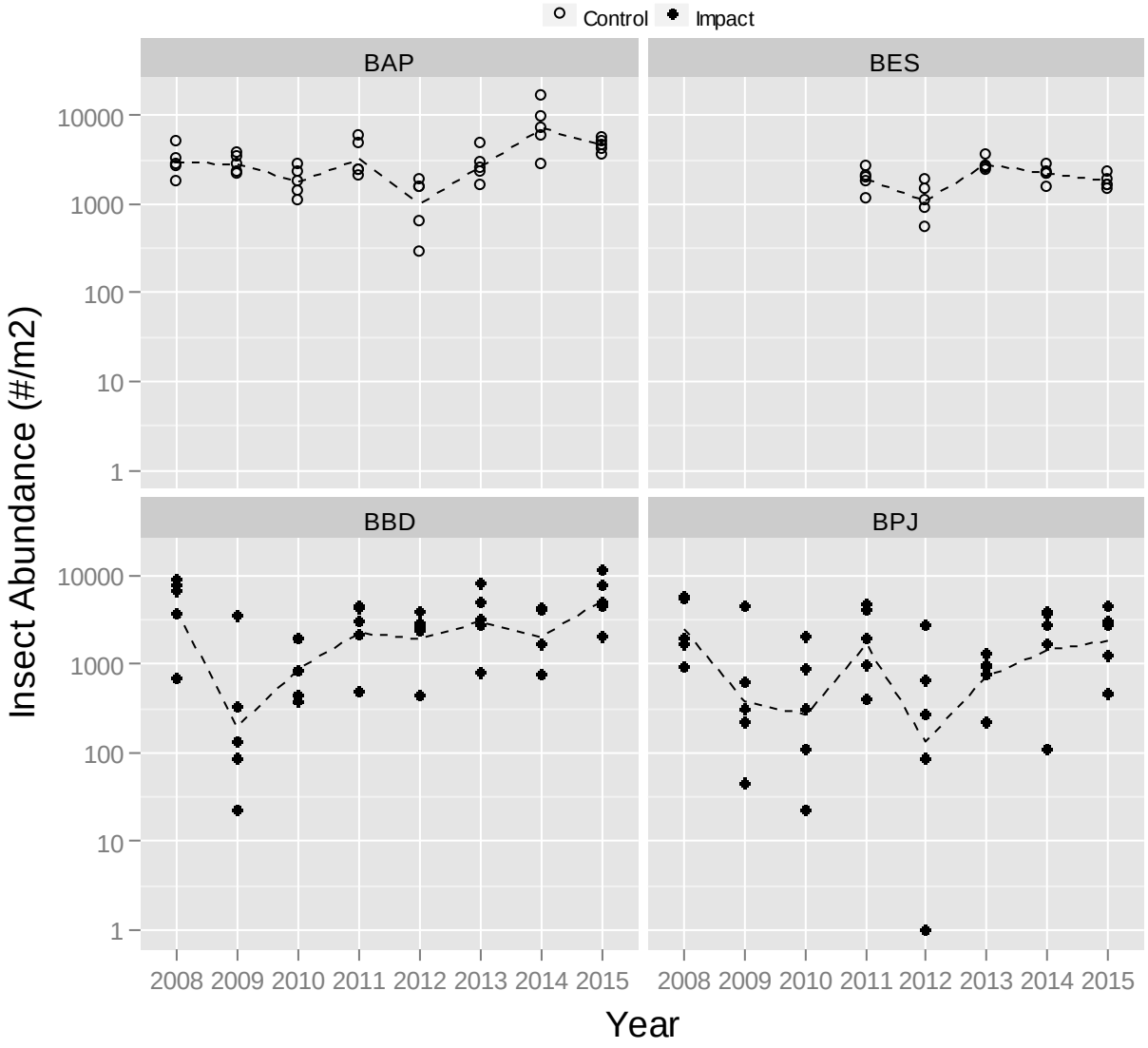


Figure E2–3. Mollusc abundance (#/m^2) from Baker Lake since 2008.

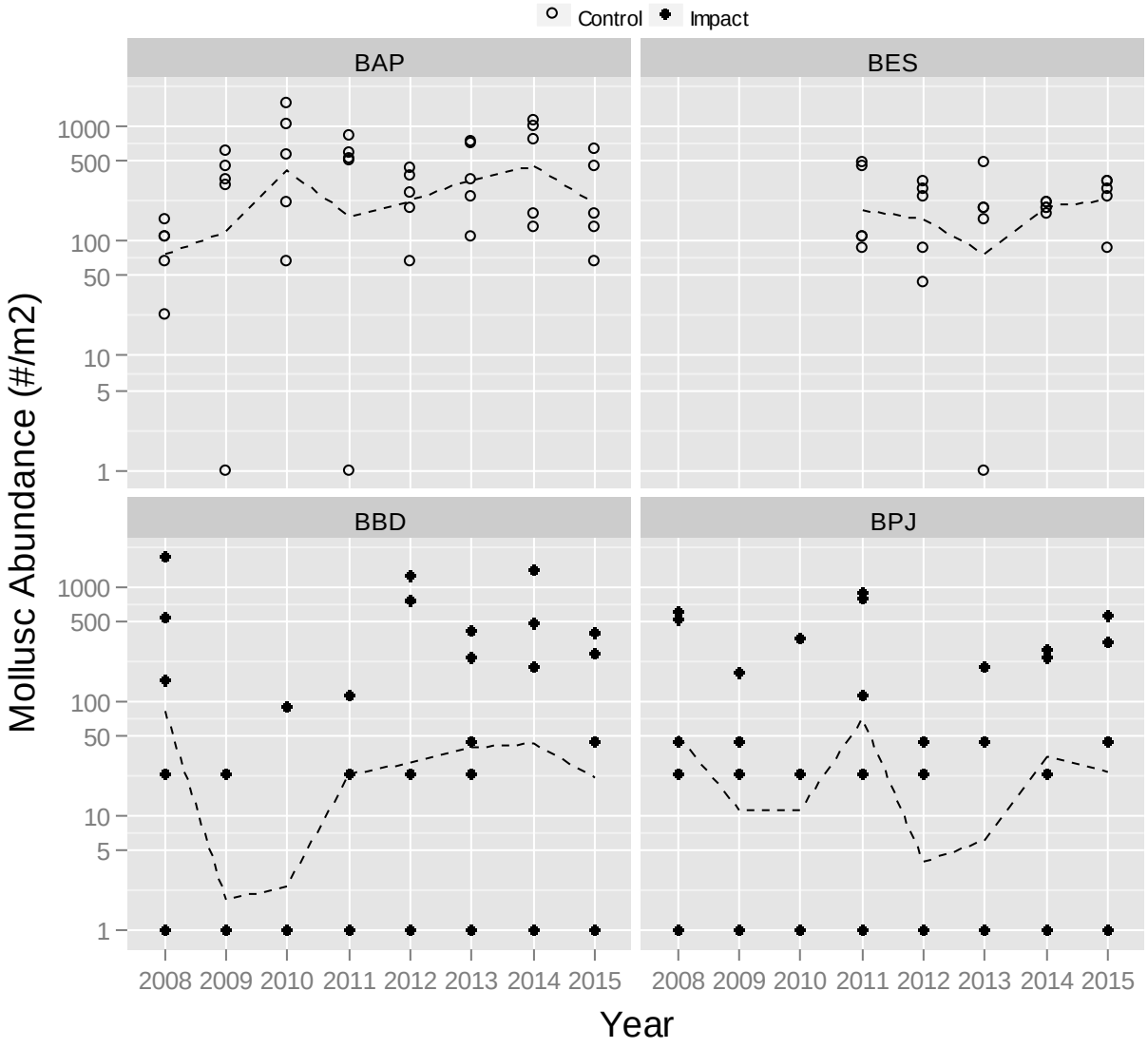


Figure E2–4. Other taxa abundance (#/m^2) from Baker Lake since 2008.

Note: "Other taxa" includes flatworms (Turbellaria) and arthropods (Acalyptonotidae, Hygrobatidae, Lebertiidae, Oxidae, and O. Notostraca).

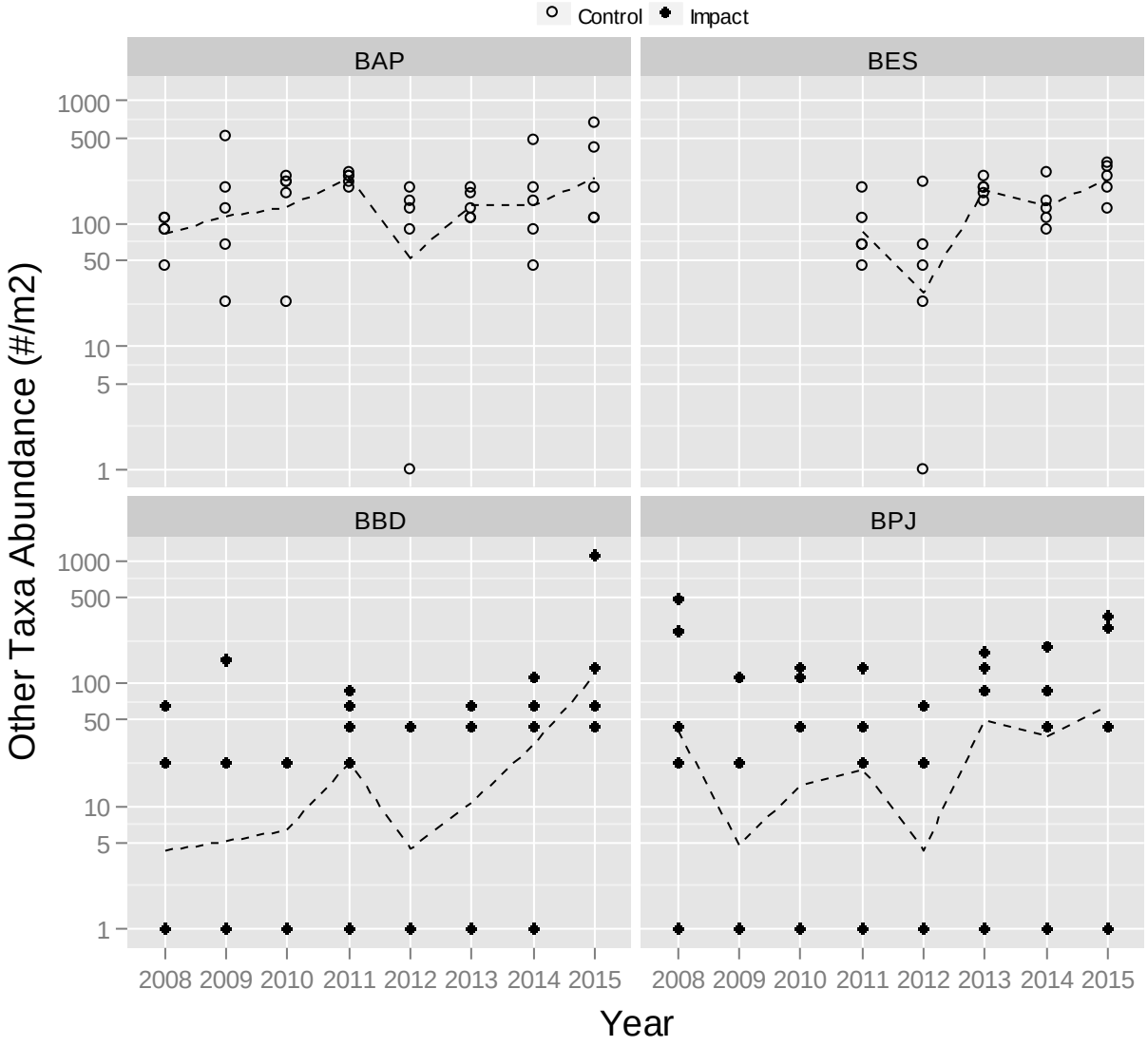


Figure E2–5. Oligochaete richness (# of taxa) from Baker Lake since 2008.

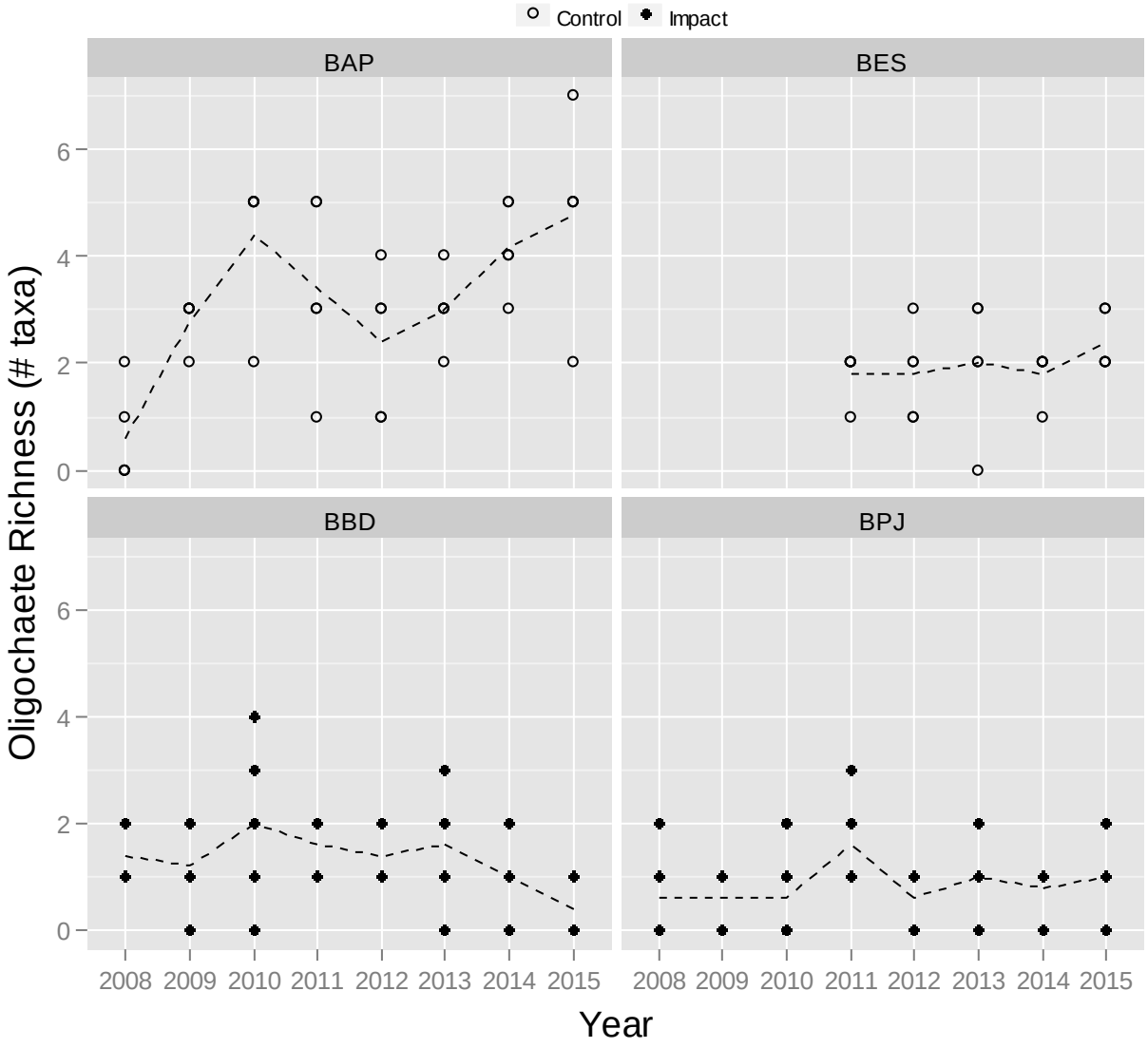


Figure E2–6. Insect richness (# of taxa) from Baker Lake since 2008.

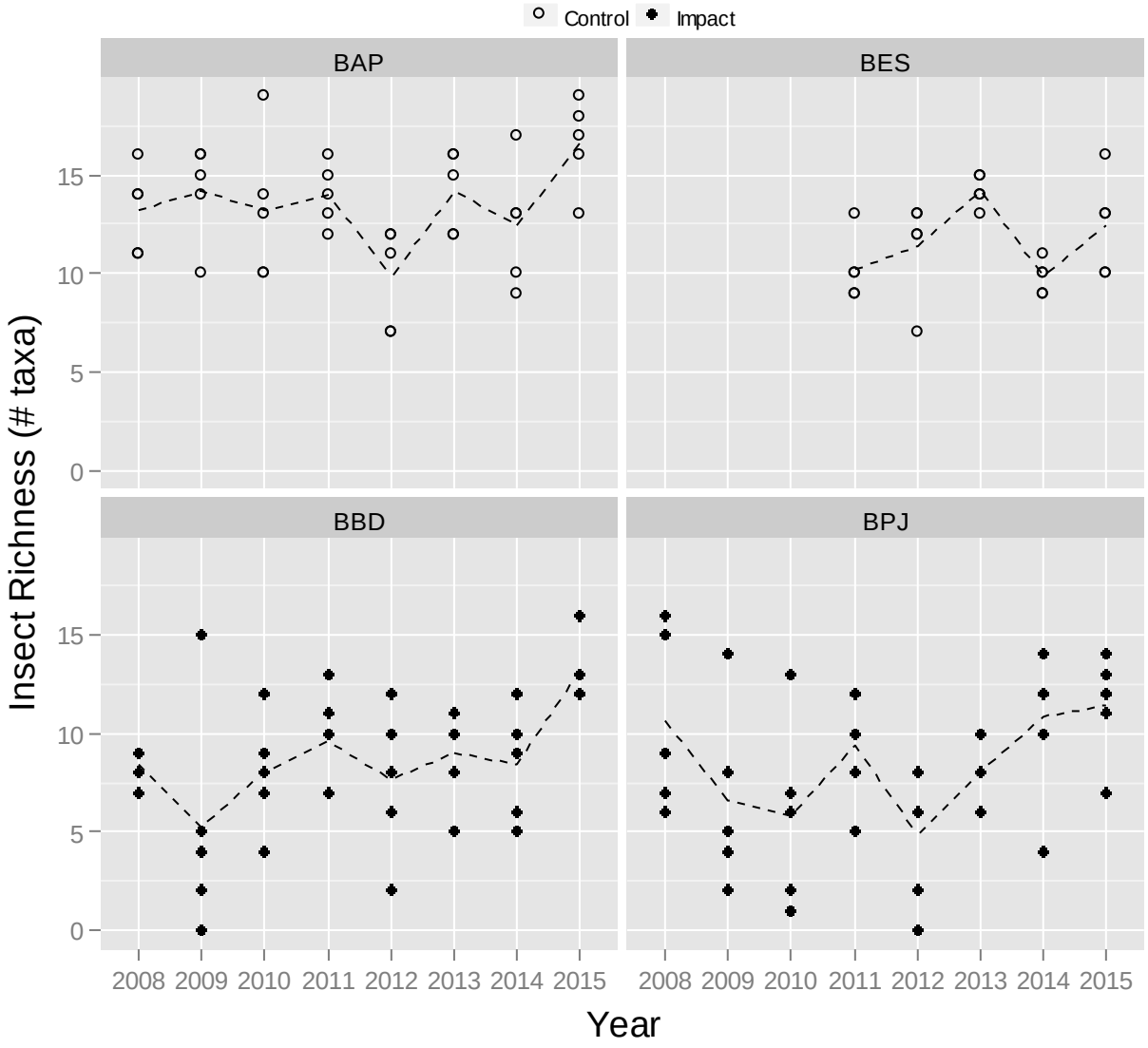


Figure E2–7. Mollusc richness (# of taxa) from Baker Lake since 2008.

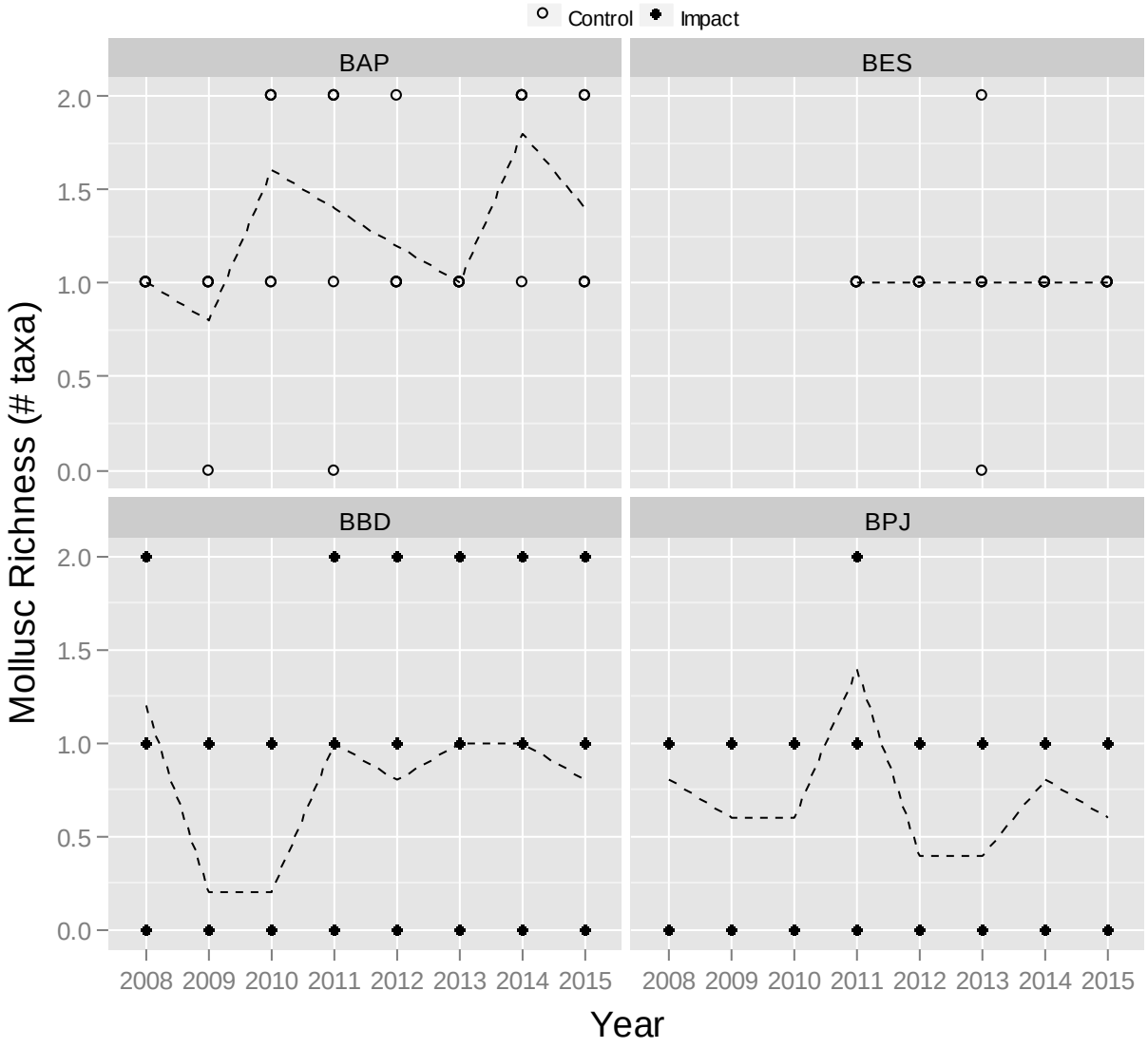


Figure E2–8. Other taxa richness (# of taxa) from Baker Lake since 2008.

Note: "Other taxa" includes flatworms (Turbellaria) and arthropods (Acalyptonotidae, Hygrobatidae, Lebertiidae, Oxidae, and O. Notostraca).

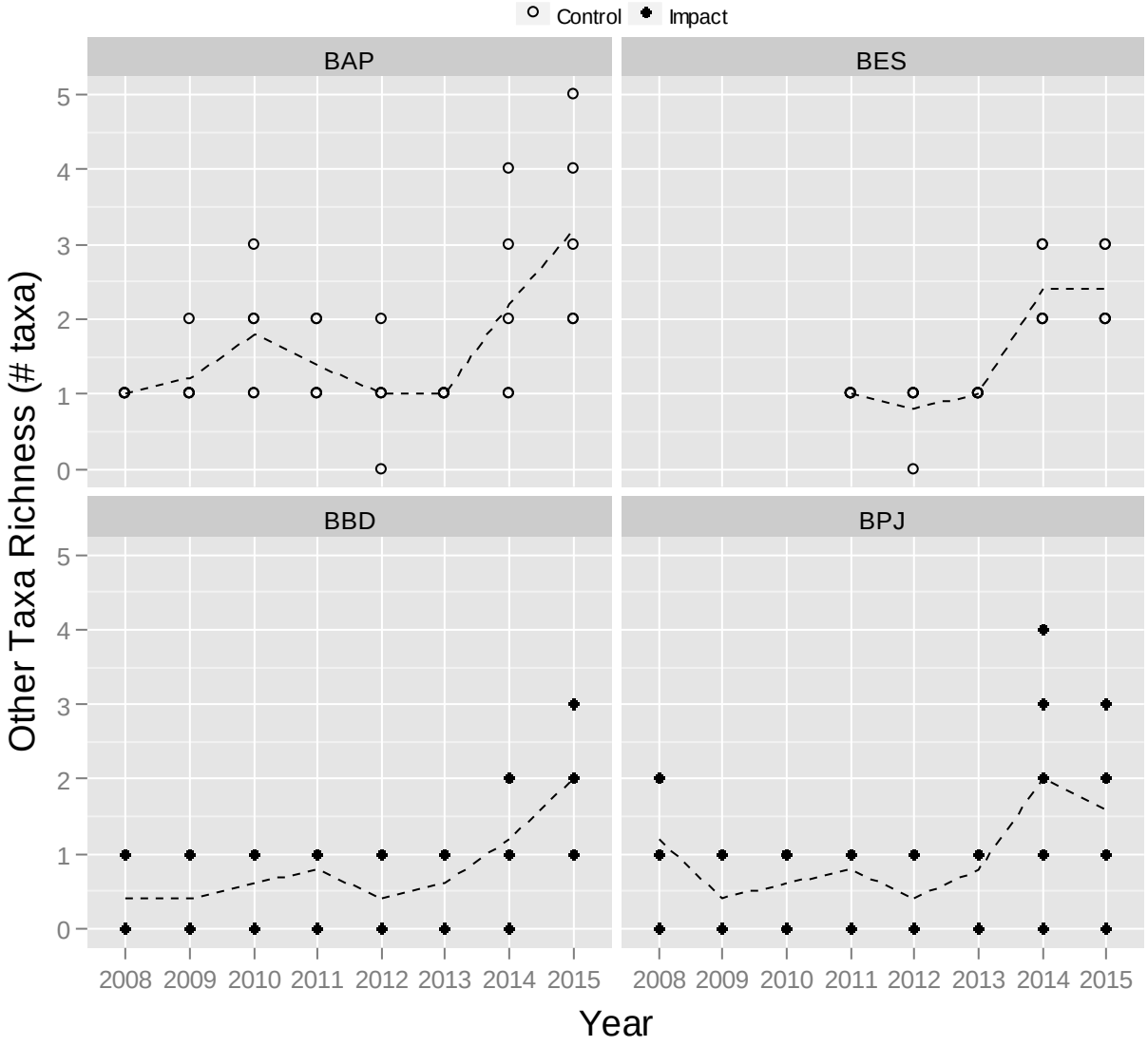


Figure E2–9. Simpson's Diversity for the benthic invertebrate community at Baker Lake since 2006..

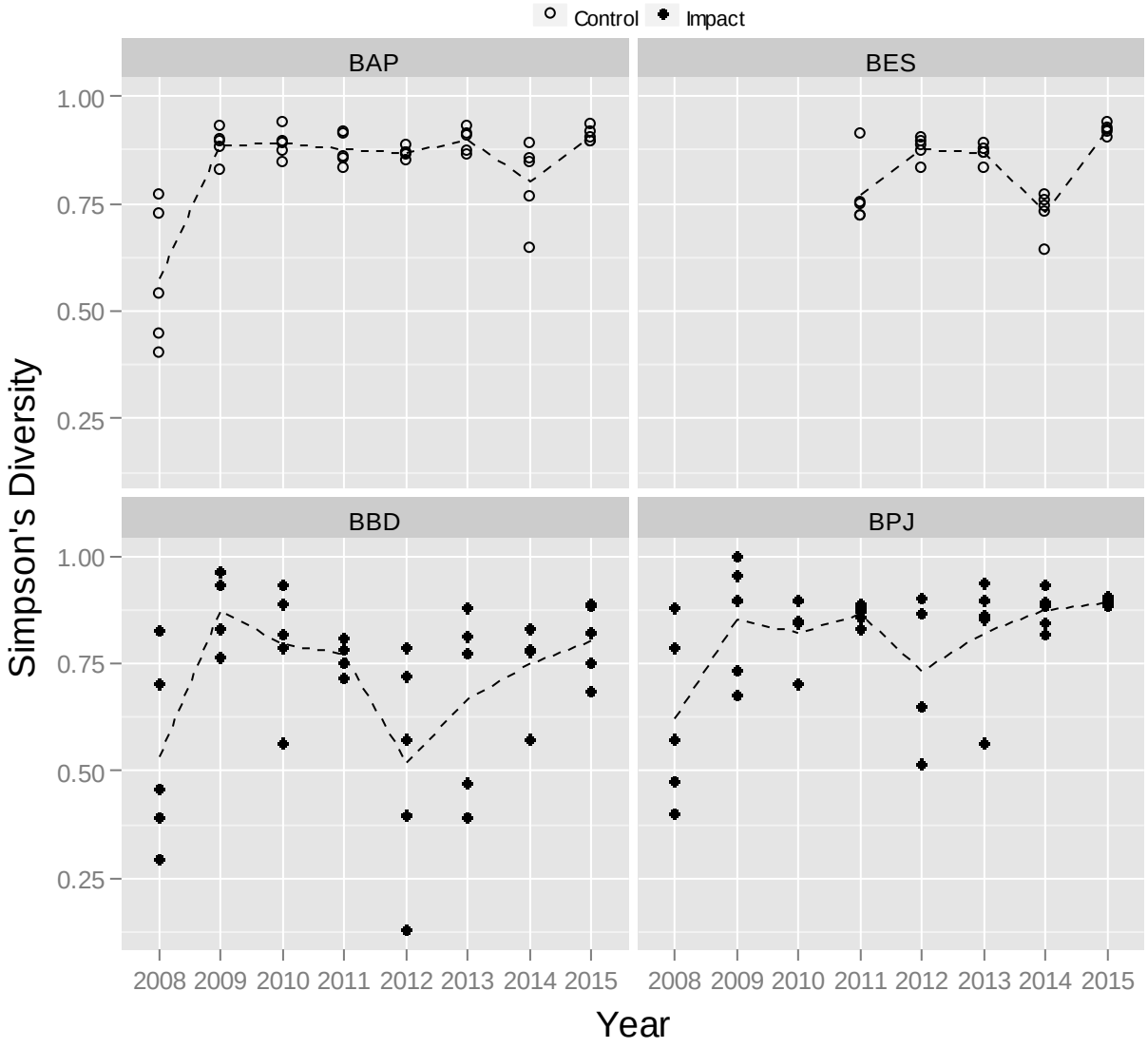
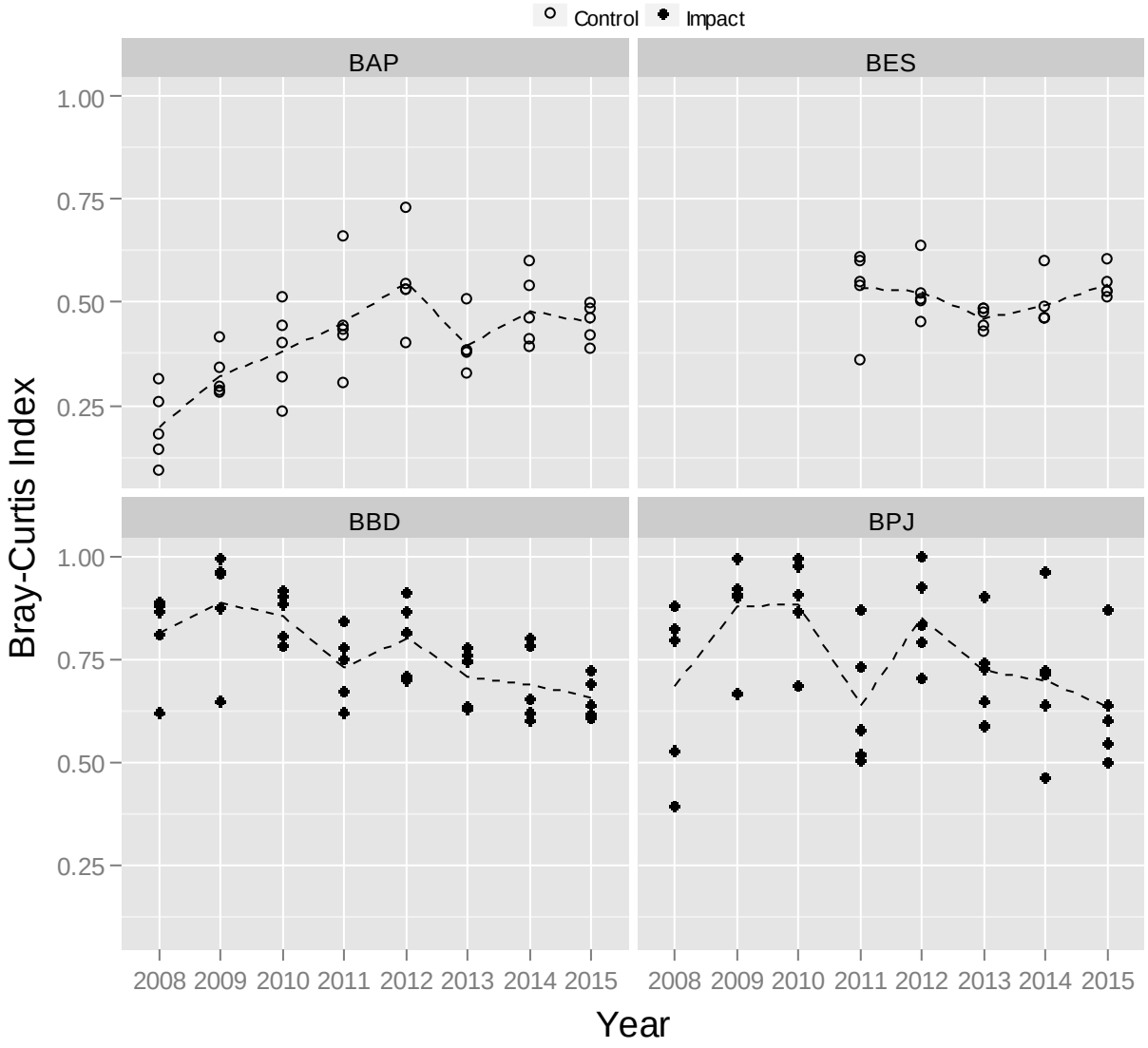


Figure E2–10. Bray-Curtis Index for the benthic invertebrate community at Baker Lake since 2008.



APPENDIX F

ALS Laboratory Reports, 2015

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 04-MAY-15
Report Date: 12-MAY-15 13:18 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1606607

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1606607-1	L1606607-2			
	Description	Water	Water			
	Sampled Date	26-APR-15	26-APR-15			
	Sampled Time	17:30	17:30			
	Client ID	CREMP-APR-EB-1	CREMP-APR-DI-1			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0	<2.0			
	Hardness (as CaCO3) (mg/L)	<0.50	<0.50			
	pH (pH)	5.62	5.52			
	Total Suspended Solids (mg/L)	<1.0	<1.0			
	Total Dissolved Solids (mg/L)	<3.0	<3.0			
	Turbidity (NTU)	0.12	<0.10			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<2.0	<2.0			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0			
	Alkalinity, Total (as CaCO3) (mg/L)	<2.0	<2.0			
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	<0.10	<0.10			
	Fluoride (F) (mg/L)	<0.020	<0.020			
	Nitrate (as N) (mg/L)	<0.0050	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.050			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020			
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0020			
	Silicate (as SiO2) (mg/L)	<0.50	<0.50			
	Sulfate (SO4) (mg/L)	<0.30	<0.30			
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010			
	Cyanide, Free (mg/L)	<0.0010	<0.0010			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50			
	Total Organic Carbon (mg/L)	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0053 RRV	<0.0030			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Total (mg/L)	0.000066	<0.000050			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Total (mg/L)	<0.050	<0.050			
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1606607-1	L1606607-2			
	Description	Water	Water			
	Sampled Date	26-APR-15	26-APR-15			
	Sampled Time	17:30	17:30			
	Client ID	CREMP-APR-EB-1	CREMP-APR-DI-1			
Grouping	**Analyte**					
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Total (mg/L)	<0.10	<0.10			
	Manganese (Mn)-Total (mg/L)	<0.00010	<0.00010			
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	<0.10	<0.10			
	Rubidium (Rb)-Total (mg/L)	<0.00020	<0.00020			
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Total (mg/L)	<0.050	<0.050			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	<0.050	<0.050			
	Strontium (Sr)-Total (mg/L)	<0.00020	<0.00020			
	Sulfur (S)-Total (mg/L)	<0.50	<0.50			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	<0.0010			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	<0.000050	<0.000050			
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Dissolved (mg/L)	<0.050	<0.050			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1606607-1	L1606607-2			
	Description	Water	Water			
	Sampled Date	26-APR-15	26-APR-15			
	Sampled Time	17:30	17:30			
	Client ID	CREMP-APR-EB-1	CREMP-APR-DI-1			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Dissolved (mg/L)	<0.10	<0.10			
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	<0.10	<0.10			
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Dissolved (mg/L)	<0.050	<0.050			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	<0.050	<0.050			
	Strontium (Sr)-Dissolved (mg/L)	<0.00020	<0.00020			
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1606607-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1606607-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L1606607-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L1606607-1, -2
Matrix Spike	Silicon (Si)-Total	MS-B	L1606607-1, -2
Duplicate	Aluminum (Al)-Total	RRV	L1606607-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Reference Information

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SILICATE-COL-VA Water Silicate by Colourimetric analysis APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA Water Low Level TDS (3.0mg/L) by Gravimetric APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page ____ of

Report To				**Report Format / Distribution**				**Service Requested** (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz			☐ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway			Email 1: efranz@azimuthgroup.ca				○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8			Email 2: gmann@azimuthgroup.ca				○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220	Fax:		Email 3: ryan.vanengen@agnicoeagle.com				**Analysis Request**
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☑ No	Job #: Meadowbank Surfacewater				
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #: Q39503				

Lab Work Order # (lab use only)	L1606607	ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alk Species, pH, EC, Turbidity	Anions (F, NO2, NO3, Br, SO4)	Low Level Chloride by IC	Silicate, TD-P, Ortho-PO4	T-CN (Low), Free CN (Low)	TSS-Low, TDS-Low	Ammonia, TKN, Total P	TOC	DOC	T. Met.+Hg (MET-T-BCMDG-VA)	D. Met.+Hg(MET-D-BCMDG-VA)	Chlorophyl 'a'
									P			P	F/P	P	F/P	
	CREMP-APR-EB-1	26-Apr-15	17:30		X	X	X	X	X	X	X	X	X	X	X	
	CREMP-APR-DI-1	26-Apr-15	17:30		X	X	X	X	X	X	X	X	X	X	X	

Short Holding Time
Rush Processing

L1606607-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observatic Yes / No ? If Yes add
Martin Theriault	27-Apr-15	9:30	lady	05/04	10:30Am	14.8 °C				

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 25-MAY-15
Report Date: 04-JUN-15 14:20 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1615889

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID Description Sampled Date Sampled Time Client ID	L1615889-1 WATER 14-MAY-15 15:30 TE-80-S	L1615889-2 WATER 14-MAY-15 16:07 TE-81-S	L1615889-3 WATER 15-MAY-15 10:55 WAL-49-S	L1615889-4 WATER 15-MAY-15 12:02 WAL-50-S	L1615889-5 WATER 15-MAY-15 13:53 TPE-80-S
FILTER							
Plant Pigments	Chlorophyll a (ug/L)		0.623	0.462	0.186	0.207	0.161

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1615889-6	L1615889-9	L1615889-10	L1615889-11	L1615889-12
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	15-MAY-15	16-MAY-15	16-MAY-15	16-MAY-15	16-MAY-15
Sampled Time	13:50	12:10	10:54	10:54	15:12
Client ID	TPE-81-S	INUG-68-S	INUG-69-S	CREMP-MAY-DUP-1	TPN-80-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.039	0.475	0.201	0.303	0.306

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1615889-13	L1615889-14	L1615889-15		
Description	WATER	WATER	WATER		
Sampled Date	16-MAY-15	17-MAY-15	17-MAY-15		
Sampled Time	14:25	12:51	13:20		
Client ID	TPN-81-S	SP-80-S	SP-81-S		
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.366	0.336	0.364		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1615889-1 WATER 14-MAY-15 15:30 TE-80-S	L1615889-2 WATER 14-MAY-15 16:07 TE-81-S	L1615889-3 WATER 15-MAY-15 10:55 WAL-49-S	L1615889-4 WATER 15-MAY-15 12:02 WAL-50-S	L1615889-5 WATER 15-MAY-15 13:53 TPE-80-S
WATER						
Physical Tests	Conductivity (uS/cm)	32.4	35.6	59.9	66.9	39.2
	Hardness (as CaCO3) (mg/L)	11.7	12.1	25.9	28.5	13.2
	pH (pH)	6.95	7.00	7.13	7.17	7.23
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	23.5	25.3	45	45	25.3
	Turbidity (NTU)	0.15	0.18	0.18	0.14	0.18
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	9.2	10.4	22.9	25.4	10.1
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	9.2	10.4	22.9	25.4	10.1
	Ammonia, Total (as N) (mg/L)	0.0127	0.0083	0.0212	0.0322	0.0237
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	1.04	1.10	1.08	1.22	0.92
	Fluoride (F) (mg/L)	0.089	0.093	0.067	0.073	0.087
	Nitrate (as N) (mg/L)	0.0057	0.0077	0.0126	0.0088	0.0432
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.196	0.152	0.205	0.273	0.162
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	0.54	0.62	1.66	1.66	<0.50
	Sulfate (SO4) (mg/L)	3.94	4.31	5.44	6.08	6.01
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.79	2.17	2.47	2.66	1.51
	Total Organic Carbon (mg/L)	2.20	1.91	2.51	2.67	1.44
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00015	0.00018	0.00033	0.00038	0.00049
	Barium (Ba)-Total (mg/L)	0.00377	0.00404	0.00378	0.00424	0.00419
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	0.000073	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	2.81	3.32	7.11	8.04	3.50
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1615889-6 WATER 15-MAY-15 13:50 TPE-81-S	L1615889-7 WATER 16-MAY-15 08:30 CREMP-MAY-EB-1	L1615889-8 WATER 16-MAY-15 08:30 CREMP-MAY-DI-1	L1615889-9 WATER 16-MAY-15 12:10 INUG-68-S	L1615889-10 WATER 16-MAY-15 10:54 INUG-69-S
WATER						
Physical Tests	Conductivity (uS/cm)	39.7	<2.0	<2.0	22.7	21.4
	Hardness (as CaCO3) (mg/L)	13.7	<0.50	<0.50	7.98	7.67
	pH (pH)	7.16	6.18	5.71	6.79	6.83
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	23.8	<3.0	<3.0	18.5	19.8
	Turbidity (NTU)	0.19	0.14	0.16	0.15	0.14
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	10.5	<2.0	<2.0	7.4	6.6
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	10.5	<2.0	<2.0	7.4	6.6
	Ammonia, Total (as N) (mg/L)	0.0260	<0.0050	<0.0050	0.0164	0.0180
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.94	<0.10	<0.10	1.10	1.02
	Fluoride (F) (mg/L)	0.090	<0.020	<0.020	0.079	0.075
	Nitrate (as N) (mg/L)	0.0348	<0.0050	<0.0050	<0.0050	0.0061
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.170	<0.050	<0.050	0.163	0.169
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	6.06	<0.30	<0.30	1.38	1.28
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.46	<0.50	<0.50	2.10	1.95
	Total Organic Carbon (mg/L)	1.56	<0.50	<0.50	2.18	2.35
Total Metals	Aluminum (Al)-Total (mg/L)	0.0049	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00056	<0.00010	<0.00010	0.00011	0.00010
	Barium (Ba)-Total (mg/L)	0.00405	<0.000050	<0.000050	0.00249	0.00231
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	3.63	<0.050	<0.050	1.65	1.56
	Chromium (Cr)-Total (mg/L)	0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1615889-11	L1615889-12	L1615889-13	L1615889-14	L1615889-15
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	16-MAY-15	16-MAY-15	16-MAY-15	17-MAY-15	17-MAY-15
Sampled Time	10:54	15:12	14:25	12:51	13:20
Client ID	CREMP-MAY-DUP-1	TPN-80-S	TPN-81-S	SP-80-S	SP-81-S
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	21.9	36.1	38.1	45.8	43.6
Hardness (as CaCO3) (mg/L)	7.84	11.3	12.0	17.6	16.5
pH (pH)	6.86	6.90	6.95	7.01	7.07
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (mg/L)	19.3	20.3	25.1	29.9	25.5
Turbidity (NTU)	0.16	0.14	0.17	0.18	0.15
Anions and Nutrients Alkalinity, Bicarbonate (as CaCO3) (mg/L)	7.1	7.8	8.3	14.6	13.9
Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO3) (mg/L)	7.1	7.8	8.3	14.6	13.9
Ammonia, Total (as N) (mg/L)	0.0168	0.0276	0.0277	0.0092	0.0108
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	1.04	0.98	1.06	0.99	0.94
Fluoride (F) (mg/L)	0.077	0.078	0.082	0.084	0.082
Nitrate (as N) (mg/L)	<0.0050	0.0795	0.0864	0.0241	0.0239
Nitrite (as N) (mg/L)	<0.0010	0.0014	0.0012	<0.0010	<0.0010
Total Kjeldahl Nitrogen (mg/L)	0.161	0.148	0.152	0.170	0.139
Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total Dissolved (mg/L)	0.0032	<0.0020	<0.0020	<0.0020	<0.0020
Phosphorus (P)-Total (mg/L)	<0.0020 RRV	<0.0020	<0.0020	<0.0020	<0.0020
Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	0.77	0.75
Sulfate (SO4) (mg/L)	1.30	6.52	6.95	5.52	5.29
Cyanides Cyanide, Total (mg/L)	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	2.07	1.47	1.68	1.77	1.67
Total Organic Carbon (mg/L)	2.01	1.59	1.73	1.85	1.85
Total Metals Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00021	0.00025	0.00028	0.00029
Barium (Ba)-Total (mg/L)	0.00244	0.00375	0.00411	0.00357	0.00339
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000069
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	1.60	2.89	3.05	4.76	4.49
Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1615889-1	L1615889-2	L1615889-3	L1615889-4	L1615889-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	14-MAY-15	14-MAY-15	15-MAY-15	15-MAY-15	15-MAY-15
Sampled Time	15:30	16:07	10:55	12:02	13:53
Client ID	TE-80-S	TE-81-S	WAL-49-S	WAL-50-S	TPE-80-S
Grouping / **Analyte**					
WATER					
Total Metals Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00063	0.00078	0.00126	0.00138	0.00053
Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.08	1.25	2.04	2.29	1.25
Manganese (Mn)-Total (mg/L)	0.00044	0.00052	0.00062	0.00069	0.00026
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000094	0.000181	0.000187	0.000252	0.000234
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00053
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	0.65	0.75	0.74	0.80	0.68
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total (mg/L)	0.207	0.240	0.757	0.765	0.097
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.01	1.05	0.866	0.992	1.31
Strontium (Sr)-Total (mg/L)	0.0157	0.0174	0.0365	0.0429	0.0160
Sulfur (S)-Total (mg/L)	1.38	1.51	1.87	2.14	2.05
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Total (mg/L)	0.000052	0.000057	0.000048	0.000053	0.000050
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.00013	0.00016	0.00032	0.00034	0.00049
Barium (Ba)-Dissolved (mg/L)	0.00376	0.00393	0.00382	0.00416	0.00418
Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Dissolved (mg/L)	2.86	3.01	7.08	7.78	3.31
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1615889-6	L1615889-7	L1615889-8	L1615889-9	L1615889-10
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	15-MAY-15	16-MAY-15	16-MAY-15	16-MAY-15	16-MAY-15
	Sampled Time	13:50	08:30	08:30	12:10	10:54
	Client ID	TPE-81-S	CREMP-MAY-EB-1	CREMP-MAY-DI-1	INUG-68-S	INUG-69-S
Grouping	**Analyte**					
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00053	<0.00050	<0.00050	<0.00050	0.00057
	Iron (Fe)-Total (mg/L)	0.011	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	0.000059	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	1.29	<0.10	<0.10	0.99	0.95
	Manganese (Mn)-Total (mg/L)	0.00040	<0.00010	<0.00010	0.00042	0.00043
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000244	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.00057	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.72	<0.10	<0.10	0.56	0.51
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.103	<0.050	<0.050	0.140	0.144
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.30	<0.050	<0.050	0.751	0.716
	Strontium (Sr)-Total (mg/L)	0.0165	<0.00020	<0.00020	0.00997	0.00947
	Sulfur (S)-Total (mg/L)	2.05	<0.50	<0.50	0.51	<0.50
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000052	<0.000010	<0.000010	0.000045	0.000050
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00054	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00414	<0.000050	<0.000050	0.00256	0.00239
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	3.49	<0.050	<0.050	1.62	1.55
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1615889-11 WATER 16-MAY-15 10:54 CREMP-MAY-DUP-1	L1615889-12 WATER 16-MAY-15 15:12 TPN-80-S	L1615889-13 WATER 16-MAY-15 14:25 TPN-81-S	L1615889-14 WATER 17-MAY-15 12:51 SP-80-S	L1615889-15 WATER 17-MAY-15 13:20 SP-81-S
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00056	<0.00050	0.00064	0.00076	0.00074
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	0.96	1.11	1.18	1.49	1.42
	Manganese (Mn)-Total (mg/L)	0.00043	0.00055	0.00067	0.00032	0.00031
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000287	0.000295	0.000169	0.000249
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00051	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.52	0.65	0.68	0.67	0.61
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.147	0.056	0.058	0.319	0.303
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.720	1.46	1.61	0.994	0.931
	Strontium (Sr)-Total (mg/L)	0.00943	0.0146	0.0158	0.0238	0.0225
	Sulfur (S)-Total (mg/L)	0.51	2.20	2.37	1.85	1.78
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000045	0.000053	0.000056	0.000050	0.000051
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0012	<0.0010	<0.0010	<0.0010	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00022	0.00024	0.00029	0.00026
	Barium (Ba)-Dissolved (mg/L)	0.00243	0.00384	0.00417	0.00351	0.00339
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	1.59	2.76	2.95	4.69	4.36
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1615889-1	L1615889-2	L1615889-3	L1615889-4	L1615889-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	14-MAY-15	14-MAY-15	15-MAY-15	15-MAY-15	15-MAY-15
Sampled Time	15:30	16:07	10:55	12:02	13:53
Client ID	TE-80-S	TE-81-S	WAL-49-S	WAL-50-S	TPE-80-S
Grouping / **Analyte**					
WATER					
Dissolved Metals Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00053	0.00065	0.00121	0.00122	0.00046
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	1.10	1.12	2.00	2.20	1.19
Manganese (Mn)-Dissolved (mg/L)	0.00023	0.00034	<0.00010	<0.00010	<0.00010
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000062	0.000101	0.000192	0.000215	0.000197
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.65	0.67	0.67	0.77	0.66
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	0.206	0.230	0.757	0.753	0.089
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.966	1.03	0.902	0.977	1.29
Strontium (Sr)-Dissolved (mg/L)	0.0149	0.0167	0.0363	0.0399	0.0159
Sulfur (S)-Dissolved (mg/L)	1.34	1.43	1.86	2.05	1.97
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000049	0.000048	0.000038	0.000046	0.000046
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1615889-6 WATER 15-MAY-15 13:50 TPE-81-S	L1615889-7 WATER 16-MAY-15 08:30 CREMP-MAY-EB-1	L1615889-8 WATER 16-MAY-15 08:30 CREMP-MAY-DI-1	L1615889-9 WATER 16-MAY-15 12:10 INUG-68-S	L1615889-10 WATER 16-MAY-15 10:54 INUG-69-S
Sample ID		L1615889-6	L1615889-7	L1615889-8	L1615889-9	L1615889-10
Description		WATER	WATER	WATER	WATER	WATER
Sampled Date		15-MAY-15	16-MAY-15	16-MAY-15	16-MAY-15	16-MAY-15
Sampled Time		13:50	08:30	08:30	12:10	10:54
Client ID		TPE-81-S	CREMP-MAY-EB-1	CREMP-MAY-DI-1	INUG-68-S	INUG-69-S
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00047	<0.00020	<0.00020	0.00045	0.00047
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	1.21	<0.10	<0.10	0.95	0.92
	Manganese (Mn)-Dissolved (mg/L)	0.00034	<0.00010	<0.00010	0.00010	<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000224	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.00056	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.66	<0.10	<0.10	0.49	0.49
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.098	<0.050	<0.050	0.141	0.147
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.32	<0.050	<0.050	0.738	0.704
	Strontium (Sr)-Dissolved (mg/L)	0.0166	<0.00020	<0.00020	0.00983	0.00908
	Sulfur (S)-Dissolved (mg/L)	1.98	<0.50	<0.50	<0.50	<0.50
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000048	<0.000010	<0.000010	0.000039	0.000040
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1615889-11	L1615889-12	L1615889-13	L1615889-14	L1615889-15
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	16-MAY-15	16-MAY-15	16-MAY-15	17-MAY-15	17-MAY-15
Sampled Time	10:54	15:12	14:25	12:51	13:20
Client ID	CREMP-MAY-DUP-1	TPN-80-S	TPN-81-S	SP-80-S	SP-81-S
Grouping / **Analyte**					
WATER					
Dissolved Metals Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00044	0.00043	0.00048	0.00108	0.00067
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	0.94	1.08	1.13	1.44	1.37
Manganese (Mn)-Dissolved (mg/L)	0.00010	0.00043	0.00045	0.00021	0.00021
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000226	0.000267	0.000154	0.000152
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.49	0.62	0.64	0.63	0.58
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	0.137	0.052	0.052	0.313	0.298
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.706	1.45	1.57	0.979	0.940
Strontium (Sr)-Dissolved (mg/L)	0.00914	0.0141	0.0152	0.0228	0.0220
Sulfur (S)-Dissolved (mg/L)	<0.50	2.14	2.32	1.80	1.73
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000039	0.000045	0.000049	0.000043	0.000043
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Bromide (Br)	DLM	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLM	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Mercury (Hg)-Dissolved	MS-B	L1615889-1, -2, -3, -4
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1615889-10
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Total	MS-B	L1615889-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1615889-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1615889-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1615889-13, -14, -15
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
	Arsenic (As)-Dissolved		L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike		MS-B	7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1615889-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CHLOROA-F-VA	Filter	Chlorophyll a by Fluorometer (Filter)	EPA 445.0

This analysis is done using procedures modified from EPA Method 445.0. Chlorophyll-a is determined by a routine acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SILICATE-COL-VA Water Silicate by Colourimetric analysis APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA Water Low Level TDS (3.0mg/L) by Gravimetric APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

L1615889-COFC

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alk Species, pH, EC, Turbidity	Anions (F, NO2, NO3, Br, SO4)	Low Level Chloride by IC	Silicate, TD-P, Ortho-PO4	T-CN (Low), Free CN (Low)	TSS-Low, TDS-Low	Ammonia, TKN, Total P	TOC	DOC	T. Met.+Hg (MET-T-BCMDG-VA	D. Met.+Hg(MET-D-BCMDG-VA		Number of Containers
	TE-80-S	14-May-15	15:30	Water	X	X	X	X	X	X	X	X	X	X	X		9
	TE-81-S	14-May-15	16:07	Water	X	X	X	X	X	X	X	X	X	X	X		9
	WAL-49-S	15-May-15	10:55	Water	X	X	X	X	X	X	X	X	X	X	X		9
	WAL-50-S	15-May-15	12:02	Water	X	X	X	X	X	X	X	X	X	X	X		9
	TPE-80-S	15-May-15	13:53	Water	X	X	X	X	X	X	X	X	X	X	X		9
	TPE-81-S	15-May-15	13:50	Water	X	X	X	X	X	X	X	X	X	X	X		9
	CREMP-MAY-EB-1	16-May-15	8:30	Water	X	X	X	X	X	X	X	X	X	X	X		9
	CREMP-MAY-DI-1	16-May-15	8:30	Water	X	X	X	X	X	X	X	X	X	X	X		9
	INUG-68-S	16-May-15	12:10	Water	X	X	X	X	X	X	X	X	X	X	X		9
	INUG-69-S	16-May-15	10:54	Water	X	X	X	X	X	X	X	X	X	X	X		9
	CREMP-MAY-DUP-1	16-May-15	10:54	Water	X	X	X	X	X	X	X	X	X	X	X		9
	TPN-80-S	16-May-15	15:12	Water	X	X	X	X	X	X	X	X	X	X	X		9
	TPN-81-S	16-May-15	14:25	Water	X	X	X	X	X	X	X	X	X	X	X		9
	SP-80-S	17-May-15	12:51	Water	X	X	X	X	X	X	X	X	X	X	X		9
	SP-81-S	17-May-15	13:20	Water	X	X	X	X	X	X	X	X	X	X	X		9
	TRAVEL BLANK	16-May-15	--	Water													5

Short Holding Time

Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			SJO	25 may	9:33 am	4.1 / 16.6 °C 15.9 / 15.6				

GENF 20.00 Front

L1615889-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page ____ of ____

Report To		**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	**Analysis Request**
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		**ALS Contact:**	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll 'a'												Number of Containers
	TE-80-S	14-May-15	15:30	Water	x												1
	TE-81-S	14-May-15	16:07	Water	x												1
	WAL-49-S	15-May-15	10:55	Water	x												1
	WAL-50-S	15-May-15	12:02	Water	x												1
	TPE-80-S	15-May-15	13:53	Water	x												1
	TPE-81-S	15-May-15	13:50	Water	x												1
	INUG-68-S	16-May-15	12:10	Water	x												1
	INUG-69-S	16-May-15	10:54	Water	x												1
	CREMP-MAY-DUP-1	16-May-15	10:54	Water	x												1
	TPN-80-S	16-May-15	15:12	Water	x												1
	TPN-81-S	16-May-15	14:25	Water	x												1
	SP-80-S	17-May-15	12:51	Water	x												1
	SP-81-S	17-May-15	13:20	Water	x												1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Volume filtered : 500 ml.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			SJO	25 May	9:33 am	16.6/17.3 16.5/15.9 °C				

15.6

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 23-JUL-15
Report Date: 31-JUL-15 10:47 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1647197

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1647197-1	L1647197-2	L1647197-3	L1647197-4	L1647197-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	15-JUL-15	15-JUL-15	15-JUL-15	15-JUL-15	15-JUL-15
Sampled Time	14:50	14:30	10:42	10:00	09:00
Client ID	SP-82-S	SP-83-S	TPE-82-S	TPE-83-S	CREMP JUL-EB-1
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	35.1	35.0	30.7	29.1	<2.0
Hardness (as CaCO3) (mg/L)	13.8	13.8	10.7	10.6	<0.50
pH (pH)	7.27	7.29	7.16	7.13	5.77
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (mg/L)	20.9	21.5	19.9	19.5	<3.0
Turbidity (NTU)	0.53	0.39	0.29	0.39	<0.10
Anions and Nutrients Alkalinity, Bicarbonate (as CaCO3) (mg/L)	11.6	11.0	8.0	7.8	1.0
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	11.6	11.0	8.0	7.8	1.0
Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	0.0058	<0.0050	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	0.78	0.75	0.67	0.64	<0.10
Fluoride (F) (mg/L)	0.060	0.057	0.069	0.071	<0.020
Nitrate (as N) (mg/L)	0.0078	0.0050	0.0287	0.0255	<0.0050
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen (mg/L)	0.095	0.108	0.092	0.081	<0.050
Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Phosphorus (P)-Total (mg/L)	<0.0020	0.0025	<0.0020	0.0026	<0.0020
Silicate (as SiO2) (mg/L)	0.66	0.72	<0.50	<0.50	<0.50
Sulfate (SO4) (mg/L)	3.96	3.73	4.27	4.06	<0.30
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.84	1.89	1.46	1.44	<0.50
Total Organic Carbon (mg/L)	1.84	1.89	1.31	1.63	<0.50
Total Metals Aluminum (Al)-Total (mg/L)	0.0143	0.0142	0.0103	0.0132	0.0077
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00026	0.00027	0.00051	0.00048	<0.00010
Barium (Ba)-Total (mg/L)	0.00305	0.00290	0.00333	0.00324	0.000088
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	3.66	3.62	2.72	2.57	<0.050
Chromium (Cr)-Total (mg/L)	0.00018	0.00014	0.00016	0.00014	0.00011

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1647197-6				
	Description	Surface Water				
	Sampled Date	15-JUL-15				
	Sampled Time	08:30				
	Client ID	CREMP JUL-DL-1				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0				
	Hardness (as CaCO3) (mg/L)	<0.50				
	pH (pH)	5.46				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	<3.0				
	Turbidity (NTU)	<0.10				
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0				
	Ammonia, Total (as N) (mg/L)	<0.0050				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	<0.10				
	Fluoride (F) (mg/L)	<0.020				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Total Kjeldahl Nitrogen (mg/L)	<0.050				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020				
	Phosphorus (P)-Total (mg/L)	<0.0020				
	Silicate (as SiO2) (mg/L)	<0.50				
	Sulfate (SO4) (mg/L)	<0.30				
Cyanides	Cyanide, Total (mg/L)	<0.0010				
	Cyanide, Free (mg/L)	<0.0010				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50				
	Total Organic Carbon (mg/L)	<0.50				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	<0.000050				
	Beryllium (Be)-Total (mg/L)	<0.000020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.0000050				
	Calcium (Ca)-Total (mg/L)	<0.050				
	Chromium (Cr)-Total (mg/L)	<0.00010				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1647197-1 Surface Water 15-JUL-15 14:50 SP-82-S	L1647197-2 Surface Water 15-JUL-15 14:30 SP-83-S	L1647197-3 Surface Water 15-JUL-15 10:42 TPE-82-S	L1647197-4 Surface Water 15-JUL-15 10:00 TPE-83-S	L1647197-5 Surface Water 15-JUL-15 09:00 CREMP JUL-EB-1
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00083	0.00089	0.00053	0.00079	<0.00050
	Iron (Fe)-Total (mg/L)	0.034	0.026	0.018	0.023	0.012
	Lead (Pb)-Total (mg/L)	<0.000050	0.000052	<0.000050	<0.000050	0.000179
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	1.17	1.13	0.95	0.91	<0.10
	Manganese (Mn)-Total (mg/L)	0.00284	0.00236	0.00257	0.00297	0.00025
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000134	0.000120	0.000138	0.000158	<0.000050
	Nickel (Ni)-Total (mg/L)	0.00057	0.00055	0.00065	0.00062	<0.00050
	Phosphorus (P)-Total (mg/L)	0.060	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.67	0.50	0.53	0.50	<0.10
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.285	0.315	0.114	0.131	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.772	0.674	0.915	0.897	<0.050
	Strontium (Sr)-Total (mg/L)	0.0159	0.0170	0.00960	0.0108	<0.00020
	Sulfur (S)-Total (mg/L)	1.50	1.36	1.52	1.42	<0.50
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	0.00035	<0.00030
	Uranium (U)-Total (mg/L)	0.000064	0.000053	0.000044	0.000051	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0037	0.0041	0.0027	0.0034	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00026	0.00023	0.00046	0.00042	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00277	0.00252	0.00321	0.00310	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	3.66	3.67	2.74	2.72	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1647197-6				
	Description	Surface Water				
	Sampled Date	15-JUL-15				
	Sampled Time	08:30				
	Client ID	CREMP JUL-DL-1				
Grouping	**Analyte**					
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.0010				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.00010				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	<0.10				
	Selenium (Se)-Total (mg/L)	<0.000050				
	Silicon (Si)-Total (mg/L)	<0.050				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	<0.050				
	Strontium (Sr)-Total (mg/L)	<0.00020				
	Sulfur (S)-Total (mg/L)	<0.50				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.00030				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	<0.00030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	LAB				
	Aluminum (Al)-Dissolved (mg/L)	<0.0010				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	<0.000050				
	Beryllium (Be)-Dissolved (mg/L)	<0.000020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050				
	Calcium (Ca)-Dissolved (mg/L)	<0.050				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1647197-1	L1647197-2	L1647197-3	L1647197-4	L1647197-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	15-JUL-15	15-JUL-15	15-JUL-15	15-JUL-15	15-JUL-15
Sampled Time	14:50	14:30	10:42	10:00	09:00
Client ID	SP-82-S	SP-83-S	TPE-82-S	TPE-83-S	CREMP JUL-EB-1
Grouping / **Analyte**					
WATER					
Dissolved Metals Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00064	0.00076	0.00053	0.00063	0.00033
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	1.14	1.12	0.94	0.93	<0.10
Manganese (Mn)-Dissolved (mg/L)	0.00190	0.00157	0.00197	0.00232	<0.00010
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000129	0.000113	0.000154	0.000133	<0.000050
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	0.00057	0.00056	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.54	0.48	0.51	0.51	<0.10
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	0.265	0.293	0.100	0.123	<0.050
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.723	0.667	0.929	0.844	<0.050
Strontium (Sr)-Dissolved (mg/L)	0.0161	0.0168	0.0113	0.0100	<0.00020
Sulfur (S)-Dissolved (mg/L)	1.37	1.32	1.45	1.42	<0.50
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000048	0.000046	0.000044	0.000042	<0.000010
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	0.0010	0.0019
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1647197-6				
	Description	Surface Water				
	Sampled Date	15-JUL-15				
	Sampled Time	08:30				
	Client ID	CREMP JUL-DL-1				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	<0.00010				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	<0.10				
	Selenium (Se)-Dissolved (mg/L)	<0.000050				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	<0.050				
	Strontium (Sr)-Dissolved (mg/L)	<0.00020				
	Sulfur (S)-Dissolved (mg/L)	<0.50				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.00030				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L1647197-6	CREMP JUL-DL-1	LPMB	Lab-Preserved for Total Metals. Sample received with pH > 2 and preserved at the lab. Total Metals results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Nitrite (as N)	DLM	L1647197-1, -2, -3, -4, -5, -6
Duplicate	Nitrate (as N)	DLM	L1647197-1, -2, -3, -4, -5, -6
Duplicate	Bromide (Br)	DLM	L1647197-1, -2, -3, -4, -5, -6
Duplicate	Nitrite (as N)	DLM	L1647197-1, -2, -3, -4, -5, -6
Duplicate	Nitrate (as N)	DLM	L1647197-1, -2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1647197-1, -2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1647197-6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1647197-6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Mercury (Hg)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1647197-6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Copper (Cu)-Total	MS-B	L1647197-2, -3, -4, -5, -6
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1647197-1, -2, -3, -4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

