Appendix G4

Report: 2014 Core Receiving Environment Monitoring Program

Final

Core Receiving Environment Monitoring Program 2014

Meadowbank Mine

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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 approach development and implementation of the trends assessment and management response recommendations; and reviewed the report.
- Eric Franz (Azimuth) – Eric was responsible for overall coordination of the CREMP. He coordinated field sampling logistics and conducted data collation and initial screening.
- Morgan Finley (Azimuth) – Morgan led the 2014 field team and provided inputs to the report.
- Maggie McConnell (Azimuth) – Maggie was responsible for data interpretation and reporting.
- Randy Baker (Azimuth) – Randy provided internal technical review of the CREMP report.
- 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

BAER – Baseline Aquatic Ecosystem Report

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

FF – Far Field

GPS – Global Positioning System

HEPH – Heavy Extractable Petroleum Hydrocarbons

INUG – Inuggugayualik Lake

ISQG – Interim Sediment Quality Guidelines

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

SOP – Standard Operating Procedure

SQG – Sediment Quality Guidelines

SP – Second Portage Lake

TE – Tehek Lake

TEFF – Tehek Lake Farfield

TIA – Tailings Impoundment Area

TKN – Total Kjeldahl Nitrogen

TOC – Total Organic Carbon

TSS – Total Suspended Solids

TPE, TPN, TPS – Third Portage Lake – East, North, and South Basins

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"; some of which were updated herein) 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[1]

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 2014 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: conductivity (TPN, TPE, TPS, SP, WAL); hardness (TPN, TPE, TPS, SP); calcium, potassium, magnesium, and sodium (TPN, TPE, TPS, SP [except sodium]); and TDS (TPN, TPE, TPS, SP, 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 2015**.
- *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 conducted in 2014 and will be conducted next in 2017. Significant increases in sediment metals relative to baseline conditions and triggers were identified in WAL (lead and zinc) and TPE (chromium). The WAL results were deemed as artefacts of the statistical models

[1] Notes: SP = Second Portage Lake; TPN = Third Portage North; TPS = Third Portage South; TPE = Third Portage East; TE = Tehek Lake; WAL = Wally Lake.

used and/or as inconsistent with baseline grab sample results; they were not attributed to mining activities. As per the recommendations in last year's CREMP (Azimuth, 2014), the 2014 coring program was expanded in TPE as a targeted study to address uncertainties regarding the nature (i.e., spatial or temporal) of the apparent temporal trend in chromium concentrations since dike construction. The targeted study confirmed that the trend is temporal and mining-related, with ultramafic rock used to construct the Bay-Goose Dike the most likely source of chromium-enriched sediments. While TPE sediment chromium concentrations have increased by 50% since dike construction and now exceed the CCME PEL, the local benthic invertebrate community has not been impacted. Notwithstanding, **a follow-up study is recommended in 2015** to test the bioavailability and toxicity of the sediments.

- *Phytoplankton Community* – The only statistically significant change in phytoplankton community metrics in 2014 was a 24% decrease in taxa richness at mid-field area TPS. However, given the lack similar changes at any near-field areas, these changes are attributed to natural variability rather than the mine. **While not apparently mine related, this trend should be watched again in 2015**.

- *Benthic Invertebrate Community* – The majority of near-field and mid-field areas showed apparent increases in abundance and taxa richness in 2014 relative to baseline/reference conditions. No statistically significant short-term (i.e., past year) or longer-term (i.e., past two to four years) trends were identified. TPN did show a reduction (37%, but not statistically significant) in total abundance relative to baseline/reference conditions in 2014; those results are being analyzed in more detail in the EEM report due in June 2015.

Baker Lake

CREMP monitoring 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 occurred in the vicinity of the barge dock and jetty in 2014. No changes in the aquatic receiving environment were observed that were attributable to AEM's activities in Baker Lake. No follow-up management actions are required for 2015.

Table ES-1. Summary of key findings from the 2014 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	?	Conductivity (TPN, TPE, TPS, SP, WAL); Hardness (TPN, TPE, TPS, SP); Ca/K/Mg/Na (TPN, TPE, TPS, SP [not Na]); TDS (TPN, TPE, TPS, SP, WAL) were all elevated relative to reference/baseline conditions. However, concentrations suggest low potential for adverse effects.	**1**
Nutrients	**0**	n/a	n/a	n/a	?		**0**
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	??	Lead and zinc exceeded the trigger at (WAL), but were clearly within baseline range. Chromium (TPE) temporal trend confirmed in coring study. Target study recommended.	**2** **
Organics	**0**	n/a	n/a	n/a	?		**0**
Effects - Phytoplankton							
Chlorophyll-*a* *	**0**	*	*	*	?		**0**
Total Biomass	**0**	n/a	n/a	n/a	?		**0**
Taxa Richness	**1**	Moderate	Low	Low	?	>20% lower at TPS than reference/baseline conditions. However, attributed to natural variability similar changes were not seen at near-field areas and there was no prior evidence of trend	**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

*Continued data quality issue (chlorophyll-*a*)
** Targeted study recommended; see text for detail.

[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, 2005) 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 (BAER, 2005), 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 – 2014 – 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, this report) was complemented by targeted studies directed towards

"AEMP" Terminology

The term "AEMP" was first used in the 2005 report *Aquatic Effects Management Program*, 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 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.

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

AEMP – is used generically when not referring to either of the first two definitions.

effects of dike construction (Azimuth, 2009a, 2010b; AEM, 2011) and associated effects related to the effects of total suspended solids (TSS) on water quality and benthic community in affected waterbodies (Azimuth, 2009b, 2010c, 2011a, 2012b).

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 NWB Type A water license requirements. In 2012, AEM completed the AEMP synthesis document which 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 (**Appendix A**), 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.

This CREMP monitoring report documents the methods and results of aquatic receiving environment monitoring activities undertaken during 2014. As in previous years, this report integrates accumulated results since 2006 to facilitate the identification of changes in limnological 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 (BAER, 2005). 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 (AEMP, 2005) 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).
- *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).

Starting in 2009, CREMP limnological and water quality sampling was expanded, to be conducted on a monthly basis throughout the year where ice conditions permitted. Consequently, sampling was also undertaken in May, November, December (2009) and January–April (2010) in addition to the routine July, August and September sampling (requirements of the Type A water license).

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 2014 program consisted of 13 sampling areas (see **Figures 1.3-1 to 1.3-3**), each categorized into one of the four[2] 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 (**Figures 1.3-1 to 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:

CREMP Sampling Area Categorization

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

- *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).

- *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**).

[2] 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).

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 review (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 Farfield) 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 possibility for exposure to a large-scale event, it is more appropriately considered a MF area. This change in categorization does not necessarily prevent the use of TPS data to make inferences regarding regional conditions (i.e., as long as its status is "control" [see text box above and **Section 1.4**] it remains relevant as an internal reference area), but it does mean that such use would need to be cognizant as discussed in **Section 1.5**.

- *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 Farfield (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; BAER, 2005). 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 (**Figures 1.3-1 and 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 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 (BAER, 2005). 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**.

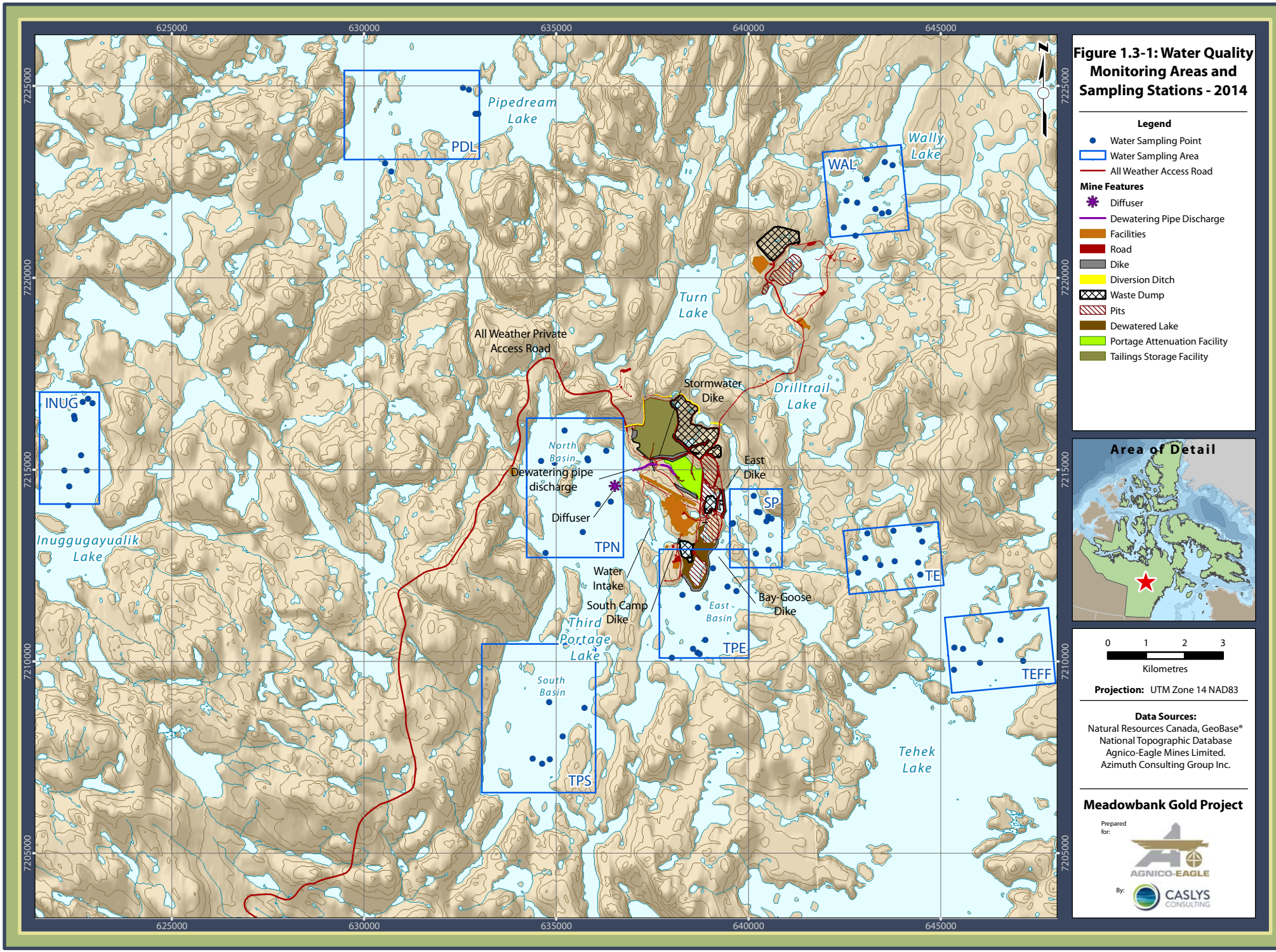


Figure 1.3-1: Water Quality Monitoring Areas and Sampling Stations - 2014

Legend

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

Mine Features

- Diffuser
- Dewatering Pipe Discharge
- Facilities
- Road
- Dike
- Diversion Ditch
- Waste Dump
- Pits
- Dewatered Lake
- Portage Attenuation Facility
- 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

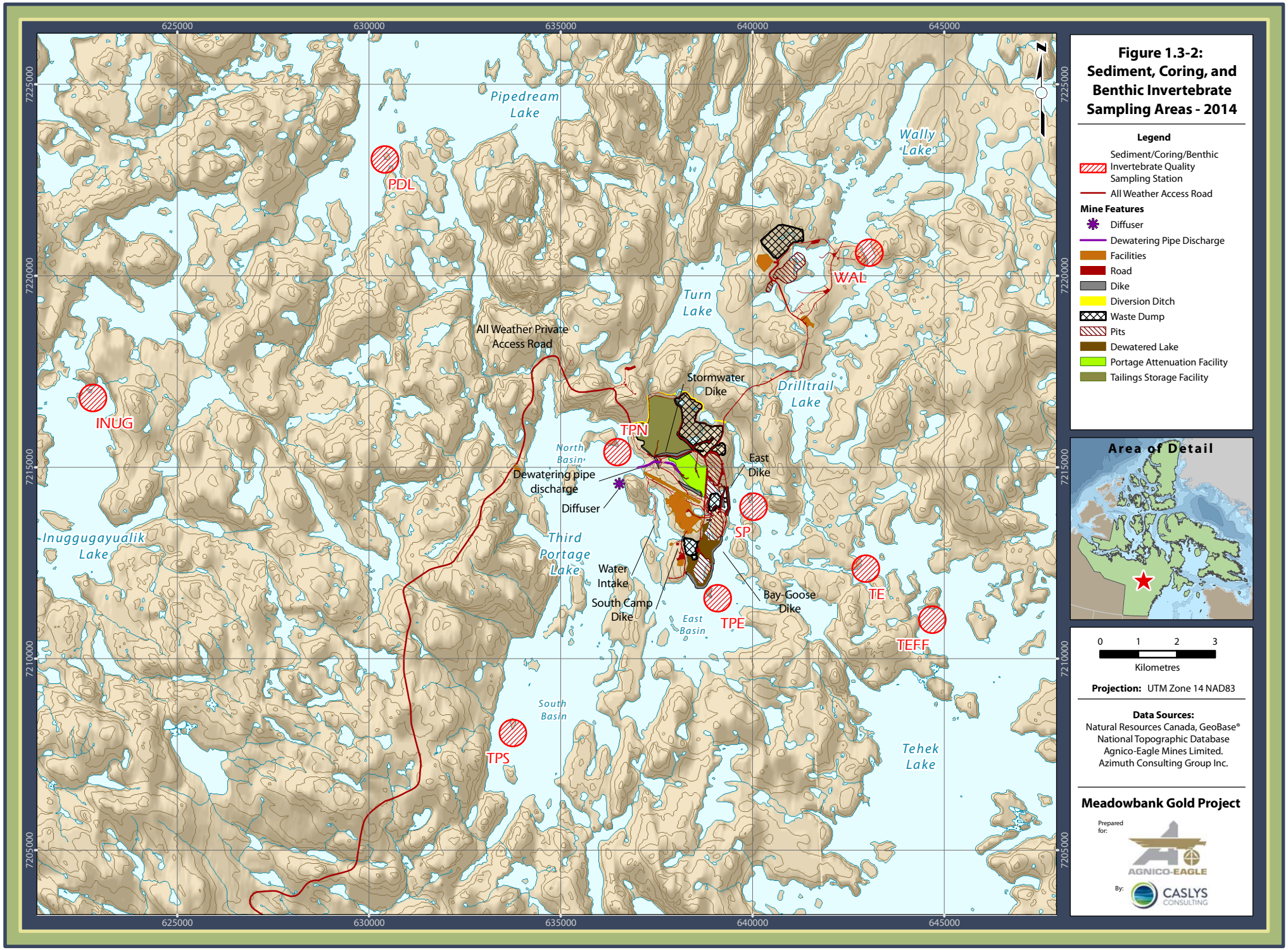


Figure 1.3-2: Sediment, Coring, and Benthic Invertebrate Sampling Areas - 2014

Legend

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

Mine Features

- Diffuser
- Dewatering Pipe Discharge
- Facilities
- Road
- Dike
- Diversion Ditch
- Waste Dump
- Pits
- Dewatered Lake
- Portage Attenuation Facility
- 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



Figure 1.3-3: Baker Lake Water, Sediment, Coring, and Benthic Invertebrate Sampling Area - 2014

Meadowbank Gold Project

Prepared for: AGNICO-EAGLE

By: CASLYS CONSULTING

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) 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**.

As discussed in the text box in **Section 1.3**, 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.

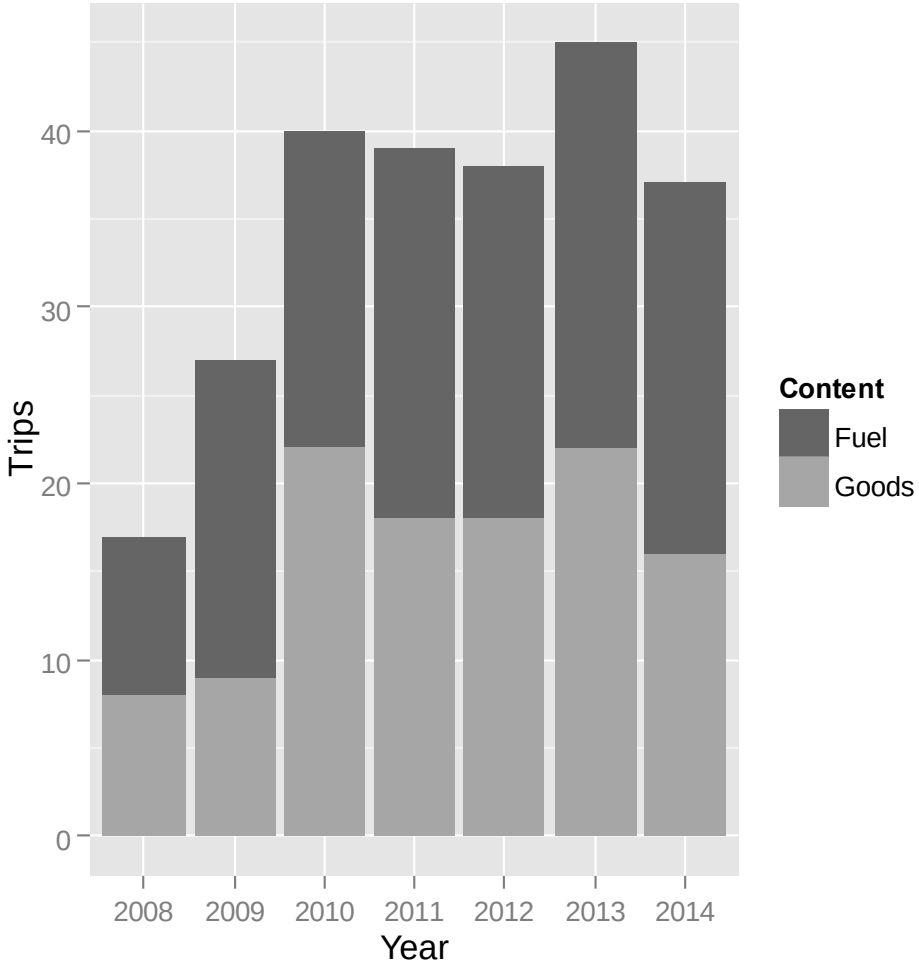
Year	Major Mine-Related Activities	Receiving Environment Overview
2008	Major in-water construction activities for 2008 included the East Dike (located in Second Portage Lake) and the Western Channel Dike (located between Third Portage Lake and Second Portage Lake); the closest CREMP sampling area to 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 to Tehek Lake. The potential impact of construction-related sediment releases to the aquatic environment was the focus of the four-year EAS study (Azimuth, 2009b, 2010c, 2011a, 2012b).
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 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. Pit development focused on North Portage and South Portage pits. Mine officially opened on 27 Feb 2010, marking the started of the operations period. 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 occurs 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 continues. North cell non-contact water diversion 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 WAL (ongoing) and did not require TSS treatment. Minor construction modifications to north cell diversion ditch 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) (Golder, 2014).	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.
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 more 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 consrtuction or modifications in 2014.	CREMP monitoring results presented herein. See Summary in **Table 4.0-1**.

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

	Meadowbank Sampling 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

Notes:
Area designations: C = Control; I = Impact; REF = reference; NF = near-field; MF = mid-field; FF = far-field; Blank denotes that the area was not part of the monitoring program that year.

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 2014 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 less conservative than threshold values. These are defined as:

- *Triggers* are early warning criteria that may lead to action. Exceedence 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 exceedences 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 exceedences 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 *Core Receiving Environment Monitoring Program (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**.

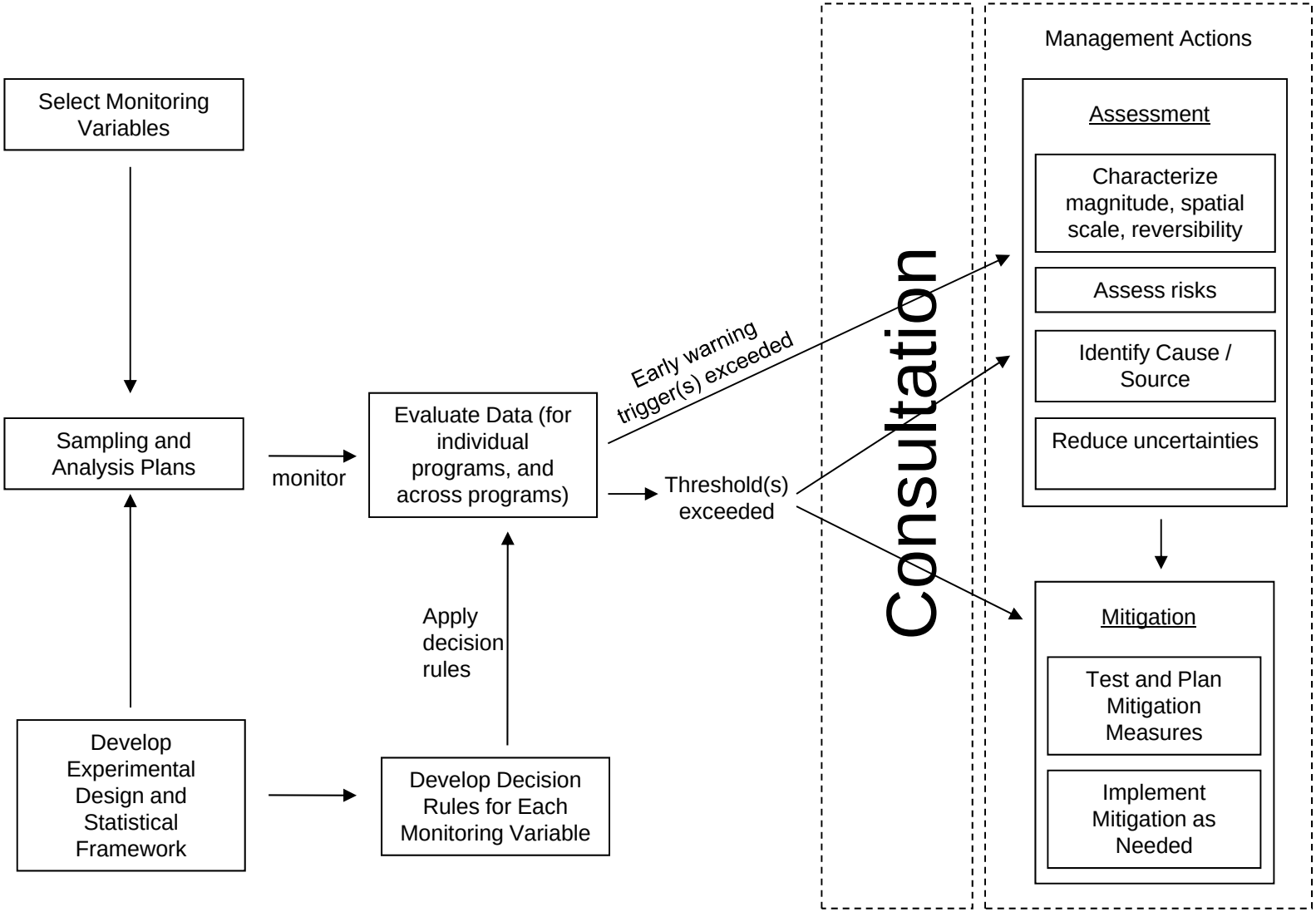
The general rationale for conducting the trend assessment followed these principles:

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

A summary of monitoring events for 2014 CREMP is presented in **Table 2.2-1**. Sampling locations for water and phytoplankton were selected randomly[3] from within their respective lake basins (**Figure 1.3-1**). 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. Sampling Methods

Sampling for the 2014 CREMP program was undertaken according to the SOPs listed in the following appendices:

- Limnology (**Appendix B**)
- Water chemistry and phytoplankton (**Appendix B**)
- Sediment chemistry (**Appendix C**)
- Benthic invertebrates (**Appendix C**)
- Sediment coring (**Appendix D**)

Each SOP includes general information on the sampling locations and timing of field collections, as well as detailed information on:

- the location and timing of sampling,
- pre-trip planning,
- field collection materials,
- quality assurance / quality control protocols,
- step-by-step instructions on sample collection,
- bottle requirements and list of parameters,
- sample preservation, and
- sample handling and transportation.

[3] 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.

Table 2.2-1. CREMP sampling summary, Meadowbank study lakes and Baker Lake, 2014.

Sampling Event	Sampling Crew	Conditions	Components	Meadowbank									Baker			
				TPN	TPE	TPS	SP	TE	TEFF	WAL	INUG	PDL	BBD	BPJ	BAP	BES
January	AEM	Ice	L	×	×	×	×									
February	AEM	Ice	L	×	×	×	×									
March	AEM	Ice	L	×	×	×	×									
April	AEM	Ice	L,W,P	×	×		×	×		×	×					
July 19-30	AEM	Open	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
August 23-September 3	Azimuth	Open	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			B, S, C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
September 10-28	AEM	Open	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
November 2-30	AEM	Ice	L,W,P	✓	✓		✓	✓		✓	✓					
December 18-20	AEM	Ice	L,W,P	✓	✓		✓	✓		✓	✓					

Notes:
L = Limnology
W = Water chemistry
P = Phytoplankton
B = Benthos
S = Sediment
C = Coring
✓ = samples collected
× = areas and components that were not collected, but were scheduled for sampling

Table 2.2-2. CREMP sampling location coordinates (GPS, UTM, NAD83), Meadowbank study lakes and Baker Lake, 2014.

Lake	Area-Replicate ID[1]	Area Type[2]	Water & Phytoplankton (monthly)			Benthos & Sediment Grabs (August)					Sediment Cores (August)			
			Date	Zone & Easting	Northing	Area-Replicate	Sample Type[3]	Depth (m)[4]	Zone & Easting	Northing	Area-Replicate	Depth (m)	Zone & Easting	Northing
Third Portage	TPE-70	NF	July	14W 639687	7211833	TPE-1	B & C	7.3	14W 639134	7211739	TPE-SC-1	8.6	14W 639145	7211731
	TPE-71		July	14W 638283	7211740	TPE-2	B & C	8.1	14W 639153	7211692	TPE-SC-2	7.5	14W 639134	7211739
	TPE-72		August	14W 638686	7211406	TPE-3	B & C	7.4	14W 639120	7211564	TPE-SC-3	6.8	14W 639134	7211739
	TPE-73		August	14W 638675	7210237	TPE-4	B & C	6.5	14W 639084	7211554	TPE-SC-4	8.1	14W 639153	7211692
	TPE-74		September	14W 639454	7211951	TPE-5	B & C	7.4	14W 639066	7211513	TPE-SC-5	9.1	14W 639127	7211557
	TPE-75		September	14W 638880	7210558	TPE-COMP	C				TPE-SC-6	7.4	14W 639120	7211564
	TPE-76		November	14W 638729	7210194						TPE-SC-7	8.0	14W 639096	7211546
	TPE-77		November	14W 639073	7212425						TPE-SC-8	7.2	14W 639089	7211555
	TPE-78		December	14W 638016	7210091						TPE-SC-9	7.8	14W 639064	7211507
	TPE-79		December	14W 638544	7210303						TPE-SC-10	7.5	14W 639049	7211513
	TPN-70	NF	July	14W 634610	7215223	TPN-1	B & C	7.0	14W 636389	7215547	TPN-SC-1	7.2	14W 636382	7215540
	TPN-71		July	14W 635691	7213373	TPN-2	B & C	9.0	14W 636385	7215525	TPN-SC-3	8.1	14W 636416	7215520
	TPN-72		August	14W 636304	7215487	TPN-3	B & C	7.4	14W 636417	7215511	TPN-SC-5	8.9	14W 636497	7215447
	TPN-73		August	14W 635833	7215243	TPN-4	B & C	9.0	14W 636514	7215438	TPN-SC-7	8.0	14W 636574	7215422
	TPN-74		September	14W 636087	7214103	TPN-5	B & C	8.5	14W 636607	7215409	TPN-SC-9	7.5	14W 636595	7215417
	TPN-75		September	14W 634959	7215173	TPN-COMP	C							
	TPN-76		November	14W 634721	7212823									
	TPN-77		November	14W 635218	7216018									
	TPN-78		December	14W 636410	7214127									
	TPN-79		December	14W 635835	7215272									
	TPS-43	MF	July	14W 634813	7208951	TPS-1	B & C	9.2	14W 633595	7208127	TPS-SC-1	9.2	14W 633595	7208127
	TPS-44		July	14W 634833	7207453	TPS-2	B & C	8.8	14W 633620	7208080	TPS-SC-2	8.8	14W 633620	7208080
	TPS-45		August	14W 635738	7208798	TPS-3	B & C	9.0	14W 633657	7208012	TPS-SC-3	9.0	14W 633657	7208012
	TPS-46		August	14W 635170	7208044	TPS-4	B & C	7.9	14W 633730	7208005	TPS-SC-4	7.9	14W 633730	7208005
	TPS-47		September	14W 634386	7207464	TPS-5	B & C	7.7	14W 633782	7208053	TPS-SC-5	7.7	14W 633782	7208053
	TPS-48		September	14W 634637	7207334	TPS-COMP	C							
Second Portage	SP-70	NF	July	14W 639600	7213600	SP-1	B & C	8.4	14W 640076	7214217	SP-SC-1	8.4	14W 640076	7214217
	SP-71		July	14W 640513	7213767	SP-2	B & C	7.3	14W 640069	7214183	SP-SC-3	7.3	14W 640069	7214183
	SP-72		August	14W 640139	7214315	SP-3	B & C	8.8	14W 640060	7214139	SP-SC-5	8.8	14W 640060	7214139
	SP-73		August	14W 640474	7213653	SP-4	B & C	8.2	14W 640036	7214116	SP-SC-7	9.3	14W 640039	7214106
	SP-74		September	14W 640603	7213718	SP-5	B & C	9.4	14W 640005	7214074	SP-SC-9	9.4	14W 640005	7214074
	SP-75		September	14W 640220	7213902	SP-COMP	C							
	SP-76		November	14W 640290	7213895									
	SP-77		November	14W 639572	7213586									
	SP-78		December	14W 640183	7212822									
	SP-79		December	14W 640525	7212901									
Tehek	TE-70	MF	July	15W 361643	7211978	TE-1	B & C	6.8	15W 359968	7212194	TE-SC-1	6.5	15W 359960	7212189
	TE-71		July	15W 360037	7212185	TE-2	B & C	8.0	15W 360006	721283	TE-SC-3	8.0	15W 360014	7212187
	TE-72		August	15W 360256	7212537	TE-3	B & C	9.5	15W 360014	7212211	TE-SC-5	9.5	15W 360014	7212211
	TE-73		August	15W 361724	7213157	TE-4	B & C	8.2	15W 360051	7212227	TE-SC-7	8.2	15W 360051	7212227
	TE-74		September	15W 360633	7212319	TE-5	B & C	8.8	15W 360111	7212235	TE-SC-9	8.9	15W 360116	7212237
	TE-75		September	15W 361013	7212396	TE-COMP	C							
	TE-76		November	15W 361779	7212830									
	TE-77		November	15W 361059	7213179									
	TE-78		December	15W 361631	7212311									
	TE-79		December	15W 360348	7213174									
	TEFF-31	FF	July	15W 364098	7209491	TEFF-1	B & C	8.8	15W 361910	7210739	TEFF-SC-1	8.8	15W 361910	7210739
	TEFF-32		July	15W 362972	7209544	TEFF-2	B & C	6.9	15W 361851	7210740	TEFF-SC-2	6.9	15W 361851	7210740
	TEFF-33		August	15W 363559	7210082	TEFF-3	B & C	9.0	15W 361844	7210681	TEFF-SC-3	9.0	15W 361844	7210681
	TEFF-34		August	15W 362566	7209945	TEFF-4	B & C	8.0	15W 361784	7210694	TEFF-SC-4	8.0	15W 361784	7210694
	TEFF-35		September	15W 362343	7209997	TEFF-5	B & C	7.6	15W 361652	7210614	TEFF-SC-5	7.4	15W 361652	7210614
	TEFF-36		September	15W 362279	7209425	TEFF-COMP	C							

Table 2.2-2. CREMP sampling location coordinates (GPS, UTM, NAD83), Meadowbank study lakes and Baker Lake, 2014.

Lake	Area-Replicate ID[1]	Area Type[2]	Water & Phytoplankton (monthly)			Benthos & Sediment Grabs (August)					Sediment Cores (August)			
			Date	Zone & Easting	Northing	Area-Replicate	Sample Type[3]	Depth (m)[4]	Zone & Easting	Northing	Area-Replicate	Depth (m)	Zone & Easting	Northing
Inugugayualik	INUG-58	Ref	July	14W 622331	7214576	INUG-1	B & C	7.0	14W 622816	7216850	INUG-SC-1	6.8	14W 622817	7216849
	INUG-59		July	14W 622640	7215375	INUG-2	B & C	6.5	14W 622784	7216864	INUG-SC-2	7.1	14W 622807	7216834
	INUG-60		August	14W 622817	7216849	INUG-3	B & C	7.4	14W 622740	7216834	INUG-SC-3	7.4	14W 622744	7216831
	INUG-61		August	14W 622682	7216767	INUG-4	B & C	8.5	14W 622711	7216786	INUG-SC-4	7.1	14W 622702	7216863
	INUG-62		September	14W 622300	7214068	INUG-5	B & C	8.5	14W 622694	7216769	INUG-SC-5	9.3	14W 622682	7216767
	INUG-63		September	14W 622461	7216408	INUG-COMP	C							
	INUG-64		November	14W 622474	7216321									
	INUG-65		November	14W 622936	7216740									
	INUG-66		December	14W 622199	7214963									
	INUG-67		December	14W 622789	7214957									
Wally	WAL-39	NF	July	15W 361387	7221577	WAL-1	B & C	9.2	15W 360895	7220495	WAL-SC-1	9.4	15W 360895	7220495
	WAL-40		July	15W 361720	7221461	WAL-2	B & C	8.4	15W 360905	7220467	WAL-SC-3	8.4	15W 360905	7220467
	WAL-41		August	15W 360930	7221787	WAL-3	B & C	9.0	15W 360931	7220437	WAL-SC-5	7.8	15W 360915	7220433
	WAL-42		August	15W 360659	7221864	WAL-4	B & C	8.0	15W 360948	7220402	WAL-SC-7	7.2	15W 360943	7220400
	WAL-43		September	15W 360520	7221172	WAL-5	B & C	8.9	15W 360997	7220360	WAL-SC-9	8.7	15W 360990	7220358
	WAL-44		September	15W 361238	7222365	WAL-COMP	C							
	WAL-45		November	15W 361550	7221446									
	WAL-46		November	15W 360800	7220924									
	WAL-47		December	15W 361926	7222663									
	WAL-48		December	15W 361739	7222782									
Pipedream	PDL-31	Ref	July	14W 632577	7224951	PDL-1	B & C	6.5	14W 630554	7222992	PDL-SC-1	6.5	14W 630552	7222994
	PDL-32		July	14W 632975	7224285	PDL-2	B & C	6.7	14W 630607	7223035	PDL-SC-2	8.8	14W 630694	7223024
	PDL-33		August	14W 630552	7222994	PDL-3	B & C	8.5	14W 630711	7222771	PDL-SC-3	6.8	14W 630584	7223016
	PDL-34		August	14W 630710	7222777	PDL-4	B & C	8.5	14W 630679	7223053	PDL-SC-4	6.5	14W 630630	7223057
	PDL-35		September	14W 632729	7224905	PDL-5	B & C	6.8	14W 630596	7223017	PDL-SC-5	8.5	14W 630700	7222950
	PDL-36		September	14W 632907	7224275	PDL-COMP	C							
Baker	BBD-31	NF	July	14W 644100	7135161	BBD-1	B & C	7.7	14W 644373	7135376	BBD-SC-1	7.5	14W 644369	7135388
	BBD-32		July	14W 643886	7135207	BBD-2	B & C	9.4	14W 644394	7135334	BBD-SC-3	8.3	14W 644402	7135352
	BBD-33		August	14W 644046	7135157	BBD-3	B & C	8.4	14W 644491	7135316	BBD-SC-5	8.5	14W 644491	7135316
	BBD-34		August	14W 643892	7135155	BBD-4	B & C	6.9	14W 644548	7135329	BBD-SC-7	6.9	14W 644548	7135329
	BBD-35		September	14W 644009	7135273	BBD-5	B & C	7.0	14W 644600	7135303	BBD-SC-9	7.1	14W 644600	7135303
	BBD-36		September	14W 644687	7135219	BBD-COMP	C							
	BPJ-31	NF	July	15W 357160	7134044	BPJ-1	B & C	7.4	15W 357288	7134109	BPJ-SC-1	7.4	15W 357288	7134109
	BPJ-32		July	15W 356679	7134085	BPJ-2	B & C	8.4	15W 357237	7134112	BPJ-SC-3	8.4	15W 357237	7134112
	BPJ-33		August	15W 357517	7133975	BPJ-3	B & C	8.0	15W 357193	7134147	BPJ-SC-5	8.0	15W 357193	7134147
	BPJ-34		August	15W 356872	7134118	BPJ-4	B & C	8.0	15W 357161	7134151	BPJ-SC-7	8.0	15W 357097	7134201
	BPJ-35		September	15W 357409	7134035	BPJ-5	B & C	8.1	15W 357026	7134222	BPJ-SC-9	8.1	15W 357026	7134222
	BPJ-36		September	15W 356881	7134168	BPJ-COMP	C							
	BES	Ref	NA			BES-1	B & C	8.3	15W 361356	7132333	BES-SC-1	8.3	15W 361356	7132333
						BES-2	B & C	7.2	15W 361445	7132301	BES-SC-2	7.2	15W 361445	7132301
						BES-3	B & C	9.1	15W 361279	7132361	BES-SC-3	9.1	15W 361279	7132361
						BES-4	B & C	8.7	15W 361254	7132378	BES-SC-4	8.8	15W 361254	7132378
						BES-5	B & C	8.9	15W 361211	7132391	BES-SC-5	8.9	15W 361211	7132391
						BES-COMP	C							
	BAP-31	Ref	July	15W 364091	7131102	BAP-1	B & C	8	15W 364157	7131052	BAP-SC-1	8.0	15W 364157	7131052
	BAP-32		July	15W 364123	7130987	BAP-2	B & C	8.3	15W 364119	7131148	BAP-SC-2	8.3	15W 364119	7131148
	BAP-33		August	15W 362944	7131103	BAP-3	B & C	7.8	15W 364078	7131160	BAP-SC-3	7.8	15W 364078	7131160
	BAP-34		August	15W 363617	7131213	BAP-4	B & C	7.7	15W 364035	7131184	BAP-SC-4	7.7	15W 364035	7131184
	BAP-35		September	NA	NA	BAP-5	B & C	8.0	15W 363982	7131210	BAP-SC-5	8.0	15W 363982	7131210
	BAP-36		September	15W 363870	7131203	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.

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

2.3. 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.

Laboratory QA/QC – Data Quality Objectives (DQOs) are numerically definable measures of analytical precision and completeness. Analytical precision is a measurement of the variability associated with duplicate analyses of the same sample in the laboratory. The laboratory duplicate is a new aliquot from the sample bottle/jar and is analyzed from the start in the same manner as the original aliquot taken from the bottle/jar. Also, Certified Reference Materials (CRM) are always included as part of routine laboratory QA/QC. The full list of laboratory DQOs for each parameter are presented in **Appendix B** (Table 3).

Field QA/QC: Water Sampling – Field QA/QC standards during water sampling were maintained for every sample. The standard QA/QC 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 QA procedures include collection and/or analysis of the following:

- Field Duplicate Samples – An independent collection of water samples at the same time and location as the original, as a measure of consistency in sampling methodology and heterogeneity of chemical parameters at discrete locations. The number of field duplicates taken is approximately 10% of original samples.
- Travel Blank – Laboratory supplied bottles of distilled water that are transported to site, carried back and forth into the field and returned to the laboratory, unopened, to test for inadvertent contamination during the transport and field sampling process.
- Equipment Blank – At the beginning or end of a field sampling episode, after routine rinsing of the pump and tubing, distilled water is run through the equipment and placed in sampling bottles for analysis of a wide suite of parameters (e.g., metals, nutrients, and conventionals). This blank tests for possible cross-contamination of samples from the water sampling 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 MDLs.

Quality assurance results of the laboratory and field duplicates were 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:

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

where: A = analytical result; B = duplicate result.

The DQOs for this project were:

- Laboratory Duplicate = 25% RPD for concentrations that exceed 10x the method detection limit (MDL).
- Field Duplicate = 50% RPD for concentrations that exceed 10 x MDL.

RPD values may be either positive or negative, and ideally should provide a mix of the two, clustered around zero. Consistently positive or negative values may indicate a bias. Large variations in RPD values are often observed between duplicate samples when the concentrations of analytes are very low and approaching the detection limit. The reason for this is apparent if one considers duplicate samples with concentrations of an analyte of 0.0005 and 0.0007 mg/L. In absolute terms, the concentration difference between the two is only 0.0002 mg/L, a very tiny amount; however, the RPD value is 33.3%. This may sometimes lead to a belief that the level of precision is less than it actually is. 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.

Field QA/QC: Sediment and Sediment Core Sampling – Field QA/QC standards during sediment sampling consisted of the following:

- 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, avoided the possibility of cross-contamination.
- 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).

- Eight (sediment grab) and 10 (sediment core) field duplicate samples were collected in the immediate vicinity of original samples from randomly selected locations as a test of consistency in field methodology and to characterize heterogeneity of sediment chemistry within discrete areas. The DQO for field duplicate samples is based on an RPD of 50% for concentrations that are >10 x MDL.

Field and Laboratory QA/QC: Biota Sampling – Standard procedures were used to collect biota samples. All 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.

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 density and biomass concentrations is considered acceptable.

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.

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.

ZEAS incorporates the following set of QA/QC procedures in all benthic projects undertaken by the company to ensure the generation of high quality and reliable data:

- Samples were logged upon arrival, inspected, and enumerated;
- Samples were checked for proper preservation;
- Samples were stained to facilitate sorting;
- Taxonomic identifications were based on the most updated and widely used keys;
- 10% of the samples were re-sorted, and re-counted, targeting >90% recovery;
- Precision and accuracy estimates were calculated;
- A voucher collection was compiled;

- Sorted sediments and debris were re-preserved in 10% formalin and are retained for up to three months. For samples subject to subsampling, sorted and unsorted fractions were re-preserved separately.

2.4. Data Evaluation Criteria

The specific methods used to apply triggers/thresholds in the evaluation of CREMP monitoring parameters varied by variable group; 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.

It is important to note that trigger values (and threshold values) may be exceeded for reasons unrelated to mining activity. For example, trigger values for parameters derived in the absence of effects-based thresholds (or where such thresholds were already exceeded prior to mine development) were set at the 95th percentile of the background data; we would expect 5% of values to exceed triggers naturally, in the absence of any mine-related changes. Thus, to avoid making false positive errors (i.e., characterizing a change or difference as mine-related when it is not), when triggers were exceeded we compared the observed pattern of change to our expectations of a mine-related effect (e.g., we would generally expect to see a gradient with NF>MF>FF); where a pattern was absent (e.g., an increase only seen at a FF area), the observed change was inferred as unrelated to mining activity. Thus, it is important to realize that trigger exceedences do not necessarily mean that mine-related changes have occurred. Rather, they highlight cases that should be looked at more closely to determine the most plausible.

2.4.1. Water Chemistry

As discussed in the *Core Receiving Environment Monitoring Program (CREMP): Design Document 2012* (Azimuth, 2012d), while monthly mean values were compared to trigger values to identify short-term, episodic exceedences in water chemistry parameters, formal application of the trigger for decision-making purposes was to the yearly mean for each sampling area (i.e., area means calculated from all water monitoring events; termed "2014 mean").

The hierarchical process for water chemistry variables was as follows (implemented separately for Meadowbank Project Lakes and Baker Lake, for which triggers were independently derived [Azimuth, 2012d]):

1. *Computation of Yearly Means* – monthly means calculated first for each parameter, then yearly means on an area-specific (i.e., lake or basin-specific) basis. Note that values < MDL were conservatively set equal to the MDL.

2. *Comparisons of Yearly Means to Triggers* – yearly means for each sampling area were compared to the triggers to identify all cases for which the mean equaled or exceeded the trigger.

3. *Statistical Testing of Yearly Means Exceeding Triggers* – cases where the yearly means exceeded the triggers were formally tested using statistical analyses; this process was conducted different for Meadowbank Project Lakes and Baker Lake:

   Meadowbank Project Lakes

   - Before-After-Control-Impact statistical framework with multiple paired "before" and "after" period events (BACIP) was applied (see Azimuth, 2012d for details).
   - INUG was used as the reference ("control") area; the other areas were tested as exposure ("impact") areas. PDL nor TEFF could be utilized as controls for BACIP as no data exists 2006 – 2008 for these areas. Instead, these areas are used to compare reference and exposure area data patterns.
   - 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; the 2014 data (only events when both INUG and the test area were sampled) were used as the "after" data.
   - All data were log-transformed (natural logs). Thus, the exponent of the BACI interaction term coefficient provides the proportional change in 2014 relative to the "before" period.
   - One-tailed tests of the null hypothesis (i.e., that test areas experienced no relative change) were conducted; the alternative hypothesis was a relative increase in a parameter at the test area.

   Baker Lake (where different from above)

   - Baker Lake areas were designated as "control" or "impact" 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. Rather, since no development-related changes had been identified to date, all years of data up to and including 2013 were considered "before" and the 2014 data as "after" period data (i.e., allowing the more robust BACIP analysis). Thus, while the trend plots were used to assess temporal trends at the "impact"

areas since monitoring started, the BACIP analyses specifically looked at changes in 2014 at the two "impact" areas relative to previous years.

- The Akilahaarjuk Point (BAP) area was used as the reference "control" area.

2.4.2. Sediment Chemistry

As discussed in the *Core Receiving Environment Monitoring Program (CREMP): Design Document 2012* (Azimuth, 2012d), the sediment core samples were used to screen against trigger values. Methods, which did not vary between the Meadowbank Project Lakes and Baker Lake, were as follows:

1. *Computation of Yearly Means* – the 2014 sediment coring data were used to calculate means for each parameter at each sampling area. Note that values < MDL were conservatively set equal to the MDL.
2. *Comparisons of Yearly Means to Triggers* – yearly means for core samples from each sampling area were compared to the triggers to identify all cases for which the mean equaled or exceeded the trigger.
3. *Statistical Testing of Yearly Means Exceeding Triggers* – cases where the yearly means exceeded the triggers were formally tested using statistical analyses. Unlike water chemistry, as sediment concentrations are not expected to vary annually due to climatic changes, a "before" – "after" (BA) analysis was used to test for temporal differences at each exposure "impact" area. Sediment is inherently much more variable than water however, and greater natural variability is to be expected.

2.4.3. Phytoplankton

As discussed in the *Core Receiving Environment Monitoring Program (CREMP): Design Document 2012* (Azimuth, 2012d), triggers and thresholds were set to relative changes (increases or decreases of 20% and 50%, respectively) in total biomass and species richness at test areas using the BACIP framework (i.e., 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). The evaluation procedure was analogous to that used for water chemistry, except that area means for 2014 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 BACIP testing. Two-tailed tests of the null hypothesis (i.e., that test areas experienced no relative change up or down) were conducted.

2.4.4. 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. As discussed in the *Core Receiving Environment Monitoring Program (CREMP): Design Document 2012* (Azimuth, 2012d), statistical power increased with consideration of more "after" period years (Note: benthic invertebrates are sampled yearly in August). Consequently, BACI analyses (analogous to phytoplankton, except that unit of temporal replication was "years" instead of "months") were conducted on four "after" data period lengths: one year (2014 only), two years (2013-2014), three years (2012-2014), and four years (2011-2014).

Similar to water chemistry (**Section 2.4.1**), 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., 2014 was compared to 2008 – 2013; 2013/2014 was compared to 2008 – 2012…and so on).

3. RESULTS AND DISCUSSION

Following the review of QA/QC results (**Section 3.1**), the remainder of this section presents results and discussion for each study component. The latter sections (**Sections 3.2 through 3.6**), are subdivided by study area (i.e., Meadowbank study lakes and Baker Lake), have been structured in a consistent manner with the general rationale used for the trend assessment, and include:

- *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 2015 (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 concerns is contained in **Section 3.1.1**. Results of the QA/QC analyses are presented in **Tables 3.1-1 to 3.1-8** for water chemistry (field, lab, and blanks), sediment chemistry (grabs and cores), phytoplankton (field and lab) and benthos, respectively.

3.1.1. Sample Shipping, Handling and Analysis Location

The frequency of compromised water samples/parameters in 2013 resulted in a re-evaluation of sample shipping procedures for 2014. The two main issues were that sample hold times were not being met and that sample cooler temperatures upon arrival at the laboratory were not optimal in either direction (some samples were too warm, others were frozen). A full list of parameter hold times can be found in **Appendix B** (see Table 3). Since we could not change the remoteness of the mine or the shipping routes, the solution for 2014 was two-fold:

1. Hold times: analyse parameters with short hold times at Multilab (Val d'Or, Quebec) to reduce transport time. Multilab was a good choice given that the charter flight from Meadowbank stops in in Val d'Or. The parameters analysed at

Multilab (which were selected only if Multilab could meet the detection limits we were requesting from ALS and if the samples were unpreserved) in 2014 were:

a. Conductivity
b. pH
c. TSS, TDS, and turbidity
d. Alkalinity (total, bicarbonate, carbonate, and hydroxide)
e. TKN

2. Temperature: have Multilab store coolers destined for ALS laboratory (Vancouver) in their walk-in fridges while waiting for cargo flight transfer.

While these changes were a marked improvement, there were still a number of samples compromised in 2014. Low cooler temperatures arriving at ALS (Vancouver) during summer months were not always achieved, which mainly affects chlorophyll-a samples (supposed to remain frozen throughout transport). ALS only reports the internal temperature of the coolers, not whether the filters arrived in a frozen state. Consequently, the chlorophyll-*a* sample integrity was inferred from the ALS cooler temperature reading that is reported on the COC. Although these samples may have thawed, they were kept in the dark which would help to interfere with any further growth on the filters. For these sampling events, the data are flagged as being potentially less reliable when interpreting the spatial and temporal trends in chlorophyll-*a*.

3.1.2. Water Chemistry

For water samples during each of the five events, two or three field duplicates, three to five laboratory duplicates, one or two equipment blanks and one or two travel blank were analyzed for water parameters. As a result, a total of 12 field duplicates, 17 laboratory duplicates, 8 equipment blanks, and 5 travel blanks were each analyzed for up to 26 conventional parameters as well as 34 total and 34 dissolved metals. Although there were some exceedences of the established DQOs, these exceedences 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). There was no pattern in the nature of the exceedences that indicates a bias of specific parameters one way or another. The results of the RPD analysis for all these parameters are presented in **Table 3.1-1** (field duplicates), **Table 3.1-2** (laboratory duplicates), and **Table 3.1-3** (detection limits, equipment and travel blanks) and discussed below:

- **Field Duplicates** – Overall, these samples showed a relatively high level of consistency with the original samples. There were only 24 cases (out of >1000 cases) where the RPD exceeded 50%. Of these 24 cases, 14 had original and duplicate values greater than 10 x MDL. Seven of these cases were for TKN and six of the

other seven cases were for conductivity, TDS, turbidity, total and bicarbonate alkalinity. Of the remaining cases where samples were less than 10 x MDL, almost half were for TSS (see further discussion below on all of these parameters).

- **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 only four cases where RPDs exceeded 25%, but in all cases these were < 10 x MDL. Laboratory duplicate samples were not conducted on parameters analysed at Multilab (note that these parameters are the same as those that exceeded RPDs in the field duplicate samples above). Consequently, DQOs were met in all samples.
- **Equipment Blanks** – Despite reviewing the procedures for collection and increasing the effort for non-contamination after 2013, there were multiple detectable parameters in equipment blank samples in 2014. The goal of these blanks is to help identify contamination associated with the sampling equipment, but they can also indicate problems with de-ionized (DI) water and/or variability in laboratory analytical methods. One of the changes initiated for 2014 was the inclusion of a de-ionized water blank in addition to the equipment and travel blanks (see "NOV DI Blank" in **Table 3.1-3**). We suspect issues with Multilab's analytical methods (i.e., lack of confidence regarding achieving stated detection limits) for re-occurring detections of conductivity, TSS, TDS, turbidity, total alkalinity, bicarbonate alkalinity, and TKN in equipment and DI water blanks. The only other re-occurring detections were for lead and zinc, both of which were rarely detected in the CREMP and generally not included in the trend analysis (dissolved zinc at Baker Lake was the only exception). No metals were detected in the de-ionized water blank or the travel blanks, suggesting that the laboratory-supplied de-ionized water was metals free. It is recommended that de-ionized water blanks be submitted with each event to provide more confidence that all supplied de-ionized water is metals free. We will also be working closely with Multilab to solve these analytical issues prior to the first monitoring event of 2015. Pending more comprehensive assessment of de-ionized water quality in 2015, the 2014 blanks data for metals suggest that some metals (particularly lead and zinc) associated with the sampling equipment (i.e., pump and/or tubing) may be contaminating samples. Sampling equipment (pumps/tubing) should be tested (i.e., using equipment blank and de-ionized water blank) prior to the first monitoring event of 2015 and replaced if necessary.
- **Travel Blanks** – There was only one case where a parameter was detectable and it was <10 x MDL.
- **Overall** – The frequency of DQO exceedences represent a small fraction of the total number of samples and parameters that were measured for QA/QC purposes (i.e., <1%). As discussed above, the equipment and de-ionized water blank results reduce

confidence in concentrations of conductivity, TSS, TDS, turbidity, total alkalinity, bicarbonate alkalinity, and TKN reported near the MDL. Both conductivity and TDS are typically found at much higher concentrations in CREMP samples, so these results should not influence inferences made for those parameters. TSS, turbidity, total and bicarbonate alkalinity, and TKN all show highly variable and apparently anomalous results in 2014 CREMP samples relative to previous years. This is corroborated by the field duplicate results (see above). Consequently, all these parameters should be excluded from further consideration in the trend assessment. All these parameters are analyzed by Multilab; as mentioned, these issues will be addressed prior to monitoring in 2015. While lead and zinc also had recurring detections in the equipment blanks, the results were unlikely to influence any inferences made on those rarely detected parameters. From a QA perspective, sampling equipment (pumps/tubing) should be tested (i.e., using equipment blank and de-ionized water blank) prior to the first monitoring event of 2015 and replaced if necessary. From a QC perspective, de-ionized water blanks should be collected with each batch of blanks/duplicates.

3.1.3. Sediment Grab and Core Chemistry

Sediment QA/QC results are presented in **Table 3.1-4** (grabs) and **Table 3.1-5** (cores) and discussed below:

- **Field Duplicates** – Overall, the eight sediment grab field homogenization duplicates showed a high level of consistency with the original samples. There were only two cases where RPDs exceeded 50%: % gravel (for which the absolute values were low in both samples and were within 2%) and molybdenum (where values < 10 x MDL). Sediment core duplicates were much more variable than bulk grabs. Of the 10 sediment core field duplicates, RPDs exceeded 50% and were > 10 x MDL in 24 cases, most (21 cases) of which were related to the WAL and TEFF duplicates samples. It should be noted that the field duplicates for the sediment cores were collected from a separate core sample rather than from a split sample (i.e., due to sediment volume constraints). Coupled with the smaller surface area and volume of the device, the core duplicates are subject to higher variability related to localized heterogeneity in sediment metals.
- **Laboratory Duplicates** – There were no cases where the RPD value exceeded the DQO of 25% for either sediment grabs or cores. This result confirms that sediments were, for the most part, well homogenized in the field prior to placement in jars and that the lab methods are repeatable.
- **Filter Swipes** – filter swipes were conducted on sediment grabs equipment only and were analyzed for total metals in units of µg/filter. The majority of parameters tested were below the MDL, only total iron was detectable. The incremental

influence of the measured amounts of iron (even though all values were < 10 x MDL) was estimated to be less than 0.001% of actual measured sediment concentrations in all cases. Consequently, the potential for meaningful cross-contamination is considered negligible and DQOs were considered to be fully met.

3.1.4. Phytoplankton

For phytoplankton, during each event between one and three field duplicates and laboratory duplicates were analyzed for density and biomass (total and for each major phytoplankton group). Similar to water chemistry, the results for phytoplankton QA/QC had a number of exceedences of the established DQOs. However, where density or biomass of a particular phytoplankton group is very small (i.e., about 1% of total), small differences in that metric between the original and the duplicate can cause very 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.

For both field and laboratory duplicates RPDs for *total* density and *total* biomass consistently met the DQOs (i.e., < 50% for field, < 25% for laboratory).

Results of the RPD analysis for all these parameters are presented in **Table 3.1-6** (field) and **Table 3.1-7** (laboratory) and are discussed below:

- **Field Duplicates** – Apart from one case of total density (in August at SP), RPDs for *total* density and *total* biomass consistently met the DQOs (i.e., < 50%). RPD values were also always much less than 50% for number of species and Simpson's diversity. Within-taxa variability of the field duplicates was high.
- **Laboratory Duplicates** – Duplicate re-counts were conducted on 10% of the samples analyzed. RPDs for *total* density and *total* biomass consistently met the DQOs (i.e., < 25%). Similar to field duplicates, laboratory duplicates showed high within-taxa variability.
- **Overall** – Taken on a taxa basis, the results illustrate the inherently large difference in composition 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.

3.1.5. 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. Of the re-sorted samples, 3/184 (1.6%), 8/164 (4.9%), 2/70 (2.9%), 0/27 (0%), 2/62 (3.2%), 7/229 (3.1%), and 4/233 (1.7%) of organisms were

missed (**Table 3.1-8**), with an overall omission rate of about 2.5%. These results suggest that the vast majority of animals observed in benthic samples by the taxonomist were recovered. A reference collection of benthic taxa has been compiled.

3.1.6. QA/QC Summary

Below is a summary of field and sample QA/QC results for the 2014 CREMP program:

- Deviations from the proposed sampling plan:
    - Through-ice limnology profiling was not completed at TPE, TPN, TPS, and SP in January, February, or March due to safety concerns around using the ice-auger at ice thickness greater than 5 feet.
    - April sampling at TPE, TPN, SP, TE, WAL and INUG was not completed due to safety concerns similar to above.
    - Only one of the two planned water chemistry and phytoplankton samples was collected at BAP in September due to deteriorating weather conditions (i.e., BAP-35-S was dropped).
- 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, with the exception of water chemistry parameters analysed at Multilab. It is recommended that laboratory QA/QC reporting from Multilab be consistent with that from ALS laboratory.
- Equipment blank samples collected for every sampling event. Results suggest further precautions needed to reduce sample contamination; sampling equipment (pumps/tubing) should be tested (i.e., using equipment blank and de-ionized water blank) prior to the first monitoring event of 2015 and replaced if necessary.
- De-ionized water blank was submitted for the November event; recommendations for 2015 include de-ionized water blanks for each event.
- Travel blank samples collected for every sampling event, with the exception of December 2014.
- Lost, damaged, and or compromised data:
    - One sediment core duplicate sample was broken during shipping to the laboratory (DUP-SC-8).
    - Coolers arriving at ALS for the July, August, and September water sampling events were not kept cool during shipping despite storage at

Multilab during layover. Chlorophyll-*a* samples from these events may have been compromised.

- TSS, turbidity, total and bicarbonate alkalinity, and TKN results from Multilab were inconsistent throughout 2014 even among sampling areas and months. Results for these parameters for 2014 were deemed unreliable for trend analysis. It is important to note that these challenges are reflective of the difficulties of monitoring water in highly oligotrophic systems. We will work closely with Multilab to resolve these analytical issues prior to the onset of 2015 sampling.

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		July CREMP Sampling								
	July MDLs	Third Portage Lake - East Basin			Wally Lake			Tehek Lake		
Analyte		TPE-71-S	DUP-1	RPD	WAL-40-S	DUP-2	RPD	TE-71-S	DUP-3	RPD
Physical Tests										
Conductivity (µS/cm)	1	29	30	-3.4	34	35	-2.9	25	25	0
Hardness (mg/L)	0.5	10.40	10.30	1.0	14.40	14.40	0	8.77	8.83	-0.7
pH (Laboratory)	0	6.48	6.62	-2.1	6.66	6.80	-2.1	6.44	6.52	-1.2
Total Suspended Solids (mg/L)	1	4	1	**120**	4	*<1*		*<1*	*<1*	
Total Dissolved Solids (mg/L)	1	20.0	20.0	0	23.0	23.0	0	17.0	17.0	0
Turbidity (NTU)	0.02	0.37	0.74	-67	0.78	0.61	24	0.59	0.39	41
Anions and Nutrients (mg/L)										
Alkalinity, Bicarbonate (as $CaCO_3$)	2	12	12	0	15	16	-6.5	10	11	-9.5
Alkalinity, Carbonate (as $CaCO_3$)	2	*<2*	*<2*		*<2*	*<2*		*<2*	*<2*	
Alkalinity, Hydroxide (as CaCO3)	2	*<2*	*<2*		*<2*	*<2*		*<2*	*<2*	
Alkalinity, Total (as $CaCO_3$)	2	12	12	0	15	16	-6.5	10	11	-9.5
Ammonia, Total (as N)	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*	
Chloride (Cl)	0.1	0.64	0.64	0	0.65	0.65	0	0.60	0.60	0.0
Fluoride (F)	0.02	0.074	0.074	0	0.049	0.049	0	0.065	0.066	-1.5
Nitrate (as N)	0.005	0.0106	0.0107	-0.9	*<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*	
Total Kjeldahl Nitrogen	0.05	0.141	0.141	0	0.172	0.176	-2.3	0.127	0.117	8.2
Orthophosphate-Dissolved (as P)	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*	
Phosphorus (P)-Total	0.002	*<0.002*	*<0.002*		0.0021	0.0023	-9.1	*<0.002*	*<0.002*	
Silicate (as SiO_2)	0.5	*<0.5*	*<0.5*		0.62	0.63	-1.6	*<0.5*	*<0.5*	
Sulfate (SO_4)	0.5	3.99	3.99	0	2.83	2.84	-0.4	2.51	2.52	-0.4
Organic / Inorganic Carbon (mg/L)										
Dissolved Organic Carbon	0.5	2.55	1.10	**79**	1.59	1.47	7.8	1.22	1.16	5.0
Total Organic Carbon	0.5	1.26	1.24	1.6	1.74	1.65	5.3	1.46	1.20	20
Plant Pigments (µg/L)										
Chlorophyll-a	0.01	0.560	0.283	66	0.312	0.392	-23	0.139	0.160	-14
Cyanides (mg/L)										
Total Cyanide	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Free Cyanide	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Total Metals (mg/L)										
Aluminum	0.003	0.0063	0.0058	8.3	0.0048	0.0046	4.3	0.0084	0.0068	21
Antimony	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Arsenic	0.0001	0.00053	0.00054	-1.9	0.00030	0.00028	6.9	0.00015	0.00015	0
Barium	0.00005	0.00332	0.00302	9.5	0.00189	0.00191	-1.1	0.00207	0.00218	-5.2
Beryllium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	2.56	2.61	-1.9	3.89	3.83	1.6	2.14	2.16	-0.9
Chromium	0.0001	0.00012	0.00011	8.7	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Cobalt	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Copper	0.0005	*<0.0005*	*<0.0005*		0.00082	0.00079	3.7	*<0.0005*	*<0.0005*	
Iron	0.01	0.013	0.011	17	0.015	0.016	-6.5	0.016	0.016	0
Lead	0.00005	*<0.00005*	*<0.00005*		*<0.00005*	*<0.00005*		*<0.00005*	*<0.00005*	
Lithium	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		0.00058	0.00055	5.3
Magnesium	0.1	0.93	0.96	-3.2	1.16	1.14	1.7	0.78	0.80	-2.5
Manganese	0.00005	0.00141	0.00141	0	0.00126	0.00120	4.9	0.00113	0.00111	1.8
Mercury	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.000186	0.000186	0	0.000137	0.000140	-2.2	0.000077	0.000078	-1.3

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		July CREMP Sampling								
	July MDLs	Third Portage Lake - East Basin			Wally Lake			Tehek Lake		
Analyte		TPE-71-S	DUP-1	RPD	WAL-40-S	DUP-2	RPD	TE-71-S	DUP-3	RPD
Nickel	0.0005	0.00052	0.00051	1.9	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Phosphorus	0.05	*<0.05*	*<0.05*		*<0.05*	*<0.05*		*<0.05*	*<0.05*	
Potassium	0.1	0.52	0.54	-3.8	0.43	0.45	-4.5	0.40	0.47	-16
Selenium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.062	0.062	0	0.321	0.321	0	0.163	0.159	2.5
Silver	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	0.87	0.89	-1.6	0.51	0.50	1.6	0.58	0.59	-2.2
Strontium	0.0002	0.0112	0.0112	0	0.0192	0.0190	1.0	0.0105	0.0107	-1.9
Sulfur	0.5	1.32	1.34	-1.5	0.98	1.00	-2.0	0.86	0.91	-5.6
Thallium	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*	
Titanium	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.000044	0.000054	-20	0.000043	0.000043	0	0.000052	0.000050	3.9
Vanadium	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.003	*<0.003*	*<0.003*		*<0.003*	*<0.003*		*<0.003*	*<0.003*	
Dissolved Metals (mg/L)										
Aluminum	0.001	0.0037	0.0027	31	0.0035	0.0031	12	0.0034	0.0025	31
Antimony	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Arsenic	0.0001	0.00051	0.00050	2.0	0.00023	0.00025	-8.3	0.00014	0.00013	7.4
Barium	0.00005	0.00298	0.00293	1.7	0.00187	0.00183	2.2	0.00210	0.00219	-4.2
Beryllium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	2.60	2.61	-0.4	3.90	3.89	0.3	2.21	2.22	-0.5
Chromium	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*	
Copper	0.0002	0.00038	0.00036	5.4	0.00074	0.00074	0	0.00038	0.00036	5.4
Iron	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*	
Lithium	0.0005	0.00054	*<0.0005*		*<0.0005*	*<0.0005*		0.00062	0.00065	-4.7
Magnesium	0.1	0.94	0.93	1.1	1.14	1.14	0	0.79	0.80	-1.3
Manganese	0.00005	0.00111	0.00114	-2.7	0.00077	0.00079	-2.4	0.00063	0.00065	-2.5
Mercury	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.000193	0.000176	9.2	0.000128	0.000128	0	0.000072	0.000075	-4.1
Nickel	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*	
Potassium	0.1	0.51	0.50	2.0	0.41	0.41	0	0.43	0.42	2.4
Selenium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.055	0.057	-3.6	0.325	0.319	1.9	0.149	0.155	-3.9
Silver	0.00001	0.000018	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	0.90	0.91	-0.9	0.52	0.52	0.2	0.60	0.60	-0.5
Strontium	0.0002	0.0110	0.01100	0	0.0187	0.01870	0	0.0105	0.01060	-0.9
Sulfur	0.5	1.33	1.37	-3.0	0.98	0.99	-1.0	0.88	0.86	2.3
Thallium	0.00001	0.000015	*<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*	
Titanium	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.000063	0.000045	33	0.000040	0.000042	-4.9	0.000041	0.000039	5.0
Vanadium	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	0.001	

Notes:

RPD = Relative Percent Difference (%) = ((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.