Reference Information

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et

Reference Information

al.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

Reference Information

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page ____ of ____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low									Number of Containers
	SP-82-S	15-Jul-15	14:50	Surface Water	X	X									2
	SP-83-S	15-Jul-15	14:30	Surface Water	X	X									2
	TPE-82-S	15-Jul-15	10:42	Surface Water	X	X									2
	TPE-83-S	15-Jul-15	10:00	Surface Water	X	X									2
	CREMP JUL-EB-1	15-Jul-15	9:00	Surface Water	X	X									2
	CREMP JUL-DI-1	15-Jul-15	8:30	Surface Water	X	X									2

Short Holding Time
Rush Processing

L1647197-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
						21 °C	EK	July 23/15	11:20	

GENF 20.00 Front

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals	Number of Containers
					P	F/P	P	P	F/P	P	F/P	
	SP-82-S	15-Jul-15	14:50	Surface Water	X	X	X	X	X	X	X	7
	SP-83-S	15-Jul-15	14:30	Surface Water	X	X	X	X	X	X	X	7
	TPE-82-S	15-Jul-15	10:42	Surface Water	X	X	X	X	X	X	X	7
	TPE-83-S	15-Jul-15	10:00	Surface Water	X	X	X	X	X	X	X	7
	CREMP JUL-EB-1	15-Jul-15	9:00	Surface Water	X	X	X	X	X	X	X	7
	CREMP JUL-DI-1	15-Jul-15	8:30	Surface Water	X	X	X	X	X	X	X	7

Short Holding Time

Rush Processing

L1647197-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
						21 °C	EC	July 23/15	1125	

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 29-JUL-15
Report Date: 07-AUG-15 12:20 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1649792

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1649792-1	L1649792-2	L1649792-3	L1649792-4	L1649792-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	19-JUL-15	19-JUL-15	19-JUL-15	21-JUL-15	21-JUL-15
Sampled Time	16:00	16:45	16:45	07:30	08:04
Client ID	WAL-51-S	WAL-52-S	CREMP JUL DUP 1	BPJ-38-S	BPJ-37-S
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	33.1	34.5	32.8	30.4	33.1
Hardness (as CaCO3) (mg/L)	15.0	14.0	13.9	10.7	10.8
pH (pH)	7.48	7.34	7.30	7.16	7.14
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (mg/L)	23.7	22.7	22.6	23.7	24.9
Turbidity (NTU)	0.35	0.29	0.24	0.34	0.39
Anions and Nutrients Alkalinity, Bicarbonate (as CaCO3) (mg/L)	11.5	12.0	11.3	8.3	8.3
Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as CaCO3) (mg/L)	11.5	12.0	11.3	8.3	8.3
Ammonia, Total (as N) (mg/L)	0.0115	<0.0050	<0.0050	0.0053	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	0.60	0.62	0.60	2.80	3.55
Fluoride (F) (mg/L)	0.039	0.038	0.039	0.053	0.053
Nitrate (as N) (mg/L)	<0.0050	0.0164	<0.0050	0.0271	0.0275
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen (mg/L)	0.171	0.228	0.157	0.192	0.183
Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	0.0020	<0.0020	0.0026	0.0026
Phosphorus (P)-Total (mg/L)	0.0026	0.0021	0.0032	0.0060	0.0057
Silicate (as SiO2) (mg/L)	0.87	0.79	0.83	<0.50	<0.50
Sulfate (SO4) (mg/L)	2.98	3.39	3.00	0.86	0.97
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.97	1.84	1.86	2.97	3.07
Total Organic Carbon (mg/L)	1.94	1.92	2.08	3.33	3.20
Total Metals Aluminum (Al)-Total (mg/L)	0.0086	0.0079	0.0123	0.0184	0.0136
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00024	0.00021	0.00024	0.00011	0.00011
Barium (Ba)-Total (mg/L)	0.00236	0.00214	0.00252	0.0179	0.0192
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	0.0000051	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	4.06	3.76	3.82	2.47	2.45
Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1649792-6 Surface Water 21-JUL-15 08:33 BBD-37-S	L1649792-7 Surface Water 21-JUL-15 08:55 BBD-38-S	L1649792-8 Surface Water 21-JUL-15 10:19 BAP-37-S	L1649792-9 Surface Water 21-JUL-15 10:19 CREMP JUL DUP 2	L1649792-10 Surface Water 21-JUL-15 10:53 BAP-38-S
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Physical Tests	Conductivity (uS/cm)	30.5	28.3	56.4	56.6	47.8
	Hardness (as CaCO3) (mg/L)	10.7	10.4	12.9	13.0	12.1
	pH (pH)	7.13	7.12	7.12	7.13	7.14
	Total Suspended Solids (mg/L)	<1.0	<1.0	1.1	<1.0	<1.0
	Total Dissolved Solids (mg/L)	17.1	18.7	39	41	31
	Turbidity (NTU)	0.33	0.31	0.30	0.26	0.44
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	8.4	8.6	8.8	8.7	8.8
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	8.4	8.6	8.8	8.7	8.8
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	0.0074	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	2.83	2.22	9.58	9.56	7.30
	Fluoride (F) (mg/L)	0.052	0.053	0.052	0.053	0.053
	Nitrate (as N) (mg/L)	0.0269	0.0267	0.0276	0.0275	0.0267
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.193	0.191	0.186	0.202	0.217
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	0.0012	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	0.0028	0.0032	0.0024	0.0045	0.0024
	Phosphorus (P)-Total (mg/L)	0.0041	0.0042	0.0038	0.0040	0.0041
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	0.87	0.79	1.85	1.84	1.52
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.13	3.03	3.10	3.00	3.01
	Total Organic Carbon (mg/L)	3.25	3.05	3.09	3.07	2.94
Total Metals	Aluminum (Al)-Total (mg/L)	0.0160	0.0197	0.0126	0.0136	0.0121
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00011	0.00014	0.00011	0.00012	0.00011
	Barium (Ba)-Total (mg/L)	0.0172	0.0178	0.0174	0.0171	0.0172
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	0.0000062	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	2.46	2.50	2.59	2.57	2.52
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1649792-1 Surface Water 19-JUL-15 16:00 WAL-51-S	L1649792-2 Surface Water 19-JUL-15 16:45 WAL-52-S	L1649792-3 Surface Water 19-JUL-15 16:45 CREMP JUL DUP 1	L1649792-4 Surface Water 21-JUL-15 07:30 BPJ-38-S	L1649792-5 Surface Water 21-JUL-15 08:04 BPJ-37-S
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00091	0.00084	0.00092	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.019	0.021	0.028	0.024	0.025
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	0.0010	0.0012
	Magnesium (Mg)-Total (mg/L)	1.13	1.08	1.10	1.11	1.14
	Manganese (Mn)-Total (mg/L)	0.00232	0.00294	0.00299	0.00453	0.00430
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000152	0.000109	0.000136	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.45	0.42	0.42	0.46	0.45
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.347	0.361	0.364	0.183	0.181
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.537	0.527	0.535	1.41	1.63
	Strontium (Sr)-Total (mg/L)	0.0201	0.0184	0.0187	0.0184	0.0180
	Sulfur (S)-Total (mg/L)	1.14	0.98	1.00	<0.50	<0.50
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000059	0.000047	0.000051	0.000035	0.000035
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0029	0.0027	0.0030	0.0037	0.0042
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00022	0.00019	0.00021	0.00011	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00226	0.00203	0.00211	0.0174	0.0175
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	4.10	3.80	3.80	2.45	2.46
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1649792-6 Surface Water 21-JUL-15 08:33 BBD-37-S	L1649792-7 Surface Water 21-JUL-15 08:55 BBD-38-S	L1649792-8 Surface Water 21-JUL-15 10:19 BAP-37-S	L1649792-9 Surface Water 21-JUL-15 10:19 CREMP JUL DUP 2	L1649792-10 Surface Water 21-JUL-15 10:53 BAP-38-S
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.025	0.028	0.021	0.020	0.019
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0010	0.0010	0.0010	0.0010	0.0010
	Magnesium (Mg)-Total (mg/L)	1.08	1.09	1.53	1.50	1.39
	Manganese (Mn)-Total (mg/L)	0.00445	0.00467	0.00421	0.00428	0.00418
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000053	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.45	0.44	0.59	0.63	0.56
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.178	0.189	0.181	0.179	0.172
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.17	1.09	5.06	4.92	3.87
	Strontium (Sr)-Total (mg/L)	0.0178	0.0182	0.0201	0.0200	0.0194
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	0.62	0.65	0.53
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00031	0.00035	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000034	0.000037	0.000036	0.000034	0.000034
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0042	0.0037	0.0050	0.0035	0.0036
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0175	0.0173	0.0174	0.0171	0.0173
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	2.46	2.44	2.61	2.62	2.54
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1649792-1	L1649792-2	L1649792-3	L1649792-4	L1649792-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	19-JUL-15	19-JUL-15	19-JUL-15	21-JUL-15	21-JUL-15
Sampled Time	16:00	16:45	16:45	07:30	08:04
Client ID	WAL-51-S	WAL-52-S	CREMP JUL DUP 1	BPJ-38-S	BPJ-37-S
Grouping / **Analyte**					
WATER					
Dissolved Metals Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00080	0.00075	0.00084	0.00033	0.00028
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	1.15	1.09	1.08	1.10	1.13
Manganese (Mn)-Dissolved (mg/L)	0.00129	0.00161	0.00165	0.00271	0.00293
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000142	0.000092	0.000092	<0.000050	<0.000050
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.42	0.40	0.40	0.46	0.46
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	0.343	0.355	0.354	0.157	0.158
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.529	0.526	0.528	1.35	1.73
Strontium (Sr)-Dissolved (mg/L)	0.0194	0.0183	0.0181	0.0177	0.0180
Sulfur (S)-Dissolved (mg/L)	1.11	0.97	1.00	<0.50	<0.50
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000054	0.000042	0.000043	0.000034	0.000031
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1649792-6 Surface Water 21-JUL-15 08:33 BBD-37-S	L1649792-7 Surface Water 21-JUL-15 08:55 BBD-38-S	L1649792-8 Surface Water 21-JUL-15 10:19 BAP-37-S	L1649792-9 Surface Water 21-JUL-15 10:19 CREMP JUL DUP 2	L1649792-10 Surface Water 21-JUL-15 10:53 BAP-38-S
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00022	0.00025	0.00022	<0.00020	0.00023
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	1.10	1.05	1.55	1.56	1.39
	Manganese (Mn)-Dissolved (mg/L)	0.00274	0.00274	0.00264	0.00254	0.00266
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.44	0.42	0.57	0.57	0.52
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.157	0.158	0.160	0.161	0.162
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.32	0.932	5.09	5.13	3.86
	Strontium (Sr)-Dissolved (mg/L)	0.0177	0.0174	0.0199	0.0199	0.0192
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50	0.63	0.63	0.51
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000031	0.000031	0.000031	0.000031	0.000031
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Bismuth (Bi)-Total	DLA	L1649792-5, -6, -7
Duplicate	Silver (Ag)-Total	DLA	L1649792-5, -6, -7
Duplicate	Thallium (Tl)-Total	DLA	L1649792-5, -6, -7
Duplicate	Tin (Sn)-Total	DLA	L1649792-5, -6, -7
Duplicate	Vanadium (V)-Total	DLA	L1649792-5, -6, -7
Duplicate	Zirconium (Zr)-Total	DLA	L1649792-5, -6, -7
Duplicate	Bromide (Br)	DLM	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bromide (Br)	DLM	L1649792-10
Duplicate	Titanium (Ti)-Total	DLM	L1649792-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1649792-1, -10, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1649792-1, -10, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

Reference Information

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SILICATE-COL-VA Water Silicate by Colourimetric analysis APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA Water Low Level TDS (3.0mg/L) by Gravimetric APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

Reference Information

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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L1649792-COFC

COC # _____

Page 1 of 1

Report To		**Report Format / Distribution**				Jr routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1:	efranz@azimuthgroup.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2:	gmann@azimuthgroup.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3:	ryan.vanengen@agnicoeagle.com			**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	CREMP Meadowbank Surfacewater			
Company:		PO / AFE:				
Contact:		LSD:				
Address:						
Phone:	Fax:	Quote #:	Q39503			
[redacted] Lab Work Order # (lab use only)		**ALS Contact:**		**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
[redacted]	WAL-51-S	19-Jul-15	16:00	Surface Water	X	X	2
[redacted]	WAL-52-S	19-Jul-15	16:45	Surface Water	X	X	2
[redacted]	CREMP JULY DUP 1	19-Jul-15	16:45	Surface Water	X	X	2
[redacted]	BPJ-38-S	21-Jul-15	7:30	Surface Water	X	X	2
[redacted]	BPJ-37-S	21-Jul-15	8:04	Surface Water	X	X	2
[redacted]	BBD-37-S	21-Jul-15	8:33	Surface Water	X	X	2
[redacted]	BBD-38-S	21-Jul-15	8:55	Surface Water	X	X	2
[redacted]	BAP-37-S	21-Jul-15	10:19	Surface Water	X	X	2
[redacted]	CREMP JULY DUP 2	21-Jul-15	10:19	Surface Water	X	X	2
[redacted]	BAP-38-S	21-Jul-15	10:53	Surface Water	X	X	2
[redacted]							
[redacted]							
[redacted]							
[redacted]							

Short Holding Time
Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	22-Jul-15					20 °C	EC	24 Jul 15	12:05	

GENF 20.00 Front

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COC # _____

Page 1 of 1

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
[redacted] Lab Work Order # (lab use only)	[redacted]	ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals						Number of Containers
					P	F/P	P	P	F/P	P	F/P						
[redacted]	WAL-51-S	19-Jul-15	16:00	Surface Water	X	X	X	X	X	X	X						7
[redacted]	WAL-52-S	19-Jul-15	16:45	Surface Water	X	X	X	X	X	X	X						7
[redacted]	CREMP JUL DUP 1	19-Jul-15	16:45	Surface Water	X	X	X	X	X	X	X						7
[redacted]	BPJ-38-S	21-Jul-15	7:30	Surface Water	X	X	X	X	X	X	X						7
[redacted]	BPJ-37-S	21-Jul-15	8:04	Surface Water	X	X	X	X	X	X	X						7
[redacted]	BBD-37-S	21-Jul-15	8:33	Surface Water	X	X	X	X	X	X	X						7
[redacted]	BBD-38-S	21-Jul-15	8:55	Surface Water	X	X	X	X	X	X	X						7
[redacted]	BAP-37-S	21-Jul-15	10:19	Surface Water	X	X	X	X	X	X	X						7
[redacted]	CREMP JUL DUP 2	21-Jul-15	10:19	Surface Water	X	X	X	X	X	X	X						7
[redacted]	BAP-38-S	21-Jul-15	10:53	Surface Water	X	X	X	X	X	X	X						7
[redacted]																	
[redacted]																	

Short Holding Time
Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	22-Jul-15					[redacted] °C	EC	July 29/15	12:45	

2.5°C

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 31-JUL-15
Report Date: 05-AUG-15 13:16 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1651165

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1651165-1 SURFACE WATE 27-JUL-15 12:36 TE-82-S	L1651165-2 SURFACE WATE 27-JUL-15 12:13 TE-83-S	L1651165-3 SURFACE WATE 27-JUL-15 11:25 TEFF-38-S	L1651165-4 SURFACE WATE 27-JUL-15 10:43 TEFF-37-S	L1651165-5 SURFACE WATE 27-JUL-15 15:56 INUG-70-S
WATER						
Physical Tests	Conductivity (uS/cm)	28.9	32.4	20.7	17.8	15.2
	pH (pH)	7.16	7.25	7.00	6.87	6.89
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	19.8	24.5	16.3	11.5	16.4
	Turbidity (NTU)	0.35	0.30	0.29	0.28	0.31
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	8.1	9.4	5.7	4.6	4.8
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	8.1	9.4	5.7	4.6	4.8
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.70	0.75	0.63	0.58	0.73
	Fluoride (F) (mg/L)	0.061	0.061	0.057	0.054	0.056
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	0.0023	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	0.53	0.57	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	3.24	3.75	2.40	2.04	0.88

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651165-6				
	Description	SURFACE WATE				
	Sampled Date	27-JUL-15				
	Sampled Time	16:20				
	Client ID	INUG-71-S				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	15.3				
	pH (pH)	6.90				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	16.7				
	Turbidity (NTU)	0.29				
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	5.0				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	5.0				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	0.73				
	Fluoride (F) (mg/L)	0.056				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020				
	Silicate (as SiO2) (mg/L)	<0.50				
	Sulfate (SO4) (mg/L)	0.88				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Nitrite (as N)	DLM	L1651165-1, -2, -3, -4, -5, -6
Duplicate	Nitrate (as N)	DLM	L1651165-1, -2, -3, -4, -5, -6
Matrix Spike	Phosphorus (P)-Total Dissolved	MS-B	L1651165-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

Reference Information

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

Report To		**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		**ALS Contact:**	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	TE-82-S	27-Jul-15	12:36	Surface Water	X	X	2
	TE-83-S	27-Jul-15	12:13	Surface Water	X	X	2
	TEFF-38-S	27-Jul-15	11:25	Surface Water	X	X	2
	TEFF-37-S	27-Jul-15	10:43	Surface Water	X	X	2
	INUG-70-S	27-Jul-15	15:56	Surface Water	X	X	2
	INUG-71-S	27-Jul-15	16:20	Surface Water	X	X	2

L1651165-COFC

Short Holding Time
Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
						22 °C	EE	July 31/15	12:00	

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 31-JUL-15
Report Date: 05-AUG-15 13:02 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1651199

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1651199-1	L1651199-2	L1651199-3	L1651199-4	L1651199-5
Description	SURFACE WATE	SURFACE WATE	SURFACE WATE	SURFACE WATE	SURFACE WATE
Sampled Date	24-JUL-15	24-JUL-15	24-JUL-15	24-JUL-15	23-JUL-15
Sampled Time	10:30	10:00	09:00	08:30	17:00
Client ID	TPN-82-S	TPN-83-S	TPS-49-S	TPS-50-S	CREMP JUL-EB-1
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	27.6	27.5	25.4	26.3	<2.0
pH (pH)	6.92	6.91	6.87	6.89	5.41
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (mg/L)	17.1	15.0	17.0	17.0	<3.0
Turbidity (NTU)	0.16	0.19	0.20	0.16	<0.10
Anions and Nutrients					
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	6.9	6.1	5.6	5.6	<1.0
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	6.9	6.1	5.6	5.6	<1.0
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	0.76	0.76	0.73	0.74	<0.10
Fluoride (F) (mg/L)	0.063	0.063	0.062	0.061	<0.020
Nitrate (as N) (mg/L)	0.0642	0.0640	0.0679	0.0670	<0.0050
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Sulfate (SO4) (mg/L)	5.05	5.05	4.89	4.88	<0.30

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651199-6				
	Description	SURFACE WATE				
	Sampled Date	23-JUL-15				
	Sampled Time	17:00				
	Client ID	CREMP JUL-DI-1				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0				
	pH (pH)	5.35				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	<3.0				
	Turbidity (NTU)	<0.10				
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	<0.10				
	Fluoride (F) (mg/L)	<0.020				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020				
	Silicate (as SiO2) (mg/L)	<0.50				
	Sulfate (SO4) (mg/L)	<0.30				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Nitrite (as N)	DLM	L1651199-1, -2, -3, -4, -5, -6
Duplicate	Nitrate (as N)	DLM	L1651199-1, -2, -3, -4, -5, -6
Matrix Spike	Phosphorus (P)-Total Dissolved	MS-B	L1651199-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

Reference Information

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

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COC # _____

Page ____ of ____

Report To		**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		**ALS Contact:**	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	TPN-82-S	24-Jul-15	10:30	Surface Water	X	X	2
	TPN-83-S	24-Jul-15	10:00	Surface Water	X	X	2
	TPS-49-S	24-Jul-15	9:00	Surface Water	X	X	2
	TPS-50-S	24-Jul-15	8:30	Surface Water	X	X	2
	CREMP JUL-EB-1	23-Jul-15	17:00	Surface Water	X	X	2
	CREMP JUL-DI-1	23-Jul-15	17:00	Surface Water	X	X	2

L1651199-COFC

Short Holding Time
● *Rush Processing*

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
						22 °C	EC	July 31/15	12:40	

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 31-JUL-15
Report Date: 12-AUG-15 12:38 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1651226

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651226-1	L1651226-2	L1651226-3	L1651226-4	L1651226-5
	Description	Other	Other	Other	Other	Other
	Sampled Date	24-JUL-15	24-JUL-15	24-JUL-15	24-JUL-15	27-JUL-15
	Sampled Time	10:30	10:00	09:00	08:30	12:36
	Client ID	TPN-82-S	TPN-83-S	TPS-49-S	TPS-50-S	TE-82-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.119	0.184	0.148	0.164	0.305

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID Description Sampled Date Sampled Time Client ID	L1651226-6 Other 27-JUL-15 12:13 TE-83-S	L1651226-7 Other 27-JUL-15 11:25 TEFF-38-S	L1651226-8 Other 27-JUL-15 10:43 TEFF-37-S	L1651226-9 Other 27-JUL-15 15:56 INUG-70-S	L1651226-10 Other 27-JUL-15 16:20 INUG-71-S
FILTER							
Plant Pigments	Chlorophyll a (ug/L)		0.246	0.275	0.209	0.298	0.269

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1651226-11 Other 28-JUL-15 13:03 PDL-37-S	L1651226-12 Other 28-JUL-15 12:03 PDL-38-S	L1651226-13 Other 19-JUL-15 16:45 JUL - DUP 1	L1651226-14 Other 21-JUL-15 10:19 JUL - DUP 2	L1651226-15 Other 15-JUL-15 14:50 SP-82-S
Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**						
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.300	0.333	0.416	0.413	0.335

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1651226-16 Other 15-JUL-15 14:30 SP-83-S	L1651226-17 Other 21-JUL-15 08:55 BBD-38-S	L1651226-18 Other 21-JUL-15 08:33 BBD-37-S	L1651226-19 Other 19-JUL-15 16:00 WAL-51-S	L1651226-20 Other 19-JUL-15 16:45 WAL-52-S
Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**						
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.308	0.286	0.479	0.258	0.514

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651226-21	L1651226-22	L1651226-23	L1651226-24	L1651226-25
	Description	Other	Other	Other	Other	Other
	Sampled Date	21-JUL-15	21-JUL-15	15-JUL-15	15-JUL-15	21-JUL-15
	Sampled Time	10:19	10:53	10:42	10:00	07:30
	Client ID	BAP-37-S	BAP-38-S	TPE-82-S	TPE-83-S	BPJ-38S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.489	0.558	0.114	0.165	0.530

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651226-26				
	Description	Other				
	Sampled Date	21-JUL-15				
	Sampled Time	08:04				
	Client ID	BPJ-37S				
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.637				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHLOROA-F-VA	Filter	Chlorophyll a by Fluorometer (Filter)	EPA 445.0

This analysis is done using procedures modified from EPA Method 445.0. Chlorophyll-a is determined by a routine acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

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Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
[redacted] Lab Work Order # (lab use only)	[redacted]	ALS Contact: Brent Mack	Sampler:

[redacted] Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyl 'a'	Number of Containers
[redacted]	TPN-82-S	24-Jul-15	10:30	Other	X	1
[redacted]	TPN-83-S	24-Jul-15	10:00	Other	X	1
[redacted]	TPS-49-S	24-Jul-15	9:00	Other	X	1
[redacted]	TPS-50-S	24-Jul-15	8:30	Other	X	1
[redacted]	TE-82-S	27-Jul-15	12:36	Other	X	1
[redacted]	TE-83-S	27-Jul-15	12:13	Other	X	1
[redacted]	TEFF-38-S	27-Jul-15	11:25	Other	X	1
[redacted]	TEFF-37-S	27-Jul-15	10:43	Other	X	1
[redacted]	INUG-70-S	27-Jul-15	15:56	Other	X	1
[redacted]	INUG-71-S	27-Jul-15	16:20	Other	X	1
[redacted]	PDL-37-S	28-Jul-15	13:03	Other	X	1
[redacted]	PDL-38-S	28-Jul-15	12:03	Other	X	1

L1651226-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

[redacted] SHIPMENT RELEASE (client use) [redacted]			[redacted] SHIPMENT RECEPTION (lab use only) [redacted]				[redacted] SHIPMENT VERIFICATION (lab use only) [redacted]			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			EC	July 31	12:00	22.0 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 04-AUG-15
Report Date: 12-AUG-15 13:59 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1651975

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651975-1	L1651975-2			
	Description	Surface Water	Surface Water			
	Sampled Date	28-JUL-15	28-JUL-15			
	Sampled Time	13:03	12:03			
	Client ID	PDL-37-S	PDL-38-S			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	22.3	21.9			
	Hardness (as CaCO3) (mg/L)	8.83	8.68			
	pH (pH)	7.00	6.97			
	Total Suspended Solids (mg/L)	<1.0	<1.0			
	Total Dissolved Solids (mg/L)	12.4	12.5			
	Turbidity (NTU)	0.20	0.22			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	8.1	7.5			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	8.1	7.5			
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.59	0.59			
	Fluoride (F) (mg/L)	0.035	0.036			
	Nitrate (as N) (mg/L)	<0.0050	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.077	0.081			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020			
	Phosphorus (P)-Total (mg/L)	0.0023	<0.0020			
	Silicate (as SiO2) (mg/L)	<0.50	<0.50			
	Sulfate (SO4) (mg/L)	1.59	1.60			
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010			
	Cyanide, Free (mg/L)	<0.0010	<0.0010			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.75	1.88			
	Total Organic Carbon (mg/L)	1.76	1.76			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0050	0.0046			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00016	0.00014			
	Barium (Ba)-Total (mg/L)	0.00206	0.00200			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Total (mg/L)	2.33	2.28			
	Chromium (Cr)-Total (mg/L)	0.00010	<0.00010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651975-1	L1651975-2			
	Description	Surface Water	Surface Water			
	Sampled Date	28-JUL-15	28-JUL-15			
	Sampled Time	13:03	12:03			
	Client ID	PDL-37-S	PDL-38-S			
Grouping	**Analyte**					
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00052	0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Total (mg/L)	0.79	0.78			
	Manganese (Mn)-Total (mg/L)	0.00175	0.00164			
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Total (mg/L)	0.000051	<0.000050			
	Nickel (Ni)-Total (mg/L)	0.00074	0.00062			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.36	0.34			
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Total (mg/L)	0.143	0.140			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	0.502	0.497			
	Strontium (Sr)-Total (mg/L)	0.00914	0.00908			
	Sulfur (S)-Total (mg/L)	0.59	0.56			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Total (mg/L)	0.000021	0.000021			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	LAB	LAB			
	Aluminum (Al)-Dissolved (mg/L)	0.0025	0.0018			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00014	0.00013			
	Barium (Ba)-Dissolved (mg/L)	0.00198	0.00200			
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Dissolved (mg/L)	2.27	2.23			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651975-1	L1651975-2			
	Description	Surface Water	Surface Water			
	Sampled Date	28-JUL-15	28-JUL-15			
	Sampled Time	13:03	12:03			
	Client ID	PDL-37-S	PDL-38-S			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00046	0.00040			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Dissolved (mg/L)	0.77	0.76			
	Manganese (Mn)-Dissolved (mg/L)	0.00106	0.00100			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000051	<0.000050			
	Nickel (Ni)-Dissolved (mg/L)	0.00071	0.00062			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	0.35	0.31			
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Dissolved (mg/L)	0.135	0.128			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	0.483	0.474			
	Strontium (Sr)-Dissolved (mg/L)	0.00873	0.00860			
	Sulfur (S)-Dissolved (mg/L)	0.55	0.55			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Dissolved (mg/L)	0.000016	0.000020			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0012	<0.0010			
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Alkalinity, Total (as CaCO3)	B	L1651975-1, -2
Method Blank	Alkalinity, Total (as CaCO3)	B	L1651975-1, -2
Duplicate	Bromide (Br)	DLM	L1651975-1, -2
Duplicate	Fluoride (F)	DLM	L1651975-1, -2
Duplicate	Nitrite (as N)	DLM	L1651975-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L1651975-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L1651975-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Reference Information

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

Reference Information

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group			☐ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz			☐ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway			Email 1:	efranz@azimuthgroup.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8			Email 2:	gmann@azimuthgroup.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220	Fax:		Email 3:	ryan.vanengen@agnicoeagle.com			
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				**Analysis Request**
Hardcopy of Invoice with Report?		☐ Yes	☑ No	Job #:	CREMP Meadowbank Surfacewater			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:	Q39503			
Lab Work Order # (lab use only)				**ALS Contact:**		**Sampler:**		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals	Number of Containers
					P	F/P	P	P	F/P	P	F/P	
	PDL-37-S	28-Jul-15	13:03	Surface Water	X	X	X	X	X	X	X	7
	PDL-38-S	28-Jul-15	12:03	Surface Water	X	X	X	X	X	X	X	7

L1651975-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			Shafee	August 4	1155	22 °C				

GENF 20.00 Front

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	PDL-37-S	28-Jul-15	13:03	Surface Water	X	X	2
	PDL-38-S	28-Jul-15	12:03	Surface Water	X	X	2

L1651975-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			Shafee	August 4	1155	22 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 05-AUG-15
Report Date: 14-AUG-15 11:46 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1653048

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1653048-1	L1653048-2	L1653048-3	L1653048-4	L1653048-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	27-JUL-15	27-JUL-15	27-JUL-15	27-JUL-15	27-JUL-15
Sampled Time	12:36	12:13	11:25	10:43	15:56
Client ID	TE-82-S	TE-83-S	TEFF-38-S	TEFF-37-S	INUG-70-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	11.4	12.9	7.92	6.46	5.76
Anions and Nutrients Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total Kjeldahl Nitrogen (mg/L)	0.090	0.100	0.081	0.086	0.090
Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.65	1.66	1.48	1.30	1.86
Total Organic Carbon (mg/L)	1.79	1.84	1.49	1.39	1.91
Total Metals Aluminum (Al)-Total (mg/L)	0.0159	0.0115	0.0107	0.0104	0.0104
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00022	0.00025	0.00013	0.00011	<0.00010
Barium (Ba)-Total (mg/L)	0.00250	0.00256	0.00233	0.00259	0.00210
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	2.79	3.45	1.94	1.56	1.18
Chromium (Cr)-Total (mg/L)	0.00011	0.00012	<0.00010	<0.00010	0.00020
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00058	0.00065	<0.00050	<0.00050	<0.00050
Iron (Fe)-Total (mg/L)	0.027	0.026	0.019	0.011	0.020
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	0.93	1.10	0.72	0.62	0.71
Manganese (Mn)-Total (mg/L)	0.00243	0.00176	0.00295	0.00272	0.00496
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000104	0.000116	0.000051	<0.000050	0.000075
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00051
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	0.44	0.50	0.43	0.41	0.38
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total (mg/L)	0.235	0.237	0.194	0.150	0.153
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.689	0.756	0.609	0.693	0.563
Strontium (Sr)-Total (mg/L)	0.0129	0.0153	0.00926	0.00783	0.00637
Sulfur (S)-Total (mg/L)	1.10	1.32	0.85	0.72	<0.50

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1653048-6				
	Description	Surface Water				
	Sampled Date	27-JUL-15				
	Sampled Time	16:20				
	Client ID	INUG-71-S				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5.87				
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050				
	Total Kjeldahl Nitrogen (mg/L)	0.093				
	Phosphorus (P)-Total (mg/L)	0.0058				
Cyanides	Cyanide, Total (mg/L)	<0.0010				
	Cyanide, Free (mg/L)	<0.0010				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.94				
	Total Organic Carbon (mg/L)	2.00				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0099				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	0.00192				
	Beryllium (Be)-Total (mg/L)	<0.000020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.0000050				
	Calcium (Ca)-Total (mg/L)	1.13				
	Chromium (Cr)-Total (mg/L)	<0.00010				
	Cobalt (Co)-Total (mg/L)	<0.00010				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	0.019				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.0010				
	Magnesium (Mg)-Total (mg/L)	0.69				
	Manganese (Mn)-Total (mg/L)	0.00495				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	0.40				
	Selenium (Se)-Total (mg/L)	<0.000050				
	Silicon (Si)-Total (mg/L)	0.149				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	0.540				
	Strontium (Sr)-Total (mg/L)	0.00610				
	Sulfur (S)-Total (mg/L)	<0.50				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1653048-1 Surface Water 27-JUL-15 12:36 TE-82-S	L1653048-2 Surface Water 27-JUL-15 12:13 TE-83-S	L1653048-3 Surface Water 27-JUL-15 11:25 TEFF-38-S	L1653048-4 Surface Water 27-JUL-15 10:43 TEFF-37-S	L1653048-5 Surface Water 27-JUL-15 15:56 INUG-70-S
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00039	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000074	0.000064	0.000049	0.000041	0.000054
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0041	0.0033	0.0029	0.0034	0.0040
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00019	0.00022	0.00012	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00239	0.00252	0.00230	0.00210	0.00187
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	2.96	3.37	1.97	1.55	1.15
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00048	0.00055	0.00035	0.00027	0.00032
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	0.98	1.09	0.73	0.63	0.70
	Manganese (Mn)-Dissolved (mg/L)	0.00132	0.00095	0.00210	0.00165	0.00310
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000088	0.000100	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.47	0.49	0.43	0.41	0.40
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.215	0.220	0.175	0.138	0.141
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.679	0.715	0.601	0.563	0.527
	Strontium (Sr)-Dissolved (mg/L)	0.0130	0.0147	0.00916	0.00761	0.00603
	Sulfur (S)-Dissolved (mg/L)	1.13	1.25	0.84	0.70	<0.50

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1653048-6				
	Description	Surface Water				
	Sampled Date	27-JUL-15				
	Sampled Time	16:20				
	Client ID	INUG-71-S				
Grouping	**Analyte**					
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.00030				
	Uranium (U)-Total (mg/L)	0.000048				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	<0.00030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0052				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	0.00195				
	Beryllium (Be)-Dissolved (mg/L)	<0.000020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050				
	Calcium (Ca)-Dissolved (mg/L)	1.17				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	0.00030				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	0.71				
	Manganese (Mn)-Dissolved (mg/L)	0.00331				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	0.41				
	Selenium (Se)-Dissolved (mg/L)	<0.000050				
	Silicon (Si)-Dissolved (mg/L)	0.137				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	0.538				
	Strontium (Sr)-Dissolved (mg/L)	0.00606				
	Sulfur (S)-Dissolved (mg/L)	<0.50				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1653048-1	L1653048-2	L1653048-3	L1653048-4	L1653048-5
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	27-JUL-15	27-JUL-15	27-JUL-15	27-JUL-15	27-JUL-15
	Sampled Time	12:36	12:13	11:25	10:43	15:56
	Client ID	TE-82-S	TE-83-S	TEFF-38-S	TEFF-37-S	INUG-70-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000060	0.000058	0.000044	0.000035	0.000041
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1653048-6				
	Description	Surface Water				
	Sampled Date	27-JUL-15				
	Sampled Time	16:20				
	Client ID	INUG-71-S				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.00030				
	Uranium (U)-Dissolved (mg/L)	0.000043				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Beryllium (Be)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Chromium (Cr)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Copper (Cu)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Nickel (Ni)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Silver (Ag)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Tin (Sn)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Titanium (Ti)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Antimony (Sb)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Chromium (Cr)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Cobalt (Co)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Copper (Cu)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Lead (Pb)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Nickel (Ni)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Selenium (Se)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Silver (Ag)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Thallium (Tl)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Tin (Sn)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Titanium (Ti)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Vanadium (V)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Zinc (Zn)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Beryllium (Be)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Chromium (Cr)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Cobalt (Co)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Nickel (Ni)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Titanium (Ti)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Boron (B)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1653048-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Reference Information

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Reference Information

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group			☐ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz			☐ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway			Email 1:	efranz@azimuthgroup.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8			Email 2:	gmann@azimuthgroup.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220	Fax:		Email 3:	ryan.vanengen@agnicoeagle.com			
Invoice To	Same as Report ?	☑ Yes	☐ No	Client / Project Information				Analysis Request
Hardcopy of Invoice with Report?		☐ Yes	☑ No	Job #:	CREMP Meadowbank Surfacewater			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:	Q39503			
Lab Work Order # (lab use only)				ALS Contact:		Sampler:		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals	Number of Containers
					P	F/P	P	P	F/P	P	F/P	
	TE-82-S	27-Jul-15	12:36	Surface Water	X	X	X	X	X	X	X	7
	TE-83-S	27-Jul-15	12:13	Surface Water	X	X	X	X	X	X	X	7
	TEFF-38-S	27-Jul-15	11:25	Surface Water	X	X	X	X	X	X	X	7
	TEFF-37-S	27-Jul-15	10:43	Surface Water	X	X	X	X	X	X	X	7
	INUG-70-S	27-Jul-15	15:56	Surface Water	X	X	X	X	X	X	X	7
	INUG-71-S	27-Jul-15	16:20	Surface Water	X	X	X	X	X	X	X	7

Short Holding Time
Rush Processing

L1653048-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			Shotte	Aug5	1130	18 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 06-AUG-15
Report Date: 14-AUG-15 13:44 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1654049

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers: 1
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1654049-1 Surface Water 24-JUL-15 10:30 TPN-82-S	L1654049-2 Surface Water 24-JUL-15 10:00 TPN-83-S	L1654049-3 Surface Water 24-JUL-15 09:00 TPS-49-S	L1654049-4 Surface Water 24-JUL-15 08:30 TPS-50-S	L1654049-5 Surface Water 23-JUL-15 17:00 CREMP JUL-EB-1
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	8.83	9.00	8.40	9.10	<0.50
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0114	0.0103	0.0122	0.0119	<0.0050
	Total Kjeldahl Nitrogen (mg/L)	0.089	0.103	0.079	0.075	<0.050
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.30	1.31	1.30	1.27	<0.50
	Total Organic Carbon (mg/L)	1.44	1.28	1.29	1.30	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0076	0.0058	0.0086	0.0051	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00022	0.00023	0.00023	0.00020	<0.00010
	Barium (Ba)-Total (mg/L)	0.00322	0.00311	0.00316	0.00317	0.000153
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	2.18	2.17	2.06	2.14	<0.050
	Chromium (Cr)-Total (mg/L)	0.00012	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00074
	Iron (Fe)-Total (mg/L)	0.011	<0.010	0.029	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000059
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	0.86	0.84	0.82	0.86	<0.10
	Manganese (Mn)-Total (mg/L)	0.00179	0.00167	0.00203	0.00172	<0.00010
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000182	0.000182	0.000191	0.000177	<0.000050
	Nickel (Ni)-Total (mg/L)	0.00054	0.00053	0.00053	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.48	0.49	0.53	0.51	<0.10
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.073	0.066	0.078	0.080	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.17	1.20	1.15	1.14	<0.050
	Strontium (Sr)-Total (mg/L)	0.0103	0.0102	0.0100	0.00997	<0.00020
	Sulfur (S)-Total (mg/L)	1.70	1.70	1.64	1.70	<0.50

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1654049-6				
	Description	Surface Water				
	Sampled Date	23-JUL-15				
	Sampled Time	17:00				
	Client ID	CREMP JUL-DI-1				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050				
	Total Kjeldahl Nitrogen (mg/L)	<0.050				
	Phosphorus (P)-Total (mg/L)	<0.0020				
Cyanides	Cyanide, Total (mg/L)	<0.0010				
	Cyanide, Free (mg/L)	<0.0010				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50				
	Total Organic Carbon (mg/L)	<0.50				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	<0.000050				
	Beryllium (Be)-Total (mg/L)	<0.000020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.0000050				
	Calcium (Ca)-Total (mg/L)	<0.050				
	Chromium (Cr)-Total (mg/L)	<0.00010				
	Cobalt (Co)-Total (mg/L)	<0.00010				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.0010				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.00010				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	<0.10				
	Selenium (Se)-Total (mg/L)	<0.000050				
	Silicon (Si)-Total (mg/L)	<0.050				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	<0.050				
	Strontium (Sr)-Total (mg/L)	<0.00020				
	Sulfur (S)-Total (mg/L)	<0.50				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1654049-1 Surface Water 24-JUL-15 10:30 TPN-82-S	L1654049-2 Surface Water 24-JUL-15 10:00 TPN-83-S	L1654049-3 Surface Water 24-JUL-15 09:00 TPS-49-S	L1654049-4 Surface Water 24-JUL-15 08:30 TPS-50-S	L1654049-5 Surface Water 23-JUL-15 17:00 CREMP JUL-EB-1
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000044	0.000042	0.000047	0.000044	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	LAB	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0021	0.0023	0.0029	0.0026	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00017	0.00018	0.00016	0.00016	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00309	0.00307	0.00312	0.00309	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	2.15	2.18	2.02	2.23	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00050	0.00038	0.00052	0.00043	<0.00020
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	0.84	0.86	0.81	0.86	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.00145	0.00142	0.00149	0.00144	<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000185	0.000173	0.000165	0.000168	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.00061	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.46	0.50	0.47	0.48	<0.10
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.063	0.062	0.075	0.075	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.19	1.18	1.12	1.15	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.00993	0.00992	0.00979	0.00977	<0.00020
	Sulfur (S)-Dissolved (mg/L)	1.69	1.71	1.62	1.68	<0.50

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1654049-6				
	Description	Surface Water				
	Sampled Date	23-JUL-15				
	Sampled Time	17:00				
	Client ID	CREMP JUL-DI-1				
Grouping	**Analyte**					
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.00030				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	<0.00030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0010				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	<0.000050				
	Beryllium (Be)-Dissolved (mg/L)	<0.000020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050				
	Calcium (Ca)-Dissolved (mg/L)	<0.050				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	<0.00010				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	<0.10				
	Selenium (Se)-Dissolved (mg/L)	<0.000050				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	<0.050				
	Strontium (Sr)-Dissolved (mg/L)	<0.00020				
	Sulfur (S)-Dissolved (mg/L)	<0.50				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1654049-1	L1654049-2	L1654049-3	L1654049-4	L1654049-5
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	24-JUL-15	24-JUL-15	24-JUL-15	24-JUL-15	23-JUL-15
	Sampled Time	10:30	10:00	09:00	08:30	17:00
	Client ID	TPN-82-S	TPN-83-S	TPS-49-S	TPS-50-S	CREMP JUL-EB-1
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000033	0.000039	0.000041	0.000039	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1654049-6				
	Description	Surface Water				
	Sampled Date	23-JUL-15				
	Sampled Time	17:00				
	Client ID	CREMP JUL-DI-1				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.00030				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1654049-1
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1654049-1
Duplicate	Chromium (Cr)-Dissolved	DLA	L1654049-1
Duplicate	Cobalt (Co)-Dissolved	DLA	L1654049-1
Duplicate	Lead (Pb)-Dissolved	DLA	L1654049-1
Duplicate	Lithium (Li)-Dissolved	DLA	L1654049-1
Duplicate	Nickel (Ni)-Dissolved	DLA	L1654049-1
Duplicate	Silver (Ag)-Dissolved	DLA	L1654049-1
Duplicate	Thallium (Tl)-Dissolved	DLA	L1654049-1
Duplicate	Tin (Sn)-Dissolved	DLA	L1654049-1
Duplicate	Titanium (Ti)-Dissolved	DLA	L1654049-1
Duplicate	Zinc (Zn)-Dissolved	DLA	L1654049-1
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1654049-1
Duplicate	Beryllium (Be)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Chromium (Cr)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Copper (Cu)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Nickel (Ni)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Silver (Ag)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Tin (Sn)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Titanium (Ti)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Antimony (Sb)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Chromium (Cr)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Cobalt (Co)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Copper (Cu)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Lead (Pb)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Nickel (Ni)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Selenium (Se)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Silver (Ag)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Thallium (Tl)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Tin (Sn)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Titanium (Ti)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Vanadium (V)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Zinc (Zn)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Beryllium (Be)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Chromium (Cr)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Cobalt (Co)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Nickel (Ni)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Titanium (Ti)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1654049-2, -3, -4, -5, -6
Duplicate	Cobalt (Co)-Total	DLA	L1654049-2, -3, -4, -5
Duplicate	Thallium (Tl)-Total	DLA	L1654049-2, -3, -4, -5
Duplicate	Vanadium (V)-Total	DLA	L1654049-2, -3, -4, -5
Duplicate	Zirconium (Zr)-Total	DLA	L1654049-2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Phosphorus (P)-Total	MS-B	L1654049-1, -2, -3, -4, -5, -6
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Total	MS-B	L1654049-1, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L1654049-1, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Boron (B)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1654049-2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Reference Information

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA Water Total organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-L-CFA-VA Water Low Level Free Cyanide in water by CFA ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA Water Low Level Total Cyanide in water by CFA ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or

Reference Information

microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

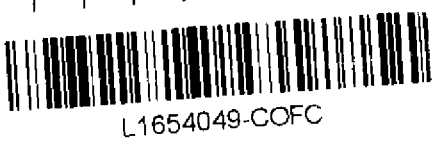
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COC # _____

Page ___ of ___

Report To		**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
[redacted] Lab Work Order # (lab use only)	L1654049	**ALS Contact:**	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals						Number of Containers
					P	F/P	P	P	F/P	P	F/P						
[redacted]	TPN-82-S	24-Jul-15	10:30	Surface Water	X	X	X	X	X	X	X						7
[redacted]	TPN-83-S	24-Jul-15	10:00	Surface Water	X	X	X	X	X	X	X						7
[redacted]	TPS-49-S	24-Jul-15	9:00	Surface Water	X	X	X	X	X	X	X						7
[redacted]	TPS-50-S	24-Jul-15	8:30	Surface Water	X	X	X	X	X	X	X						7
[redacted]	CREMP JUL-EB-1	23-Jul-15	17:00	Surface Water	X	X	X	X	X	X	X						7
[redacted]	CREMP JUL-DI-1	23-Jul-15	17:00	Surface Water	X	X	X	X	X	X	X						7
[redacted]																	
[redacted]																	
[redacted]																	
[redacted]																	
[redacted]																	
[redacted]																	



Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details [redacted]

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
						19 °C		Aug 6/15	12:00	

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 26-AUG-15
Report Date: 01-SEP-15 13:07 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1663391

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers: 1, 2
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1663391-1	L1663391-2	L1663391-3	L1663391-4	L1663391-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	13-AUG-15	13-AUG-15		15-AUG-15	15-AUG-15
Sampled Time	18:40	19:50		17:30	18:00
Client ID	SP-84-S	SP-85-S	CREMP AUG TRAV-1	BPJ-39-S	BPJ-40-S
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	34.5	34.4	<2.0	101	136
pH (pH)	7.21	7.20	5.95	7.02	7.02
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	1.0	<1.0
Total Dissolved Solids (mg/L)	19.7	24.1	<3.0	59	77
Turbidity (NTU)	0.26	0.27	<0.10	0.30	0.33
Anions and Nutrients					
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	10.8	11.0	<1.0	8.7	8.8
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	10.8	11.0	<1.0	8.7	8.8
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	0.085	0.116
Chloride (Cl) (mg/L)	0.77	0.77	<0.10	21.7	31.6
Fluoride (F) (mg/L)	0.062	0.063	<0.020	0.052	0.052
Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0128	0.0153
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P) (mg/L)	0.0010	0.0012	<0.0010	<0.0010	0.0011
Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	0.0038	0.0025
Silicate (as SiO2) (mg/L)	0.55	0.56	<0.50	<0.50	<0.50
Sulfate (SO4) (mg/L)	4.06	4.08	<0.30	3.60	5.06

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1663391-6	L1663391-7	L1663391-8	L1663391-9	L1663391-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	15-AUG-15	15-AUG-15	15-AUG-15	15-AUG-15	18-AUG-15
Sampled Time	15:20	16:00	18:30	19:05	18:00
Client ID	BAP-39-S	BAP-40-S	BBD-39-S	BBD-40-S	CREMP AUG DI-1
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	119	138	175	205	<2.0
pH (pH)	6.99	7.02	6.98	6.96	5.50
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (mg/L)	68	82	93	108	<3.0
Turbidity (NTU)	0.32	0.31	0.28	0.32	<0.10
Anions and Nutrients					
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	8.6	8.4	8.7	8.5	<1.0
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	8.6	8.4	8.7	8.5	<1.0
Bromide (Br) (mg/L)	0.099	0.117	0.155	0.181	<0.050
Chloride (Cl) (mg/L)	26.9	32.0	42.3	50.4	<0.10
Fluoride (F) (mg/L)	0.051	0.054	0.055	0.056	<0.020
Nitrate (as N) (mg/L)	0.0119	0.0108	0.0168	0.0176	<0.0050
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P) (mg/L)	0.0011	<0.0010	0.0010	0.0011	<0.0010
Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	0.0020	<0.0020	0.0025	<0.0020
Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Sulfate (SO4) (mg/L)	4.37	5.12	6.59	7.76	<0.30

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1663391-11	L1663391-12	L1663391-13	L1663391-14	
Description	Surface Water	Surface Water	Surface Water	Surface Water	
Sampled Date		18-AUG-15	14-AUG-15	14-AUG-15	
Sampled Time		17:45	14:20	15:20	
Client ID	CREMP AUG DUP-1	CREMP AUG EB-1	TPS-51-S	TPS-52-S	
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	136	<2.0	27.5	27.7	
pH (pH)	6.95	5.32	6.93	7.09	
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	
Total Dissolved Solids (mg/L)	75	<3.0	13.7	19.2	
Turbidity (NTU)	0.28	<0.10	0.20	0.22	
Anions and Nutrients					
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	8.4	<1.0	6.4	6.8	
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
Alkalinity, Total (as CaCO3) (mg/L)	8.4	<1.0	6.4	6.8	
Bromide (Br) (mg/L)	0.116	<0.050	<0.050	<0.050	
Chloride (Cl) (mg/L)	32.1	<0.10	0.75	0.74	
Fluoride (F) (mg/L)	0.054	<0.020	0.062	0.062	
Nitrate (as N) (mg/L)	0.0103	<0.0050	0.0616	0.0612	
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Orthophosphate-Dissolved (as P) (mg/L)	0.0012	<0.0010	0.0010	0.0010	
Phosphorus (P)-Total Dissolved (mg/L)	0.0021	<0.0020	<0.0020	<0.0020	
Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	
Sulfate (SO4) (mg/L)	5.14	<0.30	4.87	4.85	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Conductivity	B	L1663391-1, -13, -14, -2
Method Blank	Alkalinity, Total (as CaCO3)	B	L1663391-11, -3, -4, -5, -6, -7
Duplicate	Bromide (Br)	DLM	L1663391-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicate (as SiO2)	MS-B	L1663391-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field.			
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.
This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.			
SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)	L1663391	**ALS Contact:** Brent Mack **Sampler:** Eric Franz	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	SP-84-S	13-Aug-15	18:40	Surface Water	X	X	2
	SP-85-S	13-Aug-15	19:50	Surface Water	X	X	2
	CREMP AUG TRAV-1	-	-	Surface Water	X	X	1
	BPJ-39-S	15-Aug-15	17:30	Surface Water	X	X	2
	BPJ-40-S	15-Aug-15	18:00	Surface Water	X	X	2
	BAP-39-S	15-Aug-15	15:20	Surface Water	X	X	2
	BAP-40-S	15-Aug-15	16:00	Surface Water	X	X	2
	BBD-39-S	15-Aug-15	18:30	Surface Water	X	X	2
	BBD-40-S	15-Aug-15	19:05	Surface Water	X	X	2
	CREMP AUG DI-1	18-Aug-15	18:00	Surface Water	X	X	2
	CREMP AUG DUP-1	-	-	Surface Water	X	X	2
	CREMP AUG EB-1	18-Aug-15	17:45	Surface Water	X	X	2

Short Holding Time
Rush Processing

L1663391-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	19-Aug-15	8:05	Shatel	Aug 26	1100	18/16 °C				

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)	L1663391	ALS Contact: Brent Mack	Sampler: Eric Franz

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	TPS-51-S	14-Aug-15	14:20	Surface Water	X	X	2
	TPS-52-S	14-Aug-15	15:20	Surface Water	X	X	2



Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

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Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	19-Aug-15	8:05	Shafell	Aug 26	1160	18/16 °C				

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 31-AUG-15
Report Date: 03-SEP-15 18:44 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1665565

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1665565-1	L1665565-2			
	Description	SURFACE WATE	SURFACE WATE			
	Sampled Date	19-AUG-15	19-AUG-15			
	Sampled Time	17:05	17:45			
	Client ID	WAL-53-S	WAL-54-S			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	39.6	37.9			
	pH (pH)	7.25	7.26			
	Total Suspended Solids (mg/L)	<1.0	<1.0			
	Total Dissolved Solids (mg/L)	26.6	25.8			
	Turbidity (NTU)	0.32	0.29			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	12.3	11.9			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	12.3	11.9			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.81	0.75			
	Fluoride (F) (mg/L)	0.046	0.043			
	Nitrate (as N) (mg/L)	0.0668	0.0333			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total Dissolved (mg/L)	0.0025	<0.0020			
	Silicate (as SiO2) (mg/L)	0.64	0.68			
	Sulfate (SO4) (mg/L)	4.39	4.02			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field.			
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.
This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.			
SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.			
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"
This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.			
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity
This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Reference Information

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact: Brent Mack	Sampler: Eric Franz

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	WAL-53-S	19-Aug-15	17:05	Surface Water	X	X	2
	WAL-54-S	19-Aug-15	17:45	Surface Water	X	X	2

Analysis Request

Please Indicate below Filtered, Preserved or both (F, P, F/P)

L1665565-COFC

Short Holding Time

● *Rush Processing*

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals Includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

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Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	19-Aug-15	8:05	Jean	31/Aug	11:50	17.4, 16.5 °C				

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 02-SEP-15
Report Date: 15-SEP-15 11:43 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1667186

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1667186-1	L1667186-2	L1667186-3	L1667186-4	L1667186-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	13-AUG-15	13-AUG-15	14-AUG-15	14-AUG-15	15-AUG-15
Sampled Time	18:40	19:50	14:20	15:20	15:20
Client ID	SP-84-S	SP-85-S	TPS-51-S	TPS-52-S	BAP-39-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	13.7	13.6	8.97	9.00	16.3
Anions and Nutrients Ammonia, Total (as N) (mg/L)	0.0057	<0.0050	0.0055	<0.0050	0.0145
Total Kjeldahl Nitrogen (mg/L)	0.178	0.120	0.130	0.094	0.163
Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.67	1.71	1.37	1.30	2.97
Total Organic Carbon (mg/L)	1.82	1.69	1.51	1.44	3.10
Total Metals Aluminum (Al)-Total (mg/L)	0.0102	0.0076	0.0063	0.0065	0.0115
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00029	0.00029	0.00018	0.00018	0.00013
Barium (Ba)-Total (mg/L)	0.00257	0.00265	0.00298	0.00293	0.0181
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	0.011
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	3.59	3.50	2.19	2.11	2.91
Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00075	0.00070	<0.00050	<0.00050	<0.00050
Iron (Fe)-Total (mg/L)	0.022	0.018	<0.010	<0.010	0.018
Lead (Pb)-Total (mg/L)	0.000081	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	1.13	1.10	0.86	0.84	2.61
Manganese (Mn)-Total (mg/L)	0.00132	0.00135	0.00150	0.00153	0.00408
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000149	0.000138	0.000169	0.000162	0.000052
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	0.55	0.54	0.49	0.53	0.94
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total (mg/L)	0.222	0.206	0.064	0.068	0.152
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.773	0.770	1.12	1.12	14.3
Strontium (Sr)-Total (mg/L)	0.0163	0.0158	0.00983	0.00984	0.0262
Sulfur (S)-Total (mg/L)	1.52	1.46	1.90	1.70	1.56

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1667186-6	L1667186-7	L1667186-8	L1667186-9	L1667186-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	15-AUG-15	15-AUG-15	15-AUG-15	15-AUG-15	15-AUG-15
Sampled Time	16:00	18:30	19:05	17:30	18:00
Client ID	BAP-40-S	BBD-39-S	BBD-40-S	BPJ-39-S	BPJ-40-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	19.4	23.3	26.2	16.6	20.7
Anions and Nutrients Ammonia, Total (as N) (mg/L)	0.0069	0.0230	0.0095	<0.0050	0.0053
Total Kjeldahl Nitrogen (mg/L)	0.144	0.168	0.160	0.167	0.202
Phosphorus (P)-Total (mg/L)	<0.0020	0.0033	0.0022	0.0031	0.0020
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	2.99	2.93	2.97	3.07	3.07
Total Organic Carbon (mg/L)	3.07	3.06	3.03	3.06	2.99
Total Metals Aluminum (Al)-Total (mg/L)	0.0125	0.0159	0.0142	0.0111	0.0126
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00012	0.00013	0.00013	0.00014	0.00013
Barium (Ba)-Total (mg/L)	0.0177	0.0181	0.0177	0.0181	0.0182
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	0.012	0.014	0.016	0.010	0.012
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	3.05	3.25	3.31	2.82	3.08
Chromium (Cr)-Total (mg/L)	0.00024	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)-Total (mg/L)	0.041	0.027	0.022	0.020	0.025
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0011	0.0012	0.0013	0.0014	0.0015
Magnesium (Mg)-Total (mg/L)	2.97	3.63	4.05	2.43	3.10
Manganese (Mn)-Total (mg/L)	0.00380	0.00609	0.00566	0.00476	0.00428
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000069	0.000061	0.000077	0.000058	0.000068
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	1.05	1.27	1.38	0.87	1.10
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total (mg/L)	0.143	0.170	0.159	0.145	0.164
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	17.1	22.2	26.5	12.8	18.3
Strontium (Sr)-Total (mg/L)	0.0276	0.0320	0.0349	0.0252	0.0289
Sulfur (S)-Total (mg/L)	1.92	2.33	2.62	1.37	1.88

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667186-11 Surface Water 19-AUG-15 17:05 WAL-53-S	L1667186-12 Surface Water 19-AUG-15 17:45 WAL-54-S	L1667186-13 Surface Water 18-AUG-15 16:00 CREMP AUG EB-1	L1667186-14 Surface Water 18-AUG-15 16:00 CRAMP AUG DI-1	L1667186-15 Surface Water 18-AUG-15 16:00 CREMP DUP-1
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	17.0	16.5	<0.50	<0.50	19.5
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0141	0.0064	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (mg/L)	0.143	0.147	<0.050	<0.050	0.145
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.88	1.98	<0.50	<0.50	2.84
	Total Organic Carbon (mg/L)	1.88	2.53	<0.50	<0.50	2.72
Total Metals	Aluminum (Al)-Total (mg/L)	0.0077	0.0383	0.0041 RRV	<0.0030	0.0140
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00033	0.00051	<0.00010	<0.00010	0.00013
	Barium (Ba)-Total (mg/L)	0.00241	0.00266	0.000396 RRV	<0.000050	0.0175
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	0.012
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	4.49	4.49	<0.050	<0.050	3.01
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00015	<0.00010	0.00023 RRV	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00091	0.00111	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.018	0.120	<0.010	<0.010	0.019
	Lead (Pb)-Total (mg/L)	<0.000050	0.000090	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	1.27	1.28	<0.10	<0.10	2.88
	Manganese (Mn)-Total (mg/L)	0.00161	0.00750	<0.00010	<0.00010	0.00375
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000384	0.000294	<0.000050	<0.000050	0.000061
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.50	0.49	<0.10	<0.10	1.01
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.292	0.363	<0.050	<0.050	0.143
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.595	0.576	<0.050	<0.050	16.0
	Strontium (Sr)-Total (mg/L)	0.0219	0.0217	<0.00020	<0.00020	0.0275
	Sulfur (S)-Total (mg/L)	1.54	1.48	<0.50	<0.50	1.77

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1667186-16				
	Description	Surface Water				
	Sampled Date	18-AUG-15				
	Sampled Time	16:00				
	Client ID	CREMP AUG TRAV-1				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050				
	Total Kjeldahl Nitrogen (mg/L)	<0.050				
	Phosphorus (P)-Total (mg/L)	<0.0020				
Cyanides	Cyanide, Total (mg/L)	<0.0010				
	Cyanide, Free (mg/L)	<0.0010				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)					
	Total Organic Carbon (mg/L)	<0.50				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	<0.000050				
	Beryllium (Be)-Total (mg/L)	<0.000020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.0000050				
	Calcium (Ca)-Total (mg/L)	<0.050				
	Chromium (Cr)-Total (mg/L)	<0.00010				
	Cobalt (Co)-Total (mg/L)	<0.00010				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.0010				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.00010				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	<0.10				
	Selenium (Se)-Total (mg/L)	<0.000050				
	Silicon (Si)-Total (mg/L)	<0.050				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	<0.050				
	Strontium (Sr)-Total (mg/L)	<0.00020				
	Sulfur (S)-Total (mg/L)	<0.50				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667186-1 Surface Water 13-AUG-15 18:40 SP-84-S	L1667186-2 Surface Water 13-AUG-15 19:50 SP-85-S	L1667186-3 Surface Water 14-AUG-15 14:20 TPS-51-S	L1667186-4 Surface Water 14-AUG-15 15:20 TPS-52-S	L1667186-5 Surface Water 15-AUG-15 15:20 BAP-39-S
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000049	0.000047	0.000040	0.000040	0.000039
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0033	0.0035	0.0025	0.0027	0.0040
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00027	0.00025	0.00017	0.00017	0.00011
	Barium (Ba)-Dissolved (mg/L)	0.00251	0.00256	0.00303	0.00296	0.0177
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	3.62	3.59	2.18	2.18	2.63
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00061	0.00059	0.00038	0.00033	0.00027
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
	Magnesium (Mg)-Dissolved (mg/L)	1.13	1.12	0.86	0.87	2.36
	Manganese (Mn)-Dissolved (mg/L)	0.00071	0.00068	0.00106	0.00106	0.00022
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000130	0.000122	0.000152	0.000158	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.54	0.53	0.53	0.51	0.85
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.208	0.194	0.058	0.062	0.119
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.755	0.755	1.11	1.11	13.9
	Strontium (Sr)-Dissolved (mg/L)	0.0157	0.0157	0.00954	0.00966	0.0256
	Sulfur (S)-Dissolved (mg/L)	1.42	1.43	1.64	1.69	1.33

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1667186-6	L1667186-7	L1667186-8	L1667186-9	L1667186-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	15-AUG-15	15-AUG-15	15-AUG-15	15-AUG-15	15-AUG-15
Sampled Time	16:00	18:30	19:05	17:30	18:00
Client ID	BAP-40-S	BBD-39-S	BBD-40-S	BPJ-39-S	BPJ-40-S
Grouping / **Analyte**					
WATER					
Total Metals Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Total (mg/L)	0.000041	0.000042	0.000045	0.000039	0.000041
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0059	0.0053	0.0058	0.0045	0.0045
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.00011	0.00012	0.00010	0.00011	0.00012
Barium (Ba)-Dissolved (mg/L)	0.0174	0.0177	0.0179	0.0181	0.0178
Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.010	0.012	0.014	<0.010	0.010
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Dissolved (mg/L)	3.02	3.27	3.49	2.84	3.14
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00028	0.00029	0.00029	0.00025	0.00025
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000051	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0012	0.0014	0.0013	0.0013	0.0014
Magnesium (Mg)-Dissolved (mg/L)	2.89	3.67	4.25	2.31	3.13
Manganese (Mn)-Dissolved (mg/L)	0.00049	0.00259	0.00251	0.00106	0.00094
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000053	0.000059	0.000063	<0.000050	0.000057
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	1.00	1.29	1.44	0.84	1.10
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	0.122	0.144	0.144	0.139	0.131
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	16.0	23.0	26.6	11.1	17.4
Strontium (Sr)-Dissolved (mg/L)	0.0271	0.0316	0.0345	0.0240	0.0284
Sulfur (S)-Dissolved (mg/L)	1.80	2.27	2.68	1.22	1.83

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667186-11 Surface Water 19-AUG-15 17:05 WAL-53-S	L1667186-12 Surface Water 19-AUG-15 17:45 WAL-54-S	L1667186-13 Surface Water 18-AUG-15 16:00 CREMP AUG EB-1	L1667186-14 Surface Water 18-AUG-15 16:00 CRAMP AUG DI-1	L1667186-15 Surface Water 18-AUG-15 16:00 CREMP DUP-1
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	0.00112	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000086	0.000086	<0.000010	<0.000010	0.000038
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0050	0.0056	0.0016 RRV	<0.0010	0.0036
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00032	0.00031	<0.00010	<0.00010	0.00011
	Barium (Ba)-Dissolved (mg/L)	0.00248	0.00219	0.000246 RRV	<0.000050	0.0173
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	4.66	4.52	<0.050	<0.050	3.03
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00085	0.00083	<0.00020	<0.00020	0.00026
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.00169 RRV	<0.000050	0.000085 DTC
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	1.31	1.27	<0.10	<0.10	2.90
	Manganese (Mn)-Dissolved (mg/L)	0.00031	0.00062	0.00015 RRV	<0.00010	0.00046
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000360	0.000253	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.52	0.49	<0.10	<0.10	1.01
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.282	0.311	<0.050	<0.050	0.124
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.595	0.568	<0.050	<0.050	15.9
	Strontium (Sr)-Dissolved (mg/L)	0.0219	0.0208	<0.00020	<0.00020	0.0269
	Sulfur (S)-Dissolved (mg/L)	1.53	1.37	<0.50	<0.50	1.68

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1667186-16				
	Description	Surface Water				
	Sampled Date	18-AUG-15				
	Sampled Time	16:00				
	Client ID	CREMP AUG TRAV-1				
Grouping	**Analyte**					
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.00030				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	<0.00030				
Dissolved Metals	Dissolved Mercury Filtration Location					
	Dissolved Metals Filtration Location					
	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					
	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Sulfur (S)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667186-1 Surface Water 13-AUG-15 18:40 SP-84-S	L1667186-2 Surface Water 13-AUG-15 19:50 SP-85-S	L1667186-3 Surface Water 14-AUG-15 14:20 TPS-51-S	L1667186-4 Surface Water 14-AUG-15 15:20 TPS-52-S	L1667186-5 Surface Water 15-AUG-15 15:20 BAP-39-S
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000043	0.000043	0.000034	0.000034	0.000031
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1667186-6	L1667186-7	L1667186-8	L1667186-9	L1667186-10
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	15-AUG-15	15-AUG-15	15-AUG-15	15-AUG-15	15-AUG-15
	Sampled Time	16:00	18:30	19:05	17:30	18:00
	Client ID	BAP-40-S	BBD-39-S	BBD-40-S	BPJ-39-S	BPJ-40-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000034	0.000034	0.000037	0.000032	0.000034
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667186-11 Surface Water 19-AUG-15 17:05 WAL-53-S	L1667186-12 Surface Water 19-AUG-15 17:45 WAL-54-S	L1667186-13 Surface Water 18-AUG-15 16:00 CREMP AUG EB-1	L1667186-14 Surface Water 18-AUG-15 16:00 CRAMP AUG DI-1	L1667186-15 Surface Water 18-AUG-15 16:00 CREMP DUP-1
Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**						
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000073	0.000058	<0.000010	<0.000010	0.000034
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1667186-16				
	Description	Surface Water				
	Sampled Date	18-AUG-15				
	Sampled Time	16:00				
	Client ID	CREMP AUG TRAV-1				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					
	Zirconium (Zr)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1667186-1, -2, -4, -5, -6, -9
Matrix Spike	Total Organic Carbon	MS-B	L1667186-1, -2, -4, -5, -6, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1667186-1, -2, -3, -4, -5, -6, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1667186-1, -2, -3, -4, -5, -6, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1667186-1, -2, -3, -4, -5, -6, -9
Matrix Spike	Total Organic Carbon	MS-B	L1667186-3
Matrix Spike	Dissolved Organic Carbon	MS-B	L1667186-10, -7, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Aluminum (Al)-Dissolved	RRV	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Barium (Ba)-Dissolved	RRV	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	RRV	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Manganese (Mn)-Dissolved	RRV	L1667186-1, -10, -11, -12, -13, -14, -15, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Reference Information

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA Water Total Be (Low) in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA Water Total organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-L-CFA-VA Water Low Level Free Cyanide in water by CFA ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA Water Low Level Total Cyanide in water by CFA ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society

Reference Information

of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of ___

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact: Brent Mack	Sampler: Eric Franz

Sample #	Sample Identification (This description will appear on the rep	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals	Number of Containers
					P	F/P	P	P	F/P	P	F/P	
1	SP-84-S	13-Aug-15	18:40	Surface Water	X	X	X	X	X	X	X	7
2	SP-85-S	13-Aug-15	19:50	Surface Water	X	X	X	X	X	X	X	7
3	TPS-51-S	14-Aug-15	14:20	Surface Water	X	X	X	X	X	X	X	7
4	TPS-52-S	14-Aug-15	15:20	Surface Water	X	X	X	X	X	X	X	7
5	BAP-39-S	15-Aug-15	15:20	Surface Water	X	X	X	X	X	X	X	7
6	BAP-40-S	15-Aug-15	16:00	Surface Water	X	X	X	X	X	X	X	7
7	BBD-39-S	15-Aug-15	18:30	Surface Water	X	X	X	X	X	X	X	7
8	BBD-40-S	15-Aug-15	19:05	Surface Water	X	X	X	X	X	X	X	7
9	BPJ-39-S	15-Aug-15	17:30	Surface Water	X	X	X	X	X	X	X	7
10	BPJ-40-S	15-Aug-15	18:00	Surface Water	X	X	X	X	X	X	X	7
11	WAL-53-S	19-Aug-15	17:05	Surface Water	X	X	X	X	X	X	X	7
12	WAL-54-S	19-Aug-15	17:45	Surface Water	X	X	X	X	X	X	X	7

L1667186-COFC

Short Holding Time

Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	26-Aug-15	08-00	Jody	Sept-2	11AM	15·2 °C 17·3 16·2/15·0				

GENF 20.00 Front

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page 2 of ___

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact: Brent Mack	Sampler: Eric Franz

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals						Number of Containers
					P	F/P	P	P	F/P	P	F/P						
13	CREMP AUG EB-1	18-Aug-15	16:00	Surface Water	X	X	X	X	X	X	X						7
14	CREMP AUG DI-1	18-Aug-15	16:00	Surface Water	X	X	X	X	X	X	X						7
15	CREMP DUP-1	-	-	Surface Water	X	X	X	X	X	X	X						7
16	CREMP AUG TRAV-1	-	-	Surface Water	X	X	X	X		X							4

Short Holding Time

Rush Processing

L1667186-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

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Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			Cody	Sept. 2	11 AM	15.2 17.3 °C				

6 2/15.0

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 03-SEP-15
Report Date: 11-SEP-15 12:24 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1667837

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667837-1 Surface Water 27-AUG-15 13:45 INUG-72-S	L1667837-2 Surface Water 27-AUG-15 14:30 INUG-73-S	L1667837-3 Surface Water 26-AUG-15 15:50 PDL-39-S	L1667837-4 Surface Water 26-AUG-15 15:05 PDL-40-S	L1667837-5 Surface Water 28-AUG-15 13:34 TEFF-39-S
Sample ID		L1667837-1	L1667837-2	L1667837-3	L1667837-4	L1667837-5
Description		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date		27-AUG-15	27-AUG-15	26-AUG-15	26-AUG-15	28-AUG-15
Sampled Time		13:45	14:30	15:50	15:05	13:34
Client ID		INUG-72-S	INUG-73-S	PDL-39-S	PDL-40-S	TEFF-39-S
WATER						
Physical Tests	Conductivity (uS/cm)	16.1	15.7	21.9	22.0	17.4
	pH (pH)	6.84	6.82	7.05	7.04	6.87
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	16.1	15.2	17.3	17.4	14.4
	Turbidity (NTU)	0.29	0.28	0.22	0.19	0.21
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	4.9	4.9	7.6	6.9	4.3
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	4.9	4.9	7.6	6.9	4.3
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.77	0.76	0.62	0.62	0.59
	Fluoride (F) (mg/L)	0.059	0.058	0.036	0.035	0.055
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	0.0021	<0.0020	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	0.90	0.90	1.67	1.68	2.05

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667837-6 Surface Water 28-AUG-15 14:10 TEFF-40-S	L1667837-7 Surface Water 28-AUG-15 14:40 TE-84-S	L1667837-8 Surface Water 28-AUG-15 14:55 TE-85-S	L1667837-9 Surface Water 29-AUG-15 11:00 TPE-84-S	L1667837-10 Surface Water 29-AUG-15 14:00 TPE-85-S
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Physical Tests	Conductivity (uS/cm)	17.1	25.2	24.8	29.6	29.9
	pH (pH)	6.88	7.06	7.07	7.08	7.11
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	15.2	18.6	18.8	21.7	22.2
	Turbidity (NTU)	0.23	0.26	0.25	0.26	0.26
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	4.6	7.2	7.5	7.1	7.9
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	4.6	7.2	7.5	7.1	7.9
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.58	0.69	0.68	0.71	0.70
	Fluoride (F) (mg/L)	0.055	0.063	0.062	0.070	0.072
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0144	0.0072
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	0.0023	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	2.02	2.93	2.89	4.61	4.54

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667837-11 Surface Water 29-AUG-15 15:00 TPN-84-S	L1667837-12 Surface Water 29-AUG-15 15:48 TPN-85-S	L1667837-13 Surface Water 30-AUG-15 20:20 CRMEP AUG EB-2	L1667837-14 Surface Water 30-AUG-15 20:30 CREMP AUG DI-2	L1667837-15 Surface Water 27-AUG-15 13:45 CREMP AUG DUP-2
Sample ID		L1667837-11	L1667837-12	L1667837-13	L1667837-14	L1667837-15
Description		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date		29-AUG-15	29-AUG-15	30-AUG-15	30-AUG-15	27-AUG-15
Sampled Time		15:00	15:48	20:20	20:30	13:45
Client ID		TPN-84-S	TPN-85-S	CRMEP AUG EB-2	CREMP AUG DI-2	CREMP AUG DUP-2
WATER						
Physical Tests	Conductivity (uS/cm)	27.6	27.6	<2.0	<2.0	29.4
	pH (pH)	6.97	6.95	5.36	5.42	7.05
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	14.3	19.4	<3.0	<3.0	18.7
	Turbidity (NTU)	0.24	0.20	<0.10	<0.10	0.23
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	5.8	5.6	<1.0	<1.0	7.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	5.8	5.6	<1.0	<1.0	7.0
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.75	0.75	<0.10	<0.10	0.71
	Fluoride (F) (mg/L)	0.062	0.063	<0.020	<0.020	0.071
	Nitrate (as N) (mg/L)	0.0522	0.0532	<0.0050	<0.0050	0.0111
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	0.0021	0.0023	<0.0020	0.0033	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	4.86	4.87	<0.30	<0.30	4.58

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1667837-16				
	Description	Surface Water				
	Sampled Date	27-AUG-15				
	Sampled Time	13:45				
	Client ID	CREMP AUG DUP-3				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	27.7				
	pH (pH)	6.98				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	20.7				
	Turbidity (NTU)	0.24				
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	5.4				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	5.4				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	0.75				
	Fluoride (F) (mg/L)	0.063				
	Nitrate (as N) (mg/L)	0.0522				
	Nitrite (as N) (mg/L)	<0.0010				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020				
	Silicate (as SiO2) (mg/L)	<0.50				
	Sulfate (SO4) (mg/L)	4.88				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Alkalinity, Total (as CaCO3)	B	L1667837-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bromide (Br)	DLM	L1667837-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLM	L1667837-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1667837-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLM	L1667837-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLM	Detection Limit Adjusted due to sample matrix effects.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

Reference Information

SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 2

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz			☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway			Email 1:	efranz@azimuthgroup.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8			Email 2:	gmann@azimuthgroup.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220	Fax:		Email 3:	ryan.vanengen@agnicoeagle.com			Analysis Request
Invoice To	Same as Report ?	☑ Yes	☐ No	Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☑ No	Job #:	CREMP Meadowbank Surfacewater			
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:	Q39503			
Lab Work Order # (lab use only)				ALS Contact:	Brent Mack	Sampler:	Eric Franz	

Sample #	Sample Identification (This description will appear on the rep	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
[redacted]	INUG-72-S	27-Aug-15	13:45	Surface Water	X	X	2
[redacted]	INUG-73-S	27-Aug-15	14:30	Surface Water	X	X	2
[redacted]	PDL-39-S	26-Aug-15	15:50	Surface Water	X	X	2
[redacted]	PDL-40-S	26-Aug-15	15:05	Surface Water	X	X	2
[redacted]	TEFF-39-S	28-Aug-15	13:34	Surface Water	X	X	2
[redacted]	TEFF-40-S	28-Aug-15	14:10	Surface Water	X	X	2
[redacted]	TE-84-S	28-Aug-15	14:40	Surface Water	X	X	2
[redacted]	TE-85-S	28-Aug-15	14:55	Surface Water	X	X	2
[redacted]	TPE-84-S	29-Aug-15	11:00	Surface Water	X	X	2
[redacted]	TPE-85-S	29-Aug-15	14:00	Surface Water	X	X	2
[redacted]	TPN-84-S	29-Aug-15	15:00	Surface Water	X	X	2
[redacted]	TPN-85-S	29-Aug-15	15:48	Surface Water	X	X	2

L1667837-COFC

Short Holding Time

Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	31-Aug-15	9:00				16 °C	E	2015/09/01	11:00	

GENF 20.00 Front

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		**ALS Contact:** Brent Mack	**Sampler:** Eric Franz

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	CREMP AUG EB-2	30-Aug-15	20:20	Surface Water	X	X	2
	CREMP AUG DI-2	30-Aug-15	20:30	Surface Water	X	X	2
	CREMP AUG DUP-2	-	-	Surface Water	X	X	2
	CREMP AUG DUP-3	-	-	Surface Water	X	X	2

L1667837-COFC

Short Holding Time

Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
						16 °C	EE	Sep 3/15	16:00	

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 03-SEP-15
Report Date: 16-SEP-15 16:21 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1667896

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1667896-1	L1667896-2	L1667896-3	L1667896-4	L1667896-5
Description	Other	Other	Other	Other	Other
Sampled Date	13-AUG-15	13-AUG-15		15-AUG-15	15-AUG-15
Sampled Time	18:40	19:50		17:30	18:00
Client ID	SP-84-S	SP-85-S	CREMP AUG DUP-1	BPJ-39-S	BPJ-40-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.356	0.402	0.869	0.894	0.842

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1667896-6 Other 15-AUG-15 15:20 BAP-39-S	L1667896-7 Other 15-AUG-15 16:00 BAP-40-S	L1667896-8 Other 15-AUG-15 18:30 BBD-39-S	L1667896-9 Other 15-AUG-15 19:05 BBD-40-S	L1667896-10 Other 14-AUG-15 14:20 TPS-51-S
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.974	0.847	0.652	0.624	0.399

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1667896-11	L1667896-12	L1667896-13	L1667896-14	L1667896-15
Description	Other	Other	Other	Other	Other
Sampled Date	14-AUG-15	19-AUG-15	19-AUG-15	27-AUG-15	27-AUG-15
Sampled Time	15:20	17:05	17:45	13:45	14:30
Client ID	TPS-52-S	WAL-53-S	WAL-54-S	INUG-72-S	INUG-73-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.469	0.767	0.890	0.394	0.438

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1667896-16	L1667896-17	L1667896-18	L1667896-19	L1667896-20
Description	Other	Other	Other	Other	Other
Sampled Date	26-AUG-15	26-AUG-15	28-AUG-15	28-AUG-15	28-AUG-15
Sampled Time	15:50	15:05	13:34	14:10	14:40
Client ID	PDL-39-S	PDL-40-S	TEFF-39-S	TEFF-40-S	TE-84-S
Grouping / Analyte					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.384	0.392	0.268	0.260	0.345

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID Description Sampled Date Sampled Time Client ID	L1667896-21 Other 28-AUG-15 14:55 TE-85-S	L1667896-22 Other 29-AUG-15 11:00 TPE-84-S	L1667896-23 Other 29-AUG-15 14:00 TPE-85-S	L1667896-24 Other 29-AUG-15 15:00 TPN-84-S	L1667896-25 Other 29-AUG-15 15:48 TPN-85-S
FILTER							
Plant Pigments	Chlorophyll a (ug/L)		0.359	0.503	0.496	0.450	0.437

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1667896-26	L1667896-27			
	Description	Other	Other			
	Sampled Date					
	Sampled Time					
	Client ID	CREMP AUG DUP-2	CREMP AUG DUP-3			
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.478	0.461			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHLOROA-F-VA	Filter	Chlorophyll a by Fluorometer (Filter)	EPA 445.0

This analysis is done using procedures modified from EPA Method 445.0. Chlorophyll-a is determined by a routine acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page 1 of 3

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1:	efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2:	gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3:	ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:	Q39503	

Lab Work Order # (lab use only): L1667896

ALS Contact: Brent Mack | Sampler: Eric Franz

Sample #	Sample Identification (This description will appear on the rep	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyl 'a'	Number of Containers
[redacted]	SP-84-S	13-Aug-15	18:40	Other	X	1
[redacted]	SP-85-S	13-Aug-15	19:50	Other	X	1
[redacted]	CREMP AUG DUP-1	-	-	Other	X	1
[redacted]	BPJ-39-S	15-Aug-15	17:30	Other	X	1
[redacted]	BPJ-40-S	15-Aug-15	18:00	Other	X	1
[redacted]	BAP-39-S	15-Aug-15	15:20	Other	X	1
[redacted]	BAP-40-S	15-Aug-15	16:00	Other	X	1
[redacted]	BBD-39-S	15-Aug-15	18:30	Other	X	1
[redacted]	BBD-40-S	15-Aug-15	19:05	Other	X	1
[redacted]	TPS-51-S	14-Aug-15	14:20	Other	X	1
[redacted]	TPS-52-S	14-Aug-15	15:20	Other	X	1
[redacted]	WAL-53-S	19-Aug-15	17:05	Other	X	1

L1667896-COFC

Short Holding Time

Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	31-Aug-15	9:00				16.[illegible] °C	Ex	Sep 3/15	11:00	

GENF 20.00 Front

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		**ALS Contact:** Brent Mack	**Sampler:** Eric Franz

Sample #	Sample Identification (This description will appear on the	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyl 'a'	Number of Containers
	WAL-54-S	19-Aug-15	17:45	Other	X	1
	INUG-72-S	27-Aug-15	13:45	Other	X	1
	INUG-73-S	27-Aug-15	14:30	Other	X	1
	PDL-39-S	26-Aug-15	15:50	Other	X	1
	PDL-40-S	26-Aug-15	15:05	Other	X	1
	TEFF-39-S	28-Aug-15	13:34	Other	X	1
	TEFF-40-S	28-Aug-15	14:10	Other	X	1
	TE-84-S	28-Aug-15	14:40	Other	X	1
	TE-85-S	28-Aug-15	14:55	Other	X	1
	TPE-84-S	29-Aug-15	11:00	Other	X	1
	TPE-85-S	29-Aug-15	14:00	Other	X	1
	TPN-84-S	29-Aug-15	15:00	Other	X	1

L1667896-COFC

Short Holding Time
Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	31-Aug-15	9:00				16 °C	EK	Sep 3/15	11:00	

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact: Brent Mack	Sampler: Eric Franz

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyl 'a'	Number of Containers
	TPN-85-S	29-Aug-15	15:48	Other	X	1
	CREMP AUG DUP-2	-	-	Other	X	1
	CREMP AUG DUP-3	-	-	Other	X	1

L1667896-COFC

Short Holding Time
Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

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Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	31-Aug-15	9:00				16 °C	FE	Sep 3/15	11:00	

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 08-SEP-15
Report Date: 18-SEP-15 10:28 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1669140

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers: 1, 2
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669140-1 Surface Water 27-AUG-15 13:45 INUG-72-S	L1669140-2 Surface Water 27-AUG-15 14:30 INUG-73-S	L1669140-3 Surface Water 26-AUG-15 15:50 PDL-39-S	L1669140-4 Surface Water 26-AUG-15 15:05 PDL-40-S	L1669140-5 Surface Water 28-AUG-15 13:34 TEFF-39-S
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5.70	5.69	8.92	8.78	6.07
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (mg/L)	0.120	0.115	0.112	0.106	0.083
	Phosphorus (P)-Total (mg/L)	0.0028	<0.0020	<0.0020	<0.0020	<0.0020
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.76	1.54	1.30	1.32	1.10
	Total Organic Carbon (mg/L)	1.57	1.58	1.33	1.48	1.18
Total Metals	Aluminum (Al)-Total (mg/L)	0.0079	0.0085	0.0048	0.0047	0.0065
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00013	0.00013	<0.00010
	Barium (Ba)-Total (mg/L)	0.00186	0.00190	0.00199	0.00204	0.00211
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	1.16	1.14	2.18	2.20	1.46
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.020	0.015	0.017	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000489	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	0.69	0.69	0.76	0.77	0.58
	Manganese (Mn)-Total (mg/L)	0.00232	0.00243	0.00125	0.00125	0.00122
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	0.000055	<0.000050	0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00059	0.00060	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.40	0.40	0.37	0.35	0.36
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.122	0.123	0.121	0.123	0.114
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.565	0.563	0.478	0.502	0.574
	Strontium (Sr)-Total (mg/L)	0.00683	0.00663	0.00932	0.00937	0.00802
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	0.58	0.58	0.70

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669140-6	L1669140-7	L1669140-8	L1669140-9	L1669140-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	28-AUG-15	28-AUG-15	28-AUG-15	29-AUG-15	29-AUG-15
Sampled Time	14:10	14:40	14:55	11:00	14:00
Client ID	TEFF-40-S	TE-84-S	TE-85-S	TPE-84-S	TPE-85-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	6.01	9.82	9.74	10.8	10.7
Anions and Nutrients Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total Kjeldahl Nitrogen (mg/L)	0.081	0.106	0.094	0.107	0.097
Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	0.0021	<0.0020	<0.0020
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.06	1.34	1.36	1.38	1.25
Total Organic Carbon (mg/L)	1.10	1.23	1.25	1.39	1.22
Total Metals Aluminum (Al)-Total (mg/L)	0.0065	0.0086	0.0074	0.0069	0.0080
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	0.00013	0.00013	0.00042	0.00047
Barium (Ba)-Total (mg/L)	0.00213	0.00233	0.00219	0.00310	0.00305
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	1.40	2.42	2.35	2.69	2.72
Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00013
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)-Total (mg/L)	<0.010	0.014	0.013	<0.010	0.012
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	0.57	0.85	0.84	0.97	0.97
Manganese (Mn)-Total (mg/L)	0.00122	0.00139	0.00132	0.00112	0.00121
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000053	0.000093	0.000093	0.000187	0.000197
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	0.34	0.41	0.42	0.51	0.50
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total (mg/L)	0.106	0.179	0.172	0.059	0.062
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	0.584	0.684	0.687	1.05	1.03
Strontium (Sr)-Total (mg/L)	0.00784	0.0116	0.0113	0.0116	0.0117
Sulfur (S)-Total (mg/L)	0.69	1.00	0.99	1.59	1.70

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669140-11 Surface Water 29-AUG-15 15:00 TPN-84-S	L1669140-12 Surface Water 29-AUG-15 15:48 TPN-85-S	L1669140-13 Surface Water 30-AUG-15 20:20 CREMP AUG EB-2	L1669140-14 Surface Water 30-AUG-15 20:30 CREMP AUG DI-2	L1669140-15 Surface Water CREMP AUG DUP-2
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	9.12	9.28	<0.50	<0.50	10.6
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	0.0061	0.0052	<0.0050	0.0069
	Total Kjeldahl Nitrogen (mg/L)	0.093	0.097	<0.050	<0.050	0.109
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.19	1.16	<0.50	<0.50	1.16
	Total Organic Carbon (mg/L)	1.23	1.19	<0.50	<0.50	1.38
Total Metals	Aluminum (Al)-Total (mg/L)	0.0067	0.0060	<0.0030	<0.0030	0.0076
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00018	0.00016	<0.00010	<0.00010	0.00045
	Barium (Ba)-Total (mg/L)	0.00307	0.00307	<0.000050	0.000063 RRV	0.00296
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	2.19	2.17	<0.050	<0.050	2.60
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	0.88	0.86	<0.10	<0.10	0.94
	Manganese (Mn)-Total (mg/L)	0.00149	0.00144	0.00011	<0.00010	0.00115
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000192	0.000175	<0.000050	<0.000050	0.000183
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.50	0.47	<0.10	<0.10	0.49
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.059	<0.050	<0.050	<0.050	0.062
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.14	1.12	<0.050	<0.050	1.01
	Strontium (Sr)-Total (mg/L)	0.0109	0.0107	<0.00020	<0.00020	0.0112
	Sulfur (S)-Total (mg/L)	1.70	1.63	<0.50	<0.50	1.59

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1669140-16				
	Description	Surface Water				
	Sampled Date					
	Sampled Time					
	Client ID	CREMP AUG DUP-3				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	9.20				
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050				
	Total Kjeldahl Nitrogen (mg/L)	0.098				
	Phosphorus (P)-Total (mg/L)	<0.0020				
Cyanides	Cyanide, Total (mg/L)	<0.0010				
	Cyanide, Free (mg/L)	<0.0010				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.15				
	Total Organic Carbon (mg/L)	1.38				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0066				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	0.00015				
	Barium (Ba)-Total (mg/L)	0.00300				
	Beryllium (Be)-Total (mg/L)	<0.000020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.0000050				
	Calcium (Ca)-Total (mg/L)	2.16				
	Chromium (Cr)-Total (mg/L)	0.00015				
	Cobalt (Co)-Total (mg/L)	<0.00010				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	0.014				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.0010				
	Magnesium (Mg)-Total (mg/L)	0.86				
	Manganese (Mn)-Total (mg/L)	0.00143				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	Molybdenum (Mo)-Total (mg/L)	0.000175				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	0.47				
	Selenium (Se)-Total (mg/L)	<0.000050				
	Silicon (Si)-Total (mg/L)	0.051				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	1.14				
	Strontium (Sr)-Total (mg/L)	0.0109				
	Sulfur (S)-Total (mg/L)	1.64				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669140-1	L1669140-2	L1669140-3	L1669140-4	L1669140-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	27-AUG-15	27-AUG-15	26-AUG-15	26-AUG-15	28-AUG-15
Sampled Time	13:45	14:30	15:50	15:05	13:34
Client ID	INUG-72-S	INUG-73-S	PDL-39-S	PDL-40-S	TEFF-39-S
Grouping / **Analyte**					
WATER					
Total Metals Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Total (mg/L)	0.000048	0.000048	0.000023	0.000024	0.000043
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0030	0.0036	0.0024	0.0019	0.0026
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00014	0.00014	<0.00010
Barium (Ba)-Dissolved (mg/L)	0.00183	0.00188	0.00196	0.00199	0.00206
Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Dissolved (mg/L)	1.15	1.14	2.27	2.23	1.46
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00032	0.00033	0.00040	0.00038	0.00029
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	0.69	0.69	0.79	0.78	0.59
Manganese (Mn)-Dissolved (mg/L)	0.00032	0.00034	0.00056	0.00051	0.00055
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000202 DTC	<0.000050	<0.000050	<0.000050
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	0.00057	0.00054	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.35	0.37	0.34	0.33	0.36
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	0.111	0.108	0.119	0.117	0.112
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.534	0.559	0.489	0.479	0.564
Strontium (Sr)-Dissolved (mg/L)	0.00658	0.00649	0.00950	0.00939	0.00793
Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50	0.57	0.58	0.71

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669140-6	L1669140-7	L1669140-8	L1669140-9	L1669140-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	28-AUG-15	28-AUG-15	28-AUG-15	29-AUG-15	29-AUG-15
Sampled Time	14:10	14:40	14:55	11:00	14:00
Client ID	TEFF-40-S	TE-84-S	TE-85-S	TPE-84-S	TPE-85-S
Grouping / **Analyte**					
WATER					
Total Metals Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Total (mg/L)	0.000039	0.000058	0.000059	0.000058	0.000056
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0028	0.0035	0.0027	0.0032	0.0033
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00014	0.00014	0.00046	0.00047
Barium (Ba)-Dissolved (mg/L)	0.00202	0.00229	0.00224	0.00298	0.00295
Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Dissolved (mg/L)	1.44	2.50	2.47	2.69	2.68
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00027	0.00040	0.00039	0.00036	0.00036
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	0.58	0.87	0.87	0.98	0.98
Manganese (Mn)-Dissolved (mg/L)	0.00056	0.00059	0.00062	0.00057	0.00056
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000058	0.000087	0.000110	0.000177	0.000183
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.33	0.42	0.42	0.52	0.53
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	0.109	0.171	0.168	<0.050	<0.050
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.574	0.659	0.675	1.01	0.978
Strontium (Sr)-Dissolved (mg/L)	0.00794	0.0114	0.0113	0.0113	0.0116
Sulfur (S)-Dissolved (mg/L)	0.70	0.98	0.98	1.58	1.51

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669140-11	L1669140-12	L1669140-13	L1669140-14	L1669140-15
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	29-AUG-15	29-AUG-15	30-AUG-15	30-AUG-15	
Sampled Time	15:00	15:48	20:20	20:30	
Client ID	TPN-84-S	TPN-85-S	CREMP AUG EB-2	CREMP AUG DI-2	CREMP AUG DUP-2
Grouping / **Analyte**					
WATER					
Total Metals Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Total (mg/L)	0.000044	0.000042	<0.000010	<0.000010	0.000056
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0030	0.0037	<0.0010	<0.0010	0.0034
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.00016	0.00017	<0.00010	<0.00010	0.00047
Barium (Ba)-Dissolved (mg/L)	0.00322	0.00312	<0.000050	0.000076 RRV	0.00294
Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Dissolved (mg/L)	2.21	2.24	<0.050	<0.050	2.67
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00033	0.00058	<0.00020	<0.00020	0.00036
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	0.87	0.89	<0.10	<0.10	0.95
Manganese (Mn)-Dissolved (mg/L)	0.00090	0.00109	<0.00010	<0.00010	0.00055
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000179	0.000182	<0.000050	<0.000050	0.000189
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	0.47	0.49	<0.10	<0.10	0.49
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Dissolved (mg/L)	<0.050	0.060	<0.050	<0.050	0.051
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	1.11	1.11	<0.050	<0.050	0.992
Strontium (Sr)-Dissolved (mg/L)	0.0107	0.0107	<0.00020	<0.00020	0.0111
Sulfur (S)-Dissolved (mg/L)	1.63	1.69	<0.50	<0.50	1.56

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1669140-16				
	Description	Surface Water				
	Sampled Date					
	Sampled Time					
	Client ID	CREMP AUG DUP-3				
Grouping	**Analyte**					
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.00030				
	Uranium (U)-Total (mg/L)	0.000046				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	<0.00030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0029				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00018				
	Barium (Ba)-Dissolved (mg/L)	0.00297				
	Beryllium (Be)-Dissolved (mg/L)	<0.000020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050				
	Calcium (Ca)-Dissolved (mg/L)	2.23				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	0.00035				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	0.88				
	Manganese (Mn)-Dissolved (mg/L)	0.00100				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000174				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	0.47				
	Selenium (Se)-Dissolved (mg/L)	<0.000050				
	Silicon (Si)-Dissolved (mg/L)	0.055				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	1.05				
	Strontium (Sr)-Dissolved (mg/L)	0.0106				
	Sulfur (S)-Dissolved (mg/L)	1.63				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669140-1 Surface Water 27-AUG-15 13:45 INUG-72-S	L1669140-2 Surface Water 27-AUG-15 14:30 INUG-73-S	L1669140-3 Surface Water 26-AUG-15 15:50 PDL-39-S	L1669140-4 Surface Water 26-AUG-15 15:05 PDL-40-S	L1669140-5 Surface Water 28-AUG-15 13:34 TEFF-39-S
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000042	0.000041	0.000021	0.000021	0.000033
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669140-6	L1669140-7	L1669140-8	L1669140-9	L1669140-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	28-AUG-15	28-AUG-15	28-AUG-15	29-AUG-15	29-AUG-15
Sampled Time	14:10	14:40	14:55	11:00	14:00
Client ID	TEFF-40-S	TE-84-S	TE-85-S	TPE-84-S	TPE-85-S
Grouping / **Analyte**					
WATER					
Dissolved Metals Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000033	0.000053	0.000050	0.000049	0.000051
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669140-11	L1669140-12	L1669140-13	L1669140-14	L1669140-15
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	29-AUG-15	29-AUG-15	30-AUG-15	30-AUG-15	
Sampled Time	15:00	15:48	20:20	20:30	
Client ID	TPN-84-S	TPN-85-S	CREMP AUG EB-2	CREMP AUG DI-2	CREMP AUG DUP-2
Grouping / **Analyte**					
WATER					
Dissolved Metals Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000039	0.000040	<0.000010	<0.000010	0.000049
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1669140-16				
	Description	Surface Water				
	Sampled Date					
	Sampled Time					
	Client ID	CREMP AUG DUP-3				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.00030				
	Uranium (U)-Dissolved (mg/L)	0.000041				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Phosphorus (P)-Total	MS-B	L1669140-10, -11, -12, -13, -14, -15, -16, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1669140-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1669140-10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
	Reported Result Verified By Repeat Analysis

Reference Information

RRV

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)

Reference Information

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)	L1669140	**ALS Contact:** Brent Mack	**Sampler:** Eric Franz

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	P TOC, Ammonia, TKN, Total P	F/P DOC	P T-CN (Low), Free CN (Low)	P Total mercury	F/P Dissolved mercury	P Total Metals	F/P Dissolved Metals	Number of Containers
	INUG-72-S	27-Aug-15	13:45	Surface Water	X	X	X	X	X	X	X	7
	INUG-73-S	27-Aug-15	14:30	Surface Water	X	X	X	X	X	X	X	7
	PDL-39-S	26-Aug-15	15:50	Surface Water	X	X	X	X	X	X	X	7
	PDL-40-S	26-Aug-15	15:05	Surface Water	X	X	X	X	X	X	X	7
	TEFF-39-S	28-Aug-15	13:34	Surface Water	X	X	X	X	X	X	X	7
	TEFF-40-S	28-Aug-15	14:10	Surface Water	X	X	X	X	X	X	X	7
	TE-84-S	28-Aug-15	14:40	Surface Water	X	X	X	X	X	X	X	7
	TE-85-S	28-Aug-15	14:55	Surface Water	X	X	X	X	X	X	X	7
	TPE-84-S	29-Aug-15	11:00	Surface Water	X	X	X	X	X	X	X	7
	TPE-85-S	29-Aug-15	14:00	Surface Water	X	X	X	X	X	X	X	7
	TPN-84-S	29-Aug-15	15:00	Surface Water	X	X	X	X	X	X	X	7
	TPN-85-S	29-Aug-15	15:48	Surface Water	X	X	X	X	X	X	X	7

Short Holding Time

Rush Processing

L1669140-COFC

Special Instructions / water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	31-Aug-15	9:00				18 °C		Sep 8	12:00	

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1:	efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2:	gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3:	ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	CREMP Meadowbank Surfacewater	
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:	Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Brent Mack	Sampler: Eric Franz

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals	Number of Containers
					P	F/P	P	P	F/P	P	F/P	
	CREMP AUG EB-2	30-Aug-15	20:20	Surface Water	X	X	X	X	X	X	X	7
	CREMP AUG DI-2	30-Aug-15	20:30	Surface Water	X	X	X	X	X	X	X	7
	CREMP AUG DUP-2	-	-	Surface Water	X	X	X	X	X	X	X	7
	CREMP AUG DUP-3	-	-	Surface Water	X	X	X	X	X	X	X	7

Short Holding Time

Rush Processing

L1669140-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Eric Franz	31-Aug-15	9:00				18 °C	DJ	Sept	12:55	

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 02-DEC-15
Report Date: 11-DEC-15 11:44 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1709504

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-1	L1709504-2	L1709504-3	L1709504-4	L1709504-5
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	21-NOV-15	21-NOV-15	21-NOV-15	22-NOV-15	22-NOV-15
	Sampled Time	10:36	10:36	11:50	10:03	10:45
	Client ID	NOV TE-88-S	NOV CREMP DUP 1	NOV TE-89-S	NOV WAL-57-S	NOV WAL-58-S
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	7.19	7.15	7.57	18.5	18.3
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0056	<0.0050	<0.0050	0.0076	0.0130
	Total Kjeldahl Nitrogen (mg/L)	0.111	0.099	0.105	0.142	0.139
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0028	<0.0020	<0.0020	0.0020
Cyanides	Cyanide, Total (mg/L)	<0.0010 HTD	<0.0010 HTD	0.0014 HTD	<0.0010 HTD	<0.0010
	Cyanide, Free (mg/L)	<0.0010 HTD	<0.0010 HTD	<0.0010 HTD	<0.0010 HTD	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.17	1.13	1.25	1.87	1.68
	Total Organic Carbon (mg/L)	1.72	1.11	1.04	1.80	1.87
Total Metals	Aluminum (Al)-Total (mg/L)	0.0063	0.0059	0.0063	0.0030	0.0038
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00029	0.00023
	Barium (Ba)-Total (mg/L)	0.00219	0.00208	0.00246	0.00262	0.00226
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	1.81	1.74	1.85	4.87	4.58
	Chromium (Cr)-Total (mg/L)	0.00024	0.00013	0.00018	<0.00010	0.00011
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00215	0.00097	0.00088
	Iron (Fe)-Total (mg/L)	0.014	<0.010	<0.010	0.012	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	0.79	0.65	0.70	1.42	1.30
	Manganese (Mn)-Total (mg/L)	0.00086	0.00065	0.00091	0.00113	0.00079
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000199	0.000058	0.000055	0.000325	0.000345
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.40	0.37	0.40	0.52	0.47
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.130	0.122	0.128	0.311	0.269
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.638	0.612	0.646	0.697	0.657
	Strontium (Sr)-Total (mg/L)	0.00947	0.00836	0.00990	0.0251	0.0217
	Sulfur (S)-Total (mg/L)	0.84	0.83	0.87	1.61	1.55

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-6	L1709504-7			
	Description	Surface Water	Surface Water			
	Sampled Date	23-NOV-15	23-NOV-15			
	Sampled Time	10:35	11:05			
	Client ID	NOV INUG-76-S	NOV INUG-77-S			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5.84	5.98			
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0065	0.0059			
	Total Kjeldahl Nitrogen (mg/L)	0.123	0.116			
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0024			
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010			
	Cyanide, Free (mg/L)	<0.0010	<0.0010			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.66	1.55			
	Total Organic Carbon (mg/L)	2.10	1.58			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0071	0.0041			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Total (mg/L)	0.00178	0.00183			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Total (mg/L)	1.13	1.21			
	Chromium (Cr)-Total (mg/L)	0.00014	0.00011			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Total (mg/L)	0.67	0.72			
	Manganese (Mn)-Total (mg/L)	0.00103	0.00104			
	Mercury (Hg)-Total (mg/L)	<0.0000050	0.0000103			
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.36	0.37			
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Total (mg/L)	0.102	0.110			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	0.552	0.584			
	Strontium (Sr)-Total (mg/L)	0.00648	0.00702			
	Sulfur (S)-Total (mg/L)	<0.50	<0.50			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1709504-1 Surface Water 21-NOV-15 10:36 NOV TE-88-S	L1709504-2 Surface Water 21-NOV-15 10:36 NOV CREMP DUP 1	L1709504-3 Surface Water 21-NOV-15 11:50 NOV TE-89-S	L1709504-4 Surface Water 22-NOV-15 10:03 NOV WAL-57-S	L1709504-5 Surface Water 22-NOV-15 10:45 NOV WAL-58-S
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000039	0.000040	0.000039	0.000050	0.000051
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0019	0.0022	0.0012	0.0010	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00012	0.00028	0.00026
	Barium (Ba)-Dissolved (mg/L)	0.00217	0.00209	0.00240	0.00261	0.00244
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000063
	Calcium (Ca)-Dissolved (mg/L)	1.78	1.71	1.87	5.01	5.00
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00040	0.00028	0.00036	0.00088	0.00091
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000065	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	0.67	0.70	0.71	1.45	1.41
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	0.00017	0.00017	0.00034	0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000297	0.000396
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.37	0.38	0.41	0.52	0.52
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.116	0.121	0.120	0.323	0.283
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.634	0.600	0.646	0.706	0.679
	Strontium (Sr)-Dissolved (mg/L)	0.00889	0.00797	0.00935	0.0247	0.0257
	Sulfur (S)-Dissolved (mg/L)	0.82	0.78	0.87	1.59	1.66

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-6	L1709504-7			
	Description	Surface Water	Surface Water			
	Sampled Date	23-NOV-15	23-NOV-15			
	Sampled Time	10:35	11:05			
	Client ID	NOV INUG-76-S	NOV INUG-77-S			
Grouping	**Analyte**					
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Total (mg/L)	0.000038	0.000038			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0011	0.0020			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.00170	0.00187			
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Dissolved (mg/L)	1.18	1.21			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00029	0.00042			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Dissolved (mg/L)	0.70	0.72			
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	0.38	0.39			
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Dissolved (mg/L)	0.101	0.104			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	0.571	0.579			
	Strontium (Sr)-Dissolved (mg/L)	0.00665	0.00688			
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1709504-1	L1709504-2	L1709504-3	L1709504-4	L1709504-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	21-NOV-15	21-NOV-15	21-NOV-15	22-NOV-15	22-NOV-15
Sampled Time	10:36	10:36	11:50	10:03	10:45
Client ID	NOV TE-88-S	NOV CREMP DUP 1	NOV TE-89-S	NOV WAL-57-S	NOV WAL-58-S
Grouping / **Analyte**					
WATER					
Dissolved Metals Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000032	0.000030	0.000031	0.000044	0.000055
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	0.0011	<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-6	L1709504-7			
	Description	Surface Water	Surface Water			
	Sampled Date	23-NOV-15	23-NOV-15			
	Sampled Time	10:35	11:05			
	Client ID	NOV INUG-76-S	NOV INUG-77-S			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Dissolved (mg/L)	0.000033	0.000032			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0012	<0.0010			
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030			

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cadmium (Cd)-Total	DLM	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Phosphorus (P)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Aluminum (Al)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Boron (B)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Molybdenum (Mo)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

Reference Information

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Reference Information

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1:	efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2:	gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3:	ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:	Q39503	
Lab Work Order # (lab use only)	L1709504	ALS Contact:	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals						Number of Containers
					P	F/P	P	P	F/P	P	F/P						
	NOV TE-88-S	21-Nov-15	10:36	Surface Water	X	X	X	X	X	X	X						7
	NOV CREMP-DUP 1	21-Nov-15	10:36	Surface Water	X	X	X	X	X	X	X						7
	NOV TE-89-S	21-Nov-15	11:50	Surface Water	X	X	X	X	X	X	X						7
	NOV WAL-57-S	22-Nov-15	10:03	Surface Water	X	X	X	X	X	X	X						7
	NOV WAL-58-S	22-Nov-15	10:45	Surface Water	X	X	X	X	X	X	X						7
	NOV INUG-76-S	23-Nov-15	10:35	Surface Water	X	X	X	X	X	X	X						7
	NOV INUG-77-S	23-Nov-15	11:05	Surface Water	X	X	X	X	X	X	X						7

L1709504-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	24-Nov-15	7:30	Jean	2 Dec	10:15	0.2 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 19-NOV-15
Report Date: 26-NOV-15 11:52 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1704762

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1704762-1 Surface Water 13-NOV-15 15:26 NOV TPE-88	L1704762-2 Surface Water 13-NOV-15 14:58 NOV TPE-89	L1704762-3 Surface Water 13-NOV-15 13:17 NOV TPN-88	L1704762-4 Surface Water 13-NOV-15 14:03 NOV TPN-89	
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Physical Tests	Conductivity (uS/cm)	31.8	31.1	29.1	28.9	
	pH (pH)	7.06	7.03	6.94	6.91	
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	19.3	16.6	15.8	18.3	
	Turbidity (NTU)	0.26	0.25	0.24	0.23	
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	7.5	7.8	6.3	6.3	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	7.5	7.8	6.3	6.3	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	0.72	0.73	0.75	0.75	
	Fluoride (F) (mg/L)	0.073	0.070	0.069	0.065	
	Nitrate (as N) (mg/L)	0.0135	0.0156	0.0526	0.0532	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Sulfate (SO4) (mg/L)	4.79	4.78	4.96	5.00	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-TD-COL-VA	Water	Total Dissolved P in Water by Colour	APHA 4500-P Phosphorous
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field.			
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
SILICATE-COL-VA	Water	Silicate by Colourimetric analysis	APHA 4500-SiO2 E.
This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.			
SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.			
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"
This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.			
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity
This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)	L1704762	ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	NOV TPE-88	13-Nov-15	15:26	Surface Water	X	X	2
	NOV TPE-89	13-Nov-15	14:58	Surface Water	X	X	2
	NOV TPN-88	13-Nov-15	13:17	Surface Water	X	X	2
	NOV TPN 89	13-Nov-15	14:03	Surface Water	X	X	2

Short Holding Time

● *Rush Processing*

L1704762-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	16-Nov		Lady	Nov. 19	10:30AM	12 °C				

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 23-NOV-15
Report Date: 02-DEC-15 13:57 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1705743

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1705743-1	L1705743-2	L1705743-3	L1705743-4	
Description	Surface Water	Surface Water	Surface Water	Surface Water	
Sampled Date	13-NOV-15	13-NOV-15	13-NOV-15	13-NOV-15	
Sampled Time	15:26	14:58	13:17	14:03	
Client ID	NOV TPE-88	NOV TPE-89	NOV TPN-88	NOV TPN 89	
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	11.1	10.9	9.43	9.46	
Anions and Nutrients Ammonia, Total (as N) (mg/L)	0.0083	0.0091	0.0063	0.0059	
Total Kjeldahl Nitrogen (mg/L)	0.103	0.083	0.085	0.084	
Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.28	1.14	1.27	1.18	
Total Organic Carbon (mg/L)	1.06	1.20	1.29	1.17	
Total Metals Aluminum (Al)-Total (mg/L)	0.0056	0.0059	0.0034	0.0047	
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic (As)-Total (mg/L)	0.00045	0.00039	0.00019	0.00019	
Barium (Ba)-Total (mg/L)	0.00307	0.00309	0.00300	0.00307	
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium (Ca)-Total (mg/L)	2.69	2.65	2.26	2.29	
Chromium (Cr)-Total (mg/L)	0.00010	0.00011	0.00011	0.00011	
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00053	<0.00050	
Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Magnesium (Mg)-Total (mg/L)	0.96	0.95	0.87	0.88	
Manganese (Mn)-Total (mg/L)	0.00076	0.00079	0.00084	0.00084	
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Molybdenum (Mo)-Total (mg/L)	0.000173	0.000229	0.000167	0.000165	
Nickel (Ni)-Total (mg/L)	0.00096	<0.00050	0.00057	<0.00050	
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
Potassium (K)-Total (mg/L)	0.62	0.53	0.47	0.49	
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Silicon (Si)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium (Na)-Total (mg/L)	1.01	1.02	1.07	1.11	
Strontium (Sr)-Total (mg/L)	0.0115	0.0114	0.0103	0.0105	
Sulfur (S)-Total (mg/L)	1.76	1.67	1.75	1.79	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1705743-1	L1705743-2	L1705743-3	L1705743-4	
Description	Surface Water	Surface Water	Surface Water	Surface Water	
Sampled Date	13-NOV-15	13-NOV-15	13-NOV-15	13-NOV-15	
Sampled Time	15:26	14:58	13:17	14:03	
Client ID	NOV TPE-88	NOV TPE-89	NOV TPN-88	NOV TPN 89	
Grouping / **Analyte**					
WATER					
Total Metals Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	
Uranium (U)-Total (mg/L)	0.000044	0.000045	0.000037	0.000036	
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
Aluminum (Al)-Dissolved (mg/L)	0.0014	0.0011	0.0013	<0.0010	
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic (As)-Dissolved (mg/L)	0.00041	0.00037	0.00017	0.00017	
Barium (Ba)-Dissolved (mg/L)	0.00311	0.00298	0.00305	0.00307	
Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium (Ca)-Dissolved (mg/L)	2.80	2.75	2.32	2.33	
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Copper (Cu)-Dissolved (mg/L)	0.00037	0.00040	0.00039	0.00032	
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Magnesium (Mg)-Dissolved (mg/L)	0.99	0.97	0.88	0.89	
Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Molybdenum (Mo)-Dissolved (mg/L)	0.000153	0.000158	0.000149	0.000152	
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
Potassium (K)-Dissolved (mg/L)	0.55	0.51	0.47	0.46	
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Silicon (Si)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium (Na)-Dissolved (mg/L)	1.00	0.992	1.08	1.08	
Strontium (Sr)-Dissolved (mg/L)	0.0113	0.0111	0.0101	0.0103	
Sulfur (S)-Dissolved (mg/L)	1.68	1.63	1.73	1.68	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1705743-1	L1705743-2	L1705743-3	L1705743-4	
	Description	Surface Water	Surface Water	Surface Water	Surface Water	
	Sampled Date	13-NOV-15	13-NOV-15	13-NOV-15	13-NOV-15	
	Sampled Time	15:26	14:58	13:17	14:03	
	Client ID	NOV TPE-88	NOV TPE-89	NOV TPN-88	NOV TPN 89	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	
	Uranium (U)-Dissolved (mg/L)	0.000037	0.000036	0.000030	0.000030	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Total Organic Carbon	MS-B	L1705743-2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L1705743-2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L1705743-2, -3, -4
Matrix Spike	Dissolved Organic Carbon	MS-B	L1705743-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1705743-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1705743-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1705743-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1705743-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Reference Information

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz			☐ PDF ☐ Excel ☐ Digital ☐ Fax				○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway			Email 1:	efranz@azimuthgroup.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8			Email 2:	gmann@azimuthgroup.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220	Fax:		Email 3:	ryan.vanengen@agnicoeagle.com			
Invoice To	Same as Report ?	☑ Yes	☐ No	Client / Project Information				Analysis Request
Hardcopy of Invoice with Report?		☐ Yes	☑ No	Job #:	CREMP Meadowbank Surfacewater			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:	Q39503			
Lab Work Order # (lab use only)				ALS Contact:		Sampler:		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals						Number of Containers
					P	F/P	P	P	F/P	P	F/P						
	NOV TPE-88	13-Nov-15	15:26	Surface Water	X	X	X	X	X	X	X						7
	NOV TPE-89	13-Nov-15	14:58	Surface Water	X	X	X	X	X	X	X						7
	NOV TPN-88	13-Nov-15	13:17	Surface Water	X	X	X	X	X	X	X						7
	NOV TPN 89	13-Nov-15	14:03	Surface Water	X	X	X	X	X	X	X						7

Short Holding Time

● *Rush Processing*



Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for o[redacted]

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Martin Theriault	16-Nov-15	7:30	[redacted]	Nov.23	1015	6°C °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 27-NOV-15
Report Date: 03-DEC-15 15:06 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1707763

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1707763-1 SURFACE WATE 21-NOV-15 10:36 NOV TE-88-S	L1707763-2 SURFACE WATE 21-NOV-15 10:36 NOV CREMP DUP 1	L1707763-3 SURFACE WATE 21-NOV-15 11:50 NOV TE-89-S	L1707763-4 SURFACE WATE 22-NOV-15 10:03 NOV WAL-57-S	L1707763-5 SURFACE WATE 22-NOV-15 10:45 NOV WAL-58-S
WATER						
Physical Tests	Conductivity (uS/cm)	20.0	19.7	21.1	44.1	45.3
	pH (pH)	6.85	6.82	6.89	7.25	7.30
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	1.3	<1.0
	Total Dissolved Solids (mg/L)	14.3	14.8	14.5	26.7	28.1
	Turbidity (NTU)	0.24	0.24	0.27	0.24	0.21
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	5.6	5.8	5.9	14.3	14.2
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	5.6	5.8	5.9	14.3	14.2
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.61	0.61	0.63	0.84	0.87
	Fluoride (F) (mg/L)	0.058	0.058	0.060	0.054	0.051
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0288	0.0650
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	0.74	0.73
	Sulfate (SO4) (mg/L)	2.27	2.27	2.40	4.58	4.88

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1707763-6	L1707763-7	L1707763-8		
	Description	SURFACE WATE	SURFACE WATE	SURFACE WATE		
	Sampled Date	23-NOV-15	23-NOV-15			
	Sampled Time	10:35	11:05			
	Client ID	NOV INUG-76-S	NOV INUG-77-S	ALS TRAVEL BLANK		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	16.5	16.7	<2.0		
	pH (pH)	6.86	6.87	5.44		
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0		
	Total Dissolved Solids (mg/L)	12.1	11.5	<3.0		
	Turbidity (NTU)	0.25	0.23	<0.10		
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	5.4	5.4	<1.0		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	5.4	5.4	<1.0		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	0.77	0.78	<0.10		
	Fluoride (F) (mg/L)	0.062	0.063	<0.020		
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010		
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020		
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50		
	Sulfate (SO4) (mg/L)	0.90	0.91	<0.30		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Alkalinity, Total (as CaCO3)	B	L1707763-1, -4, -5, -8
Method Blank	Alkalinity, Total (as CaCO3)	B	L1707763-1, -4, -5, -8
Method Blank	Alkalinity, Total (as CaCO3)	B	L1707763-1, -4, -5, -8
Method Blank	Alkalinity, Total (as CaCO3)	B	L1707763-2, -3, -6, -7
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1707763-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Silicate (as SiO2)	MS-B	L1707763-1, -2, -3, -4, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA Water Bromide in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-L-IC-N-VA Water Chloride in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SILICATE-COL-VA Water Silicate by Colourimetric analysis APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.
Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	NOV TE-88-S	21-Nov-15	10:36	Surface Water	X	X	2
	NOV CREMP DUP 1	21-Nov-15	10:36	Surface Water	X	X	2
	NOV TE-89-S	21-Nov-15	11:50	Surface Water	X	X	2
	NOV WAL-57-S	22-Nov-15	10:03	Surface Water	X	X	2
	NOV WAL-58-S	22-Nov-15	10:45	Surface Water	X	X	2
	NOV INUG-76-S	23-Nov-15	10:35	Surface Water	X	X	2
	NOV INUG-77-S	23-Nov-15	11:05	Surface Water	X	X	2

L1707763-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	24-Nov-15	7:30	Jean	27 Nov	10:30	10 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 27-NOV-15
Report Date: 08-DEC-15 14:15 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1707834

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1707834-1	L1707834-2	L1707834-3	L1707834-4	L1707834-5
	Description	Surface water filte	Surface water filte	Surface water filte	Surface water filte	Surface water filte
	Sampled Date	02-NOV-15	02-NOV-15	13-NOV-15	13-NOV-15	13-NOV-15
	Sampled Time	11:09	10:26	13:17	14:03	15:26
	Client ID	NOV SP-88-S	NOV SP-89-S	NOV TPN-88-S	NOV TPN-89-S	NOV TPE-88-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.928	0.740	0.934	1.28	0.764

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1707834-6	L1707834-7	L1707834-8	L1707834-9	L1707834-10
Description	Surface water filte	Surface water filte	Surface water filte	Surface water filte	Surface water filte
Sampled Date	13-NOV-15	21-NOV-15	21-NOV-15	21-NOV-15	22-NOV-15
Sampled Time	14:58	10:36	10:36	11:50	10:03
Client ID	NOV TPE-89-S	NOV TE-88-S	NOV DUP 1	NOV TE-89-S	NOV WAL-57-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.663	0.782	0.971	0.871	1.28

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1707834-11	L1707834-12	L1707834-13		
	Description	Surface water filte	Surface water filte	Surface water filte		
	Sampled Date	22-NOV-15	23-NOV-15	23-NOV-15		
	Sampled Time	10:45	10:35	11:05		
	Client ID	NOV WAL-58-S	NOV INUG-76-S	NOV INUG-77-S		
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	1.04	0.858	0.867		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHLOROA-F-VA	Filter	Chlorophyll a by Fluorometer (Filter)	EPA 445.0

This analysis is done using procedures modified from EPA Method 445.0. Chlorophyll-a is determined by a routine acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:		Quote #: Q39503	
[redacted] Lab Wor (lab us	L1707834-COFC	[redacted] ALS Contact:	Sampler:

[redacted] Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll A	Number of Containers
[redacted]	NOV SP-88-S	02-Nov-15	11:09	Surface Water	X	1
[redacted]	NOV SP-89-S	02-Nov-15	10:26	Surface Water	X	1
[redacted]	NOV TPN-88-S	13-Nov-15	13:17	Surface Water	X	1
[redacted]	NOV TPN-89-S	13-Nov-15	14:03	Surface Water	X	1
[redacted]	NOV TPE-88-S	13-Nov-15	15:26	Surface Water	X	1
[redacted]	NOV TPE-89-S	13-Nov-15	14:58	Surface Water	X	1
[redacted]	NOV TE-88-S	21-Nov-15	10:36	Surface Water	X	1
[redacted]	NOV DUP 1	21-Nov-15	10:36	Surface Water	X	1
[redacted]	NOV TE-89-S	21-Nov-15	11:50	Surface Water	X	1
[redacted]	NOV WAL-57-S	22-Nov-15	10:03	Surface Water	X	1
[redacted]	NOV WAL-58-S	22-Nov-15	10:45	Surface Water	X	1
[redacted]	NOV INUG-76-S	23-Nov-15	10:35	Surface Water	X	1
[redacted]	NOV INUG-77-S	23-Nov-15	11:05	Surface Water	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

[redacted] SHIPMENT RELEASE (client use)			[redacted] SHIPMENT RECEPTION (lab use only)				[redacted] SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	24-Nov-15	7:30	Jean	27Nov	10:30	~~10~~ 8 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 02-DEC-15
Report Date: 11-DEC-15 11:44 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1709504

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-1	L1709504-2	L1709504-3	L1709504-4	L1709504-5
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	21-NOV-15	21-NOV-15	21-NOV-15	22-NOV-15	22-NOV-15
	Sampled Time	10:36	10:36	11:50	10:03	10:45
	Client ID	NOV TE-88-S	NOV CREMP DUP 1	NOV TE-89-S	NOV WAL-57-S	NOV WAL-58-S
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	7.19	7.15	7.57	18.5	18.3
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0056	<0.0050	<0.0050	0.0076	0.0130
	Total Kjeldahl Nitrogen (mg/L)	0.111	0.099	0.105	0.142	0.139
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0028	<0.0020	<0.0020	0.0020
Cyanides	Cyanide, Total (mg/L)	<0.0010 HTD	<0.0010 HTD	0.0014 HTD	<0.0010 HTD	<0.0010
	Cyanide, Free (mg/L)	<0.0010 HTD	<0.0010 HTD	<0.0010 HTD	<0.0010 HTD	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.17	1.13	1.25	1.87	1.68
	Total Organic Carbon (mg/L)	1.72	1.11	1.04	1.80	1.87
Total Metals	Aluminum (Al)-Total (mg/L)	0.0063	0.0059	0.0063	0.0030	0.0038
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00029	0.00023
	Barium (Ba)-Total (mg/L)	0.00219	0.00208	0.00246	0.00262	0.00226
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	1.81	1.74	1.85	4.87	4.58
	Chromium (Cr)-Total (mg/L)	0.00024	0.00013	0.00018	<0.00010	0.00011
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00215	0.00097	0.00088
	Iron (Fe)-Total (mg/L)	0.014	<0.010	<0.010	0.012	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	0.79	0.65	0.70	1.42	1.30
	Manganese (Mn)-Total (mg/L)	0.00086	0.00065	0.00091	0.00113	0.00079
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000199	0.000058	0.000055	0.000325	0.000345
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.40	0.37	0.40	0.52	0.47
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.130	0.122	0.128	0.311	0.269
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.638	0.612	0.646	0.697	0.657
	Strontium (Sr)-Total (mg/L)	0.00947	0.00836	0.00990	0.0251	0.0217
	Sulfur (S)-Total (mg/L)	0.84	0.83	0.87	1.61	1.55

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-6	L1709504-7			
	Description	Surface Water	Surface Water			
	Sampled Date	23-NOV-15	23-NOV-15			
	Sampled Time	10:35	11:05			
	Client ID	NOV INUG-76-S	NOV INUG-77-S			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5.84	5.98			
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0065	0.0059			
	Total Kjeldahl Nitrogen (mg/L)	0.123	0.116			
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0024			
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010			
	Cyanide, Free (mg/L)	<0.0010	<0.0010			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.66	1.55			
	Total Organic Carbon (mg/L)	2.10	1.58			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0071	0.0041			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Total (mg/L)	0.00178	0.00183			
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Total (mg/L)	1.13	1.21			
	Chromium (Cr)-Total (mg/L)	0.00014	0.00011			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Total (mg/L)	0.67	0.72			
	Manganese (Mn)-Total (mg/L)	0.00103	0.00104			
	Mercury (Hg)-Total (mg/L)	<0.0000050	0.0000103			
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.36	0.37			
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Total (mg/L)	0.102	0.110			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	0.552	0.584			
	Strontium (Sr)-Total (mg/L)	0.00648	0.00702			
	Sulfur (S)-Total (mg/L)	<0.50	<0.50			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1709504-1 Surface Water 21-NOV-15 10:36 NOV TE-88-S	L1709504-2 Surface Water 21-NOV-15 10:36 NOV CREMP DUP 1	L1709504-3 Surface Water 21-NOV-15 11:50 NOV TE-89-S	L1709504-4 Surface Water 22-NOV-15 10:03 NOV WAL-57-S	L1709504-5 Surface Water 22-NOV-15 10:45 NOV WAL-58-S
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000039	0.000040	0.000039	0.000050	0.000051
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0019	0.0022	0.0012	0.0010	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00012	0.00028	0.00026
	Barium (Ba)-Dissolved (mg/L)	0.00217	0.00209	0.00240	0.00261	0.00244
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000063
	Calcium (Ca)-Dissolved (mg/L)	1.78	1.71	1.87	5.01	5.00
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00040	0.00028	0.00036	0.00088	0.00091
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000065	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	0.67	0.70	0.71	1.45	1.41
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	0.00017	0.00017	0.00034	0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000297	0.000396
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.37	0.38	0.41	0.52	0.52
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.116	0.121	0.120	0.323	0.283
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.634	0.600	0.646	0.706	0.679
	Strontium (Sr)-Dissolved (mg/L)	0.00889	0.00797	0.00935	0.0247	0.0257
	Sulfur (S)-Dissolved (mg/L)	0.82	0.78	0.87	1.59	1.66

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-6	L1709504-7			
	Description	Surface Water	Surface Water			
	Sampled Date	23-NOV-15	23-NOV-15			
	Sampled Time	10:35	11:05			
	Client ID	NOV INUG-76-S	NOV INUG-77-S			
Grouping	**Analyte**					
WATER						
Total Metals	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Total (mg/L)	0.000038	0.000038			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0011	0.0020			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.00170	0.00187			
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Calcium (Ca)-Dissolved (mg/L)	1.18	1.21			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00029	0.00042			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010			
	Magnesium (Mg)-Dissolved (mg/L)	0.70	0.72			
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	0.38	0.39			
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050			
	Silicon (Si)-Dissolved (mg/L)	0.101	0.104			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	0.571	0.579			
	Strontium (Sr)-Dissolved (mg/L)	0.00665	0.00688			
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1709504-1	L1709504-2	L1709504-3	L1709504-4	L1709504-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	21-NOV-15	21-NOV-15	21-NOV-15	22-NOV-15	22-NOV-15
Sampled Time	10:36	10:36	11:50	10:03	10:45
Client ID	NOV TE-88-S	NOV CREMP DUP 1	NOV TE-89-S	NOV WAL-57-S	NOV WAL-58-S
Grouping / **Analyte**					
WATER					
Dissolved Metals Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Uranium (U)-Dissolved (mg/L)	0.000032	0.000030	0.000031	0.000044	0.000055
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	0.0011	<0.0010
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709504-6	L1709504-7			
	Description	Surface Water	Surface Water			
	Sampled Date	23-NOV-15	23-NOV-15			
	Sampled Time	10:35	11:05			
	Client ID	NOV INUG-76-S	NOV INUG-77-S			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030			
	Uranium (U)-Dissolved (mg/L)	0.000033	0.000032			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0012	<0.0010			
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030			

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cadmium (Cd)-Total	DLM	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Phosphorus (P)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Aluminum (Al)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Boron (B)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Molybdenum (Mo)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Total	MS-B	L1709504-1, -2, -3, -4, -5, -6, -7

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-L-CFA-VA	Water	Low Level Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA	Water	Low Level Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

Reference Information

HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA	Water	Total Metals in Water by ICPOES	EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Reference Information

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1:	efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2:	gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3:	ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:	Q39503	
Lab Work Order # (lab use only)	L1709504	ALS Contact:	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals						Number of Containers
					P	F/P	P	P	F/P	P	F/P						
	NOV TE-88-S	21-Nov-15	10:36	Surface Water	X	X	X	X	X	X	X						7
	NOV CREMP-DUP 1	21-Nov-15	10:36	Surface Water	X	X	X	X	X	X	X						7
	NOV TE-89-S	21-Nov-15	11:50	Surface Water	X	X	X	X	X	X	X						7
	NOV WAL-57-S	22-Nov-15	10:03	Surface Water	X	X	X	X	X	X	X						7
	NOV WAL-58-S	22-Nov-15	10:45	Surface Water	X	X	X	X	X	X	X						7
	NOV INUG-76-S	23-Nov-15	10:35	Surface Water	X	X	X	X	X	X	X						7
	NOV INUG-77-S	23-Nov-15	11:05	Surface Water	X	X	X	X	X	X	X						7

L1709504-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	24-Nov-15	7:30	Jean	2 Dec	10:15	0.2 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 30-OCT-15
Report Date: 10-NOV-15 13:26 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1695990

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers: 1, 2
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-1	L1695990-2	L1695990-3	L1695990-4	L1695990-5
Description	Water	Water	Water	Water	Water
Sampled Date	06-SEP-15	06-SEP-15	26-SEP-15	26-SEP-15	27-SEP-15
Sampled Time					
Client ID	SP-86-S	SP-87-S	WAL-55-S	WAL-56-S	TPS-54-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.184	0.277	0.642	0.584	0.288