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

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

Italicized numbers are below detection limits.

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month			August CREMP Sampling								
	July MDLs	Aug MDLs	Third Portage Lake - South Basin			Second Portage Lake			Baker Lake - Proposed Jetty		
Analyte			TPS-45-S	DUP-1	RPD	SP-72-S	DUP-2	RPD	BPJ-34-S	DUP-3	RPD
Physical Tests											
Conductivity (µS/cm)	1	1	33.0	30.0	9.5	37.0	38.0	-2.7	490.0	496.0	-1.2
Hardness (mg/L)	0.5	0.5	8.65	9.05	-4.5	13.70	13.70	0	48.60	47.30	2.7
pH (Laboratory)	0	0	6.65	6.40	3.8	6.64	6.64	0	6.70	6.71	-0.1
Total Suspended Solids (mg/L)	1	1	1	2	**-67**	1	1	0	3	*<1*	
Total Dissolved Solids (mg/L)	1	1	22.0	20.0	9.5	24.0	25.0	-4.1	327	331.0	-1.2
Turbidity (NTU)	0.02	0.02	1.00	0.92	8.3	1.10	1.10	0	0.95	1.10	-15
Anions and Nutrients (mg/L)											
Alkalinity, Bicarbonate (as $CaCO_3$)	2	2	23	12	63	42	34	21	42	42	0
Alkalinity, Carbonate (as $CaCO_3$)	2	2	*<2*	*<2*		*<2*	*<2*		*<2*	*<2*	
Alkalinity, Hydroxide (as CaCO3)	2	2	*<2*	*<2*		*<2*	*<2*		*<2*	*<2*	
Alkalinity, Total (as $CaCO_3$)	2	2	23	12	63	42	34	21	42	42	0
Ammonia, Total (as N)	0.005	0.005	0.0112	0.0106	5.5	*<0.005*	*<0.005*		0.0053	0.0073	-32
Bromide (Br)	0.05	0.05	*<0.05*	*<0.05*		*<0.05*	*<0.05*		0.432	0.438	-1.4
Chloride (Cl)	0.1	0.1	0.74	0.73	1.4	0.65	0.65	0	124.00	126.00	-1.6
Fluoride (F)	0.02	0.02	0.067	0.067	0	0.071	0.071	0	0.069	0.073	-5.6
Nitrate (as N)	0.005	0.005	0.0564	0.0553	2.0	*<0.005*	*<0.005*		0.0195	0.0197	-1.0
Nitrite (as N)	0.001	0.001	*<0.001*	0.0011		*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Total Kjeldahl Nitrogen	0.05	0.05	2.2	0.71	102	2.10	0.37	140	3.0	0.08	190
Orthophosphate-Dissolved (as P)	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*		0.0021	0.002	4.9
Phosphorus (P)-Total	0.002	0.002	*<0.002*	*<0.002*		*<0.002*	*<0.002*		0.0026	*<0.002*	
Silicate (as SiO_2)	0.5	0.5	*<0.5*	*<0.5*		*<0.5*	*<0.5*		*<0.5*	*<0.5*	
Sulfate (SO_4)	0.5	0.5	4.84	4.83	0.2	3.69	3.69	0	18.00	18.50	-2.7
Organic / Inorganic Carbon (mg/L)											
Dissolved Organic Carbon	0.5	0.5	1.28	1.21	5.6	1.51	0.80	**61**	3.0	3.05	-1.3
Total Organic Carbon	0.5	0.5	1.54	1.44	6.7	1.83	1.81	1.1	3.5	3.37	2.9
Plant Pigments (µg/L)											
Chlorophyll-a	0.01	0.01	0.196	0.212	-7.8	0.306	0.296	3.3	0.420	0.402	4.4
Cyanides (mg/L)											
Total Cyanide	0.005	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*		-	*<0.005*	
Free Cyanide	0.005	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*		-	*<0.005*	
Total Metals (mg/L)											
Aluminum	0.003	0.003	0.0065	0.007	-7.4	0.0144	0.015	-4.1	0.0085	0.0098	-14
Antimony	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Arsenic	0.0001	0.0001	0.00021	0.00022	-4.7	0.00031	0.00028	10	0.0002	0.00017	-13
Barium	0.00005	0.00005	0.00309	0.00321	-3.8	0.00254	0.00260	-2.3	0.0203	0.0203	0
Beryllium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		0.04	0.036	-2.8
Cadmium	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	0.05	2.15	2.24	-4.1	3.64	3.79	-4.0	5.09	5.11	-0.4
Chromium	0.0001	0.0001	0.00011	0.00016	-37	0.00013	0.00013	0	0.0001	0.0001	0
Cobalt	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*		0.00058	0.00062	-6.7	*<0.0005*	0.00441	
Iron	0.01	0.01	*<0.01*	0.012		0.032	0.034	-6.1	0.01	0.013	-8.0
Lead	0.00005	0.00005	0.000068	*<0.00005*		*<0.00005*	0.000067		*<0.00005*	0.00017	
Lithium	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		0.0020	0.00	0.5
Magnesium	0.1	0.1	0.85	0.90	-5.7	1.16	1.20	-3.4	9.25	9.30000	-0.5
Manganese	0.00005	0.00005	0.00234	0.00241	-2.9	0.00165	0.00152	8.2	0.00339	0.0036	-6.0
Mercury	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.00005	0.000287	0.000222	26	0.000142	0.000218	-42	0.000114	0.000114	0

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month			August CREMP Sampling								
	July MDLs	Aug MDLs	Third Portage Lake - South Basin			Second Portage Lake			Baker Lake - Proposed Jetty		
Analyte			TPS-45-S	DUP-1	RPD	SP-72-S	DUP-2	RPD	BPJ-34-S	DUP-3	RPD
Nickel	0.0005	0.0005	0.0005	0.00051	-2.0	*<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*	
Potassium	0.1	0.1	0.52	0.52	0	0.51	0.50	2.0	2.89	2.89	0
Selenium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.05	0.054	0.055	-1.8	0.215	0.223	-3.7	0.12	0.125	-5.8
Silver	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	0.05	1.20	1.20	0	0.71	0.71	-0.7	66.20	68.7000	-3.7
Strontium	0.0002	0.0002	0.0105	0.0106	-0.9	0.0165	0.0165	0	0.0664	0.07	-1.5
Sulfur	0.5	0.5	1.67	1.66	0.6	1.27	1.33	-4.6	6.04	6.11	-1.2
Thallium	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	
Titanium	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.00001	0.000053	0.000053	0	0.000052	0.000052	0	0.000057	0.000056	1.8
Vanadium	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.003	0.003	*<0.003*	*<0.003*		*<0.003*	*<0.003*		*<0.003*	0.0046	
Dissolved Metals (mg/L)											
Aluminum	0.001	0.001	0.0020	0.0021	-4.9	0.0029	0.0044	-41	0.0027	0.0030	-11
Antimony	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Arsenic	0.0001	0.0001	0.00018	0.00017	5.7	0.00025	0.00027	-7.7	0.00012	0.00010	18
Barium	0.00005	0.00005	0.00311	0.00297	4.6	0.00238	0.00252	-5.7	0.0203	0.01950	4.0
Beryllium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		0.03	0.029	0
Cadmium	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	0.05	2.10	2.18	-3.7	3.59	3.60	-0.3	4.96	4.88	1.6
Chromium	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*	
Copper	0.0002	0.0002	0.00033	0.00028	16	0.00051	0.00052	-1.9	0.00034	0.00032	6.1
Iron	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*	0.00007		0.00	*<0.00005*	
Lithium	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		0.0019	0.00183	2.2
Magnesium	0.1	0.1	0.83	0.87	-4.7	1.14	1.14	0	8.79	8.54	2.9
Manganese	0.00005	0.00005	0.00191	0.00185	3.2	0.00058	0.00072	-22	0.0022	0.00221	-0.5
Mercury	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.00005	0.000211	0.000175	19	0.000112	0.000133	-17	0.0001	0.000097	-2.1
Nickel	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*	
Potassium	0.1	0.1	0.47	0.49	-4.2	0.49	0.48	2.1	2.72	2.65	2.6
Selenium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.05	*<0.05*	*<0.05*		0.192	0.188	2.1	0.104	0.097	7.0
Silver	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	0.05	1.16	1.15	0.9	0.69	0.67	2.5	60.90	60.40	0.8
Strontium	0.0002	0.0002	0.0101	0.00983	2.7	0.0154	0.01600	-3.8	0.0604	0.05920	2.0
Sulfur	0.5	0.5	1.59	1.59	0	1.24	1.23	0.8	5.66	5.43	4.1
Thallium	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*	
Titanium	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.00001	0.000044	0.000037	17	0.000041	0.000044	-7.1	0.000046	0.000048	-4.3
Vanadium	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	0.0023		*<0.001*	*<0.001*	

Notes:

RPD = Relative Percent Difference (%) = ((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.

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

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

Italicized numbers are below detection limits.

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month	September CREMP Sampling								November CREMP Sampling						
	July MDLs	Sept MDLs	Baker Lake - Akilahaarjuk Point			Wally Lake			Nov MDLs	Wally Lake			Tehek Lake		
Analyte			BAP-36-S	DUP-1	RPD	WAL-43-S	DUP-2	RPD		WAL-46-S	DUP-1	RPD	TE-77-S	DUP-2	RPD
Physical Tests															
Conductivity (µS/cm)	1	1	742.0	219.0	109	42.0	41.0	2.4	1	40.0	41.0	-2.5	20.0	23.0	-14
Hardness (mg/L)	0.5	0.5	93.60	90.20	3.7	15.80	15.70	0.6	0.5	16.60	16.50	0.6	6.45	6.43	0.3
pH (Laboratory)	0	0	6.78	6.75	0.4	6.72	6.76	-0.6	0	6.68	6.71	-0.4	6.58	6.57	0.2
Total Suspended Solids (mg/L)	1	1	2	4	**-67**	2	3	-40	1	4	2	**67**	*<1*	*<1*	
Total Dissolved Solids (mg/L)	1	1	494.0	146.0	109	28.0	27.0	3.6	1	27.0	27.0	0	13.0	15.0	-14
Turbidity (NTU)	0.02	0.02	1.00	0.85	16	0.95	1.20	-23	0.02	0.52	0.35	39	0.37	0.79	-72
Anions and Nutrients (mg/L)															
Alkalinity, Bicarbonate (as $CaCO_3$)	2	2	12	11	8.7	14	14	0	2	18	18	0	10	12	-18
Alkalinity, Carbonate (as $CaCO_3$)	2	2	*<2*	*<2*		*<2*	*<2*		2	*<2*	*<2*		*<2*	*<2*	
Alkalinity, Hydroxide (as CaCO3)	2	2	*<2*	*<2*		*<2*	*<2*		2	*<2*	*<2*		*<2*	*<2*	
Alkalinity, Total (as $CaCO_3$)	2	2	12	11	8.7	14	14	0	2	18	18	0	10	12	-18
Ammonia, Total (as N)	0.005	0.005	*<0.005*	*<0.005*		*<0.005*	0.0121		0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Bromide (Br)	0.05	0.5	0.89	0.88	1.1	*<0.05*	*<0.05*		0.05	*<0.05*	*<0.05*		*<0.05*	*<0.05*	
Chloride (Cl)	0.1	1	263.00	262.00	0.4	0.72	0.69	4.3	0.1	0.69	0.70	-1.4	0.60	0.60	0
Fluoride (F)	0.02	0.2	*<0.2*	*<0.2*		0.054	0.054	0	0.02	0.053	0.053	0	0.065	0.065	0
Nitrate (as N)	0.005	0.05	*<0.05*	*<0.05*		*<0.005*	*<0.005*		0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Nitrite (as N)	0.001	0.01	*<0.01*	*<0.01*		*<0.001*	*<0.001*		0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Total Kjeldahl Nitrogen	0.05	0.05	0.29	0.54	-60	0.39	0.36	8.0	0.05	0.12	0.20	-50	0.73	0.23	104
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*	
Phosphorus (P)-Total Dissolved	0.002	0.002	0.0033	0.003	9.5	0.0026	0.0024	8.0	0.002	*<0.002*	*<0.002*		*<0.002*	*<0.002*	
Phosphorus (P)-Total	0.002	0.02	*<0.002*	*<0.002*		*<0.002*	*<0.02*		0.02	*<0.002*	0.0027		*<0.002*	*<0.002*	
Silicate (as SiO_2)	0.5	0.5	*<0.5*	*<0.5*		0.74	0.74	0	0.5	0.97	1.01	-4.0	*<0.5*	*<0.5*	
Sulfate (SO_4)	0.5	5	36.90	36.60	0.8	3.43	3.40	0.9	0.5	3.51	3.51	0	2.18	2.16	0.9
Organic / Inorganic Carbon (mg/L)															
Dissolved Organic Carbon	0.5	0.5	3.60	3.42	5.1	1.86	1.82	2.2	0.5	1.98	2.10	-5.9	1.27	1.41	-10
Total Organic Carbon	0.5	0.5	3.56	3.49	2.0	1.95	1.97	-1.0	0.5	2.01	2.10	-4.4	1.33	1.59	-18
Plant Pigments (µg/L)															
Chlorophyll-a	0.01	0.01	0.874	0.830	5.2	0.262	0.233	12	0.01	0.488	0.682	-33	0.448	0.466	-3.9
Cyanides (mg/L)															
Total Cyanide	0.005	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*		0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Free Cyanide	0.005	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*		0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Total Metals (mg/L)															
Aluminum	0.003	0.003	0.0119	0.0241	**-68**	0.0075	0.0083	-10	0.003	0.0043	0.0047	-8.9	0.0062	0.0058	6.7
Antimony	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	0.00013	0.00016	-21	0.00027	0.00026	3.8	0.0001	0.00026	0.00029	-11	0.00010	*<0.0001*	
Barium	0.00005	0.00005	0.02020	0.02110	-4.4	0.00184	0.00185	-0.5	0.00005	0.00198	0.00194	2.0	0.00218	0.00206	5.7
Beryllium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	0.01	0.079	0.071	11	*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	0.05	8.00	7.81	2.4	4.27	4.25	0.5	0.05	4.53	4.53	0	1.58	1.58	0
Chromium	0.0001	0.0001	0.00012	0.00019	-45	0.00012	*<0.0001*		0.0001	0.00011	*<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*	
Copper	0.0005	0.0005	*<0.0005*	*<0.0005*		0.00081	0.00084	-3.6	0.0005	0.00087	0.00078	11	*<0.0005*	*<0.0005*	
Iron	0.01	0.01	0.014	0.037	**-90**	0.017	0.017	0	0.01	0.012	0.013	-8.0	*<0.01*	*<0.01*	
Lead	0.00005	0.00005	*<0.00005*	0.000274		0.000074	0.000099	-29	0.00005	0.000092	*<0.00005*		*<0.00005*	*<0.00005*	
Lithium	0.0005	0.0005	0.00367	0.00334	9.4	*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Magnesium	0.1	0.1	18.50	17.80	3.9	1.26	1.25	0.8	0.1	1.33	1.34	-0.7	0.63	0.64	-1.6
Manganese	0.00005	0.00005	0.00163	0.00223	-31	0.00111	0.00115	-3.5	0.00005	0.00079	0.00078	2.0	0.00068	0.00075	-9.2
Mercury	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.00005	0.000193	0.000187	3.2	0.000199	0.000183	8.4	0.00005	0.000189	0.000245	-26	*<0.00005*	*<0.00005*	

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month	September CREMP Sampling								November CREMP Sampling						
	July MDLs	Sept MDLs	Baker Lake - Akilahaarjuk Point			Wally Lake			Nov MDLs	Wally Lake			Tehek Lake		
Analyte			BAP-36-S	DUP-1	RPD	WAL-43-S	DUP-2	RPD		WAL-46-S	DUP-1	RPD	TE-77-S	DUP-2	RPD
Nickel	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*	
Potassium	0.1	0.1	5.61	5.47	2.5	0.45	0.43	4.5	0.1	0.49	0.48	2.1	0.40	0.41	-2.5
Selenium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.05	0.151	0.160	-5.8	0.438	0.440	-0.5	0.05	0.434	0.433	0.2	0.120	0.117	2.5
Silver	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	136.00	142.00	-4.3	0.55	0.57	-2.3	0.05	0.58	0.58	0.5	0.61	0.61	0.2
Strontium	0.0002	0.0002	0.1230	0.1210	1.6	0.0208	0.0207	0.5	0.0002	0.0216	0.0213	1.4	0.0083	0.0084	-1.8
Sulfur	0.5	0.5	12.70	12.80	-0.8	1.13	1.12	0.9	0.5	1.26	1.25	0.8	0.73	0.76	-4.0
Thallium	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*	
Titanium	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.00001	0.000070	0.000086	-21	0.000047	0.000048	-2.1	0.00001	0.000044	0.000045	-2.2	0.000041	0.000038	7.6
Vanadium	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.003	0.003	*<0.003*	*<0.003*		*<0.003*	*<0.003*		0.003	*<0.003*	*<0.003*		*<0.003*	*<0.003*	
Dissolved Metals (mg/L)															
Aluminum	0.001	0.001	0.0021	0.0032	-42	0.0012	0.0011	8.7	0.001	0.0012	0.0015	-22	0.0017	0.0015	13
Antimony	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	0.00012	0.00013	-8.0	0.00024	0.00024	0	0.0001	0.00025	0.00023	8.3	*<0.0001*	*<0.0001*	
Barium	0.00005	0.00005	0.02080	0.01940	7.0	0.00176	0.00174	1.1	0.00005	0.00188	0.00185	1.6	0.00203	0.00203	0
Beryllium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	0.01	0.073	0.066	10	*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	0.05	7.83	7.57	3.4	4.29	4.22	1.6	0.05	4.48	4.47	0.2	1.55	1.55	0
Chromium	0.0001	0.0001	*<0.0001*	0.00012		*<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*	
Copper	0.0002	0.0002	0.00028	0.00037	-28	0.00070	0.00071	-1.4	0.0002	0.00070	0.00079	-12	0.00034	0.00024	34
Iron	0.01	0.01	*<0.01*	0.013		*<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*	
Lithium	0.0005	0.0005	0.00349	0.00323	7.7	*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Magnesium	0.1	0.1	18.00	17.30	4.0	1.25	1.25	0	0.1	1.31	1.30	0.8	0.62	0.62	0
Manganese	0.00005	0.00005	0.00078	0.00091	-15	0.00036	0.00029	23	0.00005	0.00015	0.00014	3.5	0.00023	0.00019	20
Mercury	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.00005	0.000188	0.000204	-8.2	0.000171	0.000171	0	0.00005	0.000172	0.000163	5.4	*<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*	
Phosphorus	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	5.42	5.36	1.1	0.43	0.42	2.4	0.1	0.47	0.45	4.3	0.37	0.37	0
Selenium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.05	0.123	0.117	5.0	0.430	0.411	4.5	0.05	0.415	0.417	-0.5	0.109	0.104	4.7
Silver	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	137.00	139.00	-1.4	0.56	0.56	-0.2	0.05	0.57	0.57	0.4	0.58	0.57	0.9
Strontium	0.0002	0.0002	0.1170	0.11200	4.4	0.0200	0.01990	0.5	0.0002	0.0209	0.02100	-0.5	0.0081	0.00785	3.0
Sulfur	0.5	0.5	12.30	12.40	-0.8	1.07	1.09	-1.9	0.5	1.18	1.19	-0.8	0.74	0.73	1.4
Thallium	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*	
Titanium	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.00001	0.000064	0.000075	-16	0.000038	0.000040	-5.1	0.00001	0.000041	0.000039	5.0	0.000032	0.000030	6.5
Vanadium	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.001	0.001	*<0.001*	0.0021		*<0.001*	*<0.001*		0.001	*<0.001*	0.0017		0.0018	*<0.001*	

Notes:

RPD = Relative Percent Difference (%) = ((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.

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

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

Italicized numbers are below detection limits.

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month			December CREMP Sampling					
	July MDLs	Dec MDLs	Inuggugayualik Lake			Third Portage Lake - East Basin		
Analyte			INUG-67-S	DUP-1	RPD	TPE-79-S	DUP-2	RPD
Physical Tests								
Conductivity (µS/cm)	1	1	19.0	19.0	0	37.0	37.0	0
Hardness (mg/L)	0.5	0.5	5.95	6.06	-1.8	11.70	11.40	2.6
pH (Laboratory)	0	0	6.57	6.60	-0.5	6.83	6.85	-0.3
Total Suspended Solids (mg/L)	1	1	*<1*	*<1*		*<1*	3	
Total Dissolved Solids (mg/L)	1	1	13.0	13.0	0	24.0	25.0	-4.1
Turbidity (NTU)	0.02	0.02	0.27	0.32	-17	0.44	0.34	26
Anions and Nutrients (mg/L)								
Alkalinity, Bicarbonate (as $CaCO_3$)	2	2	13	12	8.0	13	14	-7.4
Alkalinity, Carbonate (as $CaCO_3$)	2	2	*<2*	*<2*		*<2*	*<2*	
Alkalinity, Hydroxide (as CaCO3)	2	2	*<2*	*<2*		*<2*	*<2*	
Alkalinity, Total (as $CaCO_3$)	2	2	13	12	8.0	13	14	-7.4
Ammonia, Total (as N)	0.005	0.005	0.0095	0.0092	3.2	0.0132	0.0131	0.8
Bromide (Br)	0.05	0.05	*<0.05*	*<0.05*		*<0.05*	*<0.05*	
Chloride (Cl)	0.1	0.1	0.79	0.78	1.3	0.75	0.76	-1.3
Fluoride (F)	0.02	0.02	0.069	0.068	1.5	0.084	0.081	3.6
Nitrate (as N)	0.005	0.005	*<0.005*	*<0.005*		0.0166	0.0274	-49
Nitrite (as N)	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Total Kjeldahl Nitrogen	0.05	0.05	0.14	0.9	-146	1.50	0.07	182
Orthophosphate-Dissolved (as P)	0.001	0.001	0.0019	*<0.001*		*<0.001*	*<0.001*	
Phosphorus (P)-Total Dissolved	0.002	0.002	*<0.002*	*<0.002*		*<0.002*	*<0.002*	
Phosphorus (P)-Total	0.002	0.002	0.0025	0.0024	4.1	*<0.002*	*<0.002*	
Silicate (as SiO_2)	0.5	0.5	*<0.5*	*<0.5*		*<0.5*	*<0.5*	
Sulfate (SO_4)	0.5	0.3	0.96	0.95	1.0	4.89	5.00	-2.2
Organic / Inorganic Carbon (mg/L)								
Dissolved Organic Carbon	0.5	0.5	1.80	1.87	-3.8	1.46	1.40	4.2
Total Organic Carbon	0.5	0.5	1.80	2.03	-12	1.57	1.56	0.6
Plant Pigments (µg/L)								
Chlorophyll-a	0.01	0.01	0.148	0.154	-4.0	0.122	0.122	0
Cyanides (mg/L)								
Total Cyanide	0.005	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Free Cyanide	0.005	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Total Metals (mg/L)								
Aluminum	0.003	0.003	0.0039	0.0032	20	0.0041	0.0042	-2.4
Antimony	0.0001	0.0001	*<0.0001*	*<0.0001*		0.00032	*<0.0001*	
Arsenic	0.0001	0.0001	*<0.0001*	*<0.0001*		0.00052	0.00050	3.9
Barium	0.00005	0.00005	0.00173	0.00173	0	0.00313	0.00318	-1.6
Beryllium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	0.05	1.21	1.20	0.8	2.85	2.96	-3.8
Chromium	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*	
Copper	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*	
Lead	0.00005	0.00005	*<0.00005*	*<0.00005*		0.00826	*<0.00005*	
Lithium	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Magnesium	0.1	0.1	0.74	0.73	1.4	1.06	1.08	-1.9
Manganese	0.00005	0.00005	0.00063	0.00062	1.8	0.00062	0.00060	2.3
Mercury	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.00005	*<0.00005*	*<0.00005*		0.000200	0.000216	-7.7

Table 3.1-1. Field QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month	July MDLs	Dec MDLs	December CREMP Sampling					
			Inuggugayualik Lake			Third Portage Lake - East Basin		
Analyte			INUG-67-S	DUP-1	RPD	TPE-79-S	DUP-2	RPD
Nickel	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*	
Potassium	0.1	0.1	0.38	0.40	-5.1	0.54	0.55	-1.8
Selenium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.05	0.100	0.102	-2.0	0.068	0.064	6.1
Silver	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	0.05	0.59	0.58	1.7	1.14	1.14	0
Strontium	0.0002	0.0002	0.0069	0.0067	2.8	0.0127	0.0134	-5.4
Sulfur	0.5	0.5	*<0.5*	*<0.5*		1.63	1.67	-2.4
Thallium	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*	
Titanium	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.00001	0.000036	0.000039	-8.0	0.000049	0.000052	-5.9
Vanadium	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.003	0.003	*<0.003*	*<0.003*		*<0.003*	*<0.003*	
Dissolved Metals (mg/L)								
Aluminum	0.001	0.001	0.0012	0.0038	**-104**	0.0012	*<0.001*	
Antimony	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Arsenic	0.0001	0.0001	*<0.0001*	*<0.0001*		0.00046	0.00045	2.2
Barium	0.00005	0.00005	0.00173	0.00179	-3.4	0.00318	0.00325	-2.2
Beryllium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	0.05	1.19	1.22	-2.5	2.94	2.92	0.7
Chromium	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*	
Copper	0.0002	0.0002	0.00030	0.00038	-24	0.00037	0.00037	0
Iron	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*	
Lithium	0.0005	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Magnesium	0.1	0.1	0.72	0.73	-1.4	1.07	1.07	0
Manganese	0.00005	0.00005	0.00006	0.00022	**-110**	0.00007	0.00007	-1.4
Mercury	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Molybdenum	0.00005	0.00005	*<0.00005*	0.000059		0.000189	0.000202	-6.6
Nickel	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*	
Potassium	0.1	0.1	0.39	0.41	-5.0	0.58	0.56	3.5
Selenium	0.0001	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.05	0.094	0.099	-5.2	0.062	0.061	1.6
Silver	0.00001	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	0.05	0.57	0.59	-4.0	1.11	1.12	-0.9
Strontium	0.0002	0.0002	0.0063	0.00650	-3.0	0.0127	0.01270	0
Sulfur	0.5	0.5	*<0.5*	*<0.5*		1.73	1.64	5.3
Thallium	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*	
Titanium	0.01	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.00001	0.000033	0.000034	-3.0	0.000044	0.000043	2.3
Vanadium	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.001	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*	

Notes:

RPD = Relative Percent Difference (%) = ((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.

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

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

Italicized numbers are below detection limits.

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		July CREMP Sampling											
ALS Report Number	July MDLs	L1496820			L1496831			L1496854			L1497120		
Analyte		Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD
Anions and Nutrients (mg/L)													
Ammonia, Total (as N)	0.005				*<0.005*	*<0.005*		*<0.05*	*<0.05*				
Bromide (Br)	0.05	*<0.05*	*<0.05*					0.75	0.75	0	*<0.05*	*<0.05*	
Chloride (Cl)	0.1	3.04	3.05	-0.3				0.066	0.067	-1.5	0.63	0.63	0
Fluoride (F)	0.02	0.06	0.06	0				0.0573	0.0575	-0.3	0.067	0.067	0
Nitrate (as N)	0.005	0.0097	0.0091	6.4				0.0012	0.0012	0	*<0.005*	*<0.005*	
Nitrite (as N)	0.001	*<0.001*	*<0.001*					0.161	0.161	0	*<0.001*	*<0.001*	
Orthophosphate (as P)	0.001				*<0.001*	*<0.001*							
Phosphorus (P)-Total Diss.	0.002				*<0.002*	*<0.002*					*<0.002*	*<0.002*	
Phosphorus (P)-Total	0.002				*<0.002*	*<0.002*					0.0041	0.0045	-9.3
Silicate (as SiO_2)	0.5							*<0.5*	*<0.5*		*<0.5*	*<0.5*	
Sulfate (SO_4)	0.5	0.92	0.92	0				5.02	5.03	-0.2	3.49	3.49	0
Organic / Inorganic Carbon (mg/L)													
Dissolved Organic Carbon	0.5	3.04	2.96	2.7	1.35	1.38	-2.2	1.14	1.17	-2.6	1.47	1.5	-2.0
Total Organic Carbon	0.5	3.18	3.07	3.5	1.41	1.34	5.1	1.24	1.24	0	1.5	1.47	2.0
Cyanides (mg/L)													
Total Cyanide	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*							
Free Cyanide	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*							
Total Metals (mg/L)													
Aluminum	0.003	0.0075	0.007	6.9	0.0084	0.0076	10	0.0063	0.006	4.9	0.0032	0.0033	-3.1
Antimony	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Arsenic	0.0001	0.00015	0.00013	14	0.00015	0.00016	-6.5	0.00053	0.00054	-1.9	0.00022	0.00021	4.7
Barium	0.00005	0.0186	0.0162	14	0.00207	0.00212	-2.4	0.00332	0.00326	1.8	0.00246	0.00246	0
Beryllium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	2.55	2.55	0	2.14	2.17	-1.4	2.56	2.59	-1.2	3.49	3.46	0.9
Chromium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		0.00012	0.00016	**-29**	*<0.0001*	*<0.0001*	
Cobalt	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*		0.00053	0.00049	7.8
Iron	0.01	*<0.01*	*<0.01*		0.016	0.016	0	0.013	0.012	8.0	*<0.01*	*<0.01*	
Lead	0.00005	*<0.00005*	*<0.00005*		*<0.00005*	*<0.00005*		*<0.00005*	*<0.00005*		*<0.00005*	*<0.00005*	
Lithium	0.0005	0.00107	0.00097	9.8	0.00058	0.00068	-16	*<0.0005*	*<0.0005*		0.00052	0.00052	0
Magnesium	0.1	1.5	1.49	0.7	0.78	0.79	-1.3	0.93	0.95	-2.1	1.11	1.11	0
Manganese	0.00005	0.00288	0.00245	16	0.00113	0.00109	3.6	0.00141	0.00144	-2.1	0.00105	0.00111	-5.6
Mercury	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*							
Molybdenum	0.00005	*<0.00005*	*<0.00005*		0.000077	0.000081	-5.1	0.000186	0.00019	-2.1	0.000114	0.000101	12
Nickel	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		0.00052	0.00052	0	*<0.0005*	*<0.0005*	
Phosphorus	0.05	*<0.05*	*<0.05*		*<0.05*	*<0.05*		*<0.05*	*<0.05*		*<0.05*	*<0.05*	
Potassium	0.1	0.58	0.59	-1.7	0.4	0.41	-2.5	0.52	0.54	-3.8	0.48	0.47	2.1
Selenium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.109	0.111	-1.8	0.163	0.166	-1.8	0.062	0.059	5.0	0.182	0.181	0.6
Silver	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	5.02	4.32	15	0.576	0.601	-4.2	0.874	0.889	-1.7	0.637	0.648	-1.7
Strontium	0.0002	0.0196	0.0197	-0.5	0.0105	0.0107	-1.9	0.0112	0.0113	-0.9	0.0151	0.0151	0
Sulfur	0.5	0.6	0.61	-1.7	0.86	0.86	0	1.32	1.35	-2.2	1.21	1.2	0.8
Thallium	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*	
Titanium	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.000035	0.000035	0	0.000052	0.00005	3.9	0.000044	0.000044	0	0.00004	0.000037	7.8
Vanadium	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.003	*<0.003*	*<0.003*		*<0.003*	*<0.003*		*<0.003*	*<0.003*		*<0.001*	*<0.001*	

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		July CREMP Sampling											
ALS Report Number	July MDLs	L1496820			L1496831			L1496854			L1497120		
Analyte		Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD
Dissolved Metals (mg/L)													
Aluminum	0.001	0.0042	0.0042	0				0.0035	0.0028	22	0.0032	0.0033	-3.1
Antimony	0.0001	*<0.0001*	*<0.0001*					*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Arsenic	0.0001	0.00011	0.00012	-8.7				0.00023	0.00025	-8.3	0.00022	0.00021	4.7
Barium	0.00005	0.0174	0.0169	2.9				0.00187	0.00184	1.6	0.00246	0.00246	0
Beryllium	0.0001	*<0.0001*	*<0.0001*					*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Bismuth	0.0005	*<0.0005*	*<0.0005*					*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*	
Boron	0.01	0.023	0.023	0				*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Cadmium	0.00001	*<0.00001*	*<0.00001*					*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Calcium	0.05	4.44	4.46	-0.4				3.9	3.89	0.3	3.49	3.46	0.9
Chromium	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*	
Copper	0.0002	0.00024	0.00024	0				0.00074	0.00073	1.4	0.00053	0.00049	7.8
Iron	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*	
Lithium	0.0005	0.00167	0.00179	-6.9				*<0.0005*	*<0.0005*		0.00052	0.00052	0
Magnesium	0.1	7.19	7.25	-0.8				1.14	1.14	0	1.11	1.11	0
Manganese	0.00005	0.000948	0.000919	3.1				0.000772	0.000805	-4.2	0.00105	0.00111	-5.6
Mercury	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*							
Molybdenum	0.00005	0.000074	0.000073	1.4				0.000128	0.000132	-3.1	0.000114	0.000101	12
Nickel	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*	
Potassium	0.1	2.3	2.35	-2.2				0.41	0.42	-2.4	0.48	0.47	2.1
Selenium	0.0001	*<0.0001*	*<0.0001*					*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*	
Silicon	0.05	0.129	0.132	-2.3				0.325	0.323	0.6	0.182	0.181	0.6
Silver	0.00001	*<0.00001*	*<0.00001*					*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*	
Sodium	0.05	50.2	49.9	0.6				0.518	0.525	-1.3	0.637	0.648	-1.7
Strontium	0.0002	0.0496	0.0516	-4.0				0.0187	0.0186	0.5	0.0151	0.0151	0
Sulfur	0.5	4.46	4.49	-0.7				0.98	0.97	1.0	1.21	1.2	0.8
Thallium	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*	
Titanium	0.01	*<0.01*	*<0.01*					*<0.01*	*<0.01*		*<0.01*	*<0.01*	
Uranium	0.00001	0.000044	0.000044	0				0.00004	0.00004	0	0.00004	0.000037	7.8
Vanadium	0.001	*<0.001*	*<0.001*					*<0.001*	*<0.001*		*<0.001*	*<0.001*	
Zinc	0.001	*<0.001*	*<0.001*					*<0.001*	*<0.001*		*<0.001*	*<0.001*	

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% but samples < 10 x MDL.

Shaded RPD values exceed 25% and samples > 10 x MDL.

Italicized numbers are below detection limits.

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		August CREMP Sampling											
ALS Report Number	Aug MDLs	L1515830			L1515838			L1515843			L1515855		
Analyte		Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD
Anions and Nutrients (mg/L)													
Ammonia, Total (as N)	0.005				0.011	0.0111	-0.9						
Bromide (Br)	0.05												
Chloride (Cl)	0.1												
Fluoride (F)	0.02												
Nitrate (as N)	0.005												
Nitrite (as N)	0.001												
Orthophosphate (as P)	0.001	*<0.001*	*<0.001*										
Phosphorus (P)-Total Diss.	0.002										*<0.002*	*<0.002*	
Phosphorus (P)-Total	0.002							*<0.002*	*<0.002*		*<0.002*	*<0.002*	
Silicate (as SiO_2)	0.5							*<0.5*	*<0.5*				
Sulfate (SO_4)	0.5												
Organic / Inorganic Carbon (mg/L)													
Dissolved Organic Carbon	0.5	1.58	1.56	1.3				3.01	3.11	-3.3	1.79	2	-11
Total Organic Carbon	0.5	1.83	1.77	3.3				3.47	3.4	2.0	1.8	1.7	5.7
Cyanides (mg/L)													
Total Cyanide	0.005										*<0.005*	*<0.005*	
Free Cyanide	0.005										*<0.005*	*<0.005*	
Total Metals (mg/L)													
Aluminum	0.003	0.0143	0.0134	6.5	0.0331	0.0319	3.7	0.0099	0.0085	15			
Antimony	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Arsenic	0.0001	0.0001	0.00012	-18	0.00017	0.00016	6.1	0.00017	0.00014	19			
Barium	0.00005	0.00206	0.00194	6.0	0.0024	0.00228	5.1	0.0208	0.0205	1.5			
Beryllium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Bismuth	0.0005	*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*				
Boron	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		0.013	0.013	0			
Cadmium	0.00001	0.000013	0.000012	8.0	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*				
Calcium	0.05	1.16	1.18	-1.7	2.2	2.19	0.5	3.21	3.17	1.3			
Chromium	0.0001	0.00013	0.00013	0	0.00014	0.00013	7.4	0.00012	0.00011	8.7			
Cobalt	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Copper	0.0005	0.00085	0.0008	6.1	0.00051	0.00052	-1.9	*<0.0005*	*<0.0005*				
Iron	0.01	0.021	0.02	4.9	0.047	0.044	6.6	0.012	*<0.01*				
Lead	0.00005	0.000125	0.000119	4.9	0.000061	0.000064	-4.8	*<0.00005*	*<0.00005*				
Lithium	0.0005	*<0.0005*	*<0.0005*		0.00055	0.00062	-12	0.00125	0.00115	8.3			
Magnesium	0.1	0.7	0.71	-1.4	0.77	0.78	-1.3	2.9	2.89	0.3			
Manganese	0.00005	0.00198	0.00199	-0.5	0.00174	0.00167	4.1	0.00252	0.00245	2.8			
Mercury	0.00001										*<0.00001*	*<0.00001*	
Molybdenum	0.00005	*<0.00005*	*<0.00005*		0.000078	0.000081	-3.8	0.00006	0.000078	**-26**			
Nickel	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*				
Potassium	0.1	0.38	0.41	-7.6	0.43	0.42	2.4	1.01	1	1.0			
Selenium	0.0001	*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Silicon	0.05	0.112	0.113	-0.9	0.22	0.217	1.4	0.082	0.079	3.7			
Silver	0.00001	*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*				
Sodium	0.05	0.633	0.637	-0.6	0.632	0.627	0.8	15.9	15.8	0.6			
Strontium	0.0002	0.00687	0.00691	-0.6	0.0109	0.0111	-1.8	0.0307	0.0302	1.6			
Sulfur	0.5	*<0.5*	*<0.5*		0.88	0.88	0	1.56	1.52	2.6			
Thallium	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*				
Titanium	0.01	*<0.01*	*<0.01*		*<0.01*	*<0.01*		*<0.01*	*<0.01*				
Uranium	0.00001	0.000047	0.000047	0	0.000085	0.000089	-4.6	0.000045	0.000045	0			
Vanadium	0.001	*<0.001*	*<0.001*		*<0.001*	*<0.001*		*<0.001*	*<0.001*				
Zinc	0.003	*<0.003*	*<0.003*		*<0.003*	*<0.003*		*<0.003*	*<0.003*				

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		August CREMP Sampling											
ALS Report Number	Aug MDLs	L1515830			L1515838			L1515843			L1515855		
Analyte		Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD
Dissolved Metals (mg/L)													
Aluminum	0.001												
Antimony	0.0001												
Arsenic	0.0001												
Barium	0.00005												
Beryllium	0.0001												
Bismuth	0.0005												
Boron	0.01												
Cadmium	0.00001												
Calcium	0.05												
Chromium	0.0001												
Cobalt	0.0001												
Copper	0.0002												
Iron	0.01												
Lead	0.00005												
Lithium	0.0005												
Magnesium	0.1												
Manganese	0.00005												
Mercury	0.00001												
Molybdenum	0.00005												
Nickel	0.0005												
Phosphorus	0.05												
Potassium	0.1												
Selenium	0.0001												
Silicon	0.05												
Silver	0.00001												
Sodium	0.05												
Strontium	0.0002												
Sulfur	0.5												
Thallium	0.00001												
Tin	0.0001												
Titanium	0.01												
Uranium	0.00001												
Vanadium	0.001												
Zinc	0.001												

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% but samples < 10 x MDL.

Shaded RPD values exceed 25% and samples > 10 x MDL.

Italicized numbers are below detection limits.

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		September CREMP Sampling														
ALS Report Number	Sept	L1519915			L1522472			L1523347			L1527050			L1527171		
Analyte	MDLs	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD
Anions and Nutrients (mg/L)																
Ammonia, Total (as N)	0.005	*<0.005*	*<0.005*		*<0.005*	*<0.005*								0.0079	0.0075	5.2
Bromide (Br)	0.5										*<0.05*	*<0.05*		*<0.05*	*<0.05*	
Chloride (Cl)	1										0.69	0.68	1.5	0.73	0.73	0
Fluoride (F)	0.2										0.054	0.054	0	0.065	0.066	-1.5
Nitrate (as N)	0.05										*<0.005*	*<0.005*		0.0526	0.0525	0.2
Nitrite (as N)	0.01										*<0.001*	*<0.001*		0.0013	*<0.001*	
Orthophosphate (as P)	0.001							*<0.001*	*<0.001*							
Phosphorus (P)-Total Diss.	0.002															
Phosphorus (P)-Total	0.02	*<0.002*	*<0.002*					0.0031	0.0033	-6.3				*<0.002*	*<0.002*	
Silicate (as SiO_2)	0.5				*<0.5*	*<0.5*		*<0.5*	*<0.5*							
Sulfate (SO_4)	5										3.4	3.32	2.4	4.92	4.91	0.2
Organic / Inorganic Carbon (mg/L)																
Dissolved Organic Carbon	1	1.83	1.91	-4.3	2.08	1.93	7.5	3.6	3.67	-1.9	1.86	1.82	2.2			
Total Organic Carbon	1				1.78	1.88	-5.5	3.56	3.39	4.9	1.95	1.91	2.1			
Cyanides (mg/L)																
Total Cyanide	0							*<0.005*	*<0.005*		*<0.005*	*<0.005*		*<0.005*	*<0.005*	
Free Cyanide	0							*<0.005*	*<0.005*					*<0.005*	*<0.005*	
Total Metals (mg/L)																
Aluminum	0.003							0.008	0.0079	1.3	*<0.001*	0.0012				
Antimony	0.0001							*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Arsenic	0.0001							*<0.0001*	*<0.0001*		0.00026	0.00023	12			
Barium	0.00005							0.00178	0.00175	1.7	0.0017	0.00171	-0.6			
Beryllium	0.0001							*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Bismuth	0.0005							*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*				
Boron	0.01							*<0.01*	*<0.01*		*<0.01*	*<0.01*				
Cadmium	0.00001							*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*				
Calcium	0.05							1.14	1.14	0	4.19	4.2	-0.2			
Chromium	0.0001							0.00017	0.00013	**27**	*<0.0001*	*<0.0001*				
Cobalt	0.0001							*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Copper	0.0005							*<0.0005*	*<0.0005*		0.00072	0.00066	8.7			
Iron	0.01							0.015	0.016	-6.5	*<0.01*	*<0.01*				
Lead	0.00005							*<0.00005*	*<0.00005*		*<0.00005*	*<0.00005*				
Lithium	0.0005							*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*				
Magnesium	0.1							0.72	0.72	0	1.24	1.23	0.8			
Manganese	0.00005							0.00144	0.00127	13	0.000374	0.00036	3.8			
Mercury	0.00001															
Molybdenum	0.00005							*<0.00005*	*<0.00005*		0.000165	0.000169	-2.4			
Nickel	0.0005							*<0.0005*	*<0.0005*		*<0.0005*	*<0.0005*				
Phosphorus	0.05							*<0.05*	*<0.05*		*<0.05*	*<0.05*				
Potassium	0.1							0.39	0.4	-2.5	0.46	0.43	6.7			
Selenium	0.0001							*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Silicon	0.05							0.111	0.113	-1.8	0.423	0.42	0.7			
Silver	0.00001							*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*				
Sodium	0.05							0.563	0.546	3.1	0.556	0.548	1.4			
Strontium	0.0002							0.00633	0.00641	-1.3	0.0198	0.0198	0			
Sulfur	0.5							*<0.5*	*<0.5*		1.06	1.08	-1.9			
Thallium	0.00001							*<0.00001*	*<0.00001*		*<0.00001*	*<0.00001*				
Tin	0.0001							*<0.0001*	*<0.0001*		*<0.0001*	*<0.0001*				
Titanium	0.01							*<0.01*	*<0.01*		*<0.01*	*<0.01*				
Uranium	0.00001							0.00004	0.000041	-2.5	0.000042	0.00004	4.9			
Vanadium	0.001							*<0.001*	*<0.001*		*<0.001*	*<0.001*				
Zinc	0.003							*<0.003*	*<0.003*		*<0.001*	*<0.001*				

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		September CREMP Sampling														
ALS Report Number	Sept MDLs	L1519915			L1522472			L1523347			L1527050			L1527171		
Analyte		Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD
Dissolved Metals (mg/L)																
Aluminum	0.001															
Antimony	0.0001															
Arsenic	0.0001															
Barium	0.00005															
Beryllium	0.0001															
Bismuth	0.0005															
Boron	0.01															
Cadmium	0.00001															
Calcium	0.05															
Chromium	0.0001															
Cobalt	0.0001															
Copper	0.0002															
Iron	0.01															
Lead	0.00005															
Lithium	0.0005															
Magnesium	0.1															
Manganese	0.00005															
Mercury	0.00001															
Molybdenum	0.00005															
Nickel	0.0005															
Phosphorus	0.05															
Potassium	0.1															
Selenium	0.0001															
Silicon	0.05															
Silver	0.00001															
Sodium	0.05															
Strontium	0.0002															
Sulfur	0.5															
Thallium	0.00001															
Tin	0.0001															
Titanium	0.01															
Uranium	0.00001															
Vanadium	0.001															
Zinc	0.001															

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% but samples < 10 x MDL.

Shaded RPD values exceed 25% and samples > 10 x MDL.

Italicized numbers are below detection limits.

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month	November CREMP Sampling										December CREMP Sampling			
ALS Report Number	Nov MDLs	L1545458			L1545526			L1560404			Dec MDLs	L1563236		
Analyte		Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD		Original	Lab Dup	RPD
Anions and Nutrients (mg/L)														
Ammonia, Total (as N)	0.005							*<0.005*	*<0.005*		0.005	0.0132	0.0128	3.1
Bromide (Br)	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*	
Fluoride (F)	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*	
Nitrite (as N)	0.001							*<0.001*	*<0.001*		0.001	*<0.001*	*<0.001*	
Orthophosphate (as P)	0.001										0.001	*<0.001*	*<0.001*	
Phosphorus (P)-Total Diss.	0.002	*<0.002*	*<0.002*		0.0022	*<0.002*		*<0.002*	*<0.002*		0.002			
Phosphorus (P)-Total	0.02	*<0.002*	0.0022		0.0022	*<0.002*					0.002	0.0025	0.0023	8.3
Silicate (as SiO_2)	0.5	0.97	0.99	-2.0				*<0.5*	*<0.5*		0.5	*<0.5*	*<0.5*	
Sulfate (SO_4)	0.5							*<0.3*	*<0.3*		0.3	*<0.3*	*<0.3*	
Organic / Inorganic Carbon (mg/L)														
Dissolved Organic Carbon	0.5	1.75	1.76	-0.6				1.64	1.36	19	0.5	1.46	1.44	1.4
Total Organic Carbon	0.5	2.07	1.89	9.1				1.36	1.24	9.2	0.5	1.57	1.43	9.3
Cyanides (mg/L)											0			
Total Cyanide	0.005	*<0.005*	*<0.005*					*<0.005*	*<0.005*		0.005	*<0.005*	*<0.005*	
Free Cyanide	0.005	*<0.005*	*<0.005*					*<0.005*	*<0.005*		0.005	*<0.005*	*<0.005*	
Total Metals (mg/L)														
Aluminum	0.003							*<0.003*	*<0.003*		0.003	0.0041	0.0042	-2.4
Antimony	0.0001							*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*	
Arsenic	0.0001							*<0.0001*	*<0.0001*		0.0001	0.00042	0.00038	10
Barium	0.00005							*<0.00005*	*<0.00005*		0.00005	0.00333	0.00328	1.5
Beryllium	0.0001							*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*	
Bismuth	0.0005							*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*	
Boron	0.01							*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*	
Cadmium	0.00001							*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*	
Calcium	0.05							*<0.05*	*<0.05*		0.05	2.8	2.79	0.4
Chromium	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*	
Copper	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*	
Lead	0.00005							*<0.00005*	*<0.00005*		0.00005	*<0.00005*	*<0.00005*	
Lithium	0.0005							*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*	
Magnesium	0.1							*<0.1*	*<0.1*		0.1	1.05	1.04	1.0
Manganese	0.00005							*<0.00005*	*<0.00005*		0.00005	0.00063	0.000684	-8.2
Mercury	0.00001							*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*	
Molybdenum	0.00005							*<0.00005*	*<0.00005*		0.00005	0.000196	0.000202	-3.0
Nickel	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*	
Potassium	0.1							*<0.1*	*<0.1*		0.1	0.56	0.55	1.8
Selenium	0.0001							*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*	
Silicon	0.05							*<0.05*	*<0.05*		0.05	0.071	0.066	7.3
Silver	0.00001							*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*	
Sodium	0.05							*<0.05*	*<0.05*		0.05	1.17	1.13	3.5
Strontium	0.0002							*<0.0002*	*<0.0002*		0.0002	0.0129	0.0127	1.6
Sulfur	0.5							*<0.5*	*<0.5*		0.5	1.68	1.67	0.6
Thallium	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*	
Titanium	0.01							*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*	
Uranium	0.00001							*<0.00001*	*<0.00001*		0.00001	0.000047	0.000045	4.3
Vanadium	0.001							*<0.001*	*<0.001*		0.001	*<0.001*	*<0.001*	
Zinc	0.003							*<0.003*	*<0.003*		0.003	*<0.003*	*<0.003*	

Table 3.1-2. Laboratory QA/QC data for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Month		November CREMP Sampling										December CREMP Sampling		
ALS Report Number	Nov MDLs	L1545458			L1545526			L1560404			Dec MDLs	L1563236		
Analyte		Original	Lab Dup	RPD	Original	Lab Dup	RPD	Original	Lab Dup	RPD		Original	Lab Dup	RPD
Dissolved Metals (mg/L)														
Aluminum	0.001							0.0024	0.0024	0	0.001	*<0.001*	*<0.001*	
Antimony	0.0001							*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*	
Arsenic	0.0001							*<0.0001*	*<0.0001*		0.0001	0.00026	0.00025	3.9
Barium	0.00005							0.0001	0.000111	-10	0.00005	0.00197	0.00191	3.1
Beryllium	0.0001							*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*	
Bismuth	0.0005							*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*	
Boron	0.01							*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*	
Cadmium	0.00001							*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*	
Calcium	0.05							*<0.05*	*<0.05*		0.05	4.64	4.62	0.4
Chromium	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*	
Copper	0.0002							*<0.0002*	*<0.0002*		0.0002	0.00077	0.00072	6.7
Iron	0.01							*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*	
Lead	0.00005							0.000385	0.000407	-5.6	0.00005	*<0.00005*	*<0.00005*	
Lithium	0.0005							*<0.0005*	*<0.0005*		0.0005	*<0.0005*	*<0.0005*	
Magnesium	0.1							*<0.1*	*<0.1*		0.1	1.36	1.37	-0.7
Manganese	0.00005							*<0.00005*	*<0.00005*		0.00005	0.000205	0.000162	23
Mercury	0.00001							*<0.00001*	*<0.00001*		0.00001			
Molybdenum	0.00005							*<0.00005*	*<0.00005*		0.00005	0.000178	0.000172	3.4
Nickel	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*	
Potassium	0.1							*<0.1*	*<0.1*		0.1	0.46	0.44	4.4
Selenium	0.0001							*<0.0001*	*<0.0001*		0.0001	*<0.0001*	*<0.0001*	
Silicon	0.05							*<0.05*	*<0.05*		0.05	0.451	0.453	-0.4
Silver	0.00001							*<0.00001*	*<0.00001*		0.00001	*<0.00001*	*<0.00001*	
Sodium	0.05							*<0.05*	*<0.05*		0.05	0.632	0.59	6.9
Strontium	0.0002							*<0.0002*	*<0.0002*		0.0002	0.0218	0.0218	0
Sulfur	0.5							*<0.5*	*<0.5*		0.5	1.22	1.23	-0.8
Thallium	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*	
Titanium	0.01							*<0.01*	*<0.01*		0.01	*<0.01*	*<0.01*	
Uranium	0.00001							*<0.00001*	*<0.00001*		0.00001	0.00004	0.000039	2.5
Vanadium	0.001							*<0.001*	*<0.001*		0.001	*<0.001*	*<0.001*	
Zinc	0.001							0.0023	0.0032	**-33**	0.001	0.0016	*<0.001*	

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% but samples < 10 x MDL.

Shaded RPD values exceed 25% and samples > 10 x MDL.

Italicized numbers are below detection limits.

Table 3.1-3. Laboratory detection limits, equipment blanks, and travel blanks for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Analyte	Month	Detection Limits										Equipment Blanks									Travel Blanks				
		July		August		September		November		December		JUL EB-1	AUG EB-1	AUG EB-2	SEPT EB-1	NOV EB-1	NOV DI Blank	NOV EB-2	NOV EB-3	DEC EB-1	JUL TRAV-1	AUG TRAV-1	AUG TRAV-2	SEPT TRAV-1	NOV TRAV-1
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	30-Jul-14	27-Aug-14	03-Sep-14	16-Sep-14	02-Nov-14	29-Nov-14	29-Nov-14	30-Nov-14	20-Dec-14					
Physical Tests																									
Conductivity (µS/cm)		1	1	1	1	1	1	1	1	1	1	**1**	**1**	**1**	**2**	**2**	**1**	**2**	**2**	**1**					
Hardness (mg/L)		0.5	0.5	0.5	0.5	0.50	0.50	0.5	0.5	0.5	0.5	*<0.5*	*<0.5*	*<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 Suspended Solids (mg/L)		1	1	1	1	1	1	1	1	1	1	*<1*	**1**	**3**	**3**	**2**	*<1*	*<1*	*<1*	*<1*					
Total Dissolved Solids (mg/L)		1	1	1	1	1	1	1	1	1	1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**					
Turbidity (NTU)		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.39	0.92	1.00	0.68	0.68	0.54	1.2	**0.19**	**0.16**					
Anions and Nutrients (mg/L)																									
Alkalinity, Bicarbonate (as $CaCO_3$)		2	2	2	2	2	2	2	2	2	2	**5**	**7**	*<2*	**2**	**6**	**6**	**6**	**6**	**7**					
Alkalinity, Carbonate (as $CaCO_3$)		2	2	2	2	2	2	2	2	2	2	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*					
Alkalinity, Hydroxide (as CaCO3)		2	2	2	2	2	2	2	2	2	2	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*					
Alkalinity, Total (as $CaCO_3$)		2	2	2	2	2	2	2	2	2	2	**5**	**7**	*<2*	**2**	**6**	**6**	**6**	**6**	**7**					
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*	*<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	0.5	0.05	0.05	0.05	0.05	*<0.05*	*<0.05*	*<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	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*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Fluoride (F)		0.02	0.02	0.02	0.02	0.02	0.2	0.02	0.02	0.02	0.02	*<0.02*	*<0.02*	*<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	0.05	0.005	0.005	0.005	0.005	*<0.005*	*<0.005*	*<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	0.01	0.001	0.001	0.001	0.001	*<0.001*	*<0.001*	*<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*	**0.29**	*<0.05*	0.56	**0.16**	**0.06**	**0.13**	**0.08**	0.71	*<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*	*<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*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	**0.0032**	*<0.002*
Phosphorus (P)-Total		0.002	0.002	0.002	0.002	0.002	0.02	0.002	0.02	0.002	0.002	*<0.002*	*<0.002*	*<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*	*<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)		0.5	0.5	0.5	0.5	0.5	5.0	0.3	0.5	0.3	0.3	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.3*	*<0.3*	*<0.3*	*<0.30*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.3*
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*	*<0.5*	**0.52**	*<0.5*	**0.67**	*<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*	*<0.5*	*<0.5*	**1.12**	*<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														
Cyanides (mg/L)																									
Total Cyanide		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Free Cyanide		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
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	**0.0201**	*<0.003*	*<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*	*<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*	*<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	**0.00028**	*<0.00005*	*<0.00005*	**0.00013**	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*
Beryllium		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
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*	*<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		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
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*	*<0.05*	**0.086**	*<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*	*<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*	*<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	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	*<0.0005*	*<0.0005*	*<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*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	**0.011**	*<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	**0.00011**	*<0.00005*	**0.00008**	**0.00020**	*<0.00005*	*<0.00005*	**0.000063**	*<0.00005*	**0.000118**	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*
Lithium		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
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*	*<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		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	**0.00006**	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*
Mercury		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	**0.00014**	*<0.00005*	*<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*	*<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*	*<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*	*<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		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	**0.07**	*<0.05*	*<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*	*<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	47.3	*<0.05*	*<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*	*<0.0002*	**0.00038**	*<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*	*<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*	*<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	**0.00013**	*<0.0001*	*<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		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
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*	*<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		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
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*	*<0.003*	*<0.003*	**0.0109**	*<0.003*	**0.0034**	**0.0055**	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*

Table 3.1-3. Laboratory detection limits, equipment blanks, and travel blanks for water parameters, Meadowbank study lakes and Baker Lake, 2014.

Analyte	Month	Detection Limits										Equipment Blanks									Travel Blanks				
		July		August		September		November		December		JUL EB-1	AUG EB-1	AUG EB-2	SEPT EB-1	NOV EB-1	NOV DI Blank	NOV EB-2	NOV EB-3	DEC EB-1	JUL TRAV-1	AUG TRAV-1	AUG TRAV-2	SEPT TRAV-1	NOV TRAV-1
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	30-Jul-14	27-Aug-14	03-Sep-14	16-Sep-14	02-Nov-14	29-Nov-14	29-Nov-14	30-Nov-14	20-Dec-14					
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*	*<0.001*	**0.0012**	*<0.001*	*<0.001*	**0.0024**	*<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*	*<0.0001*	**0.0005**	*<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*	*<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*	*<0.00005*	**0.000233**	*<0.00005*	*<0.00005*	**0.00010**	**0.00006**	*<0.00005*					
Beryllium		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*					
Bismuth		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*					
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*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*					
Cadmium		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*					
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*	*<0.05*	**0.15**	*<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*	*<0.0001*	**0.00012**	*<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*	*<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*	*<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*	*<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	**0.00008**	*<0.00005*	*<0.00005*	0.00726	*<0.00005*	*<0.00005*	**0.00039**	*<0.00005*	*<0.00005*					
Lithium		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*					
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*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*					
Manganese		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	**0.00007**	**0.00010**	*<0.00005*	**0.00014**	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*					
Mercury		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*					
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*	*<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*	*<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*	*<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*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*					
Selenium		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*					
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*	*<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*	*<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*	*<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*	*<0.0002*	**0.00065**	*<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*	*<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*	*<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*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*					
Titanium		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*					
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*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*					
Vanadium		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*					
Zinc		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	**0.0014**	*<0.001*	*<0.001*	**0.0088**	*<0.001*	*<0.001*	**0.0023**	*<0.001*	*<0.001*					

Notes:

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

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

Italicized numbers are below detection limits.

Table 3.1-4. QA/QC data for sediment grab parameters, Meadowbank study lakes and Baker Lake, August 2014.

		TPN			INUG			TPE			TPS		
		TPN-5	Field DUP	RPD	INUG-5	Field DUP	RPD	TPE-1	Field DUP	RPD	TPS-2	Field DUP	RPD
Analyte	**MDLs**	22-Aug-14	22-Aug-14	(%)	23-Aug-14	23-Aug-14	(%)	26-Aug-14	26-Aug-14	(%)	27-Aug-14	27-Aug-14	(%)
Physical & Organic Parameters													
Moisture (%)	*0.25*	35.4	37.6	-6.0	80.6	79.7	1.1	82.9	84.6	-2.0	85.4	85.5	-0.1
pH	*0.10*	6.16	6.23	-1.1	5.08	5.25	-3.3	5.90	5.92	-0.3	5.98	5.93	0.8
Total Organic Carbon (% dw)	*0.10*	0.22	0.25	-13	3.13	3.12	0.3	3.21	3.31	-3.1	3.83	3.80	0.8
Particle Size													
% Gravel (>2mm)	*0.10*	2.34	4.01	-53	*<0.1*	*<0.10*		*<0.1*	*<0.1*		1.81	*<0.1*	
% Sand (2.00mm - 0.063mm)	*0.10*	11.5	14.0	-20	3.42	4.96	-37	4.27	5.65	-28	4.32	3.82	12
% Silt (0.063mm - 4µm)	*0.10*	44.3	50.4	-13	67.1	68.8	-2.5	67.3	67.8	-0.7	69.7	68.0	2.5
% Clay (<4µm)	*0.10*	41.8	31.6	28	29.5	26.3	11	28.4	26.6	6.5	24.2	28.10	-15
Total Metals (mg/kg dw)													
Aluminum	*50*	26200	23500	11	20200	23700	-16	26400	25600	3.1	23100	23000	0.4
Antimony	*0.10*	0.18	0.17	5.7	0.15	0.18	-18	0.27	0.23	16	0.22	0.20	9.5
Arsenic	*0.050*	13.4	13.0	3.0	69.1	79.9	-14	22.1	19.5	13	14.0	13.6	2.9
Barium	*0.50*	130	111	16	116	129	-11	114	106	7.3	99	101	-2.1
Beryllium	*0.20*	1.16	1.07	8.1	1.26	1.41	-11	1.77	1.80	-1.7	1.43	1.42	0.7
Bismuth	*0.20*	1.44	1.23	16	1.12	1.31	-16	2.56	2.36	8.1	1.56	1.61	-3.2
Cadmium	*0.050*	0.117	0.112	4.4	0.174	0.185	-6.1	0.152	0.149	2.0	0.182	0.179	1.7
Calcium	*50*	2400	2030	17	1520	1740	-13	2190	2010	8.6	1670	1650	1.2
Chromium	*0.50*	110	107	2.8	97.6	116.0	-17	146	134	8.6	114	114	0
Cobalt	*0.10*	17.4	15.4	12	11.4	13.2	-15	18.4	16.7	9.7	16.5	15.5	6.3
Copper	*0.50*	30.0	27.9	7.3	43.7	50.8	-15	57.9	53.1	8.6	65.5	65.4	0.2
Iron	*50*	37700	35400	6.3	72000	83000	-14	48800	45800	6.3	29000	28500	1.7
Lead	*0.50*	20	16.6	19	11.6	13.5	-15	23.4	21.0	11	18.9	19.3	-2.1
Lithium	*5.0*	62.7	50.5	22	23.7	28.0	-17	49.3	48.1	2.5	36.7	34.5	6.2
Magnesium	*20*	12200	10700	13	8440	9780	-15	11300	10800	4.5	9570	9510	0.6
Manganese	*1.0*	829	724	14	452	509	-12	1640	1510	8.3	563	539	4.4
Mercury	*0.0050*	0.0054	*<0.0050*		0.0176	0.0187	-6.1	0.0171	0.0164	4.2	0.0167	0.0155	7.5
Molybdenum	*0.50*	3.63	3.68	-1.4	5.91	6.84	-15	4.34	4.04	7.2	3.1	2.9	4.0
Nickel	*0.50*	71.6	66.4	7.5	66.4	76.4	-14	80.0	73.1	9.0	72.3	71.9	0.6
Phosphorus	*50*	478	428	11	1860	2120	-13	458	396	15	431	466	-7.8
Potassium	*100*	5150	4440	15	3130	3830	-20	4880	4240	14	3610	3700	-2.5
Selenium	*0.20*	*<0.2*	*<0.20*		0.73	0.84	-14	0.58	0.62	-6.7	0.70	0.78	-11
Silver	*0.10*	*<0.1*	*<0.10*		0.17	0.20	-16	*<0.1*	*<0.1*		0.14	0.14	0
Sodium	*100*	170	170	0	140	170	-19	170	140	19	140	150	-6.9
Strontium	*0.50*	22.5	19.9	12	21.2	25.3	-18	20.2	17.6	14	15.9	15.8	0.6
Thallium	*0.050*	0.376	0.346	8.3	0.199	0.241	-19	0.404	0.375	7.4	0.271	0.285	-5.0
Tin	*2.0*	*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Titanium	*1.0*	1270	1240	2	611	717	-16	977	857	13	630	669	-6.0
Uranium	*0.050*	17.1	14.3	18	15	17.8	-17	19.0	18.0	5.4	18.5	18.4	0.5
Vanadium	*0.20*	48.6	43.0	12	32.3	37.6	-15	47.6	44.0	7.9	40.5	40.3	0.5
Zinc	*1.0*	105	93.2	12	84.3	99.1	-16	117.0	107.0	8.9	97.2	98.9	-1.7

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) but samples < 10 x MDL.