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-6	L1695990-7	L1695990-8	L1695990-9	L1695990-10
Description	Water	Water	Water	Water	Water
Sampled Date	27-SEP-15	27-SEP-15	27-SEP-15	27-SEP-15	27-SEP-15
Sampled Time					
Client ID	TPS-55-S	TPN-86-S	TPN-87-S	TPE-86-S	TPE-87-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.374	0.347	0.329	0.330	0.293

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-11	L1695990-12	L1695990-13	L1695990-14	L1695990-15
Description	Water	Water	Water	Water	Water
Sampled Date	27-SEP-15	01-OCT-15	01-OCT-15	04-OCT-15	04-OCT-15
Sampled Time					
Client ID	SEPT DUP 2	INUG-74-S	INUG-75-S	TE-86-S	TE-87-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.322	0.323	0.366	0.258	0.327

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-16	L1695990-17	L1695990-18	L1695990-19	
Description	Water	Water	Water	Water	
Sampled Date	04-OCT-15	04-OCT-15	04-OCT-15	04-OCT-15	
Sampled Time					
Client ID	TEFF-41-S	TEFF-42-S	PDL-41-S	SEPT DUP 3	
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.277	0.302	0.346	0.316	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHLOROA-F-VA	Filter	Chlorophyll a by Fluorometer (Filter)	EPA 445.0

This analysis is done using procedures modified from EPA Method 445.0. Chlorophyll-a is determined by a routine acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: Meadowbank Surfacewater	F
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)	L1695990	ALS Contact:	Sampler:



Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll 'a'
	SP-86-S	06-Sep-15		Water	x
	SP-87-S	06-Sep-15		Water	x
	WAL-55-S	26-Sep-15		Water	x
	WAL-56-S	26-Sep-15		Water	x
	TPS-54-S	27-Sep-15		Water	x
	TPS-55-S	27-Sep-15		Water	x
	TPN-86-S	27-Sep-15		Water	x
	TPN-87-S	27-Sep-15		Water	x
	TPE-86-S	27-Sep-15		Water	x
	TPE-87-S	27-Sep-15		Water	x
	SEPT DUP 2	27-Sep-15		Water	x
	INUG-74-S	01-Oct-15		Water	x
	INUG-75-S	01-Oct-15		Water	x
	TE-86-S	04-Oct-15		Water	x
	TE-87-S	04-Oct-15		Water	x
	TEFF-41-S	04-Oct-15		Water	x
	TEFF-42-S	04-Oct-15		Water	x
	PDL-41-S	04-Oct-15		Water	x
	SEPT DUP 3	04-Oct-15		Water	x

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details



L1695990-COFC

Volume filtered : 500 ml.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observatic Yes / No ? If Yes add
Tom Thomson	22-Oct-15		lady	Oct-30	11AM	13.4 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 05-OCT-15
Report Date: 15-OCT-15 17:12 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1683184

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACE WATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1683184-1 Surface Water 26-SEP-15 14:13 WAL-55-S	L1683184-2 Surface Water 26-SEP-15 14:36 WAL-56-S	L1683184-3 Surface Water 27-SEP-15 09:20 TPS-53-S	L1683184-4 Surface Water 27-SEP-15 09:55 TPS-54-S	L1683184-5 Surface Water 27-SEP-15 13:46 TPN-87-S
WATER						
Physical Tests	Conductivity (uS/cm)	38.7	42.0	27.6	27.3	27.8
	Hardness (as CaCO3) (mg/L)	16.3	17.7	9.20	9.09	9.09
	pH (pH)	7.21	7.23	6.90	6.88	6.91
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	29.6	24.4	18.8	19.5	20.1
	Turbidity (NTU)	0.29	0.30	0.27	0.27	0.30
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	13.0	13.3	5.7	5.6	5.7
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	13.0	13.3	5.7	5.6	5.7
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	0.0071	0.0056	0.0052
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.76	0.79	0.74	0.73	0.74
	Fluoride (F) (mg/L)	0.048	0.046	0.064	0.062	0.064
	Nitrate (as N) (mg/L)	0.0307	0.0451	0.0525	0.0515	0.0481
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.140	0.131	0.101	0.104	0.146
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	0.58	0.62	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	4.08	4.45	4.85	4.83	4.86
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.92	1.74	1.20	1.17	1.60
	Total Organic Carbon (mg/L)	1.94	1.77	1.21	1.17	1.40
Total Metals	Aluminum (Al)-Total (mg/L)	0.0072	0.0062	0.0086	0.0099	0.0076
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00031	0.00035	0.00020	0.00021	0.00019
	Barium (Ba)-Total (mg/L)	0.00212	0.00219	0.00301	0.00304	0.00305
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	4.48	4.90	2.20	2.23	2.23
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1683184-6	L1683184-7	L1683184-8	L1683184-9	L1683184-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	27-SEP-15	27-SEP-15	27-SEP-15	27-SEP-15	
Sampled Time	14:15	14:50	14:50	15:23	
Client ID	TPN-86-S	TPE-86-S	SEPT DUP 2	TPE-87-S	TRAVEL BLANK
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	27.3	28.9	29.6	29.6	<2.0
Hardness (as CaCO3) (mg/L)	9.29	10.4	10.6	10.7	<0.50
pH (pH)	6.93	6.98	6.96	6.98	5.34
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (mg/L)	18.0	27.9	29.9	24.7	<3.0
Turbidity (NTU)	0.27	0.40	0.38	0.34	<0.10
Anions and Nutrients Alkalinity, Bicarbonate (as CaCO3) (mg/L)	6.1	8.2	7.4	7.7	<1.0
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	6.1	8.2	7.4	7.7	<1.0
Ammonia, Total (as N) (mg/L)	0.0108	<0.0050	<0.0050	<0.0050	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	0.74	0.70	0.70	0.70	<0.10
Fluoride (F) (mg/L)	0.064	0.073	0.073	0.072	<0.020
Nitrate (as N) (mg/L)	0.0476	0.0085	0.0088	0.0087	<0.0050
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen (mg/L)	0.119	0.107	0.112	0.094	<0.050
Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Phosphorus (P)-Total (mg/L)	<0.0020	0.0021	<0.0020	<0.0020	<0.0020
Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Sulfate (SO4) (mg/L)	4.86	4.59	4.60	4.60	<0.30
Cyanides Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.39	1.53	1.41	1.33	
Total Organic Carbon (mg/L)	1.59	1.42	1.37	1.27	<0.50
Total Metals Aluminum (Al)-Total (mg/L)	0.0089	0.0113	0.0099	0.0102	<0.0030
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00021	0.00044	0.00041	0.00044	<0.00010
Barium (Ba)-Total (mg/L)	0.00299	0.00301	0.00293	0.00297	<0.000050
Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total (mg/L)	2.21	2.65	2.62	2.65	<0.050
Chromium (Cr)-Total (mg/L)	0.00015	0.00010	<0.00010	0.00013	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1683184-1 Surface Water 26-SEP-15 14:13 WAL-55-S	L1683184-2 Surface Water 26-SEP-15 14:36 WAL-56-S	L1683184-3 Surface Water 27-SEP-15 09:20 TPS-53-S	L1683184-4 Surface Water 27-SEP-15 09:55 TPS-54-S	L1683184-5 Surface Water 27-SEP-15 13:46 TPN-87-S
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00088	0.00092	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.024	0.020	0.012	0.015	0.013
	Lead (Pb)-Total (mg/L)	0.000062	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	1.31	1.40	0.87	0.88	0.87
	Manganese (Mn)-Total (mg/L)	0.00161	0.00129	0.00147	0.00150	0.00144
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.000306	0.000351	0.000178	0.000180	0.000173
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.50	0.49	0.49	0.51	0.49
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.306	0.319	0.056	0.053	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.605	0.635	1.13	1.15	1.17
	Strontium (Sr)-Total (mg/L)	0.0208	0.0234	0.0104	0.0104	0.0103
	Sulfur (S)-Total (mg/L)	1.43	1.58	1.66	1.61	1.62
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000051	0.000051	0.000043	0.000043	0.000041
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0016	0.0013	0.0014	0.0017	0.0016
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00024	0.00028	0.00016	0.00017	0.00016
	Barium (Ba)-Dissolved (mg/L)	0.00205	0.00207	0.00297	0.00296	0.00295
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	4.42	4.83	2.24	2.21	2.21
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1683184-6	L1683184-7	L1683184-8	L1683184-9	L1683184-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	27-SEP-15	27-SEP-15	27-SEP-15	27-SEP-15	
Sampled Time	14:15	14:50	14:50	15:23	
Client ID	TPN-86-S	TPE-86-S	SEPT DUP 2	TPE-87-S	TRAVEL BLANK
Grouping / **Analyte**					
WATER					
Total Metals Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)-Total (mg/L)	0.013	0.019	0.017	0.021	<0.010
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Total (mg/L)	0.87	0.98	0.97	0.96	<0.10
Manganese (Mn)-Total (mg/L)	0.00149	0.00136	0.00128	0.00125	<0.00010
Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total (mg/L)	0.000190	0.000194	0.000176	0.000184	<0.000050
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total (mg/L)	0.49	0.55	0.52	0.51	<0.10
Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total (mg/L)	<0.050	0.062	0.057	0.054	<0.050
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.16	1.09	1.05	1.09	<0.050
Strontium (Sr)-Total (mg/L)	0.0104	0.0118	0.0113	0.0115	<0.00020
Sulfur (S)-Total (mg/L)	1.64	1.54	1.55	1.58	<0.50
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.00030	0.00039	0.00035	<0.00030	<0.00030
Uranium (U)-Total (mg/L)	0.000044	0.000050	0.000047	0.000049	<0.000010
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
Aluminum (Al)-Dissolved (mg/L)	0.0027	0.0020	0.0018	0.0017	
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic (As)-Dissolved (mg/L)	0.00018	0.00038	0.00038	0.00040	
Barium (Ba)-Dissolved (mg/L)	0.00304	0.00281	0.00287	0.00281	
Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium (Ca)-Dissolved (mg/L)	2.26	2.59	2.65	2.68	
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1683184-1 Surface Water 26-SEP-15 14:13 WAL-55-S	L1683184-2 Surface Water 26-SEP-15 14:36 WAL-56-S	L1683184-3 Surface Water 27-SEP-15 09:20 TPS-53-S	L1683184-4 Surface Water 27-SEP-15 09:55 TPS-54-S	L1683184-5 Surface Water 27-SEP-15 13:46 TPN-87-S
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00074	0.00077	0.00032	0.00033	0.00033
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	1.29	1.37	0.88	0.87	0.87
	Manganese (Mn)-Dissolved (mg/L)	0.00044	0.00038	0.00040	0.00049	0.00057
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000316	0.000330	0.000171	0.000165	0.000165
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.47	0.48	0.48	0.50	0.47
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.292	0.311	<0.050	<0.050	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.591	0.593	1.11	1.13	1.13
	Strontium (Sr)-Dissolved (mg/L)	0.0206	0.0227	0.0102	0.0101	0.0102
	Sulfur (S)-Dissolved (mg/L)	1.40	1.51	1.59	1.59	1.64
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000043	0.000044	0.000033	0.000034	0.000034
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1683184-6	L1683184-7	L1683184-8	L1683184-9	L1683184-10
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	27-SEP-15	27-SEP-15	27-SEP-15	27-SEP-15	
Sampled Time	14:15	14:50	14:50	15:23	
Client ID	TPN-86-S	TPE-86-S	SEPT DUP 2	TPE-87-S	TRAVEL BLANK
Grouping / **Analyte**					
WATER					
Dissolved Metals Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Copper (Cu)-Dissolved (mg/L)	0.00041	0.00035	0.00035	0.00034	
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Magnesium (Mg)-Dissolved (mg/L)	0.89	0.95	0.96	0.97	
Manganese (Mn)-Dissolved (mg/L)	0.00058	0.00029	0.00046	0.00033	
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Molybdenum (Mo)-Dissolved (mg/L)	0.000174	0.000169	0.000177	0.000171	
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
Potassium (K)-Dissolved (mg/L)	0.49	0.51	0.51	0.51	
Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Silicon (Si)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium (Na)-Dissolved (mg/L)	1.18	1.03	1.07	1.05	
Strontium (Sr)-Dissolved (mg/L)	0.0103	0.0112	0.0114	0.0113	
Sulfur (S)-Dissolved (mg/L)	1.62	1.54	1.53	1.56	
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	
Uranium (U)-Dissolved (mg/L)	0.000036	0.000039	0.000041	0.000039	
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Alkalinity, Total (as CaCO3)	B	L1683184-3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLDS	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLDS	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLDS	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLDS	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLDS	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLDS	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLDS	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Total	MS-B	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicate (as SiO2)	MS-B	L1683184-1, -10, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA Water Diss. Be (low) in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA Water Total Be (Low) in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BR-L-IC-N-VA Water Bromide in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA Water Total organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-IC-N-VA Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CL-L-IC-N-VA Water Chloride in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-L-CFA-VA Water Low Level Free Cyanide in water by CFA ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA Water Low Level Total Cyanide in water by CFA ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by

Reference Information

colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SILICATE-COL-VA Water Silicate by Colourimetric analysis APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA Water Low Level TDS (3.0mg/L) by Gravimetric APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

ALS Environmental ● *Rush Processing*

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	**Analysis Request**
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)	L1683184	**ALS Contact:**	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC, Ammonia, TKN, Total P	DOC	T-CN (Low), Free CN (Low)	Total mercury	Dissolved mercury	Total Metals	Dissolved Metals	Number of Containers
					P	F/P	P	P	F/P	P	F/P	
	WAL-55-S	26-Sep-15	14:13	Surface Water	X	X	X	X	X	X	X	7
	WAL-56-S	26-Sep-15	14:36	Surface Water	X	X	X	X	X	X	X	7
	TPS-53-S	27-Sep-15	9:20	Surface Water	X	X	X	X	X	X	X	7
	TPS-54-S	27-Sep-15	9:55	Surface Water	X	X	X	X	X	X	X	7
	TPN-87-S	27-Sep-15	13:46	Surface Water	X	X	X	X	X	X	X	7
	TPN-86-S	27-Sep-15	14:15	Surface Water	X	X	X	X	X	X	X	7
	TPE-86-S	27-Sep-15	14:50	Surface Water	X	X	X	X	X	X	X	7
	SEPT DUP 2	27-Sep-15	14:50	Surface Water	X	X	X	X	X	X	X	7
	TPE-87-S	27-Sep-15	15:23	Surface Water	X	X	X	X	X	X	X	7

L1683184-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	27-Sep-15	9:00	Jean	30ct	11:50	12,12°C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 13-OCT-15
Report Date: 20-OCT-15 16:00 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1686791

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1686791-1 Surface Water 01-OCT-15 11:28 INUG-74-S	L1686791-2 Surface Water 01-OCT-15 11:57 INUG-75-S	L1686791-3 Surface Water 04-OCT-15 10:45 PDL-41-S	L1686791-4 Surface Water 04-OCT-15 10:45 SEPT-DUP-3	L1686791-5 Surface Water 04-OCT-15 13:00 TEFF-41-S
WATER						
Physical Tests	Conductivity (uS/cm)	15.9	16.7	23.0	22.2	17.4
	Hardness (as CaCO3) (mg/L)	5.75	5.88	8.91	9.07	6.26
	pH (pH)	6.73	6.75	7.07	7.03	6.83
	Total Suspended Solids (mg/L)	1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	13.0	11.9	17.8	17.7	15.1
	Turbidity (NTU)	0.38	0.37	0.23	0.27	0.31
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	5.7	5.3	8.2	7.6	4.6
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	5.7	5.3	8.2	7.6	4.6
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.75	0.75	0.60	0.60	0.56
	Fluoride (F) (mg/L)	0.058	0.059	0.035	0.036	0.054
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.145	0.135	0.172	0.103	0.106
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0025	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	0.87	0.87	1.63	1.61	2.00
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.55	1.63	1.45	1.57	1.04
	Total Organic Carbon (mg/L)	1.92	1.84	1.64	1.50	1.12
Total Metals	Aluminum (Al)-Total (mg/L)	0.0124	0.0109	0.0059	0.0049	0.0084
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00016	0.00016	<0.00010
	Barium (Ba)-Total (mg/L)	0.00169	0.00179	0.00202	0.00192	0.00205
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	1.12	1.17	2.24	2.23	1.48
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1686791-6	L1686791-7	L1686791-8	L1686791-9	
Description	Surface Water	Surface Water	Surface Water	Surface Water	
Sampled Date	04-OCT-15	04-OCT-15	04-OCT-15	30-SEP-15	
Sampled Time	13:25	14:30	14:08	17:00	
Client ID	TEFF-42-F	TE-86-S	TE-87-S	SEPT-EB-3	
Grouping	**Analyte**				
WATER					
Physical Tests	Conductivity (uS/cm)	16.8	24.2	23.2	<2.0
	Hardness (as CaCO3) (mg/L)	5.94	9.17	8.56	<0.50
	pH (pH)	6.83	7.04	7.01	5.58
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	13.4	16.7	16.8	<3.0
	Turbidity (NTU)	0.33	0.46	0.44	<0.10
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	4.8	7.4	7.1	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	4.8	7.4	7.1	<1.0
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.56	0.64	0.63	<0.10
	Fluoride (F) (mg/L)	0.054	0.063	0.062	<0.020
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.098	0.146	0.134	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	1.95	2.76	2.61	<0.30
Cyanides	Cyanide, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Cyanide, Free (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.15	1.29	1.24	<0.50
	Total Organic Carbon (mg/L)	1.02	1.41	1.19	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0091	0.0148	0.0152	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	0.00012	0.00014	<0.00010
	Barium (Ba)-Total (mg/L)	0.00202	0.00212	0.00227	0.000107 RRV
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Total (mg/L)	1.39	2.28	2.17	0.089 RRV
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	0.00013	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1686791-1	L1686791-2	L1686791-3	L1686791-4	L1686791-5
	Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Sampled Date	01-OCT-15	01-OCT-15	04-OCT-15	04-OCT-15	04-OCT-15
	Sampled Time	11:28	11:57	10:45	10:45	13:00
	Client ID	INUG-74-S	INUG-75-S	PDL-41-S	SEPT-DUP-3	TEFF-41-S
Grouping	**Analyte**					
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.022	0.023	0.012	<0.010	0.014
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	0.68	0.72	0.80	0.78	0.60
	Manganese (Mn)-Total (mg/L)	0.00225	0.00224	0.00147	0.00140	0.00134
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00055	0.00058	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.36	0.39	0.35	0.35	0.37
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	0.122	0.129	0.118	0.119	0.116
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.577	0.560	0.508	0.475	0.560
	Strontium (Sr)-Total (mg/L)	0.00641	0.00659	0.00947	0.00918	0.00764
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	0.64	0.61	0.74
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	0.00038
	Uranium (U)-Total (mg/L)	0.000043	0.000044	0.000021	0.000021	0.000038
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB	LAB	LAB
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0018	0.0024	0.0036	0.0019	0.0020
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00014	0.00013	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00166	0.00164	0.00194	0.00182	0.00199
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	1.15	1.18	2.26	2.31	1.50
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1686791-6	L1686791-7	L1686791-8	L1686791-9	
	Description	Surface Water	Surface Water	Surface Water	Surface Water	
	Sampled Date	04-OCT-15	04-OCT-15	04-OCT-15	30-SEP-15	
	Sampled Time	13:25	14:30	14:08	17:00	
	Client ID	TEFF-42-F	TE-86-S	TE-87-S	SEPT-EB-3	
Grouping	**Analyte**					
WATER						
Total Metals	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	0.016	0.025	0.024	<0.010	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.000088 RRV	
	Lithium (Li)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Magnesium (Mg)-Total (mg/L)	0.58	0.82	0.80	<0.10	
	Manganese (Mn)-Total (mg/L)	0.00130	0.00155	0.00122	<0.00010	
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000074	0.000078	<0.000050	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	0.40	0.43	0.43	<0.10	
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Silicon (Si)-Total (mg/L)	0.115	0.182	0.182	<0.050	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	0.566	0.670	0.668	<0.050	
	Strontium (Sr)-Total (mg/L)	0.00757	0.0111	0.0109	0.00027 RRV	
	Sulfur (S)-Total (mg/L)	0.73	1.01	0.97	<0.50	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	0.00038	0.00075	<0.00090 DLM	<0.00030	
	Uranium (U)-Total (mg/L)	0.000037	0.000065	0.000059	0.000012 RRV	
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB	LAB	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	0.0025	0.0015	<0.0010	
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00012	<0.00010	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.00200	0.00199	0.00213	<0.000050	
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Calcium (Ca)-Dissolved (mg/L)	1.41	2.32	2.15	<0.050	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1686791-1 Surface Water 01-OCT-15 11:28 INUG-74-S	L1686791-2 Surface Water 01-OCT-15 11:57 INUG-75-S	L1686791-3 Surface Water 04-OCT-15 10:45 PDL-41-S	L1686791-4 Surface Water 04-OCT-15 10:45 SEPT-DUP-3	L1686791-5 Surface Water 04-OCT-15 13:00 TEFF-41-S
Sample ID		L1686791-1	L1686791-2	L1686791-3	L1686791-4	L1686791-5
Description		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date		01-OCT-15	01-OCT-15	04-OCT-15	04-OCT-15	04-OCT-15
Sampled Time		11:28	11:57	10:45	10:45	13:00
Client ID		INUG-74-S	INUG-75-S	PDL-41-S	SEPT-DUP-3	TEFF-41-S
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00029	0.00030	0.00048	0.00041	<0.00020
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000076	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	0.70	0.72	0.79	0.80	0.61
	Manganese (Mn)-Dissolved (mg/L)	0.00051	0.00050	0.00043	0.00037	0.00042
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.00053	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.38	0.39	0.32	0.34	0.37
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	0.100	0.108	0.107	0.106	0.104
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.552	0.565	0.503	0.492	0.557
	Strontium (Sr)-Dissolved (mg/L)	0.00644	0.00641	0.00904	0.00908	0.00763
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50	0.59	0.57	0.68
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000033	0.000034	0.000018	0.000018	0.000029
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1686791-6 Surface Water 04-OCT-15 13:25 TEFF-42-F	L1686791-7 Surface Water 04-OCT-15 14:30 TE-86-S	L1686791-8 Surface Water 04-OCT-15 14:08 TE-87-S	L1686791-9 Surface Water 30-SEP-15 17:00 SEPT-EB-3	
Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**						
WATER						
Dissolved Metals	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00032	0.00030	<0.00020	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000052	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	0.58	0.82	0.78	<0.10	
	Manganese (Mn)-Dissolved (mg/L)	0.00039	0.00095	0.00045	<0.00010	
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000069	0.000064	<0.000050	
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)	0.38	0.43	0.40	<0.10	
	Selenium (Se)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Silicon (Si)-Dissolved (mg/L)	0.101	0.160	0.153	<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	0.629	0.683	0.630	<0.050	
	Strontium (Sr)-Dissolved (mg/L)	0.00734	0.0110	0.0104	<0.00020	
	Sulfur (S)-Dissolved (mg/L)	0.79	0.96	0.91	<0.50	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	
	Uranium (U)-Dissolved (mg/L)	0.000028	0.000047	0.000043	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Alkalinity, Total (as CaCO3)	B	L1686791-9
Method Blank	Conductivity	B	L1686791-3, -4, -5, -6, -7, -8
Duplicate	Antimony (Sb)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lithium (Li)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLDS	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bromide (Br)	DLDS	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLDS	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLDS	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLDS	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1686791-5
Matrix Spike	Barium (Ba)-Total	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1686791-1, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLA	Detection Limit adjusted for required dilution
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA Water Total organic carbon by combustion APHA 5310B TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-L-IC-N-VA Water Chloride in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-L-CFA-VA Water Low Level Free Cyanide in water by CFA ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-L-CFA-VA Water Low Level Total Cyanide in water by CFA ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-VA Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

Reference Information

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SILICATE-COL-VA Water Silicate by Colourimetric analysis APHA 4500-SiO2 E.

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 E. "Silica". Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-LOW-VA Water Low Level TDS (3.0mg/L) by Gravimetric APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl

Reference Information

Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Surfacewater	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Conventionals** see notes	TSS-Low, TDS-Low	Number of Containers
	INUG-74-S	01-Oct-15	11:28	Surface Water	X	X	2
	INUG-75-S	01-Oct-15	11:57	Surface Water	X	X	2
	PDL-41-S	04-Oct-15	10:45	Surface Water	X	X	2
	SEPT-DUP-3	04-Oct-15	10:45	Surface Water	X	X	2
	TEFF-41-S	04-Oct-15	13:00	Surface Water	X	X	2
	TEFF-42-F	04-Oct-15	13:25	Surface Water	X	X	2
	TE-86-S	04-Oct-15	14:30	Surface Water	X	X	2
	TE-87-S	04-Oct-15	14:08	Surface Water	X	X	2
	SEPT-EB-3	30-Sep-15	17:00	Surface Water	X	X	2

L1686791-COFC

Short Holding Time

● Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

**Conventionals includes: Alk Species, pH, EC, Turbidity, Conductivity, Anions (F, NO2, NO3, Br, SO4), low-level Chloride, Silicate, TD-P, and Ortho-PO4.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Tom Thomson	27-Sep-15	9:00	Shofal	OCT. 13	1150	12 °C				

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 30-OCT-15
Report Date: 10-NOV-15 13:26 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1695990

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers: 1, 2
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-1	L1695990-2	L1695990-3	L1695990-4	L1695990-5
Description	Water	Water	Water	Water	Water
Sampled Date	06-SEP-15	06-SEP-15	26-SEP-15	26-SEP-15	27-SEP-15
Sampled Time					
Client ID	SP-86-S	SP-87-S	WAL-55-S	WAL-56-S	TPS-54-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.184	0.277	0.642	0.584	0.288

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-6	L1695990-7	L1695990-8	L1695990-9	L1695990-10
Description	Water	Water	Water	Water	Water
Sampled Date	27-SEP-15	27-SEP-15	27-SEP-15	27-SEP-15	27-SEP-15
Sampled Time					
Client ID	TPS-55-S	TPN-86-S	TPN-87-S	TPE-86-S	TPE-87-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.374	0.347	0.329	0.330	0.293

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-11	L1695990-12	L1695990-13	L1695990-14	L1695990-15
Description	Water	Water	Water	Water	Water
Sampled Date	27-SEP-15	01-OCT-15	01-OCT-15	04-OCT-15	04-OCT-15
Sampled Time					
Client ID	SEPT DUP 2	INUG-74-S	INUG-75-S	TE-86-S	TE-87-S
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.322	0.323	0.366	0.258	0.327

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1695990-16	L1695990-17	L1695990-18	L1695990-19	
Description	Water	Water	Water	Water	
Sampled Date	04-OCT-15	04-OCT-15	04-OCT-15	04-OCT-15	
Sampled Time					
Client ID	TEFF-41-S	TEFF-42-S	PDL-41-S	SEPT DUP 3	
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.277	0.302	0.346	0.316	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CHLOROA-F-VA	Filter	Chlorophyll a by Fluorometer (Filter)	EPA 445.0

This analysis is done using procedures modified from EPA Method 445.0. Chlorophyll-a is determined by a routine acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☐ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: Meadowbank Surfacewater	F
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #: Q39503	
Lab Work Order # (lab use only)	L1695990	ALS Contact:	Sampler:



Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll 'a'
	SP-86-S	06-Sep-15		Water	x
	SP-87-S	06-Sep-15		Water	x
	WAL-55-S	26-Sep-15		Water	x
	WAL-56-S	26-Sep-15		Water	x
	TPS-54-S	27-Sep-15		Water	x
	TPS-55-S	27-Sep-15		Water	x
	TPN-86-S	27-Sep-15		Water	x
	TPN-87-S	27-Sep-15		Water	x
	TPE-86-S	27-Sep-15		Water	x
	TPE-87-S	27-Sep-15		Water	x
	SEPT DUP 2	27-Sep-15		Water	x
	INUG-74-S	01-Oct-15		Water	x
	INUG-75-S	01-Oct-15		Water	x
	TE-86-S	04-Oct-15		Water	x
	TE-87-S	04-Oct-15		Water	x
	TEFF-41-S	04-Oct-15		Water	x
	TEFF-42-S	04-Oct-15		Water	x
	PDL-41-S	04-Oct-15		Water	x
	SEPT DUP 3	04-Oct-15		Water	x

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details



L1695990-COFC

Volume filtered : 500 ml.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observatic Yes / No ? If Yes add
Tom Thomson	22-Oct-15		lady	Oct-30	11AM	13.4 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Maggie McConnell
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 09-SEP-15
Report Date: 22-SEP-15 13:50 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1669873

Project P.O. #: NOT SUBMITTED
Job Reference: CREMP MEADOWBANK SEDIMENT
C of C Numbers: 2, 3, 4, 5, OL-1768
Legal Site Desc:

Comments: Please note that Silver (Ag) results for Filter samples are denoted with 'RRR' qualifiers due to a failing Laboratory Control Standard associated with those results. Due to the destructive nature of Filter analysis the testing could not be repeated and the results for Silver (Ag) should be considered approximate values.

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-94 Filter 14-AUG-15 CREMP SWIPE-1	L1669873-95 Filter 17-AUG-15 CREMP SWIPE-2	L1669873-96 Filter 17-AUG-15 CREMP SWIPE-3	L1669873-97 Filter 26-AUG-15 CREMP SWIPE-4	L1669873-98 Filter 26-AUG-15 CREMP SWIPE-5
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
FILTER						
Metals	Aluminum (Al)-Total (mg)	0.015	<0.010	0.017	<0.010	0.015
	Antimony (Sb)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Arsenic (As)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Barium (Ba)-Total (mg)	<0.00050	0.00051	0.00076	<0.00050	<0.00050
	Beryllium (Be)-Total (mg)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Bismuth (Bi)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Calcium (Ca)-Total (mg)	0.069	0.245	0.143	<0.050	<0.050
	Chromium (Cr)-Total (mg)	0.0079	0.0081	0.0104	0.0025	0.0049
	Cobalt (Co)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Copper (Cu)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg)	0.0641	0.0463	0.0701	0.0250	0.0895
	Lead (Pb)-Total (mg)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Lithium (Li)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg)	0.0108	0.0075	0.0122	0.0072	0.0090
	Manganese (Mn)-Total (mg)	0.00114	0.00077	0.00129	0.00051	0.00117
	Molybdenum (Mo)-Total (mg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Nickel (Ni)-Total (mg)	0.0035	0.0041	0.0047	<0.0030	<0.0030
	Phosphorus (P)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Potassium (K)-Total (mg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Selenium (Se)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Silver (Ag)-Total (mg)	<0.00050 RRR	<0.00050 RRR	<0.00050 RRR	<0.00050 RRR	<0.00050 RRR
	Sodium (Na)-Total (mg)	0.11	<0.10	<0.10	<0.10	<0.10
	Strontium (Sr)-Total (mg)	0.00032	0.00066	0.00045	<0.00030	<0.00030
	Thallium (Tl)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Tin (Sn)-Total (mg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Titanium (Ti)-Total (mg)	0.00061	0.00050	0.00091	<0.00050	0.00051
	Vanadium (V)-Total (mg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Zinc (Zn)-Total (mg)	0.00208	0.00473	0.00306	0.00134	0.00046

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-99 Filter 27-AUG-15 CREMP SWIPE-6	L1669873-100 Filter 28-AUG-15 CREMP SWIPE-7	L1669873-101 Filter 28-AUG-15 CREMP SWIPE-8	L1669873-102 Filter 30-AUG-15 CREMP SWIPE-9	L1669873-103 Filter 30-AUG-15 CREMP SWIPE-10
FILTER						
Metals	Aluminum (Al)-Total (mg)	<0.010	0.017	0.014	0.020	0.013
	Antimony (Sb)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Arsenic (As)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Barium (Ba)-Total (mg)	<0.00050	<0.00050	<0.00050	0.00072	<0.00050
	Beryllium (Be)-Total (mg)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Bismuth (Bi)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Calcium (Ca)-Total (mg)	<0.050	<0.050	0.060	<0.050	0.057
	Chromium (Cr)-Total (mg)	0.0029	0.0059	0.0047	0.0055	0.0114
	Cobalt (Co)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Copper (Cu)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg)	0.0391	0.0391	0.0462	0.0638	0.0737
	Lead (Pb)-Total (mg)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Lithium (Li)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg)	0.0079	0.0667	0.104	0.0592	0.0951
	Manganese (Mn)-Total (mg)	0.00076	0.00100	0.00134	0.00120	0.00151
	Molybdenum (Mo)-Total (mg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Nickel (Ni)-Total (mg)	<0.0030	<0.0030	<0.0030	<0.0030	0.0052
	Phosphorus (P)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Potassium (K)-Total (mg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Selenium (Se)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Silver (Ag)-Total (mg)	<0.00050 RRR	<0.00050 RRR	<0.00050 RRR	<0.00050 RRR	<0.00050 RRR
	Sodium (Na)-Total (mg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Strontium (Sr)-Total (mg)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Thallium (Tl)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Tin (Sn)-Total (mg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Titanium (Ti)-Total (mg)	<0.00050	<0.00050	0.00060	0.00073	<0.00050
	Vanadium (V)-Total (mg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Zinc (Zn)-Total (mg)	0.00055	0.00087	0.00145	0.00202	0.00182

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-1	L1669873-2	L1669873-3	L1669873-4	L1669873-5
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	13-AUG-15	13-AUG-15	13-AUG-15	13-AUG-15	13-AUG-15
Sampled Time					
Client ID	SP-1	SP-2	SP-3	SP-4	SP-5
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	86.2	86.0	86.2	84.6	77.8
pH (1:2 soil:water) (pH)	6.33	6.69	6.60	6.57	6.35
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)	2.71	2.48	2.27	1.69	4.89
% Silt (0.063mm - 4um) (%)	78.5	77.2	77.1	77.9	62.7
% Clay (<4um) (%)	18.8	20.3	20.6	20.4	32.4
Texture	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon Total Organic Carbon (%)	4.33	4.37	4.70	4.22	2.66
Metals Aluminum (Al) (mg/kg)	21700	23100	22800	23100	31100
Antimony (Sb) (mg/kg)	0.27	0.28	0.32	0.30	0.22
Arsenic (As) (mg/kg)	35.3	30.0	34.2	32.7	25.3
Barium (Ba) (mg/kg)	138	130	117	144	142
Beryllium (Be) (mg/kg)	1.73	1.73	1.73	1.81	2.26
Bismuth (Bi) (mg/kg)	1.96	2.00	2.01	2.07	2.73
Boron (B) (mg/kg)	8.9	9.8	9.3	8.5	10.6
Cadmium (Cd) (mg/kg)	0.372	0.279	0.236	0.315	0.121
Calcium (Ca) (mg/kg)	2610	2490	2550	2440	2430
Chromium (Cr) (mg/kg)	87.2	97.7	92.3	89.4	92.3
Cobalt (Co) (mg/kg)	18.1	17.1	15.9	17.9	15.5
Copper (Cu) (mg/kg)	68.5	67.9	66.5	68.0	76.9
Iron (Fe) (mg/kg)	85200	62600	64200	78600	54400
Lead (Pb) (mg/kg)	20.2	20.4	20.4	20.8	23.8
Lithium (Li) (mg/kg)	38.5	38.7	37.9	39.8	67.3
Magnesium (Mg) (mg/kg)	8700	9330	8820	8950	11500
Manganese (Mn) (mg/kg)	4800	3300	2370	3770	1480
Mercury (Hg) (mg/kg)	0.0491	0.0436	0.0468	0.0419	0.0296
Molybdenum (Mo) (mg/kg)	7.05	5.91	6.74	7.24	6.66
Nickel (Ni) (mg/kg)	77.8	72.6	62.2	74.5	66.3
Phosphorus (P) (mg/kg)	596	608	608	593	460
Potassium (K) (mg/kg)	4070	4380	4200	4230	5560
Selenium (Se) (mg/kg)	0.80	0.71	0.70	0.79	0.30
Silver (Ag) (mg/kg)	0.21	0.19	0.21	0.18	<0.10
Sodium (Na) (mg/kg)	368	320	318	326	270
Strontium (Sr) (mg/kg)	23.1	21.2	20.6	20.6	22.9
Thallium (Tl) (mg/kg)	0.339	0.340	0.320	0.343	0.405
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	2.2
Titanium (Ti) (mg/kg)	634	757	718	723	1050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-6	L1669873-7	L1669873-8	L1669873-9	L1669873-10
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	13-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15
Sampled Time					
Client ID	SP-COMP	TPE-1	TPE-2	TPE-3	TPE-4
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	83.8	85.7	81.5	87.5	87.8
pH (1:2 soil:water) (pH)		5.80	5.84	6.19	5.96
Particle Size % Gravel (>2mm) (%)		<0.10	1.31	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)		2.87	10.4	2.21	2.22
% Silt (0.063mm - 4um) (%)		73.8	61.2	71.0	71.1
% Clay (<4um) (%)		23.3	27.1	26.8	26.7
Texture		Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon Total Organic Carbon (%)		3.81	2.66	3.69	3.74
Metals Aluminum (Al) (mg/kg)		27100	28000	25300	24800
Antimony (Sb) (mg/kg)		0.26	0.22	0.24	0.26
Arsenic (As) (mg/kg)		24.9	15.8	17.6	19.5
Barium (Ba) (mg/kg)		117	128	119	127
Beryllium (Be) (mg/kg)		1.77	2.01	1.81	1.87
Bismuth (Bi) (mg/kg)		2.28	2.64	2.28	2.29
Boron (B) (mg/kg)		9.3	9.9	8.8	9.3
Cadmium (Cd) (mg/kg)		0.175	0.136	0.196	0.383
Calcium (Ca) (mg/kg)		2420	2220	2610	2660
Chromium (Cr) (mg/kg)		200	126	139	151
Cobalt (Co) (mg/kg)		18.5	14.1	16.3	17.4
Copper (Cu) (mg/kg)		57.2	55.6	50.7	49.1
Iron (Fe) (mg/kg)		50800	41800	45100	48200
Lead (Pb) (mg/kg)		21.1	22.3	20.4	20.9
Lithium (Li) (mg/kg)		48.3	58.7	46.4	47.1
Magnesium (Mg) (mg/kg)		12900	11400	10700	11000
Manganese (Mn) (mg/kg)		1610	953	1650	2950
Mercury (Hg) (mg/kg)		0.0238	0.0163	0.0197	0.0188
Molybdenum (Mo) (mg/kg)		4.03	4.06	3.81	4.22
Nickel (Ni) (mg/kg)		92.1	70.6	77.4	114
Phosphorus (P) (mg/kg)		538	408	416	424
Potassium (K) (mg/kg)		4670	5230	4540	4390
Selenium (Se) (mg/kg)		0.68	0.39	0.82	0.86
Silver (Ag) (mg/kg)		0.16	<0.10	<0.10	<0.10
Sodium (Na) (mg/kg)		363	417	443	383
Strontium (Sr) (mg/kg)		19.2	20.0	19.5	20.8
Thallium (Tl) (mg/kg)		0.372	0.415	0.387	0.443
Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)		867	1050	867	842

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID / Description / Sampled Date / Sampled Time / Client ID	L1669873-11 Soil/Sed/Waste 30-AUG-15 TPE-5	L1669873-12 Soil/Sed/Waste 30-AUG-15 TPE-COMP	L1669873-13 Soil/Sed/Waste 14-AUG-15 TPN-1	L1669873-14 Soil/Sed/Waste 14-AUG-15 TPN-2	L1669873-15 Soil/Sed/Waste 14-AUG-15 TPN-3
SOIL							
Physical Tests	Moisture (%)		87.5	85.2	81.0	83.2	85.0
	pH (1:2 soil:water) (pH)		6.04		6.05	6.21	6.28
Particle Size	% Gravel (>2mm) (%)		<0.10		<0.10	<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)		2.25		35.7	21.0	14.8
	% Silt (0.063mm - 4um) (%)		70.2		51.3	63.4	69.6
	% Clay (<4um) (%)		27.6		13.0	15.6	15.6
	Texture		Silt loam		Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)		3.62		3.41	3.54	5.15
Metals	Aluminum (Al) (mg/kg)		24300		14300	17200	17700
	Antimony (Sb) (mg/kg)		0.25		0.29	0.23	0.31
	Arsenic (As) (mg/kg)		18.2		13.8	8.91	20.6
	Barium (Ba) (mg/kg)		130		57.1	72.5	80.1
	Beryllium (Be) (mg/kg)		1.83		0.84	1.01	1.13
	Bismuth (Bi) (mg/kg)		2.35		0.87	1.09	1.17
	Boron (B) (mg/kg)		9.3		6.1	6.6	7.4
	Cadmium (Cd) (mg/kg)		0.382		0.143	0.155	0.195
	Calcium (Ca) (mg/kg)		2450		1630	1750	1930
	Chromium (Cr) (mg/kg)		124		103	109	117
	Cobalt (Co) (mg/kg)		16.5		9.80	9.22	13.1
	Copper (Cu) (mg/kg)		51.6		42.2	47.8	57.1
	Iron (Fe) (mg/kg)		46600		27500	22000	38500
	Lead (Pb) (mg/kg)		21.0		14.1	15.9	16.9
	Lithium (Li) (mg/kg)		46.8		22.0	25.8	25.3
	Magnesium (Mg) (mg/kg)		10100		6780	7490	7410
	Manganese (Mn) (mg/kg)		2710		414	276	738
	Mercury (Hg) (mg/kg)		0.0203		0.0166	0.0170	0.0265
	Molybdenum (Mo) (mg/kg)		4.30		2.37	1.89	3.75
	Nickel (Ni) (mg/kg)		105		52.6	58.4	68.1
	Phosphorus (P) (mg/kg)		421		467	510	745
	Potassium (K) (mg/kg)		4480		2130	2580	2660
	Selenium (Se) (mg/kg)		0.85		0.45	0.45	0.74
	Silver (Ag) (mg/kg)		<0.10		0.13	0.15	0.22
	Sodium (Na) (mg/kg)		375		217	223	253
	Strontium (Sr) (mg/kg)		19.8		14.4	15.4	15.9
	Thallium (Tl) (mg/kg)		0.459		0.161	0.196	0.212
	Tin (Sn) (mg/kg)		<2.0		<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)		822		443	493	470

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-16	L1669873-17	L1669873-18	L1669873-19	L1669873-20
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	14-AUG-15	14-AUG-15	14-AUG-15	14-AUG-15	14-AUG-15
Sampled Time					
Client ID	TPN-4	TPN-5	TPN-COMP	TPS-1	TPS-2
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	84.3	85.9	83.0	84.2	86.7
pH (1:2 soil:water) (pH)	6.03	5.91		5.96	6.14
Particle Size % Gravel (>2mm) (%)	0.31	<0.10		<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)	27.5	13.0		15.5	1.87
% Silt (0.063mm - 4um) (%)	56.8	71.4		67.4	79.1
% Clay (<4um) (%)	15.5	15.6		17.0	19.0
Texture	Silt loam	Silt loam		Silt loam	Silt loam
Organic / Inorganic Carbon Total Organic Carbon (%)	3.43	4.05		3.96	5.23
Metals Aluminum (Al) (mg/kg)	15700	18900		20400	18700
Antimony (Sb) (mg/kg)	0.20	0.27		0.22	0.31
Arsenic (As) (mg/kg)	19.2	23.2		14.2	63.2
Barium (Ba) (mg/kg)	62.5	81.7		91.7	120
Beryllium (Be) (mg/kg)	0.92	1.17		1.22	1.26
Bismuth (Bi) (mg/kg)	0.92	1.38		1.39	1.56
Boron (B) (mg/kg)	6.2	6.8		7.5	7.8
Cadmium (Cd) (mg/kg)	0.081	0.269		0.196	0.687
Calcium (Ca) (mg/kg)	1540	1650		1790	1920
Chromium (Cr) (mg/kg)	103	120		102	99.5
Cobalt (Co) (mg/kg)	10.8	12.4		14.1	33.8
Copper (Cu) (mg/kg)	40.1	60.7		51.7	63.4
Iron (Fe) (mg/kg)	35100	36500		32400	85600
Lead (Pb) (mg/kg)	13.2	17.7		19.6	23.5
Lithium (Li) (mg/kg)	26.1	27.5		30.0	26.3
Magnesium (Mg) (mg/kg)	7050	8400		8760	7790
Manganese (Mn) (mg/kg)	580	458		543	3270
Mercury (Hg) (mg/kg)	0.0147	0.0190		0.0216	0.0349
Molybdenum (Mo) (mg/kg)	2.94	4.31		2.60	6.59
Nickel (Ni) (mg/kg)	55.4	67.9		68.5	115
Phosphorus (P) (mg/kg)	538	697		616	1270
Potassium (K) (mg/kg)	2420	2900		3470	3310
Selenium (Se) (mg/kg)	0.39	0.73		0.52	1.06
Silver (Ag) (mg/kg)	<0.10	0.19		0.15	0.23
Sodium (Na) (mg/kg)	225	276		300	318
Strontium (Sr) (mg/kg)	14.4	16.0		16.1	16.9
Thallium (Tl) (mg/kg)	0.185	0.244		0.263	0.390
Tin (Sn) (mg/kg)	<2.0	<2.0		<2.0	<2.0
Titanium (Ti) (mg/kg)	482	555		693	552

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-21	L1669873-22	L1669873-23	L1669873-24	L1669873-25
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	14-AUG-15	14-AUG-15	14-AUG-15	14-AUG-15	28-AUG-15
Sampled Time					
Client ID	TPS-3	TPS-4	TPS-5	TPS-COMP	TE-1
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	84.9	84.3	83.0	83.8	73.9
pH (1:2 soil:water) (pH)	5.83	5.72	5.58		5.55
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10	<0.10		<0.10
% Sand (2.0mm - 0.063mm) (%)	11.1	5.59	10.4		32.6
% Silt (0.063mm - 4um) (%)	68.3	70.3	67.2		51.0
% Clay (<4um) (%)	20.6	24.1	22.3		16.4
Texture	Silt loam	Silt loam	Silt loam		Silt loam
Organic / Inorganic Carbon Total Organic Carbon (%)	4.06	3.90	3.24		1.93
Metals Aluminum (Al) (mg/kg)	20700	24100	22200		17500
Antimony (Sb) (mg/kg)	0.23	0.25	0.19		0.14
Arsenic (As) (mg/kg)	19.0	20.0	18.4		9.29
Barium (Ba) (mg/kg)	88.4	102	103		90.1
Beryllium (Be) (mg/kg)	1.29	1.49	1.28		1.54
Bismuth (Bi) (mg/kg)	1.49	1.86	1.55		1.83
Boron (B) (mg/kg)	7.8	8.4	7.1		5.1
Cadmium (Cd) (mg/kg)	0.172	0.159	0.312		0.119
Calcium (Ca) (mg/kg)	1730	1730	1720		1820
Chromium (Cr) (mg/kg)	106	117	111		45.7
Cobalt (Co) (mg/kg)	14.8	20.0	18.7		7.37
Copper (Cu) (mg/kg)	55.8	69.1	53.3		41.3
Iron (Fe) (mg/kg)	33900	37700	35800		33300
Lead (Pb) (mg/kg)	20.2	22.0	21.3		17.6
Lithium (Li) (mg/kg)	33.0	34.9	34.7		34.8
Magnesium (Mg) (mg/kg)	8890	9430	9530		6640
Manganese (Mn) (mg/kg)	589	797	646		465
Mercury (Hg) (mg/kg)	0.0207	0.0215	0.0186		0.0167
Molybdenum (Mo) (mg/kg)	3.54	4.56	2.30		2.80
Nickel (Ni) (mg/kg)	70.0	72.0	85.7		30.5
Phosphorus (P) (mg/kg)	571	484	647		640
Potassium (K) (mg/kg)	3570	3840	3690		3360
Selenium (Se) (mg/kg)	0.57	0.70	0.45		0.36
Silver (Ag) (mg/kg)	0.16	0.15	0.15		0.11
Sodium (Na) (mg/kg)	285	315	309		204
Strontium (Sr) (mg/kg)	16.4	17.7	16.0		15.1
Thallium (Tl) (mg/kg)	0.277	0.316	0.315		0.283
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		<2.0
Titanium (Ti) (mg/kg)	686	679	718		801

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-26	L1669873-27	L1669873-28	L1669873-29	L1669873-30
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	28-AUG-15	28-AUG-15	28-AUG-15	28-AUG-15	28-AUG-15
Sampled Time					
Client ID	TE-2	TE-3	TE-4	TE-5	TE-COMP
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	81.4	83.5	84.4	84.0	81.3
pH (1:2 soil:water) (pH)	6.25	6.22	5.91	6.33	
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	
% Sand (2.0mm - 0.063mm) (%)	12.2	7.99	3.73	4.22	
% Silt (0.063mm - 4um) (%)	69.8	74.9	76.1	78.5	
% Clay (<4um) (%)	18.0	17.1	20.2	17.3	
Texture	Silt loam	Silt	Silt loam	Silt	
Organic / Inorganic Carbon Total Organic Carbon (%)	2.69	3.05	3.36	3.48	
Metals Aluminum (Al) (mg/kg)	21400	22800	20800	21600	
Antimony (Sb) (mg/kg)	0.21	0.21	0.18	0.21	
Arsenic (As) (mg/kg)	23.0	15.8	54.4	37.0	
Barium (Ba) (mg/kg)	110	117	128	123	
Beryllium (Be) (mg/kg)	1.91	2.08	1.90	2.16	
Bismuth (Bi) (mg/kg)	1.90	2.05	1.77	1.95	
Boron (B) (mg/kg)	8.8	9.6	8.3	8.9	
Cadmium (Cd) (mg/kg)	0.213	0.196	0.356	0.235	
Calcium (Ca) (mg/kg)	2280	2390	2090	2240	
Chromium (Cr) (mg/kg)	55.8	56.6	52.3	55.6	
Cobalt (Co) (mg/kg)	11.6	11.5	12.5	12.1	
Copper (Cu) (mg/kg)	52.4	54.6	55.6	57.1	
Iron (Fe) (mg/kg)	72500	57000	101000	86000	
Lead (Pb) (mg/kg)	19.0	20.7	18.5	19.8	
Lithium (Li) (mg/kg)	44.4	47.1	43.6	52.7	
Magnesium (Mg) (mg/kg)	7940	7810	7310	7580	
Manganese (Mn) (mg/kg)	2170	2670	2480	2640	
Mercury (Hg) (mg/kg)	0.0209	0.0255	0.0258	0.0261	
Molybdenum (Mo) (mg/kg)	10.4	6.68	14.2	11.9	
Nickel (Ni) (mg/kg)	41.8	41.1	54.0	46.6	
Phosphorus (P) (mg/kg)	654	557	1150	774	
Potassium (K) (mg/kg)	4480	4480	4090	4280	
Selenium (Se) (mg/kg)	0.62	0.71	0.71	0.70	
Silver (Ag) (mg/kg)	0.12	0.15	0.14	0.15	
Sodium (Na) (mg/kg)	357	381	333	340	
Strontium (Sr) (mg/kg)	20.6	21.2	18.8	19.2	
Thallium (Tl) (mg/kg)	0.344	0.382	0.362	0.363	
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
Titanium (Ti) (mg/kg)	917	921	825	856	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-31	L1669873-32	L1669873-33	L1669873-34	L1669873-35
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	28-AUG-15	28-AUG-15	28-AUG-15	28-AUG-15	28-AUG-15
Sampled Time					
Client ID	TEFF-1	TEFF-2	TEFF-3	TEFF-4	TEFF-5
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	86.5	87.1	87.3	85.9	85.7
pH (1:2 soil:water) (pH)	6.39	5.87	6.41	6.69	5.78
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)	2.36	1.89	4.17	4.16	3.31
% Silt (0.063mm - 4um) (%)	75.2	72.8	70.9	71.7	72.1
% Clay (<4um) (%)	22.4	25.3	24.9	24.2	24.6
Texture	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon Total Organic Carbon (%)	3.98	3.81	4.05	3.64	3.61
Metals Aluminum (Al) (mg/kg)	19200	24100	23800	23100	23200
Antimony (Sb) (mg/kg)	0.21	0.19	0.19	0.18	0.17
Arsenic (As) (mg/kg)	15.9	12.5	11.4	12.2	18.9
Barium (Ba) (mg/kg)	117	119	128	118	123
Beryllium (Be) (mg/kg)	1.89	2.36	1.92	1.99	2.06
Bismuth (Bi) (mg/kg)	1.65	1.93	1.85	1.87	1.85
Boron (B) (mg/kg)	7.5	9.4	9.4	9.3	9.1
Cadmium (Cd) (mg/kg)	0.290	0.154	0.210	0.164	0.166
Calcium (Ca) (mg/kg)	1750	2250	2150	2200	2210
Chromium (Cr) (mg/kg)	50.5	60.9	57.6	55.4	57.6
Cobalt (Co) (mg/kg)	13.5	13.9	12.9	13.8	13.0
Copper (Cu) (mg/kg)	48.9	56.8	53.0	53.8	53.1
Iron (Fe) (mg/kg)	71800	45600	39800	44100	52000
Lead (Pb) (mg/kg)	19.2	21.1	21.2	20.9	20.2
Lithium (Li) (mg/kg)	52.5	68.6	51.4	51.1	54.3
Magnesium (Mg) (mg/kg)	6650	8320	7630	7970	7890
Manganese (Mn) (mg/kg)	3000	2270	2080	3230	2010
Mercury (Hg) (mg/kg)	0.0227	0.0194	0.0204	0.0206	0.0202
Molybdenum (Mo) (mg/kg)	8.01	5.50	4.44	4.93	6.34
Nickel (Ni) (mg/kg)	44.7	39.8	41.9	38.9	39.8
Phosphorus (P) (mg/kg)	571	475	519	491	596
Potassium (K) (mg/kg)	3660	4780	4700	4800	4750
Selenium (Se) (mg/kg)	0.73	0.49	0.54	0.54	0.50
Silver (Ag) (mg/kg)	0.11	<0.10	<0.10	<0.10	<0.10
Sodium (Na) (mg/kg)	372	422	420	366	378
Strontium (Sr) (mg/kg)	17.2	21.2	20.7	20.1	20.7
Thallium (Tl) (mg/kg)	0.375	0.412	0.426	0.426	0.405
Tin (Sn) (mg/kg)	<2.0	2.3	2.2	<2.0	2.2
Titanium (Ti) (mg/kg)	669	867	906	920	911

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-36	L1669873-37	L1669873-38	L1669873-39	L1669873-40
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	28-AUG-15	27-AUG-15	27-AUG-15	27-AUG-15	27-AUG-15
Sampled Time					
Client ID	TEFF-COMP	INUG-1	INUG-2	INUG-3	INUG-4
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	86.6	81.9	84.7	84.9	86.0
pH (1:2 soil:water) (pH)		5.95	6.10	5.84	5.73
Particle Size % Gravel (>2mm) (%)		<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)		5.59	6.26	3.49	2.65
% Silt (0.063mm - 4um) (%)		84.7	80.3	82.0	83.4
% Clay (<4um) (%)		9.76	13.5	14.5	13.9
Texture		Silt	Silt	Silt	Silt
Organic / Inorganic Carbon Total Organic Carbon (%)		3.81	4.36	4.94	4.86
Metals Aluminum (Al) (mg/kg)		19300	20900	20400	20100
Antimony (Sb) (mg/kg)		0.19	0.18	0.20	0.23
Arsenic (As) (mg/kg)		121	11.4	17.1	61.9
Barium (Ba) (mg/kg)		109	126	128	132
Beryllium (Be) (mg/kg)		1.29	1.39	1.43	1.41
Bismuth (Bi) (mg/kg)		1.14	1.21	1.25	1.22
Boron (B) (mg/kg)		8.0	8.9	9.0	8.4
Cadmium (Cd) (mg/kg)		0.149	0.228	0.290	0.296
Calcium (Ca) (mg/kg)		1900	2280	2150	2110
Chromium (Cr) (mg/kg)		99.2	110	107	105
Cobalt (Co) (mg/kg)		12.0	10.8	11.1	13.0
Copper (Cu) (mg/kg)		42.8	46.1	48.1	48.0
Iron (Fe) (mg/kg)		91900	37500	44900	70900
Lead (Pb) (mg/kg)		12.7	14.3	15.7	15.5
Lithium (Li) (mg/kg)		26.3	29.4	28.4	28.2
Magnesium (Mg) (mg/kg)		8660	9450	9070	9120
Manganese (Mn) (mg/kg)		1060	712	660	1060
Mercury (Hg) (mg/kg)		0.0279	0.0318	0.0400	0.0425
Molybdenum (Mo) (mg/kg)		6.76	3.26	3.88	4.86
Nickel (Ni) (mg/kg)		68.2	78.1	78.6	85.0
Phosphorus (P) (mg/kg)		2650	810	1080	1820
Potassium (K) (mg/kg)		3340	3600	3450	3360
Selenium (Se) (mg/kg)		0.59	0.54	0.64	0.74
Silver (Ag) (mg/kg)		0.15	0.18	0.22	0.23
Sodium (Na) (mg/kg)		231	314	343	320
Strontium (Sr) (mg/kg)		23.8	26.1	24.5	24.1
Thallium (Tl) (mg/kg)		0.193	0.210	0.205	0.213
Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)		544	601	550	517

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-41	L1669873-42	L1669873-43	L1669873-44	L1669873-45
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	27-AUG-15	27-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
Sampled Time					
Client ID	INUG-5	INUG-COMP	PDL-1	PDL-2	PDL-3
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	83.9	84.5	85.6	79.0	79.0
pH (1:2 soil:water) (pH)	5.72		5.89	6.25	6.22
Particle Size % Gravel (>2mm) (%)	<0.10		<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)	3.05		9.96	14.8	5.72
% Silt (0.063mm - 4um) (%)	80.3		78.1	75.3	75.1
% Clay (<4um) (%)	16.7		12.0	9.88	19.2
Texture	Silt		Silt	Silt loam	Silt
Organic / Inorganic Carbon Total Organic Carbon (%)	3.81		5.05	2.51	2.35
Metals Aluminum (Al) (mg/kg)	18300		17400	19200	23600
Antimony (Sb) (mg/kg)	0.18		0.26	0.23	0.29
Arsenic (As) (mg/kg)	135		12.0	12.9	53.4
Barium (Ba) (mg/kg)	109		98.6	95.8	109
Beryllium (Be) (mg/kg)	1.22		0.94	1.01	1.24
Bismuth (Bi) (mg/kg)	1.07		0.77	0.89	1.17
Boron (B) (mg/kg)	6.8		8.8	7.2	8.6
Cadmium (Cd) (mg/kg)	0.155		0.280	0.133	0.222
Calcium (Ca) (mg/kg)	1730		2660	2470	2320
Chromium (Cr) (mg/kg)	95.3		121	131	160
Cobalt (Co) (mg/kg)	14.3		10.3	11.5	21.4
Copper (Cu) (mg/kg)	42.0		45.1	43.1	63.2
Iron (Fe) (mg/kg)	129000		26200	29900	50700
Lead (Pb) (mg/kg)	12.1		14.4	14.3	17.0
Lithium (Li) (mg/kg)	25.0		27.2	29.0	35.3
Magnesium (Mg) (mg/kg)	8190		9700	10500	12200
Manganese (Mn) (mg/kg)	1440		265	338	2100
Mercury (Hg) (mg/kg)	0.0273		0.0210	0.0135	0.0129
Molybdenum (Mo) (mg/kg)	13.0		1.82	2.21	4.31
Nickel (Ni) (mg/kg)	72.0		80.0	78.2	114
Phosphorus (P) (mg/kg)	2010		517	508	582
Potassium (K) (mg/kg)	3050		2670	2970	3560
Selenium (Se) (mg/kg)	0.63		0.42	0.38	0.24
Silver (Ag) (mg/kg)	0.15		0.25	0.18	<0.10
Sodium (Na) (mg/kg)	225		282	192	216
Strontium (Sr) (mg/kg)	20.9		23.0	25.4	25.6
Thallium (Tl) (mg/kg)	0.192		0.174	0.181	0.230
Tin (Sn) (mg/kg)	<2.0		<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)	474		530	617	617

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-46	L1669873-47	L1669873-48	L1669873-49	L1669873-50
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	19-AUG-15	19-AUG-15
Sampled Time					
Client ID	PDL-4	PDL-5	PDL-COMP	WAL-1	WAL-2
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	80.5	78.2	80.1	90.2	91.6
pH (1:2 soil:water) (pH)	6.19	5.94		6.58	6.38
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10		<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)	5.83	13.5		5.66	1.30
% Silt (0.063mm - 4um) (%)	77.3	79.0		82.3	91.4
% Clay (<4um) (%)	16.9	7.55		12.0	7.32
Texture	Silt	Silt		Silt	Silt
Organic / Inorganic Carbon Total Organic Carbon (%)	2.72	2.51		7.92	11.6
Metals Aluminum (Al) (mg/kg)	22000	16700		20100	17200
Antimony (Sb) (mg/kg)	0.30	0.26		0.44	0.40
Arsenic (As) (mg/kg)	38.8	60.3		19.6	44.1
Barium (Ba) (mg/kg)	99.1	81.6		123	101
Beryllium (Be) (mg/kg)	1.20	0.83		1.59	1.36
Bismuth (Bi) (mg/kg)	1.10	0.73		1.98	1.64
Boron (B) (mg/kg)	8.8	6.4		11.5	12.3
Cadmium (Cd) (mg/kg)	0.125	0.194		0.543	0.419
Calcium (Ca) (mg/kg)	2390	2390		4330	4320
Chromium (Cr) (mg/kg)	149	117		60.0	53.0
Cobalt (Co) (mg/kg)	18.1	15.2		8.87	8.62
Copper (Cu) (mg/kg)	54.1	36.6		142	134
Iron (Fe) (mg/kg)	44300	50300		27800	35300
Lead (Pb) (mg/kg)	16.8	13.2		34.1	30.0
Lithium (Li) (mg/kg)	33.0	24.9		37.6	28.6
Magnesium (Mg) (mg/kg)	11600	9590		7650	6640
Manganese (Mn) (mg/kg)	1160	675		328	291
Mercury (Hg) (mg/kg)	0.0162	0.0175		0.0648	0.0812
Molybdenum (Mo) (mg/kg)	3.26	4.95		6.04	9.03
Nickel (Ni) (mg/kg)	90.3	78.1		54.2	51.8
Phosphorus (P) (mg/kg)	519	598		679	833
Potassium (K) (mg/kg)	3350	2550		3620	3050
Selenium (Se) (mg/kg)	0.35	0.40		0.82	0.81
Silver (Ag) (mg/kg)	<0.10	0.15		0.65	0.60
Sodium (Na) (mg/kg)	223	197		332	313
Strontium (Sr) (mg/kg)	25.7	23.2		29.8	27.2
Thallium (Tl) (mg/kg)	0.211	0.171		0.312	0.264
Tin (Sn) (mg/kg)	<2.0	<2.0		<2.0	<2.0
Titanium (Ti) (mg/kg)	597	584		632	425

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-51	L1669873-52	L1669873-53	L1669873-54	L1669873-55
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	19-AUG-15	19-AUG-15	19-AUG-15	19-AUG-15	30-AUG-15
Sampled Time					
Client ID	WAL-3	WAL-4	WAL-5	WAL-COMP	TPE-B-1
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	88.1	89.2	90.5	90.1	88.4
pH (1:2 soil:water) (pH)	6.82	6.76	6.92		6.98
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10	<0.10		<0.10
% Sand (2.0mm - 0.063mm) (%)	1.89	0.87	1.29		1.16
% Silt (0.063mm - 4um) (%)	85.6	88.0	92.4		69.2
% Clay (<4um) (%)	12.5	11.2	6.36		29.6
Texture	Silt	Silt	Silt		Silt loam
Organic / Inorganic Carbon Total Organic Carbon (%)	7.48	9.01	10.1		3.61
Metals Aluminum (Al) (mg/kg)	24300	22400	18900		23500
Antimony (Sb) (mg/kg)	0.59	0.44	0.48		0.23
Arsenic (As) (mg/kg)	21.8	63.8	62.2		14.3
Barium (Ba) (mg/kg)	161	128	112		140
Beryllium (Be) (mg/kg)	1.83	1.78	1.54		1.69
Bismuth (Bi) (mg/kg)	2.55	2.23	1.86		2.14
Boron (B) (mg/kg)	9.3	13.1	14.0		8.8
Cadmium (Cd) (mg/kg)	1.16	0.452	0.412		0.289
Calcium (Ca) (mg/kg)	4040	4750	5310		2290
Chromium (Cr) (mg/kg)	71.6	65.5	54.8		116
Cobalt (Co) (mg/kg)	11.1	10.9	9.67		16.3
Copper (Cu) (mg/kg)	182	153	129		46.2
Iron (Fe) (mg/kg)	30800	49200	45600		41800
Lead (Pb) (mg/kg)	42.9	35.6	32.2		19.5
Lithium (Li) (mg/kg)	41.9	36.9	32.8		43.4
Magnesium (Mg) (mg/kg)	9130	8140	7200		9720
Manganese (Mn) (mg/kg)	358	766	425		4760
Mercury (Hg) (mg/kg)	0.0625	0.0770	0.0841		0.0211
Molybdenum (Mo) (mg/kg)	7.26	11.8	10.8		3.77
Nickel (Ni) (mg/kg)	71.1	60.1	53.1		90.2
Phosphorus (P) (mg/kg)	560	887	949		385
Potassium (K) (mg/kg)	4100	4170	3560		4460
Selenium (Se) (mg/kg)	1.11	0.89	0.83		0.61
Silver (Ag) (mg/kg)	0.73	0.63	0.56		<0.10
Sodium (Na) (mg/kg)	309	384	450		349
Strontium (Sr) (mg/kg)	28.2	30.7	31.7		19.4
Thallium (Tl) (mg/kg)	0.397	0.336	0.302		0.404
Tin (Sn) (mg/kg)	<2.0	<2.0	2.0		<2.0
Titanium (Ti) (mg/kg)	677	691	625		815

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-56	L1669873-57	L1669873-58	L1669873-59	L1669873-60
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15	17-AUG-15
Sampled Time					
Client ID	TPE-B-2	TPE-B-3	TPE-B-4	TPE-B-5	BBD-1
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	86.9	90.5	86.5	86.3	
pH (1:2 soil:water) (pH)	6.68	5.68	5.50	6.13	6.65
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	0.70
% Sand (2.0mm - 0.063mm) (%)	0.72	0.68	1.33	1.05	50.2
% Silt (0.063mm - 4um) (%)	71.1	78.9	71.2	69.9	43.0
% Clay (<4um) (%)	28.2	20.4	27.5	29.1	6.14
Texture	Silt loam	Silt loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon Total Organic Carbon (%)	3.26	6.81	3.39	3.64	0.38
Metals Aluminum (Al) (mg/kg)	24300	20100	23300	23800	8090
Antimony (Sb) (mg/kg)	0.24	0.17	0.25	0.25	0.17
Arsenic (As) (mg/kg)	13.9	7.90	17.9	16.9	6.90
Barium (Ba) (mg/kg)	145	106	115	113	89.8
Beryllium (Be) (mg/kg)	1.82	1.30	1.67	1.74	0.39
Bismuth (Bi) (mg/kg)	2.31	1.43	2.13	2.28	<0.20
Boron (B) (mg/kg)	9.4	9.6	7.9	7.9	8.7
Cadmium (Cd) (mg/kg)	0.305	0.332	0.175	0.149	0.045
Calcium (Ca) (mg/kg)	2300	2700	2330	2510	2360
Chromium (Cr) (mg/kg)	109	106	120	124	17.5
Cobalt (Co) (mg/kg)	16.7	8.27	14.8	16.3	5.35
Copper (Cu) (mg/kg)	47.9	44.0	46.8	47.9	8.64
Iron (Fe) (mg/kg)	43100	22100	44900	43800	15800
Lead (Pb) (mg/kg)	20.5	14.9	19.2	20.3	7.07
Lithium (Li) (mg/kg)	46.2	37.8	42.3	45.3	11.0
Magnesium (Mg) (mg/kg)	9730	8750	9760	10200	4170
Manganese (Mn) (mg/kg)	4920	269	3890	1640	438
Mercury (Hg) (mg/kg)	0.0195	0.0279	0.0204	0.0190	0.0060
Molybdenum (Mo) (mg/kg)	3.96	1.64	3.83	3.87	1.10
Nickel (Ni) (mg/kg)	100	63.4	69.4	69.1	11.0
Phosphorus (P) (mg/kg)	387	370	394	398	720
Potassium (K) (mg/kg)	4600	3680	4320	4370	1820
Selenium (Se) (mg/kg)	0.61	0.69	0.74	0.73	<0.20
Silver (Ag) (mg/kg)	<0.10	0.33	<0.10	<0.10	<0.10
Sodium (Na) (mg/kg)	375	443	382	363	242
Strontium (Sr) (mg/kg)	20.1	19.0	18.7	19.5	51.8
Thallium (Tl) (mg/kg)	0.436	0.279	0.348	0.364	0.070
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)	838	687	803	795	423

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-61	L1669873-62	L1669873-63	L1669873-64	L1669873-65
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	17-AUG-15	17-AUG-15	17-AUG-15	17-AUG-15	17-AUG-15
Sampled Time					
Client ID	BBD-2	BBD-3	BBD-4	BBD-5	BBD-COMP
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)					32.7
pH (1:2 soil:water) (pH)	6.35	7.02	6.83	7.12	
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10	6.03	<0.10	
% Sand (2.0mm - 0.063mm) (%)	51.2	67.3	52.0	79.6	
% Silt (0.063mm - 4um) (%)	44.9	30.0	36.5	18.4	
% Clay (<4um) (%)	3.82	2.62	5.52	1.89	
Texture	Sandy loam	Sandy loam	Sandy loam	Loamy sand	
Organic / Inorganic Carbon Total Organic Carbon (%)	0.45	0.28	0.28	0.15	
Metals Aluminum (Al) (mg/kg)	7410	5940	6720	5280	
Antimony (Sb) (mg/kg)	0.12	<0.10	0.13	<0.10	
Arsenic (As) (mg/kg)	10.6	6.82	7.35	5.12	
Barium (Ba) (mg/kg)	81.3	64.9	85.0	57.8	
Beryllium (Be) (mg/kg)	0.31	0.26	0.32	0.22	
Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	
Boron (B) (mg/kg)	6.3	5.5	6.1	<5.0	
Cadmium (Cd) (mg/kg)	0.049	0.035	0.034	0.023	
Calcium (Ca) (mg/kg)	2290	1710	1820	1440	
Chromium (Cr) (mg/kg)	16.0	12.2	14.9	11.8	
Cobalt (Co) (mg/kg)	5.10	4.44	5.45	4.02	
Copper (Cu) (mg/kg)	7.03	5.42	6.80	4.38	
Iron (Fe) (mg/kg)	16100	12700	14300	11500	
Lead (Pb) (mg/kg)	6.62	4.91	5.94	3.88	
Lithium (Li) (mg/kg)	9.6	8.7	9.9	7.8	
Magnesium (Mg) (mg/kg)	4070	3550	3930	3250	
Manganese (Mn) (mg/kg)	346	516	370	321	
Mercury (Hg) (mg/kg)	0.0076	<0.0050	<0.0050	<0.0050	
Molybdenum (Mo) (mg/kg)	0.71	0.52	1.05	0.47	
Nickel (Ni) (mg/kg)	9.94	8.30	10.0	7.93	
Phosphorus (P) (mg/kg)	769	515	661	464	
Potassium (K) (mg/kg)	1390	1050	1390	940	
Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	
Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	
Sodium (Na) (mg/kg)	277	166	178	167	
Strontium (Sr) (mg/kg)	41.4	32.6	36.9	31.1	
Thallium (Tl) (mg/kg)	0.054	<0.050	0.062	<0.050	
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
Titanium (Ti) (mg/kg)	420	288	307	272	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-66 Soil/Sed/Waste 18-AUG-15 BPJ-1	L1669873-67 Soil/Sed/Waste 18-AUG-15 BPJ-2	L1669873-68 Soil/Sed/Waste 18-AUG-15 BPJ-3	L1669873-69 Soil/Sed/Waste 18-AUG-15 BPJ-4	L1669873-70 Soil/Sed/Waste 18-AUG-15 BPJ-5
SOIL						
Physical Tests	Moisture (%)					
	pH (1:2 soil:water) (pH)	7.17	6.52	6.53	6.20	6.72
Particle Size	% Gravel (>2mm) (%)	<0.10	0.35	0.42	<0.10	1.32
	% Sand (2.0mm - 0.063mm) (%)	15.7	35.3	24.7	15.2	57.8
	% Silt (0.063mm - 4um) (%)	73.0	57.7	66.3	73.3	36.0
	% Clay (<4um) (%)	11.2	6.66	8.55	11.6	4.89
	Texture	Silt loam	Silt loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.78	0.42	0.53	0.48	0.28
Metals	Aluminum (Al) (mg/kg)	9950	8430	8840	10400	6910
	Antimony (Sb) (mg/kg)	0.14	0.14	0.14	0.12	<0.10
	Arsenic (As) (mg/kg)	30.0	15.5	20.0	29.9	10.7
	Barium (Ba) (mg/kg)	157	109	99.4	120	86.5
	Beryllium (Be) (mg/kg)	0.45	0.38	0.40	0.37	0.32
	Bismuth (Bi) (mg/kg)	0.24	<0.20	0.21	0.21	<0.20
	Boron (B) (mg/kg)	8.4	8.2	6.9	8.0	6.2
	Cadmium (Cd) (mg/kg)	0.103	0.062	0.076	0.077	0.054
	Calcium (Ca) (mg/kg)	2770	2710	2540	2650	2150
	Chromium (Cr) (mg/kg)	23.5	21.0	26.7	24.3	17.4
	Cobalt (Co) (mg/kg)	8.16	6.23	6.57	7.30	5.25
	Copper (Cu) (mg/kg)	9.94	7.17	8.96	9.88	5.87
	Iron (Fe) (mg/kg)	25000	19400	20400	22600	17800
	Lead (Pb) (mg/kg)	10.5	8.25	9.91	8.97	6.26
	Lithium (Li) (mg/kg)	11.8	10.2	10.0	10.4	8.7
	Magnesium (Mg) (mg/kg)	5050	4230	4430	5320	3720
	Manganese (Mn) (mg/kg)	3290	1500	1320	1020	2390
	Mercury (Hg) (mg/kg)	0.0155	0.0084	0.0105	0.0109	0.0070
	Molybdenum (Mo) (mg/kg)	2.24	1.88	1.31	1.27	1.58
	Nickel (Ni) (mg/kg)	15.5	12.6	16.3	15.0	11.1
	Phosphorus (P) (mg/kg)	1140	1010	1060	1190	715
	Potassium (K) (mg/kg)	1840	1700	1530	2150	1390
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	357	214	286	320	221
	Strontium (Sr) (mg/kg)	52.0	51.8	47.5	51.2	47.8
	Thallium (Tl) (mg/kg)	0.095	0.070	0.080	0.068	0.053
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	370	460	338	522	406

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-71	L1669873-72	L1669873-73	L1669873-74	L1669873-75
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	18-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15
Sampled Time					
Client ID	BPJ-COMP	BAP-1	BAP-2	BAP-3	BAP-4
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	51.6	36.1	39.2	47.1	45.4
pH (1:2 soil:water) (pH)		6.79	6.80	5.87	6.36
Particle Size % Gravel (>2mm) (%)		0.15	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)		74.3	73.3	63.0	68.3
% Silt (0.063mm - 4um) (%)		23.0	23.9	32.6	28.2
% Clay (<4um) (%)		2.54	2.79	4.35	3.43
Texture		Loamy sand	Loamy sand	Sandy loam	Loamy sand
Organic / Inorganic Carbon Total Organic Carbon (%)		0.21	0.28	0.59	0.71
Metals Aluminum (Al) (mg/kg)		4830	5550	7010	6060
Antimony (Sb) (mg/kg)		0.13	0.16	0.17	0.15
Arsenic (As) (mg/kg)		6.61	7.59	7.99	3.69
Barium (Ba) (mg/kg)		381	484	402	378
Beryllium (Be) (mg/kg)		0.31	0.34	0.42	0.39
Bismuth (Bi) (mg/kg)		<0.20	<0.20	<0.20	<0.20
Boron (B) (mg/kg)		5.8	7.0	8.5	7.7
Cadmium (Cd) (mg/kg)		0.028	0.031	0.052	0.043
Calcium (Ca) (mg/kg)		2300	2440	2540	2340
Chromium (Cr) (mg/kg)		15.7	17.1	18.4	18.9
Cobalt (Co) (mg/kg)		3.83	4.07	5.08	4.36
Copper (Cu) (mg/kg)		4.90	4.96	6.84	6.75
Iron (Fe) (mg/kg)		14100	15300	15800	14400
Lead (Pb) (mg/kg)		4.44	4.83	5.75	5.30
Lithium (Li) (mg/kg)		7.3	8.1	10.1	9.5
Magnesium (Mg) (mg/kg)		2960	3170	3920	3660
Manganese (Mn) (mg/kg)		196	247	179	131
Mercury (Hg) (mg/kg)		<0.0050	<0.0050	0.0072	0.0057
Molybdenum (Mo) (mg/kg)		0.51	0.67	0.59	0.63
Nickel (Ni) (mg/kg)		9.03	9.83	11.5	11.5
Phosphorus (P) (mg/kg)		772	722	743	654
Potassium (K) (mg/kg)		1170	1430	1920	1670
Selenium (Se) (mg/kg)		<0.20	<0.20	<0.20	<0.20
Silver (Ag) (mg/kg)		<0.10	<0.10	<0.10	<0.10
Sodium (Na) (mg/kg)		145	154	193	182
Strontium (Sr) (mg/kg)		41.9	48.6	51.0	46.9
Thallium (Tl) (mg/kg)		0.054	0.060	0.087	0.071
Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)		318	375	433	376

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-76 Soil/Sed/Waste 16-AUG-15 BAP-5	L1669873-77 Soil/Sed/Waste 16-AUG-15 BAP-COMP	L1669873-78 Soil/Sed/Waste 17-AUG-15 BES-1	L1669873-79 Soil/Sed/Waste 17-AUG-15 BES-2	L1669873-80 Soil/Sed/Waste 17-AUG-15 BES-3
SOIL						
Physical Tests	Moisture (%)	39.5	41.5			
	pH (1:2 soil:water) (pH)	7.59		6.70	6.88	6.84
Particle Size	% Gravel (>2mm) (%)	<0.10		1.15	0.24	<0.10
	% Sand (2.0mm - 0.063mm) (%)	75.5		46.7	59.1	48.6
	% Silt (0.063mm - 4um) (%)	21.9		44.8	36.0	45.0
	% Clay (<4um) (%)	2.50		7.40	4.67	6.47
	Texture	Loamy sand		Sandy loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.29		0.50	0.45	0.54
Metals	Aluminum (Al) (mg/kg)	5000		8800	6980	8470
	Antimony (Sb) (mg/kg)	0.13		0.14	0.12	0.14
	Arsenic (As) (mg/kg)	3.75		5.05	4.26	5.01
	Barium (Ba) (mg/kg)	323		104	126	123
	Beryllium (Be) (mg/kg)	0.32		0.43	0.38	0.46
	Bismuth (Bi) (mg/kg)	<0.20		<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	5.9		8.8	6.8	8.8
	Cadmium (Cd) (mg/kg)	0.033		0.047	0.047	0.061
	Calcium (Ca) (mg/kg)	2120		2580	2220	2560
	Chromium (Cr) (mg/kg)	16.0		22.8	20.2	23.4
	Cobalt (Co) (mg/kg)	4.14		6.19	5.50	6.26
	Copper (Cu) (mg/kg)	4.58		7.09	6.01	7.37
	Iron (Fe) (mg/kg)	13300		17100	15100	16500
	Lead (Pb) (mg/kg)	4.45		7.28	5.93	7.24
	Lithium (Li) (mg/kg)	7.7		11.4	10.4	12.0
	Magnesium (Mg) (mg/kg)	3060		4770	4280	4860
	Manganese (Mn) (mg/kg)	910		573	554	1220
	Mercury (Hg) (mg/kg)	0.0055		0.0108	0.0087	0.0110
	Molybdenum (Mo) (mg/kg)	0.94		0.73	0.62	0.87
	Nickel (Ni) (mg/kg)	9.59		13.3	12.7	14.6
	Phosphorus (P) (mg/kg)	651		760	681	715
	Potassium (K) (mg/kg)	1270		1990	1530	1890
	Selenium (Se) (mg/kg)	<0.20		<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10		<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	137		237	206	268
	Strontium (Sr) (mg/kg)	41.1		50.1	39.9	49.5
	Thallium (Tl) (mg/kg)	0.056		0.075	0.072	0.083
	Tin (Sn) (mg/kg)	<2.0		<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	304		451	336	432

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-81	L1669873-82	L1669873-83	L1669873-84	L1669873-85
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	17-AUG-15	17-AUG-15	17-AUG-15		
Sampled Time					
Client ID	BES-4	BES-5	BES-COMP	CREMP DUP-1	CREMP DUP-2
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)			52.2	79.5	85.1
pH (1:2 soil:water) (pH)	6.79	6.85		5.64	5.79
Particle Size % Gravel (>2mm) (%)	<0.10	<0.10		<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)	43.1	48.2		6.79	17.6
% Silt (0.063mm - 4um) (%)	49.6	45.8		59.6	60.9
% Clay (<4um) (%)	7.28	5.97		33.6	21.5
Texture	Sandy loam	Sandy loam		Silt loam	Silt loam
Organic / Inorganic Carbon Total Organic Carbon (%)	0.59	0.55		2.54	3.75
Metals Aluminum (Al) (mg/kg)	8890	8720		33200	19700
Antimony (Sb) (mg/kg)	0.16	0.15		0.22	0.22
Arsenic (As) (mg/kg)	5.03	4.73		24.4	14.4
Barium (Ba) (mg/kg)	117	104		166	105
Beryllium (Be) (mg/kg)	0.46	0.44		2.20	1.27
Bismuth (Bi) (mg/kg)	0.23	<0.20		2.92	1.33
Boron (B) (mg/kg)	9.7	9.2		12.0	8.9
Cadmium (Cd) (mg/kg)	0.061	0.058		0.137	0.206
Calcium (Ca) (mg/kg)	2660	2590		2550	1950
Chromium (Cr) (mg/kg)	22.3	22.8		97.4	102
Cobalt (Co) (mg/kg)	6.31	6.12		15.3	13.9
Copper (Cu) (mg/kg)	7.05	6.98		79.9	51.3
Iron (Fe) (mg/kg)	16400	16400		51600	32200
Lead (Pb) (mg/kg)	7.84	6.91		24.6	18.5
Lithium (Li) (mg/kg)	11.8	11.3		60.8	33.4
Magnesium (Mg) (mg/kg)	4780	4720		11400	8340
Manganese (Mn) (mg/kg)	1150	819		1530	520
Mercury (Hg) (mg/kg)	0.0121	0.0106		0.0258	0.0230
Molybdenum (Mo) (mg/kg)	0.84	0.73		6.36	2.78
Nickel (Ni) (mg/kg)	14.0	13.7		67.8	66.5
Phosphorus (P) (mg/kg)	794	741		502	624
Potassium (K) (mg/kg)	1900	1990		6060	3620
Selenium (Se) (mg/kg)	<0.20	<0.20		0.29	0.48
Silver (Ag) (mg/kg)	<0.10	<0.10		<0.10	0.15
Sodium (Na) (mg/kg)	247	248		275	298
Strontium (Sr) (mg/kg)	52.3	52.6		24.8	17.5
Thallium (Tl) (mg/kg)	0.083	0.077		0.448	0.262
Tin (Sn) (mg/kg)	<2.0	<2.0		2.5	<2.0
Titanium (Ti) (mg/kg)	429	462		1190	710

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-86 Soil/Sed/Waste CREMP DUP-3	L1669873-87 Soil/Sed/Waste CREMP DUP-4	L1669873-88 Soil/Sed/Waste CREMP DUP-5	L1669873-89 Soil/Sed/Waste CREMP DUP-6	L1669873-90 Soil/Sed/Waste CREMP DUP-7
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
SOIL						
Physical Tests	Moisture (%)	47.8	37.8	77.3	82.3	86.7
	pH (1:2 soil:water) (pH)	6.03	6.29	5.79	5.33	5.84
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	60.5	55.7	6.84	6.42	2.07
	% Silt (0.063mm - 4um) (%)	35.5	39.7	72.9	74.7	70.3
	% Clay (<4um) (%)	4.01	4.55	20.2	18.9	27.7
	Texture	Sandy loam	Sandy loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.53	0.49	2.22	3.71	3.60
Metals	Aluminum (Al) (mg/kg)	6850	6340	21900	19000	23900
	Antimony (Sb) (mg/kg)	0.15	0.13	0.28	0.18	0.17
	Arsenic (As) (mg/kg)	7.82	10.4	49.6	121	12.5
	Barium (Ba) (mg/kg)	392	78.0	102	114	125
	Beryllium (Be) (mg/kg)	0.37	0.29	1.15	1.22	2.12
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	1.08	1.02	1.98
	Boron (B) (mg/kg)	8.2	5.9	7.2	8.6	9.2
	Cadmium (Cd) (mg/kg)	0.046	0.042	0.220	0.152	0.125
	Calcium (Ca) (mg/kg)	2440	2160	2080	1930	2260
	Chromium (Cr) (mg/kg)	19.6	15.0	153	99.7	60.3
	Cobalt (Co) (mg/kg)	5.05	4.98	21.2	11.9	13.5
	Copper (Cu) (mg/kg)	6.91	6.50	60.1	40.8	55.6
	Iron (Fe) (mg/kg)	15000	14500	47100	87200	42500
	Lead (Pb) (mg/kg)	5.73	7.26	16.6	12.4	22.2
	Lithium (Li) (mg/kg)	8.5	7.9	29.2	21.6	49.8
	Magnesium (Mg) (mg/kg)	3710	3780	11400	8350	8380
	Manganese (Mn) (mg/kg)	175	311	2150	1060	2000
	Mercury (Hg) (mg/kg)	0.0087	0.0076	0.0137	0.0282	0.0200
	Molybdenum (Mo) (mg/kg)	0.56	0.70	4.15	6.83	5.09
	Nickel (Ni) (mg/kg)	11.6	9.57	115	66.6	38.9
	Phosphorus (P) (mg/kg)	747	749	519	2680	498
	Potassium (K) (mg/kg)	1790	1170	3090	3350	4790
	Selenium (Se) (mg/kg)	<0.20	<0.20	0.22	0.63	0.49
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	0.15	<0.10
	Sodium (Na) (mg/kg)	198	182	185	243	343
	Strontium (Sr) (mg/kg)	50.0	38.1	22.4	25.1	21.8
	Thallium (Tl) (mg/kg)	0.078	0.061	0.226	0.182	0.430
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	446	332	536	579	918

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1669873-91 Soil/Sed/Waste; Description: CREMP DUP-8	L1669873-92 Soil/Sed/Waste; CREMP DUP-9	L1669873-93 Soil/Sed/Waste; CREMP DUP-10	L1669873-104 Soil/Sed/Waste; CREMP-COMP-DUP-1	L1669873-105 Soil/Sed/Waste; CREMP-COMP-DUP-2
SOIL						
Physical Tests	Moisture (%)	83.3	86.0	86.0	85.2	53.4
	pH (1:2 soil:water) (pH)	5.93	6.16	6.34		
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	<0.10		
	% Sand (2.0mm - 0.063mm) (%)	4.88	2.39	1.76		
	% Silt (0.063mm - 4um) (%)	72.7	70.7	68.7		
	% Clay (<4um) (%)	22.5	26.9	29.5		
	Texture	Silt loam	Silt loam	Silt loam		
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.21	3.49	3.41		
Metals	Aluminum (Al) (mg/kg)	21700	23200	23300		
	Antimony (Sb) (mg/kg)	0.18	0.22	0.24		
	Arsenic (As) (mg/kg)	55.3	17.5	17.6		
	Barium (Ba) (mg/kg)	140	122	118		
	Beryllium (Be) (mg/kg)	1.83	1.73	1.59		
	Bismuth (Bi) (mg/kg)	1.83	2.29	2.10		
	Boron (B) (mg/kg)	8.4	8.5	8.2		
	Cadmium (Cd) (mg/kg)	0.323	0.366	0.162		
	Calcium (Ca) (mg/kg)	2090	2320	2250		
	Chromium (Cr) (mg/kg)	53.9	124	116		
	Cobalt (Co) (mg/kg)	12.4	16.9	14.9		
	Copper (Cu) (mg/kg)	55.7	50.6	44.2		
	Iron (Fe) (mg/kg)	93600	44900	43600		
	Lead (Pb) (mg/kg)	19.9	21.2	19.9		
	Lithium (Li) (mg/kg)	39.4	41.3	36.5		
	Magnesium (Mg) (mg/kg)	7480	9760	9280		
	Manganese (Mn) (mg/kg)	2400	2500	4190		
	Mercury (Hg) (mg/kg)	0.0291	0.0205	0.0212		
	Molybdenum (Mo) (mg/kg)	14.2	4.10	3.91		
	Nickel (Ni) (mg/kg)	55.4	106	68.5		
	Phosphorus (P) (mg/kg)	1160	392	384		
	Potassium (K) (mg/kg)	4560	4360	4180		
	Selenium (Se) (mg/kg)	0.72	0.80	0.72		
	Silver (Ag) (mg/kg)	0.15	<0.10	<0.10		
	Sodium (Na) (mg/kg)	281	303	343		
	Strontium (Sr) (mg/kg)	18.8	19.0	18.3		
	Thallium (Tl) (mg/kg)	0.383	0.447	0.366		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	899	786	833		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-1 Soil/Sed/Waste 13-AUG-15 SP-1	L1669873-2 Soil/Sed/Waste 13-AUG-15 SP-2	L1669873-3 Soil/Sed/Waste 13-AUG-15 SP-3	L1669873-4 Soil/Sed/Waste 13-AUG-15 SP-4	L1669873-5 Soil/Sed/Waste 13-AUG-15 SP-5
SOIL						
Metals	Uranium (U) (mg/kg)	16.3	16.4	16.0	16.8	23.8
	Vanadium (V) (mg/kg)	36.5	39.4	38.0	39.4	48.9
	Zinc (Zn) (mg/kg)	109	110	108	116	142
	Zirconium (Zr) (mg/kg)	2.5	1.9	2.1	2.2	5.0
Aggregate Organics	Mineral Oil and Grease (mg/kg)					
Hydrocarbons	EPH10-19 (mg/kg)					
	EPH19-32 (mg/kg)					
	LEPH (mg/kg)					
	HEPH (mg/kg)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					
	Acenaphthylene (mg/kg)					
	Anthracene (mg/kg)					
	Benz(a)anthracene (mg/kg)					
	Benzo(a)pyrene (mg/kg)					
	Benzo(b)fluoranthene (mg/kg)					
	Benzo(b+j+k)fluoranthene (mg/kg)					
	Benzo(g,h,i)perylene (mg/kg)					
	Benzo(k)fluoranthene (mg/kg)					
	Chrysene (mg/kg)					
	Dibenz(a,h)anthracene (mg/kg)					
	Fluoranthene (mg/kg)					
	Fluorene (mg/kg)					
	Indeno(1,2,3-c,d)pyrene (mg/kg)					
	2-Methylnaphthalene (mg/kg)					
	Naphthalene (mg/kg)					
	Phenanthrene (mg/kg)					
	Pyrene (mg/kg)					
	Surrogate: Acenaphthene d10 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					
	B(a)P Total Potency Equivalent (mg/kg)					
	IACR (CCME) (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-6	L1669873-7	L1669873-8	L1669873-9	L1669873-10
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	13-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15
Sampled Time					
Client ID	SP-COMP	TPE-1	TPE-2	TPE-3	TPE-4
Grouping / **Analyte**					
SOIL					
Metals Uranium (U) (mg/kg)		15.9	19.4	16.0	15.8
Vanadium (V) (mg/kg)		49.2	48.1	44.1	43.3
Zinc (Zn) (mg/kg)		109	117	107	109
Zirconium (Zr) (mg/kg)		3.5	4.9	3.3	3.0
Aggregate Organics Mineral Oil and Grease (mg/kg)	2120				
Hydrocarbons EPH10-19 (mg/kg)	<620 DLHM				
EPH19-32 (mg/kg)	<620 DLHM				
LEPH (mg/kg)	<620				
HEPH (mg/kg)	<620				
Polycyclic Aromatic Hydrocarbons Acenaphthene (mg/kg)	<0.0050				
Acenaphthylene (mg/kg)	<0.0050				
Anthracene (mg/kg)	<0.0040				
Benz(a)anthracene (mg/kg)	<0.010				
Benzo(a)pyrene (mg/kg)	<0.010				
Benzo(b)fluoranthene (mg/kg)	<0.010				
Benzo(b+j+k)fluoranthene (mg/kg)	<0.015				
Benzo(g,h,i)perylene (mg/kg)	<0.010				
Benzo(k)fluoranthene (mg/kg)	<0.010				
Chrysene (mg/kg)	<0.010				
Dibenz(a,h)anthracene (mg/kg)	<0.0050				
Fluoranthene (mg/kg)	<0.010				
Fluorene (mg/kg)	<0.010				
Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010				
2-Methylnaphthalene (mg/kg)	<0.010				
Naphthalene (mg/kg)	<0.010				
Phenanthrene (mg/kg)	<0.010				
Pyrene (mg/kg)	<0.010				
Surrogate: Acenaphthene d10 (%)	93.3				
Surrogate: Chrysene d12 (%)	112.7				
Surrogate: Naphthalene d8 (%)	89.7				
Surrogate: Phenanthrene d10 (%)	101.1				
B(a)P Total Potency Equivalent (mg/kg)	<0.020				
IACR (CCME) (mg/kg)	<0.15				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1669873-11 Soil/Sed/Waste 30-AUG-15 TPE-5	L1669873-12 Soil/Sed/Waste 30-AUG-15 TPE-COMP	L1669873-13 Soil/Sed/Waste 14-AUG-15 TPN-1	L1669873-14 Soil/Sed/Waste 14-AUG-15 TPN-2	L1669873-15 Soil/Sed/Waste 14-AUG-15 TPN-3
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)	16.1		10.6	13.4	15.7
	Vanadium (V) (mg/kg)	41.7		27.2	31.8	32.4
	Zinc (Zn) (mg/kg)	110		66.9	76.2	80.8
	Zirconium (Zr) (mg/kg)	3.2		1.1	1.4	1.3
Aggregate Organics	Mineral Oil and Grease (mg/kg)		<1650 DLHM			
Hydrocarbons	EPH10-19 (mg/kg)		<600 DLHM			
	EPH19-32 (mg/kg)		<600 DLHM			
	LEPH (mg/kg)		<600			
	HEPH (mg/kg)		<600			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)		<0.0050			
	Acenaphthylene (mg/kg)		<0.0050			
	Anthracene (mg/kg)		<0.0040			
	Benz(a)anthracene (mg/kg)		<0.010			
	Benzo(a)pyrene (mg/kg)		<0.010			
	Benzo(b)fluoranthene (mg/kg)		<0.010			
	Benzo(b+j+k)fluoranthene (mg/kg)		<0.015			
	Benzo(g,h,i)perylene (mg/kg)		<0.010			
	Benzo(k)fluoranthene (mg/kg)		<0.010			
	Chrysene (mg/kg)		<0.010			
	Dibenz(a,h)anthracene (mg/kg)		<0.0050			
	Fluoranthene (mg/kg)		<0.010			
	Fluorene (mg/kg)		<0.010			
	Indeno(1,2,3-c,d)pyrene (mg/kg)		<0.010			
	2-Methylnaphthalene (mg/kg)		<0.010			
	Naphthalene (mg/kg)		<0.010			
	Phenanthrene (mg/kg)		<0.010			
	Pyrene (mg/kg)		<0.010			
	Surrogate: Acenaphthene d10 (%)		91.7			
	Surrogate: Chrysene d12 (%)		108.0			
	Surrogate: Naphthalene d8 (%)		89.9			
	Surrogate: Phenanthrene d10 (%)		96.7			
	B(a)P Total Potency Equivalent (mg/kg)		<0.020			
	IACR (CCME) (mg/kg)		<0.15			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-16 Soil/Sed/Waste 14-AUG-15 TPN-4	L1669873-17 Soil/Sed/Waste 14-AUG-15 TPN-5	L1669873-18 Soil/Sed/Waste 14-AUG-15 TPN-COMP	L1669873-19 Soil/Sed/Waste 14-AUG-15 TPS-1	L1669873-20 Soil/Sed/Waste 14-AUG-15 TPS-2
SOIL						
Metals	Uranium (U) (mg/kg)	11.6	18.6		15.9	18.0
	Vanadium (V) (mg/kg)	28.9	34.1		36.7	34.6
	Zinc (Zn) (mg/kg)	69.9	83.2		88.8	105
	Zirconium (Zr) (mg/kg)	1.5	2.2		2.6	1.8
Aggregate Organics	Mineral Oil and Grease (mg/kg)			<1400 DLHM		
Hydrocarbons	EPH10-19 (mg/kg)			<560 DLHM		
	EPH19-32 (mg/kg)			<560 DLHM		
	LEPH (mg/kg)			<560		
	HEPH (mg/kg)			<560		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)			<0.0050		
	Acenaphthylene (mg/kg)			<0.0050		
	Anthracene (mg/kg)			<0.0040		
	Benz(a)anthracene (mg/kg)			<0.010		
	Benzo(a)pyrene (mg/kg)			<0.010		
	Benzo(b)fluoranthene (mg/kg)			<0.010		
	Benzo(b+j+k)fluoranthene (mg/kg)			<0.015		
	Benzo(g,h,i)perylene (mg/kg)			<0.010		
	Benzo(k)fluoranthene (mg/kg)			<0.010		
	Chrysene (mg/kg)			<0.010		
	Dibenz(a,h)anthracene (mg/kg)			<0.0050		
	Fluoranthene (mg/kg)			<0.010		
	Fluorene (mg/kg)			<0.010		
	Indeno(1,2,3-c,d)pyrene (mg/kg)			<0.010		
	2-Methylnaphthalene (mg/kg)			<0.010		
	Naphthalene (mg/kg)			<0.010		
	Phenanthrene (mg/kg)			<0.010		
	Pyrene (mg/kg)			<0.010		
	Surrogate: Acenaphthene d10 (%)			86.1		
	Surrogate: Chrysene d12 (%)			108.3		
	Surrogate: Naphthalene d8 (%)			84.2		
	Surrogate: Phenanthrene d10 (%)			95.7		
	B(a)P Total Potency Equivalent (mg/kg)			<0.020		
	IACR (CCME) (mg/kg)			<0.15		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-21 Soil/Sed/Waste 14-AUG-15 TPS-3	L1669873-22 Soil/Sed/Waste 14-AUG-15 TPS-4	L1669873-23 Soil/Sed/Waste 14-AUG-15 TPS-5	L1669873-24 Soil/Sed/Waste 14-AUG-15 TPS-COMP	L1669873-25 Soil/Sed/Waste 28-AUG-15 TE-1
SOIL						
Metals	Uranium (U) (mg/kg)	16.7	21.4	16.8		17.9
	Vanadium (V) (mg/kg)	37.4	43.1	36.4		28.3
	Zinc (Zn) (mg/kg)	91.0	98.5	101		76.3
	Zirconium (Zr) (mg/kg)	2.7	2.6	3.5		5.7
Aggregate Organics	Mineral Oil and Grease (mg/kg)				<1450 DLHM	
Hydrocarbons	EPH10-19 (mg/kg)				<620 DLHM	
	EPH19-32 (mg/kg)				<620 DLHM	
	LEPH (mg/kg)				<620	
	HEPH (mg/kg)				<620	
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)				<0.0050	
	Acenaphthylene (mg/kg)				<0.0050	
	Anthracene (mg/kg)				<0.0040	
	Benz(a)anthracene (mg/kg)				<0.010	
	Benzo(a)pyrene (mg/kg)				<0.010	
	Benzo(b)fluoranthene (mg/kg)				<0.010	
	Benzo(b+j+k)fluoranthene (mg/kg)				<0.015	
	Benzo(g,h,i)perylene (mg/kg)				<0.010	
	Benzo(k)fluoranthene (mg/kg)				<0.010	
	Chrysene (mg/kg)				<0.010	
	Dibenz(a,h)anthracene (mg/kg)				<0.0050	
	Fluoranthene (mg/kg)				<0.010	
	Fluorene (mg/kg)				<0.010	
	Indeno(1,2,3-c,d)pyrene (mg/kg)				<0.010	
	2-Methylnaphthalene (mg/kg)				<0.010	
	Naphthalene (mg/kg)				<0.010	
	Phenanthrene (mg/kg)				<0.010	
	Pyrene (mg/kg)				<0.010	
	Surrogate: Acenaphthene d10 (%)				88.6	
	Surrogate: Chrysene d12 (%)				107.9	
	Surrogate: Naphthalene d8 (%)				86.6	
	Surrogate: Phenanthrene d10 (%)				98.0	
	B(a)P Total Potency Equivalent (mg/kg)				<0.020	
	IACR (CCME) (mg/kg)				<0.15	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-26 Soil/Sed/Waste 28-AUG-15 TE-2	L1669873-27 Soil/Sed/Waste 28-AUG-15 TE-3	L1669873-28 Soil/Sed/Waste 28-AUG-15 TE-4	L1669873-29 Soil/Sed/Waste 28-AUG-15 TE-5	L1669873-30 Soil/Sed/Waste 28-AUG-15 TE-COMP
SOIL						
Metals	Uranium (U) (mg/kg)	17.7	19.8	17.4	19.6	
	Vanadium (V) (mg/kg)	34.5	35.7	33.3	35.3	
	Zinc (Zn) (mg/kg)	96.3	99.9	105	102	
	Zirconium (Zr) (mg/kg)	3.5	3.4	3.1	2.9	
Aggregate Organics	Mineral Oil and Grease (mg/kg)					1700
Hydrocarbons	EPH10-19 (mg/kg)					<460 DLHM
	EPH19-32 (mg/kg)					<460 DLHM
	LEPH (mg/kg)					<460
	HEPH (mg/kg)					<460
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					<0.0050
	Acenaphthylene (mg/kg)					<0.0050
	Anthracene (mg/kg)					<0.0040
	Benz(a)anthracene (mg/kg)					<0.010
	Benzo(a)pyrene (mg/kg)					<0.010
	Benzo(b)fluoranthene (mg/kg)					<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)					<0.015
	Benzo(g,h,i)perylene (mg/kg)					<0.010
	Benzo(k)fluoranthene (mg/kg)					<0.010
	Chrysene (mg/kg)					<0.010
	Dibenz(a,h)anthracene (mg/kg)					<0.0050
	Fluoranthene (mg/kg)					<0.010
	Fluorene (mg/kg)					<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)					<0.010
	2-Methylnaphthalene (mg/kg)					<0.010
	Naphthalene (mg/kg)					<0.010
	Phenanthrene (mg/kg)					<0.010
	Pyrene (mg/kg)					<0.010
	Surrogate: Acenaphthene d10 (%)					95.8
	Surrogate: Chrysene d12 (%)					88.0
	Surrogate: Naphthalene d8 (%)					92.4
	Surrogate: Phenanthrene d10 (%)					94.0
	B(a)P Total Potency Equivalent (mg/kg)					<0.020
	IACR (CCME) (mg/kg)					<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-31 Soil/Sed/Waste 28-AUG-15 TEFF-1	L1669873-32 Soil/Sed/Waste 28-AUG-15 TEFF-2	L1669873-33 Soil/Sed/Waste 28-AUG-15 TEFF-3	L1669873-34 Soil/Sed/Waste 28-AUG-15 TEFF-4	L1669873-35 Soil/Sed/Waste 28-AUG-15 TEFF-5
SOIL						
Metals	Uranium (U) (mg/kg)	21.3	25.1	23.3	23.5	22.3
	Vanadium (V) (mg/kg)	31.4	39.3	37.5	37.6	37.6
	Zinc (Zn) (mg/kg)	98.5	110	105	104	104
	Zirconium (Zr) (mg/kg)	2.6	2.7	2.3	2.3	2.6
Aggregate Organics	Mineral Oil and Grease (mg/kg)					
Hydrocarbons	EPH10-19 (mg/kg)					
	EPH19-32 (mg/kg)					
	LEPH (mg/kg)					
	HEPH (mg/kg)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					
	Acenaphthylene (mg/kg)					
	Anthracene (mg/kg)					
	Benz(a)anthracene (mg/kg)					
	Benzo(a)pyrene (mg/kg)					
	Benzo(b)fluoranthene (mg/kg)					
	Benzo(b+j+k)fluoranthene (mg/kg)					
	Benzo(g,h,i)perylene (mg/kg)					
	Benzo(k)fluoranthene (mg/kg)					
	Chrysene (mg/kg)					
	Dibenz(a,h)anthracene (mg/kg)					
	Fluoranthene (mg/kg)					
	Fluorene (mg/kg)					
	Indeno(1,2,3-c,d)pyrene (mg/kg)					
	2-Methylnaphthalene (mg/kg)					
	Naphthalene (mg/kg)					
	Phenanthrene (mg/kg)					
	Pyrene (mg/kg)					
	Surrogate: Acenaphthene d10 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					
	B(a)P Total Potency Equivalent (mg/kg)					
	IACR (CCME) (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-36 Soil/Sed/Waste 28-AUG-15 TEFF-COMP	L1669873-37 Soil/Sed/Waste 27-AUG-15 INUG-1	L1669873-38 Soil/Sed/Waste 27-AUG-15 INUG-2	L1669873-39 Soil/Sed/Waste 27-AUG-15 INUG-3	L1669873-40 Soil/Sed/Waste 27-AUG-15 INUG-4
SOIL						
Metals	Uranium (U) (mg/kg)		14.1	15.7	16.7	16.5
	Vanadium (V) (mg/kg)		33.6	37.3	36.5	35.3
	Zinc (Zn) (mg/kg)		81.6	86.2	91.1	90.8
	Zirconium (Zr) (mg/kg)		2.3	2.4	2.3	2.4
Aggregate Organics	Mineral Oil and Grease (mg/kg)	4240				
Hydrocarbons	EPH10-19 (mg/kg)	<660 DLHM				
	EPH19-32 (mg/kg)	<660 DLHM				
	LEPH (mg/kg)	<660				
	HEPH (mg/kg)	<660				
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050				
	Acenaphthylene (mg/kg)	<0.0050				
	Anthracene (mg/kg)	<0.0040				
	Benz(a)anthracene (mg/kg)	<0.010				
	Benzo(a)pyrene (mg/kg)	<0.010				
	Benzo(b)fluoranthene (mg/kg)	<0.010				
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015				
	Benzo(g,h,i)perylene (mg/kg)	<0.010				
	Benzo(k)fluoranthene (mg/kg)	<0.010				
	Chrysene (mg/kg)	<0.010				
	Dibenz(a,h)anthracene (mg/kg)	<0.0050				
	Fluoranthene (mg/kg)	<0.010				
	Fluorene (mg/kg)	<0.010				
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010				
	2-Methylnaphthalene (mg/kg)	<0.010				
	Naphthalene (mg/kg)	<0.010				
	Phenanthrene (mg/kg)	<0.010				
	Pyrene (mg/kg)	<0.010				
	Surrogate: Acenaphthene d10 (%)	86.4				
	Surrogate: Chrysene d12 (%)	80.6				
	Surrogate: Naphthalene d8 (%)	82.8				
	Surrogate: Phenanthrene d10 (%)	85.6				
	B(a)P Total Potency Equivalent (mg/kg)	<0.020				
	IACR (CCME) (mg/kg)	<0.15				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1669873-41 Soil/Sed/Waste 27-AUG-15 INUG-5	L1669873-42 Soil/Sed/Waste 27-AUG-15 INUG-COMP	L1669873-43 Soil/Sed/Waste 26-AUG-15 PDL-1	L1669873-44 Soil/Sed/Waste 26-AUG-15 PDL-2	L1669873-45 Soil/Sed/Waste 26-AUG-15 PDL-3
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)	14.4		7.54	7.75	11.9
	Vanadium (V) (mg/kg)	32.0		33.3	38.0	45.0
	Zinc (Zn) (mg/kg)	81.8		77.4	77.1	96.3
	Zirconium (Zr) (mg/kg)	2.0		2.1	2.0	1.5
Aggregate Organics	Mineral Oil and Grease (mg/kg)		2300			
Hydrocarbons	EPH10-19 (mg/kg)		<640 DLHM			
	EPH19-32 (mg/kg)		<640 DLHM			
	LEPH (mg/kg)		<640			
	HEPH (mg/kg)		<640			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)		<0.0050			
	Acenaphthylene (mg/kg)		<0.0050			
	Anthracene (mg/kg)		<0.0040			
	Benz(a)anthracene (mg/kg)		<0.010			
	Benzo(a)pyrene (mg/kg)		<0.010			
	Benzo(b)fluoranthene (mg/kg)		<0.010			
	Benzo(b+j+k)fluoranthene (mg/kg)		<0.015			
	Benzo(g,h,i)perylene (mg/kg)		<0.010			
	Benzo(k)fluoranthene (mg/kg)		<0.010			
	Chrysene (mg/kg)		<0.010			
	Dibenz(a,h)anthracene (mg/kg)		<0.0050			
	Fluoranthene (mg/kg)		<0.010			
	Fluorene (mg/kg)		<0.010			
	Indeno(1,2,3-c,d)pyrene (mg/kg)		<0.010			
	2-Methylnaphthalene (mg/kg)		<0.010			
	Naphthalene (mg/kg)		<0.010			
	Phenanthrene (mg/kg)		<0.010			
	Pyrene (mg/kg)		<0.010			
	Surrogate: Acenaphthene d10 (%)		78.0			
	Surrogate: Chrysene d12 (%)		81.4			
	Surrogate: Naphthalene d8 (%)		75.2			
	Surrogate: Phenanthrene d10 (%)		87.0			
	B(a)P Total Potency Equivalent (mg/kg)		<0.020			
	IACR (CCME) (mg/kg)		<0.15			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-46 Soil/Sed/Waste 26-AUG-15 PDL-4	L1669873-47 Soil/Sed/Waste 26-AUG-15 PDL-5	L1669873-48 Soil/Sed/Waste 26-AUG-15 PDL-COMP	L1669873-49 Soil/Sed/Waste 19-AUG-15 WAL-1	L1669873-50 Soil/Sed/Waste 19-AUG-15 WAL-2
SOIL						
Metals	Uranium (U) (mg/kg)	10.5	6.41		16.1	14.0
	Vanadium (V) (mg/kg)	41.9	34.1		30.5	27.3
	Zinc (Zn) (mg/kg)	87.2	71.3		107	111
	Zirconium (Zr) (mg/kg)	1.4	2.0		3.5	4.7
Aggregate Organics	Mineral Oil and Grease (mg/kg)			1800		
Hydrocarbons	EPH10-19 (mg/kg)			<500 DLHM		
	EPH19-32 (mg/kg)			<500 DLHM		
	LEPH (mg/kg)			<500		
	HEPH (mg/kg)			<500		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)			<0.0050		
	Acenaphthylene (mg/kg)			<0.0050		
	Anthracene (mg/kg)			<0.0040		
	Benz(a)anthracene (mg/kg)			<0.010		
	Benzo(a)pyrene (mg/kg)			<0.010		
	Benzo(b)fluoranthene (mg/kg)			<0.010		
	Benzo(b+j+k)fluoranthene (mg/kg)			<0.015		
	Benzo(g,h,i)perylene (mg/kg)			<0.010		
	Benzo(k)fluoranthene (mg/kg)			<0.010		
	Chrysene (mg/kg)			<0.010		
	Dibenz(a,h)anthracene (mg/kg)			<0.0050		
	Fluoranthene (mg/kg)			<0.010		
	Fluorene (mg/kg)			<0.010		
	Indeno(1,2,3-c,d)pyrene (mg/kg)			<0.010		
	2-Methylnaphthalene (mg/kg)			<0.010		
	Naphthalene (mg/kg)			<0.010		
	Phenanthrene (mg/kg)			<0.010		
	Pyrene (mg/kg)			<0.010		
	Surrogate: Acenaphthene d10 (%)			90.7		
	Surrogate: Chrysene d12 (%)			100.1		
	Surrogate: Naphthalene d8 (%)			88.5		
	Surrogate: Phenanthrene d10 (%)			100.1		
	B(a)P Total Potency Equivalent (mg/kg)			<0.020		
	IACR (CCME) (mg/kg)			<0.15		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1669873-51 Soil/Sed/Waste 19-AUG-15 WAL-3	L1669873-52 Soil/Sed/Waste 19-AUG-15 WAL-4	L1669873-53 Soil/Sed/Waste 19-AUG-15 WAL-5	L1669873-54 Soil/Sed/Waste 19-AUG-15 WAL-COMP	L1669873-55 Soil/Sed/Waste 30-AUG-15 TPE-B-1
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)	23.0	16.9	14.9		15.3
	Vanadium (V) (mg/kg)	36.9	35.8	31.0		40.7
	Zinc (Zn) (mg/kg)	150	132	120		105
	Zirconium (Zr) (mg/kg)	5.9	2.9	4.0		2.9
Aggregate Organics	Mineral Oil and Grease (mg/kg)				<2250 DLHM	
Hydrocarbons	EPH10-19 (mg/kg)				<940 DLHM	
	EPH19-32 (mg/kg)				<940 DLHM	
	LEPH (mg/kg)				<940	
	HEPH (mg/kg)				<940	
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)				<0.0050	
	Acenaphthylene (mg/kg)				<0.0050	
	Anthracene (mg/kg)				<0.0040	
	Benz(a)anthracene (mg/kg)				<0.010	
	Benzo(a)pyrene (mg/kg)				<0.010	
	Benzo(b)fluoranthene (mg/kg)				<0.010	
	Benzo(b+j+k)fluoranthene (mg/kg)				<0.015	
	Benzo(g,h,i)perylene (mg/kg)				<0.010	
	Benzo(k)fluoranthene (mg/kg)				<0.010	
	Chrysene (mg/kg)				<0.010	
	Dibenz(a,h)anthracene (mg/kg)				<0.0050	
	Fluoranthene (mg/kg)				<0.010	
	Fluorene (mg/kg)				<0.010	
	Indeno(1,2,3-c,d)pyrene (mg/kg)				<0.010	
	2-Methylnaphthalene (mg/kg)				<0.010	
	Naphthalene (mg/kg)				<0.020 DLB	
	Phenanthrene (mg/kg)				<0.010	
	Pyrene (mg/kg)				<0.010	
	Surrogate: Acenaphthene d10 (%)				94.7	
	Surrogate: Chrysene d12 (%)				111.9	
	Surrogate: Naphthalene d8 (%)				93.4	
	Surrogate: Phenanthrene d10 (%)				103.6	
	B(a)P Total Potency Equivalent (mg/kg)				<0.020	
	IACR (CCME) (mg/kg)				<0.15	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-56 Soil/Sed/Waste 30-AUG-15 TPE-B-2	L1669873-57 Soil/Sed/Waste 30-AUG-15 TPE-B-3	L1669873-58 Soil/Sed/Waste 30-AUG-15 TPE-B-4	L1669873-59 Soil/Sed/Waste 30-AUG-15 TPE-B-5	L1669873-60 Soil/Sed/Waste 17-AUG-15 BBD-1
SOIL						
Metals	Uranium (U) (mg/kg)	16.6	13.4	15.1	15.8	2.24
	Vanadium (V) (mg/kg)	40.9	32.0	40.6	41.9	25.0
	Zinc (Zn) (mg/kg)	109	88.0	99.3	103	30.6
	Zirconium (Zr) (mg/kg)	2.9	6.0	2.8	3.5	6.1
Aggregate Organics	Mineral Oil and Grease (mg/kg)					
Hydrocarbons	EPH10-19 (mg/kg)					
	EPH19-32 (mg/kg)					
	LEPH (mg/kg)					
	HEPH (mg/kg)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					
	Acenaphthylene (mg/kg)					
	Anthracene (mg/kg)					
	Benz(a)anthracene (mg/kg)					
	Benzo(a)pyrene (mg/kg)					
	Benzo(b)fluoranthene (mg/kg)					
	Benzo(b+j+k)fluoranthene (mg/kg)					
	Benzo(g,h,i)perylene (mg/kg)					
	Benzo(k)fluoranthene (mg/kg)					
	Chrysene (mg/kg)					
	Dibenz(a,h)anthracene (mg/kg)					
	Fluoranthene (mg/kg)					
	Fluorene (mg/kg)					
	Indeno(1,2,3-c,d)pyrene (mg/kg)					
	2-Methylnaphthalene (mg/kg)					
	Naphthalene (mg/kg)					
	Phenanthrene (mg/kg)					
	Pyrene (mg/kg)					
	Surrogate: Acenaphthene d10 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					
	B(a)P Total Potency Equivalent (mg/kg)					
	IACR (CCME) (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1669873-61 Soil/Sed/Waste 17-AUG-15 BBD-2	L1669873-62 Soil/Sed/Waste 17-AUG-15 BBD-3	L1669873-63 Soil/Sed/Waste 17-AUG-15 BBD-4	L1669873-64 Soil/Sed/Waste 17-AUG-15 BBD-5	L1669873-65 Soil/Sed/Waste 17-AUG-15 BBD-COMP
Grouping **Analyte**					
SOIL					
Metals Uranium (U) (mg/kg)	1.37	0.916	1.83	0.872	
Vanadium (V) (mg/kg)	19.9	15.9	21.8	15.3	
Zinc (Zn) (mg/kg)	29.9	24.2	28.8	21.6	
Zirconium (Zr) (mg/kg)	3.5	3.0	4.1	3.3	
Aggregate Organics Mineral Oil and Grease (mg/kg)					600
Hydrocarbons EPH10-19 (mg/kg)					<200
EPH19-32 (mg/kg)					<200
LEPH (mg/kg)					<200
HEPH (mg/kg)					<200
Polycyclic Aromatic Hydrocarbons Acenaphthene (mg/kg)					<0.0050
Acenaphthylene (mg/kg)					<0.0050
Anthracene (mg/kg)					<0.0040
Benz(a)anthracene (mg/kg)					<0.010
Benzo(a)pyrene (mg/kg)					<0.010
Benzo(b)fluoranthene (mg/kg)					<0.010
Benzo(b+j+k)fluoranthene (mg/kg)					<0.015
Benzo(g,h,i)perylene (mg/kg)					<0.010
Benzo(k)fluoranthene (mg/kg)					<0.010
Chrysene (mg/kg)					<0.010
Dibenz(a,h)anthracene (mg/kg)					<0.0050
Fluoranthene (mg/kg)					<0.010
Fluorene (mg/kg)					<0.010
Indeno(1,2,3-c,d)pyrene (mg/kg)					<0.010
2-Methylnaphthalene (mg/kg)					<0.010
Naphthalene (mg/kg)					<0.010
Phenanthrene (mg/kg)					<0.010
Pyrene (mg/kg)					<0.010
Surrogate: Acenaphthene d10 (%)					89.7
Surrogate: Chrysene d12 (%)					105.1
Surrogate: Naphthalene d8 (%)					88.5
Surrogate: Phenanthrene d10 (%)					94.8
B(a)P Total Potency Equivalent (mg/kg)					<0.020
IACR (CCME) (mg/kg)					<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1669873-66	L1669873-67	L1669873-68	L1669873-69	L1669873-70
	Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	BPJ-1	BPJ-2	BPJ-3	BPJ-4	BPJ-5
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)	2.17	1.74	1.84	1.77	1.28
	Vanadium (V) (mg/kg)	25.5	24.1	23.5	27.5	22.3
	Zinc (Zn) (mg/kg)	43.5	33.2	37.8	42.0	28.5
	Zirconium (Zr) (mg/kg)	3.7	3.6	2.8	5.6	3.6
Aggregate Organics	Mineral Oil and Grease (mg/kg)					
Hydrocarbons	EPH10-19 (mg/kg)					
	EPH19-32 (mg/kg)					
	LEPH (mg/kg)					
	HEPH (mg/kg)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					
	Acenaphthylene (mg/kg)					
	Anthracene (mg/kg)					
	Benz(a)anthracene (mg/kg)					
	Benzo(a)pyrene (mg/kg)					
	Benzo(b)fluoranthene (mg/kg)					
	Benzo(b+j+k)fluoranthene (mg/kg)					
	Benzo(g,h,i)perylene (mg/kg)					
	Benzo(k)fluoranthene (mg/kg)					
	Chrysene (mg/kg)					
	Dibenz(a,h)anthracene (mg/kg)					
	Fluoranthene (mg/kg)					
	Fluorene (mg/kg)					
	Indeno(1,2,3-c,d)pyrene (mg/kg)					
	2-Methylnaphthalene (mg/kg)					
	Naphthalene (mg/kg)					
	Phenanthrene (mg/kg)					
	Pyrene (mg/kg)					
	Surrogate: Acenaphthene d10 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					
	B(a)P Total Potency Equivalent (mg/kg)					
	IACR (CCME) (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-71	L1669873-72	L1669873-73	L1669873-74	L1669873-75
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	18-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15
Sampled Time					
Client ID	BPJ-COMP	BAP-1	BAP-2	BAP-3	BAP-4
Grouping / **Analyte**					
SOIL					
Metals Uranium (U) (mg/kg)		1.50	1.44	1.68	1.65
Vanadium (V) (mg/kg)		20.8	22.6	23.9	22.5
Zinc (Zn) (mg/kg)		20.0	21.3	27.8	25.7
Zirconium (Zr) (mg/kg)		4.3	5.2	6.7	6.1
Aggregate Organics Mineral Oil and Grease (mg/kg)	<525 DLHM				
Hydrocarbons EPH10-19 (mg/kg)	<200				
EPH19-32 (mg/kg)	<200				
LEPH (mg/kg)	<200				
HEPH (mg/kg)	<200				
Polycyclic Aromatic Hydrocarbons Acenaphthene (mg/kg)	<0.0050				
Acenaphthylene (mg/kg)	<0.0050				
Anthracene (mg/kg)	<0.0040				
Benz(a)anthracene (mg/kg)	<0.010				
Benzo(a)pyrene (mg/kg)	<0.010				
Benzo(b)fluoranthene (mg/kg)	<0.010				
Benzo(b+j+k)fluoranthene (mg/kg)	<0.015				
Benzo(g,h,i)perylene (mg/kg)	<0.010				
Benzo(k)fluoranthene (mg/kg)	<0.010				
Chrysene (mg/kg)	<0.010				
Dibenz(a,h)anthracene (mg/kg)	<0.0050				
Fluoranthene (mg/kg)	<0.010				
Fluorene (mg/kg)	<0.010				
Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010				
2-Methylnaphthalene (mg/kg)	<0.010				
Naphthalene (mg/kg)	<0.010				
Phenanthrene (mg/kg)	<0.010				
Pyrene (mg/kg)	<0.010				
Surrogate: Acenaphthene d10 (%)	94.4				
Surrogate: Chrysene d12 (%)	112.4				
Surrogate: Naphthalene d8 (%)	93.1				
Surrogate: Phenanthrene d10 (%)	100.3				
B(a)P Total Potency Equivalent (mg/kg)	<0.020				
IACR (CCME) (mg/kg)	<0.15				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1669873-76 Soil/Sed/Waste 16-AUG-15 BAP-5	L1669873-77 Soil/Sed/Waste 16-AUG-15 BAP-COMP	L1669873-78 Soil/Sed/Waste 17-AUG-15 BES-1	L1669873-79 Soil/Sed/Waste 17-AUG-15 BES-2	L1669873-80 Soil/Sed/Waste 17-AUG-15 BES-3
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)	1.21		1.65	1.44	1.73
	Vanadium (V) (mg/kg)	19.7		25.4	22.0	24.8
	Zinc (Zn) (mg/kg)	20.7		33.6	29.6	35.0
	Zirconium (Zr) (mg/kg)	3.2		2.5	2.5	2.5
Aggregate Organics	Mineral Oil and Grease (mg/kg)		710			
Hydrocarbons	EPH10-19 (mg/kg)		<200			
	EPH19-32 (mg/kg)		<200			
	LEPH (mg/kg)		<200			
	HEPH (mg/kg)		<200			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)		<0.0050			
	Acenaphthylene (mg/kg)		<0.0050			
	Anthracene (mg/kg)		<0.0040			
	Benz(a)anthracene (mg/kg)		<0.010			
	Benzo(a)pyrene (mg/kg)		<0.010			
	Benzo(b)fluoranthene (mg/kg)		<0.010			
	Benzo(b+j+k)fluoranthene (mg/kg)		<0.015			
	Benzo(g,h,i)perylene (mg/kg)		<0.010			
	Benzo(k)fluoranthene (mg/kg)		<0.010			
	Chrysene (mg/kg)		<0.010			
	Dibenz(a,h)anthracene (mg/kg)		<0.0050			
	Fluoranthene (mg/kg)		<0.010			
	Fluorene (mg/kg)		<0.010			
	Indeno(1,2,3-c,d)pyrene (mg/kg)		<0.010			
	2-Methylnaphthalene (mg/kg)		<0.010			
	Naphthalene (mg/kg)		<0.010			
	Phenanthrene (mg/kg)		<0.010			
	Pyrene (mg/kg)		<0.010			
	Surrogate: Acenaphthene d10 (%)		95.4			
	Surrogate: Chrysene d12 (%)		111.2			
	Surrogate: Naphthalene d8 (%)		93.8			
	Surrogate: Phenanthrene d10 (%)		101.5			
	B(a)P Total Potency Equivalent (mg/kg)		<0.020			
	IACR (CCME) (mg/kg)		<0.15			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-81 Soil/Sed/Waste 17-AUG-15 BES-4	L1669873-82 Soil/Sed/Waste 17-AUG-15 BES-5	L1669873-83 Soil/Sed/Waste 17-AUG-15 BES-COMP	L1669873-84 Soil/Sed/Waste CREMP DUP-1	L1669873-85 Soil/Sed/Waste CREMP DUP-2
SOIL						
Metals	Uranium (U) (mg/kg)	1.85	1.59		25.4	14.9
	Vanadium (V) (mg/kg)	24.5	25.0		51.6	37.1
	Zinc (Zn) (mg/kg)	33.1	32.5		144	90.3
	Zirconium (Zr) (mg/kg)	2.3	2.6		4.5	2.9
Aggregate Organics	Mineral Oil and Grease (mg/kg)			<500		
Hydrocarbons	EPH10-19 (mg/kg)			<200		
	EPH19-32 (mg/kg)			<200		
	LEPH (mg/kg)			<200		
	HEPH (mg/kg)			<200		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)			<0.0050		
	Acenaphthylene (mg/kg)			<0.0050		
	Anthracene (mg/kg)			<0.0040		
	Benz(a)anthracene (mg/kg)			<0.010		
	Benzo(a)pyrene (mg/kg)			<0.010		
	Benzo(b)fluoranthene (mg/kg)			<0.010		
	Benzo(b+j+k)fluoranthene (mg/kg)			<0.015		
	Benzo(g,h,i)perylene (mg/kg)			<0.010		
	Benzo(k)fluoranthene (mg/kg)			<0.010		
	Chrysene (mg/kg)			<0.010		
	Dibenz(a,h)anthracene (mg/kg)			<0.0050		
	Fluoranthene (mg/kg)			<0.010		
	Fluorene (mg/kg)			<0.010		
	Indeno(1,2,3-c,d)pyrene (mg/kg)			<0.010		
	2-Methylnaphthalene (mg/kg)			<0.010		
	Naphthalene (mg/kg)			<0.010		
	Phenanthrene (mg/kg)			<0.010		
	Pyrene (mg/kg)			<0.010		
	Surrogate: Acenaphthene d10 (%)			89.6		
	Surrogate: Chrysene d12 (%)			105.5		
	Surrogate: Naphthalene d8 (%)			88.5		
	Surrogate: Phenanthrene d10 (%)			95.6		
	B(a)P Total Potency Equivalent (mg/kg)			<0.020		
	IACR (CCME) (mg/kg)			<0.15		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1669873-86	L1669873-87	L1669873-88	L1669873-89	L1669873-90
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date					
Sampled Time					
Client ID	CREMP DUP-3	CREMP DUP-4	CREMP DUP-5	CREMP DUP-6	CREMP DUP-7
Grouping / **Analyte**					
SOIL					
Metals Uranium (U) (mg/kg)	1.74	1.34	11.5	14.0	26.4
Vanadium (V) (mg/kg)	24.1	17.8	42.2	33.2	39.7
Zinc (Zn) (mg/kg)	28.7	26.9	92.6	78.5	111
Zirconium (Zr) (mg/kg)	6.4	3.0	1.7	2.0	2.6
Aggregate Organics Mineral Oil and Grease (mg/kg)					
Hydrocarbons EPH10-19 (mg/kg)					
EPH19-32 (mg/kg)					
LEPH (mg/kg)					
HEPH (mg/kg)					
Polycyclic Aromatic Hydrocarbons Acenaphthene (mg/kg)					
Acenaphthylene (mg/kg)					
Anthracene (mg/kg)					
Benz(a)anthracene (mg/kg)					
Benzo(a)pyrene (mg/kg)					
Benzo(b)fluoranthene (mg/kg)					
Benzo(b+j+k)fluoranthene (mg/kg)					
Benzo(g,h,i)perylene (mg/kg)					
Benzo(k)fluoranthene (mg/kg)					
Chrysene (mg/kg)					
Dibenz(a,h)anthracene (mg/kg)					
Fluoranthene (mg/kg)					
Fluorene (mg/kg)					
Indeno(1,2,3-c,d)pyrene (mg/kg)					
2-Methylnaphthalene (mg/kg)					
Naphthalene (mg/kg)					
Phenanthrene (mg/kg)					
Pyrene (mg/kg)					
Surrogate: Acenaphthene d10 (%)					
Surrogate: Chrysene d12 (%)					
Surrogate: Naphthalene d8 (%)					
Surrogate: Phenanthrene d10 (%)					
B(a)P Total Potency Equivalent (mg/kg)					
IACR (CCME) (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1669873-91 Soil/Sed/Waste CREMP DUP-8	L1669873-92 Soil/Sed/Waste CREMP DUP-9	L1669873-93 Soil/Sed/Waste CREMP DUP-10	L1669873-104 Soil/Sed/Waste CREMP-COMP-DUP-1	L1669873-105 Soil/Sed/Waste CREMP-COMP-DUP-2
SOIL						
Metals	Uranium (U) (mg/kg)	18.9	16.3	15.6		
	Vanadium (V) (mg/kg)	35.3	40.4	39.6		
	Zinc (Zn) (mg/kg)	107	110	96.1		
	Zirconium (Zr) (mg/kg)	3.1	3.2	2.7		
Aggregate Organics	Mineral Oil and Grease (mg/kg)				1210	<500
Hydrocarbons	EPH10-19 (mg/kg)				<640 DLHM	<200
	EPH19-32 (mg/kg)				<640 DLHM	<200
	LEPH (mg/kg)				<640	<200
	HEPH (mg/kg)				<640	<200
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)				<0.0050	<0.0050
	Acenaphthylene (mg/kg)				<0.0050	<0.0050
	Anthracene (mg/kg)				<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)				<0.010	<0.010
	Benzo(a)pyrene (mg/kg)				<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)				<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)				<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)				<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)				<0.010	<0.010
	Chrysene (mg/kg)				<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)				<0.0050	<0.0050
	Fluoranthene (mg/kg)				<0.010	<0.010
	Fluorene (mg/kg)				<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)				<0.010	<0.010
	2-Methylnaphthalene (mg/kg)				<0.010	<0.010
	Naphthalene (mg/kg)				<0.010	<0.010
	Phenanthrene (mg/kg)				<0.010	<0.010
	Pyrene (mg/kg)				<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)				89.3	90.0
	Surrogate: Chrysene d12 (%)				111.7	112.7
	Surrogate: Naphthalene d8 (%)				82.6	85.6
	Surrogate: Phenanthrene d10 (%)				107.0	102.7
	B(a)P Total Potency Equivalent (mg/kg)				<0.020	<0.020
	IACR (CCME) (mg/kg)				<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	EPH10-19	DLHM	L1669873-104, -105
Duplicate	EPH19-32	DLHM	L1669873-104, -105
Duplicate	Chromium (Cr)	DUP-H	L1669873-13, -14, -15, -16, -17, -19, -20, -21, -22, -23, -25
Duplicate	Cobalt (Co)	DUP-H	L1669873-13, -14, -15, -16, -17, -19, -20, -21, -22, -23, -25
Duplicate	Lead (Pb)	DUP-H	L1669873-13, -14, -15, -16, -17, -19, -20, -21, -22, -23, -25
Duplicate	Lithium (Li)	DUP-H	L1669873-13, -14, -15, -16, -17, -19, -20, -21, -22, -23, -25
Duplicate	Molybdenum (Mo)	DUP-H	L1669873-13, -14, -15, -16, -17, -19, -20, -21, -22, -23, -25
Duplicate	Nickel (Ni)	DUP-H	L1669873-13, -14, -15, -16, -17, -19, -20, -21, -22, -23, -25
Duplicate	Calcium (Ca)	DUP-H	L1669873-1, -2, -3, -4, -5
Laboratory Control Sample	Silver (Ag)-Total	LCS-L	L1669873-100, -101, -102, -103, -94, -95, -96, -97, -98, -99
Certified Reference Material	Bismuth (Bi)	RM-H	L1669873-60, -61, -62, -63, -64, -70, -78, -79, -80, -82

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
LCS-L	Lab Control Sample recovery was below ALS DQO. Reference Material and/or Matrix Spike results were acceptable. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
RM-H	Reference Material recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AIR VOLUME-VA	Misc.	Air volume (L)	HYGIENE METHOD
C-TOT-ORG-LECO-SK	Soil	Organic Carbon by combustion method	SSSA (1996) p. 973

Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight lass after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

Reference for Inorganic C:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

EPH-TUMB-FID-VA	Soil	EPH in Solids by Tumbler and GCFID	BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

LEPH/HEPH-CALC-VA	Soil	LEPHs and HEPHs	BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual

Reference Information

results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction. depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.