Shaded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) and samples > 10 x MDL.

Bolded Filter Swipe values exceed laboratory MDLs but < 10 x MDL.

Shaded Filter Swipe values > 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 3.1-4. QA/QC data for sediment grab parameters, Meadowbank study lakes and Baker Lake, August 2014.

		WAL			TE			BAP			BES		
		WAL-1	Field DUP	RPD	TE-1	Field DUP	RPD	BAP-2	Field DUP	RPD	BES-4	Field DUP	RPD
Analyte	**MDLs**	28-Aug-14	28-Aug-14	(%)	29-Aug-14	29-Aug-14	(%)	31-Aug-14	31-Aug-14	(%)	31-Aug-14	31-Aug-14	(%)
Physical & Organic Parameters													
Moisture (%)	*0.25*	91.2	91	0.2	68.5	69.4	-1.3	52.9	52.3	1.1	44.8	43.8	2.3
pH	*0.10*	6.25	6.29	-0.6	5.82	5.92	-1.7	5.84	5.92	-1.4	6.55	6.49	0.9
Total Organic Carbon (% dw)	*0.10*	11	10.8	1.8	1.63	1.55	5.0	1.35	1.79	-28	0.43	0.37	15
Particle Size													
% Gravel (>2mm)	*0.10*	*<0.1*	*<0.1*		*<0.1*	*<0.1*		*<0.1*	*<0.1*		0.42	0.37	13
% Sand (2.00mm - 0.063mm)	*0.10*	1.87	1.76	6.1	47.8	47.7	0.2	64.4	52.6	20	67.9	65.2	4.1
% Silt (0.063mm - 4µm)	*0.10*	85	83.9	1.3	43.2	41.9	3.1	30.1	42.0	-33	28.5	30.6	-7.1
% Clay (<4µm)	*0.10*	13.1	14.4	-9.5	8.98	10.4	-15	5.44	5.43	0.2	3.13	3.83	-20
Total Metals (mg/kg dw)													
Aluminum	*50*	16800	17300	-2.9	12100	11500	5.1	6910	7970	-14	6220	6120	1.6
Antimony	*0.10*	0.4	0.4	0	0.11	*<0.1*		0.16	0.19	-17	0.17	0.12	34
Arsenic	*0.050*	48.5	51.5	-6.0	7.5	7.9	-4.8	4.1	4.7	-14	3.5	3.4	1.7
Barium	*0.50*	95	97	-1.5	54	53	1.9	320	342	-6.6	119	117	1.7
Beryllium	*0.20*	1.32	1.31	0.8	1.00	1.02	-2.0	0.42	0.50	-17	0.33	0.35	-5.9
Bismuth	*0.20*	1.69	1.72	-1.8	1.05	1.03	1.9	*<0.2*	0.3		*<0.2*	*<0.2*	
Cadmium	*0.050*	0.406	0.417	-2.7	0.06	0.066	-9.5	0.066	0.082	-22	*<0.05*	*<0.05*	
Calcium	*50*	3640	3700	-1.6	1330	1240	7.0	2430	2700	-11	2120	2160	-1.9
Chromium	*0.50*	49.8	51.0	-2.4	30.6	29.8	2.6	19.6	21.5	-9.2	18.2	18.7	-2.7
Cobalt	*0.10*	8.26	8.44	-2.2	5.07	05.1	-0.6	4.89	5.50	-12	4.67	4.72	-1.1
Copper	*0.50*	131	134	-2.3	28.5	29.0	-1.7	8.7	9.9	-13	4.8	4.6	4.4
Iron	*50*	35100	36300	-3.4	22000	22400	-1.8	14900	16300	-9.0	13300	13000	2.3
Lead	*0.50*	29.7	30.2	-1.7	10.8	10.9	-0.9	6.78	7.53	-10	4.97	5.07	-2.0
Lithium	*5.0*	27.0	27.8	-2.9	23.4	23.5	-0.4	10.4	11.3	-8.3	8.8	9.2	-4.4
Magnesium	*20*	6220	6410	-3.0	4670	4600	1.5	3890	4320	-10	3780	3790	-0.3
Manganese	*1.0*	321	330	-2.8	354	359	-1.4	145	163	-12	644	656	-1.8
Mercury	*0.0050*	0.0669	0.101	-41	0.0108	0.0104	3.8	0.0081	0.0085	-4.8	0.0067	0.0057	16
Molybdenum	*0.50*	9.32	9.72	-4.2	2.04	2.08	-1.9	0.82	1.11	-30	0.61	1.45	**-82**
Nickel	*0.50*	47	47.2	-0.4	19.2	19.3	-0.5	12.2	13.8	-12	10.6	10.9	-2.8
Phosphorus	*50*	778	789	-1.4	389	459	-17	775	670	15	671	707	-5.2
Potassium	*100*	2830	2970	-4.8	2230	2140	4.1	1700	1970	-15	1330	1320	0.8
Selenium	*0.20*	0.91	0.96	-5.3	0.32	0.31	3.2	*<0.2*	*<0.2*		*<0.2*	*<0.2*	
Silver	*0.10*	0.59	0.59	0	*<0.1*	*<0.1*		*<0.1*	*<0.1*		*<0.1*	*<0.1*	
Sodium	*100*	150	160	-6.5	100	*<100*		190	230	-19	170	180	-5.7
Strontium	*0.50*	23.5	24.4	-3.8	10.8	10.6	1.9	48.0	53.9	-12	38.3	37.8	1.3
Thallium	*0.050*	0.277	0.278	-0.4	0.181	0.166	8.6	0.082	0.101	-21	0.076	0.064	17
Tin	*2.0*	*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Titanium	*1.0*	457	541	-17	605	532	13	394	465	-17	376	334	12
Uranium	*0.050*	14.1	14.6	-3.5	10.3	10.2	1.0	2.12	2.56	-19	1.23	1.20	2.5
Vanadium	*0.20*	26.1	26.6	-1.9	19.8	19.4	2.0	24.4	27.9	-13	19.4	19.1	1.6
Zinc	*1.0*	110	116	-5.3	72.7	56.4	25	32.7	39.9	-20	25.3	27.2	-7.2

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) but samples < 10 x MDL.

Shaded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) and samples > 10 x MDL.

Bolded Filter Swipe values exceed laboratory MDLs but < 10 x MDL.

Shaded Filter Swipe values > 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 3.1-4. QA/QC data for sediment grab parameters, Meadowbank study lakes and Baker Lake, August 2014.

Analyte	MDLs	Various Lakes Original August	Various Lakes Laboratory Duplicate	RPD (%)	Various Lakes Original August	Various Lakes Laboratory Duplicate	RPD (%)	Various Lakes Original August	Various Lakes Laboratory Duplicate	RPD (%)	Various Lakes Original August	Various Lakes Laboratory Duplicate	RPD (%)		Swipe-1 FILTER 26-Aug-14	Swipe-2 FILTER 27-Aug-14	Swipe-3 FILTER 28-Aug-14	Swipe-5 FILTER 29-Aug-14	Swipe-6 FILTER 31-Aug-14	Swipe-7 FILTER 31-Aug-14
Physical & Organic Parameters																				
Moisture (%)	*0.25*	86.6	86.9	-0.3	84	84.5	-0.6	86.1	86.3	-0.2	85.5	84.3	1.4							
pH	*0.10*	6.21	6.01	3.3	6.25	6.29	-0.6	5.4	5.45	-0.9	5.84	5.85	-0.2							
Total Organic Carbon (% dw)	*0.10*	0.79	0.78	1.3	3.53	3.55	-0.6	3.38	3.43	-1.5	0.35	0.38	-8.2							
Particle Size																				
% Gravel (>2mm)	*0.10*	0.23	0.23	0	*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*								
% Sand (2.00mm - 0.063mm)	*0.10*	21.3	20.7	2.9	1.6	1.69	-5.5	7.15	6.83	4.6	73.8	71.7	2.9							
% Silt (0.063mm - 4µm)	*0.10*	46.7	46.6	0	73.5	73.6	-0.1	68.6	69.5	-1.3	23.7	25.6	-7.7							
% Clay (<4µm)	*0.10*	31.8	32.5	-2.2	24.9	24.7	0.8	24.2	23.7	2.1	2.51	2.61	-3.9							
Total Metals (mg/kg dw)														**MDLs (mg)**			**TOTAL METALS (mg)**			
Aluminum	*50*	25700	24700	4.0	16800	17400	-3.5	16900	16000	5.5	6910	7100	-2.7	*0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Antimony	*0.10*	0.20	0.18	11	0.40	0.39	2.5	0.14	0.13	7.4	0.16	0.15	6.5	*0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Arsenic	*0.050*	9.4	9.2	2.8	48.5	49.6	-2.2	138	154	-11	4.1	4.0	2.9	*0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Barium	*0.50*	118	111	6.1	95	96	-0.2	100	96	4.1	320	310	3.2	*0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Beryllium	*0.20*	1.50	1.41	6.2	1.32	1.37	-3.7	1.06	0.98	7.8	0.42	0.38	10	*0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Bismuth	*0.20*	1.66	1.60	3.7	1.69	1.73	-2.3	0.94	0.92	2.2	*<0.20*	*<0.20*		*0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Cadmium	*0.050*	0.24	0.226	6.0	0.406	0.423	-4.1	0.157	0.162	-3.1	0.066	0.083	-23	*0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Calcium	*50*	2090	1900	9.5	3640	3700	-1.6	1510	1310	14	2430	2430	0	*0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Chromium	*0.50*	124.0	120.0	3.3	49.8	51.2	-2.8	80.0	81.0	-1.2	19.6	20.5	-4.5	*0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*
Cobalt	*0.10*	14.4	14.1	2.1	8.26	8.48	-2.6	10.6	10.9	-2.8	4.89	5.06	-3.4	*0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Copper	*0.50*	61.6	59.8	3.0	131	132	-0.8	35.3	35.6	-0.8	8.7	10.4	-17	*0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Iron	*50*	27300	26800	1.8	35100	36000	-2.5	109000	115000	-5.4	14900	14800	0.7	*0.003*	**0.0063**	**0.0072**	*<0.003*	**0.0083**	**0.0046**	**0.0138**
Lead	*0.50*	19.8	19.1	3.6	29.7	30.3	-2.0	10.3	10.1	2.0	6.78	6.75	0.4	*0.004*	*<0.004*	*<0.004*	*<0.004*	*<0.004*	*<0.004*	*<0.004*
Lithium	*5.0*	44.1	42.2	4.4	27	27.7	-2.6	20.6	19.8	4.0	10.4	10.8	-3.8	*0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Magnesium	*20*	10800	10500	2.8	6220	6480	-4.1	7220	6980	3.4	3890	4080	-4.8	*0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Manganese	*1.0*	395	382	3.3	321	333	-3.7	1090	1150	-5.4	145	152	-4.7	*0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Mercury	*0.0050*	0.013	0.0124	4.7	0.0669	0.0671	-0.3	0.0221	0.0206	7.0	0.0081	0.0094	-15							
Molybdenum	*0.50*	1.87	1.81	3.3	9.32	9.54	-2.3	8.35	8.96	-7.0	0.82	0.66	22	*0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*
Nickel	*0.50*	82.4	80.8	2.0	47	47.8	-1.7	58.8	58.9	-0.2	12.2	12.8	-4.8	*0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Phosphorus	*50*	388	354	9.2	778	795	-2.2	2530	2660	-5.0	775	695	11	*0.03*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*
Potassium	*100*	4250	4040	5.1	2830	2980	-5.2	2590	2410	7.2	1700	1710	-0.6	*0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Selenium	*0.20*	0.47	0.44	6.6	0.91	0.94	-3.2	0.57	0.6	-5.1	*<0.20*	*<0.20*		*0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Silver	*0.10*	0.13	0.12	8.0	0.59	0.6	-2	0.15	0.14	6.9	*<0.10*	*<0.10*		*0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Sodium	*100*	150	150	0	150	150	0	120	110	8.7	190	200	-5.1	*0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Strontium	*0.50*	19.5	18.2	6.9	23.5	24.1	-2.5	18.8	16.8	11	48.0	46.3	3.6	*0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Thallium	*0.050*	0.307	0.286	7.1	0.277	0.274	1.1	0.167	0.153	8.8	0.082	0.082	0	*0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Tin	*2.0*	*<2.0*	2.3		*<2.0*	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*		*0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*
Titanium	*1.0*	754	727	3.6	457	474	-3.7	466	384	19.3	394	407	-3.2	*0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Uranium	*0.050*	18.7	17.9	4.4	14.1	14.5	-2.8	11.9	11.4	4.3	2.12	2.43	-14							
Vanadium	*0.20*	41.3	39.8	3.7	26.1	26.5	-1.5	26.7	26.2	1.9	24.4	25.1	-2.8	*0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*
Zinc	*1.0*	112	109	2.7	110	112	-1.8	73.4	70.3	4.3	32.7	34.4	-5.1	*0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) but samples < 10 x MDL.

Shaded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) and samples > 10 x MDL.

Bolded Filter Swipe values exceed laboratory MDLs but < 10 x MDL.

Shaded Filter Swipe values > 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 3.1-5. QA/QC data for sediment cores, Meadowbank study lakes and Baker Lake, August 2014.

Analytes		TPE			TPE-B			SP			TE			WAL		
		TPE-SC-3	DUP-SC-1	**RPD**	TPE-B-SC-1	DUP-SC-2	**RPD**	SP-SC-1	DUP-SC-3	**RPD**	TE-SC-1	DUP-SC-6	**RPD**	WAL-SC-1	DUP-SC-4	**RPD**
	MDLs	26-Aug-14	26-Aug-14	(%)	28-Aug-14	28-Aug-14	(%)	02-Sep-14	02-Sep-14	(%)	29-Aug-14	29-Aug-14	(%)	28-Aug-14	28-Aug-14	(%)
Physical & Organic Parameters																
pH	0.1	6.19	6.24	-0.8	6.01	6.22	-3.4	5.99	6.07	-1.3	6.16	5.92	4.0	6.37	7.11	-11
Total Organic Carbon (% dw)	0.1	3.02	1.69	56	7.41	5.92	22	4.69	4.88	-4.0	1.39	1.28	8.2	11.80	13.80	-16
Total Metals (mg/kg dw)																
Aluminum	50	26700	31500	-16	20000	22600	-12	26700	26100	2.3	13900	11300	21	18400	09090	68
Antimony	0.10	0.22	0.19	15	0.19	0.16	17	0.33	0.35	-5.9	0.10	*<0.10*		0.38	0.21	**58**
Arsenic	0.050	17.20	11.90	36	8.37	7.92	5.5	41.30	29.30	34	5.63	8.74	-43	32.10	21.70	39
Barium	0.50	117	141	-19	99	123	-22	127	126	0.8	64	50	26	89	49	59
Beryllium	0.20	1.85	2.01	-8.3	1.34	1.45	-7.9	2.03	1.93	5.1	1.11	0.99	11	1.35	0.70	**63**
Bismuth	0.20	2.28	2.94	-25	1.42	1.51	-6.1	2.28	2.29	-0.4	1.23	0.98	23	1.65	0.80	**69**
Cadmium	0.050	0.156	0.070	**76**	0.323	0.296	8.7	0.255	0.207	21	0.081	*<0.050*		0.401	0.218	**59**
Calcium	50	2030	2010	1.0	2780	2740	1.4	2650	2650	0	1520	1230	21	3990	3030	27
Chromium	0.50	127	109	15	113	110	2.7	90.5	97.0	-6.9	33.6	27.1	21	52.3	26.6	65
Cobalt	0.10	16.0	15.0	6.5	8.62	8.86	-2.7	14.2	15.9	-11	5.64	4.97	13	8.69	4.29	68
Copper	0.50	55.6	57.7	-3.7	45.4	44.4	2.2	73.4	69.6	5.3	31.2	26.6	16	128.0	65.1	65
Iron	50	43700	43200	1.2	23500	24800	-5.4	70700	56100	23	21200	23200	-9.0	27200	16800	47
Lead	0.50	21.4	24.0	-11	14.6	15.4	-5.3	22.8	22.4	1.8	13.0	10.5	21	29.8	15.5	63
Lithium	5.0	55.3	69.6	-23	35.7	42.4	-17	44.1	43.5	1.4	28.7	23.9	18	30.7	15.4	**66**
Magnesium	20	11100	12400	-11	8660	9070	-4.6	9550	9590	-0.4	5240	4310	19	6840	3460	66
Manganese	1.0	1080	829	26	275	285	-3.6	2630	3220	-20	284	335	-16	283	139	68
Mercury	0.0050	0.0150	0.0076	**65**	0.036	0.0221	48	0.033	0.0348	-6.5	0.013	0.0085	39	0.066	0.0765	-15
Molybdenum	0.50	3.83	3.83	0	1.77	1.65	7.0	7.60	5.46	33	2.23	2.35	-5.2	7.12	4.40	47
Nickel	0.50	71.7	65.6	8.9	63.8	64.2	-0.6	64.0	67.0	-4.6	23.2	17.9	26	49.4	26.7	60
Phosphorus	50	409	300	31	385	402	-4.3	644	567	13	435	415	4.7	814	599	30
Potassium	100	4750	5890	-21	3540	4230	-18	4590	4490	2.2	2770	2160	25	3420	1690	68
Selenium	0.20	0.62	0.24	**88**	0.80	0.73	9.2	0.81	0.83	-2.4	0.28	0.28	0	0.95	0.50	**62**
Silver	0.10	*<0.10*	*<0.10*		0.36	0.29	22	0.2	0.21	-4.9	*<0.10*	*<0.10*		0.61	0.28	**74**
Sodium	100	170	190	-11	190	230	-19	210	190	10	110	*<100*		180	110	48
Strontium	0.50	19.0	20.1	-5.6	19.9	21.4	-7.3	23.6	23.3	1.3	12.5	10.2	20	27.7	18.7	39
Thallium	0.050	0.402	0.454	-12	0.271	0.307	-12	0.369	0.386	-4.5	0.241	0.185	26	0.340	0.140	**83**
Tin	2.0	3.1	3.3	-6.2	3.6	4.0	-11	4.5	5.5	-20	*<2.0*	*<2.0*		4.6	2.9	45
Titanium	1.0	1050	1300	-21	818	960	-16	741	727	1.9	731	591	21	638	316	68
Uranium	0.050	18.4	23.2	-23	13.3	14.7	-10	19.1	18.5	3.2	12.4	10.3	19	14.6	07.1	69
Vanadium	0.20	46.6	53.6	-14	32.9	35.2	-6.8	41.0	40.1	2.2	23.0	18.9	20	26.9	13.8	64
Zinc	1.0	114	132	-15	95	96	-0.2	114	110	3.6	65	52	23	116	59	66

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) but samples < 10 x MDL.

Shaded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) and samples > 10 x MDL.

Table 3.1-5. QA/QC data for sediment cores, Meadowbank study lakes and Baker Lake, August 2014.

Analytes		TEFF			TPS			BBD			BPJ			BAP		
		TEFF-SC-1	DUP-SC-7	RPD	TPS-SC-1	DUP-SC-5	RPD	BBD-SC-7	DUP-SC-9	RPD	BPJ-SC-1	DUP-SC-10	RPD	BAP-SC-2	DUP-SC-11	RPD
	MDLs	30-Aug-14	30-Aug-14	(%)	27-Aug-12	27-Aug-14	(%)	31-Aug-14	31-Aug-14	(%)	31-Aug-14	31-Aug-14	(%)	31-Aug-14	31-Aug-14	(%)
Physical & Organic Parameters																
pH	0.1	6.18	5.66	8.8	6.08	6.09	-0.2	5.82	6.08	-4.4	6.25	6.25	0	5.62	5.85	-4.0
Total Organic Carbon (% dw)	0.1	3.85	4.28	-11	5.71	5.53	3.2	0.30	0.28	6.9	0.65	1.02	-44	0.44	0.89	**-68**
Total Metals (mg/kg dw)																
Aluminum	50	22800	15300	39	22200	22300	-0.4	7850	06910	13	08470	09460	-11	05360	07210	-29
Antimony	0.10	0.19	0.24	-23	0.38	0.28	30	0.13	0.11	17	0.13	0.15	-14	0.13	0.15	-14
Arsenic	0.050	10.70	23.80	-76	46.40	24.40	62	4.91	4.57	7.2	9.43	9.53	-1.1	3.03	3.90	-25
Barium	0.50	112	215	-63	103	101	2.0	70.0	71.7	-2.4	126	147	-15	382	365	4.6
Beryllium	0.20	1.79	1.30	32	1.68	1.42	17	0.41	0.30	31	0.39	0.42	-7.4	0.31	0.38	-20
Bismuth	0.20	1.72	1.27	30	1.74	1.73	0.6	*<0.20*	*<0.20*		*<0.20*	0.23		*<0.20*	*<0.20*	
Cadmium	0.050	0.198	0.480	**-83**	1.100	0.422	89	*<0.050*	*<0.050*		0.091	0.103	-12	*<0.050*	*<0.050*	
Calcium	50	1940	1610	19	2110	1930	8.9	2740	2620	4.5	2460	2740	-11	2020	2260	-11
Chromium	0.50	52.3	35.9	37	113	117	-3.5	17.7	16.1	9.5	20.7	22.1	-6.5	15.5	19.1	-21
Cobalt	0.10	9.89	25.40	-88	31.0	21.8	35	5.38	5.22	3.0	7.74	8.74	-12	3.89	4.95	-24
Copper	0.50	51.2	41.9	20	76.4	66.8	13	7.23	06.1	17	08.8	09.8	-11	06.5	07.6	-15
Iron	50	37500	119000	-104	48600	37700	25	14900	13600	9.1	18900	21100	-11	13300	15700	-17
Lead	0.50	19.6	16.7	16	30.8	23.1	29	6.97	06.2	12	08.8	09.9	-12	04.4	06.1	-32
Lithium	5.0	46.0	30.4	41	34.6	35.4	-2.3	10.4	09.3	11	11.1	11.8	-6.1	08.1	10.0	-21
Magnesium	20	7340	5050	37	9060	9410	-3.8	4030	3710	8.3	4710	5200	-9.9	3150	4030	-25
Manganese	1.0	2810	23100	-157	1560	1550	0.6	268	303	-12	3500	4260	-20	124	149	-18
Mercury	0.0050	0.021	0.0217	-5.7	0.032	0.0259	20	*<0.0050*	*<0.0050*		0.011	0.0116	-7.1	*<0.0050*	0.0072	
Molybdenum	0.50	5.38	15.80	-98	6.24	5.58	11	1.30	1.39	-6.7	1.70	1.79	-5.2	*<0.50*	0.60	
Nickel	0.50	39.5	69.5	-55	109.0	85.4	24	10.2	9.0	13	13.8	15.1	-9.0	09.0	11.5	-25
Phosphorus	50	473	632	-29	628	557	12	920	950	-3.2	900	969	-7.4	692	716	-3.4
Potassium	100	4340	2920	39	3460	3590	-3.7	1750	1480	17	1630	1780	-8.8	1310	1780	-30
Selenium	0.20	0.80	1.01	-23	1.19	0.94	23	*<0.20*	*<0.20*		*<0.20*	*<0.20*		*<0.20*	*<0.20*	
Silver	0.10	*<0.10*	0.12		0.25	0.19	27	*<0.10*	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*	
Sodium	100	200	140	35	170	160	6.1	190	150	24	250	330	-28	150	230	-42
Strontium	0.50	18.7	16.3	14	18.5	17.2	7.3	48.2	42.4	13	47.2	50.2	-6.2	44.6	47.4	-6.1
Thallium	0.050	0.389	0.424	-8.6	0.412	0.317	26	0.076	0.059	25	0.082	0.088	-7.1	0.054	0.084	-43
Tin	2.0	3.8	3.2	17	3.1	3.6	-15	3.1	*<2.0*		*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Titanium	1.0	789	513	42	600	568	5.5	502	457	9.4	414	453	-9.0	358	425	-17
Uranium	0.050	21.7	15.9	31	19.3	18.8	2.6	2.50	02.3	9.6	02.0	02.0	-0.5	01.3	01.9	-33
Vanadium	0.20	34.2	24.5	33	41.0	41.2	-0.5	24.5	21.8	12	24.6	25.0	-1.6	18.8	23.9	-24
Zinc	1.0	100	94	6.1	129	108	18	29	25	12	41	47	-13	22	31	-35

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) but samples < 10 x MDL.

Shaded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) and samples > 10 x MDL.

Table 3.1-5. QA/QC data for sediment cores, Meadowbank study lakes and Baker Lake, August 2014.

Analytes	MDLs	Various Lakes			Various Lakes			Various Lakes		
		Original	Laboratory Duplicate	RPD	Original	Laboratory Duplicate	RPD	Original	Laboratory Duplicate	RPD
		August		(%)	August		(%)	August		(%)
Physical & Organic Parameters										
pH	0.1	6.71	6.83	-1.8	6.25	6.44	-3.0			
Total Organic Carbon (% dw)	0.1	3.03	3.04	-0.3	4.49	4.42	1.6	3.46	3.54	-2.3
Total Metals (mg/kg dw)										
Aluminum	50	24400	26600	-8.6	5080	5270	-3.7	9460	9430	0.3
Antimony	0.10	0.23	0.23	0	*<0.10*	*<0.10*		0.15	0.14	6.9
Arsenic	0.050	17.5	18.7	-6.6	3.81	3.76	1.3	9.53	8.68	9.3
Barium	0.50	111	119	-7.0	59.1	58.3	1.4	147	147	0
Beryllium	0.20	1.79	1.84	-2.8	0.23	0.23	0	0.42	0.42	0
Bismuth	0.20	2.23	2.36	-5.7	*<0.20*	*<0.20*		0.23	0.22	4.4
Cadmium	0.050	0.159	0.159	0	*<0.050*	*<0.050*		0.103	0.104	-1.0
Calcium	50	2340	2500	-6.6	1500	1600	-6.5	2740	2670	2.6
Chromium	0.50	135	136	-0.7	10.9	12.4	-13	22.1	21.5	2.8
Cobalt	0.10	16.2	17.2	-6.0	4.13	4.19	-1.4	8.74	8.74	0
Copper	0.50	48.1	51.7	-7.2	4.44	4.62	-4.0	9.79	9.32	4.9
Iron	50	42700	45900	-7.2	12100	12200	-0.8	21100	20600	2.4
Lead	0.50	20.1	21.3	-5.8	4.67	4.64	0.6	9.86	9.69	1.7
Lithium	5.0	44.7	47.3	-5.7	7.2	7.6	-5.4	11.8	11.7	0.9
Magnesium	20	10400	11000	-5.6	3240	3320	-2.4	5200	5070	2.5
Manganese	1.0	1620	1780	-9.4	483	451	6.9	4260	4240	0.5
Mercury	0.0050	0.017	0.017	0	*<0.0050*	*<0.0050*		0.0116	0.0120	-3.4
Molybdenum	0.50	3.64	3.90	-6.9	*<0.50*	0.56		1.79	1.76	1.7
Nickel	0.50	71.5	75.0	-4.8	7.37	7.53	-2.1	15.1	14.6	3.4
Phosphorus	50	399	485	-19	499	539	-7.7	969	943	2.7
Potassium	100	4100	4580	-11	860	880	-2.3	1780	1770	0.6
Selenium	0.20	0.92	0.97	-5.3	*<0.20*	*<0.20*		*<0.20*	*<0.20*	
Silver	0.10	0.10	*<0.10*		*<0.10*	*<0.10*		*<0.10*	*<0.10*	
Sodium	100	170	190	-11	130	130	0	330	320	3.1
Strontium	0.50	19.5	20.8	-6.5	30.1	33.4	-10	50.2	50.4	-0.4
Thallium	0.050	0.378	0.403	-6.4	*<0.050*	*<0.050*		0.088	0.081	8.3
Tin	2.0	3.3	3.8	-14	*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Titanium	1.0	923	1040	-12	256	270	-5.3	453	451	0.4
Uranium	0.050	14.7	15.7	-6.6	0.821	0.808	1.6	2.02	1.99	1.5
Vanadium	0.20	41.5	44.5	-7.0	14.6	14.9	-2.0	25.0	24.5	2.0
Zinc	1.0	103	117	-13	23.0	22.6	1.8	46.6	44.3	5.1

Notes:

RPD = Relative Percent Difference (%) = ((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.

Bolded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) but samples < 10 x MDL.

Shaded RPD values exceed 25% (lab duplicates) or 50% (field duplicates) and samples > 10 x MDL.

Table 3.1-6. Field QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2014.

Field QA	Phytoplankton Density (cells/L)							Total
	Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	
TPE-71	400	223704	0	1529808	1070616	28936	23368	2876832
JUL DUP-1	400	122928	0	1315088	1060864	57672	10400	2567352
RPD (%)	0	**58**		15	0.9	**-66**	**77**	11
WAL-40	122128	289560	0	1998552	182400	127744	8584	2728968
JUL DUP-2	7584	656344	0	1799800	347832	136328	21752	2969640
RPD (%)	**177**	**-78**		10	**-62**	-6.5	**-87**	-8.4
TE-71	600	259424	0	1150040	131112	51088	8184	1600448
JUL DUP-3	400	373768	0	1221880	140496	22552	14968	1774064
RPD (%)	40	-36		-6.1	-6.9	**78**	**-59**	-10
TPS-45	0	489312	0	999976	94992	8384	7784	1600448
AUG DUP-1	7584	510664	0	1071616	275592	8784	8784	1883024
RPD (%)	NA	-4.3		-6.9	**-97**	-4.7	-12	-16
SP-72	0	3470672	0	1272968	325280	59088	600	5128608
AUG DUP-2	0	589888	0	1682456	30936	86224	15168	2404672
RPD (%)		**142**		-28	**165**	-37	**-185**	**72**
BPJ-34	73640	388336	0	1057048	189664	374368	1200	2084256
AUG DUP-3	2800	432440	0	1214696	189232	225104	1200	2065472
RPD (%)	**185**	-11		-14	0.2	50	0	0.9
BAP-36	7000	222904	0	1404280	263168	259024	600	2156976
SEP DUP-1	6000	165232	0	1446784	239216	129912	16168	2003312
RPD (%)	15	30		-3.0	10	**66**	**-186**	7.4
WAL-43	0	215920	0	2142432	132512	85640	1600	2578104
SEP DUP-2	0	323280	0	1265784	384568	86224	2800	2062656
RPD (%)		-40		**51**	**-97**	-0.7	**-55**	22
WAL-46	14368	65656	0	1149840	231104	236488	200	1697656
NOV DUP-1	14368	116344	0	589688	319312	29136	400	1069248
RPD (%)	0	**-56**		**64**	-32	**156**	**-67**	45
TE-77	3000	3546	0	399363	173959	61784	100	641752
NOV DUP-2	11092	32015	0	472931	258965	139298	500	914802
RPD (%)	**-115**	**-160**		-17	-39	**-77**	**-133**	-35
INUG-67	0	49745	0	174159	3646	50245	400	278196
DEC DUP-1	0	28369	0	290980	700	600	0	320649
RPD (%)		**55**		**-50**	**136**	**195**	NA	-14
TPE-79	0	10838	0	283688	32115	14984	100	341726
DEC DUP-2	0	21277	0	344072	4546	3946	0	373841
RPD (%)		**-65**		-19	**150**	**117**	NA	-9.0

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". RPD has been left blank.

Table 3.1-6. Field QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2014.

Field QA	Phytoplankton Biomass (mg/m^3)							Total	Other	
	Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate		# Species	Simp.Div.
TPE-71	0.12	7.85	0.00	140.89	66.40	1.98	20.80	238.04	29	0.79
JUL DUP-1	0.10	3.06	0.00	121.72	59.26	3.74	13.71	201.58	22	0.78
RPD (%)	18	**88**		15	11	**-61**	41	17	27	2.0
WAL-40	10.55	11.44	0.00	151.53	11.11	21.75	23.57	229.95	40	0.83
JUL DUP-2	0.55	15.58	0.00	164.23	17.50	22.55	7.68	228.09	42	0.88
RPD (%)	**180**	-31		-8.0	-45	-3.6	**102**	0.8	-4.9	-5.9
TE-71	0.14	4.77	0.00	83.63	8.41	3.56	6.19	106.70	34	0.88
JUL DUP-3	0.08	3.75	0.00	114.82	8.05	2.18	6.81	135.68	31	0.88
RPD (%)	**56**	24		-31	4.4	48	-10	-24	9.2	-0.2
TPS-45	0.00	17.84	0.00	100.71	5.28	2.00	8.80	134.64	31	0.87
AUG DUP-1	0.82	14.80	0.00	100.24	11.33	2.80	15.01	144.99	34	0.89
RPD (%)	NA	19		0	**-73**	-33	**-52**	-7.4	-9.2	-2.0
SP-72	0.00	43.29	0.00	94.49	10.51	16.20	11.48	175.98	33	0.77
AUG DUP-2	0.00	11.04	0.00	120.98	5.39	17.39	21.21	176.01	37	0.88
RPD (%)		**119**		-25	**65**	-7.0	**-60**	0	-11	-13
BPJ-34	0.95	7.12	0.00	67.81	44.99	49.69	8.49	179.06	40	0.88
AUG DUP-3	0.37	9.31	0.00	82.89	32.23	31.02	3.74	159.55	34	0.88
RPD (%)	**89**	-27		-20	33	46	**78**	12	16	0.1
BAP-36	1.51	8.25	0.00	105.23	24.39	22.65	2.06	164.09	33	0.78
SEP DUP-1	1.80	7.02	0.00	119.54	26.11	11.68	8.19	174.34	30	0.78
RPD (%)	-17	16		-13	-6.8	**64**	**-120**	-6.1	9.5	-0.1
WAL-43	0.00	8.22	0.00	135.39	7.53	24.61	11.49	187.24	34	0.81
SEP DUP-2	0.00	14.93	0.00	96.52	22.20	14.88	13.33	161.86	32	0.86
RPD (%)		**-58**		34	**-99**	49	-15	15	6.1	-5.1
WAL-46	0.36	1.81	0.00	77.61	19.07	35.10	0.20	134.15	28	0.87
NOV DUP-1	0.45	4.09	0.00	48.71	31.36	4.12	6.33	95.07	29	0.86
RPD (%)	-21	**-77**		46	-49	**158**	**-188**	34	-3.5	1.2
TE-77	0.89	0.10	0.00	44.59	4.89	8.44	0.64	59.54	20	0.78
NOV DUP-2	1.29	0.85	0.00	31.20	8.31	14.41	1.07	57.13	25	0.80
RPD (%)	-37	**-158**		35	**-52**	**-52**	**-51**	4.1	-22	-3.0
INUG-67	0.00	0.34	0.00	6.97	0.79	4.98	9.51	22.58	17	0.80
DEC DUP-1	0.00	0.77	0.00	10.38	2.09	0.67	0.00	13.91	13	0.64
RPD (%)		**-77**		-39	**-91**	**152**	NA	48	27	23
TPE-79	0.00	0.54	0.00	11.77	1.39	2.22	2.40	18.32	13	0.65
DEC DUP-2	0.00	0.71	0.00	14.07	1.72	0.78	0.00	17.28	11	0.60
RPD (%)		-28		-18	-21	**96**	NA	5.8	17	8.2

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". RPD has been left blank.

Table 3.1-7. Laboratory QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2014.

Laboratory QA	Phytoplankton Density (cells/L)							Total
	Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	
BPJ-32	0	201352	0	2406840	118776	106576	10984	2844528
JUL REP-1	0	222904	0	2255976	141128	91408	10984	2722400
RPD (%)		-10		6.5	-17	15	0	4.4
TPE-70	400	144880	0	1507656	930352	14768	10600	2608656
JUL REP-2	200	122728	0	1392512	967872	14768	10000	2508080
RPD (%)	**67**	17		7.9	-4.0	0	5.8	3.9
TPN-70	0	72640	0	1170008	368984	28936	1800	1642368
JUL REP-3	0	172616	0	1123904	569336	14768	2000	1882624
RPD (%)		**-82**		4.0	**-43**	**65**	-11	-14
WAL-42	0	511064	0	1956248	477744	112192	24152	3081400
AUG REP-1	0	504080	0	1964032	520048	111792	16168	3116120
RPD (%)		1.4		-0.4	-8.5	0.4	**40**	-1.1
TE-72	2600	223904	0	1856272	217520	72256	7784	2380336
AUG REP-2	1600	289160	0	1698224	261024	49704	7784	2307496
RPD (%)	**48**	**-25**		8.9	-18	**37**	0	3.1
INUG-60	71840	296944	0	1389712	118144	22152	8384	1907176
AUG REP-3	50688	223904	0	1311688	138296	36320	7784	1768680
RPD (%)	**35**	**28**		5.8	-16	**-48**	7.4	7.5
PDL-35	3400	144280	0	1473920	262456	37320	15768	1937144
SEP REP-1	3800	144280	0	1439200	284008	38120	8184	1917592
RPD (%)	-11	0		2.4	-7.9	-2.1	**63**	1.0
INUG-62	14368	196368	0	1726960	125528	116944	7784	2187952
SEP REP-2	14968	139096	0	1734744	139496	137696	7984	2173984
RPD (%)	-4.1	**34**		-0.4	-11	-16	-2.5	0.6
TPN-74	0	151064	0	711216	137096	17568	400	1017344
SEP REP-3	0	122128	0	768688	101976	19168	200	1012160
RPD (%)		21		-7.8	**29**	-8.7	**67**	0.5
INUG-64	0	29169	0	312557	267958	42553	100	652336
NOV REP-1	0	54192	0	273650	253773	17731	200	599545
RPD (%)		**-60**		13	5.4	**82**	**-67**	8.4
TPN-78	0	10638	0	219858	10738	15284	100	256619
DEC REP-1	0	7092	0	209220	17931	19031	100	253373
RPD (%)		**40**		5.0	**-50**	-22	0	1.3

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". RPD has been left blank.

Table 3.1-7. Laboratory QA/QC data for phytoplankton, Meadowbank study lakes and Baker Lake, 2014.

Laboratory QA	Phytoplankton Biomass (mg/m^3)							Total	Other	
	Cyanophyte	Chlorophyte	Euglenophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate		# Species	Simp.Div.
BPJ-32	0.00	5.11	0.00	180.89	21.83	15.45	32.88	256.16	35	0.84
JUL REP-1	0.00	4.83	0.00	158.51	23.37	13.64	34.40	234.75	37	0.85
RPD (%)		5.6		13	-6.8	12	-4.5	8.7	-5.6	-0.2
TPE-70	0.12	6.97	0.00	126.47	68.80	1.36	15.47	219.19	25	0.79
JUL REP-2	0.06	6.00	0.00	118.98	69.69	1.37	13.19	209.28	24	0.78
RPD (%)	**68**	15		6.1	-1.3	-0.7	16	4.6	4.1	0.9
TPN-70	0.00	2.11	0.00	118.89	27.00	1.32	1.90	151.22	28	0.83
JUL REP-3	0.00	4.67	0.00	106.05	27.22	1.35	13.82	153.10	27	0.82
RPD (%)		**-76**		11	-0.8	-2.0	**-152**	-1.2	3.6	1.9
WAL-42	0.00	10.85	0.00	159.48	26.34	32.79	43.09	272.54	45	0.89
AUG REP-1	0.00	8.52	0.00	167.38	29.53	31.84	33.71	270.98	43	0.89
RPD (%)		24		-4.8	-11	2.9	24	0.6	4.5	0
TE-72	0.86	7.24	0.00	125.43	11.07	14.98	6.13	165.72	40	0.84
AUG REP-2	0.57	7.63	0.00	126.95	10.34	11.21	7.56	164.26	38	0.85
RPD (%)	**41**	-5.2		-1.2	6.8	**29**	-21	0.9	5.1	-0.3
INUG-60	1.08	8.42	0.00	133.72	6.26	3.28	10.37	163.12	38	0.90
AUG REP-3	0.85	7.13	0.00	126.97	7.34	4.85	7.51	154.66	36	0.90
RPD (%)	24	17		5.2	-16	**-39**	**32**	5.3	5.4	-0.5
PDL-35	0.83	4.10	0.00	110.75	23.17	4.15	20.10	163.08	34	0.80
SEP REP-1	0.92	4.70	0.00	130.53	23.16	5.42	15.34	180.07	34	0.82
RPD (%)	-11	-14		-16	0	**-27**	**27**	-10	0	-2.0
INUG-62	0.37	3.12	0.00	125.53	5.39	11.74	4.03	150.18	36	0.83
SEP REP-2	0.45	2.82	0.00	102.92	5.53	11.97	4.23	127.92	36	0.84
RPD (%)	-18	10		20	-2.7	-1.9	-5.0	16	0	-0.6
TPN-74	0.00	2.66	0.00	39.95	3.84	5.60	2.97	55.01	24	0.85
SEP REP-3	0.00	2.26	0.00	33.98	3.47	7.73	1.48	48.92	24	0.83
RPD (%)		16		16	10	**-32**	**67**	12	0	2.5
INUG-64	0.00	1.13	0.00	26.29	14.19	2.82	0.13	44.57	28	0.80
NOV REP-1	0.00	1.72	0.00	25.59	16.16	1.55	0.88	45.90	28	0.80
RPD (%)		**-41**		2.7	-13	**58**	**-149**	-3.0	0	0
TPN-78	0.00	0.23	0.00	9.58	0.44	2.99	2.36	15.59	14	0.72
DEC REP-1	0.00	0.12	0.00	11.32	0.80	2.94	2.30	17.49	14	0.74
RPD (%)		**60**		-17	**-57**	1.6	2.3	-11	0	-3.1

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". RPD has been left blank.

Table 3.1-8. Percent recovery of benthic invertebrate samples, Meadowbank study lakes and Baker Lake, August 2014.

Area-Replicate	Number of Organisms Recovered	Number of Organisms in Re-sort	Percent Recovery
BAP-5	181	184	98.4%
BES-3	156	164	95.1%
INUG-4	68	70	97.1%
PDL-5	27	27	100.0%
TE-2	60	62	96.8%
TPE-3	222	229	96.9%
TPS-4	229	233	98.3%
		Average % Recovery	97.5%

Notes:
All sixty-five samples were sorted in their entirety, except BAP-2 and BAP-4 which were sorted to one half fraction. Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group.

3.2. Limnology

3.2.1. Meadowbank Study Lakes

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^{o}C water near the ice-water interface, increasing to 3^{o}C to 5 ^{o}C at depth.

During open water conditions, maximum water temperatures may reach 14^{o}C in summer with little evidence of thermal stratification, except for brief periods of time (days) and typically only a 4^{o}C to 5^{o}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 3 m depth for all project lakes since 2006 are depicted in **Figure 3.2-1**.

The 2014 vertical temperature profiles are characteristic of the typical thermal regime of these lakes (**Figures 3.2-2 through 3.2-6**). Winter temperature profiles show a slight negative thermal stratification with water temperatures near 0^{o}C at the ice-water interface, increasing to no more than 3.5^{o}C at depth (**Figure 3.2-6**). 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, with uniform temperature and high oxygen concentrations and saturation. Water temperatures warm rapidly to reach maximum temperatures of at least 14^{o}C by late July and into August. Deeper basins, such as TPS, are typically 2^{o}C to 3^{o}C colder than the shallower basins. Temperatures in 2014 were moderate and typical of historical temperature patterns (**Figure 3.2-1**). No vertical stratification was recorded during summer months in 2014, either because sampling did not occur during a period of calm, windless conditions or that calm conditions did not persist long enough for stratification to become established (**Figures 3.2-2 and 3.2-3**).

In September, water temperatures cooled to below 5^{o}C but remained un-stratified until freeze-up. With vertical mixing, oxygen concentrations are high and fully saturated (**Figure 3.2-4**). While the values jumped around slightly, no vertical stratification was observed.

In November and December, once thick ice has formed, similar stratification patterns and data value ranges as those observed earlier in the year (note: limnology profiles were not taken in April 2014). This includes increasing water temperature and decreasing oxygen concentration with lowering depth. Water temperature is at its seasonal low of < 3^{o}C (**Figures 3.2-5 and 3.2-6**).

The seasonal patterns in water temperature and oxygen concentrations observed in 2014 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 3.3**), field conductivity is discussed here as an indicator of change in the water column to facilitate review by the reader. 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 2014, 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 cyro-concentration were observed when expected (winter: **Figure 3.2-6**), with no differences between reference and near-field areas and uniform profiles during the open water period (**Figures 3.2-2 to 3.2-4**).

3.2.2. Baker Lake

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 near to the Meadowbank Spud Barge), –East Shore, –Akilahaarjuk Point (BBD, BPJ, BES, and BAP). Limnology surveys were conducted in July, August, and September.

3.2.2.1. General Observations

Baker Lake is a very large lake with much greater wind fetch than 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**), 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. Consequently, we identified a need to better characterize Baker Lake limnology at depth. Therefore, in August 2012, in addition to the limnology data collected at the water areas in Baker Lake, a deep limnology survey was conducted along transects into Baker Lake offshore of Baker Lake water sampling locations. 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).

3.2.2.2. 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 study lakes except that water temperatures are cooler, reaching no more than 10^{o}C in mid-summer, are generally un-stratified because of the large, cold water volume and large fetch of Baker Lake (**Figure 3.2-1 and Figure 3.2-7**).

As described above in the 2012 deep limnology profiling at Baker Lake, conductivity can show a strong and abrupt stratification. In 2014, at impact sites (BBD and BPJ) conductivity increased from <10 µS/cm at the surface to >500 between 10-12m (**Figure 3.2-7**). Conductivity at the reference site (BAP) was much more consistent with depth during a given month.

Overall, the general pattern of temperature and conductivity in Baker Lake was similar in 2014 as in previous monitoring periods (**Figure 3.2-7**). Occasional elevations in conductivity and related parameters is 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 3.2-1. Mean monthly field-measured temperature (°C) at 3 m depth from 2006 – 2014, Meadowbank study lakes and Baker Lake.

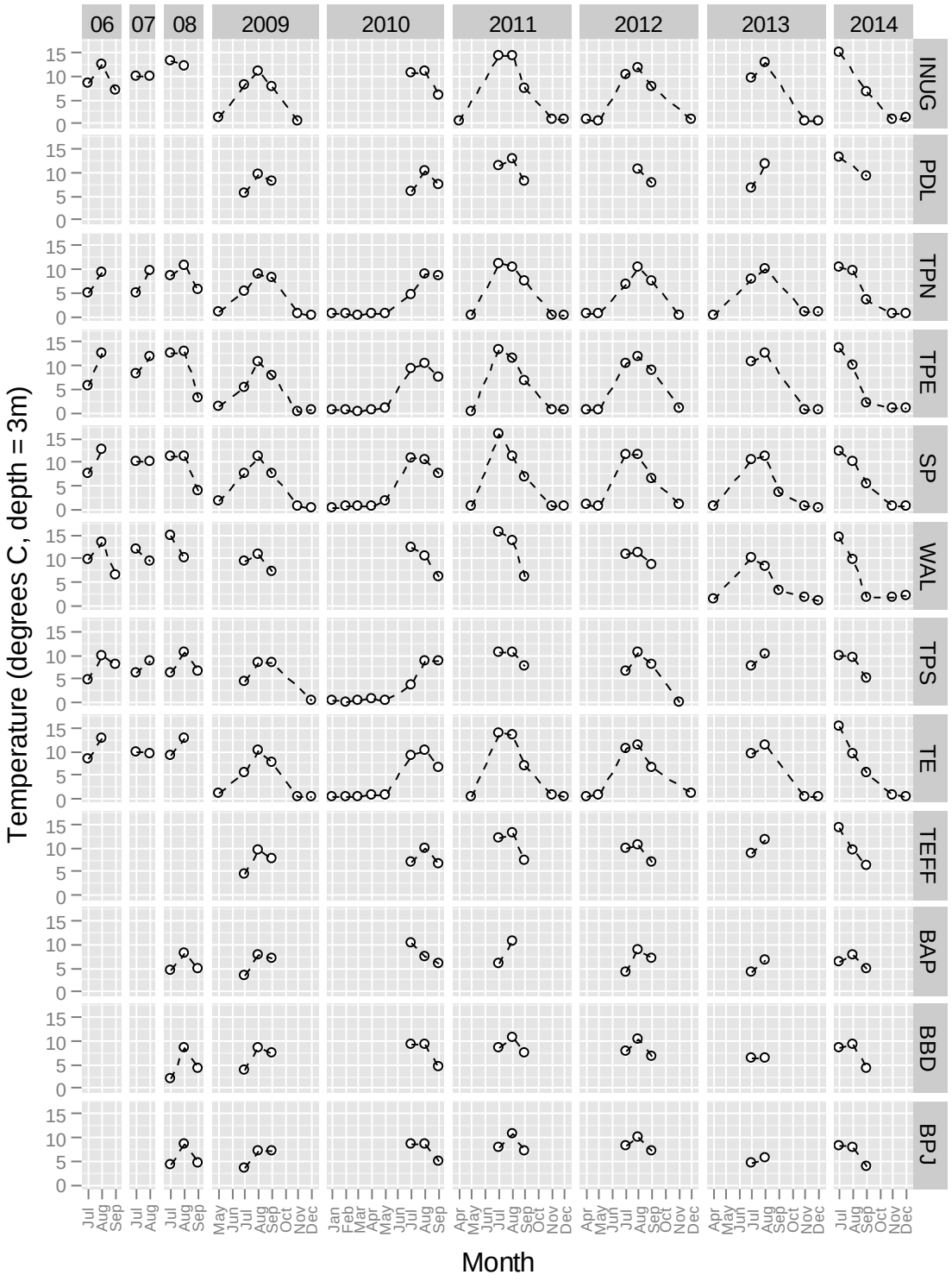


Figure 3.2-2. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for July, 2014.

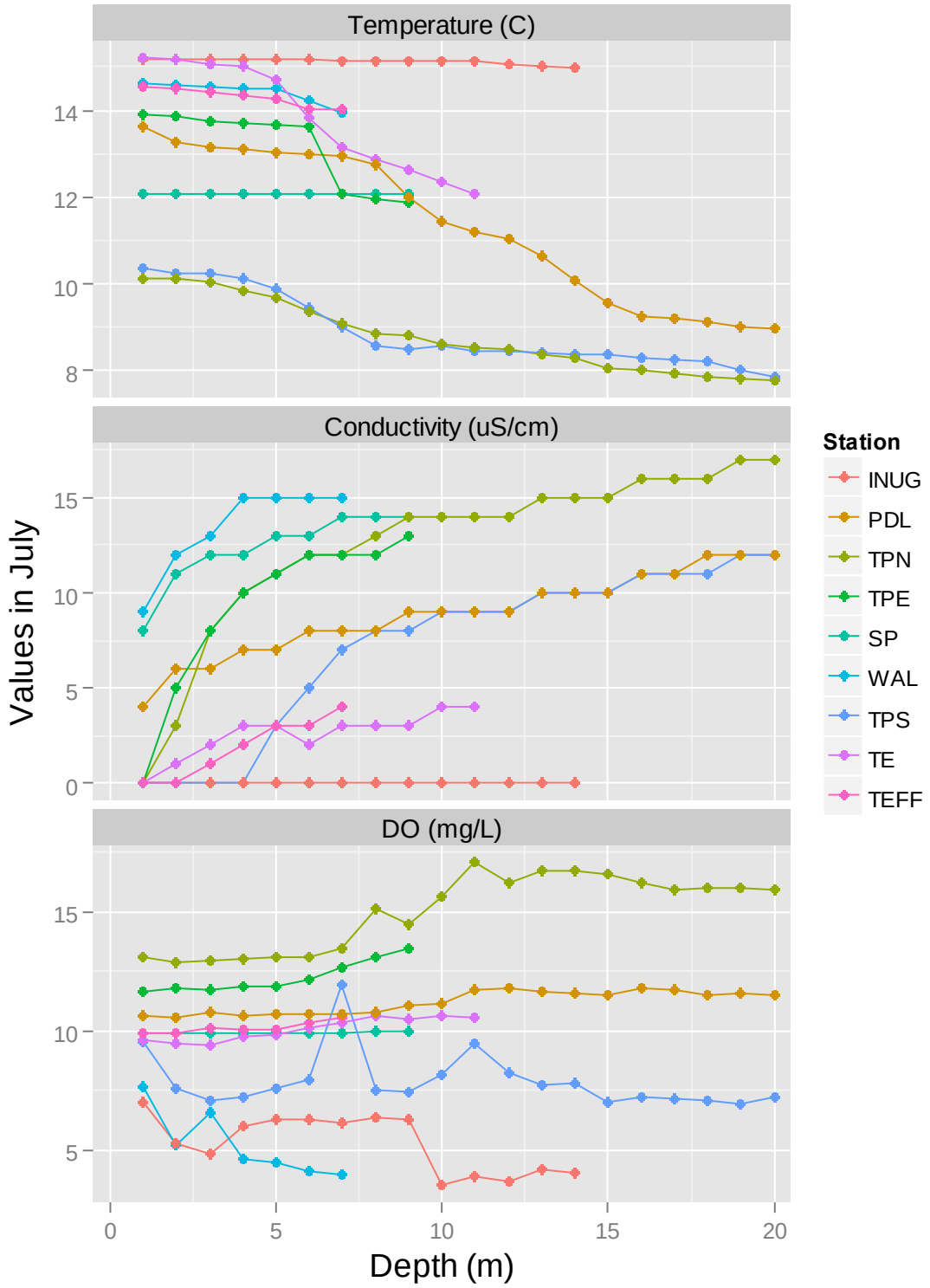


Figure 3.2-3. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for August, 2014.

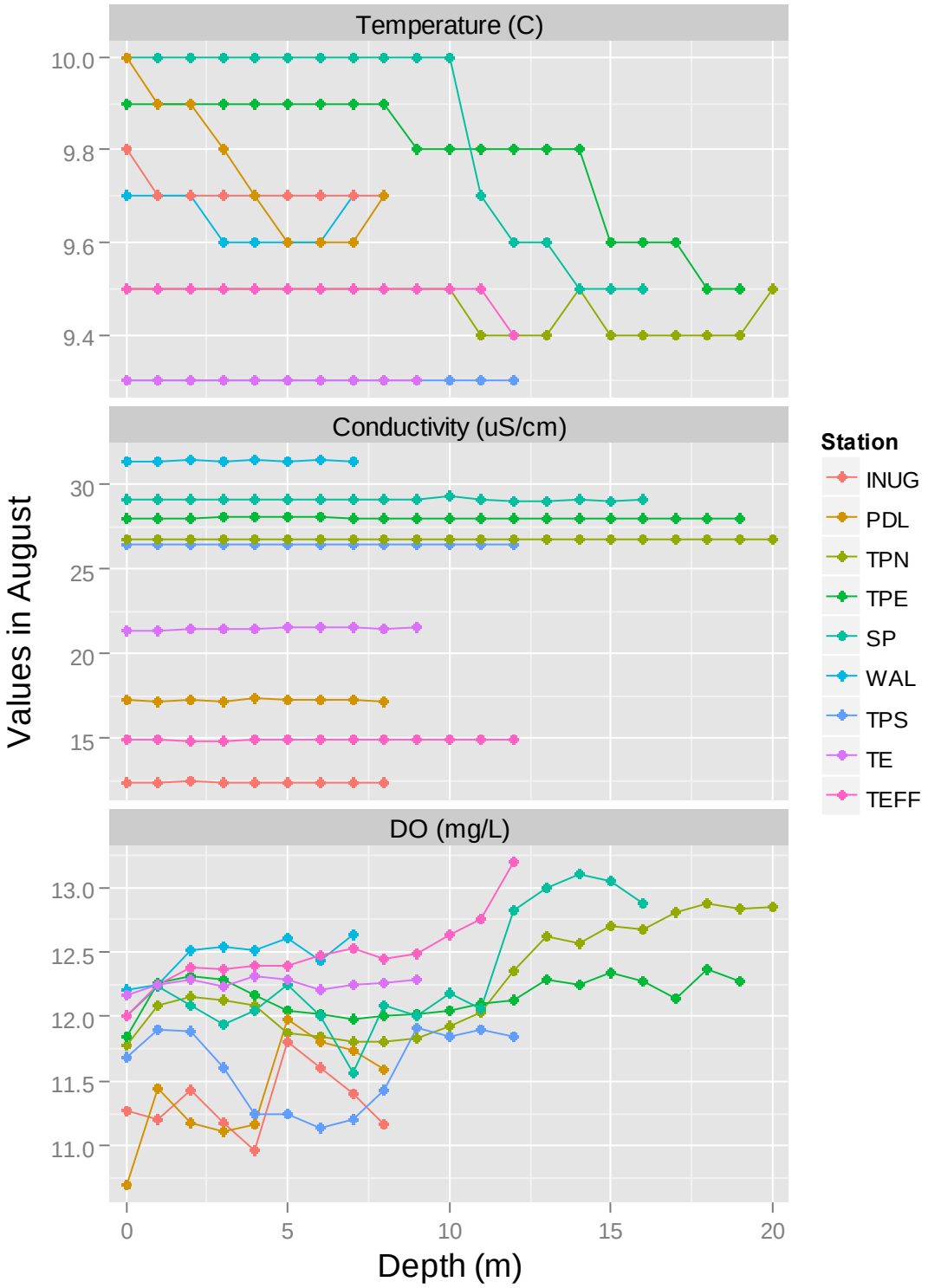


Figure 3.2-4. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for September, 2014.

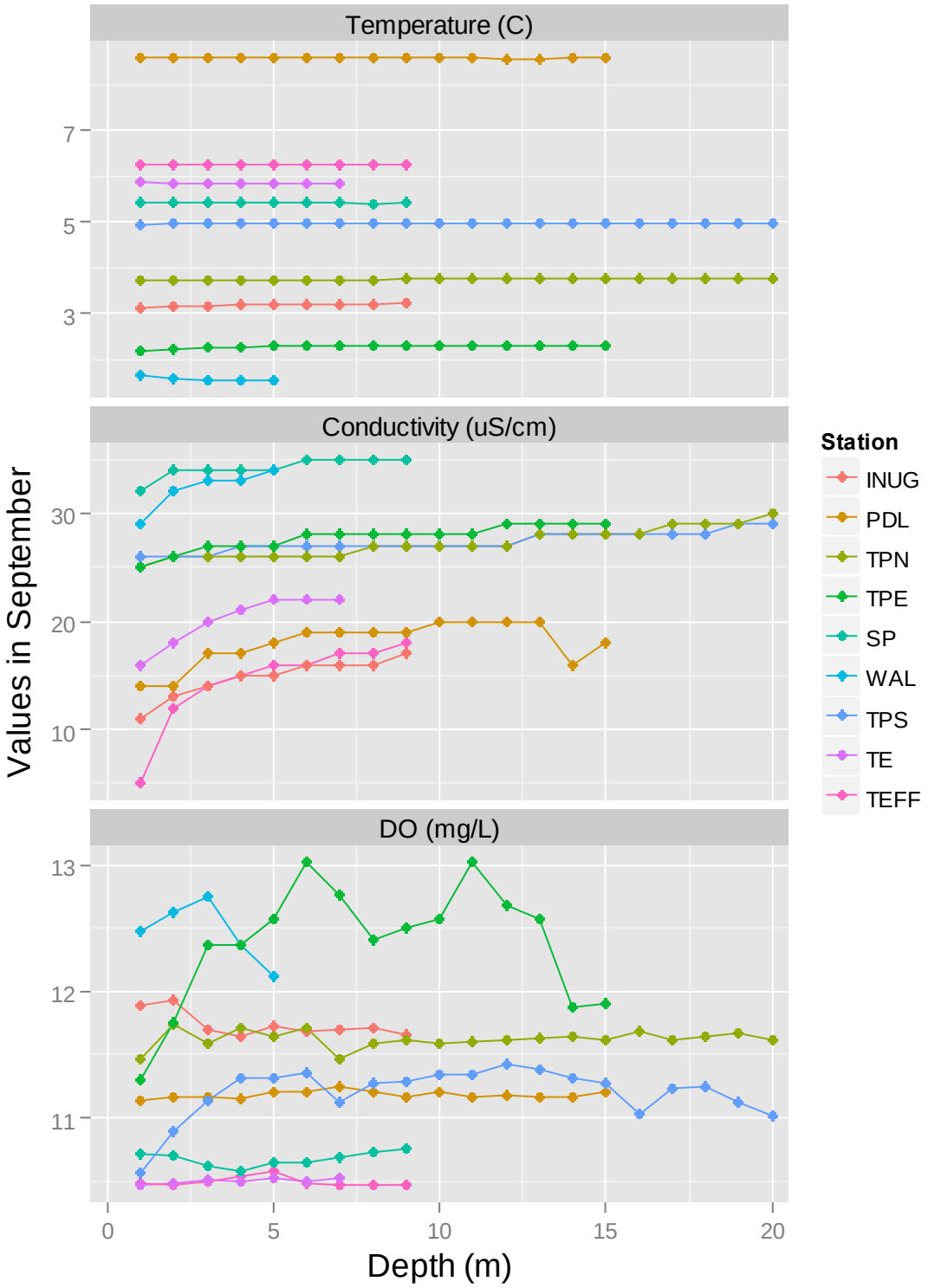


Figure 3.2-5. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for November, 2014.

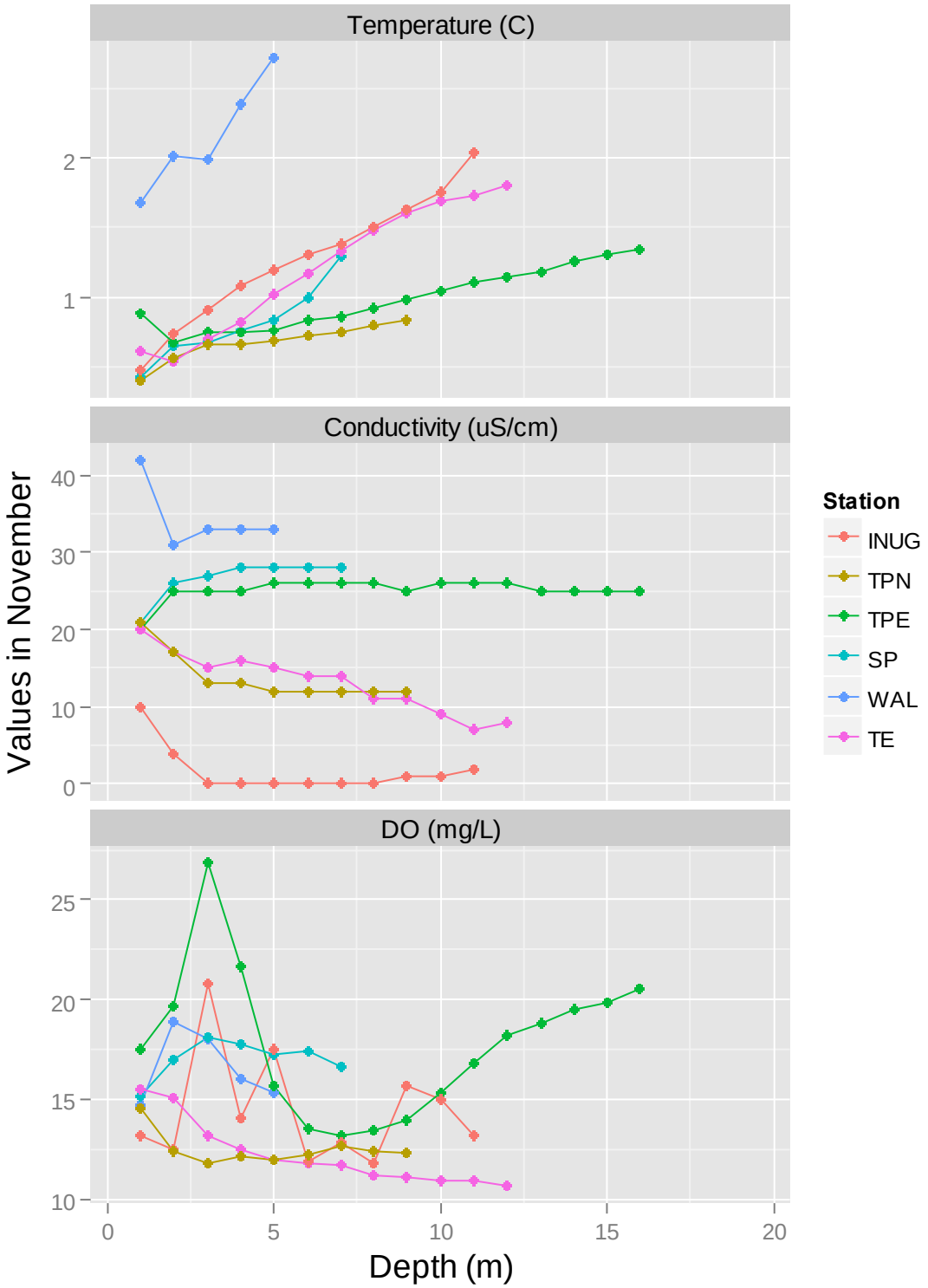


Figure 3.2-6. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles for December, 2014.

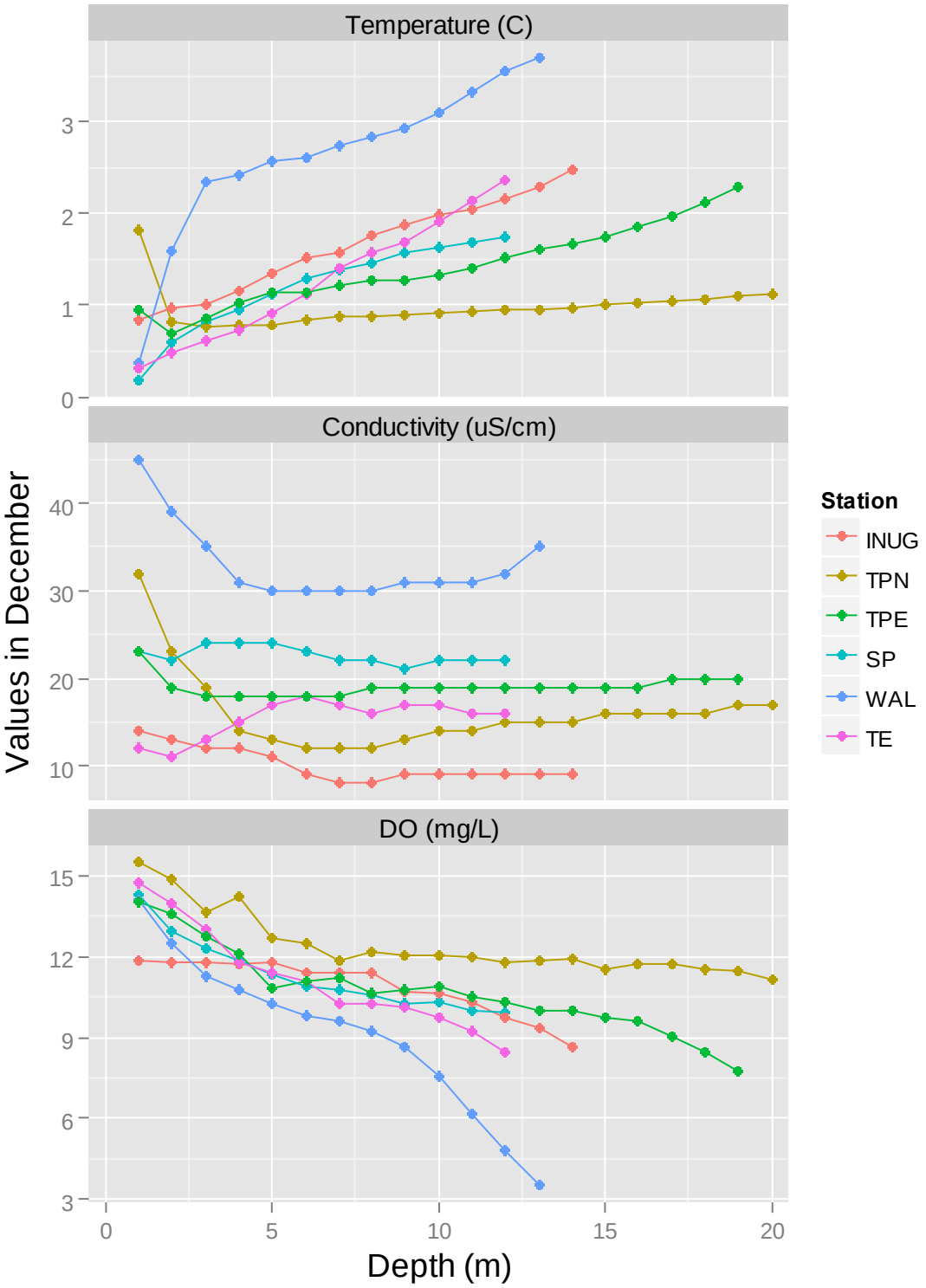
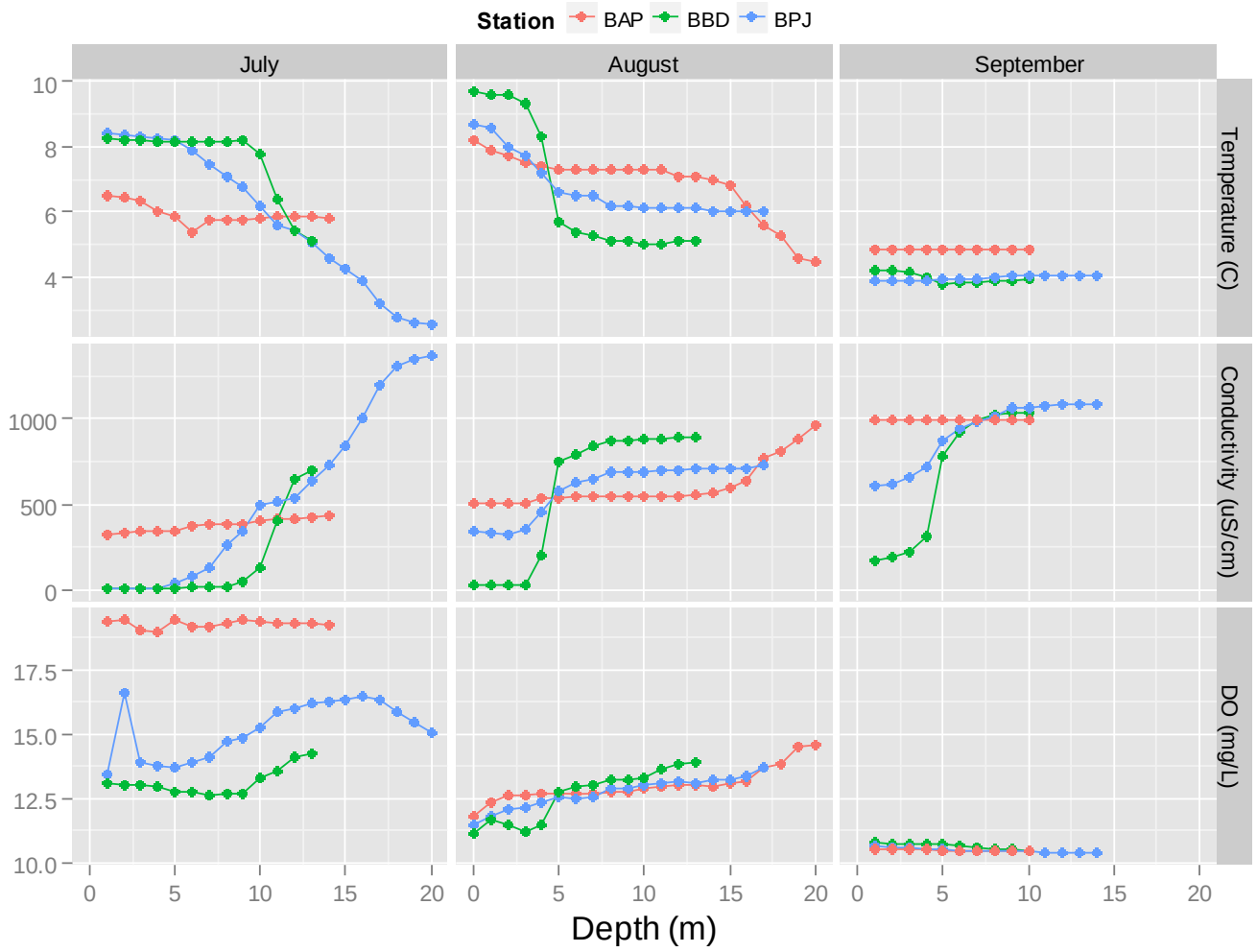


Figure 3.2-7. Field-measured temperature (°C), conductivity (µS/cm) and dissolved oxygen (mg/L) profiles in Baker Lake for July, August, and September, 2014.



3.3. Water Chemistry

3.3.1. Meadowbank Study Lakes

3.3.1.1. 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[4].

3.3.1.2. Temporal and Spatial Trend Interpretation

Results for conventional water quality parameters, nutrients and metals for 2014 are presented in **Table 3.3-1**, along with their respective trigger and threshold values. They are discussed below when relevant from a spatial and temporal trend perspective.

Note that TSS, total and bicarbonate alkalinity, and TKN were excluded from formal trend analysis in 2014 due to QA/QC concerns that rendered their results unreliable (see **Section 3.1.2** for more details). For transparency, these parameters are plotted (included as figures, see below) to allow readers to examine the results for themselves and to verify the reasons for their exclusion.

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

[4] 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.

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 3.3-2**):

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 fact just over half (53%) of parameters measured exceeded MDLs at least 10% of the time and 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 screen.
3. *Apparent Detection Pattern Matching Mining Activity* – In order 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, 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 2014, no parameters were added back into the trend assessment process based on this screen.

All parameters retained are shown in **Figures 3.3-1 through 3.3-39**. All parameters in these figures were measured from a depth of 3 meters for all areas and events. 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 (plots for these parameters are included for reference in **Appendix E**).

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 2014 means for Meadowbank study lakes exceeded their respective trigger values (see **Appendix A** for updated derivation details) are presented in **Table 3.3-3**.

Trigger values (upper and lower) for field-measured pH were developed this year and added to the list of parameters for trend assessment (see Table 3 in **Appendix A**). In the past, laboratory-measured pH values were more reliable and consistent between years than the field-measured parameter. However, due to issues identified with the analytical methods at Multilab (see **Section 3.1.2**), and the inconsistency of laboratory-measured pH in 2014, we are relying on field pH data herein. For transparency, both field-measured and laboratory-measured pH values are plotted (see **Figures 3.3-3 and 3.3-4**).

For each parameter/area combination highlighted in **Table 3.3-3**, formal statistical testing of the observed result was conducted using the BACIP statistical model (see **Section 2.4.1** for more details). In this analysis, the model interaction term (or BACIP 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 3.3-4**; key results (i.e., those parameter/area combinations where the 2014 results were statistically different [$p<0.1$]) were as follows:

- *Laboratory Conductivity/Hardness* – TPN, TPE, SP, TPS, and WAL showed an increase relative to baseline/reference conditions (with the exception of hardness at WAL). 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, SP, and TPS showed an increase (relative to baseline/reference) in all of these compounds (with the exception of sodium at SP). Despite these increases, concentrations at these impact areas have always 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. 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

benchmark of 500 mg/L (WLWB 2013) has recently been adopted at Diavik. Thus, these changes (leading to TDS concentrations on the order of 15 to 40 mg/L at TPE and SP) are very low and not of concern.

In addition, while the 2014 data for total and bicarbonate alkalinity and TKN were deemed unreliable, these parameters were associated with temporal increases in last year's CREMP (Azimuth, 2014). Consequently, they should be retained as parameters to watch in 2015.

Total and dissolved metals concentrations were consistently low or undetectable within the study lakes (**Table 3.3-1**). In 2014, the same metals were measured above laboratory detection limits (MDLs) as in 2013. This is important to note in relation to ongoing discharges to the receiving environment (e.g., dewatering from Vault Lake to Wally Lake [June 20 – 29, 2014] and discharge from Vault attenuation pond to Wally Lake [July 24 – August 14, 2014] and discharge of East Dike seepage to Second Portage Lake [during all of 2014, except from May 3 to July 28, 2014]). See **Section 1.4** and **Table 1.4-1** for more details on major mine-related activities in 2014.

Similar to previous years, the CREMP is detecting changes in some general water quality parameters that appear to be related to mining activity. However, it is important to point out that none of the above parameters have trigger values that were set in the context of effects-based threshold values (e.g., CCME water quality guidelines). 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 BACIP model results reported above only indicate that statistically significant changes have been detected. Available information suggests that the observed concentrations of these parameters are well below levels of concern. As in the past, it is recommended that these trends continue to be monitored in 2015.

3.3.2. Baker Lake

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 2014 are presented in **Table 3.3-1**; they are discussed, where relevant from a spatial and temporal trend perspective.

Note that TSS, total and bicarbonate alkalinity, and TKN were excluded from formal trend analysis in 2014 due to QA/QC concerns that rendered their results unreliable (see **Section 3.1.2** for more details). For transparency, these parameters are plotted (included as figures, see below) to allow readers to examine the results for themselves and to verify the reasons for their exclusion.

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 3.3.1.2** 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 3.3-5** 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. In fact over half (62%) of parameters measured exceeded MDLs at least 10% of the time and 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 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 parameters retained are shown in **Figures 3.3-40 through 3.3-86**. All parameters in these figures were measured from a depth of 3 meters for all areas and events. 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 barge activities or to natural variability and were excluded from further consideration (plots for these parameters are included for reference in **Appendix E**).

Historical trend assessment results related to barge activities are discussed at greater length in the 2012 CREMP report (Azimuth, 2013). Water chemistry parameters for which the 2014 means for Baker Lake exceeded their respective trigger values (see **Appendix A** for updated derivation details) are presented in **Table 3.3-6**. Trigger values (upper and lower) for field-measured pH were developed this year and added to the list of parameters for trend assessment (see Table 3 in **Appendix A**). In the past, laboratory-measured pH values were more reliable and consistent between years than the field-measured parameter. However, due to issues identified with the analytical methods at Multilab (see **Section 3.1.2**), and the inconsistency of laboratory-measured pH in 2014, we are relying on field pH data herein. For transparency, both field-measured and laboratory-measured pH values are plotted (see **Figures 3.3-42 and 3.3-43**).

For each parameter/area combination highlighted in **Table 3.3-6**, formal statistical testing of the observed result was conducted using the BACIP statistical model (see **Section 2.4.1** for more details). In this analysis, the model interaction term (or BACIP 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 3.3-7**; however, no parameter/area combinations were statistically different (at $p<0.1$) in 2014.

Thus, despite the increase in barge traffic seen over the past five years (**Figure 1.4-1**), there were no obvious changes to water quality that could be attributed to that activity. This is not surprising given 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. Consequently, there are no follow-up measures for management in 2015.

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Third Portage Lake										Third Portage Lake										Third Portage Lake					
Station						East Basin (TPE)										North Basin (TPN)										South Basin (TPS)					
Area-Replicate ID	CCME (2012)		Trigger[2]		Threshold[2]	TPE-70-S	TPE-71-S	TPE-72-S	TPE-73-S	TPE-74-S	TPE-75-S	TPE-76-S	TPE-77-S	TPE-78-S	TPE-79-S	TPN-70-S	TPN-71-S	TPN-72-S	TPN-73-S	TPN-74-S	TPN-75-S	TPN-76-S	TPN-77-S	TPN-78-S	TPN-79-S	TPS-43-S	TPS-44-S	TPS-45-S	TPS-46-S	TPS-47-S	TPS-48-S
Depth (m)	Guideline[1]	Meadowbank	Baker Lake	Wally Lake		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Date						25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14	03-Nov-14	03-Nov-14	20-Dec-14	20-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14	30-Nov-14	30-Nov-14	19-Dec-14	19-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14
Field Measurements (Surface)																															
Temperature (°C)						13.5	13.9	9.9	9.9	2.2	1.8	0.9	1.2	0.6	1.0	10.9	10.1	9.6	9.5	3.7	3.4	0.4	0.5	0.2	1.8	10.4	9.8	9.3	9.3	4.9	4.9
Specific Conductivity (µS/cm)						0	0	28	28	25	25	20	23	28	23	0	0	26.8	26.8	25	23	21	10	22	32	0	0	26.5	26.5	26	19
Dissolved Oxygen (mg/L)						11.63	11.63	11.81	11.85	11.3	12.1	17.54	18.35	13.91	14.05	12.35	13.12	11.79	11.78	11.46	11.35	14.56	14.28	13.72	15.52	9.59	13.25	11.69	11.56	10.56	11.15
pH	6.5 - 9.0	6.30 - 8.25	6.50 - 8.32	6.54 - 8.34	6.5 - 9.0	7.46	7.53	8.03	7.95	7.07	7.07	6.68	7.02	7.11	6.95	7.52	7.36	7.84	7.79	7.15	-	6.81	6.91	6.98	6.94	7.52	7.37	7.85	7.86	6.89	7.01
Physical Tests (mg/L)																															
Conductivity (µS/cm)*		23.5	494.5	36.6		**31**	**29**	**31**	**33**	**28**	**27**	**44**	**37**	**37**	**37**	**29**	**29**	**33**	**30**	**27**	**27**	**35**	**35**	**34**	**34**	**28**	**28**	**33**	**32**	**27**	**26**
Hardness		8.5	41.2	16.7		**10.6**	**10.4**	**10.7**	**10.6**	**10.5**	**16.8**	**10.8**	**10.8**	**11.4**	**11.7**	**9.2**	**9.2**	**9.0**	**9.1**	**9.1**	**9.2**	**9.7**	**9.6**	**9.7**	**9.7**	**9.1**	**9.0**	**8.7**	**8.7**	**9.0**	**9.1**
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.86 - 8.11	6.92 - 8.17	6.5 - 9.0	6.50	**6.48**	6.53	6.56	6.62	6.64	7.88	6.51	6.80	6.83	**6.42**	**6.44**	**6.39**	**6.40**	**6.47**	6.50	6.67	6.71	6.69	6.69	**6.48**	**6.45**	6.65	**6.36**	6.57	**6.49**
Total Dissolved Solids*		18.0	208	25.3		**21**	**20**	**21**	**22**	18	18	**29**	**25**	**24**	**24**	**19**	**19**	**22**	**20**	18	18	12	**23**	**23**	**22**	**19**	**19**	**22**	**21**	18	17
Anions and Nutrients (mg/L)																															
Alkalinity - Carbonate		4	4	4		*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Alkalinity - Hydroxide						*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Ammonia (as N)[3]	***equation***	0.065	0.067	0.067	0.126	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Bromide						*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<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	120	60.28	95.7	60.2	120	0.64	0.64	0.67	0.66	0.67	0.67	0.67	0.66	0.76	0.75	0.75	0.74	0.74	0.74	0.73	0.74	0.79	0.80	0.78	0.78	0.73	0.72	0.74	0.73	0.73	0.73
Fluoride	0.120					0.08	0.07	0.08	0.08	0.08	0.08	0.07	0.07	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Nitrate (as N)	3.0	1.50	1.51	1.50	3	0.0084	0.0106	0.0093	0.0087	0.0096	0.0106	0.0150	0.0135	0.0274	0.0166	0.0573	0.0575	0.0534	0.0530	0.0526	0.0530	0.0622	0.0628	0.0606	0.0614	0.0582	0.0577	0.0564	0.0551	0.0545	0.0553
Nitrite (as N)	0.060	0.031	0.031	0.031	0.060	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.001	0.001	0.001	*<0.001*	0.001	0.001	0.001	0.001	*<0.001*	0.001	0.001	0.001	*<0.001*	*<0.001*	0.001	0.001
Ortho Phosphate (as P)		0.002	0.002	0.002		*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<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 Diss.						*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0026	0.0028	0.0022	0.0023	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0023	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0025	0.0033
Phosphorus (P)-Total	0.0040	0.0060	0.0096	0.0067	0.004	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0022	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0021	*<0.002*	*<0.002*	*<0.002*	*<0.002*
Silicate (as SiO_2)		1.0	1.0	1.08		*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
Sulphate (SO_4)		64.71	65.92	65.20	128	3.93	3.99	4.20	4.15	4.33	4.35	4.42	4.35	5.00	4.89	5.02	4.97	4.89	4.89	4.92	4.93	5.28	5.33	5.24	5.23	4.82	4.77	4.84	4.83	4.87	4.88
Organic / Inorganic Carbon (mg/L)																															
Dissolved Organic Carbon		2.60	4.05	3.21		1.15	2.55	1.26	1.24	1.38	1.33	1.52	1.58	1.59	1.46	1.15	1.20	1.24	1.32	1.48	1.38	1.64	1.41	1.51	1.28	1.14	1.08	1.28	1.31	1.54	1.49
Total Organic Carbon		2.79	4.25	4.11		1.26	1.26	1.64	1.65	1.76	1.50	1.70	1.67	1.59	1.57	1.30	2.26	1.51	1.43	1.55	1.44	1.36	1.48	1.79	1.47	1.24	1.32	1.54	1.73	1.44	1.80
Plant Pigments (ug/L)																															
Chlorophyll-a*						0.203	0.560	0.290	0.248	0.170	0.128	0.342	0.208	0.114	0.122	0.219	0.119	0.146	0.178	0.109	0.128	0.196	0.178	0.088	0.080	0.155	0.218	0.196	0.158	0.157	0.163
Cyanides																															
Total Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Free Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Total Metals (mg/L)																															
Aluminum[3]	***equation***	0.054	0.056	0.053	0.100	0.0070	0.0063	0.0131	0.0161	0.0095	0.0105	0.0064	0.0081	0.0041	0.0041	0.0032	0.0037	0.0081	0.0062	0.0056	0.0050	0.0043	0.0040	0.0033	0.0032	0.0032	0.0035	0.0065	0.0067	0.0055	0.0068
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.00	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.00
Arsenic	0.0050	0.00255	0.00257	0.0026	0.005	0.0006	0.0005	0.0006	0.0006	0.0005	0.0005	0.0004	0.0005	0.0004	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Barium		0.50	0.51	0.50	1	0.0034	0.0033	0.0033	0.0033	0.0028	0.0029	0.0025	0.0028	0.0033	0.0031	0.0031	0.0033	0.0036	0.0032	0.0029	0.0028	0.0032	0.0031	0.0030	0.0033	0.0031	0.0031	0.0031	0.0033	0.0029	0.0029
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron	1.5	0.76	0.76	0.76	1.5	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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[3]	***equation***	0.000025	0.000025	0.000025	0.000040	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	0.00	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium		2.15	4.50	4.88		**2.63**	**2.56**	**2.77**	**2.81**	**2.51**	**2.61**	**2.77**	**2.76**	**2.80**	**2.85**	**2.22**	**2.18**	**2.36**	**2.20**	**2.18**	2.08	**2.34**	**2.41**	**2.31**	**2.31**	**2.16**	**2.17**	**2.15**	**2.23**	2.11	**2.16**
Chromium[4]	0.001	0.00056	0.00056	0.00055	0.001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.0001	0.0001	0.0001	0.0001	0.0002	*<0.0001*	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	0.0001	*<0.0001*	0.0002	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*	*<0.0001*	*<0.0001*	*<0.0001*	*<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[3]	***equation***	0.00124	0.00125	0.00149	0.002	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0010	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0006	*<0.0005*	*<0.0005*	*<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	0.3	0.155	0.160	0.157	0.3	0.01	0.01	0.02	0.03	0.02	0.02	0.01	0.02	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.01	*<0.01*	*<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[3]	***equation***	0.000525	0.000525	0.000525	0.001	0.00009	*<0.00005*	*<0.00005*	0.00006	0.00007	*<0.00005*	*<0.00005*	0.00007	*<0.00005*	**0.00826**	*<0.00005*	0.00010	0.00052	0.00008	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00007	0.00016	*<0.00005*	*<0.00005*
Lithium		0.048	0.048	0.048	0.096	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.00	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Magnesium		0.83	7.44	1.36		**0.95**	**0.93**	**0.99**	**1.00**	**0.90**	**0.94**	**0.96**	**0.96**	**1.05**	**1.06**	**0.90**	**0.88**	**0.92**	**0.86**	**0.86**	0.81	**0.91**	**0.94**	**0.93**	**0.93**	**0.88**	**0.89**	**0.85**	**0.88**	**0.84**	**0.85**
Manganese[3]		0.3157	0.3400	0.3300	***equation***	0.0014	0.0014	0.0015	0.0016	0.0010	0.0011	0.0008	0.0008	**0.0006**	**0.0006**	0.0035	0.0033	0.0028	0.0024	0.0017	0.0015	0.0012	0.0014	0.0013	0.0011	0.0030	0.0027	0.0023	0.0024	0.0018	0.0018
Mercury	0.000026	0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum	0.073	0.0365	0.0365	0.0370	0.073	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0003
Nickel[3]	***equation***	0.0127	0.0128	0.0130	0.025	0.0005	0.0005	*<0.0005*	0.0005	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0005	0.0005	0.0006	0.0005	*<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*	*<0.05*	*<0.05*	*<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		0.50	2.43	0.59		**0.55**	**0.52**	**0.54**	**0.56**	0.50	**0.51**	**0.52**	**0.51**	**0.56**	**0.54**	**0.51**	**0.51**	**0.56**	0.47	**0.51**	0.48	**0.51**	**0.54**	**0.55**	**0.52**	**0.51**	**0.52**	**0.52**	0.50	0.49	**0.51**
Selenium	0.001	0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.07	0.06	0.08	0.09	0.07	0.08	0.07	0.08	0.07	0.07	*<0.05*	*<0.05*	*<0.05*	*<0.05*	0.06	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	0.05	0.06	*<0.05*	0.05
Silver	0.0001					*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.975	54.0	0.72		0.85	0.87	**1.05**	**1.03**	0.96	**0.98**	0.92	**1.00**	**1.17**	**1.14**	**1.16**	**1.13**	**1.35**	**1.22**	**1.16**	**1.10**	**1.25**	**1.27**	**1.27**	**1.26**	**1.15**	**1.11**	**1.20**	**1.26**	**1.16**	**1.16**
Strontium		0.0279	0.0564	0.0330	0.049	0.0115	0.0112	0.0124	0.0121	0.0109	0.0112	0.0113	0.0120	0.0129	0.0127	0.0104	0.0104	0.0113	0.0108	0.0103	0.0097	0.0112	0.0114	0.0101	0.0110	0.0103	0.0102	0.0105	0.0109	0.0100	0.0101
Sulfur						1.33	1.32	1.48	1.44	1.49	1.46	1.53	1.47	1.68	1.63	1.72	1.70	1.77	1.64	1.73	1.63	1.76	1.78	1.74	1.76	1.66	1.64	1.67	1.71	1.70	1.69
Thallium	0.0008	0.00041	0.00041	0.00041	0.0008	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		1.00	1.00	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium	0.015	0.0075	0.0075	0.0075	0.015	0.000050	0.000044	0.000061	0.000063	0.000051	0.000050	0.000046	0.000049	0.000047	0.000049	0.000045	0.000042	0.000053	0.000051	0.000044	0.000040	0.000042	0.000042	0.000042	0.000046	0.000044	0.000046	0.000053	0.000055	0.000043	0.000048
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]	0.030	0.0063	0.0132	0.0106	***equation***	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Third Portage Lake										Third Portage Lake										Third Portage Lake					
Station						East Basin (TPE)										North Basin (TPN)										South Basin (TPS)					
Area-Replicate ID			Trigger[2]			TPE-70-S	TPE-71-S	TPE-72-S	TPE-73-S	TPE-74-S	TPE-75-S	TPE-76-S	TPE-77-S	TPE-78-S	TPE-79-S	TPN-70-S	TPN-71-S	TPN-72-S	TPN-73-S	TPN-74-S	TPN-75-S	TPN-76-S	TPN-77-S	TPN-78-S	TPN-79-S	TPS-43-S	TPS-44-S	TPS-45-S	TPS-46-S	TPS-47-S	TPS-48-S
Depth (m)	CCME (2012)				Threshold[2]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Baker Lake	Wally Lake		25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14	03-Nov-14	03-Nov-14	20-Dec-14	20-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14	30-Nov-14	30-Nov-14	19-Dec-14	19-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14
Dissolved Metals (mg/L)																															
Aluminum[3]		0.0263	0.0274	0.0260	0.05	0.0026	0.0037	0.0036	0.0042	0.0020	**0.120**	0.0023	0.0015	*<0.001*	0.0012	0.0014	0.0014	0.0024	0.0024	0.0021	0.0021	0.0018	0.0020	0.0011	0.0015	*<0.001*	0.0013	0.0020	0.0020	0.0021	0.0027
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.0002	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		0.0026	0.0026	0.0026	0.005	0.0006	0.0005	0.0006	0.0006	0.0005	0.0007	0.0004	0.0004	0.0004	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Barium		0.5010	0.5089	0.5000	1	0.0033	0.0030	0.0032	0.0029	0.0028	0.0094	0.0028	0.0028	0.0033	0.0032	0.0029	0.0032	0.0033	0.0032	0.0029	0.0029	0.0030	0.0030	0.0032	0.0031	0.0030	0.0031	0.0031	0.0032	0.0029	0.0030
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron		0.76	0.76	0.76	1.5	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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		0.000025	0.000025	0.000025	0.00004	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	**0.0003**	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium						2.67	2.60	2.69	2.67	2.64	4.96	2.76	2.76	2.84	2.94	2.21	2.22	2.20	2.21	2.20	2.23	2.36	2.34	2.34	2.35	2.18	2.17	2.10	2.11	2.18	2.20
Chromium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	**0.0009**	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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*	0.00	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		0.00119	0.00116	0.00148	0.002	0.00037	0.00038	0.00037	0.00035	0.00039	**0.0043**	0.00037	0.00036	0.00034	0.00037	0.00036	0.00036	0.00032	0.00034	0.00037	0.00034	0.00046	0.00035	0.00034	0.00035	0.00036	0.00039	0.00033	0.00035	0.00038	0.00042
Iron		0.155	0.155	0.155	0.3	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.15	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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		0.000525	0.000525	0.000525	0.001	*<0.00005*	*<0.00005*	0.00007	*<0.00005*	*<0.00005*	**0.0032**	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00006	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00008	0.00007
Lithium		0.048	0.048	0.048	0.096	*<0.0005*	0.00	*<0.0005*	*<0.0005*	*<0.0005*	0.0012	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.00	*<0.0005*	*<0.0005*	0.00	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Magnesium						0.95	0.94	0.96	0.95	0.95	1.08	0.95	0.96	1.05	1.07	0.89	0.89	0.86	0.87	0.86	0.87	0.92	0.92	0.94	0.93	0.88	0.88	0.83	0.84	0.87	0.86
Manganese[3]		0.315	0.339	0.330	***equation***	0.0011	0.0011	0.0008	0.0008	0.0005	0.0062	0.0004	0.0003	**0.0001**	**0.0001**	0.0031	0.0031	0.0018	0.0019	0.0012	0.0012	0.0010	0.0010	0.0010	0.0009	0.0024	0.0024	0.0019	0.0018	0.0013	0.0015
Mercury		0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum		0.037	0.037	0.037	0.073	0.0002	0.0002	0.0002	0.0002	0.0002	0.0004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel		0.013	0.013	0.013	0.025	*<0.0005*	*<0.0005*	0.0005	*<0.0005*	*<0.0005*	0.0015	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0007	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0007
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*	*<0.05*	*<0.05*	*<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						0.51	0.51	0.54	0.49	0.54	0.85	0.51	0.49	0.55	0.58	0.49	0.50	0.48	0.49	0.51	0.50	0.53	0.50	0.52	0.51	0.49	0.48	0.47	0.49	0.53	0.52
Selenium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.05	0.06	0.07	0.07	0.06	0.23	0.05	0.06	0.06	0.06	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<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*	0.0000	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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						0.90	0.90	0.97	0.95	0.98	2.93	1.00	0.98	1.12	1.11	1.19	1.13	1.18	1.17	1.16	1.15	1.18	1.21	1.26	1.23	1.11	1.11	1.16	1.20	1.18	1.15
Strontium		0.028	0.049	0.033	0.049	0.011	0.011	0.012	0.011	0.011	0.015	0.012	0.011	0.0123	0.0127	0.0103	0.0101	0.0103	0.0103	0.0101	0.0101	0.0108	0.0109	0.0111	0.0098	0.0099	0.0098	0.0101	0.0100	0.0101	0.0100
Sulfur						1.31	1.33	1.36	1.35	1.52	4.78	1.46	1.45	1.68	1.73	1.71	1.68	1.62	1.60	1.71	1.71	1.72	1.75	1.80	1.75	1.64	1.63	1.59	1.57	1.70	1.71
Thallium		0.00041	0.00041	0.00041	0.0008	*<0.00001*	0.000015	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	**0.0018**	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		1.01	1.01	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium		0.0075	0.0075	0.0075	0.015	0.00004	0.00006	0.00005	0.00005	0.00004	0.00007	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]		0.0053	0.0122	0.0096	***equation***	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	**0.020**	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.001	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.002	**0.006**

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2014.

[2] Trigger and threshold values were developed in "CREMP Design Document 2012" (Azimuth, 2012).

A number of thresholds were derived from methods (or sources) other than CCME guidelines - see **Appendix A** for 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.

* Data for TDS, conductivity, and chlorophyll-a should be interpreted with caution, particularly at low concentrations, see **Section 3.1** of the text.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Second Portage Lake (SP)										Tehek Lake										Tehek Lake					
Station																Tehek (TE)										Tehek Farfield (TEFF)					
Area-Replicate ID			Trigger[2]			SP-70-S	SP-71-S	SP-72-S	SP-73-S	SP-74-S	SP-75-S	SP-76-S	SP-77-S	SP-78-S	SP-79-S	TE-70-S	TE-71-S	TE-72-S	TE-73-S	TE-74-S	TE-75-S	TE-76-S	TE-77-S	TE-78-S	TE-79-S	TEFF-31-S	TEFF-32-S	TEFF-33-S	TEFF-34-S	TEFF-35-S	TEFF-36-S
Depth (m)	CCME (2012)					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Baker Lake	Wally Lake	Threshold[2]	19-Jul-14	19-Jul-14	26-Aug-14	26-Aug-14	15-Sep-14	15-Sep-14	02-Nov-14	02-Nov-14	18-Dec-14	18-Dec-14	30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14	28-Nov-14	28-Nov-14	20-Dec-14	20-Dec-14	30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14
Field Measurements (Surface)																															
Temperature (°C)						12.2	12.1	10.3	10.0	5.4	5.3	1.1	0.4	0.7	0.2	15.2	15.7	9.3	9.5	5.3	5.9	0.6	0.2	0.3	0.8	14.1	14.6	9.4	9.5	6.3	6.2
Specific Conductivity (µS/cm)						4	8	29.2	29.1	32	29	25	21	39	23	0	0	21.3	17.9	16	16	20	11	12	24	0	0	14.2	14.9	5	4
Dissolved Oxygen (mg/L)						9.32	9.89	11.97	12	10.71	10.87	26.89	15.13	14.59	14.29	9.62	9.2	12.16	11.86	10.81	10.46	15.5	15.39	14.73	12.96	9.92	9.9	12.16	12.01	10.48	10.47
pH	6.5 - 9.0	6.30 - 8.25	6.50 - 8.32	6.54 - 8.34	6.5 - 9.0	7.95	7.76	7.48	7.42	7.78	7.81	**5.78**	**5.46**	7.05	7.06	7.42	7.50	7.20	7.19	7.39	7.49	7.45	7.26	6.77	6.92	7.58	7.55	7.23	7.05	7.42	7.72
Physical Tests (mg/L)																															
Conductivity (µS/cm)*		23.5	494.5	36.6		**39**	**36**	**37**	**37**	**41**	**45**	**38**	**37**	**48**	**46**	21	**25**	**25**	21	**26**	**24**	**26**	20	**26**	**34**	18	19	17	18	18	19
Hardness		8.5	41.2	16.7		**13.3**	**13.3**	**13.7**	**13.5**	**13.7**	**13.7**	**14.3**	**14.2**	**17.1**	**11.7**	7.2	**8.8**	**9.2**	7.7	**9.2**	**8.6**	7.6	6.5	8.1	**11.4**	5.7	6.3	5.5	5.9	6.2	6.0
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.86 - 8.11	6.92 - 8.17	6.5 - 9.0	6.63	6.68	6.64	6.66	6.53	6.89	6.61	6.61	6.90	6.92	**6.42**	**6.44**	6.59	**6.38**	6.58	6.55	6.84	6.58	6.67	6.79	**6.35**	**6.35**	**6.26**	**6.33**	**6.42**	6.75
Total Dissolved Solids*		18.0	208	25.3		**26**	**24**	**24**	**25**	**27**	**30**	**25**	**25**	**32**	**30**	14	17	17	14	17	16	17	13	17	**23**	12	12	11	12	12	13
Anions and Nutrients (mg/L)																															
Alkalinity - Carbonate		4	4	4		*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Alkalinity - Hydroxide						*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Ammonia (as N)[3]	***equation***	0.065	0.067	0.067	0.126	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.01	0.01	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.01	0.01	*<0.005*	*<0.005*	0.01	*<0.005*	*<0.005*	*<0.005*
Bromide						*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<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	120	60.28	95.7	60.2	120	0.62	0.63	0.65	0.65	0.70	0.70	0.75	0.73	0.87	0.84	0.58	0.60	0.63	0.59	0.63	0.62	0.63	0.60	0.69	0.80	0.55	0.56	0.55	0.56	0.58	0.58
Fluoride	0.120					0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.06	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.06	0.06	0.06	0.06	0.07	0.06
Nitrate (as N)	3.0	1.50	1.51	1.50	3	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.0052	*<0.005*	0.0088	0.0073	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.0062	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Nitrite (as N)	0.060	0.031	0.031	0.031	0.060	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Ortho Phosphate (as P)		0.002	0.002	0.002		*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<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 Diss.						*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0024	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<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	0.0040	0.0060	0.0096	0.0067	0.004	**0.0041**	**0.0089**	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.02*	0.0022	0.0029	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0025	0.0022	*<0.002*	*<0.002*	*<0.002*	0.0025	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*
Silicate (as SiO_2)		1.0	1.0	1.08		*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	0.55	0.59	0.63	0.79	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
Sulphate (SO_4)		64.71	65.92	65.20	128	3.51	3.49	3.69	3.66	3.85	3.87	4.15	4.00	4.82	4.44	2.18	2.51	2.70	2.28	2.73	2.55	2.47	2.18	2.65	3.50	1.90	1.97	1.89	1.98	2.06	2.05
Organic / Inorganic Carbon (mg/L)																															
Dissolved Organic Carbon		2.60	4.05	3.21		1.47	1.40	1.51	1.43	1.80	2.08	1.85	1.75	1.35	2.19	1.15	1.22	1.32	1.23	1.48	1.56	1.67	1.27	1.46	*<0.5*	1.05	1.02	1.08	1.13	1.28	1.32
Total Organic Carbon		2.79	4.25	4.11		1.50	1.27	1.83	1.74	2.01	1.78	1.75	2.07	2.18	2.12	1.21	1.46	1.69	1.59	1.46	1.36	1.49	1.33	1.43	1.68	1.23	1.10	1.51	1.49	1.32	1.26
Plant Pigments (ug/L)																															
Chlorophyll-a*						0.233	0.201	0.306	0.304	0.480	0.456	0.438	0.272	0.310	0.204	0.070	0.139	0.358	0.358	0.282	0.358	0.514	0.448	0.232	0.384	0.169	0.094	0.264	0.220	0.262	0.236
Cyanides																															
Total Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Free Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Total Metals (mg/L)																															
Aluminum[3]	***equation***	0.054	0.056	0.053	0.100	0.0092	0.0083	0.0144	0.0145	0.0101	0.0106	0.0059	0.0066	0.0036	*<0.003*	0.0058	0.0084	0.0331	0.0241	0.0225	0.0236	0.0070	0.0062	0.0043	0.0044	0.0045	0.0042	0.0121	0.0139	0.0119	0.0100
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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	0.0050	0.00255	0.00257	0.0026	0.005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	*<0.0001*	0.0001	0.0001	0.0002	*<0.0001*	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*
Barium		0.50	0.51	0.50	1	0.0025	0.0025	0.0025	0.0025	0.0024	0.0026	0.0025	0.0024	0.0030	0.0026	0.0021	0.0021	0.0024	0.0024	0.0021	0.0021	0.0022	0.0022	0.0025	0.0029	0.0020	0.0020	0.0020	0.0021	0.0019	0.0020
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron	1.5	0.76	0.76	0.76	1.5	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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[3]	***equation***	0.000025	0.000025	0.000025	0.000040	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium		2.15	4.50	4.88		**3.39**	**3.42**	**3.64**	**3.75**	**3.57**	**3.70**	**3.72**	**3.73**	**4.33**	**4.37**	1.75	2.14	**2.20**	1.81	**2.19**	2.10	1.93	1.58	1.99	**2.92**	1.37	1.46	1.26	1.36	1.43	1.44
Chromium[4]	0.001	0.00056	0.00056	0.00055	0.001	0.0001	*<0.0001*	0.0001	0.0002	0.0001	0.0002	*<0.0001*	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.0001	0.0001	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*	*<0.0001*	*<0.0001*	*<0.0001*	*<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[3]	***equation***	0.00124	0.00125	0.00149	0.002	*<0.001*	*<0.001*	0.0006	0.0007	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	*<0.0005*	*<0.0005*	0.0005	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0006	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Iron	0.3	0.155	0.160	0.157	0.3	0.02	0.02	0.03	0.03	0.02	0.02	0.01	0.02	*<0.01*	*<0.01*	0.01	0.02	0.05	0.04	0.03	0.03	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.02	0.02	0.01	0.01
Lead[3]	***equation***	0.000525	0.000525	0.000525	0.001	*<0.00005*	*<0.00005*	*<0.00005*	0.00008	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00006	*<0.00005*	*<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		0.048	0.048	0.048	0.096	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.00	0.00	0.00	*<0.0005*	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.00
Magnesium		0.83	7.44	1.36		**1.09**	**1.11**	**1.16**	**1.19**	**1.14**	**1.18**	**1.21**	**1.19**	**1.40**	**1.39**	0.68	0.78	0.77	0.69	0.78	0.76	0.73	0.63	0.78	**1.07**	0.57	0.60	0.53	0.55	0.58	0.60
Manganese[3]		0.3157	0.3400	0.3300	***equation***	0.0022	0.0019	0.0017	0.0016	0.0012	0.0014	0.0006	0.0007	0.0004	0.0005	0.0010	0.0011	0.0017	0.0016	0.0013	0.0015	0.0006	0.0007	0.0007	0.0006	0.0008	0.0008	0.0012	0.0013	0.0013	0.0013
Mercury	0.000026	0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum	0.073	0.0365	0.0365	0.0370	0.073	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	*<0.00005*	0.0001	0.0001	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.0001
Nickel[3]	***equation***	0.0127	0.0128	0.0130	0.025	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<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*	*<0.05*	*<0.05*	*<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		0.50	2.43	0.59		0.48	0.50	**0.51**	0.49	0.48	0.50	**0.53**	**0.51**	**0.57**	**0.56**	0.44	0.40	0.43	0.39	0.43	0.43	0.42	0.40	0.48	**0.53**	0.37	0.38	0.36	0.37	0.39	0.39
Selenium	0.001	0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.19	0.19	0.22	0.23	0.23	0.23	0.23	0.24	0.28	0.35	0.13	0.16	0.22	0.20	0.19	0.19	0.14	0.12	0.15	0.21	0.10	0.11	0.12	0.12	0.12	0.12
Silver	0.0001					*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	0.0000	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.975	54.0	0.72		0.64	0.66	0.71	0.72	0.72	0.75	0.76	0.75	0.93	0.80	0.56	0.58	0.63	0.59	0.58	0.60	0.64	0.61	0.69	0.85	0.52	0.53	0.55	0.54	0.53	0.54
Strontium		0.0279	0.0564	0.0330	0.049	0.0155	0.0153	0.0165	0.0161	0.0167	0.0171	0.0167	0.0164	0.0209	0.0214	0.0089	0.0105	0.0109	0.0088	0.0103	0.0101	0.0098	0.0083	0.0102	0.0149	0.0072	0.0077	0.0070	0.0072	0.0073	0.0075
Sulfur						1.17	1.20	1.27	1.30	1.28	1.34	1.39	1.38	1.65	1.56	0.81	0.86	0.88	0.80	0.87	0.86	0.86	0.73	0.94	1.19	0.70	0.73	0.64	0.65	0.70	0.70
Thallium	0.0008	0.00041	0.00041	0.00041	0.0008	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		1.00	1.00	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium	0.015	0.0075	0.0075	0.0075	0.015	0.000049	0.000046	0.000052	0.000048	0.000050	0.000047	0.000044	0.000042	0.000049	0.000049	0.000040	0.000052	0.000085	0.000063	0.000063	0.000069	0.000041	0.000041	0.000044	0.000049	0.000052	0.000036	0.000036	0.000038	0.000046	0.000044
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]	0.030	0.0063	0.0132	0.0106	***equation***	*<0.003*	*<0.003*	*<0.003*	0.0032	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Second Portage Lake (SP)										Tehek Lake									
Station																Tehek (TE)									
Area-Replicate ID						SP-70-S	SP-71-S	SP-72-S	SP-73-S	SP-74-S	SP-75-S	SP-76-S	SP-77-S	SP-78-S	SP-79-S	TE-70-S	TE-71-S	TE-72-S	TE-73-S	TE-74-S	TE-75-S	TE-76-S	TE-77-S	TE-78-S	TE-79-S
Depth (m)	CCME (2012)		Trigger[2]			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Baker Lake	Wally Lake	Threshold[2]	19-Jul-14	19-Jul-14	26-Aug-14	26-Aug-14	15-Sep-14	15-Sep-14	02-Nov-14	02-Nov-14	18-Dec-14	18-Dec-14	30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14	28-Nov-14	28-Nov-14	20-Dec-14	20-Dec-14
Dissolved Metals (mg/L)																									
Aluminum[3]		0.0263	0.0274	0.0260	0.05	0.0020	0.0032	0.0029	0.0044	0.0024	0.0034	0.0016	0.0013	*<0.001*	*<0.001*	0.0018	0.0034	0.0064	0.0053	0.0039	0.0032	0.0017	0.0017	0.0011	0.0011
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		0.0026	0.0026	0.0026	0.005	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	*<0.0001*	0.0001	0.0001	*<0.0001*	0.0001	0.0001	0.0001	*<0.0001*	*<0.0001*	0.0001
Barium		0.5010	0.5089	0.5000	1	0.0025	0.0025	0.0024	0.0023	0.0024	0.0024	0.0024	0.0023	0.0031	0.0018	0.0021	0.0021	0.0022	0.0020	0.0022	0.0021	0.0021	0.0020	0.0024	0.0029
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron		0.76	0.76	0.76	1.5	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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		0.000025	0.000025	0.000025	0.00004	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium						3.49	3.49	3.59	3.55	3.60	3.61	3.76	3.73	4.46	3.08	1.77	2.21	2.32	1.89	2.34	2.16	1.89	1.55	1.98	2.87
Chromium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Copper		0.00119	0.00116	0.00148	0.002	0.00051	0.00053	0.00051	0.00047	0.00057	0.00054	0.00049	0.00050	0.00063	0.00048	0.00030	0.00038	0.00051	0.00042	0.00040	0.00036	0.00033	0.00034	0.00032	0.00046
Iron		0.155	0.155	0.155	0.3	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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		0.000525	0.000525	0.000525	0.001	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00005	*<0.00005*	0.00012	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*
Lithium		0.048	0.048	0.048	0.096	*<0.0005*	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.00	*<0.0005*	*<0.0005*	0.00	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Magnesium						1.11	1.11	1.14	1.13	1.14	1.15	1.20	1.19	1.46	0.98	0.69	0.79	0.82	0.72	0.82	0.78	0.70	0.62	0.77	1.04
Manganese[3]		0.315	0.339	0.330	***equation***	0.0010	0.0011	0.0006	0.0006	0.0005	0.0006	0.0003	0.0002	0.0002	0.0001	0.0006	0.0006	0.0009	0.0007	0.0005	0.0006	0.0002	0.0002	0.0002	0.0003
Mercury		0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum		0.037	0.037	0.037	0.073	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	*<0.00005*	0.0001	0.0001	0.0001	*<0.00005*	0.0001	0.0001
Nickel		0.013	0.013	0.013	0.025	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<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*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Potassium						0.48	0.48	0.49	0.48	0.47	0.50	0.51	0.50	0.61	0.37	0.38	0.43	0.43	0.40	0.45	0.44	0.42	0.37	0.44	0.54
Selenium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.18	0.18	0.19	0.19	0.21	0.21	0.22	0.23	0.28	0.24	0.13	0.15	0.19	0.16	0.17	0.17	0.13	0.11	0.14	0.21
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*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Sodium						0.67	0.64	0.69	0.65	0.72	0.72	0.76	0.72	0.97	0.56	0.56	0.60	0.65	0.61	0.66	0.63	0.61	0.58	0.68	0.82
Strontium		0.028	0.049	0.033	0.049	0.0150	0.0151	0.0154	0.0150	0.0161	0.0158	0.0165	0.0162	0.0207	0.0140	0.0085	0.0105	0.0110	0.0090	0.0110	0.0100	0.0094	0.0081	0.0101	0.0141
Sulfur						1.19	1.21	1.24	1.20	1.24	1.24	1.40	1.35	1.69	1.07	0.73	0.88	0.92	0.78	0.90	0.85	0.81	0.74	0.93	1.21
Thallium		0.00041	0.00041	0.00041	0.0008	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		1.01	1.01	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium		0.0075	0.0075	0.0075	0.015	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00005	0.00003	0.00003	0.00004	0.00006	0.00005	0.00005	0.00004	0.00003	0.00003	0.00004	0.00004
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]		0.0053	0.0122	0.0096	***equation***	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.002	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.002	*<0.001*	0.002

Lake																Tehek Lake									
Station																Tehek Farfield (TEFF)									
Area-Replicate ID																TEFF-31-S	TEFF-32-S	TEFF-33-S	TEFF-34-S	TEFF-35-S	TEFF-36-S				
Depth (m)																3	3	3	3	3	3				
Date																30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14				
Dissolved Metals (mg/L)																									
Aluminum[3]																0.0021	0.0015	0.0026	0.0045	0.0017	0.0016				
Antimony																*<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*				
Barium																0.0020	0.0020	0.0020	0.0020	0.0020	0.0020				
Beryllium																*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*				
Bismuth																*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*				
Boron																*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*				
Cadmium																*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*				
Calcium																1.34	1.52	1.31	1.41	1.48	1.44				
Chromium																*<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*				
Copper																0.00023	0.00026	0.00032	0.00034	0.00025	0.00026				
Iron																*<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*				
Lithium																*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*				
Magnesium																0.56	0.61	0.55	0.58	0.60	0.59				
Manganese[3]																0.0005	0.0006	0.0004	0.0004	0.0003	0.0004				
Mercury																*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*				
Molybdenum																*<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*				
Phosphorus																*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*				
Potassium																0.33	0.39	0.36	0.36	0.39	0.40				
Selenium																*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*				
Silicon																0.10	0.11	0.10	0.11	0.11	0.10				
Silver																*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*				
Sodium																0.53	0.54	0.55	0.56	0.56	0.56				
Strontium																0.0069	0.0075	0.0068	0.0073	0.0075	0.0073				
Sulfur																0.64	0.72	0.65	0.67	0.67	0.70				
Thallium																*<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*				
Titanium																*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*				
Uranium																0.00003	0.00003	0.00003	0.00003	0.00003	0.00003				
Vanadium																*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*				
Zinc[3]																*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*				

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2014.

[2] Trigger and threshold values were developed in "CREMP Design Document 2012" (Azimuth, 2012).

A number of thresholds were derived from methods (or sources) other than CCME guidelines - see **Appendix A** for 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.

* Data for TDS, conductivity, and chlorophyll-a should be interpreted with caution, particularly at low concentrations, see **Section 3.1** of the text.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Inuggugayualik Lake (INUG)										Pipedream Lake (PDL)						Wally Lake (WAL)									
Station						INUG-58-S	INUG-59-S	INUG-60-S	INUG-61-S	INUG-62-S	INUG-63-S	INUG-64-S	INUG-65-S	INUG-66-S	INUG-67-S	PDL-31-S	PDL-32-S	PDL-33-S	PDL-34-S	PDL-35-S	PDL-36-S	WAL-39-S	WAL-40-S	WAL-41-S	WAL-42-S	WAL-43-S	WAL-44-S	WAL-45-S	WAL-46-S	WAL-47-S	WAL-48-S
Area-Replicate ID						3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Depth (m)	CCME (2012)		Trigger[2]			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Date	Guideline[1]	Meadowbank	Baker Lake	Wally Lake	Threshold[2]	30-Jul-14	30-Jul-14	03-Sep-14	03-Sep-14	21-Sep-14	21-Sep-14	29-Nov-14	29-Nov-14	19-Dec-14	19-Dec-14	30-Jul-14	30-Jul-14	03-Sep-14	03-Sep-14	10-Sep-14	10-Sep-14	26-Jul-14	26-Jul-14	27-Aug-14	27-Aug-14	22-Sep-14	22-Sep-14	02-Nov-14	02-Nov-14	18-Dec-14	18-Dec-14
Field Measurements (Surface)																															
Temperature (°C)						15.2	15.2	9.7	9.8	3.1	3.5	0.5	0.7	0.8	0.4	13.6	13.4	9.8	10.8	8.6	8.7	14.9	14.6	9.7	9.7	1.7	1.7	1.7	2.0	0.4	0.7
Specific Conductivity (µS/cm)						0	0	12.2	12.3	11	9	10	22	14	15	4	0	17.3	17.3	14	18	12	9	31.6	31.4	29	32	42	31	45	42
Dissolved Oxygen (mg/L)						7.01	10.14	10.54	11.27	11.86	11.91	13.18	20.29	11.85	13.64	10.62	7.00	11.53	10.69	11.14	11.03	12.57	7.64	12.01	12.2	12.48	12.1	14.71	19.39	14.09	13.96
pH	6.5 - 9.0	6.30 - 8.25	6.50 - 8.32	6.54 - 8.34	6.5 - 9.0	7.38	7.61	7.34	7.21	7.58	7.71	6.95	6.88	7.02	6.94	7.51	7.55	7.54	7.32	7.04	7.18	7.68	7.72	7.56	7.54	6.99	7.48	**5.81**	**5.87**	7.02	6.77
Physical Tests (mg/L)																															
Conductivity (µS/cm)*		23.5	494.5	36.6		19	18	19	12	16	15	17	20	19	19	**24**	**24**	**24**	**24**	20	20	35	34	**40**	**41**	**42**	**40**	**41**	**40**	**45**	**47**
Hardness		8.5	41.2	16.7		5.7	5.6	5.6	5.7	5.6	5.7	5.9	6.1	5.8	6.0	**8.7**	**8.7**	**8.9**	**9.0**	**8.8**	**8.8**	14.5	14.4	15.4	15.6	15.8	15.6	**16.9**	16.6	**17.2**	15.9
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.86 - 8.11	6.92 - 8.17	6.5 - 9.0	**6.28**	**6.29**	**6.07**	**6.10**	**6.47**	**6.49**	6.59	6.56	6.59	6.57	**6.47**	**6.43**	**6.33**	**6.33**	6.67	6.64	**6.69**	**6.66**	**6.75**	**6.78**	**6.72**	**6.74**	**6.79**	**6.68**	6.93	6.94
Total Dissolved Solids*		18.0	208	25.3		12	12	13	12	10	10	11	13	12	13	16	16	16	16	13	13	23	23	**27**	**27**	**28**	**26**	**27**	**27**	**30**	**31**
Anions and Nutrients (mg/L)																															
Alkalinity - Carbonate		4	4	4		*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Alkalinity - Hydroxide						*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Ammonia (as N)[3]	***equation***	0.065	0.067	0.067	0.126	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.01	0.01	0.01	0.01	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.02	0.02
Bromide						*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<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	120	60.28	95.7	60.2	120	0.71	0.71	0.73	0.73	0.74	0.74	0.77	0.79	0.77	0.79	0.60	0.60	0.60	0.60	0.61	0.61	0.65	0.65	0.68	0.67	0.72	0.68	0.71	0.69	0.71	0.74
Fluoride	0.120					0.06	0.06	0.06	0.06	0.07	0.06	0.07	0.07	0.07	0.07	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06
Nitrate (as N)	3.0	1.50	1.51	1.50	3	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<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)	0.060	0.031	0.031	0.031	0.060	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Ortho Phosphate (as P)		0.002	0.002	0.002		*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.0019	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<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 Diss.						*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0026	0.0026	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0021	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0026	0.0027	*<0.002*	*<0.002*	*<0.002*	*<0.002*
Phosphorus (P)-Total	0.0040	0.0060	0.0096	0.0067	0.004	0.0037	0.0023	0.0026	*<0.002*	*<0.002*	0.0022	*<0.002*	*<0.002*	0.0022	0.0025	*<0.002*	*<0.002*	*<0.002*	*<0.002*	0.0022	0.0029	*<0.002*	0.0021	0.0023	0.0022	*<0.002*	*<0.002*	0.0021	*<0.002*	*<0.002*	0.0025
Silicate (as SiO_2)		1.0	1.0	1.08		*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	0.63	0.62	0.76	0.71	0.74	0.75	0.96	0.97	0.97	1.04
Sulphate (SO_4)		64.71	65.92	65.20	128	0.86	0.87	0.88	0.88	0.88	0.89	0.93	0.98	0.94	0.96	1.61	1.61	1.63	1.63	1.65	1.65	2.84	2.83	3.13	3.12	3.43	3.33	3.56	3.51	3.58	3.73
Organic / Inorganic Carbon (mg/L)																															
Dissolved Organic Carbon		2.60	4.05	3.21		1.86	1.56	1.78	1.63	1.88	2.22	1.96	1.96	1.82	1.80	1.35	1.37	1.52	1.58	1.83	2.02	1.53	1.59	1.78	1.79	1.86	1.97	2.12	1.98	2.04	2.12
Total Organic Carbon		2.79	4.25	4.11		1.71	1.52	2.05	2.08	1.91	2.25	1.94	2.02	1.96	1.80	1.41	1.36	1.88	1.83	1.55	1.96	1.65	1.74	2.08	1.80	1.95	1.97	2.10	2.01	2.00	2.35
Plant Pigments (ug/L)																															
Chlorophyll-a*						0.118	0.075	0.486	0.408	0.320	0.424	0.262	0.190	0.154	0.148	0.055	0.107	0.318	0.308	0.304	0.364	0.296	0.312	0.618	0.644	0.262	0.256	0.652	0.488	0.172	0.226
Cyanides																															
Total Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Free Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Total Metals (mg/L)																															
Aluminum[3]	***equation***	0.054	0.056	0.053	0.100	0.0035	0.0044	0.0143	0.0099	0.0078	0.0080	0.0060	0.0056	0.0044	0.0039	*<0.003*	0.0032	0.0048	0.0060	0.0054	0.0067	0.0052	0.0048	0.0124	0.0128	0.0075	0.0071	0.0042	0.0043	*<0.003*	*<0.003*
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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	0.0050	0.00255	0.00257	0.0026	0.005	*<0.0001*	*<0.0001*	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.0001	*<0.0001*	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Barium		0.50	0.51	0.50	1	0.0017	0.0018	0.0021	0.0019	0.0017	0.0018	0.0018	0.0018	0.0016	0.0017	0.0019	0.0019	0.0020	0.0020	0.0018	0.0019	0.0019	0.0019	0.0019	0.0018	0.0018	0.0019	0.0020	0.0020	0.0020	0.0021
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron	1.5	0.76	0.76	0.76	1.5	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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[3]	***equation***	0.000025	0.000025	0.000025	0.000040	*<0.00001*	*<0.00001*	0.00	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium		2.15	4.50	4.88		1.07	1.11	1.16	1.16	1.14	1.14	1.22	1.25	1.19	1.21	**2.19**	**2.21**	**2.23**	**2.24**	**2.16**	**2.16**	3.91	3.89	4.22	4.20	4.27	4.16	4.34	4.53	4.63	4.77
Chromium[4]	0.001	0.00056	0.00056	0.00055	0.001	*<0.0001*	*<0.0001*	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.0001	*<0.0001*	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*	*<0.0001*	*<0.0001*	*<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[3]	***equation***	0.00124	0.00125	0.00149	0.002	*<0.0005*	*<0.0005*	0.0009	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0006	0.0005	0.0005	0.0007	0.0009	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0008	0.0009
Iron	0.3	0.155	0.160	0.157	0.3	0.02	*<0.01*	0.02	0.02	0.01	0.02	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.01	0.02	0.02	0.03	0.04	0.02	0.02	0.01	0.01	*<0.01*	*<0.01*
Lead[3]	***equation***	0.000525	0.000525	0.000525	0.001	*<0.00005*	*<0.00005*	0.00013	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00023	*<0.00005*	0.00024	*<0.00005*	*<0.00005*	0.00006	0.00007	0.00007	*<0.00005*	0.00009	*<0.00005*	*<0.00005*
Lithium		0.048	0.048	0.048	0.096	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Magnesium		0.83	7.44	1.36		0.67	0.69	0.70	0.73	0.72	0.72	0.74	0.75	0.72	0.74	0.78	0.78	0.79	0.79	0.75	0.75	1.15	1.16	1.23	1.22	1.26	1.22	1.29	1.33	**1.37**	**1.40**
Manganese[3]		0.3157	0.3400	0.3300	***equation***	0.0014	0.0014	0.0020	0.0015	0.0013	0.0014	0.0008	0.0008	0.0007	0.0006	0.0007	0.0007	0.0009	0.0009	0.0010	0.0009	0.0014	0.0013	0.0019	0.0020	0.0011	0.0012	0.0008	0.0008	0.0006	0.0006
Mercury	0.000026	0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum	0.073	0.0365	0.0365	0.0370	0.073	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel[3]	***equation***	0.0127	0.0128	0.0130	0.025	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	*<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*	*<0.05*	*<0.05*	*<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		0.50	2.43	0.59		0.39	0.40	0.38	0.40	0.40	0.39	0.38	0.39	0.38	0.38	0.37	0.31	0.36	0.35	0.35	0.34	0.44	0.43	0.42	0.44	0.45	0.43	0.49	0.49	0.49	0.49
Selenium	0.001	0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.09	0.09	0.11	0.12	0.11	0.11	0.11	0.12	0.10	0.10	0.12	0.13	0.13	0.13	0.12	0.13	0.33	0.32	0.44	0.43	0.44	0.43	0.41	0.43	0.45	0.47
Silver	0.0001					*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.975	54.0	0.72		0.49	0.51	0.63	0.57	0.56	0.56	0.58	0.59	0.57	0.59	0.45	0.46	0.49	0.48	0.52	0.50	0.52	0.51	0.55	0.53	0.55	0.54	0.57	0.58	0.61	0.65
Strontium		0.0279	0.0564	0.0330	0.049	0.0061	0.0063	0.0069	0.0067	0.0064	0.0063	0.0069	0.0070	0.0066	0.0069	0.0089	0.0091	0.0094	0.0093	0.0088	0.0093	0.0190	0.0192	0.0210	0.0198	0.0208	0.0203	0.0200	0.0216	0.0238	0.0247
Sulfur						*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	0.61	0.56	0.59	0.61	0.54	0.61	0.98	0.98	1.08	1.05	1.13	1.10	1.20	1.26	1.24	1.30
Thallium	0.0008	0.00041	0.00041	0.00041	0.0008	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<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		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		1.00	1.00	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium	0.015	0.0075	0.0075	0.0075	0.015	0.000037	0.000039	0.000047	0.000044	0.000038	0.000040	0.000037	0.000042	0.000036	0.000036	0.00002	0.00002	0.00003	0.00002	0.00002	0.00002	0.00004	0.00004	0.00006	0.00005	0.00005	0.00005	0.00005	0.00004	0.000043	0.000041
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]	0.030	0.0063	0.0132	0.0106	***equation***	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Inuggugayualik Lake (INUG)										Pipedream Lake (PDL)						Wally Lake (WAL)									
Station						INUG-58-S	INUG-59-S	INUG-60-S	INUG-61-S	INUG-62-S	INUG-63-S	INUG-64-S	INUG-65-S	INUG-66-S	INUG-67-S	PDL-31-S	PDL-32-S	PDL-33-S	PDL-34-S	PDL-35-S	PDL-36-S	WAL-39-S	WAL-40-S	WAL-41-S	WAL-42-S	WAL-43-S	WAL-44-S	WAL-45-S	WAL-46-S	WAL-47-S	WAL-48-S
Area-Replicate ID						3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Depth (m)	CCME (2012)		Trigger[2]																												
Date	Guideline[1]	Meadowbank	Baker Lake	Wally Lake	Threshold[2]	30-Jul-14	30-Jul-14	03-Sep-14	03-Sep-14	21-Sep-14	21-Sep-14	29-Nov-14	29-Nov-14	19-Dec-14	19-Dec-14	30-Jul-14	30-Jul-14	03-Sep-14	03-Sep-14	10-Sep-14	10-Sep-14	26-Jul-14	26-Jul-14	27-Aug-14	27-Aug-14	22-Sep-14	22-Sep-14	02-Nov-14	02-Nov-14	18-Dec-14	18-Dec-14
Dissolved Metals (mg/L)																															
Aluminum[3]		0.0263	0.0274	0.0260	0.05	0.0012	0.0056	0.0021	0.0022	0.0018	0.0024	0.0028	0.0017	0.0014	0.0012	*<0.001*	*<0.001*	0.0013	0.0016	0.0013	0.0024	0.0032	0.0035	0.0041	0.0027	0.0012	*<0.001*	0.0020	0.0012	*<0.001*	*<0.001*
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		0.0026	0.0026	0.0026	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	0.0002	0.0002	0.0001	0.0002	0.0003	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003	0.0003	0.0002
Barium		0.5010	0.5089	0.5000	1	0.0017	0.0017	0.0018	0.0017	0.0017	0.0017	0.0017	0.0018	0.0016	0.0017	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0018	0.0019	0.0018	0.0019	0.0018	0.0017	0.0019	0.0019	0.0020	0.0018
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron		0.76	0.76	0.76	1.5	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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		0.000025	0.000025	0.000025	0.00004	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium						1.13	1.11	1.12	1.13	1.11	1.12	1.18	1.23	1.15	1.19	2.21	2.20	2.24	2.29	2.24	2.22	3.91	3.90	4.18	4.23	4.29	4.19	4.59	4.48	4.64	4.29
Chromium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.00	0.00	*<0.0001*	0.00	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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*	*<0.0001*	*<0.0001*	*<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		0.00119	0.00116	0.00148	0.002	0.00034	0.00030	0.00033	0.00030	0.00042	0.00035	0.00030	0.00031	0.00031	0.00030	0.00043	0.00040	0.00039	0.00040	0.00046	0.00056	0.00075	0.00074	0.00069	0.00070	0.00070	0.00072	0.00077	0.00070	0.00077	0.00071
Iron		0.155	0.155	0.155	0.3	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<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		0.000525	0.000525	0.000525	0.001	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00006	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00007	*<0.00005*	0.00005	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00008	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*
Lithium		0.048	0.048	0.048	0.096	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Magnesium						0.69	0.68	0.69	0.70	0.69	0.70	0.72	0.74	0.70	0.72	0.78	0.78	0.79	0.81	0.78	0.78	1.15	1.14	1.21	1.23	1.25	1.24	1.33	1.31	1.36	1.25
Manganese[3]		0.315	0.339	0.330	***equation***	0.0004	0.0004	0.0005	0.0005	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	0.0003	0.0003	0.0002	0.0003	0.0007	0.0008	0.0006	0.0008	0.0004	0.0004	0.0002	0.0001	0.0002	0.0002
Mercury		0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00005*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum		0.037	0.037	0.037	0.073	0.0001	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel		0.013	0.013	0.013	0.025	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	0.0006	0.0005	0.0005	0.0005	0.0005	0.0006	*<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*	*<0.05*	*<0.05*	*<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						0.36	0.38	0.39	0.39	0.37	0.37	0.40	0.36	0.35	0.39	0.34	0.33	0.35	0.35	0.37	0.36	0.40	0.41	0.43	0.43	0.43	0.46	0.48	0.47	0.46	0.45
Selenium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.09	0.09	0.12	0.11	0.12	0.13	0.12	0.12	0.33	0.33	0.40	0.41	0.43	0.42	0.43	0.42	0.45	0.43
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*	*<0.00001*	*<0.00001*	*<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						0.52	0.52	0.53	0.54	0.54	0.57	0.56	0.57	0.56	0.57	0.47	0.47	0.47	0.46	0.51	0.51	0.52	0.52	0.52	0.52	0.56	0.56	0.58	0.57	0.63	0.56
Strontium		0.028	0.049	0.033	0.049	0.0060	0.0060	0.0061	0.0062	0.0061	0.0061	0.0064	0.0067	0.0064	0.0063	0.0088	0.0088	0.0089	0.0088	0.0091	0.0094	0.0187	0.0187	0.0194	0.0194	0.0200	0.0198	0.0211	0.0209	0.0218	0.0215
Sulfur						*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	0.55	0.53	0.55	0.58	0.54	0.56	0.95	0.98	1.02	1.03	1.07	1.06	1.21	1.18	1.22	1.15
Thallium		0.00041	0.00041	0.00041	0.0008	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	0.00	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Tin		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<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		1.01	1.01	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium		0.0075	0.0075	0.0075	0.015		0.00003	0.00003	0.00004	0.00003	0.00004	0.00003	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00005	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]		0.0053	0.0122	0.0096	***equation***	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.001	0.003	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.001	0.002	*<0.001*	*<0.001*	0.006	*<0.001*	0.002	*<0.001*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2014.