MET-AR-MG-ICP-VA Filter Metals in Filter by ICPOES NIOSH 7303/EPA 6010B

This analysis is carried out using procedures adapted from Method 7303 in the NIOSH Manual of Analytcial Methods (NMAM). The procedure involves a hot block digestion of the filter media, using a combination of nitric acid and hydrochloric acid. Instrumental analysis of the filter extract is by inductively coupled plasma - optical emission spectrophotometry (EPA 6010B).

MOISTURE-VA Soil Moisture content ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OGG-TUMB-SG-VA Soil CWS MOG with Silica Gel CCME PETROLEUM HYDROCARBONS-GRAVIMETRIC

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." A subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extraction apparatus. The extract undergoes a silica-gel clean-up to remove polar compounds, and is analyzed gravimetrically. Mineral Oil and Grease is equivalent to fraction F4G of the Canada-wide Standard for Petroleum Hydrocarbons.

Accuracy target values for Reference Materials used in this method are derived from averages of long-term method performance, as certified values do not exist for the reported parameters.

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PSA-PIPET+GRAVEL-SK Soil Particle size - Sieve and Pipette SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

2 3 4 5 OL-1768

Reference Information

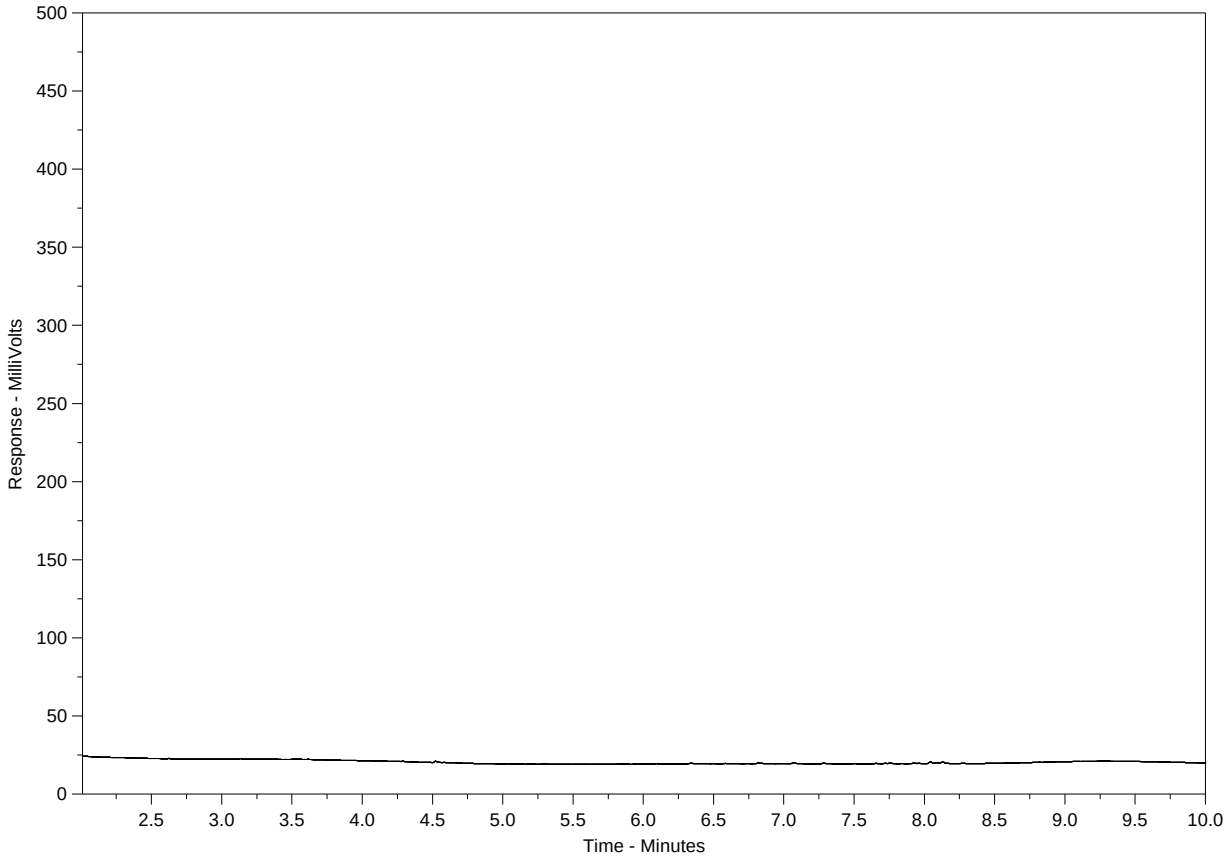
GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-6
Client Sample ID: SP-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

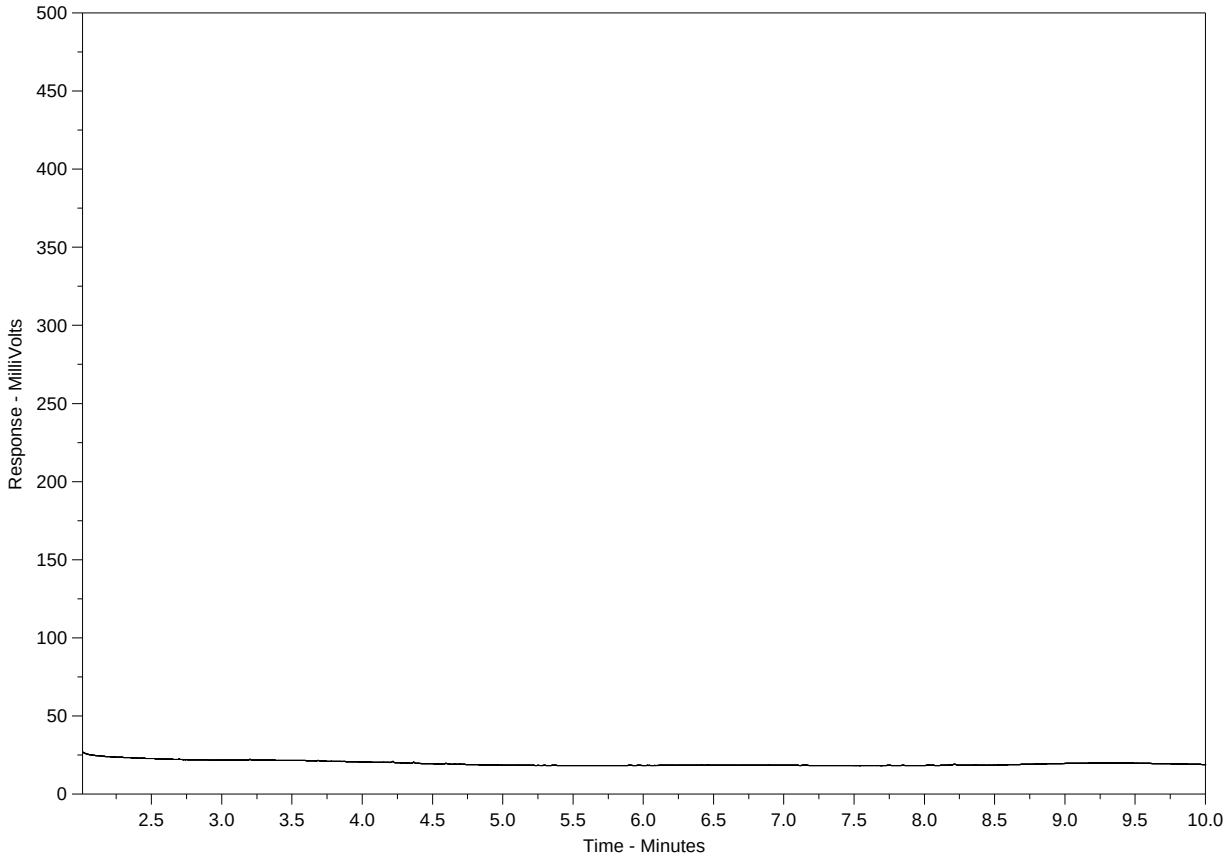
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-12
Client Sample ID: TPE-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

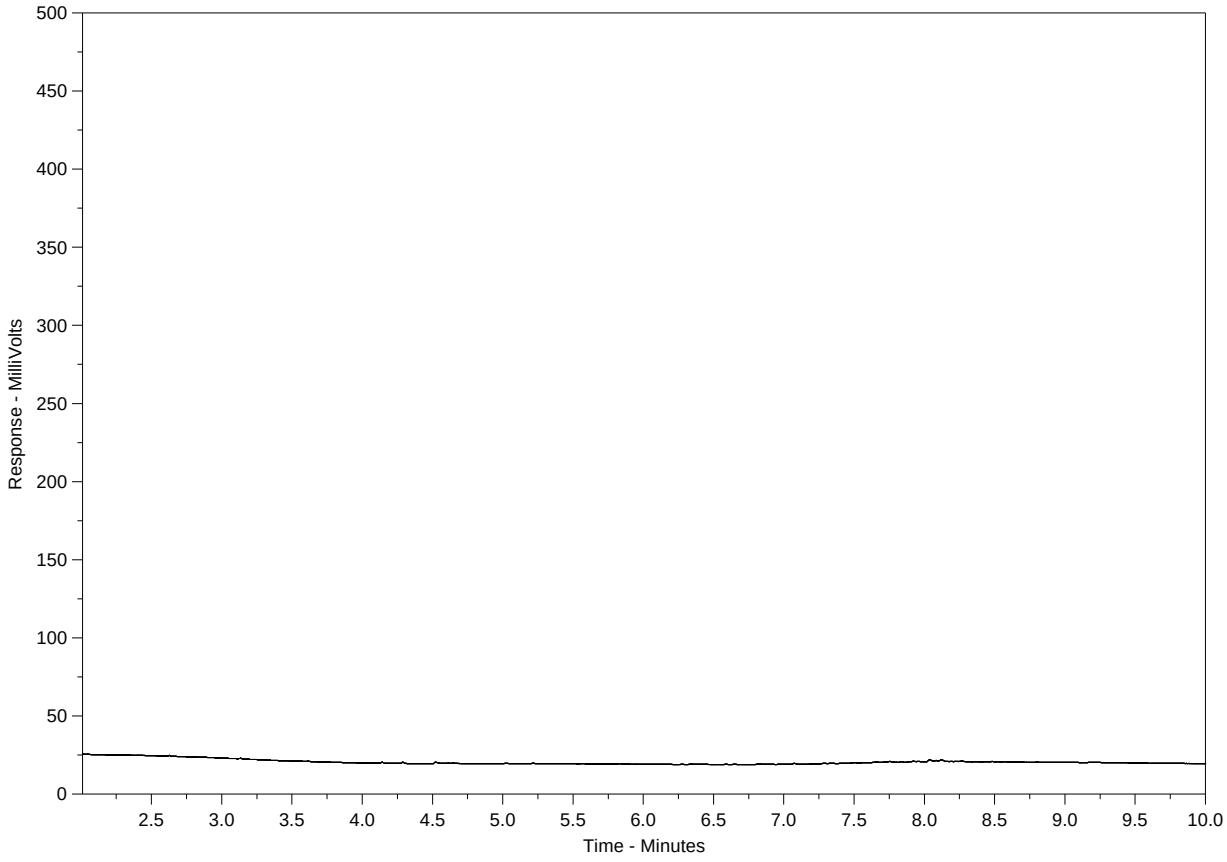
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-18
Client Sample ID: TPN-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

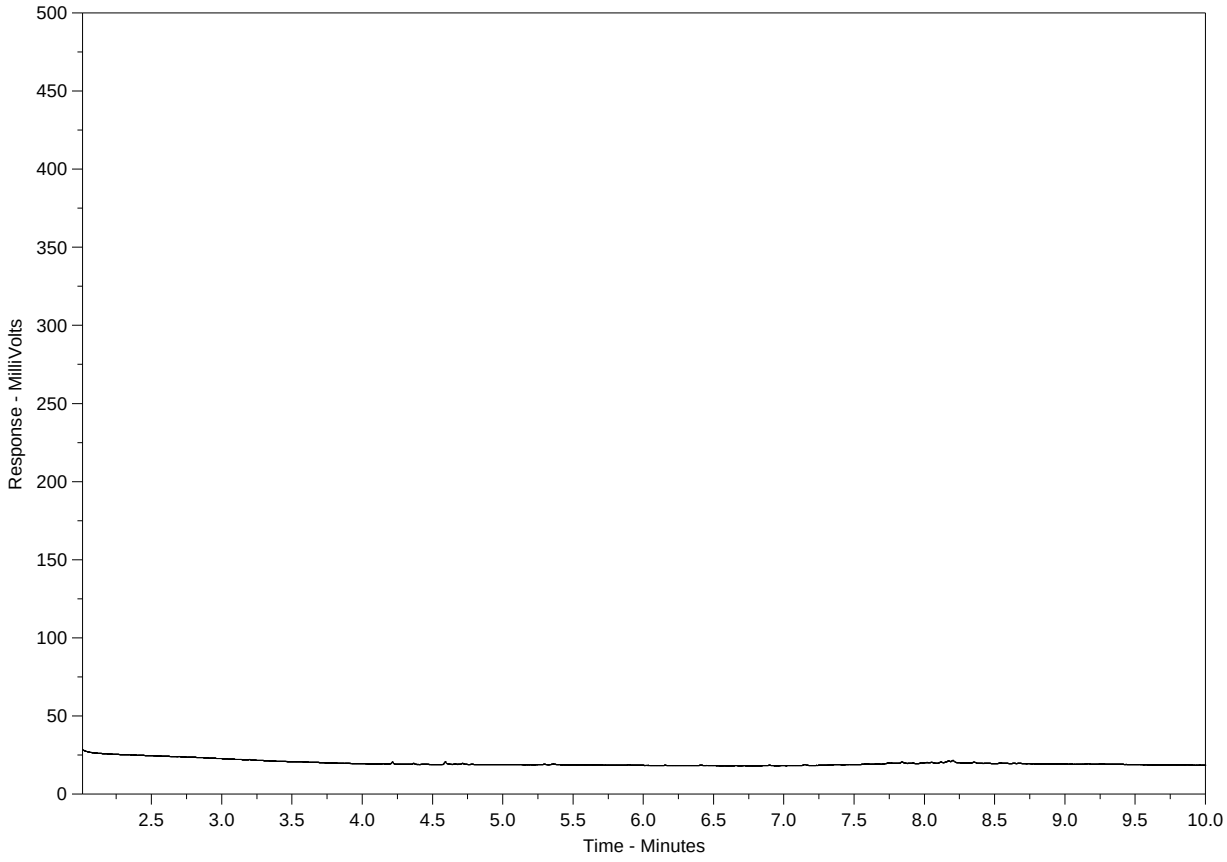
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-24
Client Sample ID: TPS-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

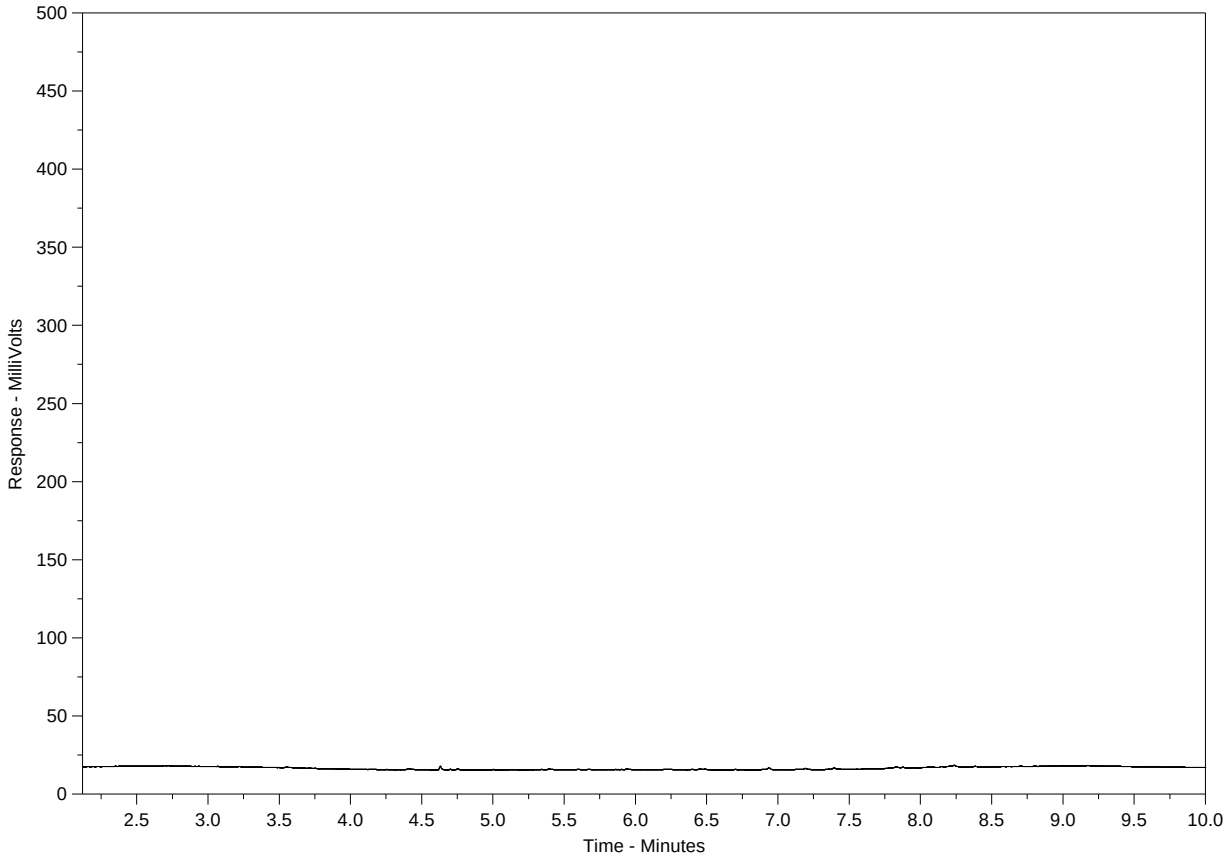
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-30
Client Sample ID: TE-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

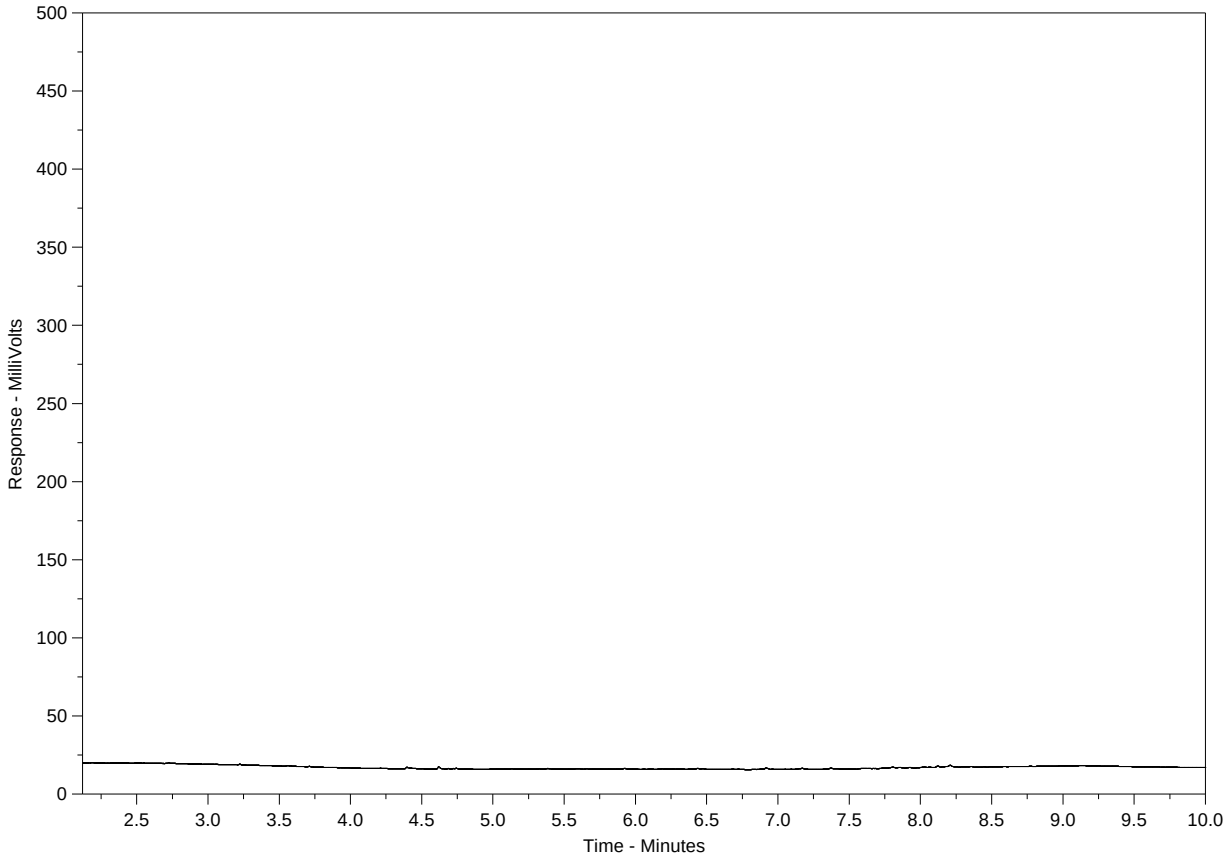
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-36
Client Sample ID: TEFF-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

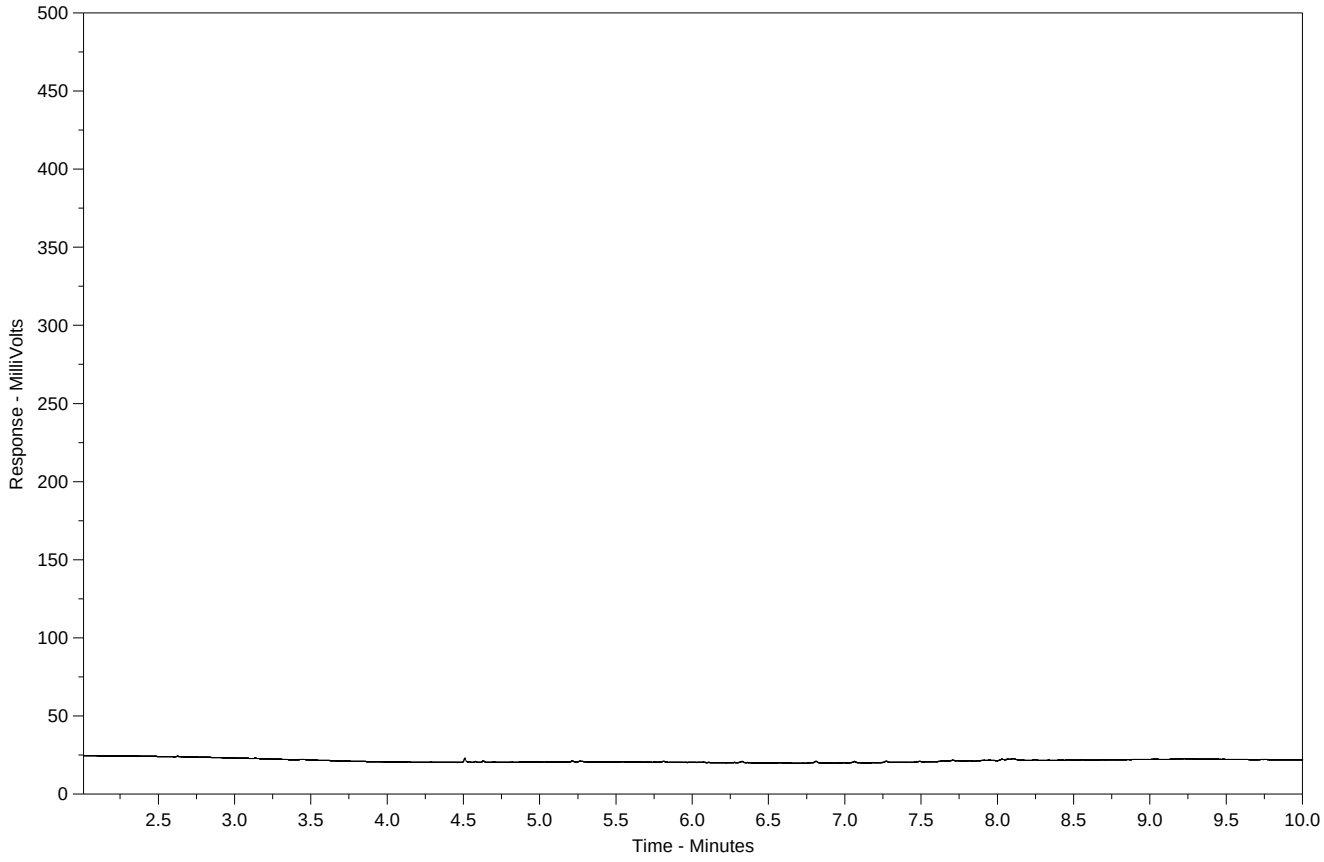
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-42
Client Sample ID: INUG-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

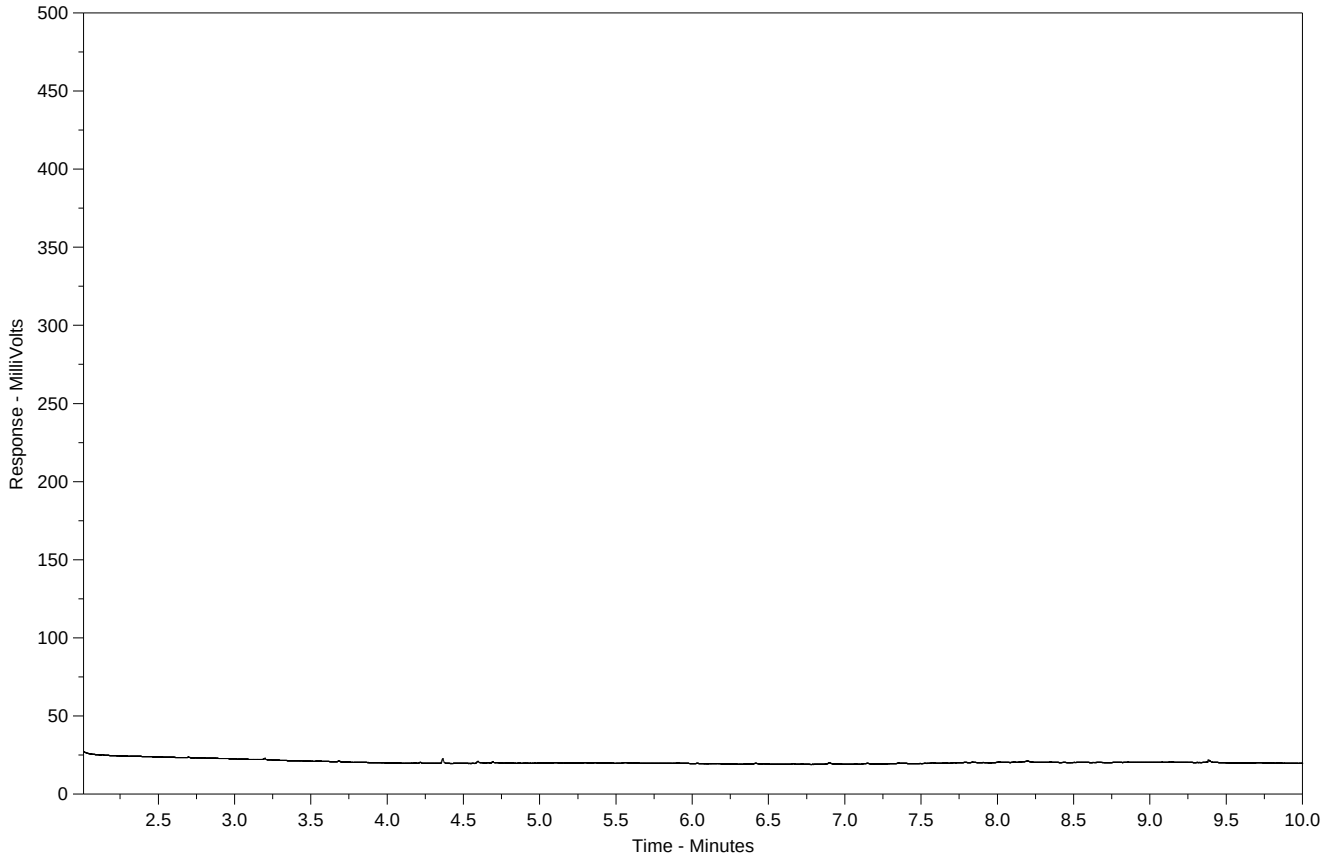
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-48
Client Sample ID: PDL-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

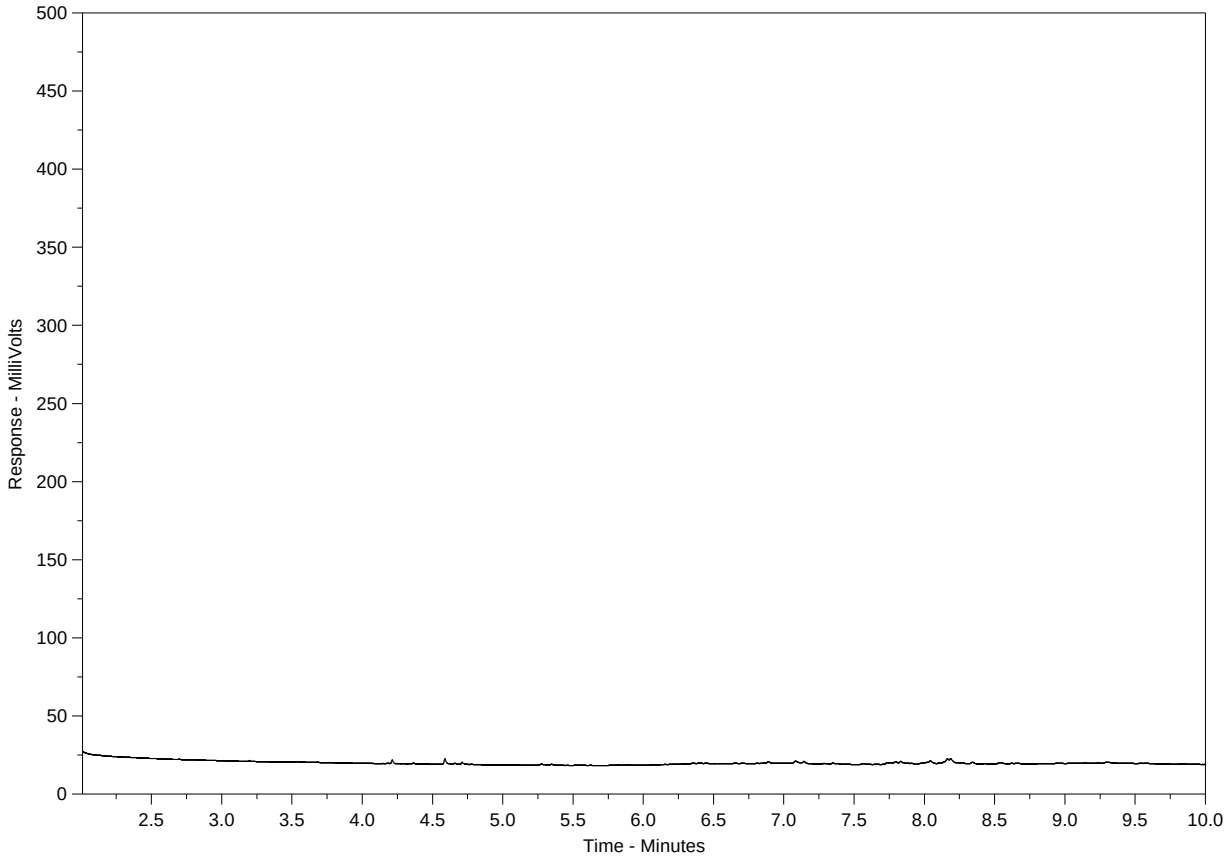
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-54
Client Sample ID: WAL-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

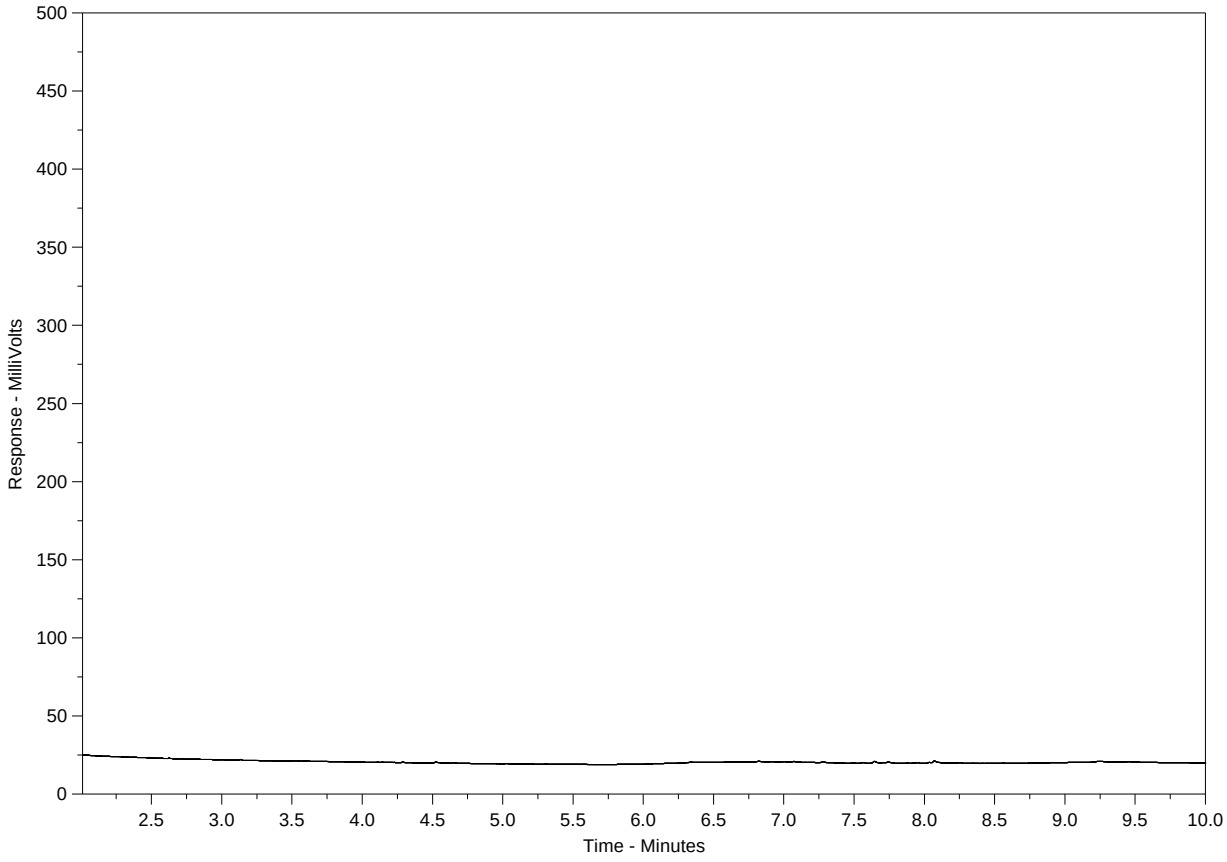
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-65
Client Sample ID: BBD-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

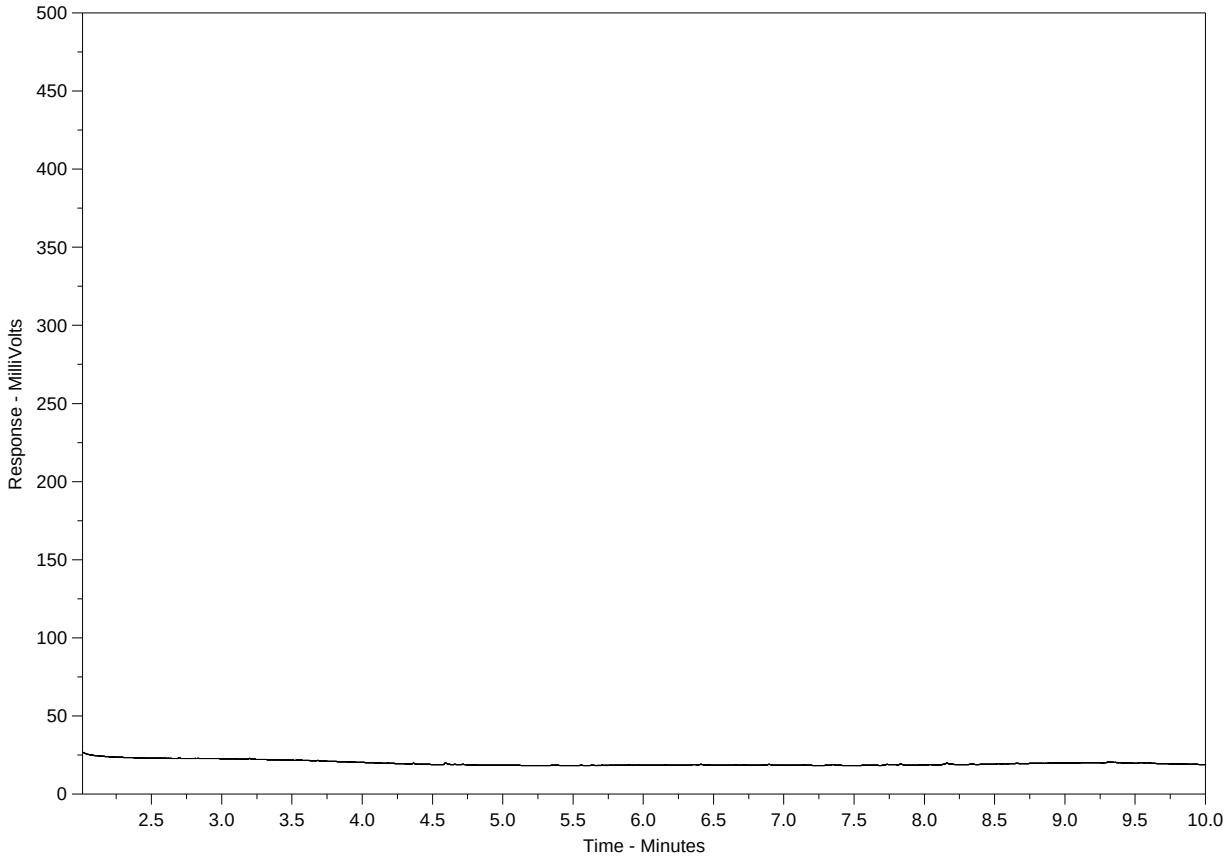
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-71
Client Sample ID: BPJ-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

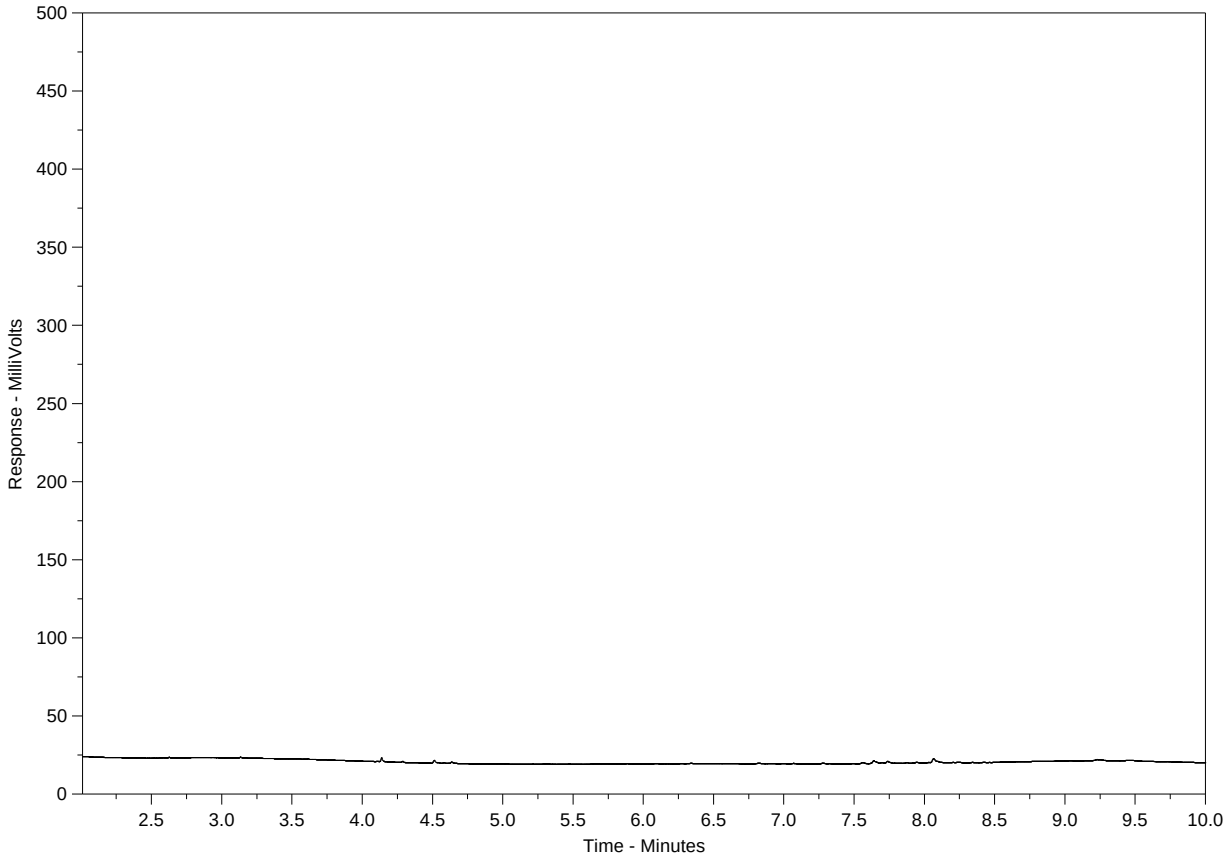
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-77
Client Sample ID: BAP-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

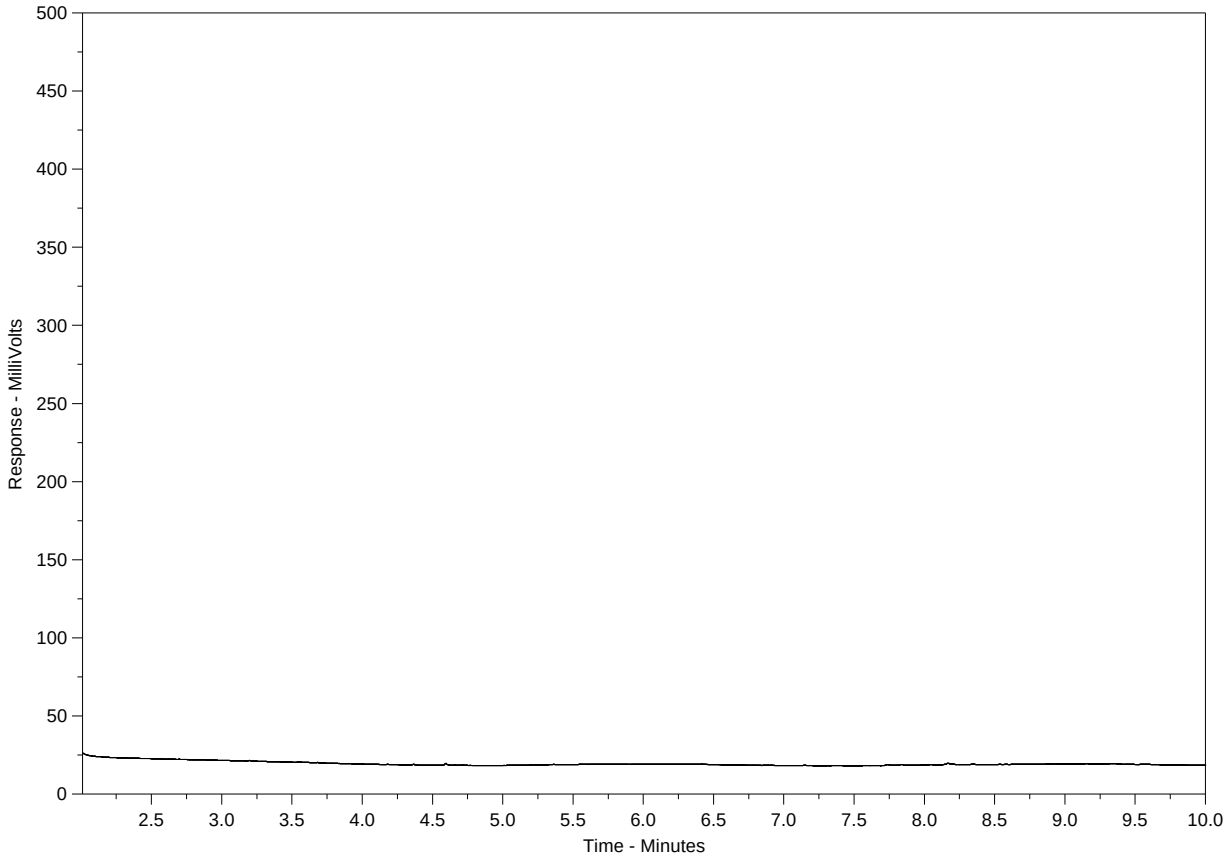
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-83
Client Sample ID: BES-COMP



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

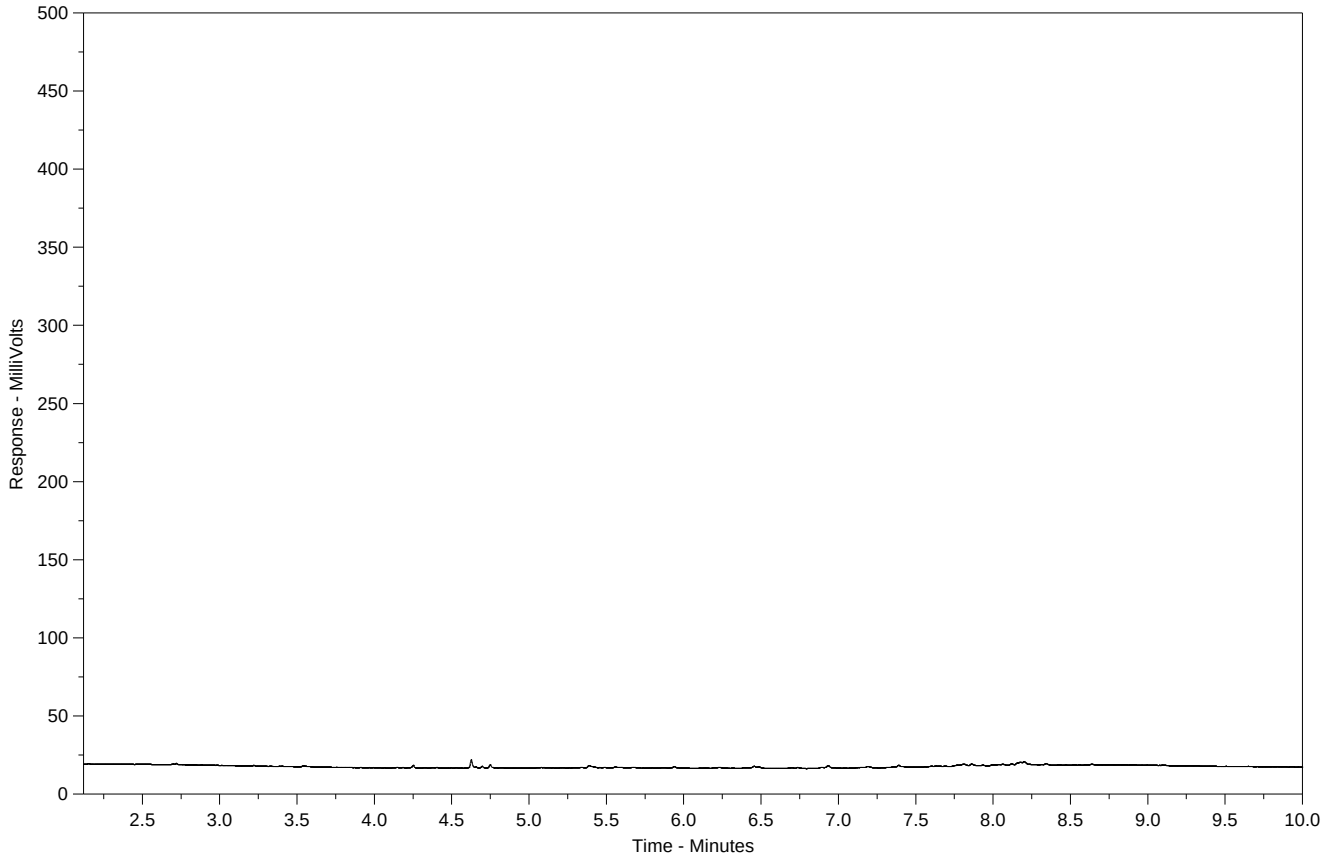
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-104
Client Sample ID: CREMP-COMP-DUP-1



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

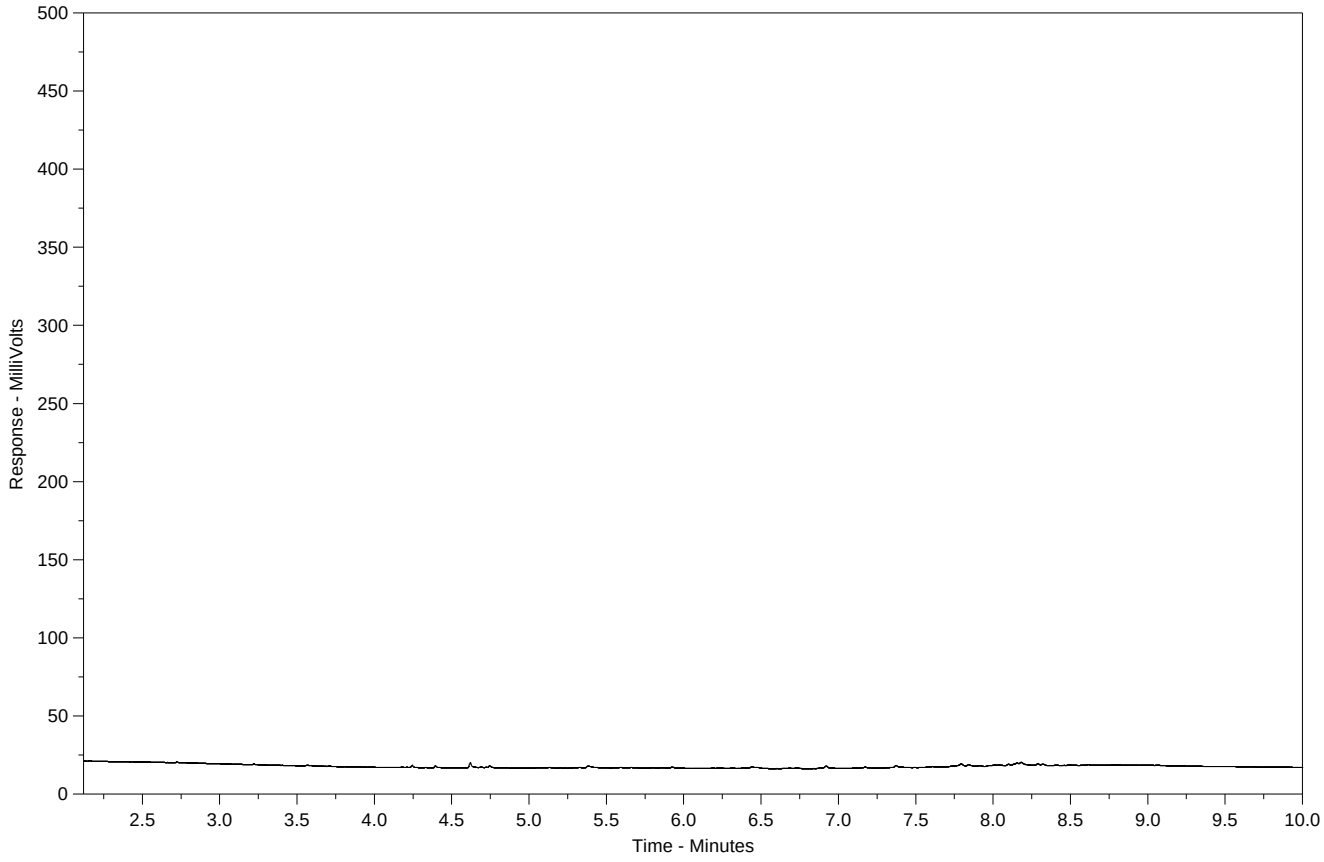
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: WG2170614-5#L1669873-104
Client Sample ID: CREMP-COMP-DUP-1



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

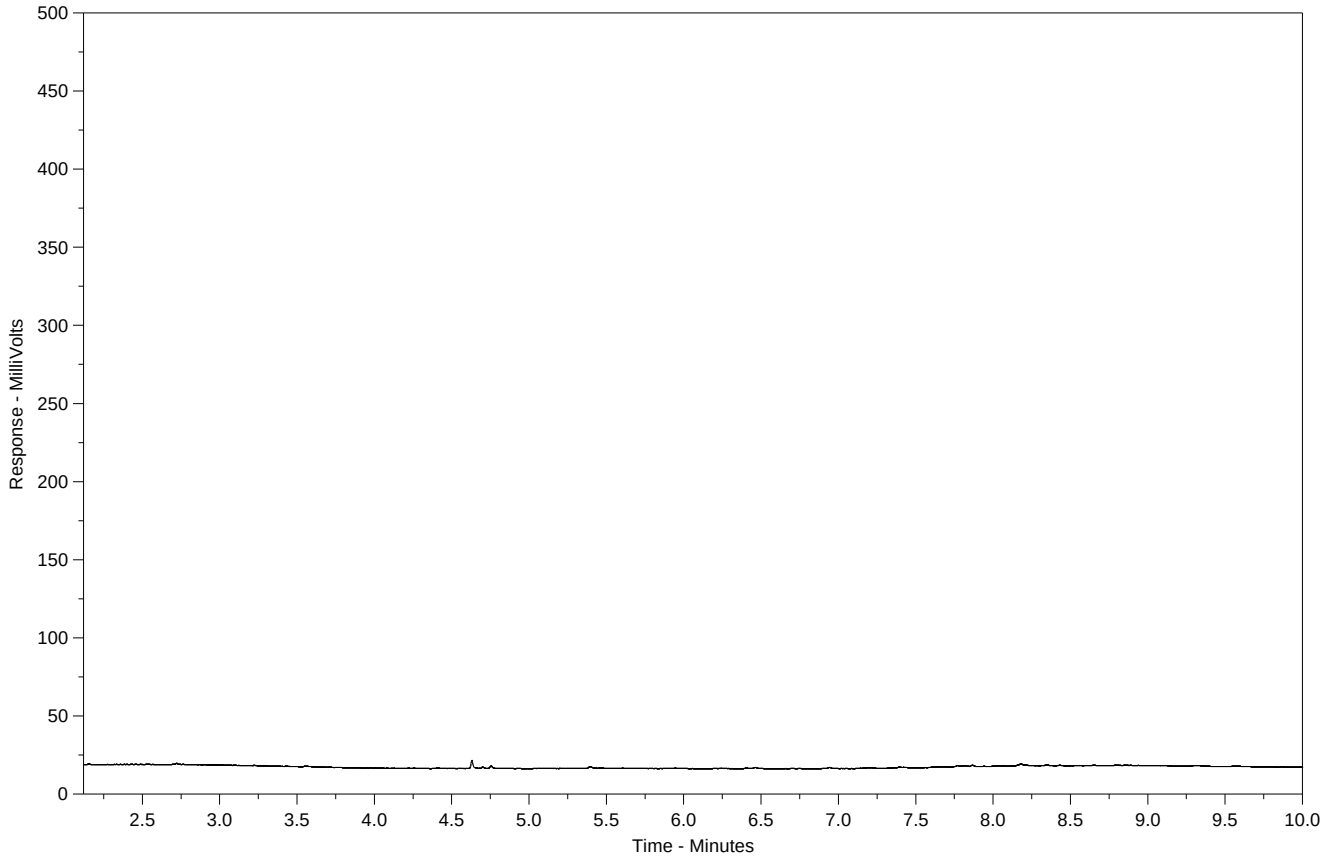
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report

ALS Sample ID: L1669873-105
Client Sample ID: CREMP-COMP-DUP-2



nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →		

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1768

Report To				Reporting		Service Requested
Company:	Azimuth Consulting Group			Distribution:	☐Fax ☐Mail ☑Email	⊙Regular (Standard Turnaround Times - Business Days) - R
Contact:	Maggie McConnell			☐Criteria on Report (select from Guidelines below)		○Priority (3 Days) - surcharge will apply - P
Address:	#218 - 2902 West Broadway Vancouver, BC Canada, V6K 2G8			Report Type:	☑Excel ☐Digital	○Priority (2 Days) - surcharge will apply - P2
				Report Format:		○Emergency (1-2 day) – surcharge will apply - E
				Report Email(s):	mmcconnell@azimuthgroup.ca gmann@azimuthgroup.ca efranz@azimuthgroup.ca	○Same Day or Weekend Emergency - surcharge will apply - E2
						○Specify date required - X
Phone:	604-730-1220	Fax:	604-739-8511			
Invoice To	☑Email ☐Mail			EDD Format:		
Company:	Azimuth Consulting Group			EDD Email(s):		
Contact:	Maggie McConnell					
Address:	#218 - 2902 West Broadway Vancouver, BC Canada, V6K 2G8			Project Info		
				Job #:	CREMP Meadowbank Sediment	
				PO/AFE:		
Email:	mmcconnell@azimuthgroup.ca			LSD:		
Phone:	604-730-1220			Quote #:	Q38011	
Lab Work Order # (lab use only)		L1669873		ALS Contact:	Brent Mack	Sampler: Eric Franz

Analysis Requests

Sample #	Sample Identification (This will appear on the report)	Coordinates Longitude	Coordinates Latitude	Date	Time	Sample Type	Number of Containers	Total metals, pH, Moisture	TOC, Grain size	PAHs, LEPHs, HEPHs, MOG	Total Metals	Please indicate below Filter (F, P, F/P)
	SP-1			8 Aug 15		Soil/Sed/Waste	2	R	R			
	SP-2					Soil/Sed/Waste	2	R	R			
	SP-3					Soil/Sed/Waste	2	R	R			
	SP-4					Soil/Sed/Waste	2	R	R			
	SP-5					Soil/Sed/Waste	2	R	R			
	SP-COMP					Soil/Sed/Waste	1			R		
	TPE-1			30 Aug 15		Soil/Sed/Waste	2	R	R			
	TPE-2					Soil/Sed/Waste	2	R	R			

(See page 2 for further samples)

L1669873-COFC

Special Instructions/Comments	The questions below must be answered for water samples (check Yes or No)	Guidelines
NA = dates withheld on DUP samples.	Are any sample taken from a regulated DW system? ☐Yes ☐No If yes, please use an authorized drinking water COC Is the water sampled intended to be potable for human consumption? ☐Yes ☐No	

SAMPLE CONDITION (lab use only)
☐Frozen ☐Cold ☐Ambient ☐Cooling Initiated

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: ☐Yes If Yes add SIF
Eric Franz	31 Aug 15	10:55	lady	Sept 1	9Am	17.9 °C 16.1 16.8 17.8				

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1768

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests																	
		Longitude	Latitude				Number of Containers	Total metals, pH, Moisture	TOC, Grain size	PAHs, LEPHs, HEPHs, MOG	Total Metals													
							Please Indicate below Filtered, Preserved or both(F, P, F/P)																	
	TPE-3			30 Aug 15		Soil/Sed/Waste	2	R	R															
	TPE-4			↓		Soil/Sed/Waste	2	R	R															
	TPE-5			↓		Soil/Sed/Waste	2	R	R															
	TPE-COMP			↓		Soil/Sed/Waste	1			R														
	TPN-1			14 Aug 15		Soil/Sed/Waste	2	R	R															
	TPN-2			↓		Soil/Sed/Waste	2	R	R															
	TPN-3			↓		Soil/Sed/Waste	2	R	R															
	TPN-4			↓		Soil/Sed/Waste	2	R	R															
	TPN-5			↓		Soil/Sed/Waste	2	R	R															
	TPN-COMP			↓		Soil/Sed/Waste	1			R														
	TPS-1			14 Aug 15		Soil/Sed/Waste	2	R	R															
	TPS-2			↓		Soil/Sed/Waste	2	R	R															
	TPS-3			↓		Soil/Sed/Waste	2	R	R															
	TPS-4			↓		Soil/Sed/Waste	2	R	R															
	TPS-5			↓		Soil/Sed/Waste	2	R	R															
	TPS-COMP			↓		Soil/Sed/Waste	1			R														
	TE-1			28 Aug 15		Soil/Sed/Waste	2	R	R															
	TE-2			↓		Soil/Sed/Waste	2	R	R															
	TE-3			↓		Soil/Sed/Waste	2	R	R															
	TE-4			↓		Soil/Sed/Waste	2	R	R															
	TE-5			↓		Soil/Sed/Waste	2	R	R															
	TE-COMP			↓		Soil/Sed/Waste	1			R														
	TEFF-1			↓		Soil/Sed/Waste	2	R	R															
	TEFF-2			↓		Soil/Sed/Waste	2	R	R															
	TEFF-3			↓		Soil/Sed/Waste	2	R	R															
	TEFF-4			↓		Soil/Sed/Waste	2	R	R															
	TEFF-5			↓		Soil/Sed/Waste	2	R	R															

(See page 3 for further samples)

L1669873-COFC

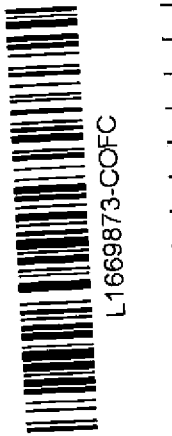
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COC #: OL-1768

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests																	
		Longitude	Latitude				Number of Containers	Total metals, pH, Moisture	TOC, Grain size	PAHs, LEPHs, HEPHs, MOG	Total Metals													
							Please indicate below Filtered, Preserved or both(F, P, F/P)																	
	TEFF-COMP			28 Aug 15		Soil/Sed/Waste	1			R														
	INUG-1			27 Aug 15		Soil/Sed/Waste	2	R	R															
	INUG-2					Soil/Sed/Waste	2	R	R															
	INUG-3					Soil/Sed/Waste	2	R	R															
	INUG-4					Soil/Sed/Waste	2	R	R															
	INUG-5					Soil/Sed/Waste	2	R	R															
	INUG-COMP					Soil/Sed/Waste	1			R														
	PDL-1			26 Aug 15		Soil/Sed/Waste	2	R	R															
	PDL-2					Soil/Sed/Waste	2	R	R															
	PDL-3					Soil/Sed/Waste	2	R	R															
	PDL-4					Soil/Sed/Waste	2	R	R															
	PDL-5					Soil/Sed/Waste	2	R	R															
	PDL-COMP					Soil/Sed/Waste	1			R														
	WAL-1			19 Aug 15		Soil/Sed/Waste	2	R	R															
	WAL-2					Soil/Sed/Waste	2	R	R															
	WAL-3					Soil/Sed/Waste	2	R	R															
	WAL-4					Soil/Sed/Waste	2	R	R															
	WAL-5					Soil/Sed/Waste	2	R	R															
	WAL-COMP					Soil/Sed/Waste	1			R														
	TPE-B-1			30 Aug 15		Soil/Sed/Waste	2	R	R															
	TPE-B-2					Soil/Sed/Waste	2	R	R															
	TPE-B-3					Soil/Sed/Waste	2	R	R															
	TPE-B-4					Soil/Sed/Waste	2	R	R															
	TPE-B-5					Soil/Sed/Waste	2	R	R															
	BBD-1			17 Aug 15		Soil/Sed/Waste	2	R	R															
	BBD-2					Soil/Sed/Waste	2	R	R															
	BBD-3					Soil/Sed/Waste	2	R	R															

(See page 4 for further samples)



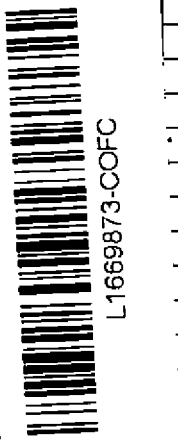
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Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests																		
		Longitude	Latitude				Number of Containers	Total metals, pH, Moisture	TOC, Grain size	PAHs, LEPHs, HEPHs, MOG	Total Metals														
							Please indicate below Filtered, Preserved or both(F, P, F/P)																		
	BBD-4			17 Aug 15		Soil/Sed/Waste	2	R	R																
	BBD-5			↓		Soil/Sed/Waste	2	R	R																
	BBD-COMP			↓		Soil/Sed/Waste	1			R															
	BPJ-1			18 Aug 15		Soil/Sed/Waste	2	R	R																
	BPJ-2			↓		Soil/Sed/Waste	2	R	R																
	BPJ-3			↓		Soil/Sed/Waste	2	R	R																
	BPJ-4			↓		Soil/Sed/Waste	2	R	R																
	BPJ-5			↓		Soil/Sed/Waste	2	R	R																
	BPJ-COMP			↓		Soil/Sed/Waste	1			R															
	BAP-1			16 Aug 15		Soil/Sed/Waste	2	R	R																
	BAP-2			↓		Soil/Sed/Waste	2	R	R																
	BAP-3			↓		Soil/Sed/Waste	2	R	R																
	BAP-4			↓		Soil/Sed/Waste	2	R	R																
	BAP-5			↓		Soil/Sed/Waste	2	R	R																
	BAP-COMP			↓		Soil/Sed/Waste	1			R															
	BES-1			17 Aug 15		Soil/Sed/Waste	2	R	R																
	BES-2			↓		Soil/Sed/Waste	2	R	R																
	BES-3			↓		Soil/Sed/Waste	2	R	R																
	BES-4			↓		Soil/Sed/Waste	2	R	R																
	BES-5			↓		Soil/Sed/Waste	2	R	R																
	BES-COMP			↓		Soil/Sed/Waste	1			R															
	CREMP DUP-1			NA		Soil/Sed/Waste	2	R	R																
	CREMP DUP-2			NA		Soil/Sed/Waste	2	R	R																
	CREMP DUP-3			NA		Soil/Sed/Waste	2	R	R																
	CREMP DUP-4			NA		Soil/Sed/Waste	2	R	R																
	CREMP DUP-5			NA		Soil/Sed/Waste	2	R	R																
	CREMP DUP-6			NA		Soil/Sed/Waste	2	R	R																

(See page 5 for further samples)



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COC #: OL-1768

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests																	
		Longitude	Latitude				Number of Containers	Total metals, pH, Moisture	TOC, Grain size	PAHs, LEPHs, HEPHs, MOG	Total Metals													
							Please indicate below Filtered, Preserved or both(F, P, F/P)																	
	CREMP DUP-7			NA		Soil/Sed/Waste	2	R	R															
	CREMP DUP-8			NA		Soil/Sed/Waste	2	R	R															
	CREMP DUP-9			NA		Soil/Sed/Waste	2	R	R															
	CREMP DUP-10			NA		Soil/Sed/Waste	2	R	R															
	CREMP SWIPE-1			14 Aug 15		Filter	1				R													
	CREMP SWIPE-2			17 Aug 15		Filter	1				R													
	CREMP SWIPE-3			17 Aug 15		Filter	1				R													
	CREMP SWIPE-4			26 Aug 15		Filter	1				R													
	CREMP SWIPE-5			26 Aug 15		Filter	1				R													
	CREMP SWIPE-6			27 Aug 15		Filter	1				R													
	CREMP SWIPE-7			28 Aug 15		Filter	1				R													
	CREMP SWIPE-8			28 Aug 15		Filter	1				R													
	CREMP SWIPE-9			30 Aug 15		Filter	1				R													
	CREMP SWIPE-10			30 Aug 15		Filter	1				R													
	CREMP-COMP-DUP-1			NA		Soil/Sed/Waste	1			R														
	CREMP-COMP-DUP-2			NA		Soil/Sed/Waste	1			R														



AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 08-OCT-15
Report Date: 20-OCT-15 14:53 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1685694

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1685694-1	L1685694-2			
	Description	Other	Other			
	Sampled Date	08-OCT-15	08-OCT-15			
	Sampled Time					
	Client ID	CREMP-SWIPE-QA-1	CREMP-SWIPE-QA-2			
Grouping	**Analyte**					
FILTER						
Metals	Aluminum (Al)-Total (mg)	<0.010	<0.010			
	Antimony (Sb)-Total (mg)	<0.010	<0.010			
	Arsenic (As)-Total (mg)	<0.010	<0.010			
	Barium (Ba)-Total (mg)	<0.00050	<0.00050			
	Beryllium (Be)-Total (mg)	<0.00030	<0.00030			
	Bismuth (Bi)-Total (mg)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg)	<0.00050	<0.00050			
	Calcium (Ca)-Total (mg)	<0.050	<0.050			
	Chromium (Cr)-Total (mg)	<0.0010	<0.0010			
	Cobalt (Co)-Total (mg)	<0.00050	<0.00050			
	Copper (Cu)-Total (mg)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg)	0.0074	0.0124			
	Lead (Pb)-Total (mg)	<0.0030	<0.0030			
	Lithium (Li)-Total (mg)	<0.00050	<0.00050			
	Magnesium (Mg)-Total (mg)	0.0090	0.0098			
	Manganese (Mn)-Total (mg)	<0.00030	<0.00030			
	Molybdenum (Mo)-Total (mg)	<0.0020	<0.0020			
	Nickel (Ni)-Total (mg)	<0.0030	<0.0030			
	Phosphorus (P)-Total (mg)	<0.020	<0.020			
	Potassium (K)-Total (mg)	<0.10	<0.10			
	Selenium (Se)-Total (mg)	<0.010	<0.010			
	Silver (Ag)-Total (mg)	<0.00050	<0.00050			
	Sodium (Na)-Total (mg)	<0.10	<0.10			
	Strontium (Sr)-Total (mg)	<0.00030	<0.00030			
	Thallium (Tl)-Total (mg)	<0.010	<0.010			
	Tin (Sn)-Total (mg)	<0.0020	<0.0020			
	Titanium (Ti)-Total (mg)	<0.00050	<0.00050			
	Vanadium (V)-Total (mg)	<0.0020	<0.0020			
	Zinc (Zn)-Total (mg)	0.00033	0.00042			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AIR VOLUME-VA	Misc.	Air volume (L)	HYGIENE METHOD
MET-AR-MG-ICP-VA	Filter	Metals in Filter by ICPOES	NIOSH 7303/EPA 6010B

This analysis is carried out using procedures adapted from Method 7303 in the NIOSH Manual of Analytcial Methods (NMAM). The procedure involves a hot block digestion of the filter media, using a combination of nitric acid and hydrochloric acid. Instrumental analysis of the filter extract is by inductively coupled plasma - optical emission spectrophotometry (EPA 6010B).

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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COC # _____

Page 1 of 1

Report To		**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Company:	Azimuth Consulting Group	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Franz	☑ PDF ☑ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	218-2902 West Broadway	Email 1: efranz@azimuthgroup.ca	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2: gmann@azimuthgroup.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agnicoeagle.com	**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: CREMP Meadowbank Sediment	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:		Quote #: Q38011	
Lab Work Order # (lab use only)	L1685694-COFC	**ALS Contact:** Brent Mack **Sampler:** EF, MM	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Metals	Number of Containers
	CREMP-SWIPE-QA-1	08-Oct-15		Other	X	1
	CREMP-SWIPE-QA-2	08-Oct-15		Other	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please analyse these filters in the same manner as the filters from L1669873 from Sept. 2015.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	08-Oct-15	11:30	Shafee	OCT.8	1416	21 °C				

GENF 20.00 Front

APPENDIX G

Sediment Toxicity Test Results – Maxxam Analytics

maxxam.ca

MAXXAM ANALYTICS
4606 Canada Way
Burnaby, BC V5G 1K5

Office 604 734 7276
Toll Free 800 665 8566
Fax 604 731 2386

FRESHWATER SEDIMENT TOXICITY TESTING USING *HYALELLA AZTECA* AND *CHIRONOMUS DILUTUS*

Prepared for:

Azimuth Consulting Group Inc.
218 – 2902 West Broadway
Vancouver, BC
V6K 2G8

Prepared by:

Ecotoxicology Group
Maxxam Analytics
Project No.: 2-11-15018
Maxxam Job #: B577416
November 2015

EXECUTIVE SUMMARY

A total of 4 freshwater sediment samples were collected on August 26, 27, and 30, 2015. The samples arrived at the Maxxam Burnaby Laboratory, in good condition, on September 3, 2015.

The following freshwater sediment toxicity tests were conducted on the samples; a 14 day survival and growth test with the freshwater amphipod, *Hyalella azteca,* and a 10 day survival and growth test with the freshwater midge, *Chironomus dilutus*.

The tests were initiated September 15, 2015, and were completed on September 29 and 25, 2015. Growth and survival endpoints, for each sample, were statistically assessed against those of the negative control.

Details regarding the test results, methods, test conditions, organism acclimation, and quality control measures are summarised within the report. All tabulated data, raw data, and associated supporting documents are located within the report appendices.

Each test was considered valid as survival in the negative control(s) met the validity criteria outlined in the associated reference methods.

TABLE OF CONTENTS

1 SEDIMENT DESCRIPTION 1

1.1 Sample Information 1

1.2 Negative Control Sediment 1

1.3 Porewater Characterisation 2

2 10 DAY *CHIRONOMUS DILUTUS* SURVIVAL AND GROWTH TEST 3

2.1 Test Methods 3

2.2 Organism Information 4

2.2.1 Organism Acclimation and Holding Information 4

2.2.2 Organism Health 4

2.2.3 Organism Age 4

2.3 Test Conditions 4

2.4 Quality Assurance/Quality Control 6

2.4.1 Reference Toxicant Results 6

2.4.2 Test Validity Criteria 6

2.5 Results 6

2.5.1 Data Analysis 7

2.5.2 Method Deviations 7

3 14 DAY *HYALELLA AZTECA* SURVIVAL AND GROWTH TEST 8

3.1 Test Methods 8

3.2 Organism Information 8

3.2.1 Acclimation and Holding Information 8

3.2.2 Organism Health 9

3.2.3 Organism Age 9

3.3 Test Conditions 9

3.4 Quality Assurance/Quality Control 11

3.4.1 Reference Toxicant Results 11

3.4.2 Test Validity Criteria 11

3.5 Results 11

3.5.1 Data Analysis 12

3.5.2 Method Deviations 12

4 REFERENCES 13

APPENDICES

A Sample Information

B 10-day *Chironomus dilutus* Survival and Growth Test

C 14-Day *Hyalella azteca* Growth and Survival Test

LIST OF TABLES

Table 1-1	Physiochemical Characterisation of Yaquina Bay Beach Sand	1
Table 2-1	Test Conditions for the 10-day *Chironomus dilutus* Test	5
Table 2-2	Reference Toxicant Test Result for *Chironomus dilutus*	6
Table 2-3	Results for Mean *Chironomus dilutus* Survival and Growth	7
Table 3-1	Test Conditions for the 14-day *Hyalella azteca* Test	10
Table 3-2	Reference Toxicant Test Results for *Hyalella azteca*	11
Table 3-3	Results for Mean *Hyalella azteca* Survival and Growth	12

SECTION

1 SEDIMENT DESCRIPTION

1.1 Sample Information

A total of 4 freshwater sediment samples were collected on August 26, 27, and 30, 2015. The samples arrived at the Maxxam Burnaby Laboratory, in good condition, on September 3, 2015.

Per sample location, 5 field replicates were collected in 1L containers for the *H. azteca* and *C. dilutus* tests.

All tests were initiated within their respective hold times. Sample information, including sample descriptions, porewater ammonia analyses, and water quality data are located in Appendix A.

All samples arrived at the laboratory in good condition, and there were no apparent events during shipping and handling which appeared to have compromised the quality of the samples. The samples varied in colour, texture, grain size and content. Upon opening the containers, a description of each sample was recorded ("Sediment Sample Descriptions" in Appendix A).

Prior to use in the tests, each field replicate was thoroughly homogenised, using a stainless steel spoon. Any headspace in the sample container was purged with nitrogen gas prior to re-sealing it in order to prevent oxidation of the sediment during storage. When not in use, the sediments were stored in the dark at 4 ± 2°C.

1.2 Negative Control Sediment

The negative control sediment for the toxicity tests was collected from Yaquina Bay, Newport, Oregon, by staff of Northwestern Aquatic Sciences. This beach sand has been used as a negative control in previous studies within our laboratory, and has been found to be non-toxic to a variety of organisms. It was wet sieved and thoroughly washed with control water through 500 µm stainless steel mesh before being used in the tests.

Table 1-1 Physiochemical Characterisation of Yaquina Bay Beach Sand

Total Organic Carbon (g/kg)	Moisture Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
0.34	7.0	<0.10	99	0.15	0.55

1.3 Porewater Characterisation

Aliquots of the sample composites were distributed into 500 mL polycarbonate centrifuge bottles and nitrogen gas was placed over the sediments. They were centrifuged for 20 minutes at 5000 rpm. The resulting porewater was carefully decanted and analysed for ammonia, pH, and temperature.

Analysis of ammonia in porewater was performed at the Maxxam Environmental Inorganic Water Laboratory. Colorimetric methods were used to determine aqueous concentrations of ammonia.

The total ammonia concentration, as N (mg/L) in the samples, was measured under basic conditions using the Berthelot reaction in the presence of EDTA. A sample was treated sequentially until a blue indophenol complex formed, which could then be measured photometrically at 660nm.

Total ammonia in porewater measurements are available in Appendix A.

SECTION

2 10 DAY *CHIRONOMUS DILUTUS* SURVIVAL AND GROWTH TEST

2.1 Test Methods

The survival and growth of *Chironomus dilutus* larvae, when exposed to solid-phase sediment samples for 10 days, was assessed according to the Environment Canada Biological Test Method "Test for Survival and Growth in Sediment Using the Larvae of Freshwater Midges (*Chironomus tentans* or *Chironomus riparius*", and the Maxxam SOP "*Chironomus dilutus* 10-Day Survival and Growth Test" (BBY2SOP-00010).

One day prior to test initiation, the field replicates were individually homogenized, and a 100mL aliquot was distributed into a 375mL labelled test vessel. Reconstituted moderately hard water was then slowly added to the vessel by pouring a stream of water onto a Plexiglas baffle without disturbing the sediment layer. The test vessels were then randomized on the bench top, and airlines and lids were fitted to each test vessel.

A composite sample was produced by combining equal portions of each field replicate in a stainless steel bowl. Then, 100mL of composite sample was distributed into a sixth replicate test vessel used for water quality measurements. The remaining composite material was centrifuged to exact porewater for ammonia and pH measurements (see Section 1.3).

The following day, aliquots of overlying water were removed from the test vessels for initial water quality analysis. Larval chironomids were removed from their holding containers and seeded into the test vessels.

During the test, daily observations and aeration checks were performed, and the temperature and dissolved oxygen was measured three times per week in the test vessel designated for water quality measurements.

At test termination, the contents of each test vessel were sieved and the live larval midges counted. The larvae were then placed into pre-weighed aluminum weigh boats that were subsequently placed into a drying oven. Missing larval midges were presumed to have died and decomposed during the test.

2.2 Organism Information

2.2.1 Organism Acclimation and Holding Information

One batch of laboratory-reared *Chironomus dilutus* larvae was received from Aquatic Biosystems on September 15, 2015. The midge larvae were shipped in 1L plastic containers filled with unbleached paper towels and overlying moderately hard water. Prior to shipping, the headspace in each container was filled with oxygen gas of a sufficient concentration to maintain adequate saturation levels in the shipping water.

Upon arrival at Maxxam, the water quality of the shipping water was measured and compared to the test conditions. Care was taken not to expose the larvae to temperature changes greater than 2°C. The hardness of the shipping and overlying waters were confirmed to be within 20% of one another.

Any moribund or deceased larvae were removed and recorded on the acclimation sheet (Appendix B).

The chironomid larvae were not fed during the holding period as they were used shortly after they arrived at the lab. Historically at Maxxam, it has been determined that little to no acclimation is required as long as the shipping, testing, and supplier laboratory conditions closely match.

2.2.2 Organism Health

The mortality rate during shipping did not exceed 10% overall. Bench sheets with the receiving water quality and observations of the number dead or inactive larvae are available in Appendix B.

2.2.3 Organism Age

Twenty representative larvae were euthanized and their head capsule widths were measured to the nearest 0.10mm, using an inverted microscope outfitted with an ocular micrometer. The average head capsule width of the organism batch was determined to be within 0.33 – 0.45mm, which indicated they were the correct age (see Table 2-1).

2.3 Test Conditions

See Table 2-1 for a detailed list of the test conditions. All bench sheets used to record raw data are available in Appendix B.

Table 2-1 Test Conditions for the 10-day *Chironomus dilutus* Test

Parameter	Conditions and Methods
Test Type and Duration	10 Day, Static (non-renewal)
Temperature	23 ± 1°C
Photoperiod and Light Intensity	16 hours light: 8 hours dark. Wide spectrum cool white fluorescent lights used to provide 644-806 lux during light cycle.
Aeration	< 100 bubbles/ minute. Clean oil-free air supplied to each test vessel via micro-bore plastic tubing
Test Chamber	375mL glass jars with plastic lids containing small opening for airline tubing.
Sediment Volume	100mL of homogenized sediment (3-4cm depth)
Overlying Water Source and Volume	175mL; Reconstituted Moderately Hard Water; warmed to 23 ± 1°C and aerated >24 hours before use.
Overlying Water Quality	Temperature, pH, dissolved oxygen, conductance, hardness, alkalinity and ammonia, measurements on Day 0 and Day 10 of test. Temperature and dissolved oxygen were also measured three times weekly during the test.
Replicates	5 per sample, plus an additional replicate for water quality measurements.
Control Sediment	Yaquina Bay Sand, rinsed with control water and sieved through a 500 µm stainless steel mesh
Feeding	3.75mL Tetramin™ flakes as slurry (4g dry solids/L) per vessel, three times weekly.
Organisms/ replicate	10
Organism Source	Aquatic Biosystems, Fort Collins, Colorado.
Mortality during acclimation	0.0%
Mean Head capsule width and organism age	0.40 ± 0.04mm; 3rd instar larval midges
Endpoints	Mean Survival and Growth
Test Validity Criteria	≥70% mean survival in the negative controls
	>0.6 mg mean dry weight in the negative controls
Statistical Software	CETIS™ version 1.8.7.16. Tidepool Scientific Software (Copyright 2000-2013).

2.4 Quality Assurance/Quality Control

2.4.1 Reference Toxicant Results

A 96 hour reference toxicant test, or positive control test, was conducted alongside the sediment test. The water-only test, using copper sulphate ($CuSO_4$), was initiated to aid in the assessment of organism sensitivity and the precision of the results. The reference toxicant test LC50 result was then compared in a control chart against the results of previous tests. Table 2-2 summarises the result of the reference toxicant test.

The calculated LC50 for the reference toxicant test was within the two standard deviation (95%) range of the historic mean LC50. This supports the assumption that the sensitivity of organism batch was comparable to batches previously tested in this laboratory.

The method used in preparing the control charts was taken from "Control Charting of Reference Toxicant Tests" (BBY2 WI-00007).

Table 2-2 Reference Toxicant Test Result for *Chironomus dilutus*

Organism Batch	Test Date	LC50 with 95% Confidence Limits (mg/L Cu^{2+})	Previous Mean with 2SD (mg/L Cu^{2+})
AB150915	2015 Sep 15	0.85 (0.57, 1.20)	0.88 (0.36 – 2.14)

2.4.2 Test Validity Criteria

The test is considered to be acceptable if the mean percent survival in the negative control is ≥70%, and the mean dry weight is ≥ 0.6mg. The mean percent survival of the controls was 96%, and the mean dry weight 1.27mg.

2.5 Results

Total survival in each replicate and the mean ± SD in the control and test sediments are listed in the "*Chironomus dilutus* Survival and Growth Test- Survival of Larvae" and the "Chironomid Survival and Growth Test- Dry Weights of Larvae" sheets. No samples showed a significant decrease in survival or mean dry weight compared to the lab control. A summary of the test results is located in Table 2-3.

Total ammonia concentrations, pH, temperature, hardness, conductance, and alkalinity in overlying and water at test initiation (Day 0) and completion (Day 10), as well as other daily water quality measurements, are available in Appendix B.

2.5.1 Data Analysis

The survival data for all samples and the negative control was entered into the statistical program "Comprehensive Environmental Toxicity Information System" (CETIS, 2000-2013). When determining the appropriate comparison tests to use, the Environment Canada "Guidance Document on Statistical Methods for Environmental Toxicity Tests" (EPS 1/RM/46, 2005) was followed.

See the CETIS Analytical Reports for information on the specific tests used for the mean survival and dry weight comparisons. All analyses were conducted as one-tailed comparisons with the decision level for determining statistical significance set to 0.05 (p value <0.05).

Table 2-3 Results for Mean *Chironomus dilutus* Survival and Growth

Sample ID	Mean Survival ± SD (%)	Mean Dry Weight ± SD (mg)
Lab Control	96 ± 9	1.27 ± 0.19
PDL	96 ± 9	1.88 ± 0.11
INUG	96 ± 5	1.74 ± 0.22
TPE-B	88 ± 8	1.65 ± 0.22
TPE	98 ± 4	1.52 ±0.19

SD = Standard Deviation

2.5.2 Method Deviations

There were no method deviations during testing.

SECTION

3 14 DAY *HYALELLA AZTECA* SURVIVAL AND GROWTH TEST

3.1 Test Methods

The survival and growth of the freshwater amphipod, *Hyalella azteca*, when exposed to solid-phase sediment samples for 14 days, were assessed according to the Environment Canada Biological Test Method "Test for Survival and Growth in Sediment and Water Using the Freshwater Amphipod *Hyalella azteca* (EPS 1/RM/33)*"* and the Maxxam SOP "*Hyaella azteca* 14-Day Survival and Growth Test" (BBY2SOP-00011).

One day prior to test initiation, the samples were homogenized, and 100 mL aliquots were distributed into 375mL labelled test vessels. Reconstituted moderately hard water was then slowly added to the vessel by pouring a stream of water onto a Plexiglas baffle without disturbing the sediment layer. The test vessels were then randomized on the bench top and airlines and lids were fitted to each test vessel.

The following day, aliquots of overlying water were removed from the test vessels for initial water quality analysis. Amphipods were removed from their holding containers and seeded into the test vessels.

During the test, daily observations and aeration checks were performed, and the temperature and dissolved oxygen was measured three times per week in the test vessel designated for water quality measurements.

At test termination, the contents of each test vessel were processed and the live amphipods counted. The amphipods were then placed into aluminum foil weigh boats that were subsequently placed into a drying oven for >24hours. Missing amphipods were presumed to have died and decomposed during the test.

3.2 Organism Information

3.2.1 Acclimation and Holding Information

One batch of *Hyalella azteca* was received from Aquatic Biosystems, Fort Collins, Colorado, USA, on September 11, 2015. Laboratory reared juvenile amphipods were packed into 1L plastic containers, filled with moderately hard water and a few plastic mesh squares. Prior to shipping, the headspace in each container was filled with oxygen gas of a sufficient concentration to maintain adequate saturation levels in the shipping water. They were shipped directly for overnight delivery to Maxxam and arrived without incident.

Upon arrival at Maxxam, the container contents were carefully poured into glass culture dishes, filled with a small amount of reconstituted water. Gentle aeration was supplied to each culture pan. An aliquot of shipping water from each container was set aside for water quality. It was then ensured that temperature adjustments to the holding water of the amphipods did not exceed 2°C per day.

The organisms were held at Maxxam for 4 days before the test was initiated. The amphipods were fed YCT (yeast, digested trout chow, and alfalfa flakes) daily during the holding period. Datasheets containing the water quality measurements, with observations of number dead or inactive amphipods during the holding period, are available in Appendix C.

3.2.2 Organism Health

The average mortality rate in the culture did not exceed 10%.

3.2.3 Organism Age

At test initiation, the amphipods were 7-9 days old.

3.3 Test Conditions

See Table 3-1 for a detailed list of the test conditions. All bench sheets and raw data are available in Appendix C.

Table 3-1 Test Conditions for the 14-day *Hyalella azteca* Test

Parameter	**Conditions and Methods**
Test Type and Duration	14 Day, Static
Temperature	23 ± 1°C
Photoperiod and Light Intensity	16 hours light: 8 hours dark. Wide spectrum cool white fluorescent lights used to provide: 500-1000 lux during the light cycle.
Aeration	< 100 bubbles/ minute. Clean oil-free air supplied to each test vessel via micro-bore plastic tubing
Test Chamber	375mL glass jars with plastic lids containing small opening for airline tubing.
Sediment Volume	100mL of homogenized sediment (3-4cm depth)
Overlying Water Volume and Source	175 mL; Reconstituted water; SAM5 recipe (Borgmann, 1996). Temperature adjusted and aerated >24h before use.
Overlying Water Quality	Temperature, pH, dissolved oxygen, hardness, alkalinity and ammonia, measurements on Day 0 and Day 14 of test. Temperature and dissolved oxygen were also measured three times weekly during the test.
Feeding	Every 2-3 days; 800uL per replicate of a ground Tetramin™ flake- slurry (4g dry solids/mL), and 1.75mL YCT.
Replicates	5 per sample, plus an additional replicate for water quality measurements.
Control Sediment	Yaquina Bay Sand. Rinsed with clean overlying water and sieved through a 500 µm stainless steel mesh
Organisms/ Replicate	10
Organism Source and age	Aquatic Biosystems; amphipods aged 7-9 days at test start.
Mortality during acclimation	0.0%
Endpoints	Mean Survival, Mean Dry weight
Test Validity Criteria	≥ 80% mean survival in the controls. ≥0.1mg/amphipod in the controls.
Statistical Software	CETIS™ version 1.8.7.16. Tidepool Scientific Software (Copyright 2000-2013).

3.4 Quality Assurance/Quality Control

3.4.1 Reference Toxicant Results

A 96 hour reference toxicant test, or positive control test, was conducted alongside the sediment test. The water-only test, using copper sulphate ($CuSO_4$) was initiated to aid in the assessment of organism sensitivity and the precision of the results. The reference toxicant test LC50 result was then compared in a control chart against the results of previous tests. Table 3-2 summarises the result of the reference toxicant test.

The calculated LC50 for the reference toxicant test was within the two standard deviation (95%) range of the historic mean LC50. This supports the assumption that the sensitivity of organism batch was comparable to batches previously tested in this laboratory.

The method used in preparing the control charts was taken from "Control Charting of Reference Toxicant Tests" (BBY2 WI-00007).

Table 3-2 Reference Toxicant Test Results for *Hyalella azteca*

Organism Batch	Test Date	LC50 with 95% Confidence Limits (µg/L Cu^{2+})	Previous Mean with 2SD (µg/L Cu^{2+})
AB150911	2015 Sep 15	154 (128, 186)	198 (123- 319)

3.4.2 Test Validity Criteria

Survival data in the laboratory control is considered be acceptable if the mean percent survival in the negative control is ≥80%, and the mean dry weight in the control exceeds ≥0.1 mg/amphipod. The mean percent survival of the control was 100%. The mean dry weight in the control was 0.16mg/amphipod.

3.5 Results

Total survival and growth in each replicate, and the mean ± SD in the control and sediments are listed in the "*Hyalella azteca* Survival and Growth Test- Dry Weights" and "*Hyalella azteca* Survival and Growth Test-Survival" sheets. Samples TPE-B and TPE showed a signifnatict decrease in mean survival compared to the lab control. Samples PDL, INUG and TPE showed a significant decrease in mean dry weight compared to the lab control. A summary of the results is located in Table 3-3.

Total ammonia concentrations, pH, temperature, hardness, and alkalinity in overlying and water at test initiation (Day 0) and completion (Day 14), as well as other daily water quality measurements, are available in Appendix C.

3.5.1 Data Analysis

The survival and dry weight data for all samples, the negative control, and the reference sediment was entered into the statistical program "Comprehensive Environmental Toxicity Information System" (CETIS, 2000-2013). When determining the appropriate comparison tests to use, the Environment Canada "Guidance Document on Statistical Methods for Environmental Toxicity Tests" (EPS 1/RM/46, 2005) was followed.

See the CETIS Analytical Reports for information on the specific tests used for the mean survival comparisons, as well as supporting auxiliary tests, if applicable. All analyses were conducted as one-tailed comparisons with the decision level for determining statistical significance set to 0.05 (p value <0.05).

Table 3-3 Results for Mean *Hyalella azteca* Survival and Growth

Sample ID	**Mean Survival ± SD (%)**	**Mean Dry Weight ± SD (mg/amphipod)**
Lab Control	100 ± 0	0.16 ± 0.01
PDL	96 ± 9	0.13 ± 0.02*
INUG	90 ± 7	0.09 ± 0.02*
TPE-B	66 ± 38*	0.14 ± 0.03
TPE	68 ±41*	0.10 ± 0.02*

SD: Standard Deviation

*Denotes a statistically significant effect relative to the Lab Control

3.5.2 Method Deviations

There were no method deviations during testing.

SECTION

4 REFERENCES

Borgmann, U. 1996. Systematic Analysis of Aqueous Ion Requirements of *Hyalella azteca*: A Standard Artificial Medium Including the Essential Bromide Ion. Archives of Environmental Contamination and Toxicology. 30: 356-363.

Comprehensive Environmental Toxicity Information System (CETIS). 2000-2013. Tidepool Scientific. LLC. Version 1.8.7.16

Environment Canada. 1997. Biological Test method: Test for Survival and Growth in Sediment of Freshwater Midges (*Chironomus tentans or Chironomus riparius*). Environmental Protection Publications, Conservation and Protection. Ottawa, Ontario. EPS 1/RM/32.

Environment Canada. 2013. Biological Test method: Test for Survival and Growth in Sediment and Water Using the Freshwater Amphipod *Hyalella azteca*. Environmental Protection Publications, Conservation and Protection. Ottawa, Ontario. EPS 1/RM/33.

Environment Canada. 2005. Guidance Document on Statistical Methods for Environmental Toxicity Tests. Environmental Protection Publications. Conservation and Protection. Ottawa, Ontario. EPS 1/RM/46.

Maxxam SOP for the *Chironomus dilutus* 10-Day Survival and Growth Test. BBY2 SOP-00010.

Maxxam SOP for the *Hyalella azteca* 14-Day Survival and Growth Test. BBY2 SOP-00011.

Maxxam WI for Standard Operating Procedure for the Control Charting of Reference Toxicant Tests. BBY2 WI-00007.

APPENDICES

APPENDIX

A SAMPLE INFORMATION

Maxxam

ECOTOXICOLOGY

SEDIMENT SAMPLE DESCRIPTIONS

BBY2FCD-00136/3

Client # / Name: 4954 Azimuth Consulting

Job #: B577446

Maxxam Sample Name	Sample #	Client Sample Name	Date Homogenised / Subsampled	Grain Size & Colour	Type of Debris Removed (e.g. rock, wood, plant, etc...)	Endemic Animals Removed	Odour	Additional Comments/Observations	Analyst
PDL-1	NB4841 to NB4845	PDL (1-5)	2015 Sept 14	Smooth clay brown	n/a	n/a	n/a	reps C+D are a rusty brown and A B and E are brown	NB
INUG-1	NB4846 to NB4850	INUG (1-5)	2015 Sep 14	Smooth, clay, brown/ rusty brown	n/a	n/a	n/a	Reps A+E are a rusty brown Rep B,C,D are brown	mt
TPE-B-1	NB4859 to NB4863	TPE-B (1-5)	2015 sep 14	Smooth, clay, brown, rusty brown	Some small thin roots	n/a	n/a	Reps C+D are more rusty brown Reps A,B,E more brown	mt
TPE-1	NB4864 to NB4868	TPE (1-5)	2015 Sept 14	Smooth clay brown	n/a	n/a	n/a	all reps are brown	NB

NA gp 2015 NOV 10

ECOTOXICOLOGY
FRESHWATER SEDIMENT TESTS – POREWATER MEASUREMENTS

Client # & Name: #4954 Azimuth Date Measured: 2015 Sep 14

Method for Porewater Collection:
Centrifuged sediments @ 5000 RPM @ 4°C for 20 minutes using centrifuge BBY2-0

Sample ID	Temperature (°C)	pH	Ammonia (mg/L)
TPE-1	13.9	6.9	✓ 0.13
TPE-B-1	14.1	7.0	✓ 0.62
PDL-1	13.8	7.0	✓ 0.31
INUG-1	13.8	6.9	✓ 0.47
	n/a MT 2015 Sep 14		
Analyst	M.Thompson	M.Thompson	M.Thompson
Date	2015 Sep 14	2015 Sep 14	2015 Sep 14

Comments:

DMC 2015 Nov 16

N/A

2015 Nov 18

Maxxam Job #: B580084
Report Date: 2015/09/18

AZIMUTH CONSULTING GROUP INC.
Client Project #: 2-11-15016
Site Location: DAY-1 POREWATER
Sampler Initials: MT

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		ND0308		ND0309	ND0310		
Sampling Date		2015/09/14		2015/09/14	2015/09/14		
COC Number		G098647		G098647	G098647		
	UNITS	PDL-1 POREWATER DAY-1	QC Batch	INUG-1 POREWATER DAY-1	TPE-1 POREWATER DAY-1	RDL	QC Batch
Nutrients							
Total Ammonia (N)	mg/L	0.31	8041894	0.47	0.13	0.0050	8041895
RDL = Reportable Detection Limit							

Maxxam ID		ND0311		
Sampling Date		2015/09/14		
COC Number		G098647		
	UNITS	TPE-B-1 POREWATER DAY-1	RDL	QC Batch
Nutrients				
Total Ammonia (N)	mg/L	0.62	0.0050	8041895
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

APPENDIX

B 10-DAY *CHIRONOMUS DILUTUS* SURVIVAL AND GROWTH TEST

CETIS Analytical Report

Chironomus 10-d Survival and Growth Sediment Test — **Maxxam Analytics**

Analysis ID:	21-4651-5630	**Endpoint:**	Mean Dry Weight	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Nov-15 15:15	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	05-2134-5991	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	15 Sep-15 19:00	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	25 Sep-15 12:00	**Species:**	Chironomus dilutus	**Brine:**	Not Applicable
Duration:	9d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control	12-0462-8977	15 Sep-15 19:00	15 Sep-15 19:00	NA	Maxxam Analytics Ltd.	2-11-15018
PDL	06-5902-3484	26 Aug-15	03 Sep-15 09:00	20d 19h	Azimuth Consulting Group I	
INUG	10-3185-1114	27 Aug-15	03 Sep-15 09:00	19d 19h	Maxxam Analytics Ltd.	
TPE-B	13-7529-6401	30 Aug-15	03 Sep-15 09:00	16d 19h		
TPE	15-2370-7670	30 Aug-15	03 Sep-15 09:00	16d 19h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control	Freshwater Sedimen	Azimuth Consulting Group	Control		
PDL	Freshwater Sedimen	Azimuth Consulting Group	PDL		
INUG	Freshwater Sedimen	Azimuth Consulting Group	INUG		
TPE-B	Freshwater Sedimen	Azimuth Consulting Group	TPE-B		
TPE	Freshwater Sedimen	Azimuth Consulting Group	TPE		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	22.0%	

Dunnett Multiple Comparison Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control		PDL	-5.029	2.305	0.279	8	1.0000	CDF	Non-Significant Effect
		INUG	-3.911	2.305	0.279	8	1.0000	CDF	Non-Significant Effect
		TPE-B	-3.133	2.305	0.279	8	1.0000	CDF	Non-Significant Effect
		TPE	-2.033	2.305	0.279	8	0.9988	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.777	2.822	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.079071	0.2697676	4	7.369	0.0008	Significant Effect
Error	0.7321393	0.03660697	20			
Total	1.81121		24			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.698	13.28	0.7912	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9646	0.8877	0.5145	Normal Distribution

Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	5	1.269	1.029	1.51	1.302	1.02	1.48	0.08655	15.25%	0.0%
PDL	5	1.878	1.736	2.02	1.872	1.751	2.05	0.05108	6.08%	-47.94%
INUG	5	1.743	1.469	2.016	1.784	1.432	2.022	0.09866	12.66%	-37.28%
TPE-B	5	1.648	1.379	1.918	1.592	1.388	1.911	0.0969	13.14%	-29.87%
TPE	5	1.515	1.277	1.754	1.488	1.294	1.797	0.08593	12.68%	-19.39%

2015 Nov 18 Doug Dm 2015 Nov 18

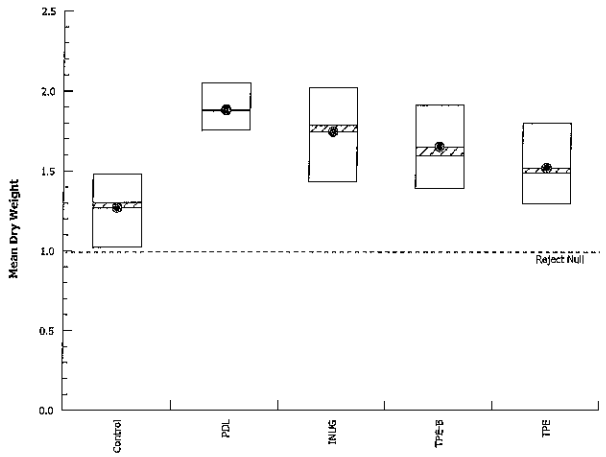
Chironomus 10-d Survival and Growth Sediment Test — **Maxxam Analytics**

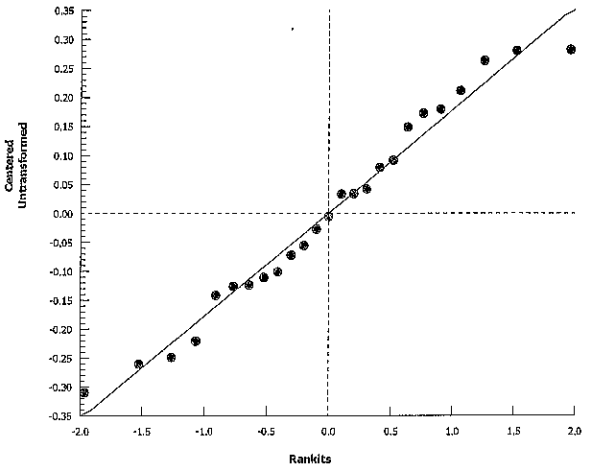
Analysis ID:	21-4651-5630	**Endpoint:**	Mean Dry Weight	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Nov-15 15:15	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Mean Dry Weight Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	1.48	1.302	1.02	1.127	1.418
PDL	1.751	1.872	1.911	1.805	2.05
INUG	1.833	1.641	2.022	1.784	1.432
TPE-B	1.388	1.911	1.827	1.592	1.524
TPE	1.594	1.488	1.294	1.404	1.797

Graphics





CETIS Analytical Report

Chironomus 10-d Survival and Growth Sediment Test — **Maxxam Analytics**

Analysis ID:	03-0318-3534	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Nov-15 13:24	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes
Batch ID:	05-2134-5991	**Test Type:**	Survival-AF Growth	**Analyst:**	
Start Date:	15 Sep-15 19:00	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	25 Sep-15 12:00	**Species:**	Chironomus dilutus	**Brine:**	Not Applicable
Duration:	9d 17h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed		C > T	NA	NA	

Fisher Exact/Bonferroni-Holm Test

Sample	vs	Sample	Test Stat	P-Value	P-Type	Decision(α:5%)
Control		PDL	0.6913	1.0000	Exact	Non-Significant Effect
Control		INUG	0.6913	1.0000	Exact	Non-Significant Effect
Control		TPE-B	0.1343	0.5373	Exact	Non-Significant Effect
Control		TPE	1	1.0000	Exact	Non-Significant Effect

Data Summary

Sample Code	NR	R	NR + R	Prop NR	Prop R	%Effect
Control	48	2	50	0.96	0.04	0.0%
PDL	48	2	50	0.96	0.04	0.0%
INUG	48	2	50	0.96	0.04	0.0%
TPE-B	44	6	50	0.88	0.12	8.33%
TPE	49	1	50	0.98	0.02	-2.08%

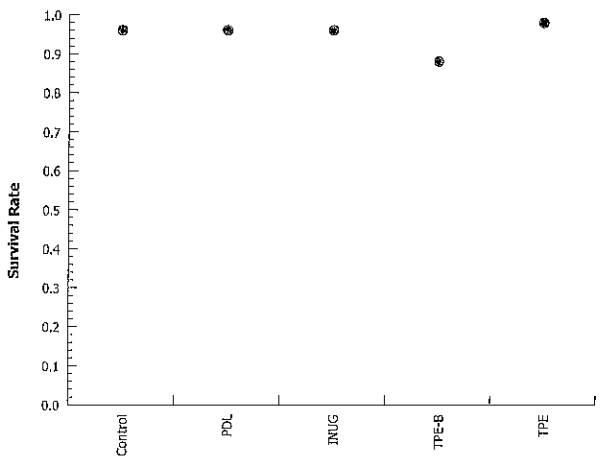
Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	1	1	1	1	0.8
PDL	1	1	0.8	1	1
INUG	0.9	1	1	1	0.9
TPE-B	0.8	0.9	0.8	0.9	1
TPE	1	0.9	1	1	1

Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	10/10	10/10	10/10	10/10	8/10
PDL	10/10	10/10	8/10	10/10	10/10
INUG	9/10	10/10	10/10	10/10	9/10
TPE-B	8/10	9/10	8/10	9/10	10/10
TPE	10/10	9/10	10/10	10/10	10/10

Graphics



Analyst: 2015 Nov 16 DMC QA: 2015 Nov 18 JP

ECOTOXICOLOGY

Chironomid Survival and Growth Test
Dry Weights of Larvae

MaxXam

BBY2FCD-00231/2

Client # & Name: 4954-Azimuth

Start Date and Time: 2015 Sep 15 @ 19:00

Balance ID: BBY2-0421

End Date: 2015 Sep 25

Job # B577416

Weighing Dates: 2015 Sep 22 2015 Oct 05

Drying Temperature (°C): 60

Drying Time (h): >24

Analysts: S. Rostama

Boat #	Sample	Rep	# Worms	Boat Wt. (g)	Boat & Worms Wt. (g)	Worm Wt. (mg)	Mean Wt./worm (mg)	Mean Wt./ Sample (mg)	SD
137	Control	A	10	1.13575	1.15055	14.80	1.48	1.27	0.19
138		B	10	1.05839	1.07141	13.02	1.30		
139		C	10	1.12367	1.13387	10.20	1.02		
140		D	10	1.10317	1.11444	11.27	1.13		
141		E	8	1.07499	1.08633	11.34	1.42		
142	PDL-1	A	10	1.09165	1.10916	17.51	1.75	1.88	0.11
143	PDL-2	B	10	1.10930	1.12802	18.72	1.87		
144	PDL-3	C	8	1.05619	1.07148	15.29	1.91		
145	PDL-4	D	10	1.09577	1.11382	18.05	1.81		
146	PDL-5	E	10	1.10354	1.12404	20.50	2.05		
147	INUG-1	A	9	1.10713	1.12363	16.50	1.83	1.74	0.22
148	INUG-2	B	10	1.10725	1.12366	16.41	1.64		
149	INUG-3	C	10	1.10858	1.12880	20.22	2.02		
150	INUG-4	D	10	1.10999	1.12783	17.84	1.78		
151	INUG-5	E	9	1.15677	1.16966	12.89	1.43		
152	TPE-B-1	A	8	1.12860	1.13970	11.10	1.39	1.65	0.22
153	TPE-B-2	B	9	1.12311	1.14031	17.20	1.91		
154	TPE-B-3	C	8	1.12249	1.13711	14.62	1.83		
155	TPE-B-4	D	9	1.08010	1.09443	14.33	1.59		
156	TPE-B-5	E	10	1.12928	1.14452	15.24	1.52		
157	TPE-1	A	10	1.18690	1.20284	15.94	1.59	1.52	0.19
158	TPE-2	B	9	1.11355	1.12694	13.39	1.49		
159	TPE-3	C	10	1.09367	1.10661	12.94	1.29		
160	TPE-4	D	10	1.14153	1.15557	14.04	1.40		
161	TPE-5	E	10	1.15061	1.16858	17.97	1.80		
162		A	10			0.00	0.00	0.00	0.00
163		B	10			0.00	0.00		
164		C	10			0.00	0.00		
165		D	10			0.00	0.00		
166		E	10			0.00	0.00		
167		A	10			0.00	0.00	0.00	0.00
168		B	10			0.00	0.00		
169		C	10			0.00	0.00		
170		D	10			0.00	0.00		
171		E	10			0.00	0.00		
172		QA/QC		1.09974	1.09996				
173		QA/QC		1.08978	1.08985				
137		0 - A	10	1.13581	1.15058	14.77	1.48		
Analyst									

The average dry weight for the replicate controls must be >0.6 mg, for the test to be valid.

Chironomus dilutus Survival and Growth Test
Survival of Larvae

Client # & Name: 4954-Azimuth
Start Date and Time: 2015 Sep 15 @ 19:00
Sample Date: 2015 Aug 26 & 27 & 30
End Date: 2015 Sep 25
Job # B577416
Stats File ID: CT-1954-0115
Organism Lot #: AB150915

Analysts: P. Howes, J. Pickard,

Sample	Rep	# Larvae	% Survived	Survival	
				Mean	SD
Control	A	10	100	96	9
	B	10	100		
	C	10	100		
	D	10	100		
	E	8	80		
PDL-1	A	10	100	96	9
PDL-2	B	10	100		
PDL-3	C	8	80		
PDL-4	D	10	100		
PDL-5	E	10	100		
INUG-1	A	9	90	96	5
INUG-2	B	10	100		
INUG-3	C	10	100		
INUG-4	D	10	100		
INUG-5	E	9	90		
TPE-B-1	A	8	80	88	8
TPE-B-2	B	9	90		
TPE-B-3	C	8	80		
TPE-B-4	D	9	90		
TPE-B-5	E	10	100		
TPE-1	A	10	100	98	4
TPE-2	B	9	90		
TPE-3	C	10	100		
TPE-4	D	10	100		
TPE-5	E	10	100		
	A		0	0	0
	B		0		
	C		0		
	D		0		
	E		0		

ECOTOXICOLOGY

CHIRONOMUS DILUTUS SURVIVAL AND GROWTH TEST - TEST INFORMATION

Client # & Name	#4954 Azimuth
Project Number	2-11-15018
Test Initiation Date & Time	2015 sept 15 @ 19:00
Test Completion Date	2015 Sept 25
Statistics File #	CT-4954-0115
Analyst(s)	NBlassaitz ~~NBrassa~~, M. Thompson, P. Howes, D. Lai, S. Rostama, C. Mathany, M. O'Toole
Control Water Batch	2015 sept 10
Control Sediment #1	
Control Sediment #2	
Organism Lot	(R) ~~AS~~ AB150915
Age at Start of Test	2nd instar
Feeding Regime	3.75 mL Tetramin slurry (4g/L) per replicate 3x weekly
Food Preparation Date:	2015 sept11, 2015 sept15, 2015 Sept 17, 2015 Sep 22
Job #	
List of Sample ID/#	B577416 PDL - NB4841 to NB4845 INUG - NB4846 to NB4850 TPE-B - NB4859 to NB4863 TPE - NB4864 to NB4868

2015 Nov 10

2015 Nov 10

(R) WEOM 2015 Sept 25

ECOTOXICOLOGY
***CHIRONOMUS DILUTUS* TEST DATA SHEET**

Sample ID: Control
Sample Date: n/a
Sample Received: n/a

Start Date: 2015 Sep 15
End Date: 2015 Sept 25
Job/Sample #: n/a

Measurements						Samples Taken			
pH		Hardness ($mg/L\ CaCO_3$)		Conductance ($\mu S/cm$)		Alkalinity ($mg/L\ CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
8.2	8.3	96	104	392	698	✓554	✓126	✓0.021	✓66

Initial overlying WQ measurements:	
Analyst MT	Date 2015 Sep 15

Final overlying WQ measurements:	
Analyst NB	Date 2015 Sept 25

Day	Tuesday	Friday	Sunday (Monday)	Tuesday (Wednesday)	Friday
	Day 0	Day 3	Day 5 (6)	Day 7 (8)	Day 10
Temp. (ºC)	23.2	23.5	23.0	23.1	22.6
D.O. (mg/L)	8.5	8.4	8.4	8.5	8.6
Feeding	✓	✓	✓	✓	n/a
Analyst	MT	NB	MT	mo	NB

Acceptable 2015 Sept 15

Replicate	A	B	C	D	E
# Surviving	10	10	10	10	8
Analyst	PH	gp	PH	gp	PH

Date	Replicate	Comments	Analyst

gp 2015 Nov 16

MaxXam

BBY2FCD-00140/2

Page 1 of 1

ECOTOXICOLOGY

***CHIRONOMUS DILUTUS* TEST DATA SHEET**

Sample ID: PDL

Sample Date: 2015 Aug 26

Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15

End Date: 2015 Sept 25

Job/Sample #: B577446/NB4841 to NB4845

Measurements						Samples Taken			
pH		Hardness (mg/L $CaCO_3$)		Conductance (µS/cm)		Alkalinity (mg/L $CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
(A) ~~8.0~~ 7.7	7.9	80	56	(A) ~~333~~ 283	235	✓ 360	✓ 332	✓ 011	✓ 50

Initial overlying WQ measurements:			
Analyst	MT	Date	2015Sep15

Final overlying WQ measurements:			
Analyst	MB	Date	2015Sept25

Day	Tuesday	Friday	~~Sunday~~ Monday (B)	~~Tuesday~~ Wednesday (B)	Friday
	Day 0	Day 3	~~Day 5~~ Day 6	~~Day 7~~ Day 8	Day 10
Temp. (ºC)	(A) ~~23.3~~ 23.5	23.8	23.4	23.2	23.1
D.O. (mg/L)	(A) ~~8.4~~ 8.0	8.2	8.4	8.5	8.3
Feeding	✓	✓	✓	✓	n/a
Analyst	MT	MB	MT	MO	MB

(A) WE MT 2015 Sep 15

(B) WE DML 2015 Sept 25

Replicate	A	B	C	D	E
# Surviving	10	10	8	10	10
Analyst	JP	JP	JP	SR	DML

Date	Replicate	Comments	Analyst
		JP 2015 Nov 10	

ECOTOXICOLOGY

CHIRONOMUS DILUTUS TEST DATA SHEET

Sample ID: INUG
Sample Date: 2015 Aug 27
Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15
End Date: 2015 Sept 25
Job/Sample #: B5774l6/NB4846 to NB4850

Measurements						Samples Taken			
pH		Hardness ($mg/L\ CaCO_3$)		Conductance ($\mu S/cm$)		Alkalinity ($mg/L\ CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
7.5	7.5	84	36	280	204	✓ 31.6	✓ 150	✓ 0.12	✓ 4.8

Initial overlying WQ measurements:	
Analyst MT	Date 2015 Sep 15

Final overlying WQ measurements:	
Analyst NB	Date 2015 Sept 25

Day	Tuesday	Friday	Sunday (A) (Monday)	Tuesday (B) (Wednesday)	Friday
	Day 0	Day 3	Day ~~5~~ 6	Day ~~7~~ 8	Day 10
Temp. (ºC)	23.2	23.8	23.3	23.3	23.0
D.O. (mg/L)	7.5	8.2	8.4	8.4	8.3
Feeding	✓	✓	✓	✓	n/a
Analyst	MT	NB	MT	MO	NB

(B) WO done 2015 Sept 25

Replicate	A	B	C	D	(B) E
# Surviving	9	10	10	10	~~8~~ 9
Analyst	JP	JP	PH	PH	PH

(~~A~~) (6) (b) 2015 Sept 25 PH

Date	Replicate	Comments	Analyst
		JP 2015 Nov 10	

ECOTOXICOLOGY
***CHIRONOMUS DILUTUS* TEST DATA SHEET**

Sample ID: TPE-B
Sample Date: 2015 Aug 30
Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15
End Date: 2015 Sept 25
Job/Sample #: B577416/NB4859 to NB4868

Measurements						Samples Taken			
pH		Hardness ($mg/L\ CaCO_3$)		Conductance ($\mu S/cm$)		Alkalinity ($mg/L\ CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
7.7	7.9	84	76	301	272	✓ 39.5	✓ 62.5	✓ 0.093	✓ 4.1

Initial overlying WQ measurements:	
Analyst MT	Date 2015 Sep 15

Final overlying WQ measurements:	
Analyst MB	Date 2015 Sept 25

Day	Tuesday	Friday	~~Sunday~~ Monday (A)	~~Tuesday~~ Wednesday (B)	Friday
	Day 0	Day 3	Day ~~5~~ 6	Day ~~7~~ 8	Day 10
Temp. (ºC)	23.4	23.8	23.3	23.0	23.0
D.O. (mg/L)	7.8	8.2	(B) ~~8.4~~ 8.2	8.4	8.4
Feeding	✓	✓	✓	✓	n/a
Analyst	ML	MB	MT	MB	MB

(A) WEOMC 2015 Sep 15
(B) WE MT 2015 Sep 21

Replicate	A	B	C	D	E
# Surviving	8	9	8	9	10
Analyst	JP	SR	SR	JP	SR

Date	Replicate	Comments	Analyst
		JP 2015 Nov 10	

ECOTOXICOLOGY
***CHIRONOMUS DILUTUS* TEST DATA SHEET**

Sample ID: TPE
Sample Date: 2015 Aug 30
Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15
End Date: 2015 Sept 25
Job/Sample #: B577416/ NB4864 to NB4868

Measurements						Samples Taken			
pH		Hardness ($mg/L\ CaCO_3$)		Conductance ($\mu S/cm$)		Alkalinity ($mg/L\ CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
7.9	7.9	84	80	285	246	✓ 37	✓ 37.4	✓ 0.033	✓ 40

Initial overlying WQ measurements:		Final overlying WQ measurements:	
Analyst MH	Date 2015Sep15	Analyst NB	Date 2015 Sept 25

Day	Tuesday	Friday	~~Monday~~ Sunday (A) ✓	~~Wednesday~~ Tuesday (A)	Friday
	Day 0	Day 3	Day ~~5~~ 6	Day ~~7~~ 8	Day 10
Temp. (ºC)	23.1	23.6	23.1	23.0	23.0
D.O. (mg/L)	8.3	8.3	8.5	8.5	8.4
Feeding	✓	✓	✓	✓	N/A
Analyst	MH	NB	MH	mo	NB

(A) WE DNC 2015Sep15

Replicate	A	B (A)	C (A)	D	E
# Surviving	10	~~9~~ 10	~~10~~ 8	10	10
Analyst	gp SR	gp	gp	SR	SR

Date	Replicate	Comments	Analyst
		(A) WE gp 2015 Sep24	gp
		2015 Nov 10 gp	

Chironomus dilutus (Formerly C. tentans)
Measurements of Head Capsule Widths

Client # & Name: 4954 & 11938

Start Date and Time: 2015 Sept 15 @ 19:00

End Date: 2015 Sept 25

Organism Lot #: AB150915

Head Widths at Beginning of Test

Chironomid #	Head Width (mm)
1	0.430
2	0.490
3	0.420
4	0.450
5	0.400
6	0.410
7	0.340
8	0.410
9	0.350
10	0.450
11	0.330
12	0.360
13	0.350
14	0.380
15	0.430
16	0.440
17	0.390
18	0.380
19	0.370
20	0.470
Average	0.40
SD	0.05
Analyst	MT

Average must be 0.33-0.45 mm (Environment Canada 1998)
1 mm=40 units on micrometer

ECOTOXICOLOGY
CHIRONOMID SURVIVAL AND GROWTH TEST – AERATION CHECKS

Client # & Name: #4954 Azimuth

Start Date & Time: 2015 Sep 15 @ 1900

Initial when aeration is checked. If air is off record DO and note which replicate(s) in comments section.