[2] Trigger and threshold values were developed in "CREMP Design Document 2012" (Azimuth, 2012).

A number of thresholds were derived from methods (or sources) other than CCME guidelines - see **Appendix A** for 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.

* Data for TDS, conductivity, and chlorophyll-a should be interpreted with caution, particularly at low concentrations, see **Section 3.1** of the text.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Baker Lake						Baker Lake						Baker Lake					
Station						Akilahaarjuk Point (BAP)						Barge Dock (BBD)						Proposed Jetty (BPJ)					
Area-Replicate ID	CCME (2012)		Trigger[2]		Threshold[2]	BAP-31-S	BAP-32-S	BAP-33-S	BAP-34-S	BAP-35-S	BAP-36-S	BBD-31-S	BBD-32-S	BBD-33-S	BBD-34-S	BBD-35-S	BBD-36-S	BPJ-31-S	BPJ-32-S	BPJ-33-S	BPJ-34-S	BPJ-35-S	BPJ-36-S
Depth (m)	Guideline[1]	Meadowbank	Baker Lake	Wally Lake		3	3	3	3	-	3	3	3	3	3	3	3	3	3	3	3	3	3
Date						22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	-	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14
Field Measurements (Surface)																							
Temperature (°C)						6.8	6.5	8.2	8.2	-	4.9	8.2	8.8	9.7	9.7	4.2	4.2	8.4	8.4	8.7	8.7	3.9	3.9
Specific Conductivity (µS/cm)						376	328	503	504	-	988	9	35	26.2	24.3	173	161	33	9	290	344	775	604
Dissolved Oxygen (mg/L)						31.54	19.36	11.85	11.86	-	82.4	13.08	13.34	11.39	11.17	83.3	84.5	15.84	13.41	12.0	11.5	81.1	81.2
pH	6.5 - 9.0	6.30 - 8.25	6.50 - 8.32	6.54 - 8.34	6.5 - 9.0	6.66	6.87	7.15	7.26	-	8.19	7.17	7.42	7.42	7.30	-	-	7.05	7.15	7.32	7.17	-	7.55
Physical Tests (mg/L)																							
Conductivity (µS/cm)*		23.5	494.5	36.6		407	364	**638**	**643**	-	**742**	40	32	49	52	234	**849**	53	36	387	490	**736**	**562**
Hardness		8.5	41.2	16.7		**45.7**	40.7	**65.2**	**65.0**	-	**93.6**	10.6	11.1	12.2	11.6	32.0	26.4	12.6	11.0	**42.4**	**48.6**	**82.5**	**63.5**
pH (Laboratory)	6.5 - 9.0	6.50 - 7.94	6.86 - 8.11	6.92 - 8.17	6.5 - 9.0	**6.71**	**6.68**	**6.83**	**6.73**	-	**6.78**	**6.58**	**6.52**	**6.68**	**6.65**	**6.75**	**6.80**	**6.56**	**6.59**	**6.68**	**6.70**	**6.73**	**6.75**
Total Dissolved Solids*		18.0	208	25.3		**271**	**243**	**425**	**428**	-	**494**	26	21	33	34	156	**566**	35	24	**258**	**327**	**491**	**375**
Anions and Nutrients (mg/L)																							
Alkalinity - Carbonate		4	4	4		*<2*	*<2*	*<2*	*<2*	-	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Alkalinity - Hydroxide						*<2*	*<2*	*<2*	*<2*	-	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*	*<2*
Ammonia (as N)[3]	***equation***	0.065	0.067	0.067	0.126	*<0.005*	*<0.005*	0.01	*<0.005*	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.01	0.01	0.01	*<0.005*
Bromide						0.34	0.32	0.60	0.59	-	0.89	*<0.05*	*<0.05*	*<0.05*	*<0.05*	0.22	0.17	*<0.05*	*<0.05*	0.36	0.43	0.81	0.60
Chloride	120	60.28	95.7	60.2	120	**103**	92	**172**	**169**	-	**263**	2	5	9	6	62	49	8	3	**104**	**124**	**231**	**171**
Fluoride	0.120					0.07	0.07	0.07	0.07	-	*<0.2*	0.06	0.06	0.06	0.04	0.06	0.06	0.06	0.06	0.07	0.07	*<0.2*	0.07
Nitrate (as N)	3.0	1.50	1.51	1.50	3	0.0155	0.0134	0.0187	0.0188	-	*<0.05*	0.0098	0.0083	0.0077	0.0055	0.0117	0.0119	0.0108	0.0097	0.0178	0.0195	*<0.05*	0.0218
Nitrite (as N)	0.060	0.031	0.031	0.031	0.060	*<0.001*	*<0.001*	*<0.001*	*<0.001*	-	*<0.01*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.01*	*<0.001*
Ortho Phosphate (as P)		0.002	0.002	0.002		*<0.001*	*<0.001*	*<0.001*	*<0.001*	-	*<0.001*	0.0010	*<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 Diss.						*<0.002*	0.0022	*<0.002*	*<0.002*	-	0.0033	0.0020	0.0025	0.0022	0.0021	0.0032	*<0.002*	0.0021	*<0.002*	*<0.002*	0.0021	0.0038	0.0043
Phosphorus (P)-Total	0.0040	0.0060	0.0096	0.0067	0.004	0.0040	0.0031	0.0025	*<0.002*	-	*<0.002*	**0.0045**	0.0035	0.0024	0.0028	0.0031	**0.0043**	**0.0044**	0.0033	*<0.002*	0.0026	0.0028	0.0024
Silicate (as SiO_2)		1.0	1.0	1.08		*<0.5*	*<0.5*	*<0.5*	*<0.5*	-	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	0.71
Sulphate (SO_4)		64.71	65.92	65.20	128	15.10	13.50	24.90	24.40	-	36.90	0.81	1.21	1.78	1.07	9.32	7.42	1.60	0.92	15.20	18.00	32.40	24.90
Organic / Inorganic Carbon (mg/L)																							
Dissolved Organic Carbon		2.60	4.05	3.21		3.07	3.03	3.08	2.98	-	3.60	3.04	3.03	3.02	3.03	3.33	3.55	3.12	3.01	3.17	3.01	3.55	3.86
Total Organic Carbon		2.79	4.25	4.11		3.12	3.00	3.32	3.56	-	3.56	3.18	3.08	3.35	3.33	3.67	3.46	3.00	3.01	3.50	3.47	3.76	3.59
Plant Pigments (ug/L)																							
Chlorophyll-a*						0.839	0.477	0.620	0.684	-	0.874	0.608	0.362	0.366	0.568	0.454	0.460	0.793	0.767	0.406	0.420	0.628	0.600
Cyanides																							
Total Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	-	*<0.005*	*<0.005*
Free Cyanide						*<0.005*	*<0.005*	*<0.005*	*<0.005*	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	-	*<0.005*	*<0.005*
Total Metals (mg/L)																							
Aluminum[3]	***equation***	0.054	0.056	0.053	0.100	0.0083	0.0101	0.0099	0.0080	-	0.0119	0.0062	0.0065	0.0099	0.0084	0.0120	0.0145	0.0075	0.0070	0.0092	0.0085	0.0191	0.0157
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<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	0.0050	0.00255	0.00257	0.0026	0.005	0.0002	0.0002	0.0002	0.0002	-	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0001	0.0002
Barium		0.50	0.51	0.50	1	0.0168	0.0174	0.0194	0.0201	-	0.0202	0.0166	0.0164	0.0208	0.0200	0.0198	0.0199	0.0186	0.0162	0.0191	0.0203	0.0214	0.0195
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	-	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron	1.5	0.76	0.76	0.76	1.5	0.03	0.02	0.04	0.05	-	0.08	*<0.01*	*<0.01*	0.01	*<0.01*	0.02	0.02	*<0.01*	*<0.01*	0.03	0.04	0.07	0.05
Cadmium[3]	***equation***	0.000025	0.000025	0.000025	0.000040	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	-	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium		2.15	4.50	4.88		**4.65**	4.36	**6.17**	**6.48**	-	**8.00**	2.44	2.44	3.21	2.67	3.81	3.48	2.55	2.41	**4.54**	**5.09**	**6.96**	**6.13**
Chromium[4]	0.001	0.00056	0.00056	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	0.0001	*<0.0001*	*<0.0001*	0.0001	*<0.0001*	0.0002	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*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Copper[3]	***equation***	0.00124	0.00125	0.00149	0.002	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	-	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	**0.0014**	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Iron	0.3	0.155	0.160	0.157	0.3	0.01	0.01	0.01	0.01	-	0.01	0.01	*<0.01*	0.01	0.01	0.02	0.02	*<0.01*	0.01	0.01	0.01	0.03	0.03
Lead[3]	***equation***	0.000525	0.000525	0.000525	0.001	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	-	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00007	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*
Lithium		0.048	0.048	0.048	0.096	0.0015	0.0015	0.0021	0.0023	-	0.0037	0.0009	0.0010	0.0013	0.0010	0.0015	0.0014	0.0011	0.0008	0.0016	0.0020	0.0032	0.0027
Magnesium		0.83	7.44	1.36		**8.00**	7.15	**12.50**	**13.20**	-	**18.50**	1.10	1.18	2.90	1.39	5.21	4.00	1.50	1.15	7.44	**9.25**	**15.40**	**12.70**
Manganese[3]		0.3157	0.3400	0.3300	***equation***	0.0019	0.0035	0.0026	0.0025	-	0.0016	0.0025	0.0024	0.0025	0.0022	0.0027	0.0027	0.0029	0.0023	0.0035	0.0034	0.0028	0.0030
Mercury	0.000026	0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	-	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum	0.073	0.0365	0.0365	0.0370	0.073	0.0001	0.0001	0.0001	0.0001	-	0.0002	*<0.00005*	*<0.00005*	0.0001	0.0001	0.0001	0.0001	*<0.00005*	*<0.00005*	0.0001	0.0001	0.0002	0.0001
Nickel[3]	***equation***	0.0127	0.0128	0.0130	0.025	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	-	*<0.0005*	*<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*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Potassium		0.50	2.43	0.59		**2.65**	2.38	**3.85**	**4.07**	-	**5.61**	0.45	0.47	1.01	0.55	1.67	1.31	0.58	0.47	2.36	**2.89**	**4.67**	**3.90**
Selenium	0.001	0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.14	0.14	0.14	0.14	-	0.15	0.11	0.10	0.08	0.08	0.09	0.09	0.11	0.11	0.12	0.12	0.15	0.14
Silver	0.0001					*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	-	*<0.00001*	*<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		0.975	54.0	0.72		**57**	49.8	**89**	**94**	-	**136**	1.0	1.7	15.9	3.3	33.6	23.8	5.0	1.5	50.4	**66**	**114**	**92**
Strontium		0.0279	0.0564	0.0330	0.049	**0.058**	**0.053**	**0.083**	**0.085**	-	**0.123**	0.0175	0.0182	0.0307	0.0206	0.0430	0.0356	0.020	0.018	**0.054**	**0.066**	**0.104**	**0.087**
Sulfur						5.03	4.44	8.34	8.69	-	12.70	*<0.5*	*<0.5*	1.56	*<0.5*	3.26	2.40	0.60	*<0.5*	4.78	6.04	10.60	8.41
Thallium	0.0008	0.00041	0.00041	0.00041	0.0008	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	-	*<0.00001*	*<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		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<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		1.00	1.00	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	-	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium	0.015	0.0075	0.0075	0.0075	0.015	0.00005	0.00005	0.00006	0.00007	-	0.00007	0.00004	0.00004	0.00005	0.00004	0.00005	0.00005	0.00004	0.00003	0.00005	0.00006	0.00007	0.00006
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	-	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]	0.030	0.0063	0.0132	0.0106	***equation***	*<0.003*	*<0.003*	*<0.003*	*<0.003*	-	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*	*<0.003*

Table 3.3-1. Conventional water chemistry and total and dissolved metals (mg/L), Meadowbank study lakes and Baker Lake, 2014.

Lake						Baker Lake						Baker Lake						Baker Lake					
Station						Akilahaarjuk Point (BAP)						Barge Dock (BBD)						Proposed Jetty (BPJ)					
Area-Replicate ID	CCME (2012)		Trigger[2]			BAP-31-S	BAP-32-S	BAP-33-S	BAP-34-S	BAP-35-S	BAP-36-S	BBD-31-S	BBD-32-S	BBD-33-S	BBD-34-S	BBD-35-S	BBD-36-S	BPJ-31-S	BPJ-32-S	BPJ-33-S	BPJ-34-S	BPJ-35-S	BPJ-36-S
Depth (m)	Guideline[1]	Meadowbank	Baker Lake	Wally Lake	Threshold[2]	3	3	3	3	-	3	3	3	3	3	3	3	3	3	3	3	3	3
Date						22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	-	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14
Dissolved Metals (mg/L)																							
Aluminum[3]		0.0263	0.0274	0.0260	0.05	0.0042	0.0042	0.0017	0.0021	-	0.0021	0.0036	0.0039	0.0027	0.0030	0.0028	0.0018	0.0038	0.0034	0.0024	0.0027	0.0018	0.0023
Antimony		0.0101	0.0101	0.0100	0.020	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<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		0.0026	0.0026	0.0026	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*	0.0001	0.0001	0.0001	0.0001	0.0001
Barium		0.5010	0.5089	0.5000	1	0.0169	0.0174	0.0185	0.0192	-	0.0208	0.0167	0.0167	0.0194	0.0191	0.0184	0.0193	0.0165	0.0162	0.0184	0.0203	0.0196	0.0196
Beryllium		0.0027	0.0027	0.0027	0.0053	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Bismuth						*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	-	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*
Boron		0.76	0.76	0.76	1.5	0.03	0.02	0.04	0.04	-	0.07	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.02	0.02	*<0.01*	*<0.01*	0.02	0.03	0.06	0.05
Cadmium		0.000025	0.000025	0.000025	0.00004	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	-	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Calcium						4.79	4.44	6.05	6.04	-	7.83	2.45	2.49	2.61	2.57	3.88	3.55	2.57	2.46	4.55	4.96	7.10	5.89
Chromium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.00	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	0.00
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*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Copper		0.00119	0.00116	0.00148	0.002	0.00028	0.00024	0.00028	0.00046	-	0.00028	0.00022	0.00024	0.00034	0.00028	0.00034	0.00030	0.00025	0.00028	0.00028	0.00034	0.00028	0.00029
Iron		0.155	0.155	0.155	0.3	*<0.01*	*<0.01*	*<0.01*	*<0.01*	-	*<0.01*	*<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		0.000525	0.000525	0.000525	0.001	*<0.00005*	*<0.00005*	*<0.00005*	0.00010	-	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.00008	*<0.00005*	*<0.00005*
Lithium		0.048	0.048	0.048	0.096	0.0018	0.0017	0.0021	0.0022	-	0.0035	0.0010	0.0010	0.0010	0.0010	0.0015	0.0014	0.0011	0.0011	0.0016	0.0019	0.0027	0.0025
Magnesium						8.18	7.19	12.20	12.10	-	18.00	1.09	1.17	1.38	1.27	5.41	4.25	1.49	1.17	7.54	8.79	15.70	11.80
Manganese[3]		0.315	0.339	0.330	***equation***	0.0011	0.0009	0.0013	0.0014	-	0.0008	0.0014	0.0014	0.0007	0.0008	0.0011	0.0010	0.0013	0.0009	0.0020	0.0022	0.0016	0.0017
Mercury		0.000018	0.000018	0.000018	0.000026	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	-	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Molybdenum		0.037	0.037	0.037	0.073	0.0001	0.0001	0.0001	0.0001	-	0.0002	*<0.00005*	*<0.00005*	*<0.00005*	*<0.00005*	0.0001	0.0001	*<0.00005*	*<0.00005*	0.0001	0.0001	0.0002	0.0001
Nickel		0.013	0.013	0.013	0.025	*<0.0005*	*<0.0005*	*<0.0005*	*<0.0005*	-	*<0.0005*	*<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*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Potassium						2.63	2.30	3.73	3.74	-	5.42	0.44	0.46	0.52	0.49	1.71	1.38	0.55	0.45	2.39	2.72	4.75	3.61
Selenium		0.00055	0.00055	0.00055	0.001	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Silicon						0.14	0.13	0.12	0.12	-	0.12	0.10	0.10	0.06	0.05	0.07	0.06	0.11	0.10	0.10	0.10	0.11	0.10
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*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*
Sodium						57.50	50.20	84.30	84.70	-	137.00	0.93	1.63	3.23	2.41	35.50	25.90	4.30	1.59	47.70	60.90	120.00	86.10
Strontium		0.028	0.049	0.033	0.049	**0.056**	**0.050**	**0.078**	**0.077**	-	**0.117**	0.017	0.017	0.020	0.019	0.044	0.037	0.019	0.018	**0.052**	**0.060**	**0.104**	**0.082**
Sulfur						5.18	4.46	8.12	8.02	-	12.30	*<0.5*	*<0.5*	*<0.5*	*<0.5*	3.38	2.58	0.59	*<0.5*	4.64	5.66	10.80	7.99
Thallium		0.00041	0.00041	0.00041	0.0008	*<0.00001*	*<0.00001*	*<0.00001*	*<0.00001*	-	*<0.00001*	*<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		0.0002	0.0002	0.0002		*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	-	*<0.0001*	*<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		1.01	1.01	1.00	2	*<0.01*	*<0.01*	*<0.01*	*<0.01*	-	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium		0.0075	0.0075	0.0075	0.015	0.00005	0.00004	0.00005	0.00005	-	0.00006	0.00003	0.00003	0.00003	0.00003	0.00004	0.00004	0.00003	0.00003	0.00004	0.00005	0.00005	0.00006
Vanadium		0.0035	0.0035	0.0035	0.006	*<0.001*	*<0.001*	*<0.001*	*<0.001*	-	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Zinc[3]		0.0053	0.0122	0.0096	***equation***	*<0.001*	*<0.001*	*<0.001*	*<0.001*	-	*<0.001*	*<0.001*	*<0.001*	0.001	*<0.001*	*<0.001*	0.002	*<0.001*	*<0.001*	*<0.001*	*<0.001*	0.001	*<0.001*

Notes:

[1] CCME (Canadian Council of Ministers of the Environment) Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999, updated up to 2014.

[2] Trigger and threshold values were developed in "CREMP Design Document 2012" (Azimuth, 2012).

A number of thresholds were derived from methods (or sources) other than CCME guidelines - see **Appendix A** for 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.

* Data for TDS, conductivity, and chlorophyll-a should be interpreted with caution, particularly at low concentrations, see **Section 3.1** of the text.

123 Bolded concentrations exceed the trigger value.

123 Bolded and shaded concentrations also exceed the threshold value.

Italicized numbers are below detection limits.

Table 3.3-2. Screening process for water quality parameters, Meadowbank study lakes 2014.

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 3.3-1			Aluminum	Figure 3.3-18			Aluminum	Figure 3.3-32		
Hardness	Figure 3.3-2			Antimony			*	Antimony			*
pH -Field	Figure 3.3-3			Arsenic	Figure 3.3-19			Arsenic	Figure 3.3-33		
pH -Lab	Figure 3.3-4			Barium	Figure 3.3-20			Barium	Figure 3.3-34		
TSS	Figure 3.3-5			Beryllium			*	Beryllium			*
TDS	Figure 3.3-6			Boron			*	Boron			*
B-Alkalinity	Figure 3.3-7			Cadmium			*	Cadmium			*
C-Alkalinity			*	Calcium	Figure 3.3-21			Chromium			*
T-Alkalinity	Figure 3.3-8			Chromium	Figure 3.3-22			Copper	Figure 3.3-35		
Ammonia-N	Figure 3.3-9			Copper	Figure 3.3-23			Iron			*
Chloride	Figure 3.3-10			Iron	Figure 3.3-24			Lead			*
Nitrate-N	Figure 3.3-11			Lead			*	Lithium			*
Nitrite-N			*	Lithium			*	Manganese	Figure 3.3-36		
TKN	Figure 3.3-12			Magnesium	Figure 3.3-25			Mercury			*
T-phosphorous	Figure 3.3-13			Manganese	Figure 3.3-26			Molybdenum	Figure 3.3-37		
Ortho-phosphate			*	Mercury			*	Nickel			*
Reactive silica	Figure 3.3-14			Molybdenum	Figure 3.3-27			Selenium			*
Sulphate	Figure 3.3-15			Nickel			*	Strontium	Figure 3.3-38		
DOC	Figure 3.3-16			Potassium	Figure 3.3-28			Thallium			*
TOC	Figure 3.3-17			Selenium			*	Tin			*
T-Cyanide				Sodium	Figure 3.3-29			Titanium			*
Free Cyanide				Strontium	Figure 3.3-30			Uranium	Figure 3.3-39		
				Thallium			*	Vanadium			*
				Tin			*	Zinc			*
				Titanium			*				
				Uranium	Figure 3.3-31						
				Vanadium			*				
				Zinc			*				

Notes: [1] See text for further detail; ***** Plots for these parameters are presented in **Appendix E**.

Table 3.3-3. Water variables for which 2014 means exceeded triggers (or below the lower trigger for pH) for Meadowbank areas.

		Meadowbank Study Lakes									
		REF	REF	NF	NF	NF	MF	MF	FF		NF
Parameter Measured	**Trigger**	**INUG**	**PDL**	**TPN**	**TPE**	**SP**	**TPS**	**TE**	**TEFF**	**Trigger**	**WAL**
Conductivity*	23.5	-	-	31.3	33.4	40.4	29.0	24.8	-	36.6	40.5
Hardness	8.5	-	8.8	9.3	11.4	13.9	8.9	-	-	-	-
Calcium	2.1	-	2.2	2.3	2.7	3.8	2.2	-	-	-	-
Potassium	0.50	-	-	0.52	0.53	0.51	0.51	-	-	-	-
Magnesium	0.83	-	-	0.89	0.97	1.21	0.87	-	-	-	-
Sodium	0.98	-	-	1.22	1.00	-	1.17	-	-	-	-
TDS*	18.0	-	-	19.6	22.2	26.8	19.3	-	-	25.3	26.9
Lead (total)	0.000525	-	-	-	0.000879	-	-	-	-	-	-
pH Lab (lower trigger)	6.50	6.40	6.48	-	-	-	6.50	-	6.41	6.92	6.89

Notes:

*results should be interpreted with caution, particularly at low concentrations (see **Section 3.1.2** for more detail)

Reported mean values are all in units of mg/L with the exception of conductivity (µS/cm) and pH (unitless)

REF = reference; NF = near-field; MF = mid-field; FF = far-field

"-" = mean value does not exceed the trigger

Table 3.3-4. Results of BACI tests for selected water variables and Meadowbank areas in 2014.

See notes at the bottom of the next page.

Parameter Measured	Test Station	n(B)	n(A)	Estimate	SE	P-value[1]	Proportional Change		
							Exp(Est.)	LCI	UCI
Conductivity*	TPN	6	5	0.596	0.068	**0.000**	1.82	1.56	2.12
	TPE	8	5	0.635	0.060	**0.000**	1.89	1.66	2.15
	SP	5	5	0.423	0.083	**0.000**	1.53	1.26	1.85
	TPS	20	3	0.346	0.155	**0.018**	1.41	1.02	1.95
	TE	5	5	0.042	0.096	0.338	1.04	0.84	1.30
	WAL	18	5	0.097	0.065	**0.076**	1.10	0.96	1.26
Hardness	TPN	6	5	0.507	0.010	**0.000**	1.66	1.62	1.70
	TPE	8	5	0.682	0.055	**0.000**	1.98	1.75	2.23
	SP	5	5	0.362	0.051	**0.000**	1.44	1.28	1.62
	TPS	20	3	0.316	0.101	**0.003**	1.37	1.11	1.69
Calcium	TPN	6	5	0.545	0.017	**0.000**	1.72	1.66	1.79
	TPE	8	5	0.686	0.044	**0.000**	1.99	1.80	2.19
	SP	5	5	0.411	0.037	**0.000**	1.51	1.38	1.64
	TPS	20	3	0.354	0.122	**0.004**	1.42	1.10	1.84
Potassium	TPN	6	5	0.281	0.025	**0.000**	1.32	1.25	1.4
	TPE	8	5	0.311	0.016	**0.000**	1.36	1.32	1.41
	SP	5	5	0.275	0.031	**0.000**	1.32	1.23	1.41
	TPS	20	3	0.159	0.082	**0.033**	1.17	0.99	1.39
Magnesium	TPN	6	5	0.402	0.023	**0.000**	1.50	1.42	1.58
	TPE	8	5	0.482	0.042	**0.000**	1.62	1.48	1.78
	SP	5	5	0.334	0.036	**0.000**	1.40	1.28	1.52
	TPS	20	3	0.253	0.093	**0.007**	1.29	1.06	1.56
Sodium	TPN	6	5	0.764	0.025	**0.000**	2.15	2.03	2.27
	TPE	8	5	0.563	0.026	**0.000**	1.76	1.66	1.86
	TPS	20	3	0.511	0.185	**0.006**	1.67	1.14	2.45

Table 3.3-4 continued. Results of BACI tests for selected water variables and Meadowbank areas in 2014.

Parameter Measured	Test Station	n(B)	n(A)	Estimate	SE	P-value[1]	Proportional Change		
							Exp(Est.)	LCI	UCI
TDS*	TPN	6	5	0.426	0.094	**0.001**	1.53	1.24	1.90
	TPE	8	5	0.602	0.062	**0.000**	1.82	1.59	2.09
	SP	5	5	0.715	0.088	**0.000**	2.04	1.67	2.50
	TPS	20	3	0.373	0.228	**0.058**	1.45	0.91	2.33
	WAL	18	5	0.248	0.140	**0.045**	1.28	0.96	1.71
Lead (total)	TPE	8	5	0.551	0.410	0.103	1.74	0.70	4.28
pH Lab (lower)	TPS	20	3	0.028	0.017	0.944	1.03	0.99	1.06
	TEFF	14	3	0.019	0.006	0.997	1.02	1.01	1.03
	WAL	18	5	0.005	0.021	0.589	1.00	0.96	1.05

Notes:

*results should be interpreted with caution, particularly at low concentrations (see **Section 3.1.2** for more detail)

[1] **Bolded** values are P-values < 0.1

Test station = station 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 = one-tailed test of the null hypothesis of no change or a decrease in mean (opposite for a pH lower tigger)

Exp(Est.) = estimated proportional change (i.e., exp[Estimate])

LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Table 3.3-5. Screening process for water quality parameters, Baker Lake 2014.

CONVENTIONALS			TOTAL METALS			DISSOLVED METALS		
Screening Level	**1**	**2**	**Screening Level**	**1**	**2**	**Screening Level**	**1**	**2**
Screening Rule[1]	**>DL ≥ 10% frequency**	**C-I > 0.05 frequency**	**Screening Rule[1]**	**>DL ≥ 10% frequency**	**C-I > 0.05 frequency**	**Screening Rule[1]**	**>DL ≥ 10% frequency**	**C-I > 0.05 frequency**
Conductivity	Figure 3.3-40		Aluminum	Figure 3.3-58		Aluminum	Figure 3.3-76	
Hardness	Figure 3.3-41		Antimony		*	Antimony		*
pH -Field	Figure 3.3-42		Arsenic	Figure 3.3-59		Arsenic	Figure 3.3-77	
pH -Lab	Figure 3.3-43		Barium	Figure 3.3-60		Barium	Figure 3.3-78	
TSS	Figure 3.3-44		Beryllium		*	Beryllium		*
TDS	Figure 3.3-45		Boron	Figure 3.3-61		Boron	Figure 3.3-79	
B-Alkalinity	Figure 3.3-46		Cadmium		*	Cadmium		*
C-Alkalinity		*	Calcium	Figure 3.3-62		Chromium		*
T-Alkalinity	Figure 3.3-47		Chromium	Figure 3.3-63		Copper	Figure 3.3-80	
Ammonia-N	Figure 3.3-48		Copper	Figure 3.3-64		Iron		*
Chloride	Figure 3.3-49		Iron	Figure 3.3-65		Lead		*
Nitrate-N	Figure 3.3-50		Lead		Figure 3.3-66	Lithium	Figure 3.3-81	
Nitrite-N		*	Lithium	Figure 3.3-67		Manganese	Figure 3.3-82	
TKN	Figure 3.3-51		Magnesium	Figure 3.3-68		Mercury		*
T-phosphorous	Figure 3.3-52		Manganese	Figure 3.3-69		Molybdenum	Figure 3.3-83	
Ortho-phosphate	Figure 3.3-53		Mercury		*	Nickel		*
Reactive silica	Figure 3.3-54		Molybdenum	Figure 3.3-70		Selenium		*
Sulphate	Figure 3.3-55		Nickel		*	Strontium	Figure 3.3-84	
DOC	Figure 3.3-56		Potassium	Figure 3.3-71		Thallium		*
TOC	Figure 3.3-57		Selenium		*	Tin		*
T-Cyanide			Sodium	Figure 3.3-72		Titanium		*
Free Cyanide			Strontium	Figure 3.3-73		Uranium	Figure 3.3-85	
			Thallium		*	Vanadium		*
			Tin		*	Zinc	Figure 3.3-86	
			Titanium	Figure 3.3-74				
			Uranium	Figure 3.3-75				
			Vanadium		*			
			Zinc		*			

Notes: [1] See text for further detail; ***** Plots for these parameters are presented in **Appendix E**.

Table 3.3-6. Water variables for which 2014 means exceeded triggers (or below the lower trigger for pH) for Baker Lake areas.

		Baker Lake		
		REF	NF	NF
Parameter Measured	**Trigger**	BAP	BBD	BPJ
Chloride	95.7	177	-	106.8
Conductivity*	494.5	589.3	-	-
Hardness	41.2	67.3	-	43.4
Calcium	4.5	6.3	-	4.6
Potassium	2.4	4.0	-	2.5
Magnesium	7.4	13.0	-	7.9
Sodium	54.0	93.6	-	54.9
TDS*	208	393	-	252
Strontium (total)	0.056	0.088	-	0.058
Strontium (dissolved)	0.049	0.082	-	0.056
pH Lab (lower trigger)	6.860	6.752	6.663	6.668

Notes:

*results should be interpreted with caution, particularly at low concentrations (see **Section 3.1.2** for more detail)

Reported mean values are all in units of mg/L with the exception of conductivity (µS/cm) and pH (unitless)

REF = reference; NF = near-field

"-" = mean value does not exceed the trigger

Table 3.3-7. Results of BACI tests for selected water variables and Baker Lake areas in 2014.

Parameter Measured	Test Station	n(B)	n(A)	Estimate	SE	P-value[1]	Proportional Change		
							Exp(Est.)	LCI	UCI
Chloride	BPJ	16	3	-0.595	0.627	0.822	0.55	0.15	2.07
Hardness	BPJ	16	3	-0.525	0.257	0.972	0.59	0.34	1.02
Calcium	BPJ	16	3	-0.323	0.127	0.990	0.72	0.55	0.95
Potassium	BPJ	16	3	-0.640	0.264	0.987	0.53	0.30	0.92
Magnesium	BPJ	16	3	-0.629	0.327	0.964	0.53	0.27	1.06
Sodium	BPJ	16	3	-0.691	0.660	0.845	0.50	0.12	2.01
TDS*	BPJ	16	3	-0.580	0.396	0.919	0.56	0.24	1.29
Strontium (total)	BPJ	16	3	-0.496	0.202	0.987	0.61	0.40	0.93
Strontium (dissolved)	BPJ	13	3	-0.442	0.223	0.966	0.64	0.40	1.04
pH Lab (lower)	BBD	16	3	-0.002	0.026	0.470	1.00	0.95	1.05
	BPJ	16	3	-0.006	0.009	0.280	0.99	0.97	1.01

Notes:

*results should be interpreted with caution, particularly at low concentrations (see **Section 3.1.2** for more detail)

[1] **Bolded** values are P-values < 0.1

Test station = station 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

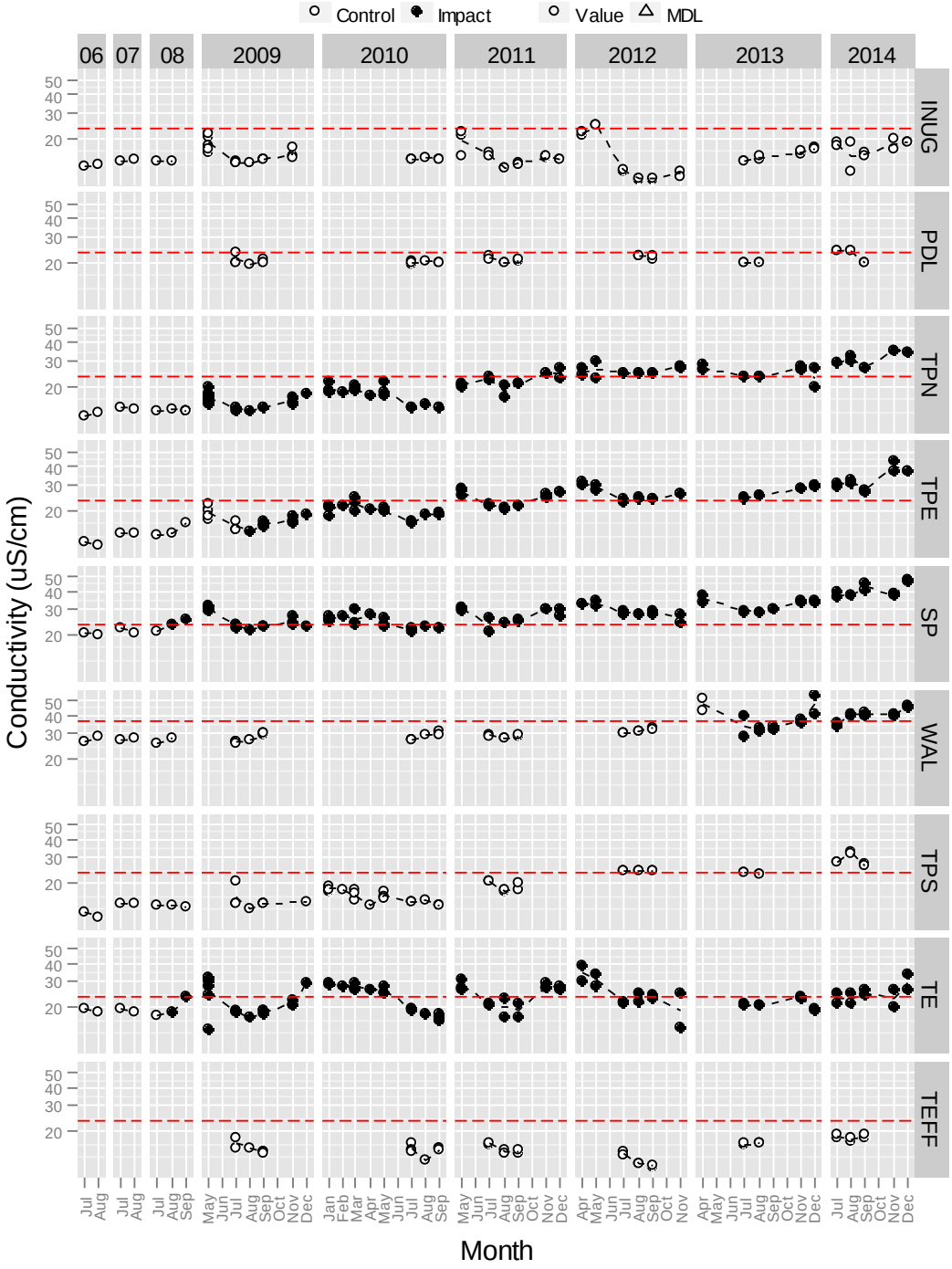
SE = standard error of the estimate

P-value = one-tailed test of the null hypothesis of no change or a decrease in mean (opposite for a pH lower tigger)

Exp(Est.) = estimated proportional change (i.e., exp[Estimate])

LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Figure 3.3-1. 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 **Section 3.1.2** for more detail).

Figure 3.3-2. Hardness (mg/L) in water samples from Meadowbank study lakes since 2006.

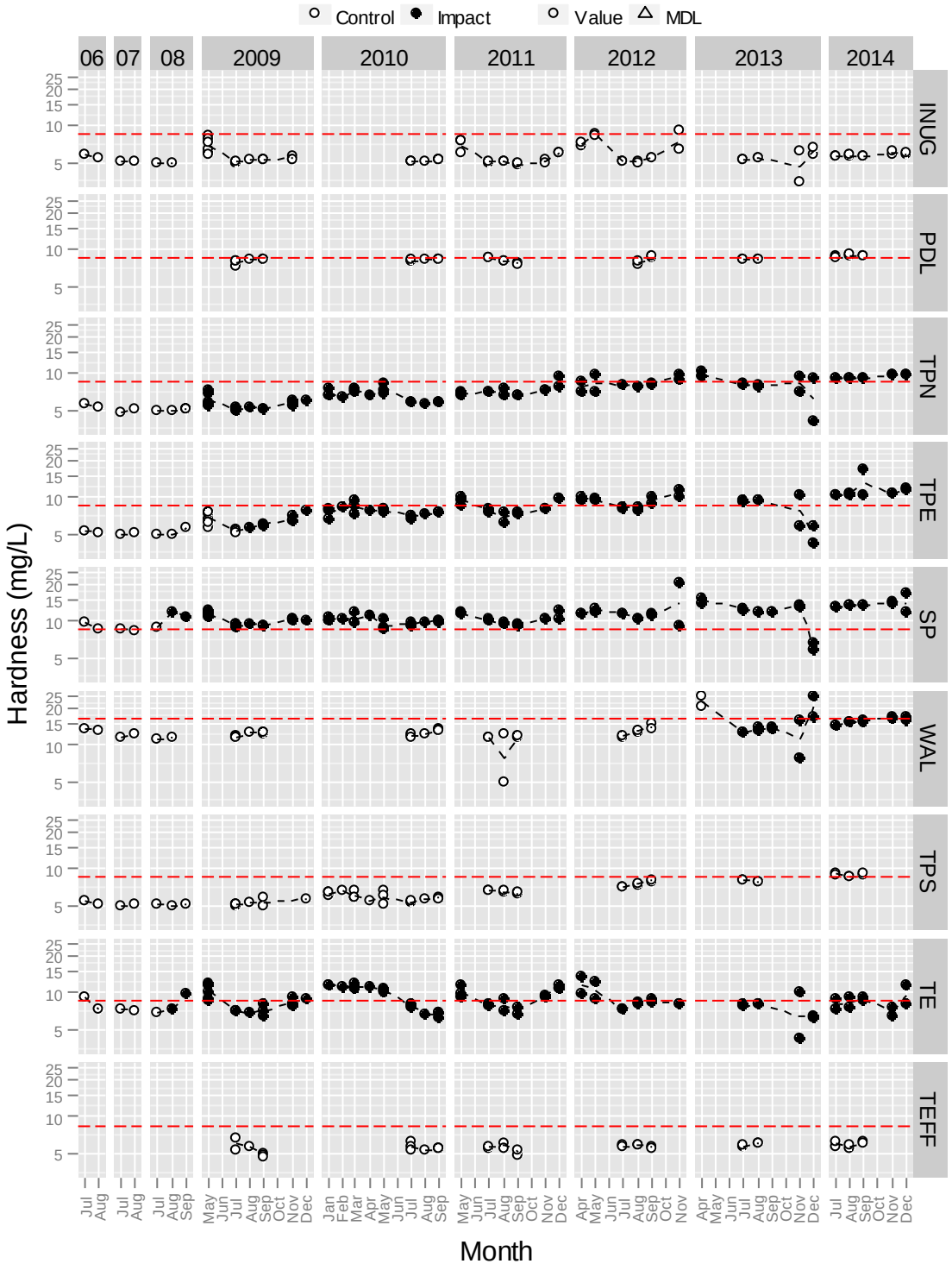


Figure 3.3-3. Field-measured pH in water samples from Meadowbank study lakes since 2006.

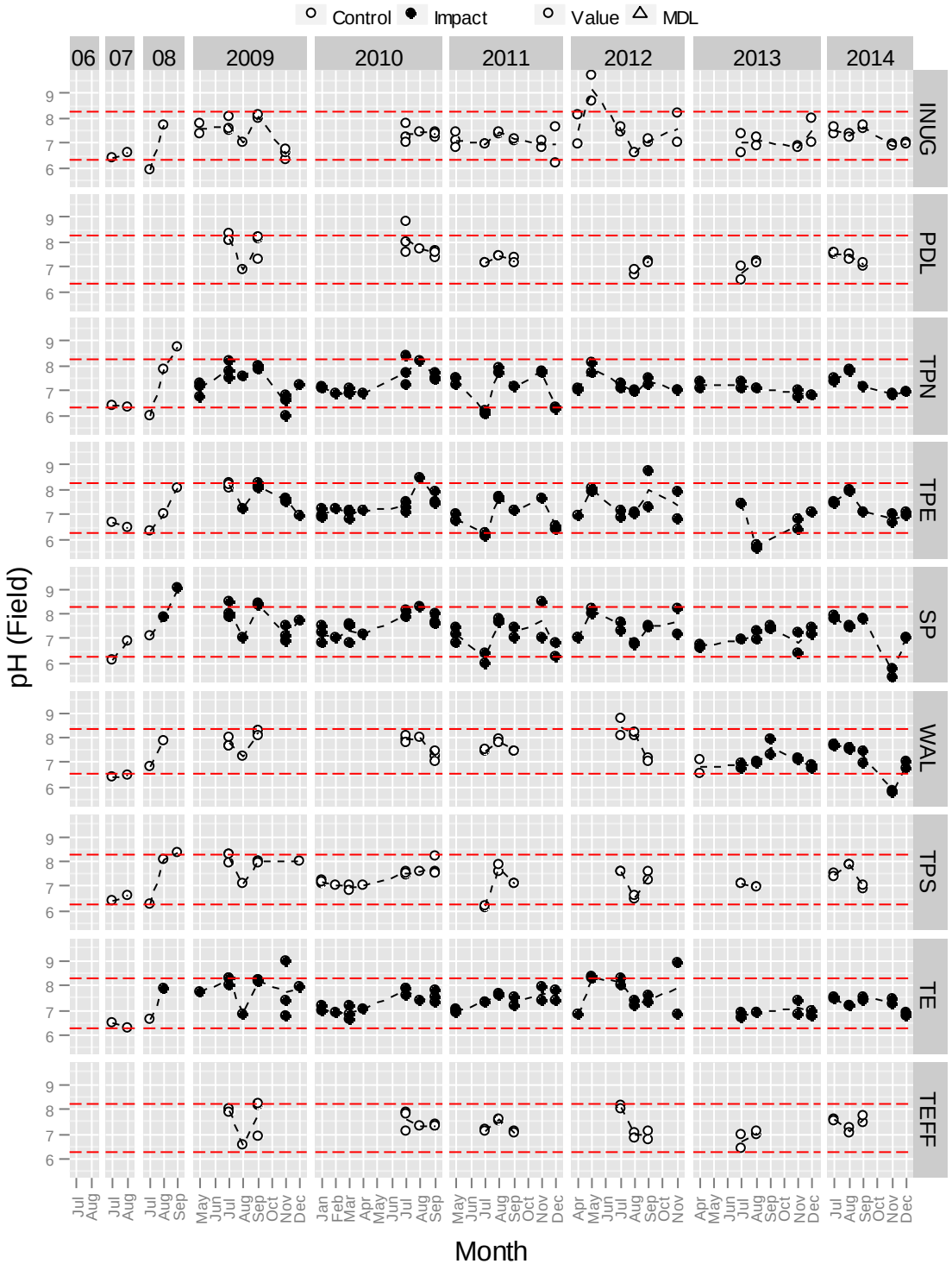


Figure 3.3-4. Laboratory-measured pH in water samples from Meadowbank study lakes since 2006.

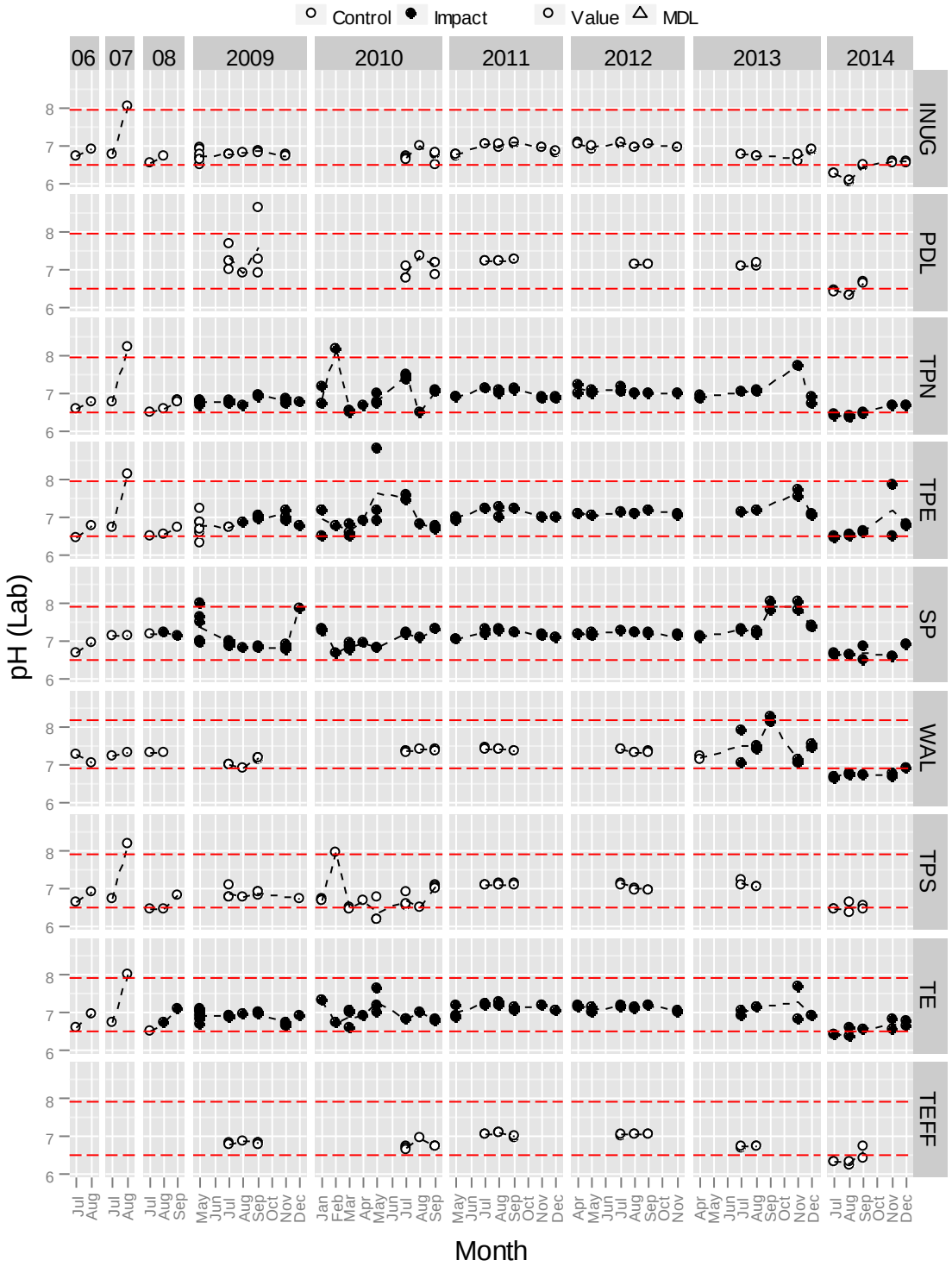
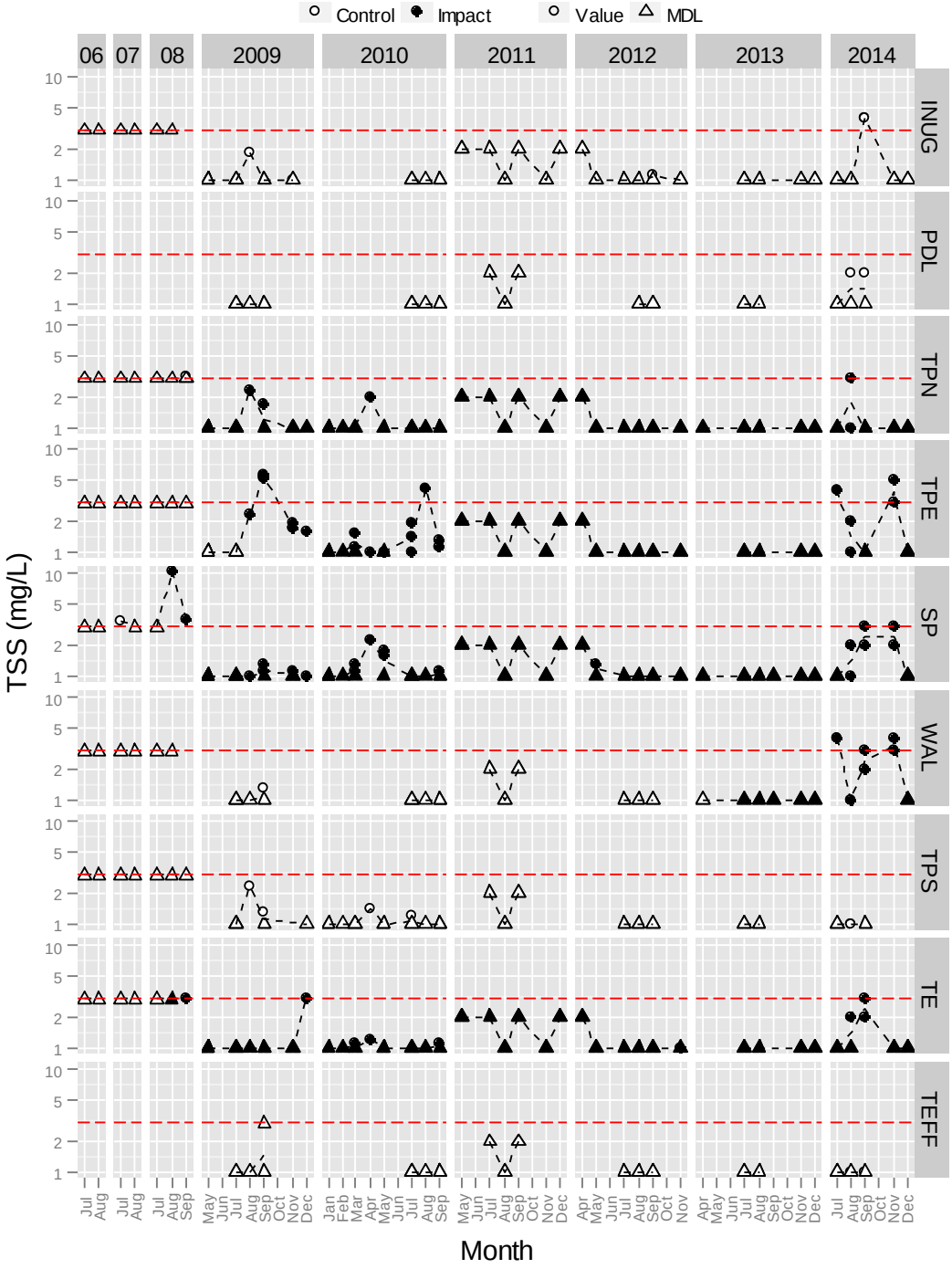
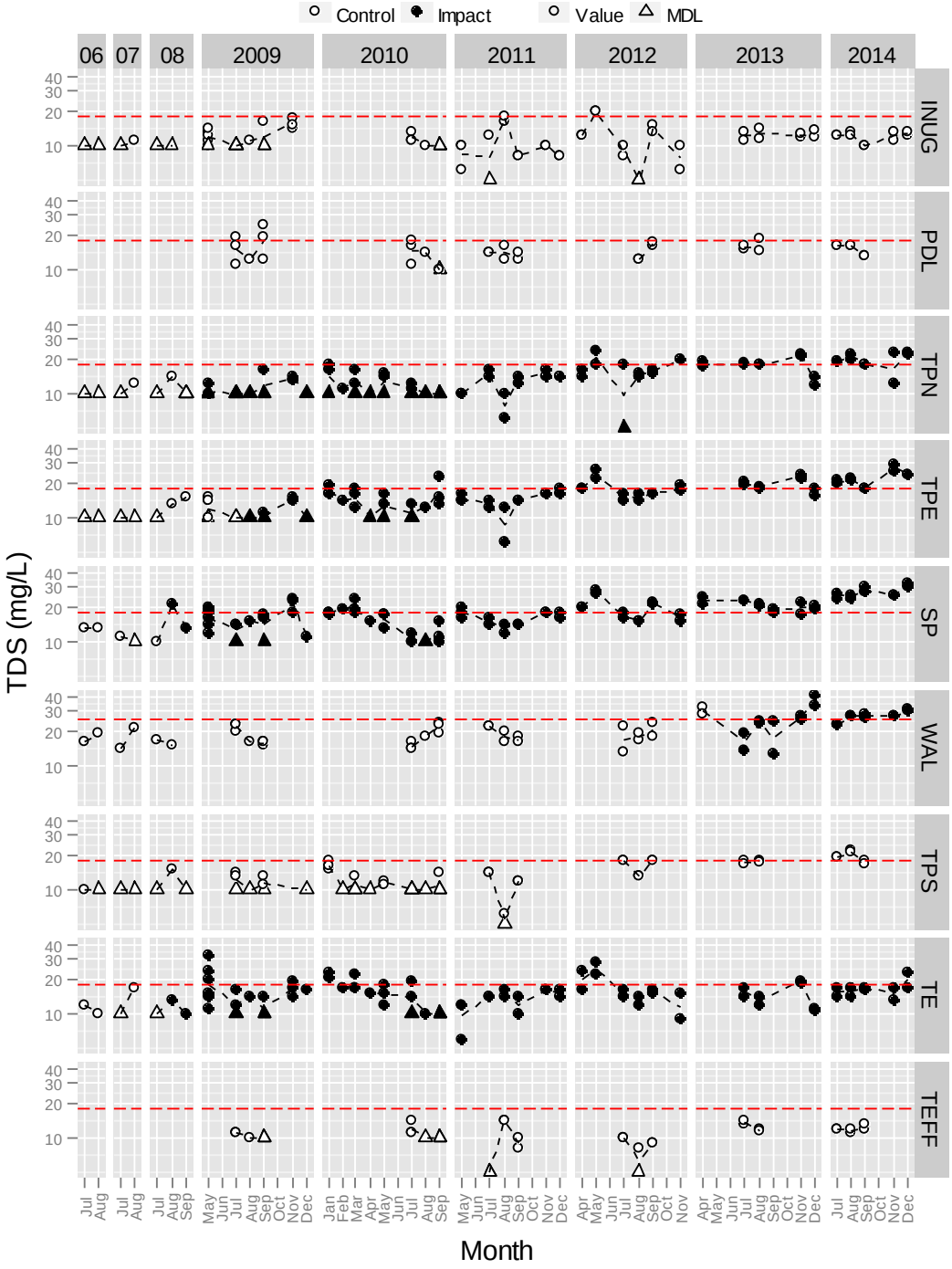


Figure 3.3-5. Total Suspended Solids (TSS; mg/L) in water samples from Meadowbank study lakes since 2006.



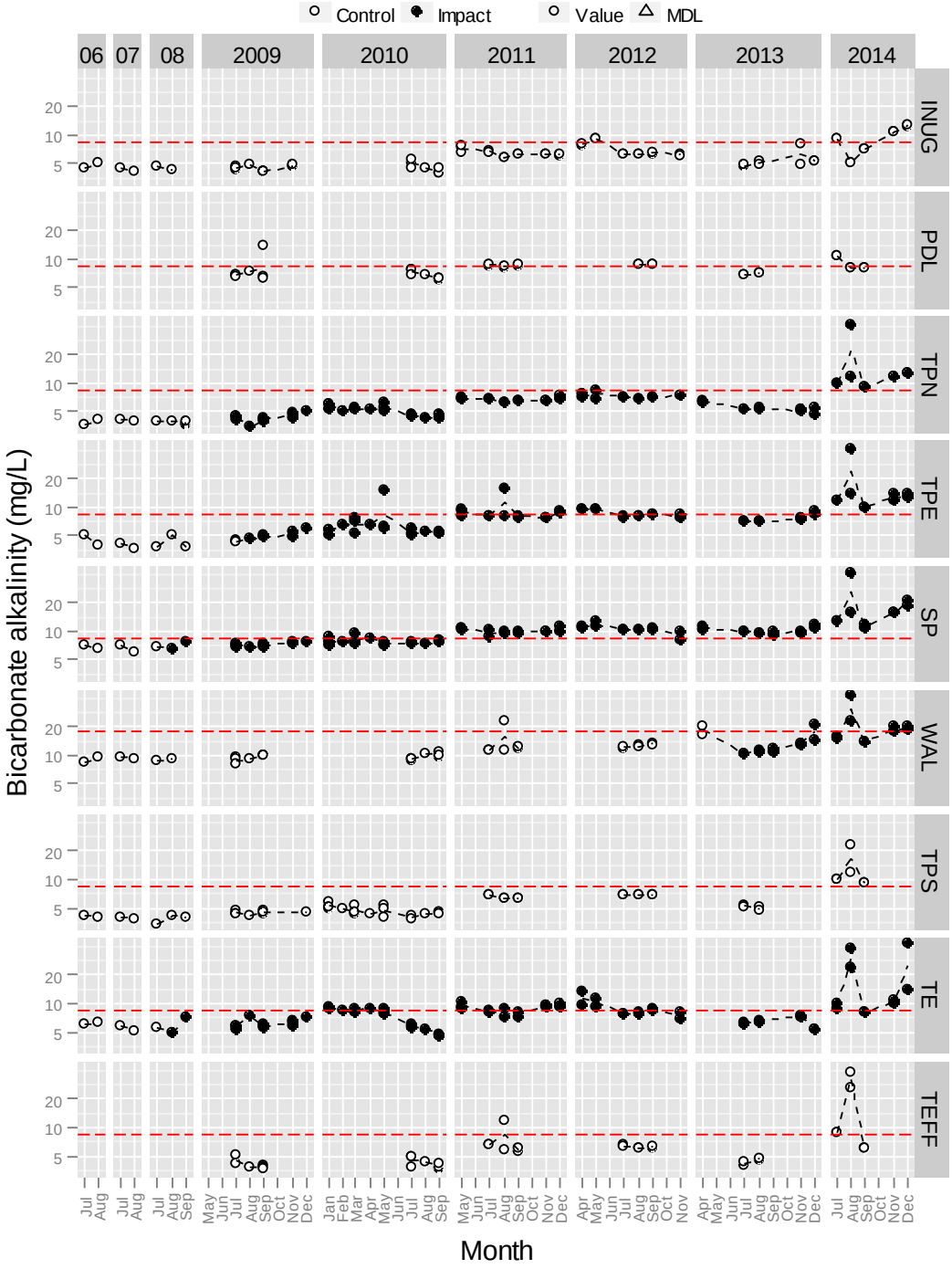
*__Note__: TSS data from 2014 are deemed unreliable and were excluded from formal trend assessment (see **Section 3.1.2** for more detail).

Figure 3.3-6. Total Dissolved Solids (TDS; mg/L) in water samples from Meadowbank study lakes since 2006.



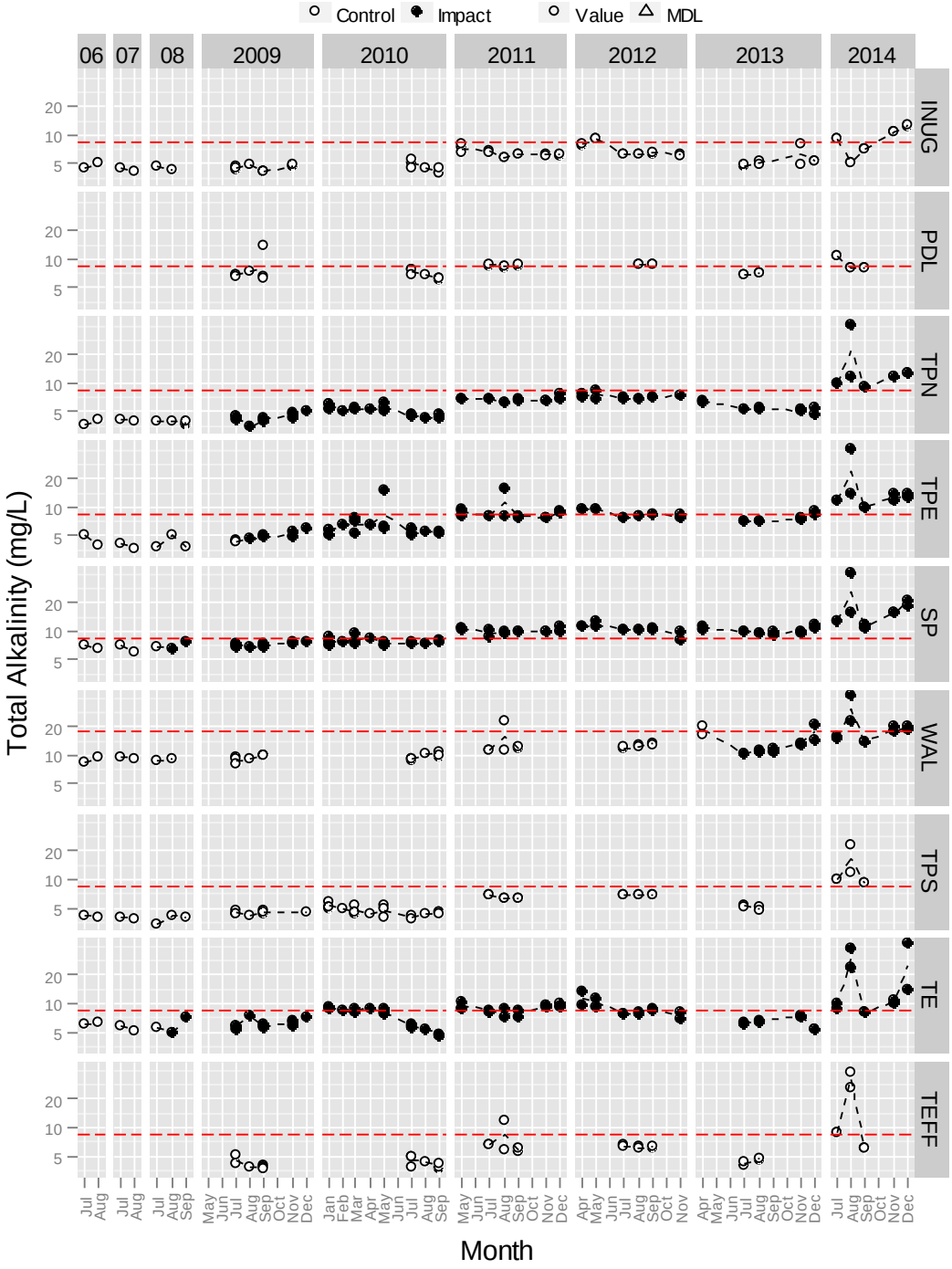
*__Note__: TDS data from 2014 should be interpreted with caution, particularly at low concentrations (see **Section 3.1.2** for more detail).