	Day -1	Day 0	1	2	3	4	5	6	7	8	9	10
Date	2015 Sep 14	2015 Sep 15	2015 Sept 16	2015 Sept 17	2015 Sept 18	2015 Sep 19	2015 Sept 20	2015 Sep 21	2015 Sept 22	2015 Sep 23	2015 Sep 24	2015 Sep 25
Early AM	n/a	MT	NB	NB	NB	CS	NB	MT	NB	mo	MT	mo
Mid-day	n/a	NB	MT	NB	NB	CS	NB	MT	MT	mo	MT	
Late PM	NB	NB	MT	NB	NB	CS	NB	MT	NB	mo	MT	2015 Nov 16

Comments:

2015 Sep 14 – started aeration @ 17:30 – NB

20 @ Lemna 2015 Nov 19 TPG-B-1 Rep E

2015 Sep 23 – ~~GRT-1 Rep C~~ stopped aerating. DO @ 23.3 ~~1.6~~ % sat. Restarted aeration @ ~~8:58~~ 08:01 @ mo. Sediment in this sample appears expanded. mo

JP 2015 Nov 10

ECOTOXICOLOGY

ORGANISMS - ACCLIMATION AND HOLDING CONDITIONS

Maxxam

BBY2FCD-00070/2

Client #'s: 4954 @ ~~#10952~~ + #11938 Date & Time of Arrival: 2015 Sep 15 @ 1600

Organism Lot #: AB150915 Age upon Arrival: Second instar

Water (L) per Shipping Bag: ~1 Organism: Chironomous diluvius

Number of Shipping Bags: 11 #of Organisms Ordered: 1500 + 150

Arrival Conditions

Bag ID	# Dead	% Dead	Cond (µS/cm)/ Salinity (ppt)	Temp (°C)	DO (mg/L)	7.0 @ pH	Feeding	Analyst
#1 / #2	0	0	411/417	22.5/22.4	16.6/13.7	7.1/6.8	n/a	Mt
#3 / #4	0	0	421/423	22.4/22.7	16.4/8.5	6.9/6.8	n/a	Mt
#5 / #6	0	0	413/428	22.7/22.5	12.4/13.8	6.8/6.8	n/a	Mt
#7 / #8	0	0	425/419	22.4/22.5	14.0/17.3	6.8/6.7	n/a	Mt
#9 / #10	0	0	427/423	22.6/22.5	12.3/14.5	6.8/6.9	n/a	Mt
#11	0	0 @	~~411~~ 411	22.3	17.1	6.8	n/a	Mt

Daily Conditions During Holding/Acclimation

	Mortalities		Water Quality					
Date	# Dead	% Dead	Cond (µS/cm)/ Salinity (ppt)	Temp (°C)	DO (mg/L)	pH	Feeding	Analyst
Total Mortalities								

Comments (e.g. feeding times and quantities; fish behaviour, acclimation conditions): Analyst

@WE Mt 2015 Sep 15

2015 Sep 15 - Did WQ and set airlines in all shipping containers. Mt

Used organisms upon arrival. Mt

AB150915CD

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel:970/484-5091 Fax:970/484-2514

Rec'd
2015 Sep 15 @ 16:54
MT

ORGANISM HISTORY

DATE: 9/14/2015

SPECIES: *Chironomus dilutus (formerly C. tentans)*

AGE: Deposited 9/5/2015

LIFE STAGE: Second Instar 9/16/2015

HATCH DATE: Emergent date 9/29/2015

BEGAN FEEDING: Immediately

FOOD: *Raphidocelis subcapitata.**, Flake slurry

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	25°C	22-25°C
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	132 mg/l	108-184 mg/l
TOTAL ALKALINITY (as $CaCO_3$):	65 mg/l	60-105 mg/l
pH:	7.59	7.50-8.21

Comments: * Formerly known as *Psuedokirschneriella subcapitata* and *Selenastrum capricornutum*

Facility Supervisor

ECOTOXICOLOGY

Reconstitued Water Recipe for Chironomus

MaxXam

BBY2FCD-00141/2

BATCH ID : 2015 sept 10
(Date Hardened)

Chironomus dilutus **H_2O Hardness Adjustment (Environment Canada 1997)**
(For water hardness 90 - 100 mg/L)

Chemical Weights	$CaCl_2X2H_2O$	$MgSO_4$ (g)	$CaSO_4$ (g)	$NaHCO_3$ (g)	KCl (g)
Brand	Sigma Aldrich	Fisher	Sigma Aldrich	Fisher	Sigma Aldrich
Lot #	MKBN6366V	146801	MKBR2597V	146818	SLBK3147V SLBK (A)
Calculated	3.97	1.80	3.00	5.76	0.24
Actual	3.9702	1.8003	3.0003	5.7602	0.2401

Balance ID: BBY2 - 0260

Analyst: T. Wollelo

Add to Type 3 DI (L): 60

Water Use: #11938, #4454

DI Machine ID: BBY2 - 0160

Date: 2015 Sept 10

Water Quality:

Temp: 22.3 pH: 8.0 Hardness 100 -

Cond.: 343 DO: 9.1 Alkalinity: n/a

Analyst: M. Thompson Date: 2015 Sep 11

Comments:

$CaCl_2 \times 2H_2O$ (Calcium Chloride - dihydrous)

$MgSO_4$ (Magnesium Sulphate - anhydrous)

$CaSO_4$ (g) (Calcium Sulphate- anhydrous)

$NaHCO_3$ (Sodium Bicarbonate)

KCl (Potassium Chloride)

Recipe: 0.45mM $CaCl_2$: 0.37mM $CaSO_4$: 0.25mM $MgSO_4$: 1.14mM $NaHCO_3$: 0.05mM KCl

Maxxam Job #: B580549
Report Date: 2015/09/21

AZIMUTH CONSULTING GROUP INC.
Client Project #: 2-11-15018 CHIRONOWD +HYALELLA
Site Location: ECOTOX BURNABY
Sampler Initials: NB

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		ND2613		ND2614		ND2615	ND2616		
Sampling Date		2015/09/15 11:15		2015/09/15 11:15		2015/09/15 11:15	2015/09/15 11:15		
COC Number		g098651		g098651		g098651	g098651		
	UNITS	CONTROL HY.	QC Batch	INUG-1 HY.	QC Batch	PDL-1 HY.	TPE-1 HY.	RDL	QC Batch
Misc. Inorganics									
Alkalinity (Total as CaCO3)	mg/L	49.4	8041051	25.1	8041051	34.0	30.0	0.50	8041051
Alkalinity (PP as CaCO3)	mg/L	<0.50	8041051	<0.50	8041051	<0.50	<0.50	0.50	8041051
Bicarbonate (HCO3)	mg/L	60.3	8041051	30.6	8041051	41.4	36.6	0.50	8041051
Carbonate (CO3)	mg/L	<0.50	8041051	<0.50	8041051	<0.50	<0.50	0.50	8041051
Hydroxide (OH)	mg/L	<0.50	8041051	<0.50	8041051	<0.50	<0.50	0.50	8041051
Nutrients									
Total Ammonia (N)	mg/L	0.041	8043296	0.16	8043298	0.13	0.033	0.0050	8043296
RDL = Reportable Detection Limit									

Maxxam ID		ND2617	ND2618	ND2618		ND2619		ND2620		
Sampling Date		2015/09/15 11:15	2015/09/15 11:15	2015/09/15 11:15		2015/09/15 11:15		2015/09/15 11:15		
COC Number		g098651	g098651	g098651		g098651		g098651		
	UNITS	TPE-B-1 HY.	CONTROL CH.	CONTROL CH. Lab-Dup	QC Batch	INUG-CH.	QC Batch	PDL-1 CH.	RDL	QC Batch
Misc. Inorganics										
Alkalinity (Total as CaCO3)	mg/L	39.7	55.4		8041051	31.6	8041077	36.0	0.50	8041077
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50		8041051	<0.50	8041077	<0.50	0.50	8041077
Bicarbonate (HCO3)	mg/L	48.5	67.6		8041051	38.5	8041077	44.0	0.50	8041077
Carbonate (CO3)	mg/L	<0.50	<0.50		8041051	<0.50	8041077	<0.50	0.50	8041077
Hydroxide (OH)	mg/L	<0.50	<0.50		8041051	<0.50	8041077	<0.50	0.50	8041077
Nutrients										
Total Ammonia (N)	mg/L	0.085	0.021	0.022	8043298	0.12	8043298	0.11	0.0050	8043296
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate										

Maxxam Job #: B580549
Report Date: 2015/09/21

AZIMUTH CONSULTING GROUP INC.
Client Project #: 2-11-15018 CHIRONOWD +HYALELLA
Site Location: ECOTOX BURNABY
Sampler Initials: NB

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		ND2621		ND2622		
Sampling Date		2015/09/15 11:15		2015/09/15 11:15		
COC Number		g098651		g098651		
	UNITS	TPE-1 CH.	QC Batch	TPE-B-1 CH.	RDL	QC Batch
Misc. Inorganics						
Alkalinity (Total as CaCO3)	mg/L	37.0	8041051	39.5	0.50	8041051
Alkalinity (PP as CaCO3)	mg/L	<0.50	8041051	<0.50	0.50	8041051
Bicarbonate (HCO3)	mg/L	45.1	8041051	48.1	0.50	8041051
Carbonate (CO3)	mg/L	<0.50	8041051	<0.50	0.50	8041051
Hydroxide (OH)	mg/L	<0.50	8041051	<0.50	0.50	8041051
Nutrients						
Total Ammonia (N)	mg/L	0.033	8043296	0.093	0.0050	8043298
RDL = Reportable Detection Limit						

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B584041
Report Date: 2015/10/02

Maxxam Analytics (TOX Internal)
Client Project #: 2-11-15018
Site Location: DAY 10 OVERLY CHIRONOMIDS #4954, ECOTOX
Sampler Initials: NB

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NF3811	NF3812	NF3813	NF3814	
Sampling Date		2015/09/25 09:30	2015/09/25 09:30	2015/09/25 09:30	2015/09/25 09:30	
COC Number		G107995	G107995	G107995	G107995	
	UNITS	CONTROL OVERLY DAY 10 CH	PDL-1 OVERLY DAY 10 CH	INUG-1 OVERLY DAY 10 CH	TPE-B OVERLY DAY 10 CH	RDL
Misc. Inorganics						
Alkalinity (Total as CaCO3)	mg/L	126	33.2	15.0	62.5	0.50
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	<0.50	<0.50	0.50
Bicarbonate (HCO3)	mg/L	154	40.5	18.2	76.2	0.50
Carbonate (CO3)	mg/L	<0.50	<0.50	<0.50	<0.50	0.50
Hydroxide (OH)	mg/L	<0.50	<0.50	<0.50	<0.50	0.50
Nutrients						
Total Ammonia (N)	mg/L	6.6	5.0	4.8	4.1	0.050
RDL = Reportable Detection Limit						

Maxxam ID		NF3815	
Sampling Date		2015/09/25 09:30	
COC Number		G107995	
	UNITS	TPE-1 OVERLY DAY 10 CH	RDL
Misc. Inorganics			
Alkalinity (Total as CaCO3)	mg/L	37.4	0.50
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50
Bicarbonate (HCO3)	mg/L	45.6	0.50
Carbonate (CO3)	mg/L	<0.50	0.50
Hydroxide (OH)	mg/L	<0.50	0.50
Nutrients			
Total Ammonia (N)	mg/L	4.0	0.050
RDL = Reportable Detection Limit			

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam

Randomization Chart for Chironomid Tests

Back Wall

	6	12	etc.
	5	11	
Position Map	4	10	
	3	9	
	2	8	
	1	7	

Front of Counter

Client: 4954- Azimuth Date:

Position #	Colour	Treatment	Replicate
1	Red		A
17	Red		B
20	Red		C
29	Red	Control	D
30	Red		E
18	Red		Measure
21	Fl. Green	PDL-1	A
13	Fl. Green	PDL-2	B
5	Fl. Green	PDL-3	C
6	Fl. Green	PDL-4	D
4	Fl. Green	PDL-5	E
8	Fl. Green	PDL	Measure
9	Purple	INUG-1	A
23	Purple	INUG-2	B
12	Purple	INUG-3	C
2	Purple	INUG-4	D
16	Purple	INUG-5	E
27	Purple	INUG	Measure
19	Teal Green	TPE-B-1	A
25	Teal Green	TPE-B-2	B
28	Teal Green	TPE-B-3	C
10	Teal Green	TPE-B-4	D
7	Teal Green	TPE-B-5	E
24	Teal Green	TPE-B	Measure
3	Lt. Blue	TPE-1	A
15	Lt. Blue	TPE-2	B
22	Lt. Blue	TPE-3	C
14	Lt. Blue	TPE-4	D
26	Lt. Blue	TPE-5	E
11	Lt. Blue	TPE	Measure

APPENDIX

C 14-DAY *HYALELLA AZTECA* GROWTH AND SURVIVAL TEST

Hyalella 14-d Survival and Growth Sediment Test **Maxxam**

Analysis ID:	10-1061-2538	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Nov-15 13:33	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	01-6539-4268	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	15 Sep-15 16:20	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Reconstituted Water
Ending Date:	29 Sep-15 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	13d 20h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	19.5%	

Dunnett Multiple Comparison Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control		PDL	2.466	2.331	0.029	8	0.0386	CDF	Significant Effect
		INUG	5.136	2.331	0.029	8	0.0002	CDF	Significant Effect
		TPE-B	1.158	2.331	0.031	7	0.3238	CDF	Non-Significant Effect
		TPE	4.107	2.331	0.031	7	0.0012	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.059	2.78	0.7283	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01366228	0.00341557	4	8.589	0.0005	Significant Effect
Error	0.007157699	0.0003976499	18			
Total	0.02081998		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.906	13.28	0.2971	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9862	0.88	0.9806	Normal Distribution

Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control	5	0.1596	0.1499	0.1693	0.156	0.154	0.173	0.003501	4.91%	0.0%
PDL	5	0.1285	0.1063	0.1507	0.1225	0.112	0.155	0.008009	13.94%	19.49%
INUG	5	0.09482	0.07086	0.1188	0.09889	0.063	0.1156	0.008629	20.35%	40.59%
TPE-B	4	0.1441	0.0977	0.1905	0.1419	0.1114	0.1813	0.01458	20.24%	9.71%
TPE	4	0.1047	0.06805	0.1413	0.1054	0.08111	0.1267	0.0115	21.98%	34.42%

Mean Dry Weight-mg Detail

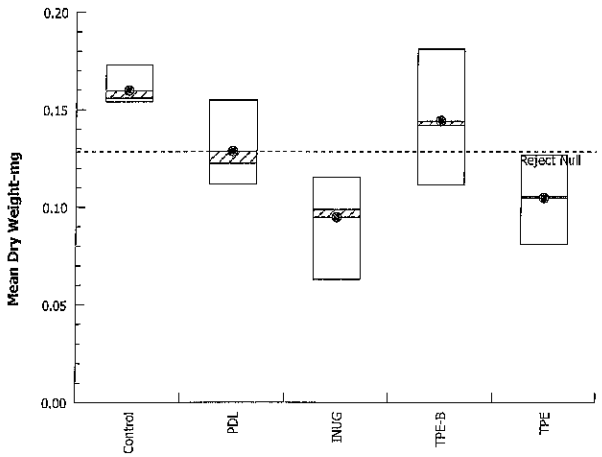
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	0.154	0.16	0.156	0.173	0.155
PDL	0.138	0.115	0.112	0.1225	0.155
INUG	0.063	0.1	0.09667	0.09889	0.1156
TPE-B	0.1488	0.1114	0.1813	0.135	
TPE	0.1267	0.08889	0.08111	0.122	

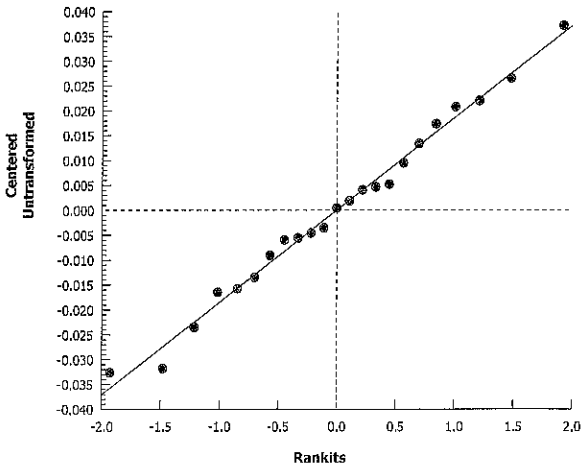
Analyst: 2015 Nov 16 DML QA: 2015 NOV 18

Hyalella 14-d Survival and Growth Sediment Test **Maxxam**

Analysis ID:	10-1061-2538	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Nov-15 13:33	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: DML QA: 2015 Nov 18

Hyalella 14-d Survival and Growth Sediment Test **Maxxam**

Analysis ID:	14-7566-6060	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Nov-15 15:48	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes
Batch ID:	01-6539-4268	**Test Type:**	Survival-Growth	**Analyst:**	
Start Date:	15 Sep-15 16:20	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Reconstituted Water
Ending Date:	29 Sep-15 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	13d 20h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed		C > T	NA	NA	

Fisher Exact/Bonferroni-Holm Test

Sample	vs	Sample	Test Stat	P-Value	P-Type	Decision(α:5%)
Control		PDL	0.2475	0.2475	Exact	Non-Significant Effect
Control		INUG	0.02814	0.0563	Exact	Non-Significant Effect
Control		TPE-B	1.48E-06	<0.0001	Exact	Significant Effect
Control		TPE	3.66E-06	<0.0001	Exact	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria

Data Summary

Sample Code	NR	R	NR + R	Prop NR	Prop R	%Effect
Control	50	0	50	1	0	0.0%
PDL	48	2	50	0.96	0.04	4.0%
INUG	45	5	50	0.9	0.1	10.0%
TPE-B	33	17	50	0.66	0.34	34.0%
TPE	34	16	50	0.68	0.32	32.0%

Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	1	1	1	1	1
PDL	1	1	1	0.8	1
INUG	1	0.8	0.9	0.9	0.9
TPE-B	0	0.8	0.7	0.8	1
TPE	0.6	0.9	0	0.9	1

Survival Rate Binomials

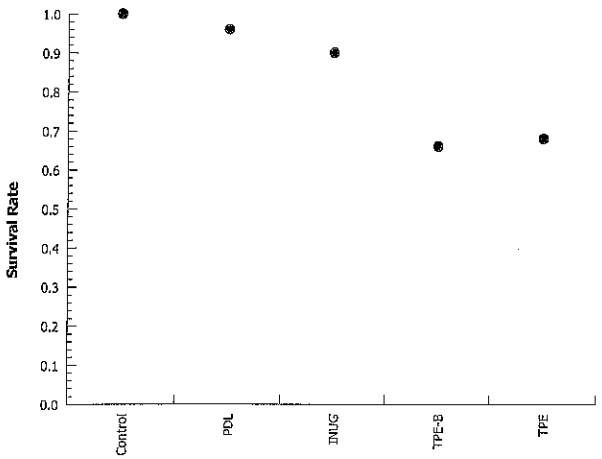
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control	10/10	10/10	10/10	10/10	10/10
PDL	10/10	10/10	10/10	8/10	10/10
INUG	10/10	8/10	9/10	9/10	9/10
TPE-B	0/10	8/10	7/10	8/10	10/10
TPE	6/10	9/10	0/10	9/10	10/10

Analyst: 2015 Nov 16 QA: 2015 Nov 18

Hyalella 14-d Survival and Growth Sediment Test **Maxxam**

Analysis ID:	14-7566-6060	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Nov-15 15:48	**Analysis:**	STP 2x2 Contingency Tables	**Official Results:**	Yes

Graphics



ECOTOXICOLOGY

Hyalella azteca Survival and Growth Test - Dry Weights

MaxXam

BBY2FCD-00129/2

Client # & Name: 4954-Azimuth Consulting

Start Date and Time: 2015 Sep 15 @ 16:20

Organism Lot #: AB150911

End Date: 2015 Sep 29

Weighing Dates: 2015 Oct 01

Drying Temperature (°C): 60

Drying Time (h): >24hrs

Stats File ID: HA-4954-0115

Analysts: M. Thompson

Job/Sample #: B577416/Various

Boat #	Sample	Rep	# *Hyalella*	*Hyalella* Wt.(g)	*Hyalella* Wt. (mg)	Mean Wt./*Hyalella* (mg)	Mean Wt./Sample (mg)	SD
106	Control	A	10	0.00154	1.54	0.15	0.16	0.01
107		B	10	0.00160	1.60	0.16		
108		C	10	0.00156	1.56	0.16		
109		D	10	0.00173	1.73	0.17		
110		E	10	0.00155	1.55	0.16		
111	PDL-1	A	10	0.00138	1.38	0.14	0.13	0.02
112	PDL-2	B	10	0.00115	1.15	0.12		
113	PDL-3	C	10	0.00112	1.12	0.11		
114	PDL-4	D	8	0.00098	0.98	0.12		
115	PDL-5	E	10	0.00155	1.55	0.16		
116	INUG-1	A	10	0.00063	0.63	0.06	0.09	0.02
117	INUG-2	B	8	0.00080	0.80	0.10		
118	INUG-3	C	9	0.00087	0.87	0.10		
119	INUG-4	D	9	0.00089	0.89	0.10		
120	INUG-5	E	9	0.00104	1.04	0.12		
121	TPE-B-1	A	0	-	-	#VALUE!	0.14	0.03
122	TPE-B-2	B	8	0.00119	1.19	0.15		
123	TPE-B-3	C	7	0.00078	0.78	0.11		
124	TPE-B-4	D	8	0.00145	1.45	0.18		
125	TPE-B-5	E	10	0.00135	1.35	0.14		
126	TPE-1	A	6	0.00076	0.76	0.13	0.10	0.02
127	TPE-2	B	9	0.00080	0.80	0.09		
128	TPE-3	C	0	-	-	#VALUE!		
129	TPE-4	D	9	0.00073	0.73	0.08		
130	TPE-5	E	10	0.00122	1.22	0.12		
106		0 - A	10	0.00155	1.55	0.16		
Analyst								

The average dry weight for the replicate controls must be >0.1 mg, for the test to be valid.

Hyalella azteca Survival and Growth Test - Survival

Client # & Name: 4954-Azimuth Consulting
Start Date and Time: 2015 Sep 15 @ 16:20
Sample Date: 2015 Aug 26 & 27 & 30
End Date: 2015 Sep 29
Job # B577416
Stats File ID: HA-4954-0115
Organism Lot #: AB150911

Analysts: M. Thompson, M. Armstrong, S. Rostama, M. O'Toole, M. Brassil, G. Matharu,

Sample	Rep	# Hyalella	% Survived	Survival	
				Mean	SD
Control	A	10	100	100	0
	B	10	100		
	C	10	100		
	D	10	100		
	E	10	100		
PDL-1	A	10	100	96	9
PDL-2	B	10	100		
PDL-3	C	10	100		
PDL-4	D	8	80		
PDL-5	E	10	100		
INUG-1	A	10	100	90	7
INUG-2	B	8	80		
INUG-3	C	9	90		
INUG-4	D	9	90		
INUG-5	E	9	90		
TPE-B-1	A	0	0	66	38
TPE-B-2	B	8	80		
TPE-B-3	C	7	70		
TPE-B-4	D	8	80		
TPE-B-5	E	10	100		
TPE-1	A	6	60	68	41
TPE-2	B	9	90		
TPE-3	C	0	0		
TPE-4	D	9	90		
TPE-5	E	10	100		

ECOTOXICOLOGY

HYALELLA AZTECA SURVIVAL AND GROWTH TEST - TEST INFORMATION

Client # & Name	#4954 Azimuth
Project Number	2-11-15018
Test Initiation Date & Time	2015 Sep 15 @ 16:20
Test Completion Date	2015 Sep 29
Statistics File #	HA-4954-0115
Analyst(s)	NBlassaitz M.Thompson, S.Rostama, C.Mahaan, M.O'Toole
Control Water Batch	2015 Sept 11
Control Sediment #1	JP 2015 Nov 10
Control Sediment #2	
Organism Lot	AB150911
Age at Start of Test	7-9 days
Feeding Regime	1.75 mL YCT + 800 µl tetramin slurry (4g/L) per replicate 3x weekly
Food Preparation Date:	Tm slurry = 2015Sept11,15,21,22, YCT = 2015 Sept 03,10,17,22
Job #	B577416
List of Sample ID/#	PDL / NB4841 to NB4845 INUG / NB4846 to NB4850 TPE-B / NB4859 to NB4863 TPE / NB4864 to NB4868
	n/a MT 2015 Sep 10

ECOTOXICOLOGY

***HYALELLA AZTECA* SURVIVAL AND GROWTH TEST – AERATION CHECKS**

Client # & Name: #4954 A/I Azimuth Start Date: 2015 Sep 15

WE MT 2015 SEP 10

Initial when aeration is checked. If air is off record DO and note which replicate(s) in comments section.

	Day -1	Day 0	1	2	3	4	5	6
Date	2015 Sep 14	2015 Sep 15	2015 Sept 16	2015 Sept 17	2015 Sept 18	2015 Sep 19	2015 Sept 20	2015 Sep 21
Early AM	n/a	MT	NB	NB	NB	CS	NB	MT
Mid-day	n/a	NB	MT	NB	NB	CS	NB	MT
Late PM	UB	MT	MT	NB	NB	CS	NB	MT

	Day 7	8	9	10	11	12	13	14
Date	2015 Sept 22	2015 Sep 23	2015 Sep 24	2015 Sep 25	2015 Sept 26	2015 Sep 27	2015 Sep 28	2015 Sep 29
Early AM	NB	no	MT	no	NB	UB	no	no
Mid-day	MT	no	MT	NB	NB	y	no	no
Late PM	NB	no	MT	no	NB	y	no	

Dec 2015 Nov 16

Comments:

2015 Sep 14 - Started aeration @ 17:30 UB

Sep 2015 Nov 16

Maxxam

ECOTOXICOLOGY

BBY2FCD-00143/2

HYALELLA AZTECA SURVIVAL AND GROWTH TEST - DATA SHEET

Sample ID: Control

Sample Date: n/a

Sample Received: n/a

Start Date: 2015 Sep 15

End Date: 2015 Sep 29

Job/Sample #: n/a

Measurements						Samples Taken			
pH		Hardness ($mg/L\ CaCO_3$)		Conductance ($\mu S/cm$)		Alkalinity ($mg/L\ CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
8.2	8.4	104	144	480	669	✓ 49.4	✓ 116	✓ 0.04	✓ 3.6

Initial overlying WQ measurements:	
Analyst MT	Date 2015 Sep 15

Final overlying WQ measurements:	
Analyst MT	Date 2015 Sep 29

Day	Tuesday	~~Friday~~ Thursday (A)	Sunday	Tuesday	~~Friday~~ Thursday (A)	Sunday	Tuesday
	Day 0	Day ~~2~~ 2	Day 5	Day 7	Day ~~10~~ 9	Day 12	Day 14
Temp. (ºC)	23.4	23.1	23.2	23.0	23.0	22.9	22.5
D.O. (mg/L)	8.3	8.4	8.4	8.6	8.5	8.5	8.5
Feeding	MB	✓	✓	✓	✓	✓	n/a
Analyst	MT	MB	MB	MB	MT	✓	MT

Replicate	A	B	C	D	E
# Surviving	10	10	10	10	10
Analyst	GS	SR	SR	✓	SR

(A) Recorded 2015 Sep 15

Date	Replicate	Comments	Analyst

✓ 2015 Nov 10

ECOTOXICOLOGY

HYALELLA AZTECA SURVIVAL AND GROWTH TEST - DATA SHEET

Sample ID: PDL
Sample Date: 2015 Aug 26
Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15
End Date: 2015 Sep 29
Job/Sample #: B577416 / NB ~~4841~~ 4841 (A) to NB4845

Measurements						Samples Taken			
pH		Hardness ($mg/L\ CaCO_3$)		Conductance ($\mu S/cm$)		Alkalinity ($mg/L\ CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
8.0	8.0	104	56	338	320	✓ 34.0	✓ 32.1	✓ 0.13	✓ 3.4

Initial overlying WQ measurements:			
Analyst	MH	Date	2015 Sep 15

Final overlying WQ measurements:			
Analyst	MH	Date	2015 Sep 29

Day	Tuesday	~~Friday~~ Thursday (A)(B)	Sunday	Tuesday	~~Friday~~ Thursday (A)(B)	Sunday	Tuesday
	Day 0	Day ~~12~~ 12	Day 5	Day 7	Day ~~10~~ 9	Day 12	Day 14
Temp. (ºC)	23.3	23.7	23.3	23.3	23.2	22.9	22.3
D.O. (mg/L)	8.4	8.3	8.3	8.4	8.4	8.5	8.6
Feeding	✓	✓	✓	✓	✓	✓	n/a
Analyst	MH	MB	MB	MB	MH	MH	MH

(A) WE MH 2015 Sep 10
(B) WE SR 2015 Sep 15

Replicate	A	B	C	D	E
# Surviving	10	10	10	~~8~~ 8 (A)	10
Analyst	CS	SR	SR	SR	MH

Date	Replicate	Comments	Analyst
		JP 2015 Nov 10	

(A) WE SR 2015 Sep 29

Maxxam

BBY2FCD-00143/2

ECOTOXICOLOGY

HYALELLA AZTECA SURVIVAL AND GROWTH TEST - DATA SHEET

Sample ID: INUG

Sample Date: 2015 Aug 27

Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15

End Date: 2015 Sep 29 (A)

Job/Sample #: B577416 / NB4846 ~~4846~~ to NB4850

Measurements						Samples Taken			
pH		Hardness ($mg/L\ CaCO_3$)		Conductance ($\mu S/cm$)		Alkalinity ($mg/L\ CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
8.0	7.8	92	80	331	281	✓ 25.1	✓ 22.2	✓ 0.16	✓ 4.9

Initial overlying WQ measurements:	
Analyst MT	Date 2015 Sep 15

Final overlying WQ measurements:	
Analyst MT	Date 2015 Sep 29

Day	Tuesday	~~Friday~~ Thursday (B)	Sunday	Tuesday	~~Friday~~ Thursday (A)	Sunday	Tuesday
	Day 0	Day ~~3~~ 2	Day 5	Day 7	Day ~~10~~ 9	Day 12	Day 14
Temp. (ºC)	23.3	23.8	23.3	23.1	23.2	22.9	22.4
D.O. (mg/L)	8.4	8.3	8.4	8.4	8.4	8.5	8.5
Feeding	✓	✓	✓	✓	✓	✓	n/a
Analyst	ML	NB	NB	NB	MT	MJ	MT

Replicate	A	B	C	D	E
# Surviving	10	8	9	9	9
Analyst	MJ	MO	SR	NB	MO

(A) WE MT 2015 Sep 10

(B) WE ONC 2015 Sep 15

Date	Replicate	Comments	Analyst
		MJ 2015 Nov. 10	

ECOTOXICOLOGY

HYALELLA AZTECA SURVIVAL AND GROWTH TEST - DATA SHEET

Sample ID: TPE-B
Sample Date: 2015 Aug 30
Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15
End Date: 2015 Sep 29
Job/Sample #: B577416/NB4859 to NB4868

Measurements						Samples Taken			
pH		Hardness (mg/L $CaCO_3$)		Conductance (µS/cm)		Alkalinity (mg/L $CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
8.0	8.2	108	108	351	353	✓ 39.7	✓ 64.4	✓ 0.085	✓ 3.6

Initial overlying WQ measurements:	
Analyst MH	Date 2015Sep15

Final overlying WQ measurements:	
Analyst MH	Date 2015Sep29

Day	Tuesday	~~Friday~~ Thursday (R)	Sunday	Tuesday	~~Friday~~ Thursday (A)	Sunday	Tuesday
	Day 0	Day ~~3~~ 2	Day 5	Day 7	Day ~~10~~ 9	Day 12	Day 14
Temp. (ºC)	23.3	23.6	23.4	22.7	22.9	22.9	22.5
D.O. (mg/L)	8.5	8.3	8.3	8.5	8.4	8.5	8.5
Feeding	✓	✓	✓	✓	✓	✓	n/a
Analyst	MH	NB	NB	NB	MH	[illegible]	MH

Replicate	A	B	C	D	E
# Surviving	0	8	7	8	10
Analyst	NB	[illegible]	MO	[illegible]	SR

(A) Weekend 2015 Sep 13

Date	Replicate	Comments	Analyst
2015 Sep 29	measure	# surviving = 3 weighboat I1	MH

2015 Nov 10

ECOTOXICOLOGY

HYALELLA AZTECA SURVIVAL AND GROWTH TEST - DATA SHEET

Sample ID: TPE
Sample Date: 2015 Aug 30
Sample Received: 2015 Sep 03

Start Date: 2015 Sep 15
End Date: 2015 Sep 29
Job/Sample #: B577416/ NB4864 to NB4868

Measurements						Samples Taken			
pH		Hardness (mg/L $CaCO_3$)		Conductance (µS/cm)		Alkalinity (mg/L $CaCO_3$)		Ammonia (mg/L)	
Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
7.9	8.0	104	100	336	331	✓ 300	✓ 39.2	✓ 0.033	✓ 3.6

Initial overlying WQ measurements:	
Analyst MT	Date 2015 Sep 15

Final overlying WQ measurements:	
Analyst MT	Date 2015 Sep 29

Day	Tuesday	~~Friday~~ Thursday (A)	Sunday	Tuesday	~~Friday~~ Thursday (B)	Sunday	Tuesday
	Day 0	~~Day 3~~ Day 2	Day 5	Day 7	~~Day 10~~ Day 9	Day 12	Day 14
Temp. (ºC)	23.3	23.8	23.5	23.2	23.1	22.9	22.6
D.O. (mg/L)	8.4	8.3	8.3	8.5	8.4	8.5	8.5
Feeding	✓	✓	✓	✓	✓	✓	n/a
Analyst	MT	NB	NB	NB	MT	WJ	MT

Replicate	A	B	C	D	E
# Surviving	(B) ~~10~~ 6	9	(B) ~~10~~ 0	9	10
Analyst	MT	MT	MT	WJ	SR

(A) WE DML 2015 Sept 15
(B) WE MT 2015 Sep 29

Date	Replicate	Comments	Analyst
2015 Sep 29	A	Found 2 x chironomid-like organisms in test vessel	MT
2015 Sep 29	Measure	# Surviving = 10. Weighboat I 2	CMS

JP 2015 Nov 10

ECOTOXICOLOGY

ORGANISMS - ACCLIMATION AND HOLDING CONDITIONS

MaxXam

BBY2FCD-00070/2

Client #'s: #11938, #4954 Date & Time of Arrival: 2015 Sep 11 @ 12:12

Organism Lot #: AB150911 Age upon Arrival: 3-5 days

Water (L) per Shipping Bag: ~1 Organism: Hyalella azteca

Number of Shipping Bags: 4 #of Organisms ~~Ordered~~: 1595

JP 2015 Nov 10

Arrival Conditions

Bag ID	# Dead	% Dead	Cond (µS/cm) / Salinity (ppt)	Temp (°C)	DO (mg/L)	pH	Feeding	Analyst
#1	n/a MH 2015 Sep 11		986	23.2	7.5	7.4	NA	MH
#2			984	23.0	7.6	7.4	NA	MH
#3			984	23.1	7.4	7.4	NA	MH
#4			989	23.1	7.4	7.4	NA	MH
			n/a MH 2015 Sep 11					

Daily Conditions During Holding/Acclimation

Date	Mortalities # Dead	Mortalities % Dead	Water Quality Cond (µS/cm) / Salinity (ppt)	Temp (°C)	DO (mg/L)	pH	Feeding	Analyst
#1 (Pan A)	n/a CJ 2015 Sept 12		922	22.7	8.6	7.3	✓	CJ
#2 (Pan B)			827	22.5	8.6	7.4	✓	CJ
#3 (Pan C)			846	22.3	8.8	7.5	✓	CJ
#4 (Pan D)			866	22.3	8.7	7.5	✓	CJ
A 2015 Sept 13	JP 2015 Nov 10		981	21.1	8.8	7.9	n/a	MB
B 2015 Sept 13			862	20.7	8.8	8.0	n/a	MB
C 2015 Sept 13			868	21.5	8.8	8.0	n/a	MB
D 2015 Sept 13			957	20.1	8.8	8.0	n/a	MB
A 2015 Sept 14			940	21.5	8.7	8.0	✓	MB
B 2015 Sept 14			852	20.9	8.8	8.1	✓	MB
C 2015 Sept 14			821	21.6	8.7	8.1	✓	MB
Total Mortalities	0		924	21.1	8.7	8.1	✓	MB

Comments (e.g. feeding times and quantities; fish behaviour, acclimation conditions): Analyst

2015 Sep 11 - Placed contents of each shipping container into a different glass pan. Added ~500mL hyalella water batch 2015 Sep 08, airlines, and 5 mL YCT batch 2015 Aug 27 to each pan. Also added a few squares of hyalella mesh to each pan. MH

2015 Sept 14 - WQ and fed 5mL YCT/pan - MB

2015 Sept 15 - pan A = DO = 8.3 mg/L pH = 7.9 temp = 22.9 cond. = 954 µs/cm

pan B = DO = 8.2 mg/L pH = 7.9 cond = 870 µs/cm temp = 22.6°C pan C = DO = 8.3 mg/L pH = 8.0 temp = 21.9°C cond = 897 µs/cm pan D = DO = 8.5 mg/L pH = 8.0 temp = 21.9°C cond = 965 µs/cm

Fed each pan 5mL YCT batch 2015 Sept 10 - MB

Rec'd 2015 sep 11 @ 12:12
mt

AB150911 HA

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 9/10/2015

SPECIES: *Hyalella azteca*

AGE: 2-4 day

LIFE STAGE: Juvenile

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: Flake slurry

Water Chemistry Record:	Current	Range
TEMPERATURE:	24°C	23-26°C
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	168 mg/l	122-198 mg/l
TOTAL ALKALINITY (as $CaCO_3$):	65 mg/l	60-95 mg/l
pH:	7.67	7.52-8.11

Comments:

Facility Supervisor

SAM-5S Water Recipe for Hyalella

BATCH ID : 2015 Sept11
(Date Hardened)

SAM-5S Reconstituted Water Recipe for *Hyalella azteca* as per Borgmann 1996 (For water hardness ~125 mg/L)

Chemical Weights	$CaCl_2X2H_2O$	$MgSO_4$ (g)	NaBr (g)	$NaHCO_3$ (g)	KCl (g)
Brand	Sigma	Fisher	Fisher	Fisher	Sigma
Lot #	MKBN6366V	146801	124514	146818	SLBK3147V
Calculated	14.70	3.01	0.10	8.40	0.37
Actual	14.7000	3.0105	0.1004	8.3995	0.3700

Balance ID: BB#2-0260

Analyst: D.Lai

Add to Type 3 DI (L): 100

Water Use: #11938, #4954

DI Machine ID: BB#2-0160

Date: 2015Sept11

Water Quality:

Temp (°C): 22.6 pH: 8.2 Hardness (mg/L) 138

Cond (µs/cm): 391 DO (mg/L): 8.6 Alkalinity (mg/L):

Analyst: S.Rostama Date: 2015 Sep 13

Comments: N/A

NaHCO3 (Sodium Bicarbonate)

NaBr (Sodium Bromide)

CaCl2 x 2H2O (Calcium Chloride - dihydrous)

MgSO4 (Magnesium Sulfate - anhydrous)

KCl (Potassium Chloride)

SAM-5S Recipe = 1 mM CaCl2, 1 mM NaHCO3, 0.01 mM NaBr, 0.05 mM KCl, and 0.25 mM MgSO4

Borgmann, U. 1996. Systematic analysis of aqueous ion requirements of *Hyalella azteca* : A standard artificial medium including the essential bromide ion. *Archives of Environmental Contamination and Toxicology* . 30: 356-363.

Maxxam Job #: B580549
Report Date: 2015/09/21

AZIMUTH CONSULTING GROUP INC.
Client Project #: 2-11-15018 CHIRONOWD +HYALELLA
Site Location: ECOTOX BURNABY
Sampler Initials: NB

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		ND2613		ND2614		ND2615	ND2616		
Sampling Date		2015/09/15 11:15		2015/09/15 11:15		2015/09/15 11:15	2015/09/15 11:15		
COC Number		g098651		g098651		g098651	g098651		
	UNITS	CONTROL HY.	QC Batch	INUG-1 HY.	QC Batch	PDL-1 HY.	TPE-1 HY.	RDL	QC Batch
Misc. Inorganics									
Alkalinity (Total as CaCO3)	mg/L	49.4	8041051	25.1	8041051	34.0	30.0	0.50	8041051
Alkalinity (PP as CaCO3)	mg/L	<0.50	8041051	<0.50	8041051	<0.50	<0.50	0.50	8041051
Bicarbonate (HCO3)	mg/L	60.3	8041051	30.6	8041051	41.4	36.6	0.50	8041051
Carbonate (CO3)	mg/L	<0.50	8041051	<0.50	8041051	<0.50	<0.50	0.50	8041051
Hydroxide (OH)	mg/L	<0.50	8041051	<0.50	8041051	<0.50	<0.50	0.50	8041051
Nutrients									
Total Ammonia (N)	mg/L	0.041	8043296	0.16	8043298	0.13	0.033	0.0050	8043296
RDL = Reportable Detection Limit									

Maxxam ID		ND2617	ND2618	ND2618		ND2619		ND2620		
Sampling Date		2015/09/15 11:15	2015/09/15 11:15	2015/09/15 11:15		2015/09/15 11:15		2015/09/15 11:15		
COC Number		g098651	g098651	g098651		g098651		g098651		
	UNITS	TPE-B-1 HY.	CONTROL CH.	CONTROL CH. Lab-Dup	QC Batch	INUG-CH.	QC Batch	PDL-1 CH.	RDL	QC Batch
Misc. Inorganics										
Alkalinity (Total as CaCO3)	mg/L	39.7	55.4		8041051	31.6	8041077	36.0	0.50	8041077
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50		8041051	<0.50	8041077	<0.50	0.50	8041077
Bicarbonate (HCO3)	mg/L	48.5	67.6		8041051	38.5	8041077	44.0	0.50	8041077
Carbonate (CO3)	mg/L	<0.50	<0.50		8041051	<0.50	8041077	<0.50	0.50	8041077
Hydroxide (OH)	mg/L	<0.50	<0.50		8041051	<0.50	8041077	<0.50	0.50	8041077
Nutrients										
Total Ammonia (N)	mg/L	0.085	0.021	0.022	8043298	0.12	8043298	0.11	0.0050	8043296
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate										

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B580549
Report Date: 2015/09/21

AZIMUTH CONSULTING GROUP INC.
Client Project #: 2-11-15018 CHIRONOWD +HYALELLA
Site Location: ECOTOX BURNABY
Sampler Initials: NB

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		ND2621		ND2622		
Sampling Date		2015/09/15 11:15		2015/09/15 11:15		
COC Number		g098651		g098651		
	UNITS	TPE-1 CH.	QC Batch	TPE-B-1 CH.	RDL	QC Batch
Misc. Inorganics						
Alkalinity (Total as CaCO3)	mg/L	37.0	8041051	39.5	0.50	8041051
Alkalinity (PP as CaCO3)	mg/L	<0.50	8041051	<0.50	0.50	8041051
Bicarbonate (HCO3)	mg/L	45.1	8041051	48.1	0.50	8041051
Carbonate (CO3)	mg/L	<0.50	8041051	<0.50	0.50	8041051
Hydroxide (OH)	mg/L	<0.50	8041051	<0.50	0.50	8041051
Nutrients						
Total Ammonia (N)	mg/L	0.033	8043296	0.093	0.0050	8043298
RDL = Reportable Detection Limit						

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B585303
Report Date: 2015/10/02

Maxxam Analytics (TOX Internal)
Client Project #: 2-11-0691
Site Location: ECOTOX
Sampler Initials: MT

Day 14 Hy

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NG2953	NG2954		NG2955		NG2956	NG2957	
Sampling Date		2015/09/29	2015/09/29		2015/09/29		2015/09/29	2015/09/29	
COC Number		G106168	G106168		G106168		G106168	G106168	
	UNITS	CONTROL	PDL-1	RDL	INUG-1	RDL	TPE-B-1	TPE-1	RDL
Misc. Inorganics									
Alkalinity (Total as CaCO3)	mg/L	116	32.1	0.50	22.2	0.50	64.4	39.2	0.50
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50
Bicarbonate (HCO3)	mg/L	142	39.2	0.50	27.1	0.50	78.5	47.9	0.50
Carbonate (CO3)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50
Hydroxide (OH)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50
Nutrients									
Total Ammonia (N)	mg/L	3.6	3.4	0.0050	4.9	0.050	3.6	3.6	0.0050
RDL = Reportable Detection Limit									

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam

Randomization Chart for Hyalella Tests

Back Wall

	6	12	etc.
	5	11	
Position Map	4	10	
	3	9	
	2	8	
	1	7	

Front of Counter

Client: 4954- Azimuth Date:

Position #	Colour	Treatment	Replicate
28	Red		A
13	Red		B
18	Red		C
3	Red	Control	D
22	Red		E
5	Red		Measure
21	Fl. Green	PDL-1	A
19	Fl. Green	PDL-2	B
4	Fl. Green	PDL-3	C
11	Fl. Green	PDL-4	D
9	Fl. Green	PDL-5	E
26	Fl. Green	PDL	Measure
10	Purple	INUG-1	A
16	Purple	INUG-2	B
20	Purple	INUG-3	C
15	Purple	INUG-4	D
7	Purple	INUG-5	E
1	Purple	INUG	Measure
27	Teal Green	TPE-B-1	A
25	Teal Green	TPE-B-2	B
29	Teal Green	TPE-B-3	C
2	Teal Green	TPE-B-4	D
30	Teal Green	TPE-B-5	E
24	Teal Green	TPE-B	Measure
8	Lt. Blue	TPE-1	A
12	Lt. Blue	TPE-2	B
6	Lt. Blue	TPE-3	C
14	Lt. Blue	TPE-4	D
23	Lt. Blue	TPE-5	E
17	Lt. Blue	TPE	Measure

APPENDIX H

Sequential Extraction Laboratory Data – Maxxam Analytics

Maxxam Analytics 4606 Canada Way, Burnaby, BC Canada V5G 1K5 Tel: 604 734 7276 Fax: 604 731 2386 www.maxxam.ca

Table 1: BCR Sequential Extraction Test Results for project

Maxxam Sample No	Sample ID	Sample Weight (wet weight)	Final Volume	Hardness CaCO3	Dissolved Aluminum (Al)	Dissolved Antimony (Sb)	Dissolved Arsenic (As)	Dissolved Barium (Ba)	Dissolved Beryllium (Be)
	Units	**g**	**mL**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
NL6616	PDL COMP SOLUTION A	1.0	40.0	18.5	3.64	0.000039	0.0110	0.127	0.00101
NL6832	PDL COMP SOLUTION B	1.0	40.0	6.17	6.18	0.000064	0.0105	0.0573	0.000602
NL6839	PDL COMP SOLUTION C&D	1.0	51.0	9.18	4.55	0.000081	0.00455	0.0251	0.000396
NL6618	INUG COMP SOLUTION A	1.0	40.0	12.6	3.89	<0.000020	0.0128	0.170	0.00119
NL6833	INUG COMP SOLUTION B	1.0	40.0	3.10	4.60	0.000037	0.0128	0.0521	0.000677
NL6840	INUG COMP SOLUTION C&D	1.0	51.0	8.75	3.78	0.000031	0.00208	0.0253	0.000335
NL6829	TPE-B COMP SOLUTION A	1.0	40.0	16.1	4.31	0.000029	0.00565	0.113	0.00147
NL6834	TPE-B COMP SOLUTION B	1.0	40.0	4.48	4.50	0.000045	0.00265	0.0422	0.000518
NL6842	TPE-B COMP SOLUTION C&D	1.0	51.0	6.80	4.75	0.000063	0.00101	0.0206	0.000463
NL6830	TPE COMP SOLUTION A	1.0	40.0	18.5	4.27	0.000036	0.00295	0.100	0.00153
NL6836	TPE COMP SOLUTION B	1.0	40.0	4.36	4.84	0.000063	0.00235	0.0408	0.000580
NL6844	TPE COMP SOLUTION C&D	1.0	51.0	7.31	5.50	0.000069	0.00184	0.0246	0.000558
NM3678	BLANK SOLUTION A	0.0	40.0	<0.50	0.0188	<0.000020	<0.000020	0.00204	<0.000010
NM3689	BLANK SOLUTION B	0.0	40.0	<0.50	0.0233	0.000021	0.000136	0.00234	<0.000010
NM3701	BLANK SOLUTION C&D	0.0	51.0	0.64	1.06	0.000076	0.000167	0.00431	<0.000010
NM3679	BCR SOLUTION A	1.0	40.0	509	10.1	0.00243	0.0907	0.539	0.00304
NM3699	BCR SOLUTION B	1.0	40.0	171	81.0	0.00365	0.488	2.36	0.0109
NM3703	BCR SOLUTION C&D	1.0	51.0	49.1	15.8	0.00114	0.0600	0.249	0.00149
QAQC									
Duplicates									
NL6832 Dup	PDL COMP SOLUTION B				6.28	0.000064	0.0105	0.0568	0.000601
NM3678 Dup	BLANK SOLUTION A				0.0190	<0.000020	<0.000020	0.00203	<0.000010
Blanks									
Method Blank					<0.00050	<0.000020	<0.000020	<0.000020	<0.000010
Method Blank					<0.00050	<0.000020	<0.000020	<0.000020	<0.000010
Reference Material									
CRC ICPMS H2O 10 ppb (8093006) % recovery					103.68200	99.50000	97.85000	110.83000	103.39000
CRC ICPMS H2O 10 ppb (8099883) % recovery					100.83600	101.00000	98.11000	111.01000	96.77000
True Values CRC ICPMS H2O 10 ppb					**100**	**1**	**10**	**10**	**10**
Detection Limits		N/A	N/A	0.50	0.00050	0.000020	0.000020	0.000020	0.000010
Maxxam SOP #		N/A	N/A	BY WI-00033	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000

References:
Hardness = (Calcium*2.497) + (Magnesium*4.118)

Maxxam Analytics 4606 Canada Way, Burnaby, BC Canada V5G 1K5 Tel: 604 734 7276 Fax: 604 731 2386 www.maxxam.ca

Client: AZIMUTH CONSULTING GROUP INC.

Table 1: BCR Sequential Extraction Test Results for project

Maxxam Sample No	Sample ID	Sample Weight (wet weight)	Final Volume	Dissolved Bismuth (Bi)	Dissolved Boron (B)	Dissolved Cesium (Cs)	Dissolved Cadmium (Cd)	Dissolved Calcium (Ca)	Dissolved Chromium (Cr)
	Units	**g**	**mL**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
NL6616	PDL COMP SOLUTION A	1.0	40.0	0.000136	<0.050	0.000390	0.000578	5.47	0.00825
NL6832	PDL COMP SOLUTION B	1.0	40.0	0.00134	<0.050	0.00116	0.000250	0.596	0.0159
NL6839	PDL COMP SOLUTION C&D	1.0	51.0	0.000402	0.057	0.000619	0.000128	1.19	0.0590
NL6618	INUG COMP SOLUTION A	1.0	40.0	0.0000770	<0.050	0.000182	0.000617	3.45	0.00656
NL6833	INUG COMP SOLUTION B	1.0	40.0	0.00145	<0.050	0.000710	0.000127	0.397	0.0114
NL6840	INUG COMP SOLUTION C&D	1.0	51.0	0.000240	0.059	0.000475	0.000107	1.22	0.0411
NL6829	TPE-B COMP SOLUTION A	1.0	40.0	0.000171	<0.050	0.000413	0.000456	4.73	0.00749
NL6834	TPE-B COMP SOLUTION B	1.0	40.0	0.00213	<0.050	0.00146	0.000240	0.569	0.0114
NL6842	TPE-B COMP SOLUTION C&D	1.0	51.0	0.000480	0.058	0.000801	0.000143	0.693	0.0314
NL6830	TPE COMP SOLUTION A	1.0	40.0	0.000119	<0.050	0.000359	0.000326	5.27	0.00613
NL6836	TPE COMP SOLUTION B	1.0	40.0	0.00182	<0.050	0.00143	0.000139	0.438	0.0132
NL6844	TPE COMP SOLUTION C&D	1.0	51.0	0.000689	0.057	0.000848	0.000123	0.713	0.0333
NM3678	BLANK SOLUTION A	0.0	40.0	0.0000110	<0.050	<0.000050	0.0000050	<0.050	0.00027
NM3689	BLANK SOLUTION B	0.0	40.0	<0.0000050	<0.050	<0.000050	0.0000340	0.084	0.00018
NM3701	BLANK SOLUTION C&D	0.0	51.0	0.0000250	0.077	<0.000050	0.0000740	0.257	0.00211
NM3679	BCR SOLUTION A	1.0	40.0	0.00107	<0.050	0.00130	0.177	171	0.146
NM3699	BCR SOLUTION B	1.0	40.0	0.0169	<0.050	0.00684	0.0862	43.7	1.03
NM3703	BCR SOLUTION C&D	1.0	51.0	0.00546	0.057	0.00249	0.00483	3.87	2.50
QAQC									
Duplicates									
NL6832 Dup	PDL COMP SOLUTION B			0.00138	<0.050	0.00116	0.000245	0.605	0.0159
NM3678 Dup	BLANK SOLUTION A			0.0000120	<0.050	<0.000050	0.0000070	<0.050	0.00028
Blanks									
Method Blank				<0.0000050	<0.050	<0.000050	<0.0000050	<0.050	<0.00010
Method Blank				<0.0000050	<0.050	<0.000050	<0.0000050	<0.050	<0.00010
Reference Material									
CRC ICPMS H2O 10 ppb (8093006) % recovery				101.10000		105.70000	102.67000		102.22000
CRC ICPMS H2O 10 ppb (8099883) % recovery				101.30000		104.10000	97.65000		101.35000
True Values CRC ICPMS H2O 10 ppb				**1**		**1**	**10**		**10**
Detection Limits		N/A	N/A	0.0000050	0.050	0.000050	0.0000050	0.050	0.00010
Maxxam SOP #		N/A	N/A	BBY7SOP-00002	BY7SOP-0000	BY7SOP-0000	BBY7SOP-00002	BY7SOP-0000	BBY7SOP-00002

References:
Hardness = (Calcium*2.497) + (Magnesium*4.118)

Maxxam Analytics 4606 Canada Way, Burnaby, BC Canada V5G 1K5 Tel: 604 734 7276 Fax: 604 731 2386 www.maxxam.ca

Table 1: BCR Sequential Extraction Test Results for project

Maxxam Sample No	Sample ID	Sample Weight (wet weight)	Final Volume	Dissolved Cobalt (Co)	Dissolved Copper (Cu)	Dissolved Lanthanum (La)	Dissolved Iron (Fe)	Dissolved Lead (Pb)	Dissolved Lithium (Li)
	Units	**g**	**mL**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
NL6616	PDL COMP SOLUTION A	1.0	40.0	0.00855	0.0824	0.0480	3.04	0.0122	0.00335
NL6832	PDL COMP SOLUTION B	1.0	40.0	0.00634	0.0664	0.162	11.2	0.0418	0.00275
NL6839	PDL COMP SOLUTION C&D	1.0	51.0	0.00368	0.0529	0.0174	3.34	0.00968	0.0111
NL6618	INUG COMP SOLUTION A	1.0	40.0	0.00742	0.0764	0.0953	4.01	0.00539	0.00234
NL6833	INUG COMP SOLUTION B	1.0	40.0	0.00529	0.0421	0.151	28.9	0.0296	0.00139
NL6840	INUG COMP SOLUTION C&D	1.0	51.0	0.00298	0.0452	0.0181	4.02	0.00977	0.00939
NL6829	TPE-B COMP SOLUTION A	1.0	40.0	0.0161	0.0543	0.126	7.97	0.0109	0.00303
NL6834	TPE-B COMP SOLUTION B	1.0	40.0	0.00284	0.0340	0.185	12.2	0.0320	0.00293
NL6842	TPE-B COMP SOLUTION C&D	1.0	51.0	0.00292	0.0496	0.0186	3.51	0.0101	0.0138
NL6830	TPE COMP SOLUTION A	1.0	40.0	0.0162	0.0750	0.125	3.68	0.00761	0.00268
NL6836	TPE COMP SOLUTION B	1.0	40.0	0.00502	0.0352	0.190	11.9	0.0331	0.00263
NL6844	TPE COMP SOLUTION C&D	1.0	51.0	0.00295	0.0548	0.0206	4.33	0.0122	0.0161
NM3678	BLANK SOLUTION A	0.0	40.0	0.0000260	0.0558	<0.000050	0.0055	0.00238	<0.00050
NM3689	BLANK SOLUTION B	0.0	40.0	0.0000340	0.00655	<0.000050	0.0122	0.00253	<0.00050
NM3701	BLANK SOLUTION C&D	0.0	51.0	0.000115	0.0436	0.000091	0.0689	0.00795	0.00091
NM3679	BCR SOLUTION A	1.0	40.0	0.0544	1.17	0.0130	11.3	0.157	0.0103
NM3699	BCR SOLUTION B	1.0	40.0	0.0815	2.63	0.157	166	2.80	0.0251
NM3703	BCR SOLUTION C&D	1.0	51.0	0.0284	0.851	0.0216	15.3	0.117	0.0336
QAQC									
Duplicates									
NL6832 Dup	PDL COMP SOLUTION B			0.00639	0.0666	0.163	11.1	0.0433	0.00265
NM3678 Dup	BLANK SOLUTION A			0.0000200	0.0552	<0.000050	0.0054	0.00243	<0.00050
Blanks									
Method Blank				<0.0000050	<0.000050	<0.000050	<0.0010	<0.0000050	<0.00050
Method Blank				<0.0000050	<0.000050	<0.000050	<0.0010	<0.0000050	<0.00050
Reference Material									
CRC ICPMS H2O 10 ppb (8093006) % recovery				106.77000	105.33000	111.10000	102.36900	107.22000	104.99000
CRC ICPMS H2O 10 ppb (8099883) % recovery				104.20000	107.77000	109.40000	105.17200	110.03000	105.09000
True Values CRC ICPMS H2O 10 ppb				**10**	**10**	**1**	**100**	**10**	**10**
Detection Limits		N/A	N/A	0.0000050	0.000050	0.000050	0.0010	0.0000050	0.00050
Maxxam SOP #		N/A	N/A	BY7SOP-00002	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000

References:
Hardness = (Calcium*2.497) + (Magnesium*4.118)

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Table 1: BCR Sequential Extraction Test Results for project

Maxxam Sample No	Sample ID	Sample Weight (wet weight)	Final Volume	Dissolved Magnesium (Mg)	Dissolved Manganese (Mn)	Dissolved Phosphorus (P)	Dissolved Molybdenum (Mo)	Dissolved Nickel (Ni)	Dissolved Potassium (K)
	Units	**g**	**mL**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
NL6616	PDL COMP SOLUTION A	1.0	40.0	1.19	1.21	0.158	0.000170	0.0583	0.840
NL6832	PDL COMP SOLUTION B	1.0	40.0	1.14	0.728	0.330	0.000339	0.0264	0.377
NL6839	PDL COMP SOLUTION C&D	1.0	51.0	1.51	0.0852	1.00	0.00417	0.0407	1.84
NL6618	INUG COMP SOLUTION A	1.0	40.0	0.972	1.71	0.0684	<0.000050	0.0568	0.807
NL6833	INUG COMP SOLUTION B	1.0	40.0	0.512	0.571	0.461	0.000099	0.0185	0.312
NL6840	INUG COMP SOLUTION C&D	1.0	51.0	1.38	0.119	0.253	0.00850	0.0316	2.00
NL6829	TPE-B COMP SOLUTION A	1.0	40.0	1.04	5.78	0.0215	0.000067	0.0646	0.811
NL6834	TPE-B COMP SOLUTION B	1.0	40.0	0.742	0.370	0.0747	0.000209	0.0140	0.346
NL6842	TPE-B COMP SOLUTION C&D	1.0	51.0	1.23	0.152	0.411	0.00383	0.0262	1.84
NL6830	TPE COMP SOLUTION A	1.0	40.0	1.29	3.31	0.0233	0.000065	0.0387	0.832
NL6836	TPE COMP SOLUTION B	1.0	40.0	0.792	0.705	0.100	0.000265	0.0142	0.354
NL6844	TPE COMP SOLUTION C&D	1.0	51.0	1.34	0.120	0.494	0.00350	0.0242	2.03
NM3678	BLANK SOLUTION A	0.0	40.0	<0.050	0.000371	<0.0020	<0.000050	0.000720	<0.050
NM3689	BLANK SOLUTION B	0.0	40.0	<0.050	0.000276	0.0054	<0.000050	0.00125	<0.050
NM3701	BLANK SOLUTION C&D	0.0	51.0	<0.050	0.00182	0.0970	0.000271	0.00248	1.16
NM3679	BCR SOLUTION A	1.0	40.0	20.2	4.13	9.09	0.00127	0.341	3.68
NM3699	BCR SOLUTION B	1.0	40.0	15.0	3.07	36.7	0.00269	0.625	3.24
NM3703	BCR SOLUTION C&D	1.0	51.0	9.57	0.466	3.96	0.0109	0.272	3.95
QAQC									
Duplicates									
NL6832 Dup	PDL COMP SOLUTION B			1.15	0.741	0.329	0.000335	0.0264	0.378
NM3678 Dup	BLANK SOLUTION A			<0.050	0.000365	<0.0020	<0.000050	0.000710	<0.050
Blanks									
Method Blank				<0.050	<0.000050	<0.0020	<0.000050	<0.000020	<0.050
Method Blank				<0.050	<0.000050	<0.0020	<0.000050	<0.000020	<0.050
Reference Material									
CRC ICPMS H2O 10 ppb (8093006) % recovery					99.42000		95.10000	100.91000	
CRC ICPMS H2O 10 ppb (8099883) % recovery					99.87000		93.70000	98.99000	
True Values CRC ICPMS H2O 10 ppb					**10**		**1**	**10**	
Detection Limits		N/A	N/A	0.050	0.000050	0.0020	0.000050	0.000020	0.050
Maxxam SOP #		N/A	N/A	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000

References:
Hardness = (Calcium*2.497) + (Magnesium*4.118)

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Table 1: BCR Sequential Extraction Test Results for project

Maxxam Sample No	Sample ID	Sample Weight (wet weight)	Final Volume	Dissolved Rubidium (Rb)	Dissolved Selenium (Se)	Dissolved Silicon (Si)	Dissolved Silver (Ag)	Dissolved Sodium (Na)	Dissolved Strontium (Sr)	Dissolved Sulphur (S)
	Units	**g**	**mL**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
NL6616	PDL COMP SOLUTION A	1.0	40.0	0.00557	0.000047	2.04	0.0000090	0.122	0.0268	<10
NL6832	PDL COMP SOLUTION B	1.0	40.0	0.00602	0.000115	2.29	0.000318	0.123	0.00398	<10
NL6839	PDL COMP SOLUTION C&D	1.0	51.0	0.00454	0.00154	3.72	0.0000830	0.761	0.00395	<10
NL6618	INUG COMP SOLUTION A	1.0	40.0	0.00421	<0.000040	2.16	0.0000050	0.145	0.0262	<10
NL6833	INUG COMP SOLUTION B	1.0	40.0	0.00444	0.000114	2.41	0.000313	0.125	0.00329	<10
NL6840	INUG COMP SOLUTION C&D	1.0	51.0	0.00532	0.00209	4.04	0.0000500	0.826	0.00475	<10
NL6829	TPE-B COMP SOLUTION A	1.0	40.0	0.00679	0.000085	2.58	0.0000060	0.160	0.0282	<10
NL6834	TPE-B COMP SOLUTION B	1.0	40.0	0.00623	0.000137	2.65	0.000179	0.251	0.00431	<10
NL6842	TPE-B COMP SOLUTION C&D	1.0	51.0	0.00555	0.00179	4.50	0.0000580	0.799	0.00413	<10
NL6830	TPE COMP SOLUTION A	1.0	40.0	0.00635	0.000104	1.97	<0.0000050	0.165	0.0303	<10
NL6836	TPE COMP SOLUTION B	1.0	40.0	0.00697	0.000162	2.01	0.000155	0.133	0.00372	<10
NL6844	TPE COMP SOLUTION C&D	1.0	51.0	0.00659	0.00194	5.82	0.0000440	0.866	0.00473	<10
NM3678	BLANK SOLUTION A	0.0	40.0	<0.000050	<0.000040	<0.10	0.0000160	<0.050	0.000184	<10
NM3689	BLANK SOLUTION B	0.0	40.0	<0.000050	<0.000040	<0.10	0.0000150	0.101	0.000567	<10
NM3701	BLANK SOLUTION C&D	0.0	51.0	0.000188	0.000119	0.27	0.0000180	0.729	0.00170	<10
NM3679	BCR SOLUTION A	1.0	40.0	0.0192	0.00111	13.9	0.00171	1.38	1.13	18
NM3699	BCR SOLUTION B	1.0	40.0	0.0373	0.00162	48.1	0.101	0.605	0.346	<10
NM3703	BCR SOLUTION C&D	1.0	51.0	0.0321	0.0208	12.9	0.0172	1.30	0.0387	13
QAQC										
Duplicates										
NL6832 Dup	PDL COMP SOLUTION B			0.00611	0.000113	2.34	0.000316	0.124	0.00418	<10
NM3678 Dup	BLANK SOLUTION A			<0.000050	<0.000040	<0.10	0.0000160	<0.050	0.000176	<10
Blanks										
Method Blank				<0.000050	<0.000040	<0.10	<0.0000050	<0.050	<0.000050	<10
Method Blank				<0.000050	<0.000040	<0.10	<0.0000050	<0.050	<0.000050	<10
Reference Material										
CRC ICPMS H2O 10 ppb (8093006) % recovery					95.77000		95.00000		99.19000	
CRC ICPMS H2O 10 ppb (8099883) % recovery					91.26000		94.90000		102.42000	
True Values CRC ICPMS H2O 10 ppb					**10**		**1**		**10**	
Detection Limits		N/A	N/A	0.000050	0.000040	0.10	0.0000050	0.050	0.000050	10
Maxxam SOP #		N/A	N/A	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-000

References:
Hardness = (Calcium*2.497) + (Magnesium*4.118)

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Table 1: BCR Sequential Extraction Test Results for project

Maxxam Sample No	Sample ID	Sample Weight (wet weight)	Final Volume	Dissolved Tellurium (Te)	Dissolved Thallium (Tl)	Dissolved Thorium (Th)	Dissolved Tin (Sn)	Dissolved Titanium (Ti)	Dissolved Tungsten (W)	Dissolved Uranium (U)
	Units	**g**	**mL**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
NL6616	PDL COMP SOLUTION A	1.0	40.0	<0.000020	0.0000430	0.000232	<0.00020	0.0666	0.000019	0.00703
NL6832	PDL COMP SOLUTION B	1.0	40.0	0.000236	0.0000770	0.0000860	<0.00020	0.0799	0.000046	0.0115
NL6839	PDL COMP SOLUTION C&D	1.0	51.0	<0.000020	0.0000340	0.00279	0.00578	0.943	0.00126	0.0140
NL6618	INUG COMP SOLUTION A	1.0	40.0	<0.000020	0.0000420	0.000437	<0.00020	0.0290	0.000010	0.0145
NL6833	INUG COMP SOLUTION B	1.0	40.0	0.000153	0.0000580	0.0000500	<0.00020	0.0424	0.000019	0.0162
NL6840	INUG COMP SOLUTION C&D	1.0	51.0	<0.000020	0.0000380	0.00615	0.00324	0.527	0.00146	0.0124
NL6829	TPE-B COMP SOLUTION A	1.0	40.0	<0.000020	0.0000990	0.000408	<0.00020	0.0482	0.000018	0.0120
NL6834	TPE-B COMP SOLUTION B	1.0	40.0	0.000125	0.000120	0.000248	<0.00020	0.111	0.000051	0.0142
NL6842	TPE-B COMP SOLUTION C&D	1.0	51.0	<0.000020	0.0000490	0.00687	0.00751	0.466	0.00202	0.00942
NL6830	TPE COMP SOLUTION A	1.0	40.0	0.000020	0.0000540	0.000313	<0.00020	0.0422	0.000018	0.0116
NL6836	TPE COMP SOLUTION B	1.0	40.0	0.000129	0.000102	0.000116	<0.00020	0.119	0.000058	0.0157
NL6844	TPE COMP SOLUTION C&D	1.0	51.0	<0.000020	0.0000560	0.0120	0.00834	0.370	0.00131	0.0107
NM3678	BLANK SOLUTION A	0.0	40.0	<0.000020	0.0000020	<0.0000050	<0.00020	<0.00050	<0.000010	0.0000050
NM3689	BLANK SOLUTION B	0.0	40.0	0.000177	0.0000090	<0.0000050	<0.00020	<0.00050	<0.000010	0.0000020
NM3701	BLANK SOLUTION C&D	0.0	51.0	<0.000020	0.0000090	0.0000230	0.0147	0.00600	0.000171	0.000134
NM3679	BCR SOLUTION A	1.0	40.0	0.000090	0.000465	0.000889	0.00197	0.300	0.000753	0.00427
NM3699	BCR SOLUTION B	1.0	40.0	0.000173	0.00194	0.000589	0.00699	0.208	0.00274	0.0207
NM3703	BCR SOLUTION C&D	1.0	51.0	0.000280	0.000700	0.00636	0.00309	0.211	0.00247	0.0375
QAQC										
Duplicates										
NL6832 Dup	PDL COMP SOLUTION B			0.000205	0.0000810	0.0000730	<0.00020	0.0804	0.000041	0.0117
NM3678 Dup	BLANK SOLUTION A			<0.000020	0.0000020	<0.0000050	<0.00020	<0.00050	<0.000010	0.0000050
Blanks										
Method Blank				<0.000020	<0.0000020	<0.0000050	<0.00020	<0.00050	<0.000010	<0.0000020
Method Blank				<0.000020	<0.0000020	<0.0000050	<0.00020	<0.00050	<0.000010	<0.0000020
Reference Material										
CRC ICPMS H2O 10 ppb (8093006) % recovery				103.00000	101.30000		96.50000	97.36000		107.61000
CRC ICPMS H2O 10 ppb (8099883) % recovery				99.70000	99.60000		102.50000	98.59000		112.15000
True Values CRC ICPMS H2O 10 ppb				**1**	**1**		**1**	**10**		**10**
Detection Limits		N/A	N/A	0.000020	0.0000020	0.0000050	0.00020	0.00050	0.000010	0.0000020
Maxxam SOP #		N/A	N/A	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000

References:
Hardness = (Calcium*2.497) + (Magnesium*4.118)

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Table 1: BCR Sequential Extraction Test Results for project

Maxxam Sample No	Sample ID	Sample Weight (wet weight)	Final Volume	Dissolved Vanadium (V)	Dissolved Zinc (Zn)	Dissolved Zirconium (Zr)	Dissolved Mercury (Hg)
	Units	**g**	**mL**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
NL6616	PDL COMP SOLUTION A	1.0	40.0	0.00378	0.0339	0.00037	<0.000050
NL6832	PDL COMP SOLUTION B	1.0	40.0	0.0164	0.0319	0.00062	<0.000050
NL6839	PDL COMP SOLUTION C&D	1.0	51.0	0.0139	0.0405	0.00807	<0.000050
NL6618	INUG COMP SOLUTION A	1.0	40.0	0.00086	0.0539	0.00034	<0.000050
NL6833	INUG COMP SOLUTION B	1.0	40.0	0.0143	0.0218	0.00070	<0.000050
NL6840	INUG COMP SOLUTION C&D	1.0	51.0	0.0104	0.0309	0.00460	<0.000050
NL6829	TPE-B COMP SOLUTION A	1.0	40.0	0.00187	0.0410	0.00048	<0.000050
NL6834	TPE-B COMP SOLUTION B	1.0	40.0	0.0121	0.0242	0.00095	<0.000050
NL6842	TPE-B COMP SOLUTION C&D	1.0	51.0	0.00916	0.0404	0.00608	<0.000050
NL6830	TPE COMP SOLUTION A	1.0	40.0	0.00104	0.0316	0.00057	<0.000050
NL6836	TPE COMP SOLUTION B	1.0	40.0	0.0101	0.0220	0.00080	<0.000050
NL6844	TPE COMP SOLUTION C&D	1.0	51.0	0.0103	0.0458	0.00380	<0.000050
NM3678	BLANK SOLUTION A	0.0	40.0	<0.00020	0.00314	<0.00010	<0.000050
NM3689	BLANK SOLUTION B	0.0	40.0	0.00062	0.00208	<0.00010	<0.000050
NM3701	BLANK SOLUTION C&D	0.0	51.0	<0.00020	0.0115	0.00034	<0.000050
NM3679	BCR SOLUTION A	1.0	40.0	0.0283	4.05	0.00114	<0.000050
NM3699	BCR SOLUTION B	1.0	40.0	0.287	2.55	0.00258	0.000123
NM3703	BCR SOLUTION C&D	1.0	51.0	0.0562	0.782	0.00309	<0.000050
QAQC							
Duplicates							
NL6832 Dup	PDL COMP SOLUTION B			0.0165	0.0323	0.00060	<0.000050
NM3678 Dup	BLANK SOLUTION A			<0.00020	0.00319	<0.00010	<0.000050
Blanks							
Method Blank				<0.00020	<0.00010	<0.00010	<0.000050
Method Blank				<0.00020	<0.00010	<0.00010	<0.000050
Reference Material							
CRC ICPMS H2O 10 ppb (8093006) % recovery				111.52000	99.77000		97.40000
CRC ICPMS H2O 10 ppb (8099883) % recovery				96.01000	101.79000		93.00000
True Values CRC ICPMS H2O 10 ppb				**10**	**10**		**1**
Detection Limits		N/A	N/A	0.00020	0.00010	0.00010	0.000050
Maxxam SOP #		N/A	N/A	BY7SOP-0000	BY7SOP-0000	BY7SOP-0000	BBY7SOP-00002

References:

Hardness = (Calcium*2.497) + (Magnesium*4.118)

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Client: AZIMUTH CONSULTING GROUP INC.

Table 2: Moisture Results for project Azimuth

MaxxLIMs ID	Customer Sample ID	Container Weight (g) (W1)	Container + Wet Sample Weight (g) (W2)	Weight of Wet Sample (g)	Dry Sample + Container Weight (g) (W3)	Weight of Dry Sample (g)	% Moisture	Comments
	Method Blank		4.04	4.04	4.04	4.04	0.0	
--	PDL Comp.	4.18	5.22	1.03	4.39	0.20	80.2	
--	INUG Comp.	4.21	5.23	1.02	4.51	0.30	70.5	
--	TPE-B Comp.	4.18	5.19	1.01	4.31	0.13	87.4	
--	TPE-B Comp. Dup.	4.18	5.19	1.02	4.31	0.13	87.2	
--	TPE Comp.	4.20	5.21	1.01	4.35	0.15	85.4	