Figure 3.3-7. 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 **Section 3.1.2** for more detail).

Figure 3.3-8. 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 **Section 3.1.2** for more detail).

Figure 3.3-9. Ammonia-N (mg/L) in water samples from Meadowbank study lakes since 2006.

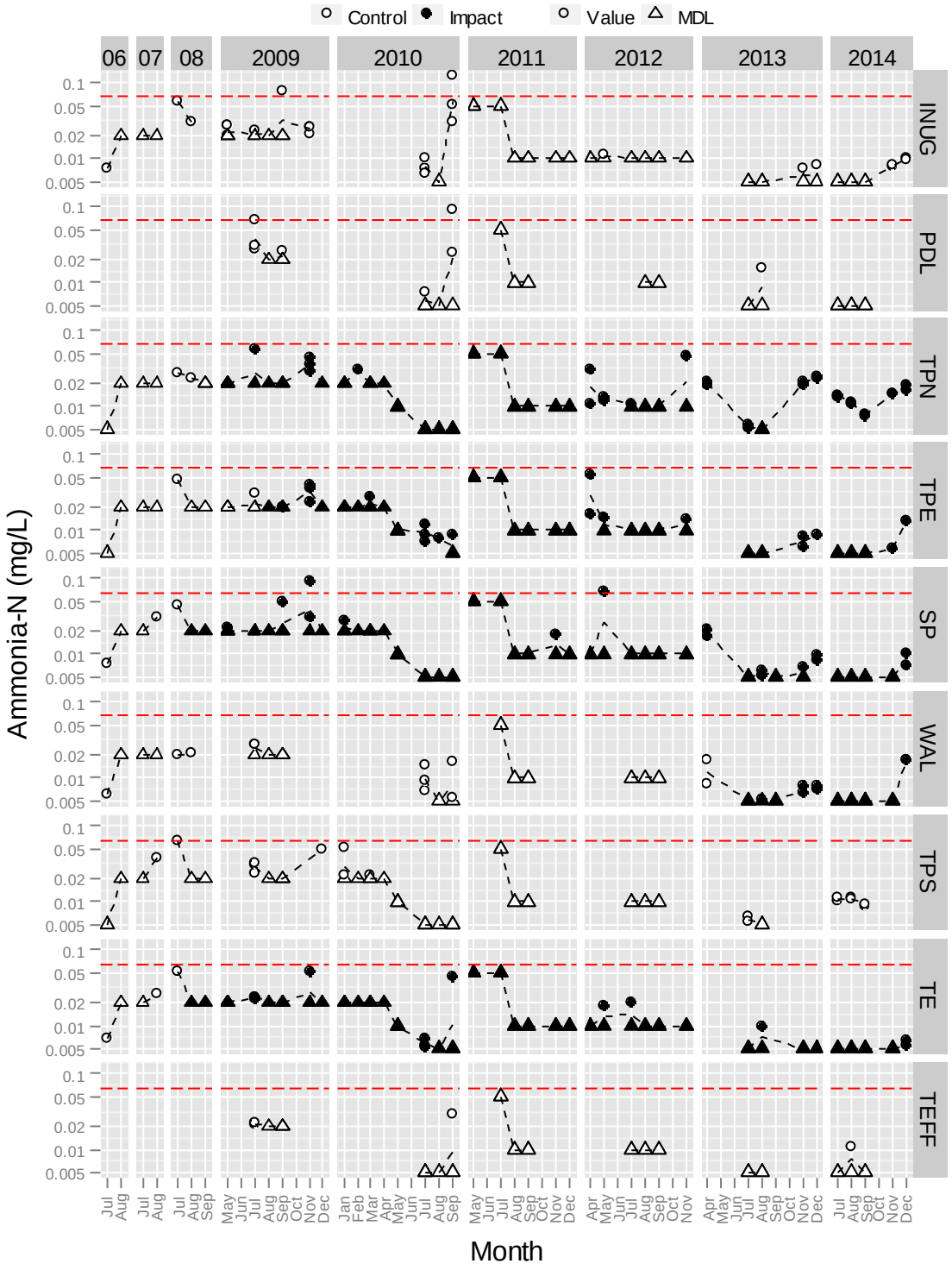


Figure 3.3-10. Chloride (mg/L) in water samples from Meadowbank study lakes since 2006.

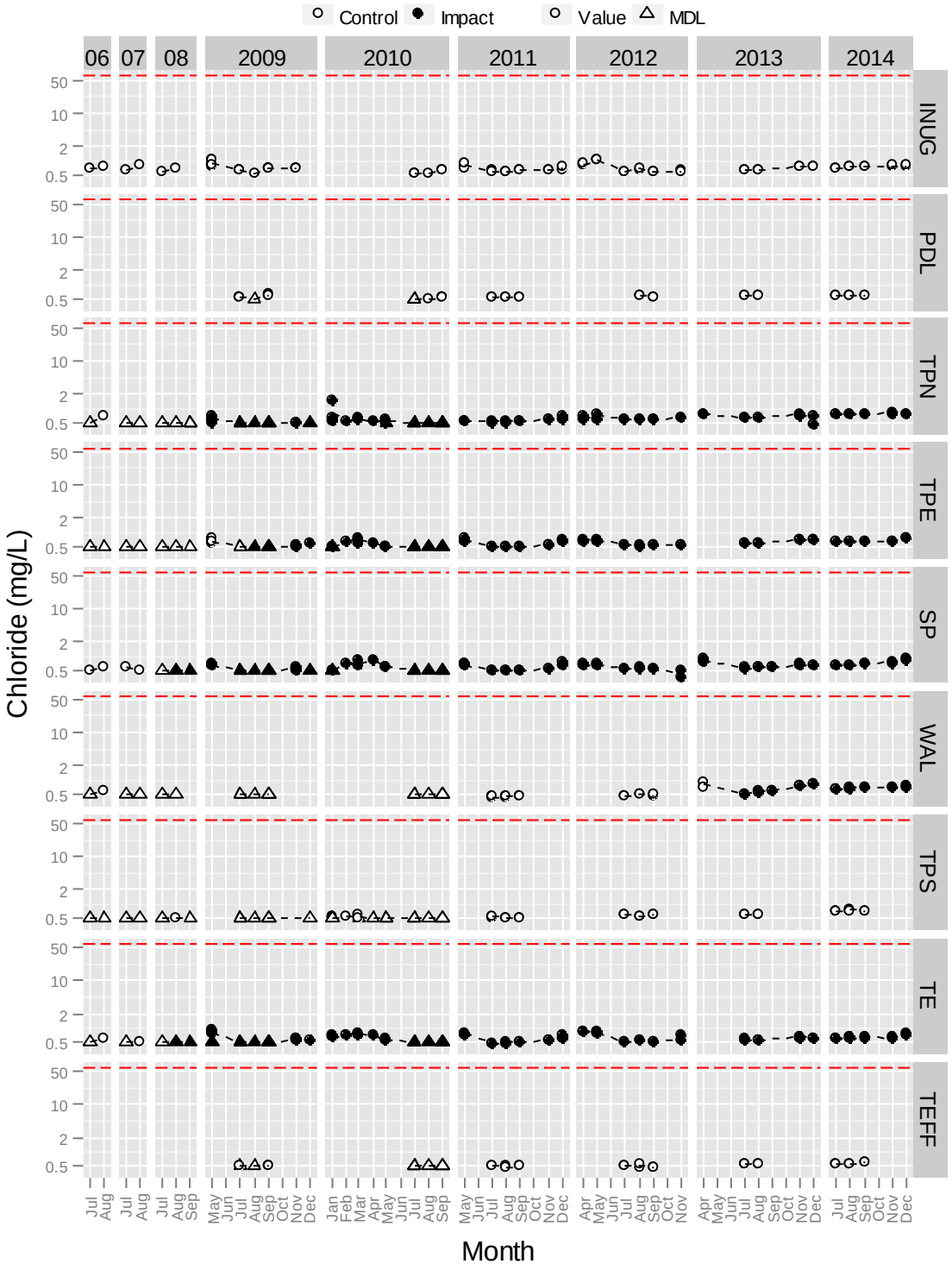


Figure 3.3-11. Nitrate-N (mg/L) in water samples from Meadowbank study lakes since 2006.

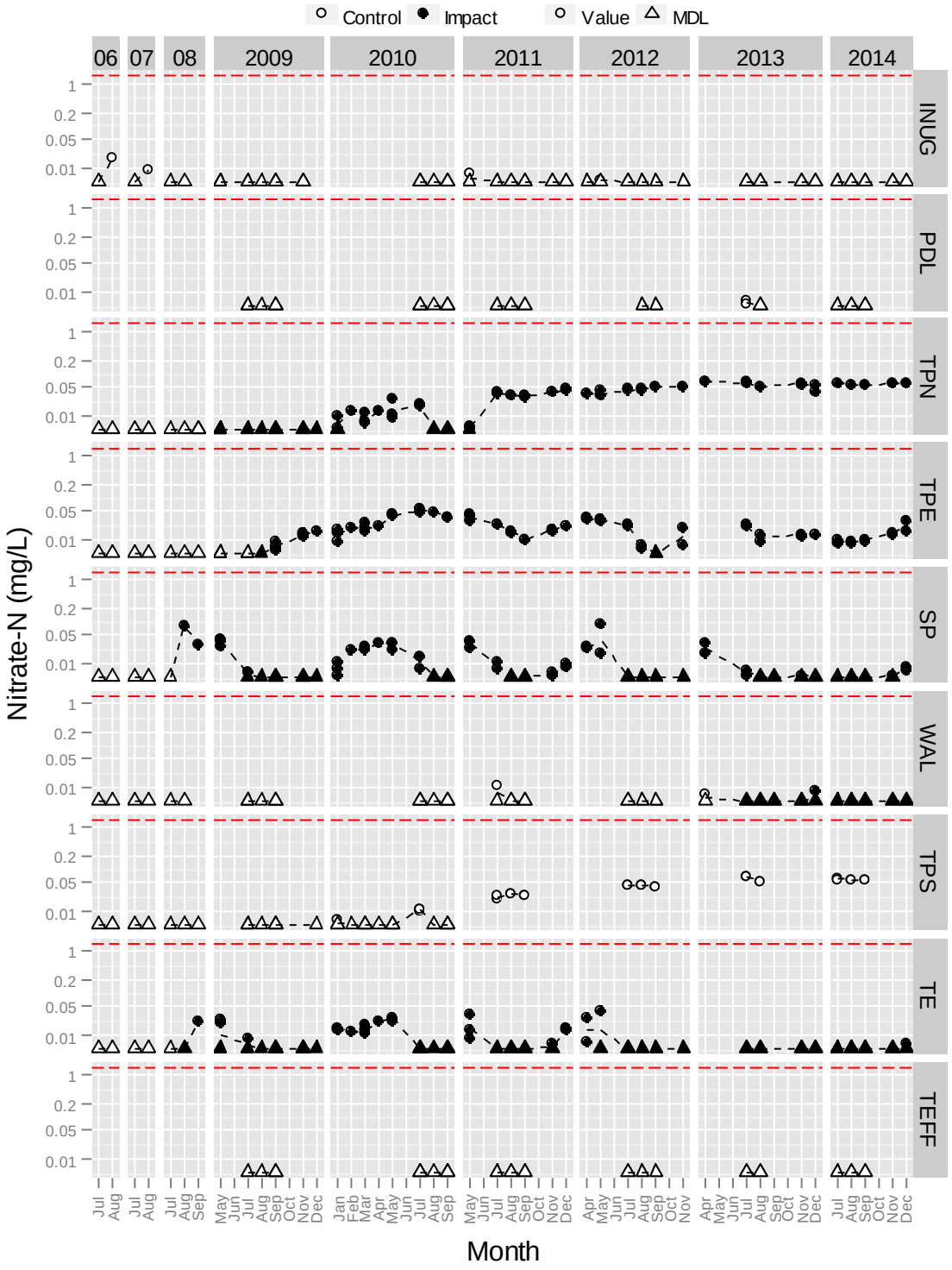
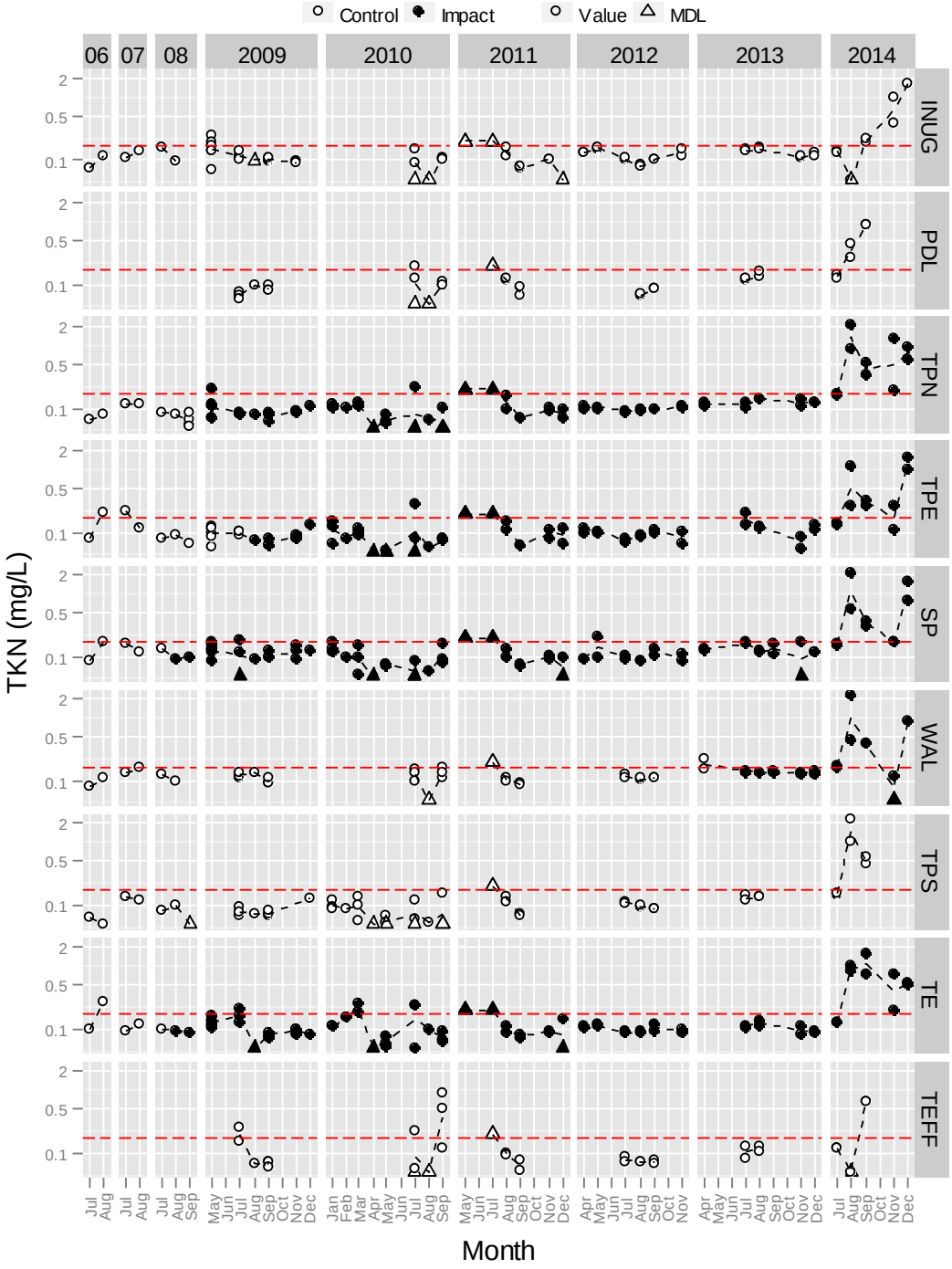


Figure 3.3-12. Total Kjeldahl Nitrogen (TKN; mg/L) in water samples from Meadowbank study lakes since 2006.



*__Note__: TKN data from 2014 are deemed unreliable and were excluded from formal trend assessment (see **Section 3.1.2** for more detail).

Figure 3.3-13. Total Phosphorus (mg/L) in water samples from Meadowbank study lakes since 2006.

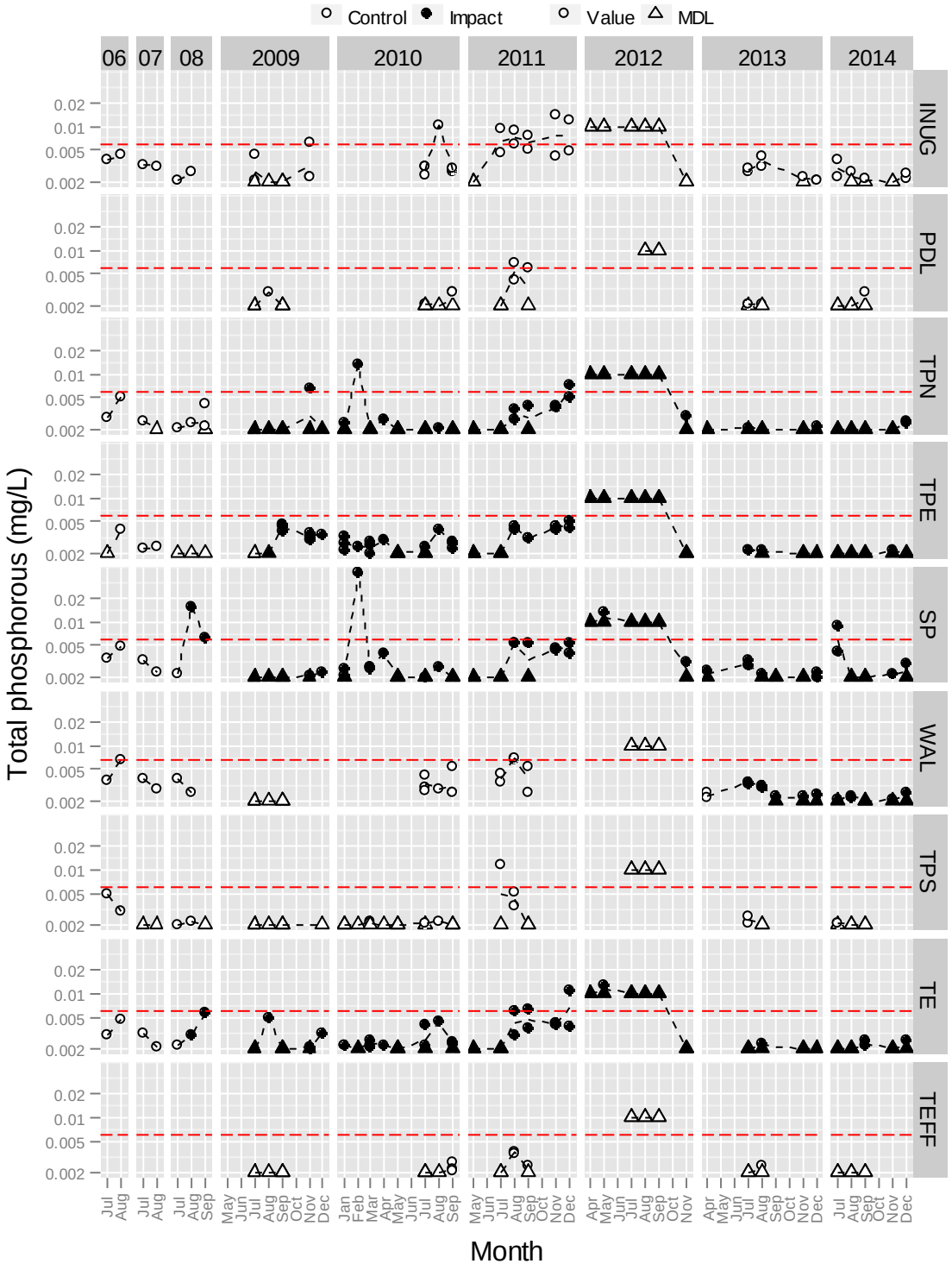


Figure 3.3-14. Reactive Silica (mg/L) in water samples from Meadowbank study lakes since 2006.

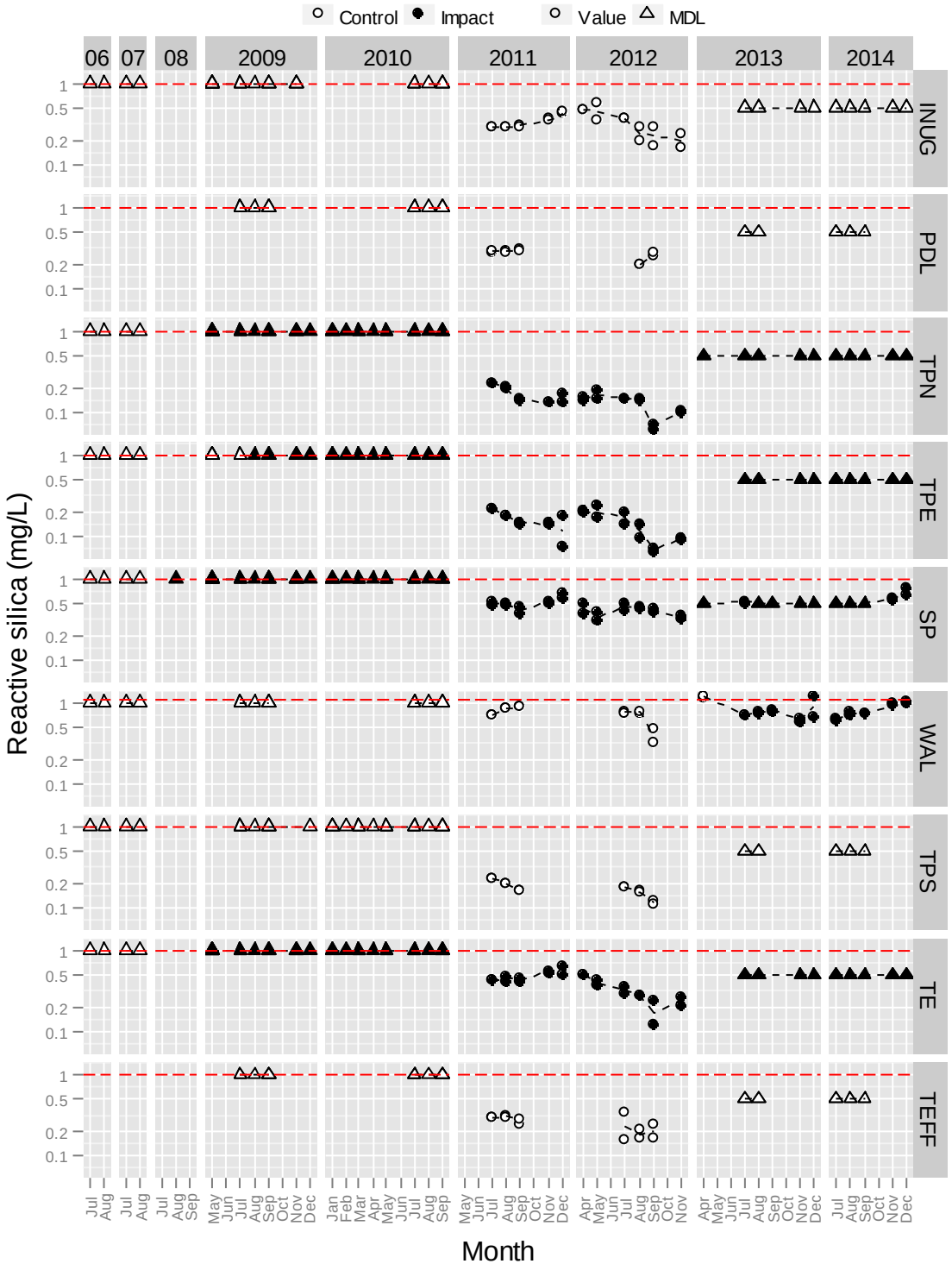


Figure 3.3-15. Sulphate (mg/L) in water samples from Meadowbank study lakes since 2006.

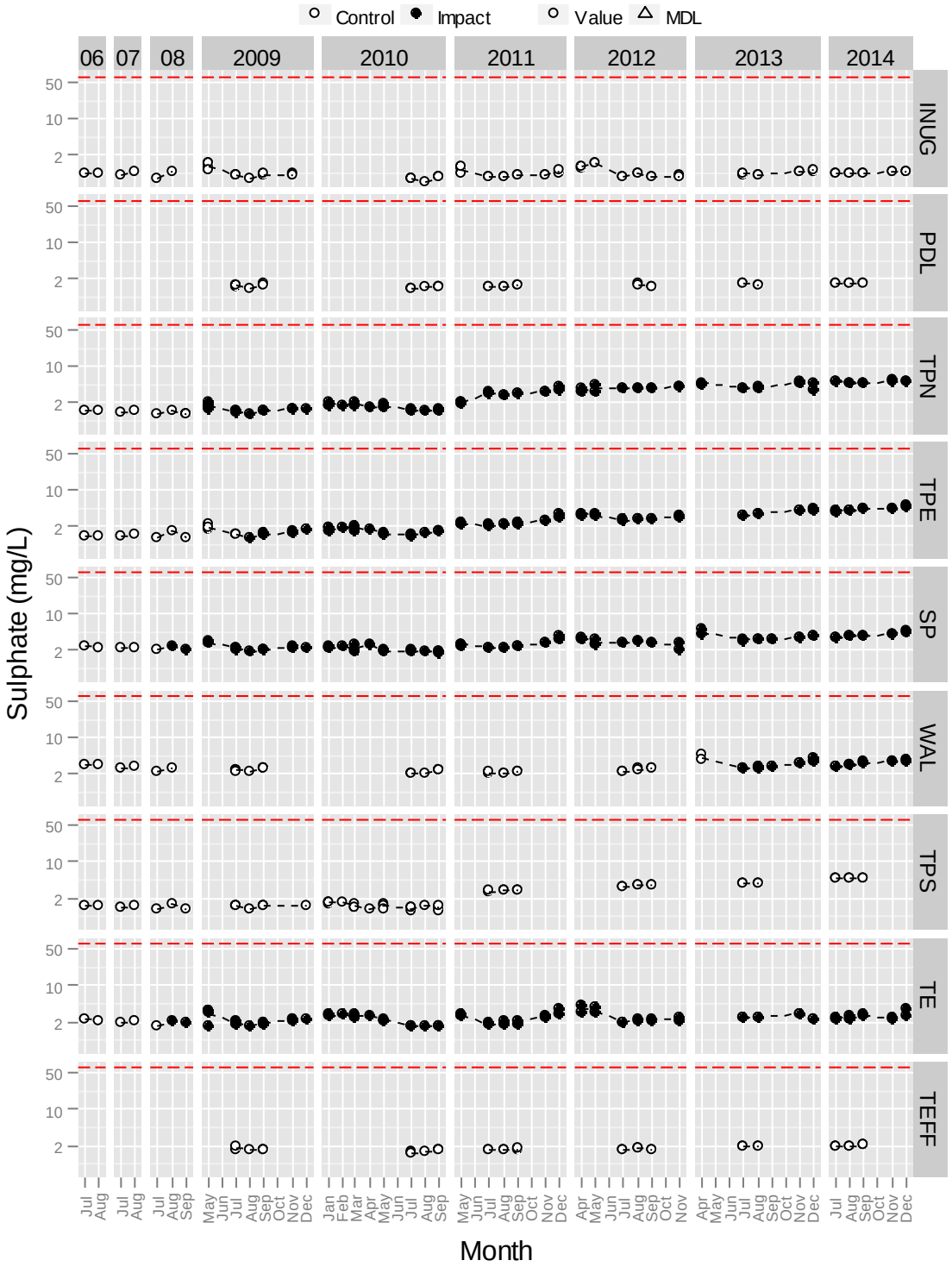


Figure 3.3-16. Dissolved Organic Carbon (DOC; mg/L) in water samples from Meadowbank study lakes since 2006.

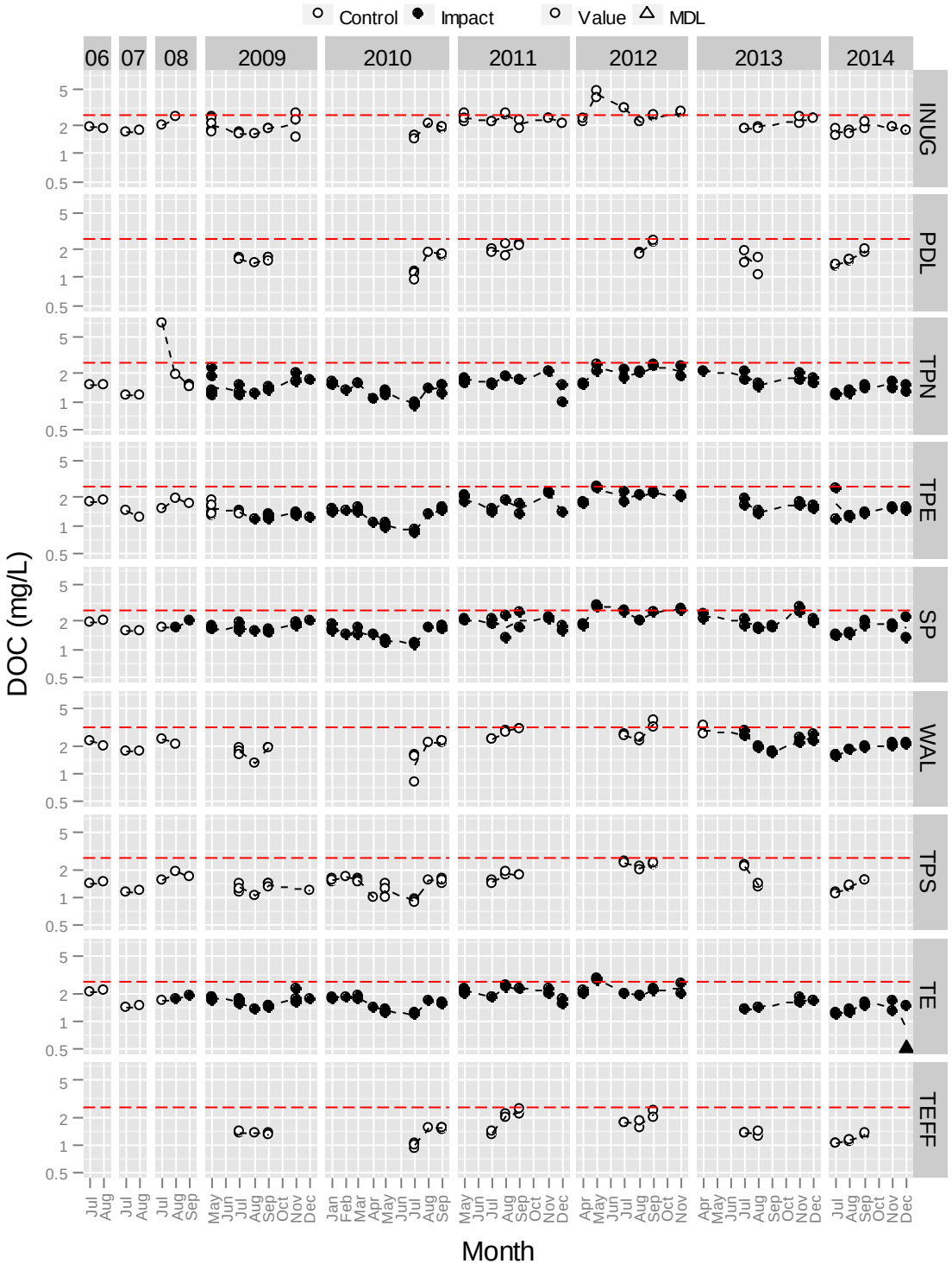


Figure 3.3-17. Total Organic Carbon (TOC; mg/L) in water samples from Meadowbank study lakes since 2006.

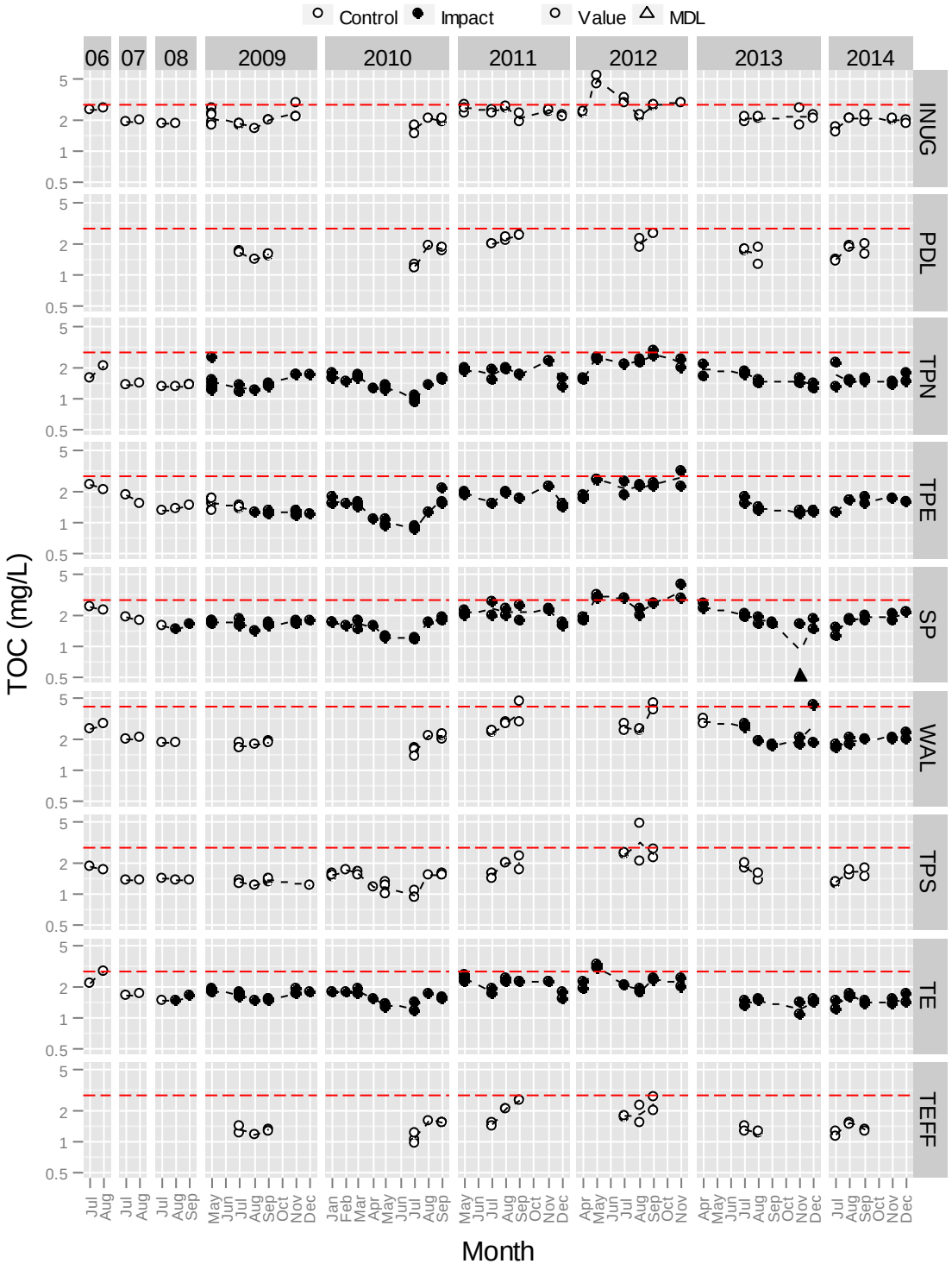


Figure 3.3-18. Total Aluminum (mg/L) in water samples from Meadowbank study lakes since 2006.

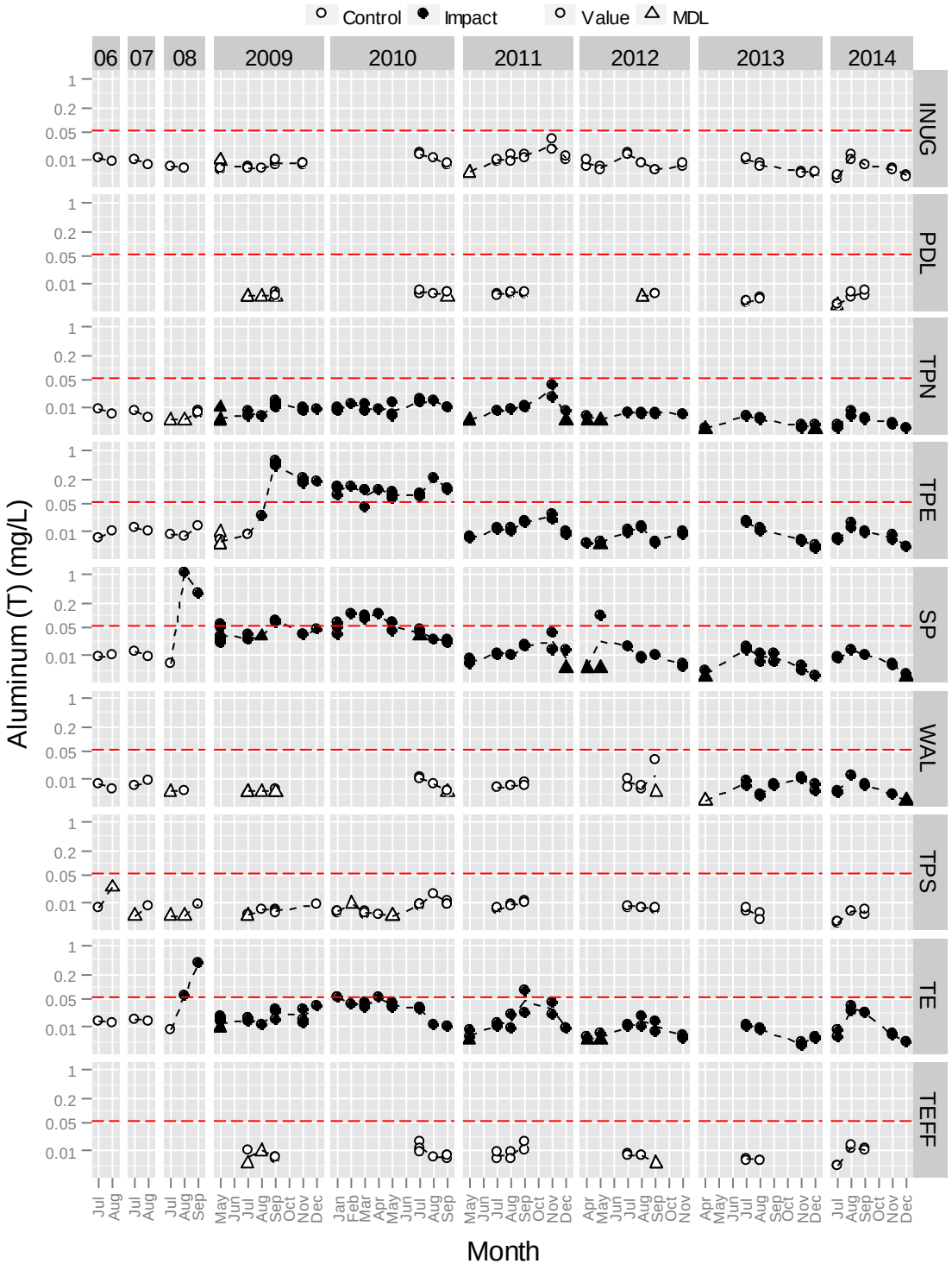


Figure 3.3-19. Total Arsenic (mg/L) in water samples from Meadowbank study lakes since 2006.

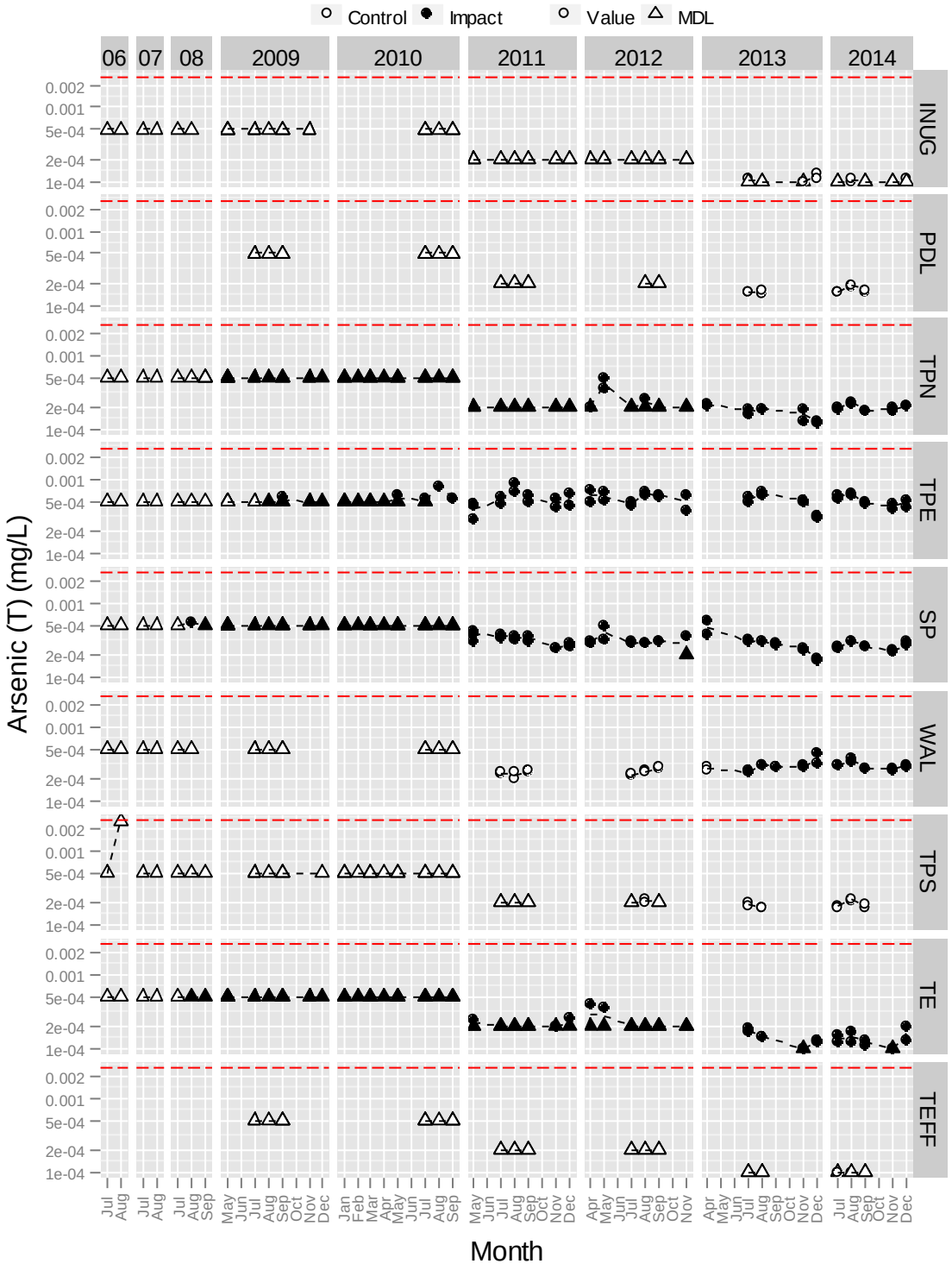


Figure 3.3-20. Total Barium (mg/L) in water samples from Meadowbank study lakes since 2006.

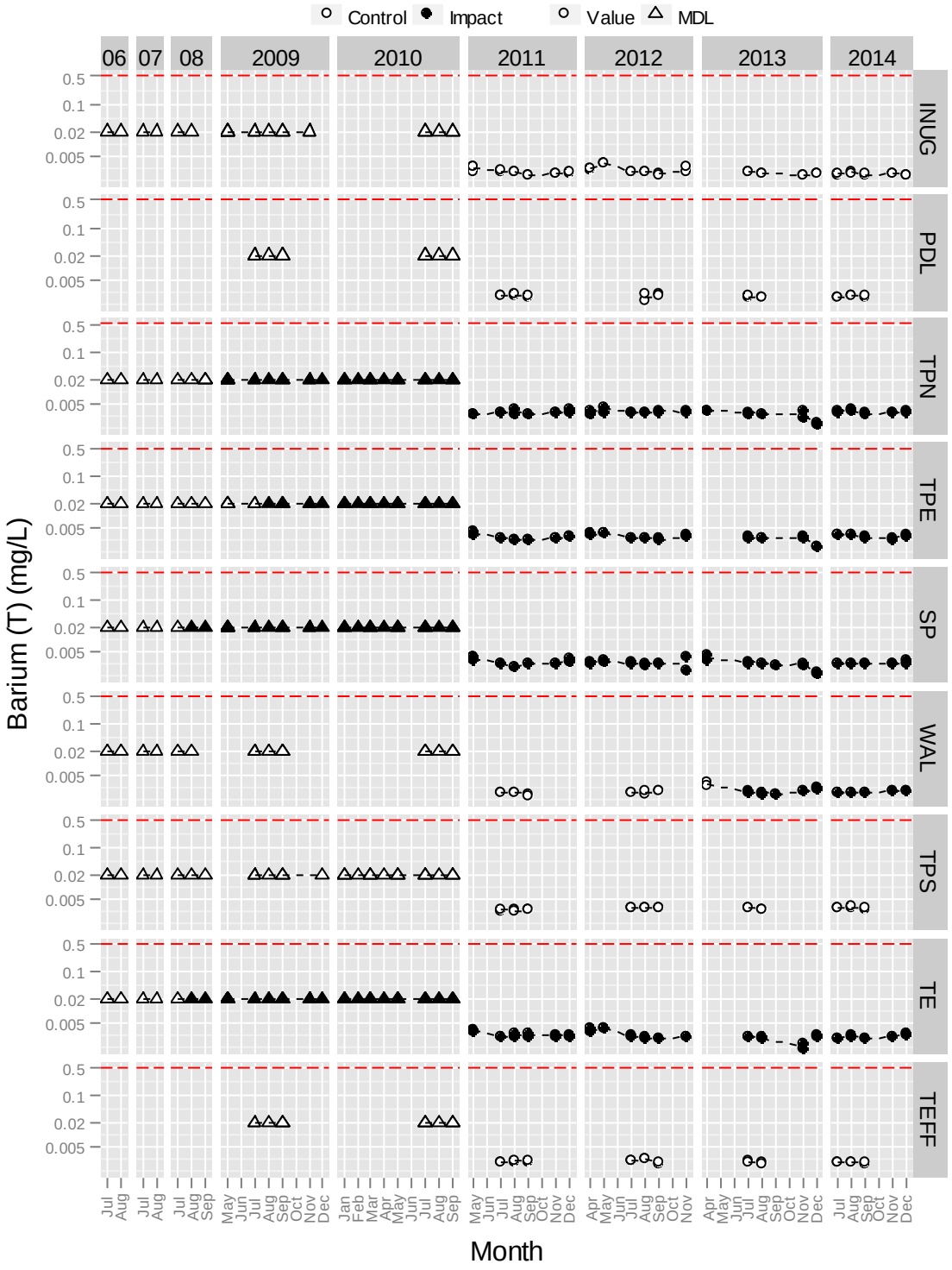


Figure 3.3-21. Total Calcium (mg/L) in water samples from Meadowbank study lakes since 2006.

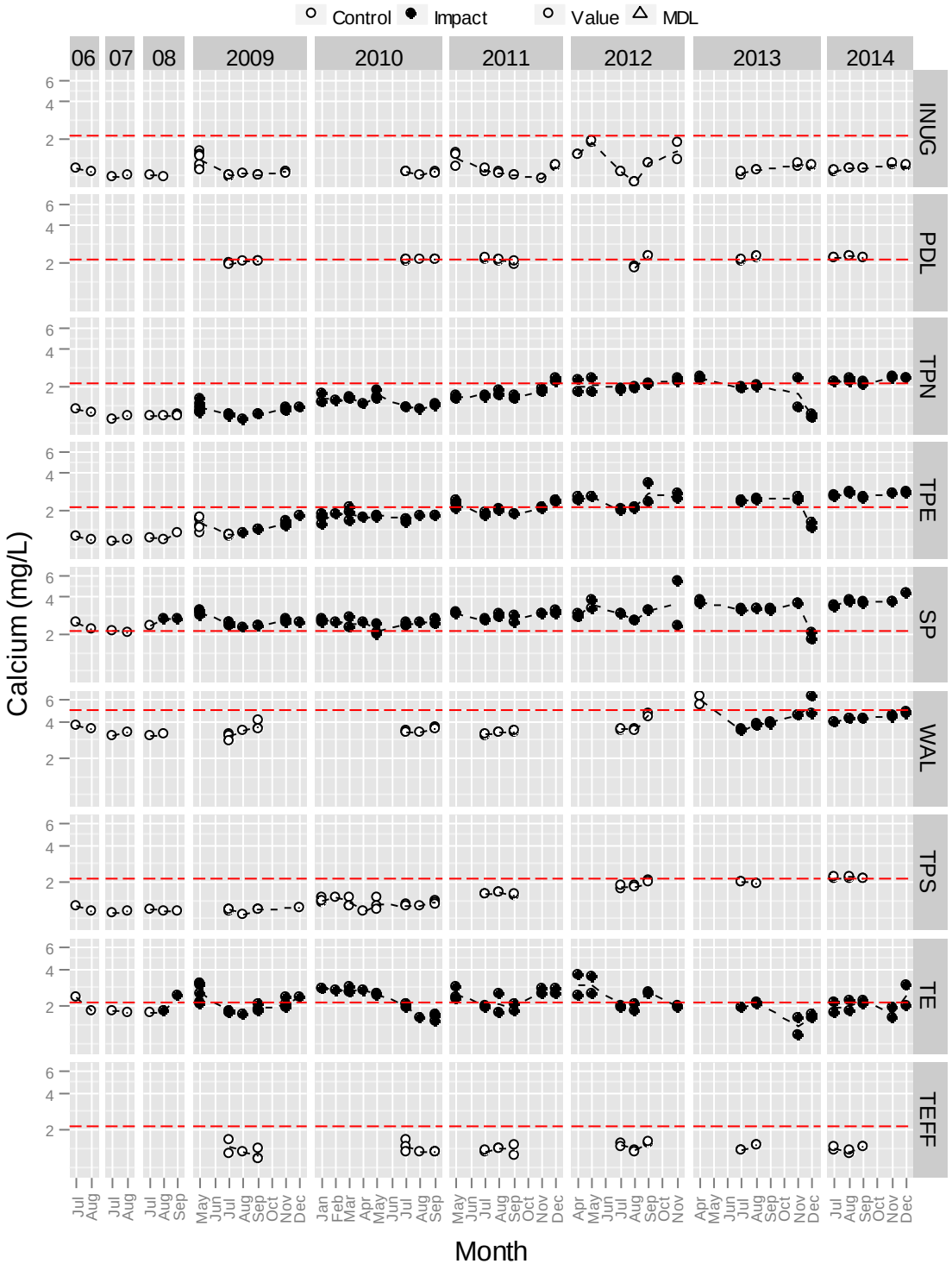


Figure 3.3-22. Total Chromium (mg/L) in water samples from Meadowbank study lakes since 2006.

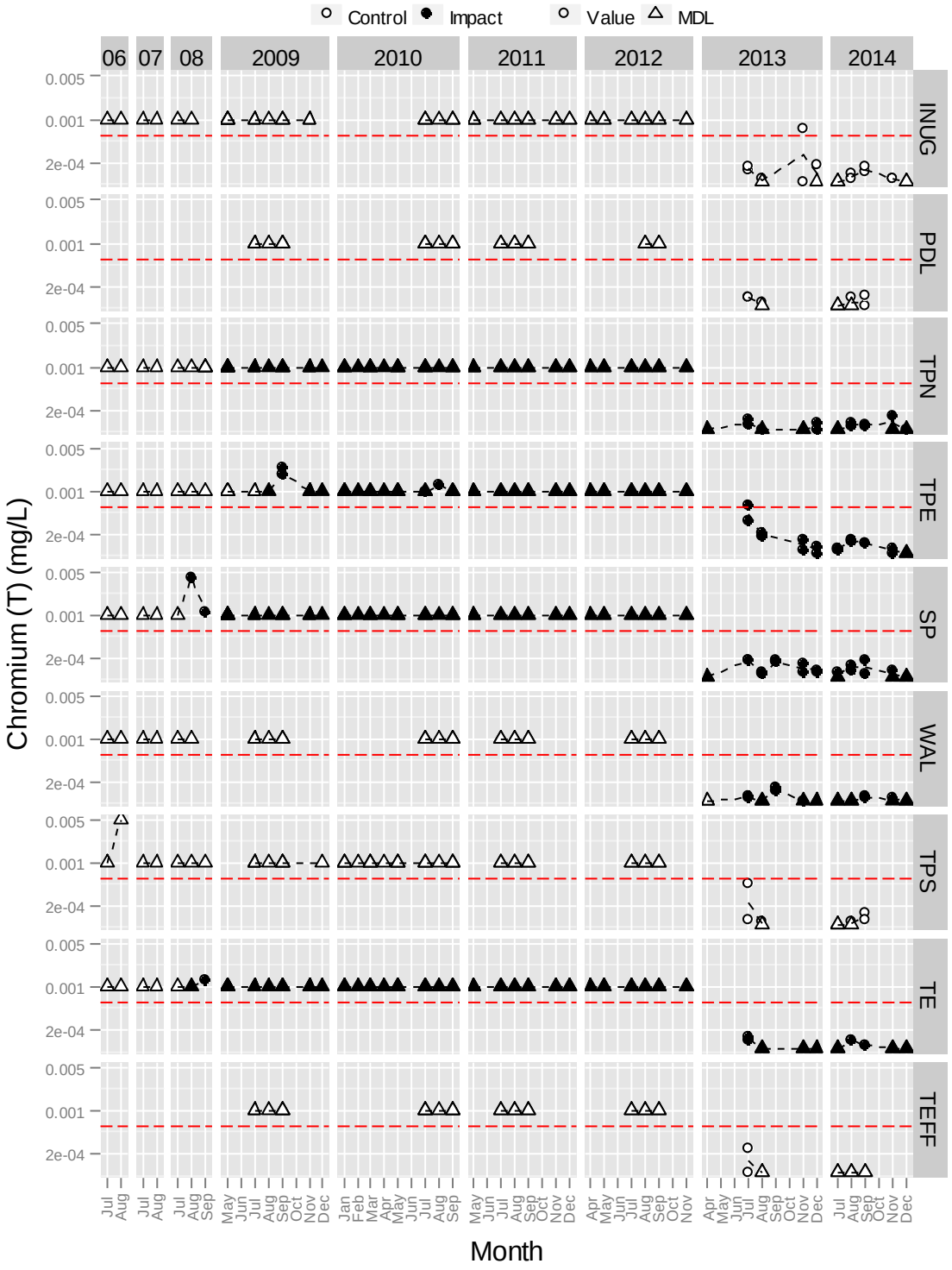


Figure 3.3-23. Total Copper (mg/L) in water samples from Meadowbank study lakes since 2006.

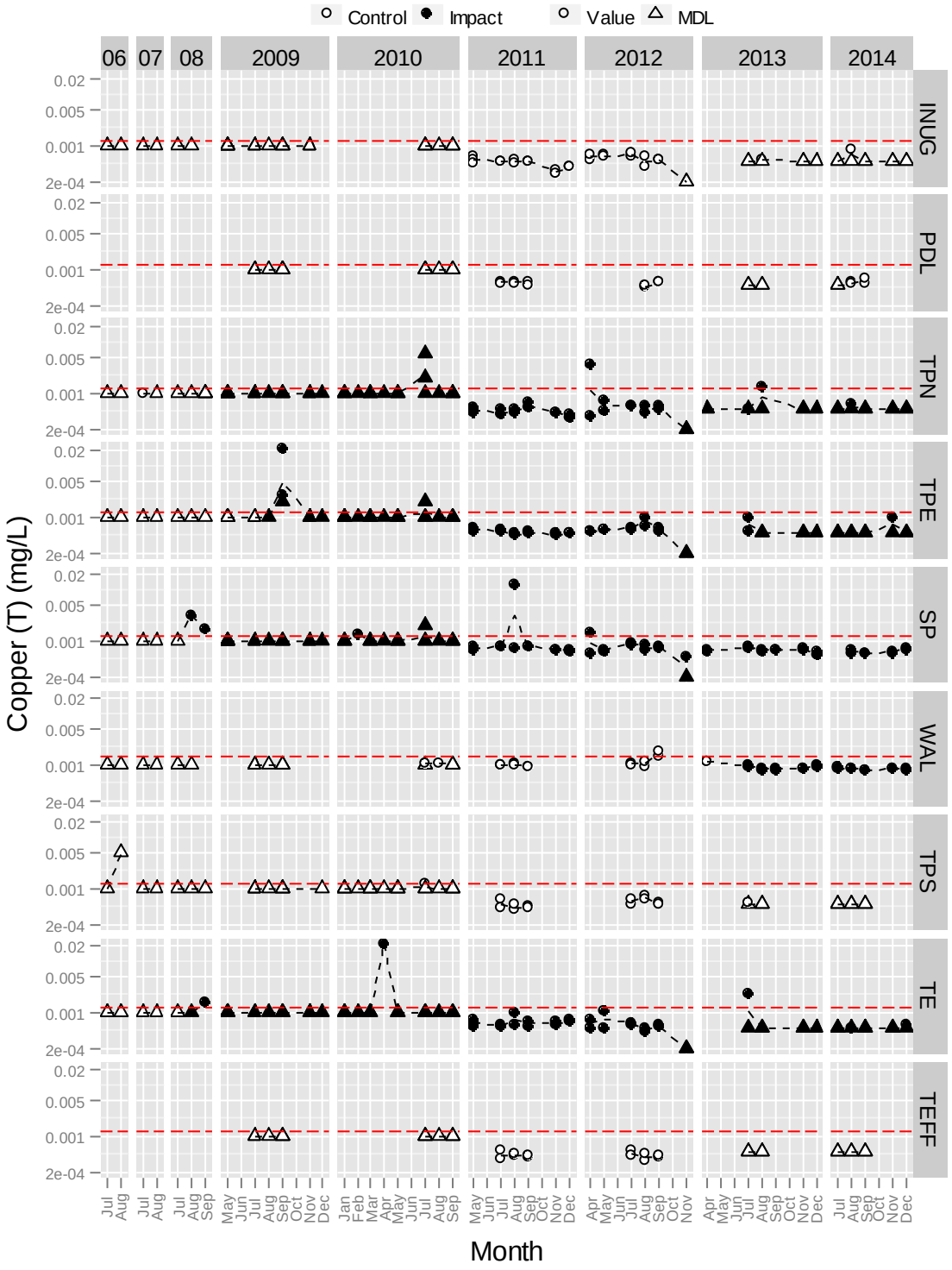


Figure 3.3-24. Total Iron (mg/L) in water samples from Meadowbank study lakes since 2006.

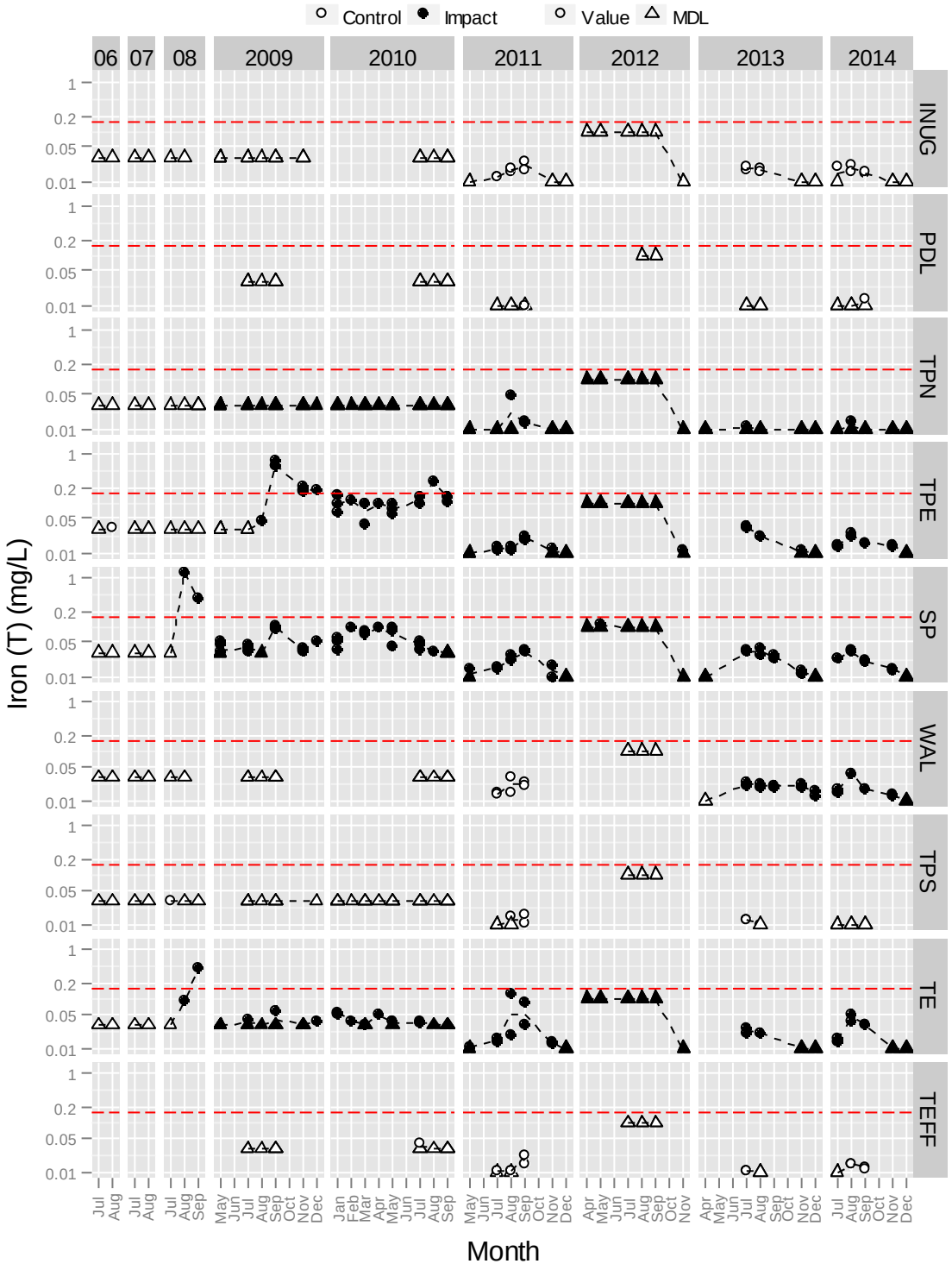


Figure 3.3-25. Total Magnesium (mg/L) in water samples from Meadowbank study lakes since 2006.

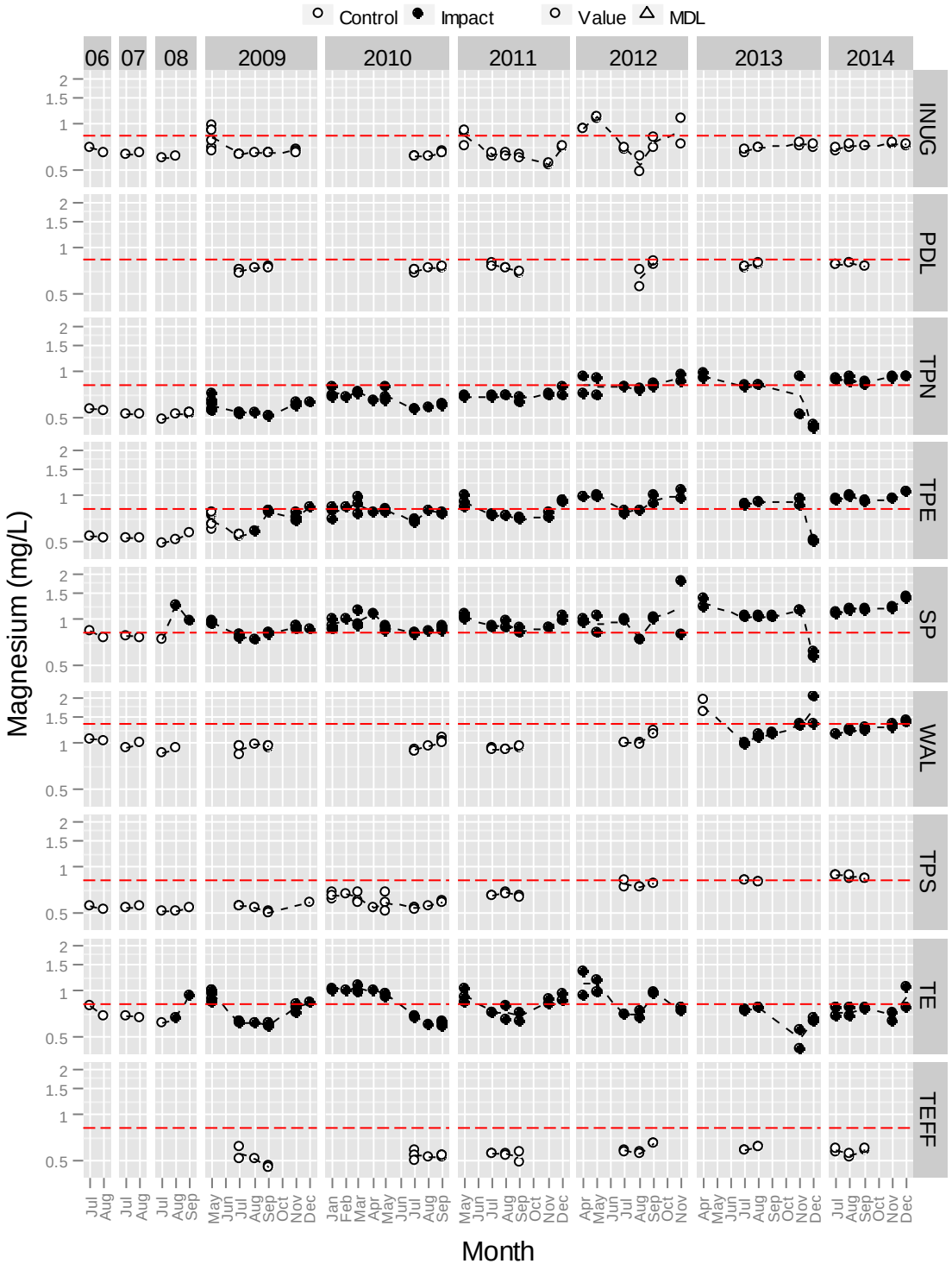


Figure 3.3-26. Total Manganese (mg/L) in water samples from Meadowbank study lakes since 2006.

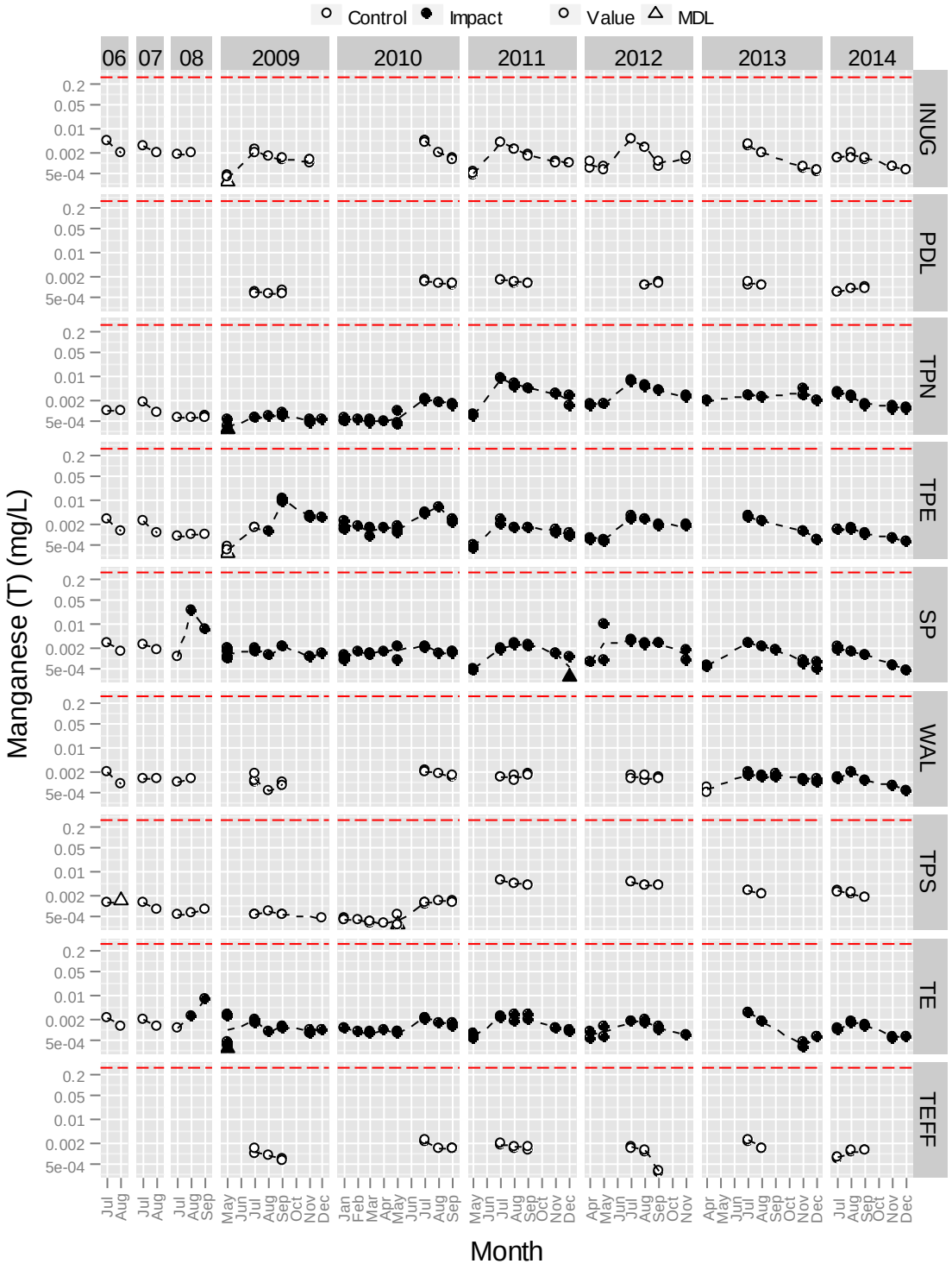


Figure 3.3-27. Total Molybdenum (mg/L) in water samples from Meadowbank study lakes since 2006.

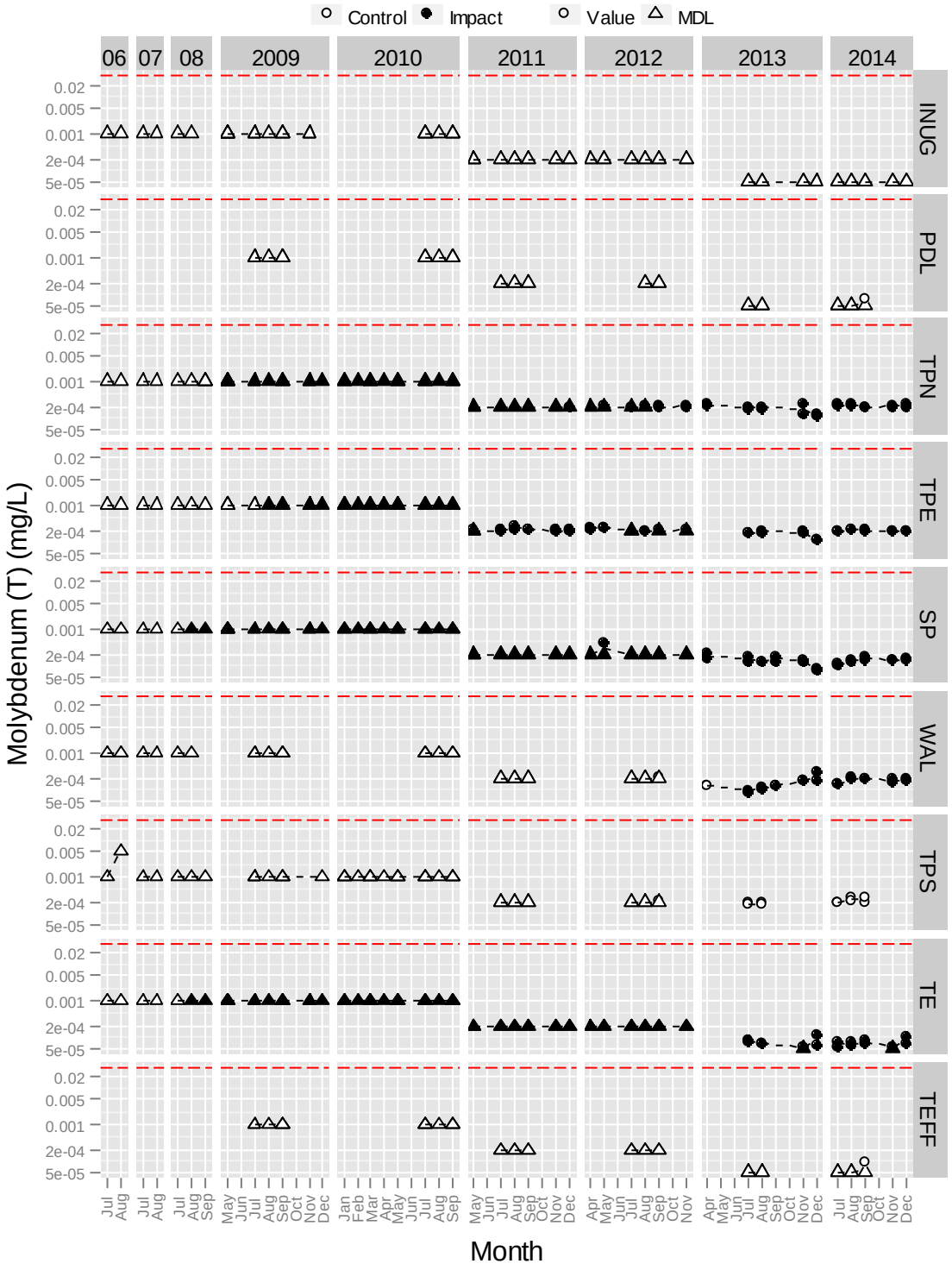


Figure 3.3-28. Total Potassium (mg/L) in water samples from Meadowbank study lakes since 2006.

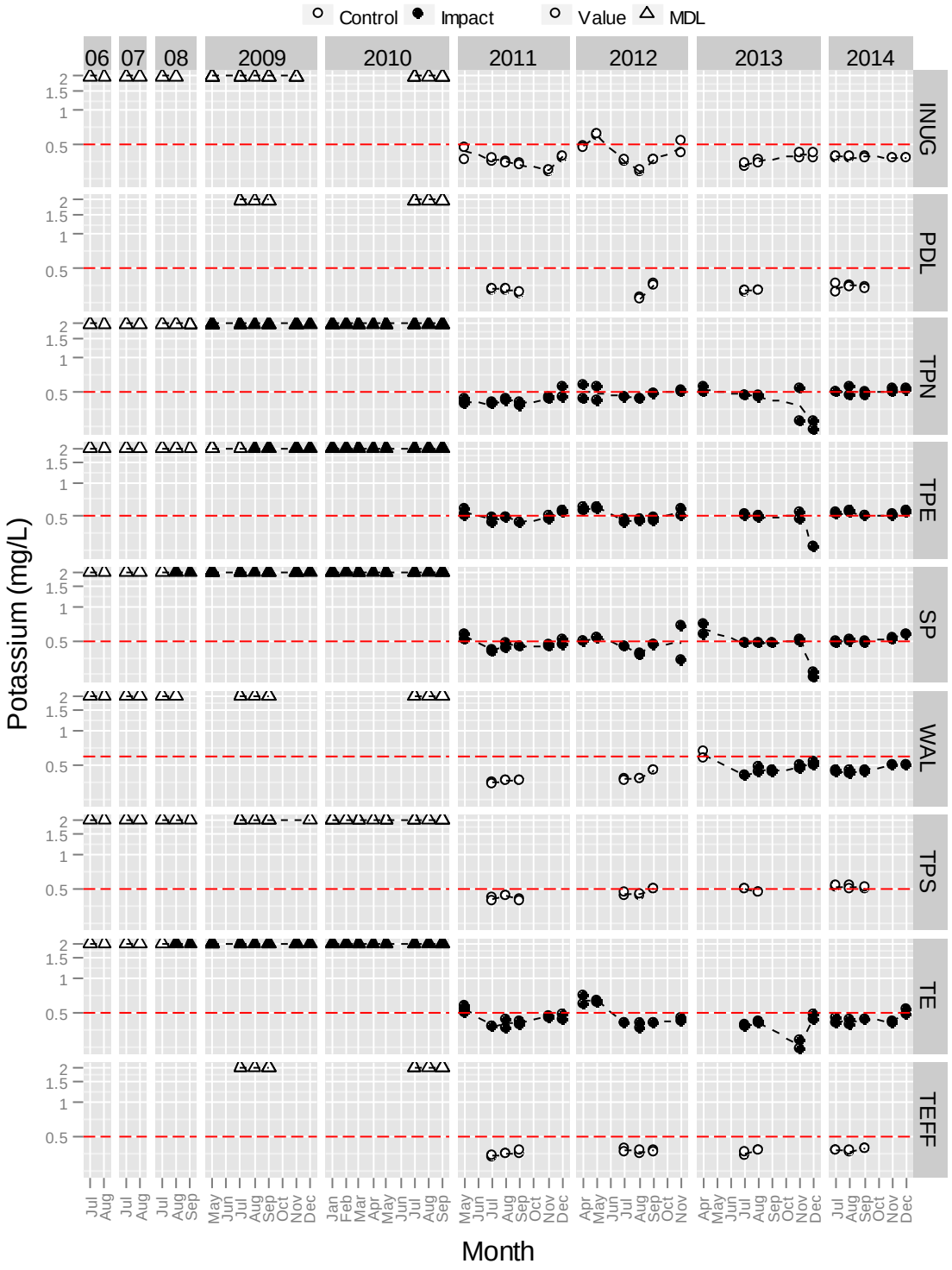


Figure 3.3-29. Total Sodium (mg/L) in water samples from Meadowbank study lakes since 2006.

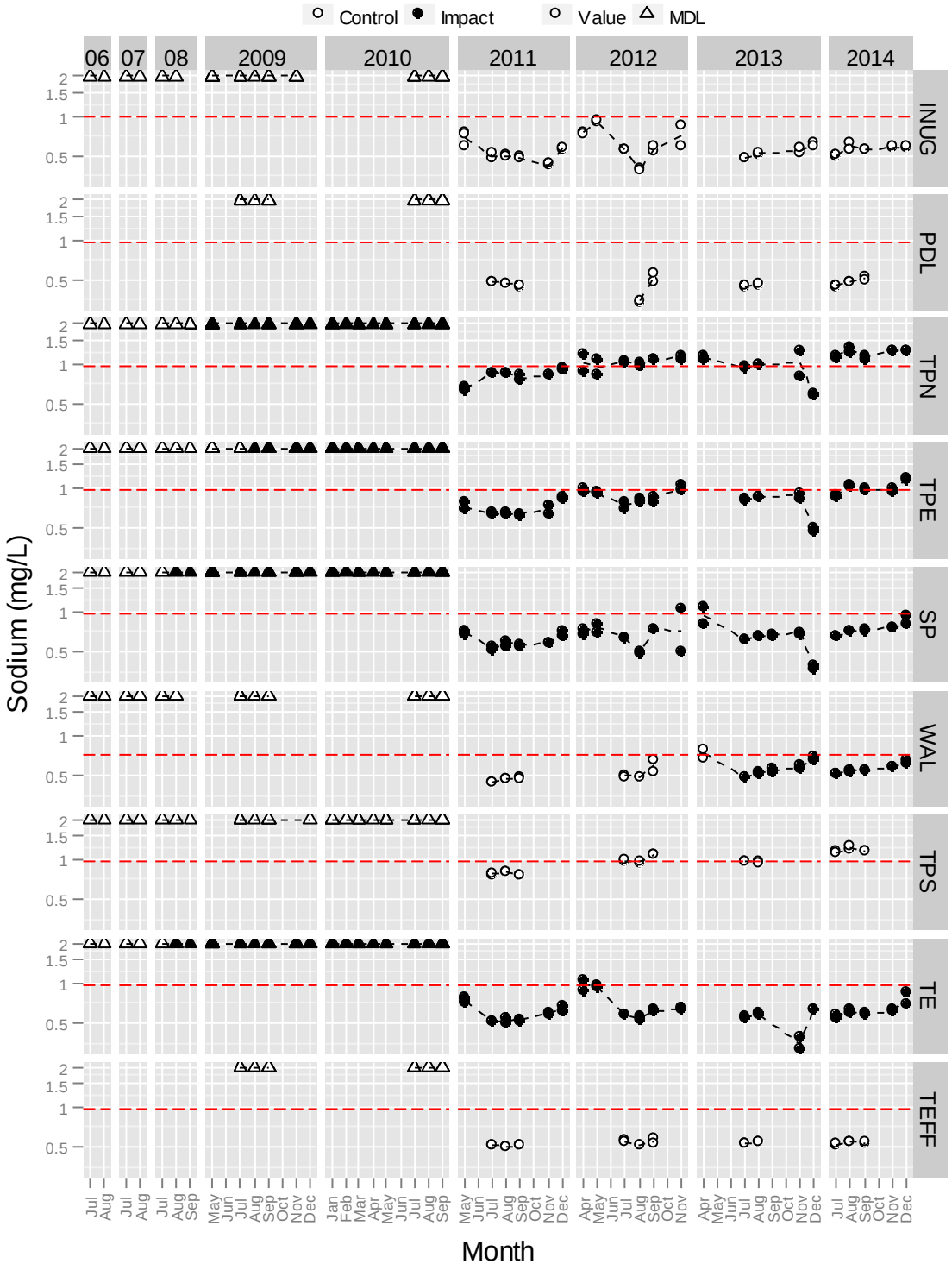


Figure 3.3-30. Total Strontium (mg/L) in water samples from Meadowbank study lakes since 2006.

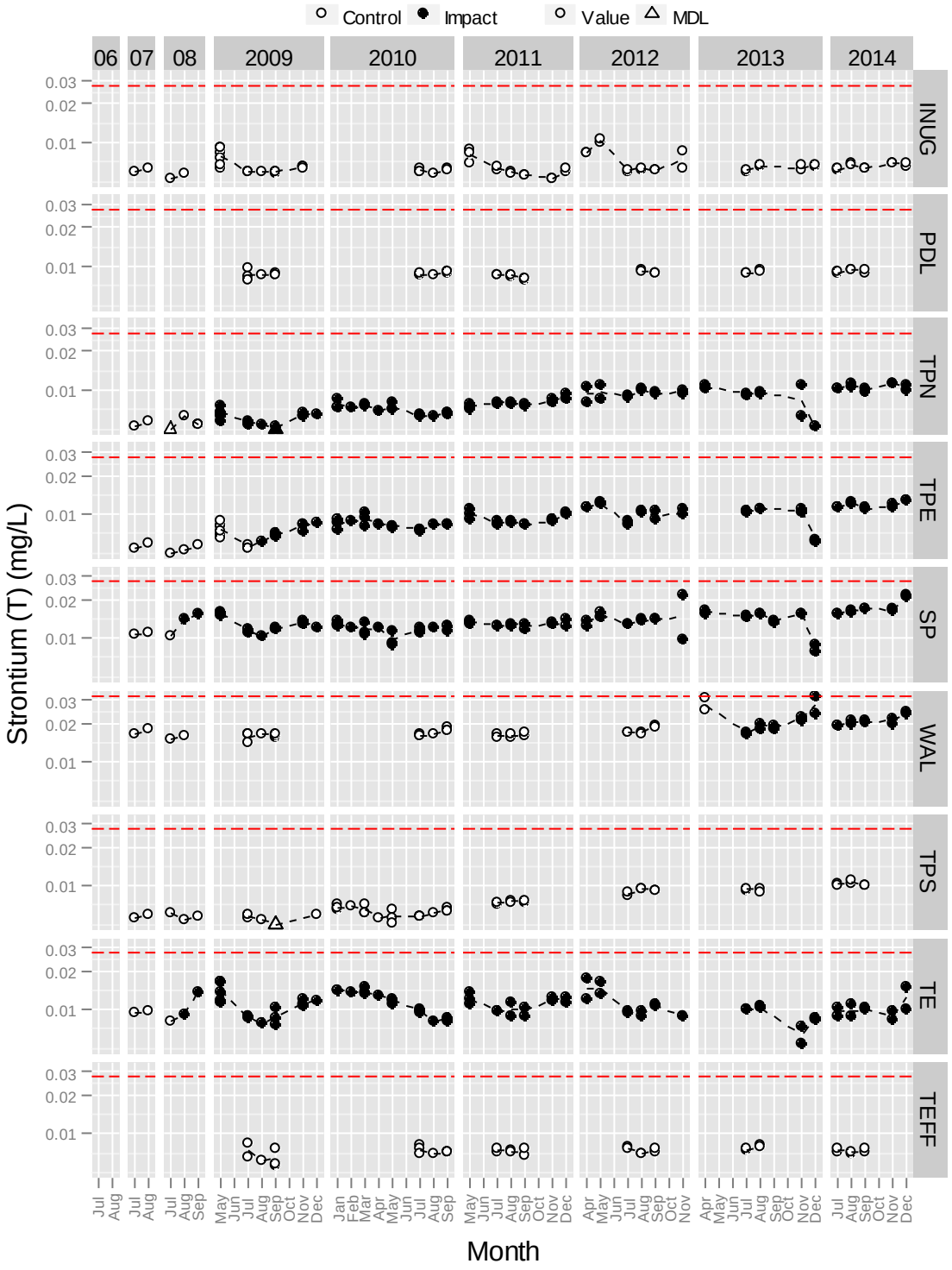


Figure 3.3-31. Total Uranium (mg/L) in water samples from Meadowbank study lakes since 2006.

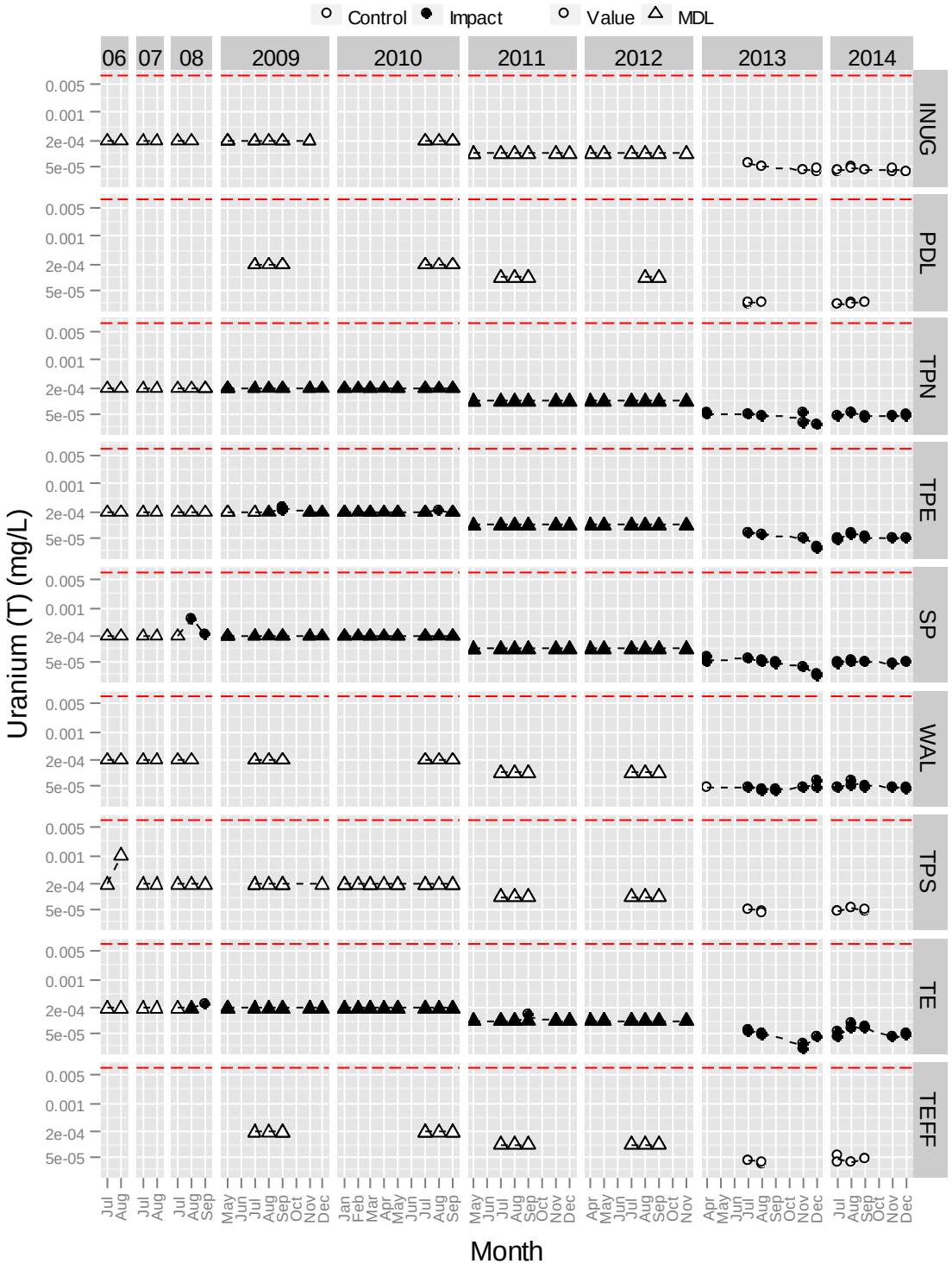


Figure 3.3-32. Dissolved Aluminum (mg/L) in water samples from Meadowbank study lakes since 2006.

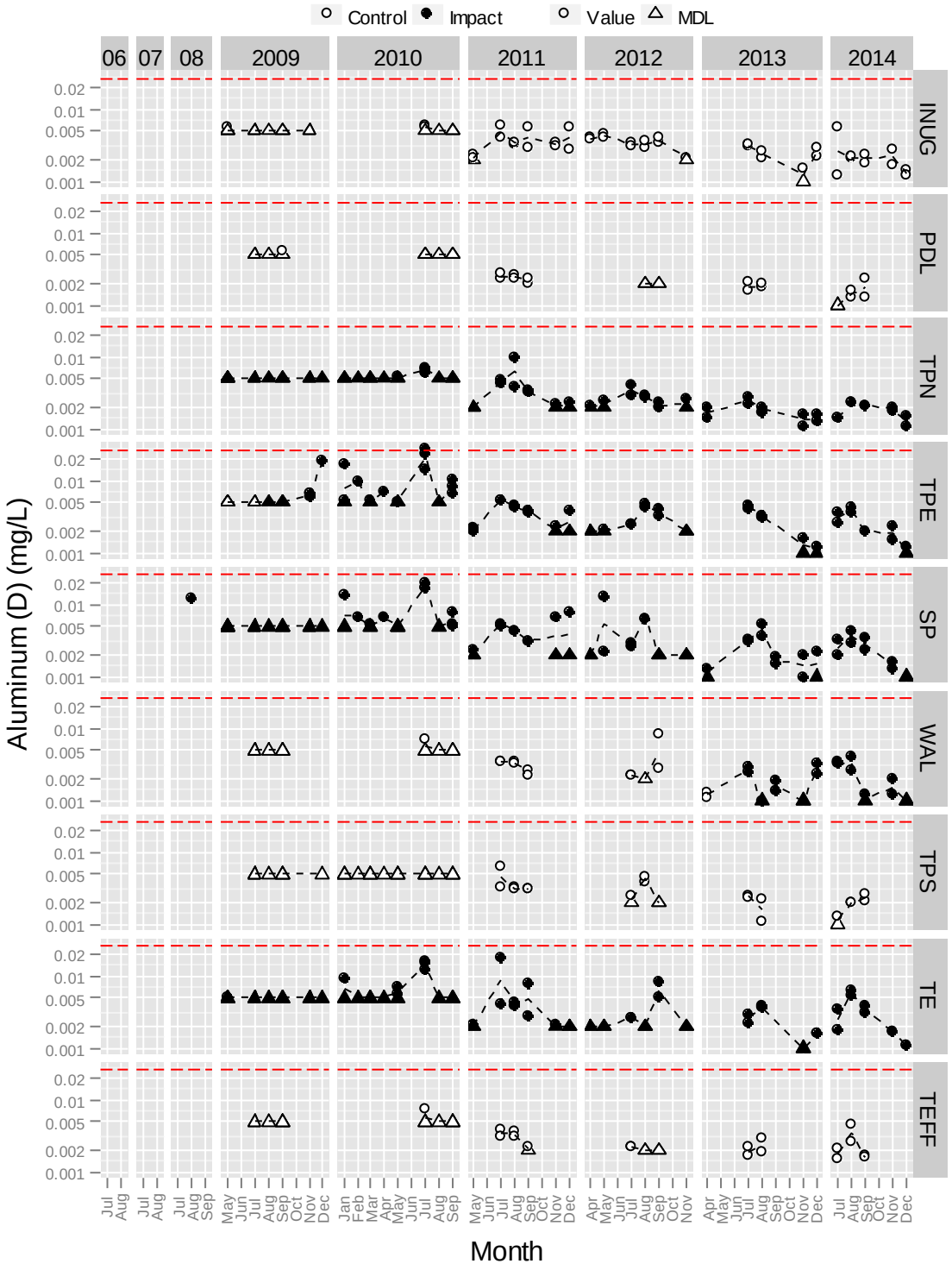


Figure 3.3-33. Dissolved Arsenic (mg/L) in water samples from Meadowbank study lakes since 2006.

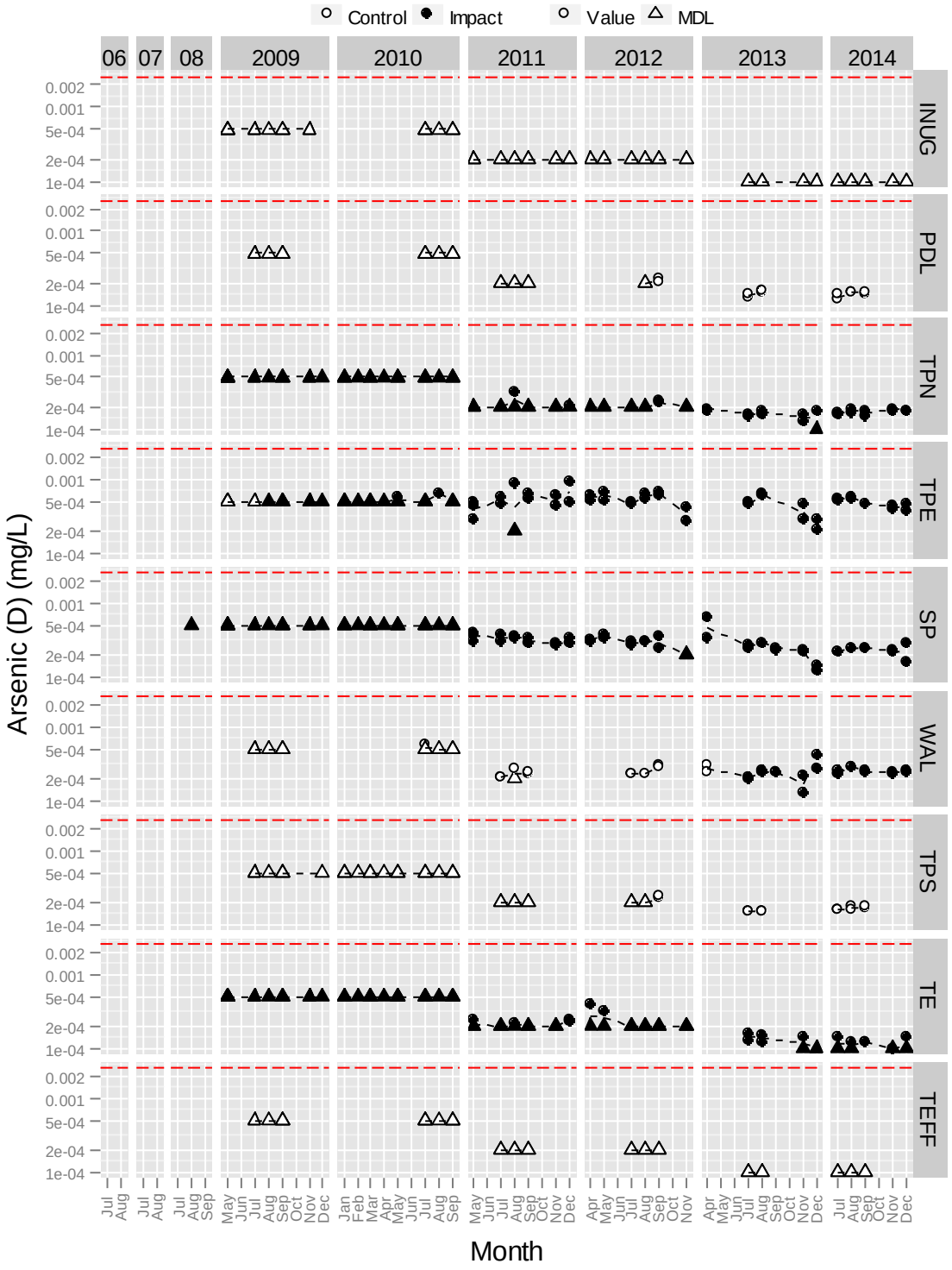


Figure 3.3-34. Dissolved Barium (mg/L) in water samples from Meadowbank study lakes since 2006.

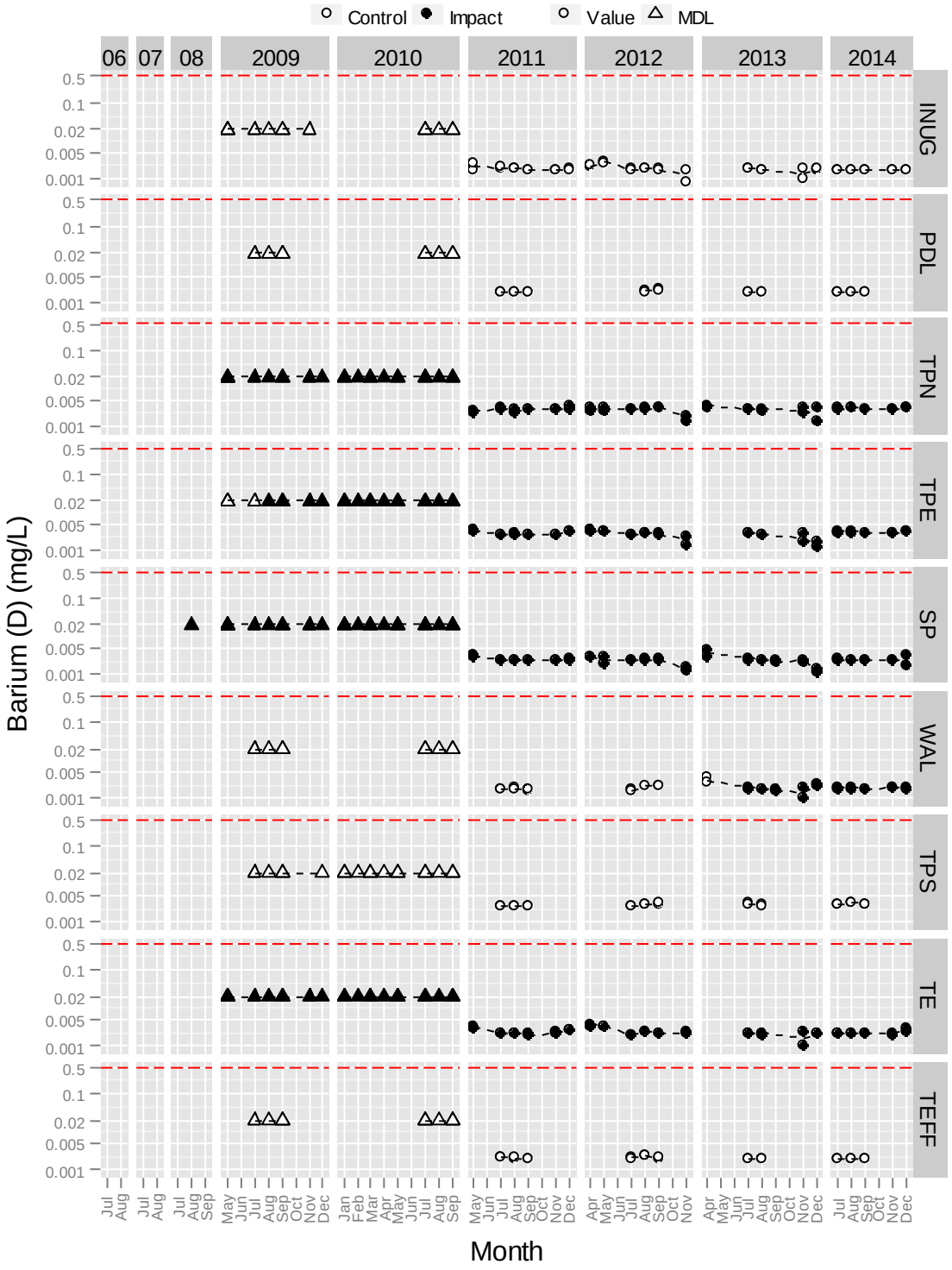


Figure 3.3-35. Dissolved Copper (mg/L) in water samples from Meadowbank study lakes since 2006.

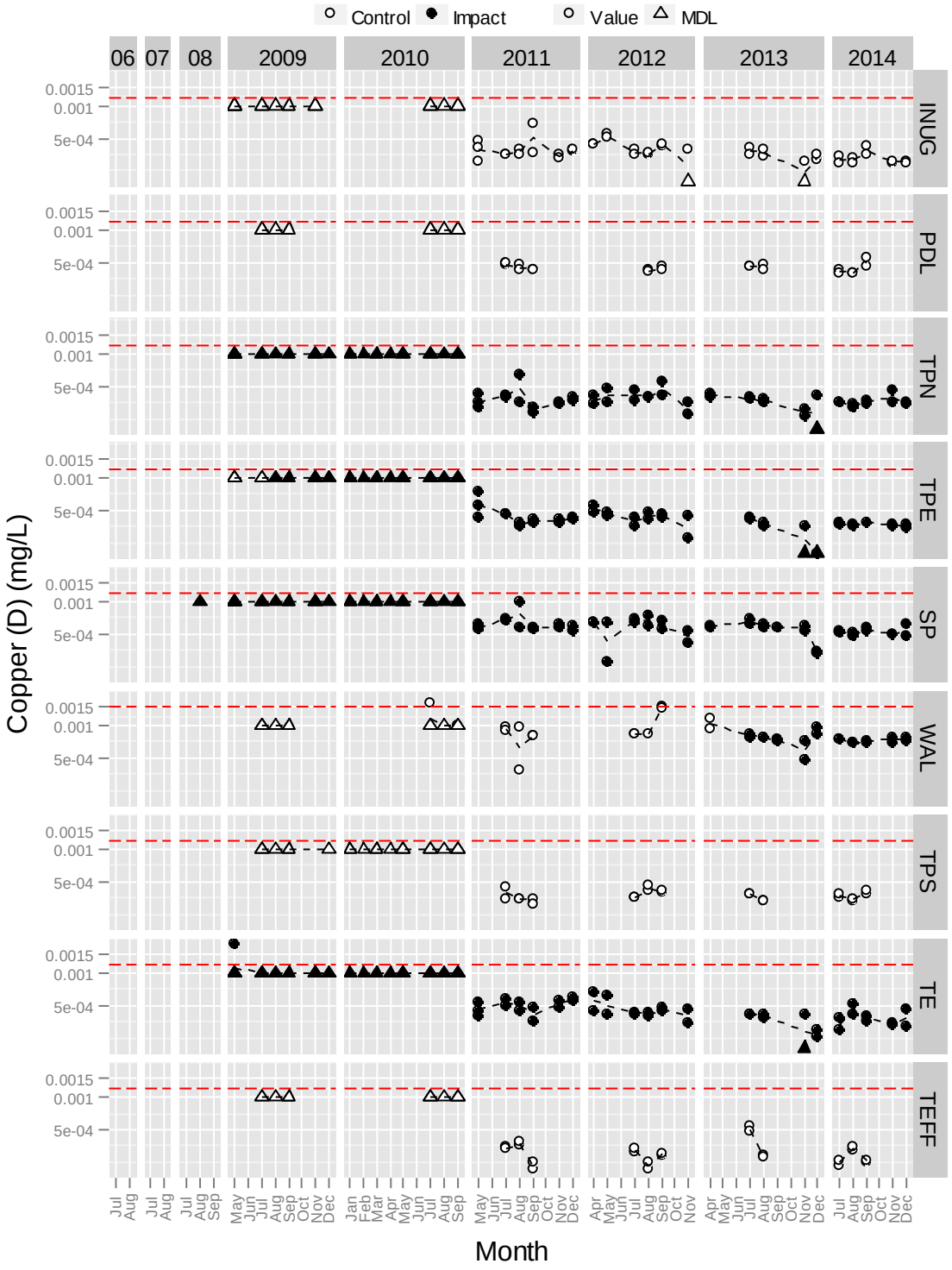


Figure 3.3-36. Dissolved Manganese (mg/L) in water samples from Meadowbank study lakes since 2006.

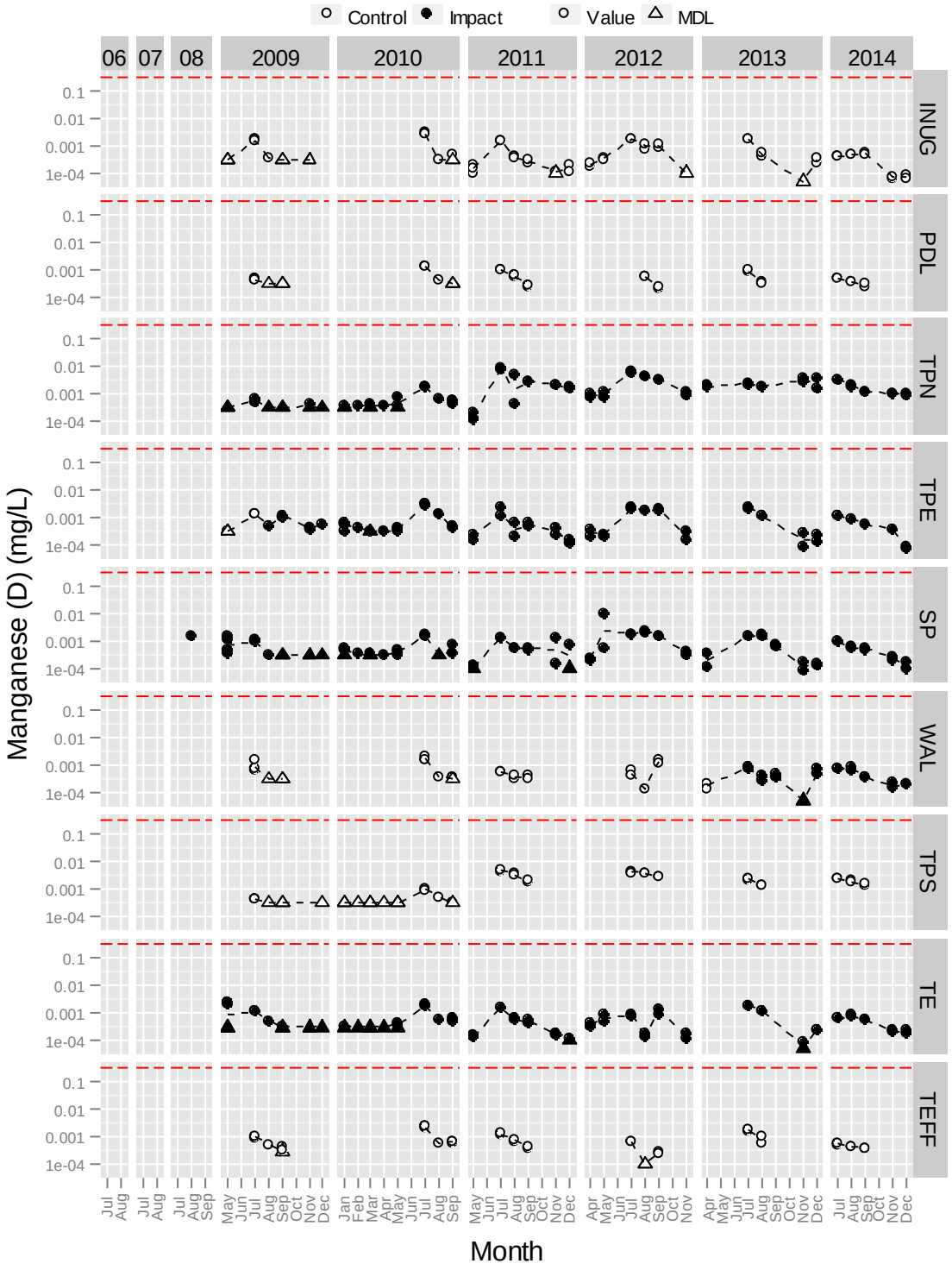


Figure 3.3-37. Dissolved Molybdenum (mg/L) in water samples from Meadowbank study lakes since 2006.

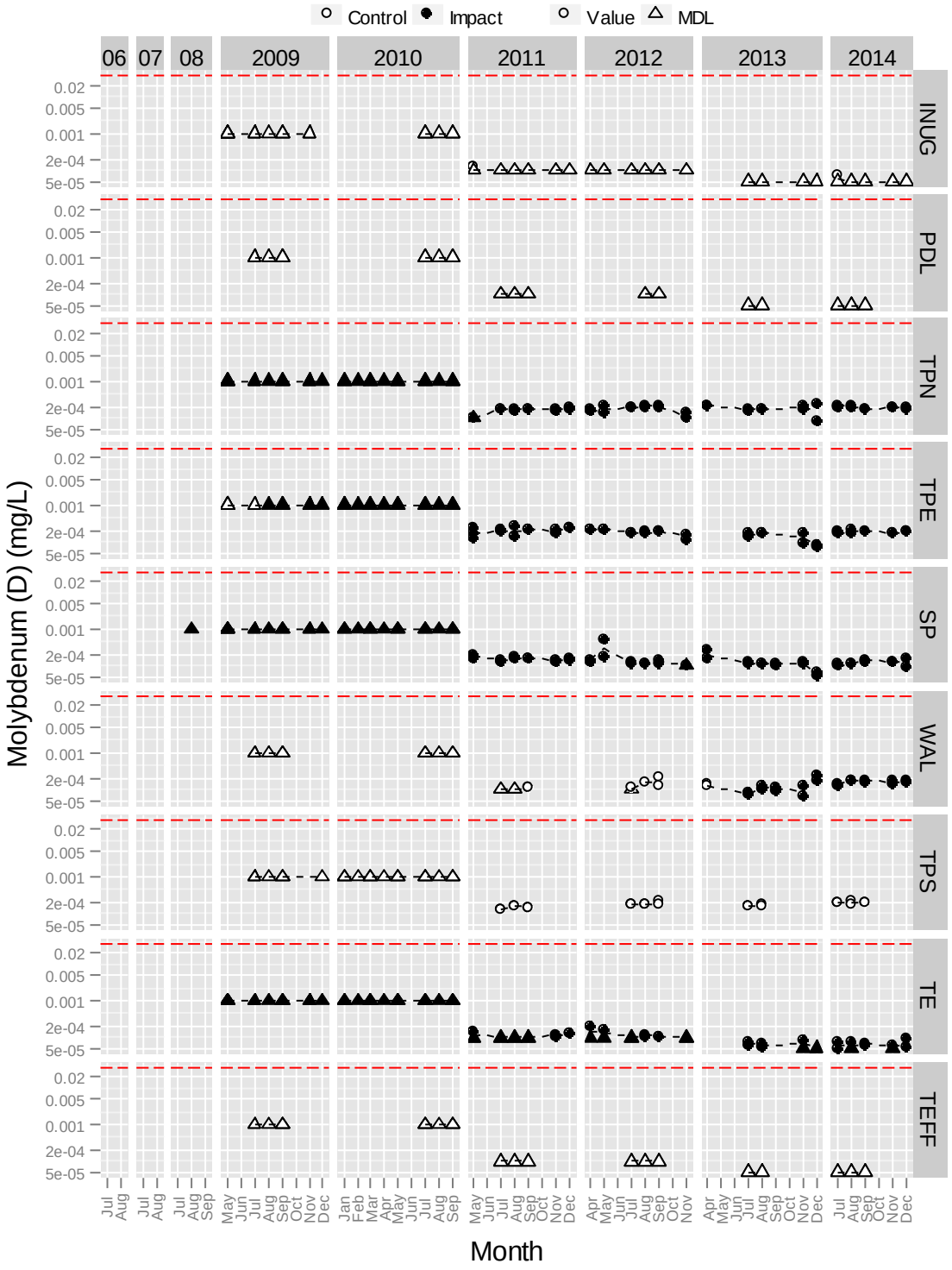


Figure 3.3-38. Dissolved Strontium (mg/L) in water samples from Meadowbank study lakes since 2006.

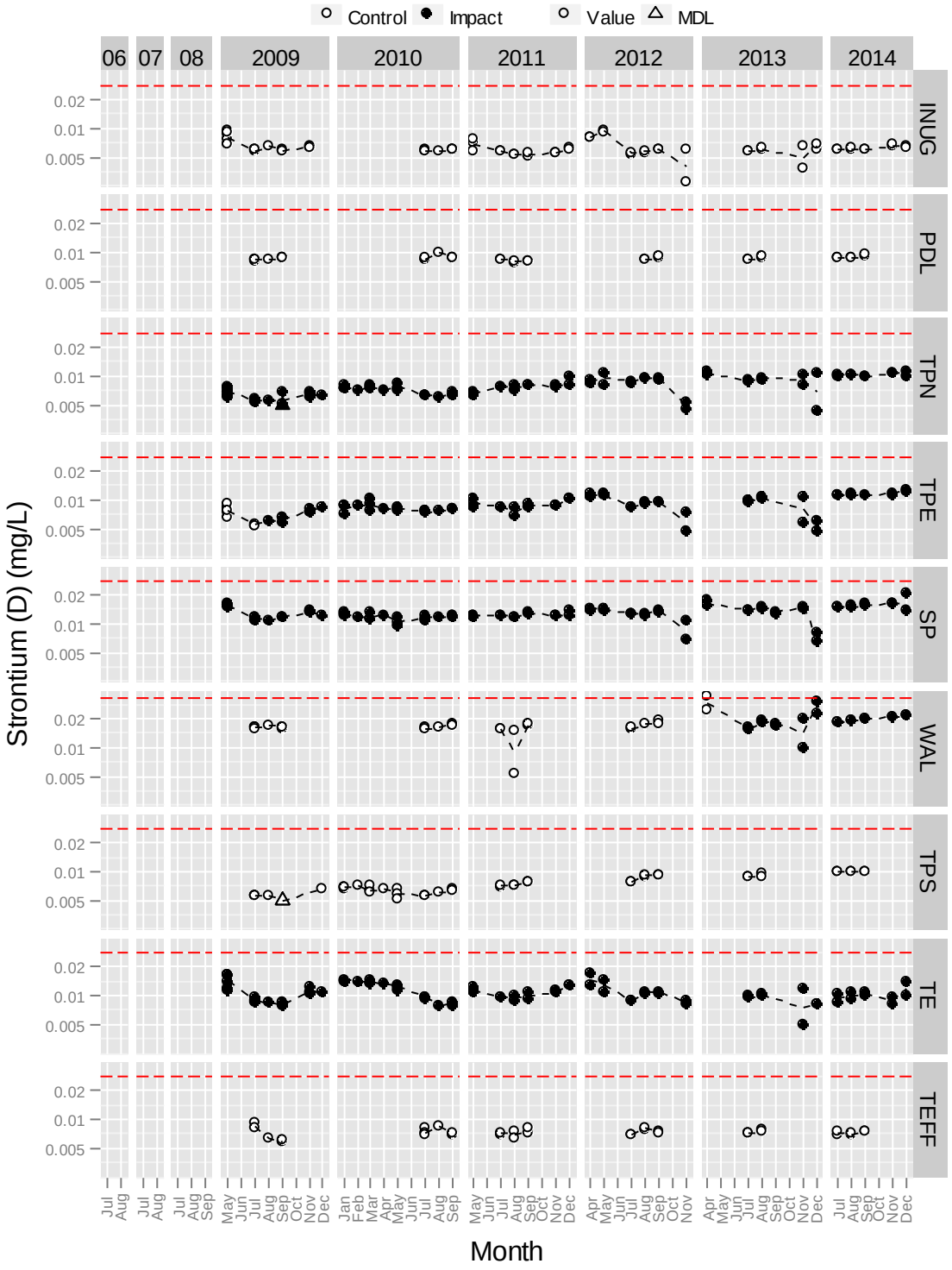


Figure 3.3-39. Dissolved Uranium (mg/L) in water samples from Meadowbank study lakes since 2006.

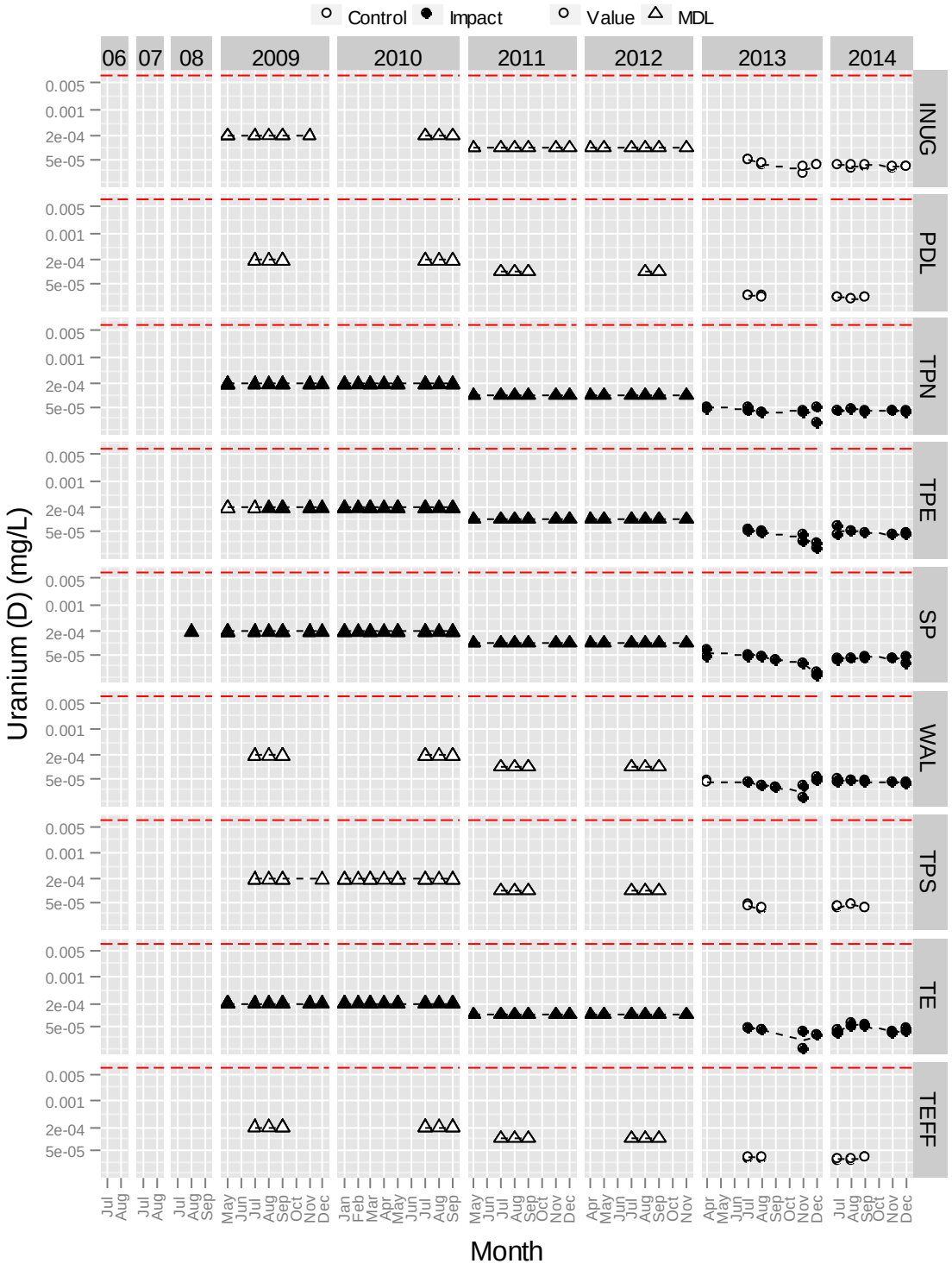
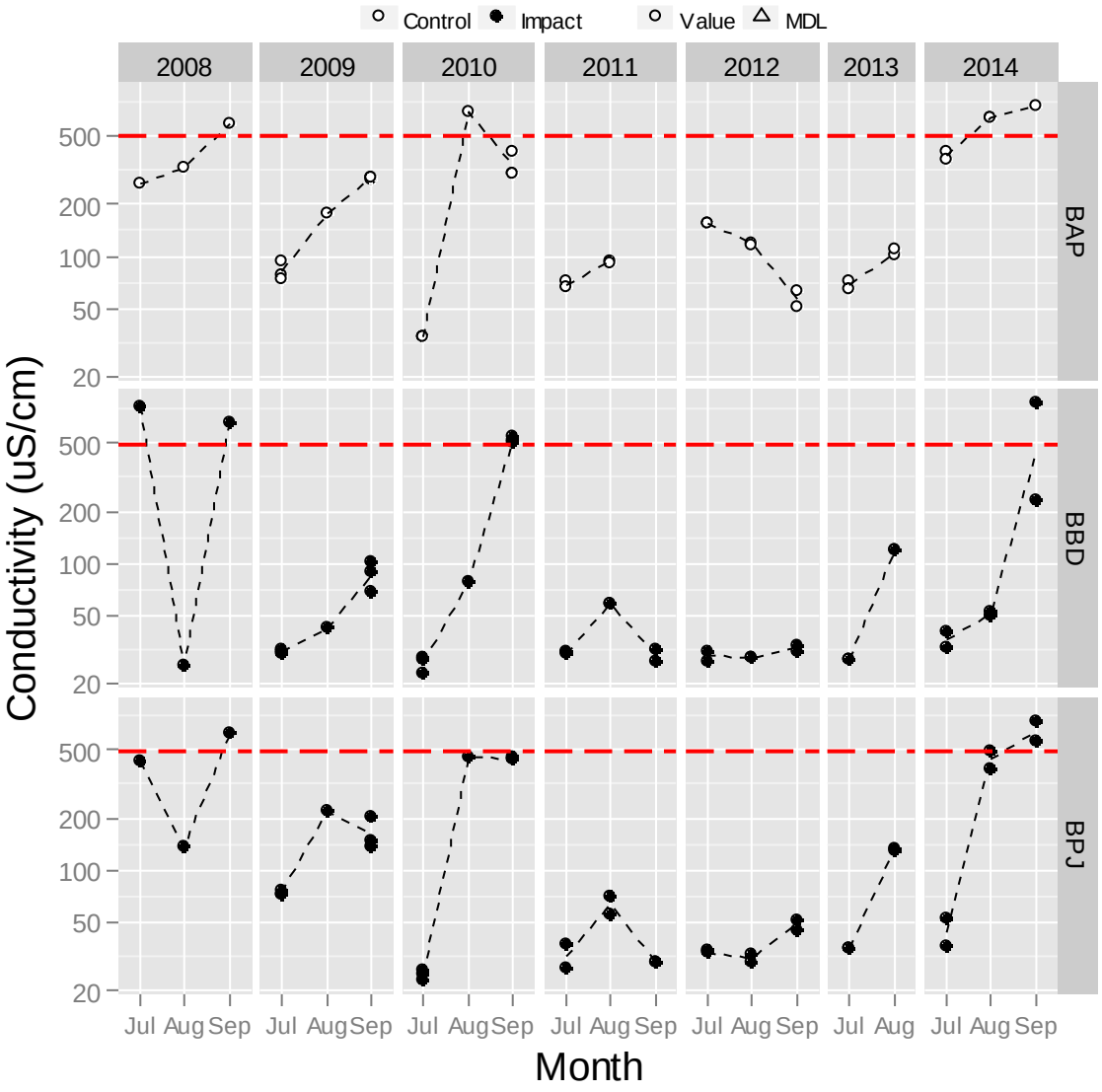


Figure 3.3-40. Laboratory-measured conductivity (µS/cm) in water samples from Baker Lake since 2008.



*__Note__: Laboratory-measured conductivity data from 2014 should be interpreted with caution, particularly at low concentrations (see **Section 3.1.2** for more detail).

Figure 3.3-41. Hardness (mg/L) in water samples from Baker Lake since 2008.

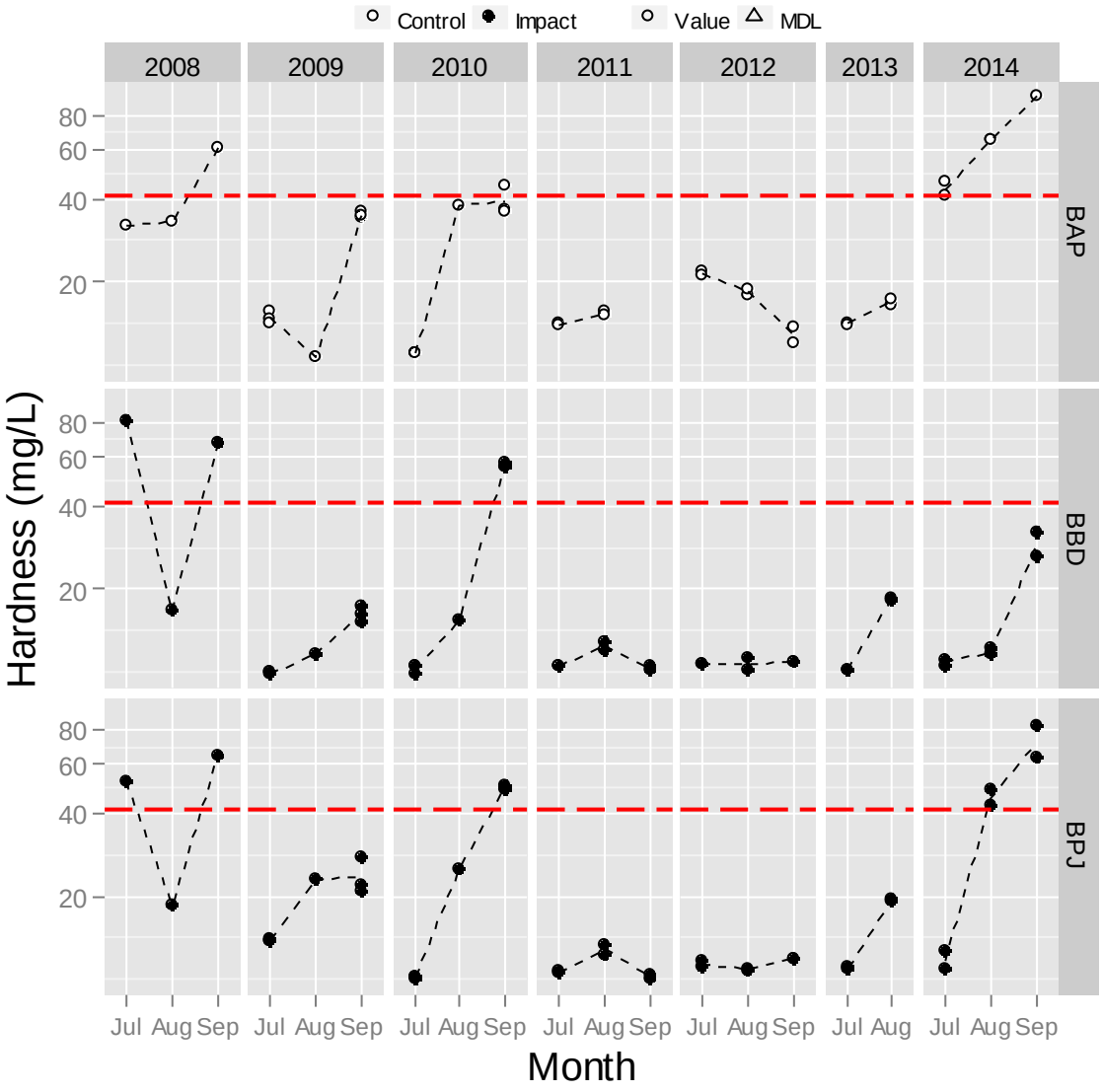


Figure 3.3-42. Field-measured pH in water samples from Baker Lake since 2008.

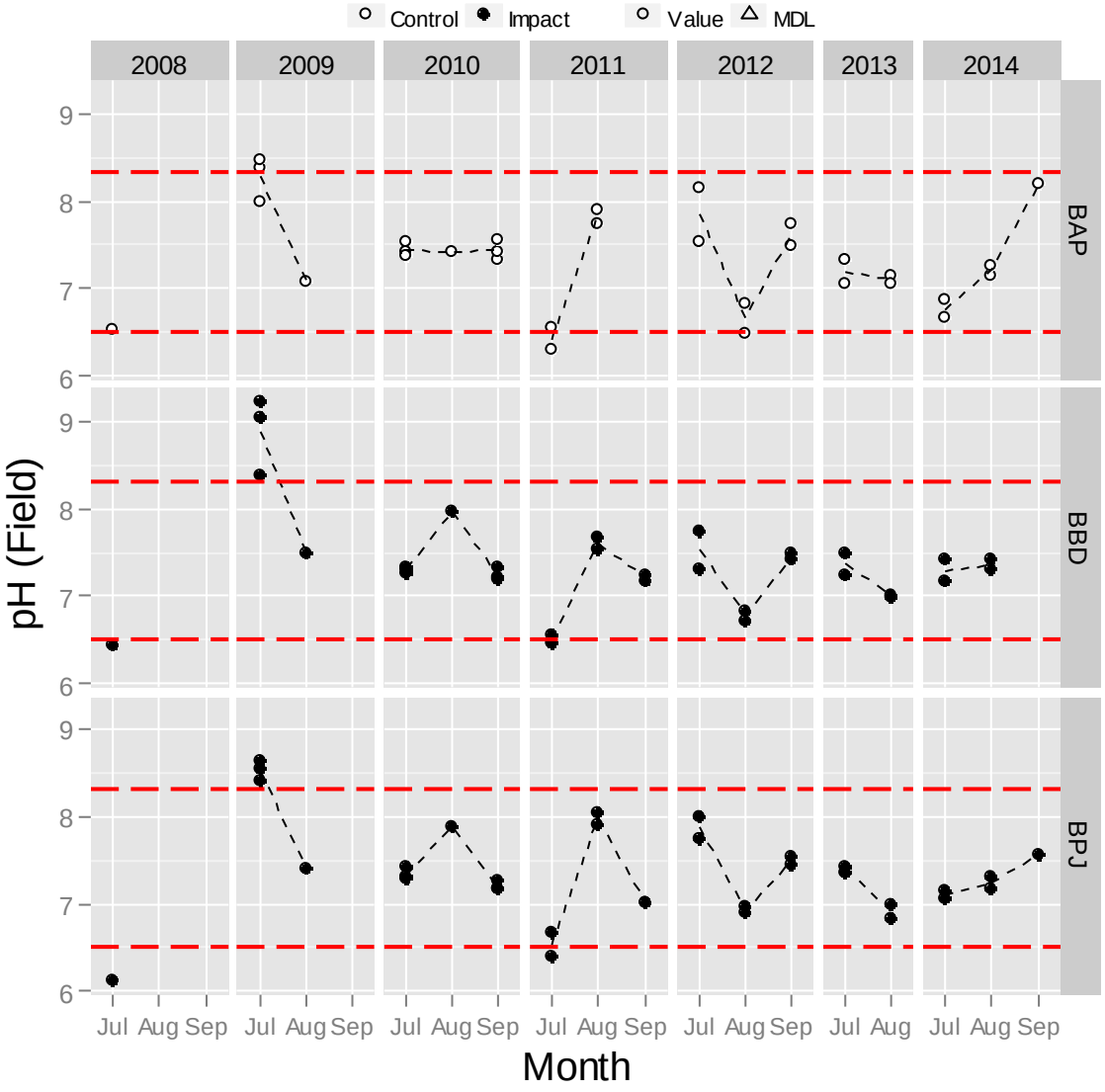


Figure 3.3-43. Laboratory-measured pH in water samples from Baker Lake since 2008.

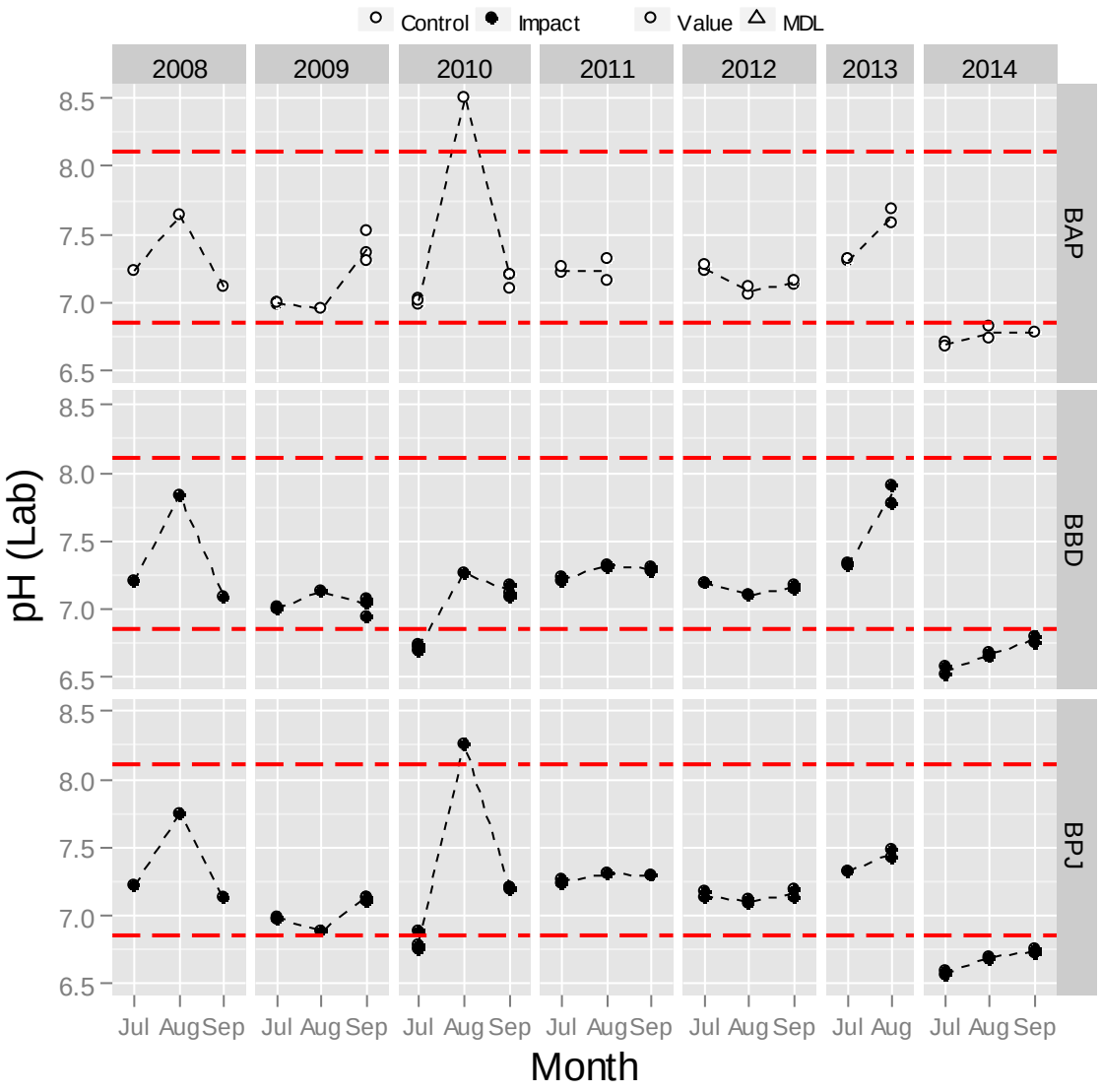
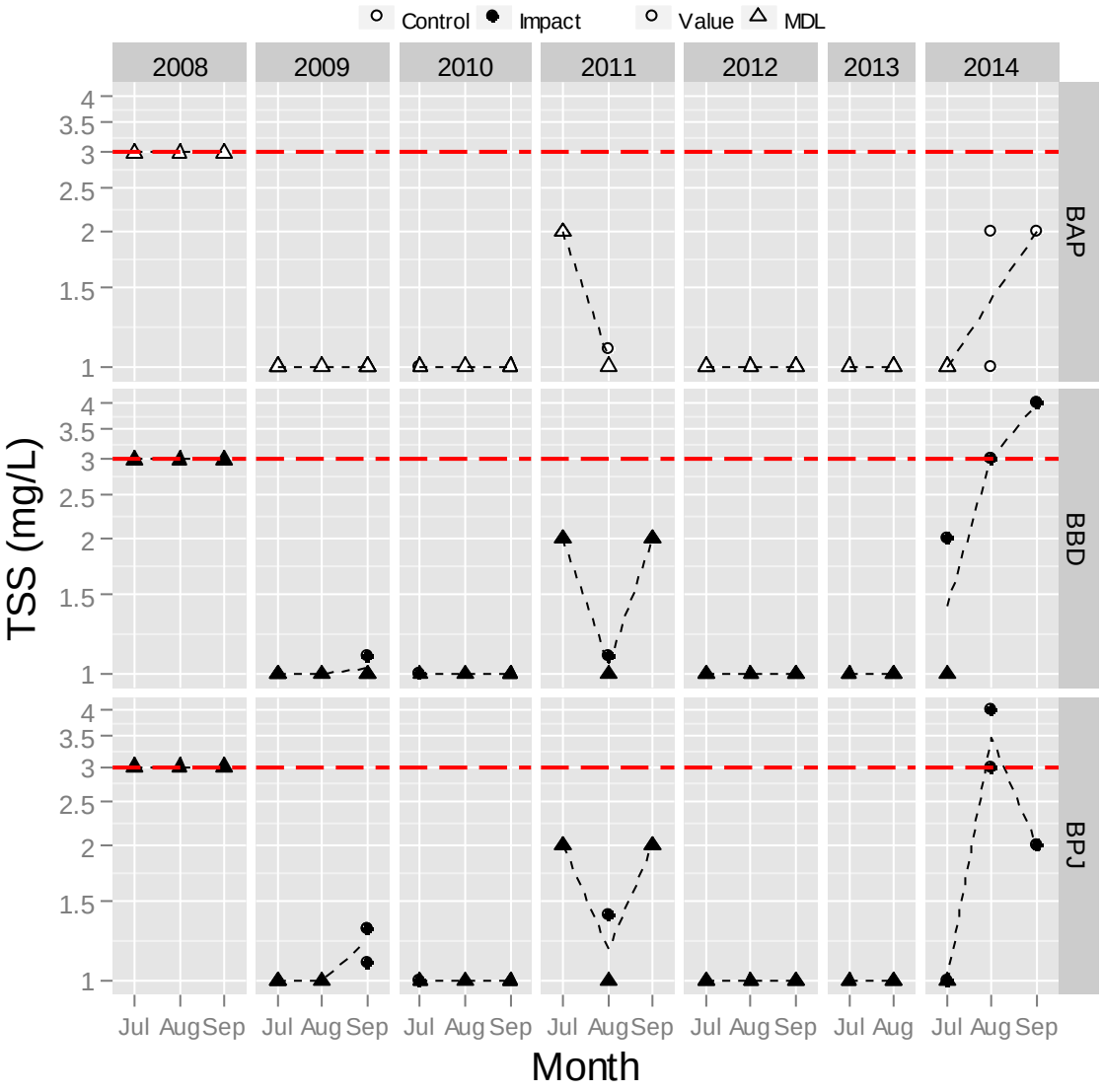
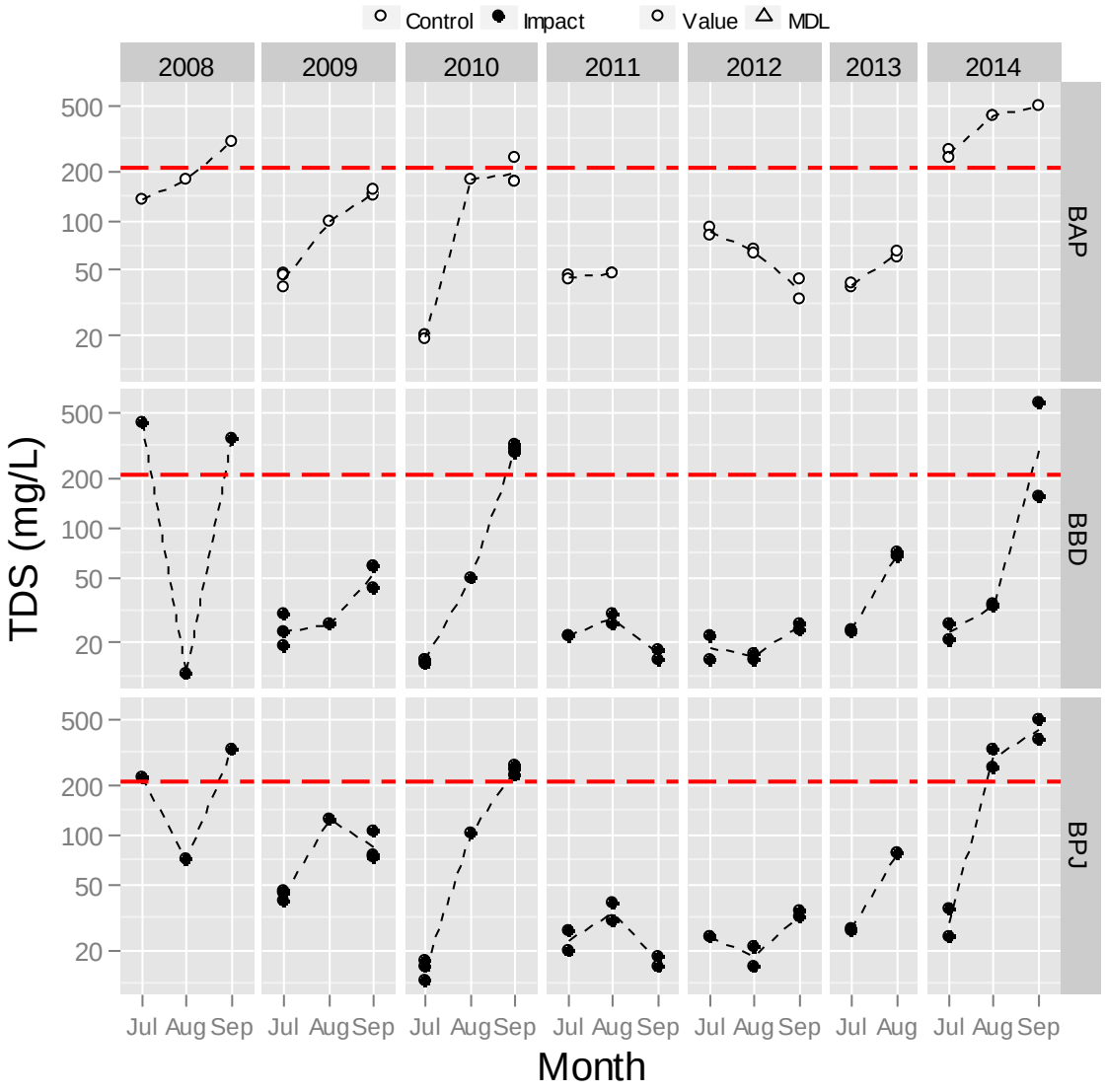


Figure 3.3-44. Total Suspended Solids (TSS; mg/L) in water samples from Baker Lake since 2008.



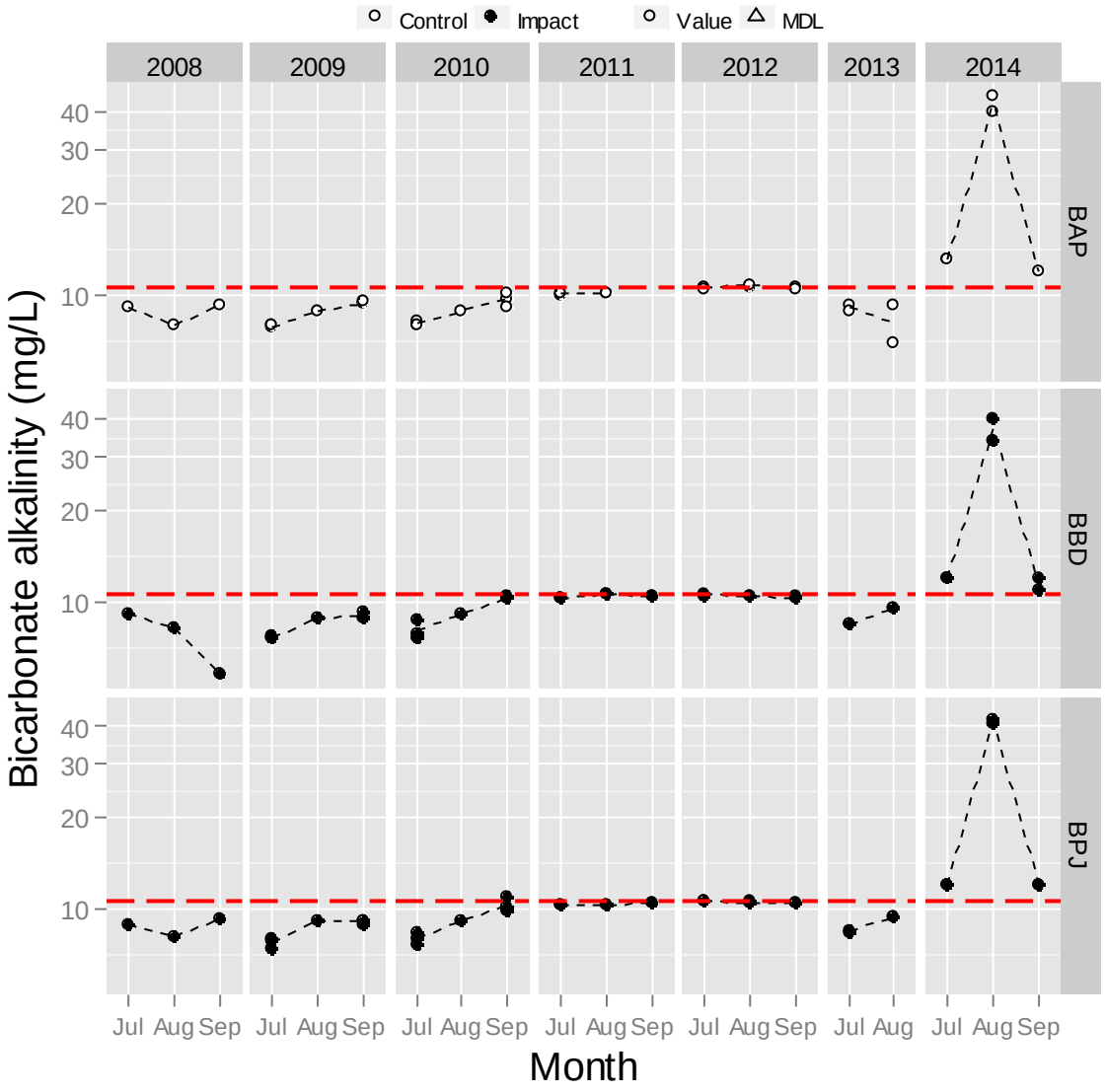
*__Note__: TSS data from 2014 are deemed unreliable and were excluded from formal trend assessment (see **Section 3.1.2** for more detail).

Figure 3.3-45. Total Dissolved Solids (TDS; mg/L) in water samples from Baker Lake since 2008.



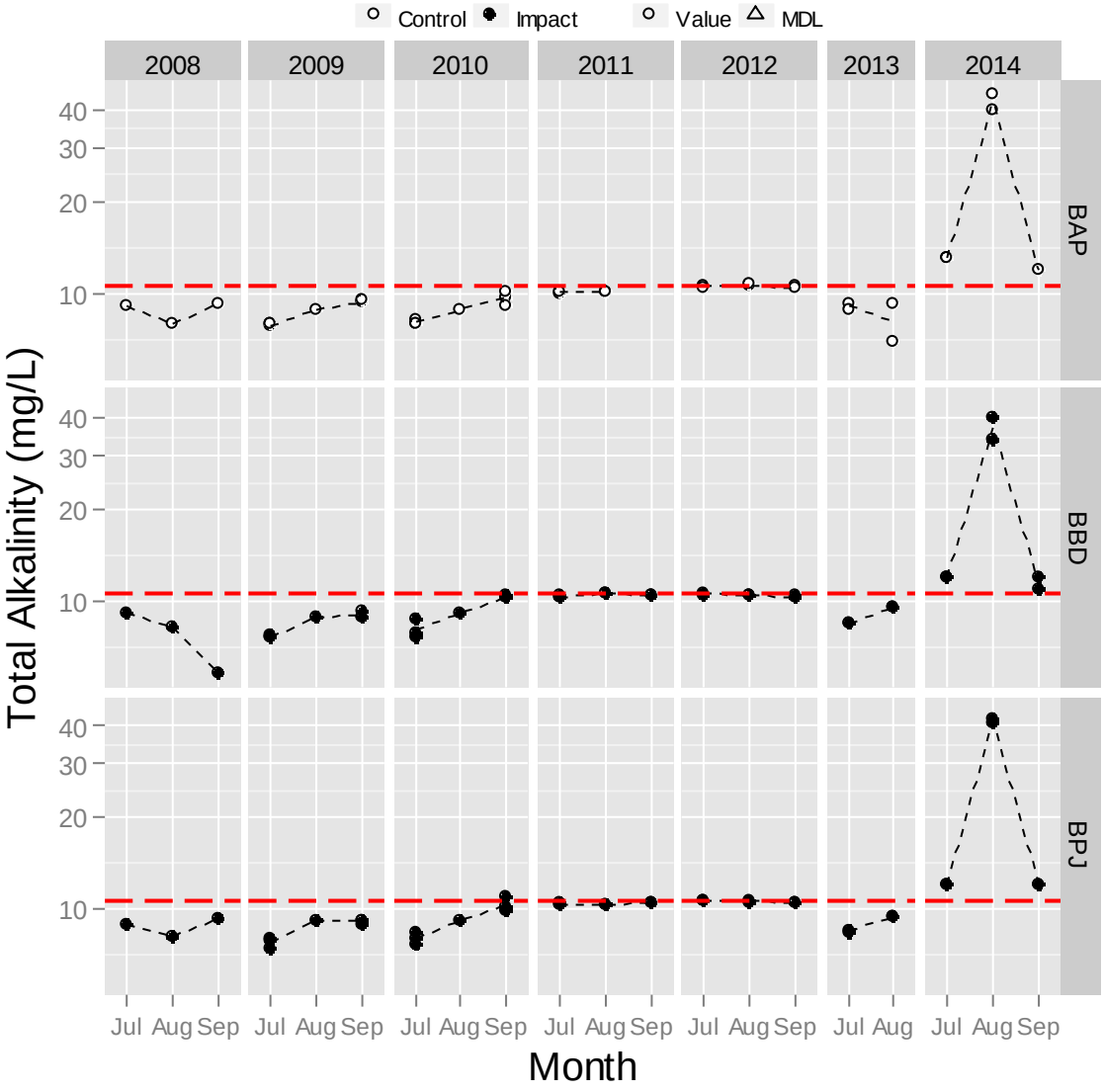
*__Note__: TDS data from 2014 should be interpreted with caution, particularly at low concentrations (see **Section 3.1.2** for more detail).

Figure 3.3-46. 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 **Section 3.1.2** for more detail).

Figure 3.3-47. 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 **Section 3.1.2** for more detail).

Figure 3.3-48. Ammonia-N (mg/L) in water samples from Baker Lake since 2008.

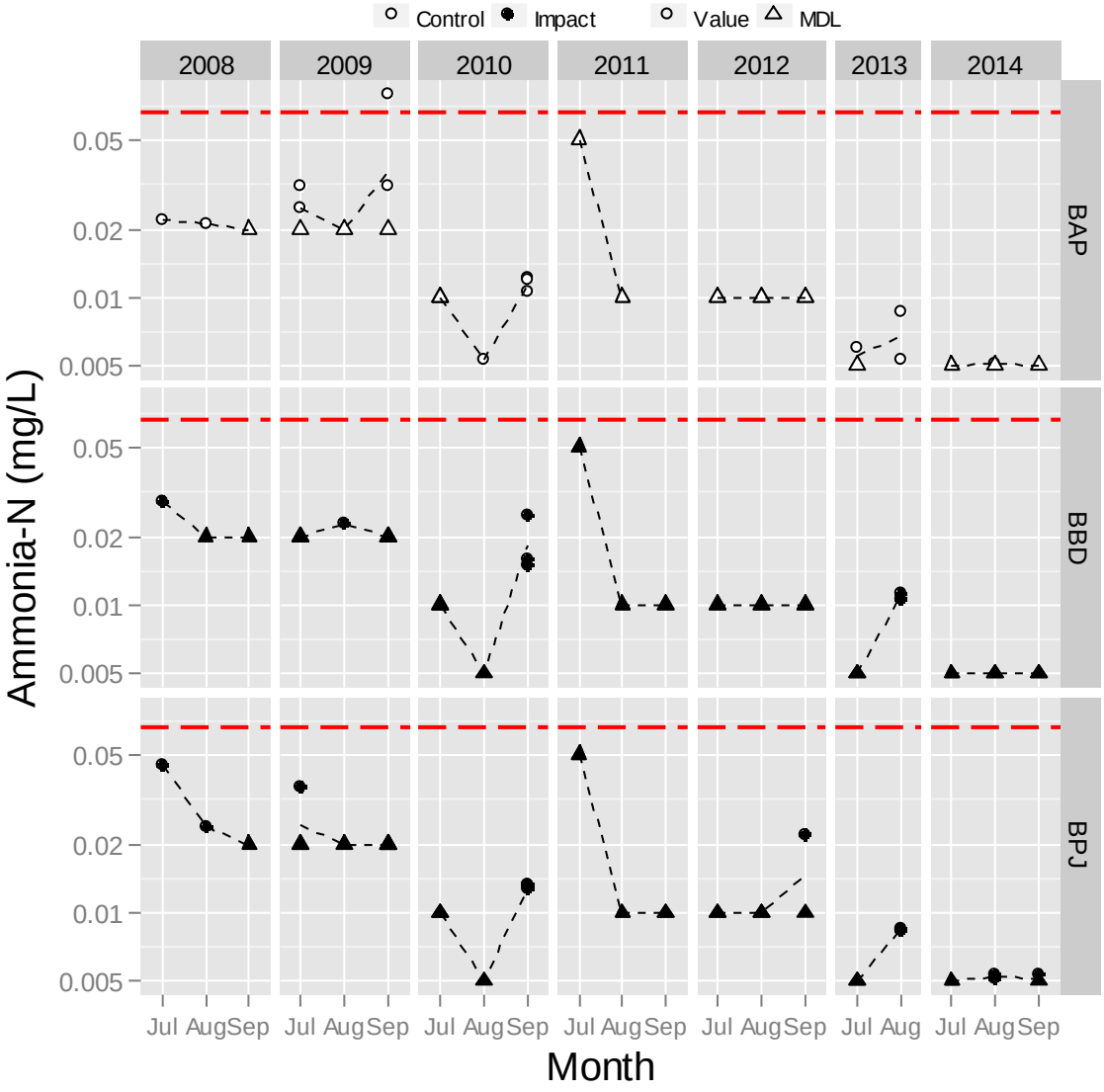


Figure 3.3-49. Chloride (mg/L) in water samples from Baker Lake since 2008.

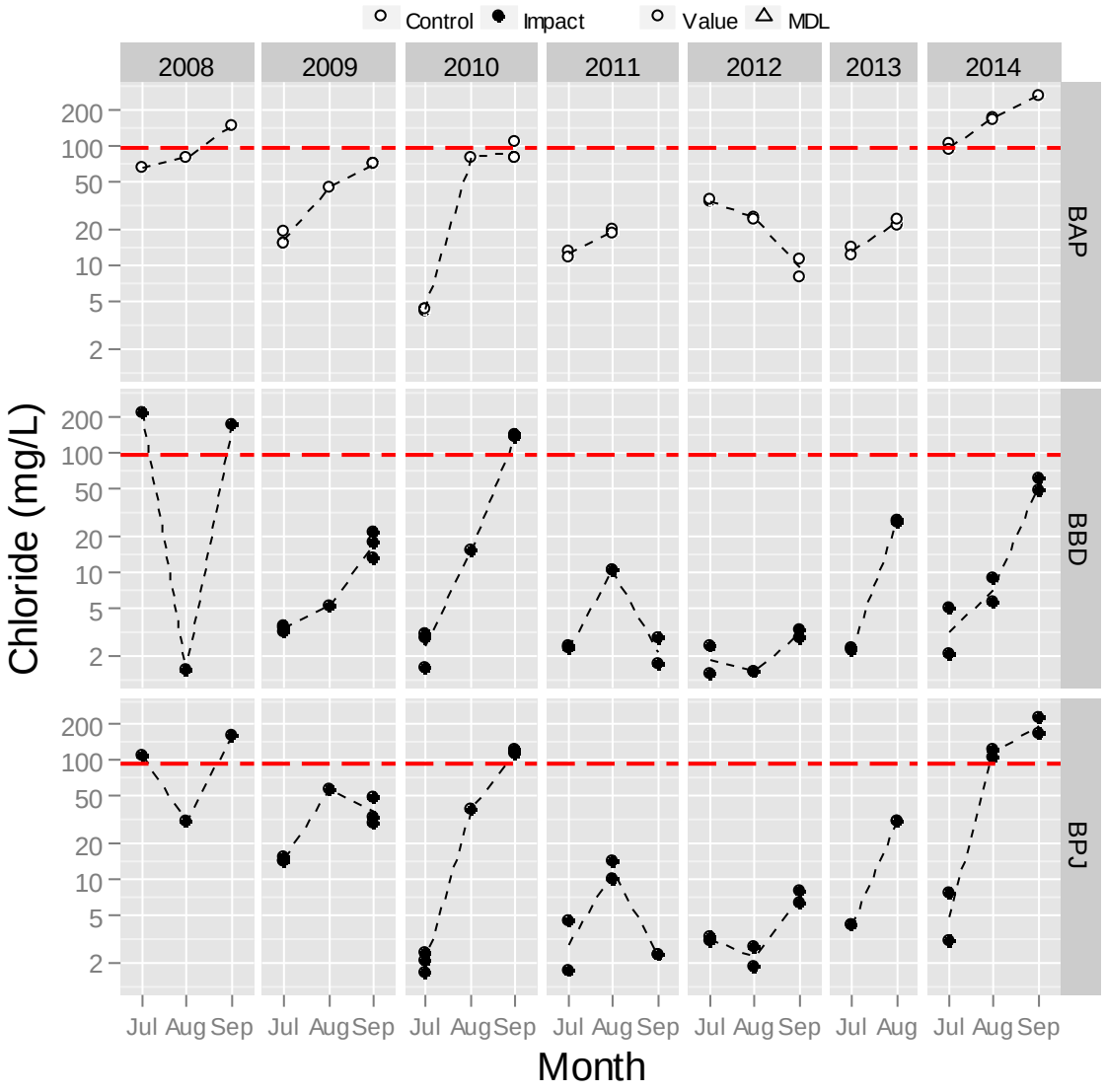


Figure 3.3-50. Nitrate-N (mg/L) in water samples from Baker Lake since 2008.

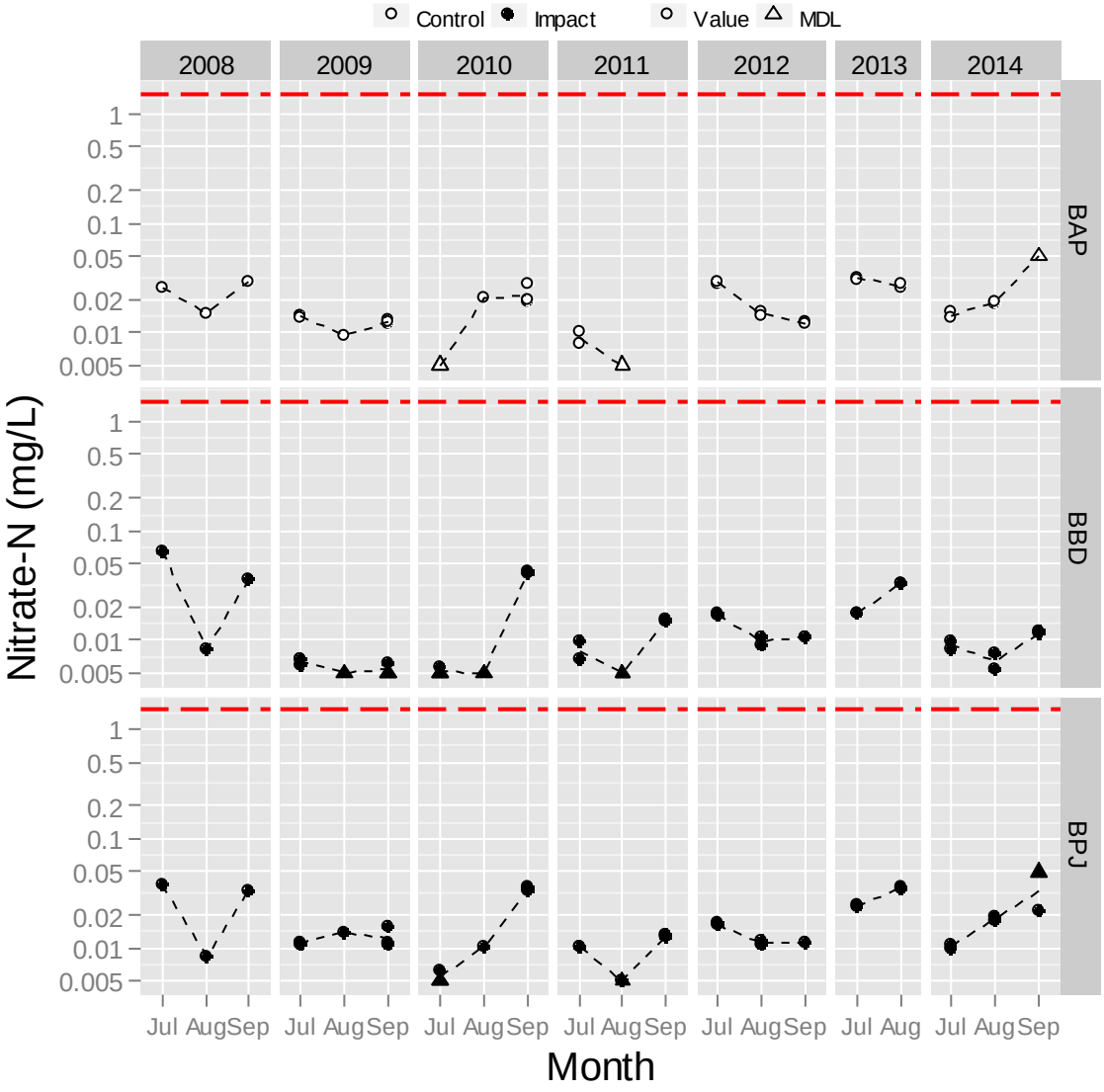
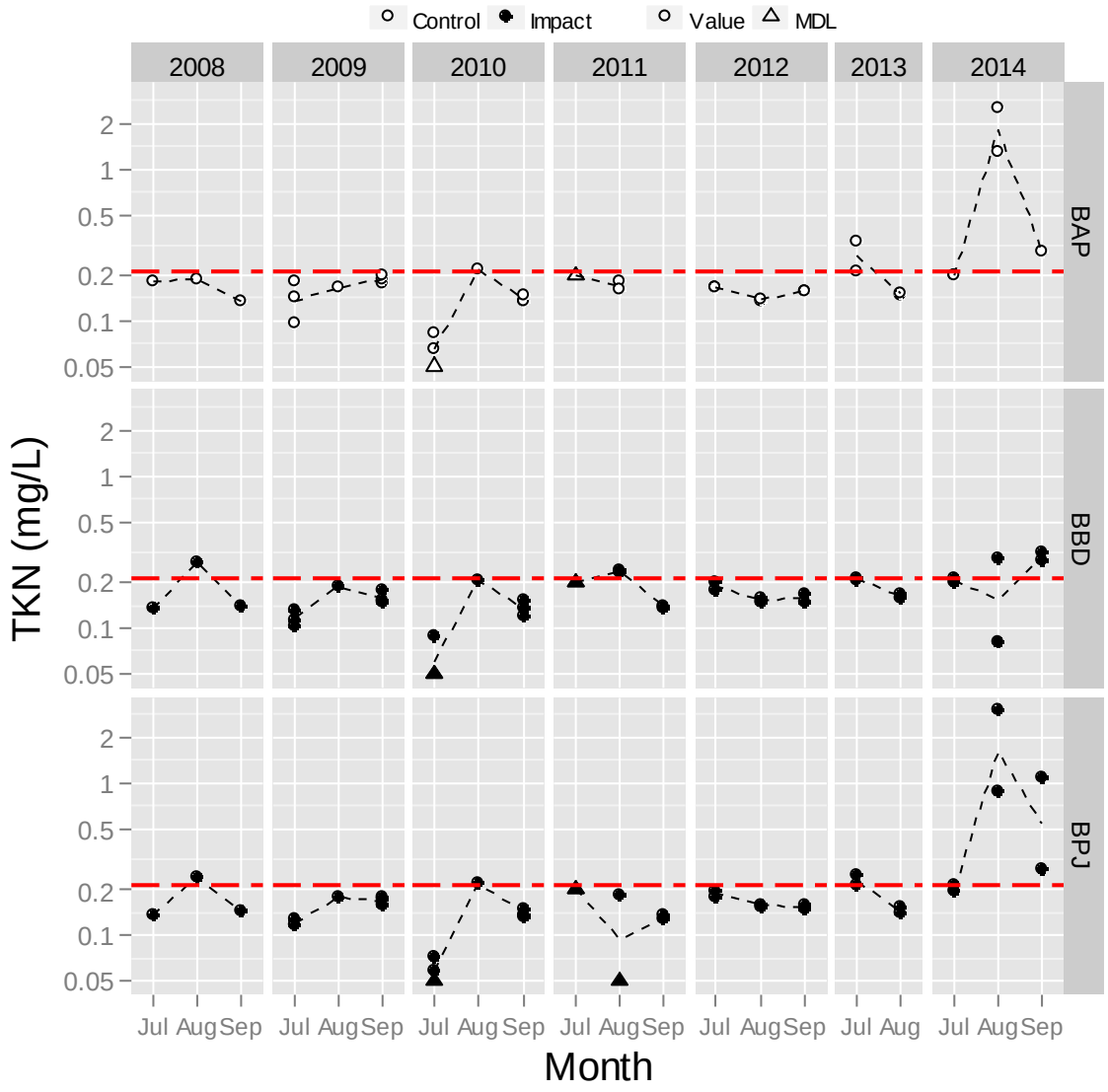


Figure 3.3-51. Total Kjeldahl Nitrogen (TKN; mg/L) in water samples from Baker Lake since 2008.



*__Note__: TKN data from 2014 are deemed unreliable and were excluded from formal trend assessment (see **Section 3.1.2** for more detail).

Figure 3.3-52. Total Phosphorus (mg/L) in water samples from Baker Lake since 2008.

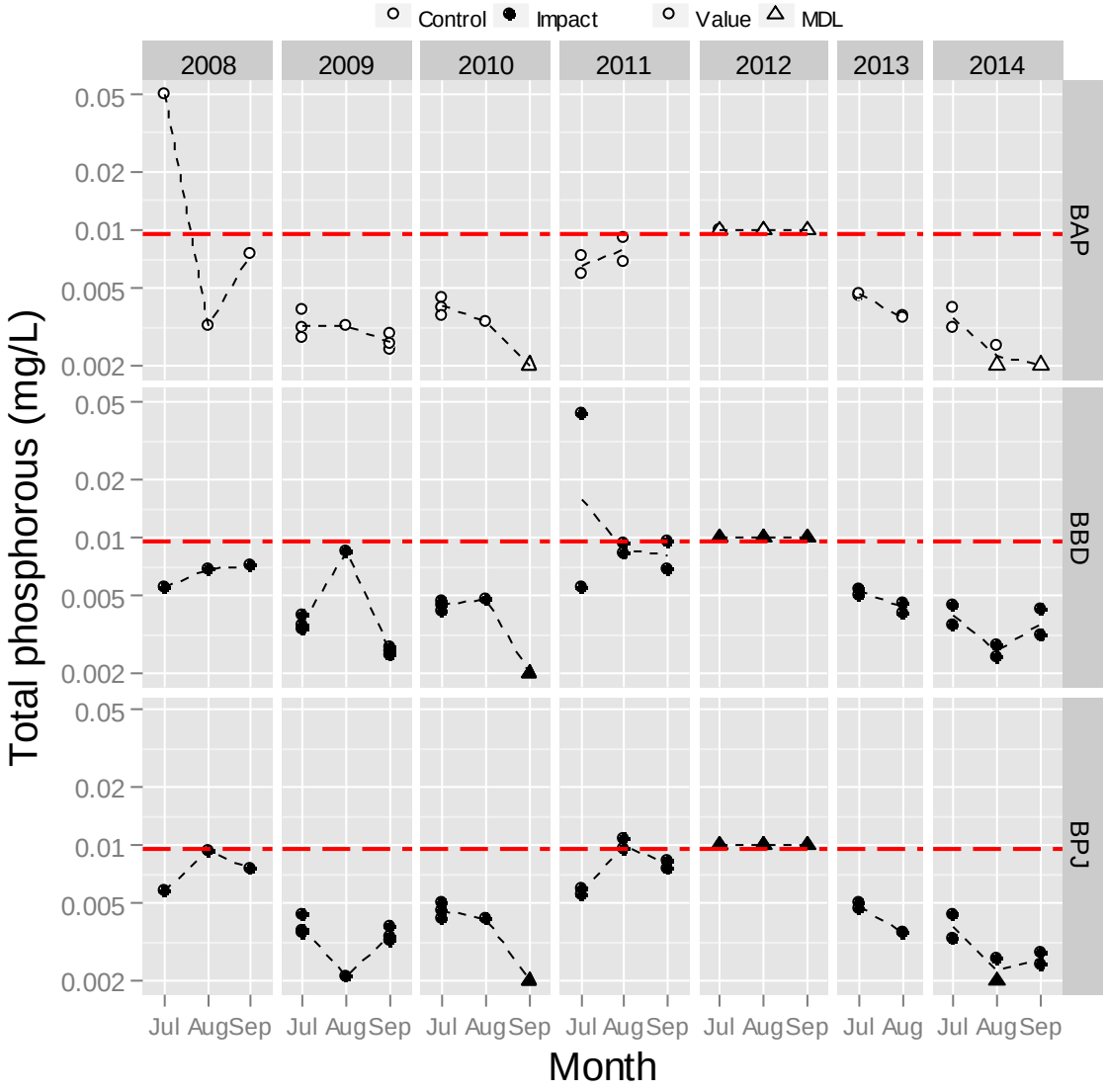


Figure 3.3-53. Total Ortho-phosphate (mg/L) in water samples from Baker Lake since 2008.

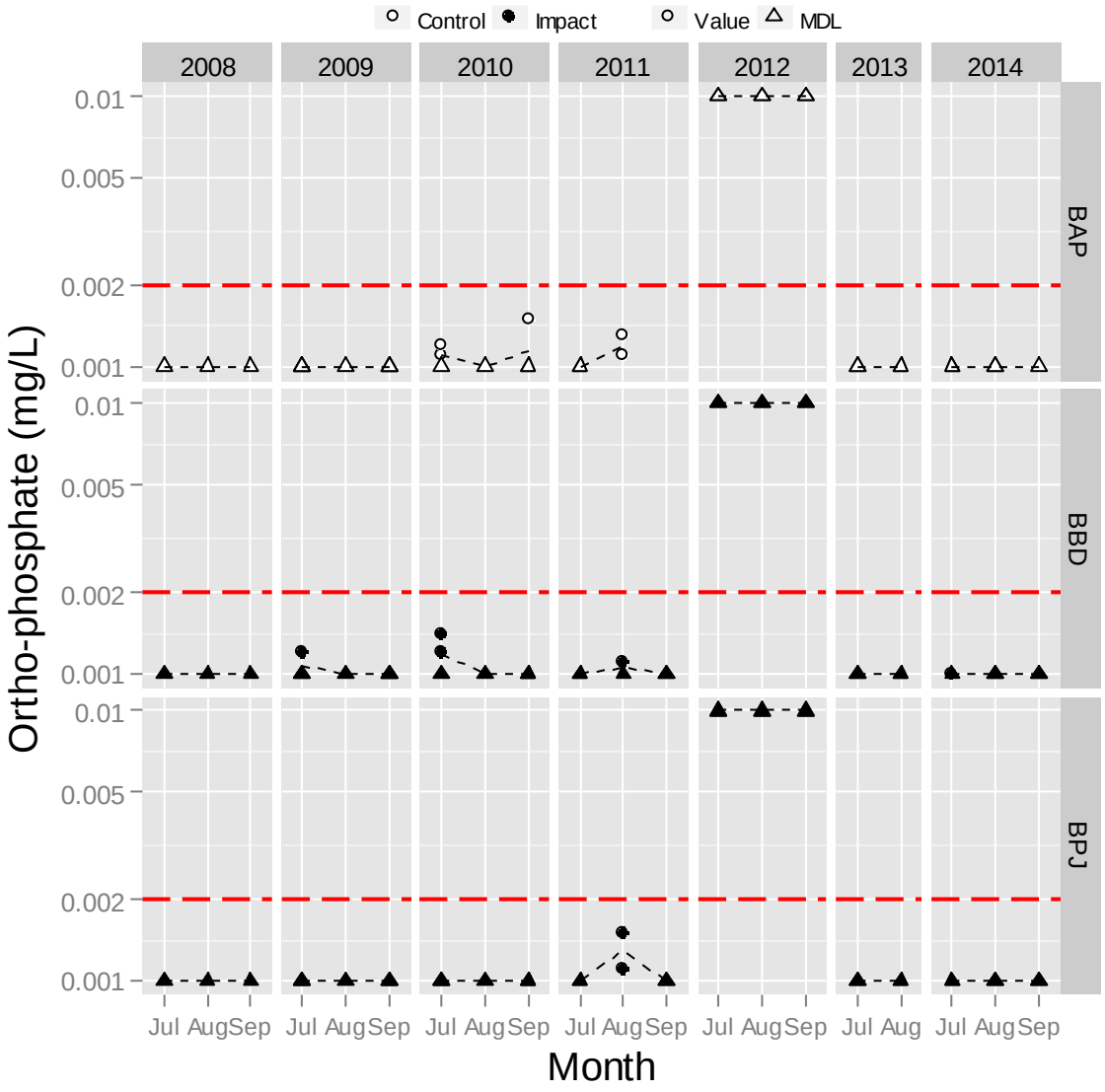


Figure 3.3-54. Reactive Silica (mg/L) in water samples from Baker Lake since 2008.

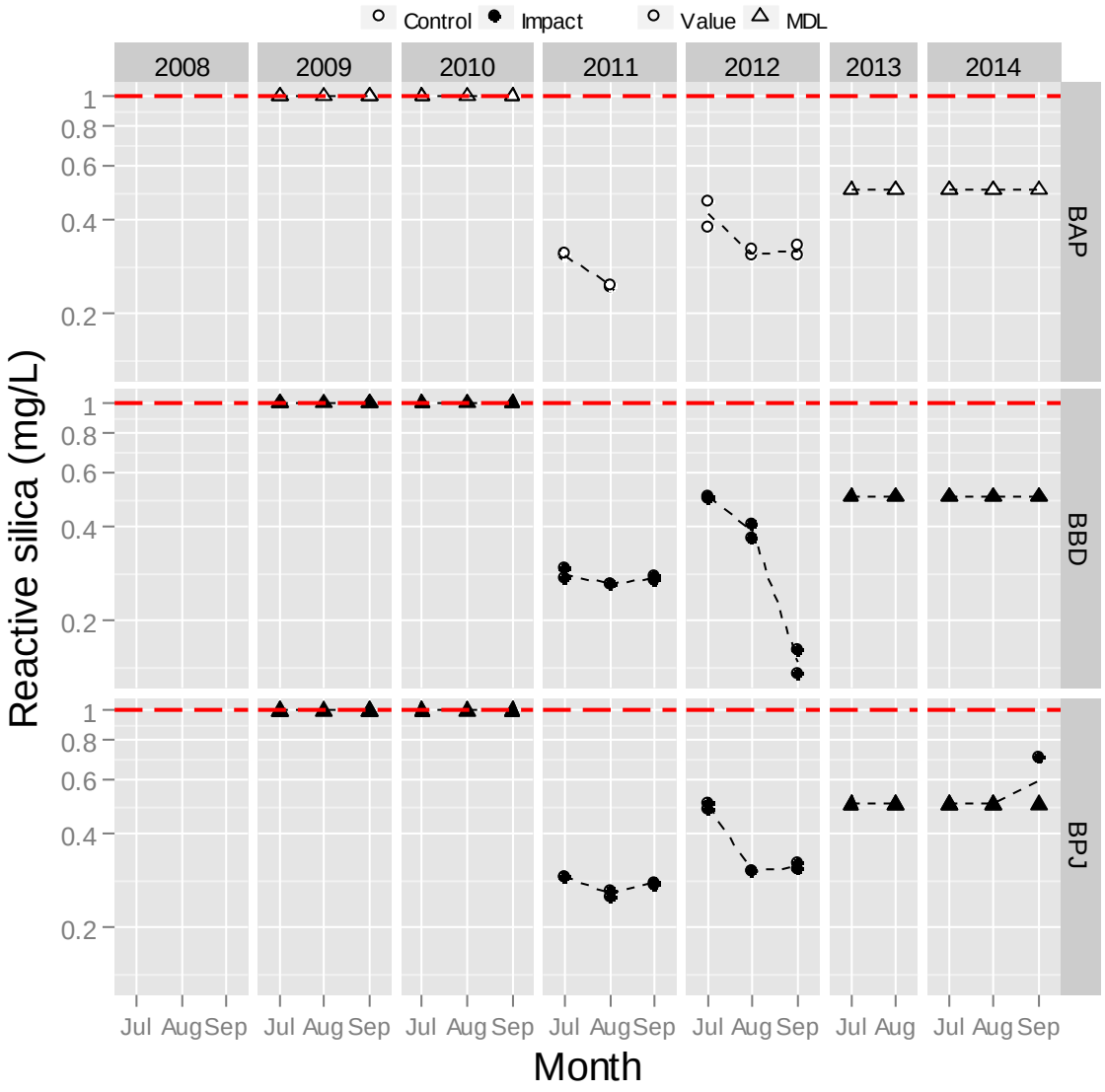


Figure 3.3-55. Sulphate (mg/L) in water samples from Baker Lake since 2008.

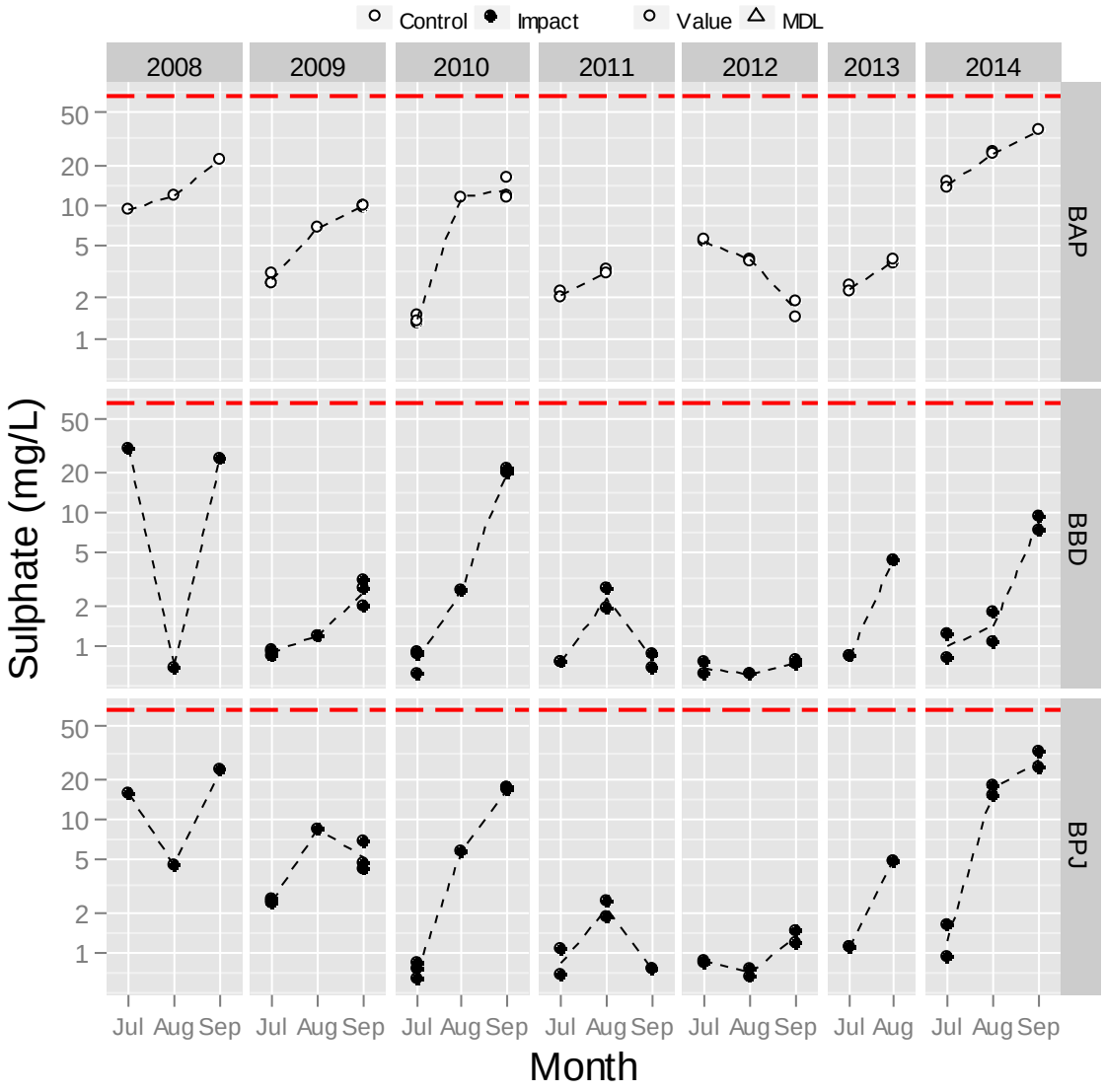


Figure 3.3-56. Dissolved Organic Carbon (DOC; mg/L) in water samples from Baker Lake since 2008.

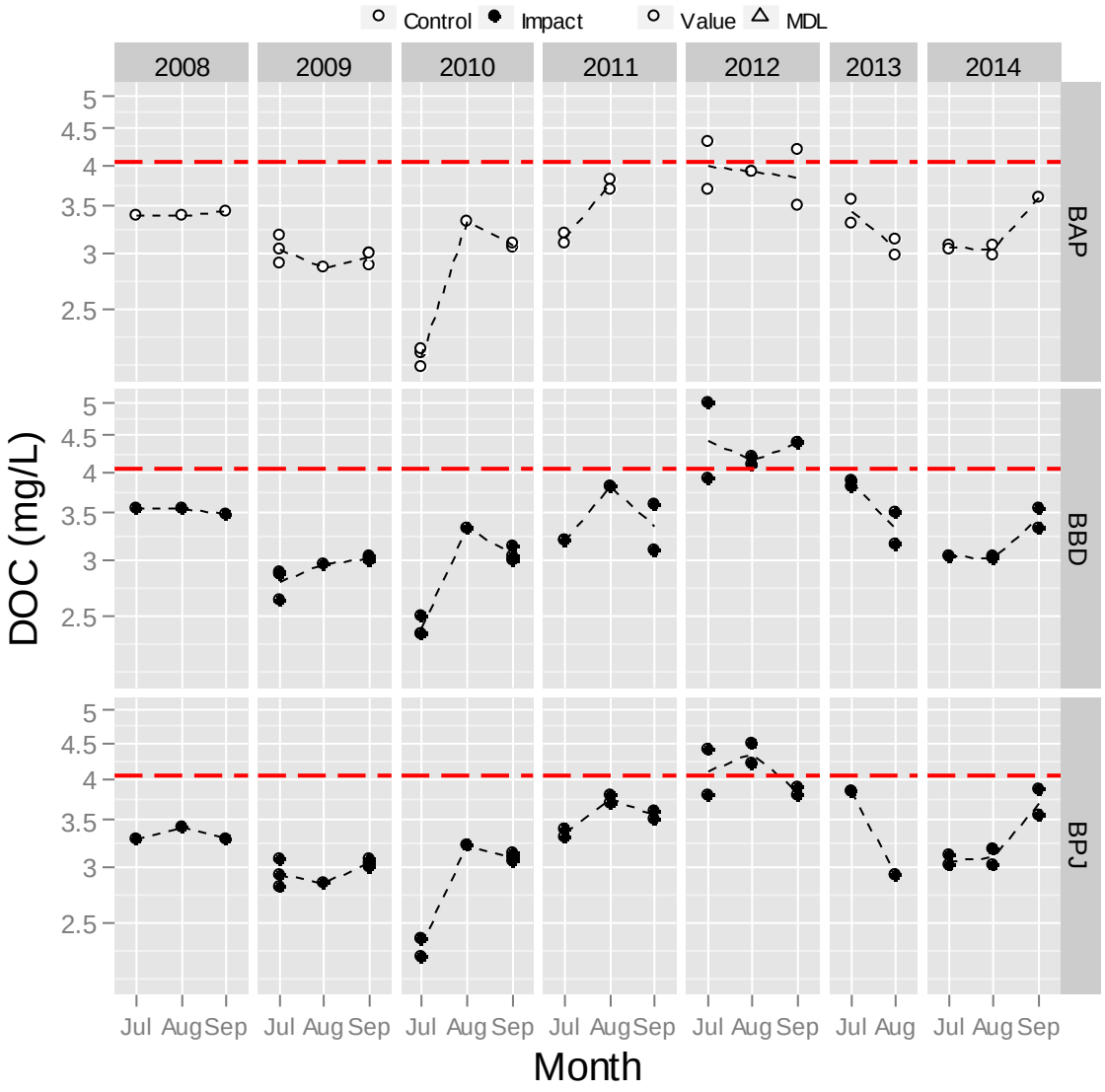


Figure 3.3-57. Total Organic Carbon (TOC; mg/L) in water samples from Baker Lake since 2008.

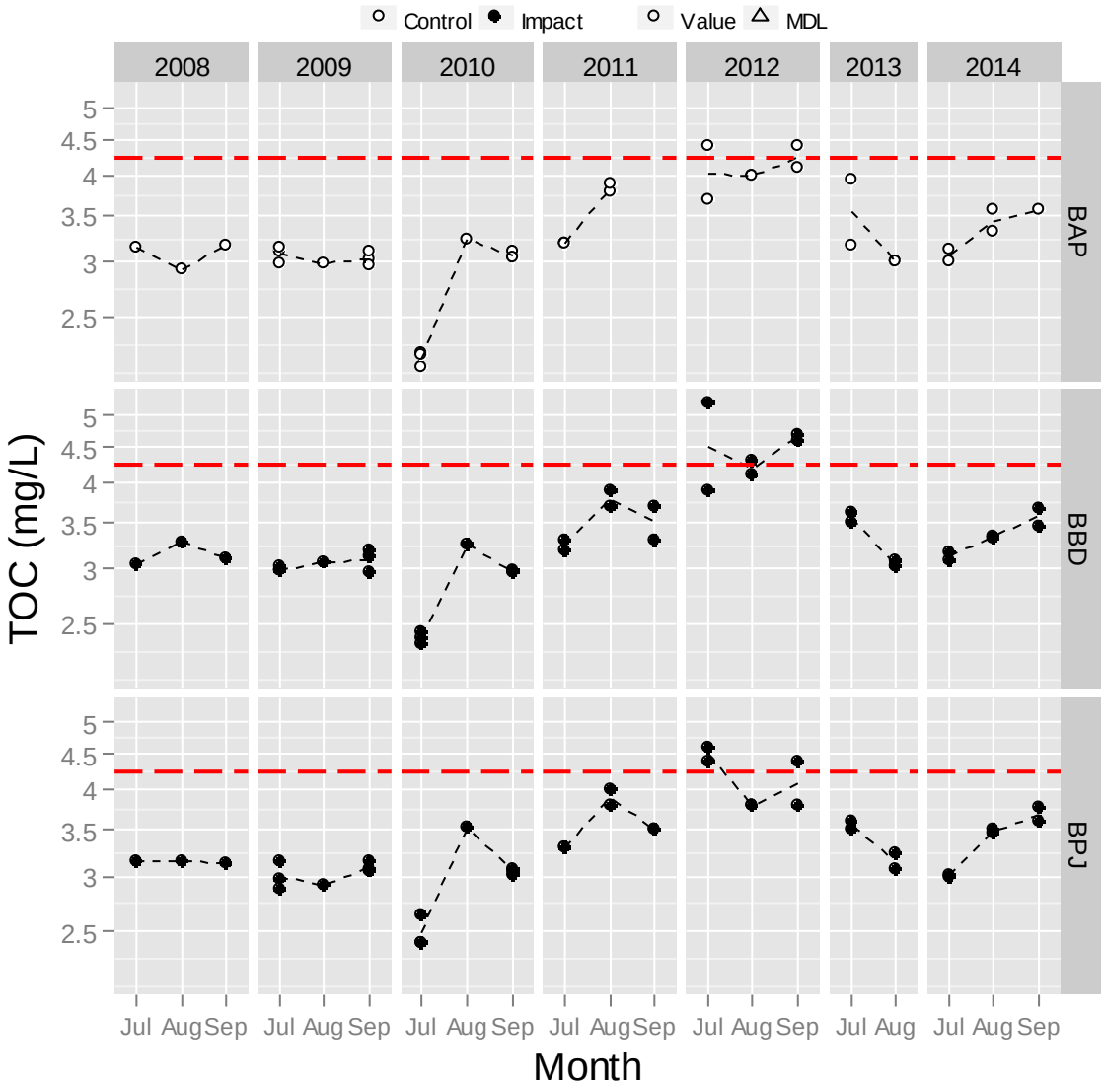


Figure 3.3-58. Total Aluminum (mg/L) in water samples from Baker Lake since 2008.

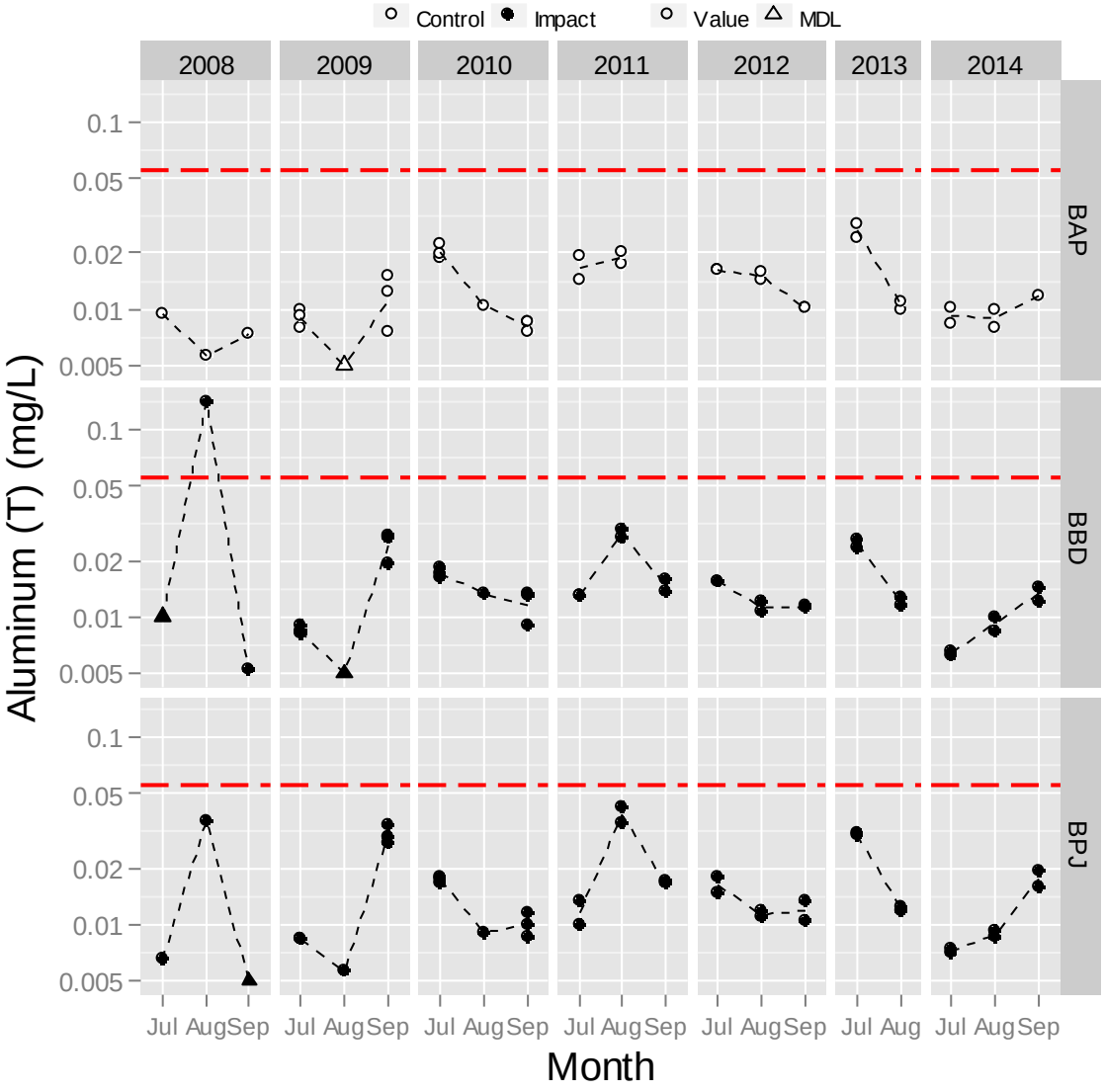


Figure 3.3-59. Total Arsenic (mg/L) in water samples from Baker Lake since 2008.

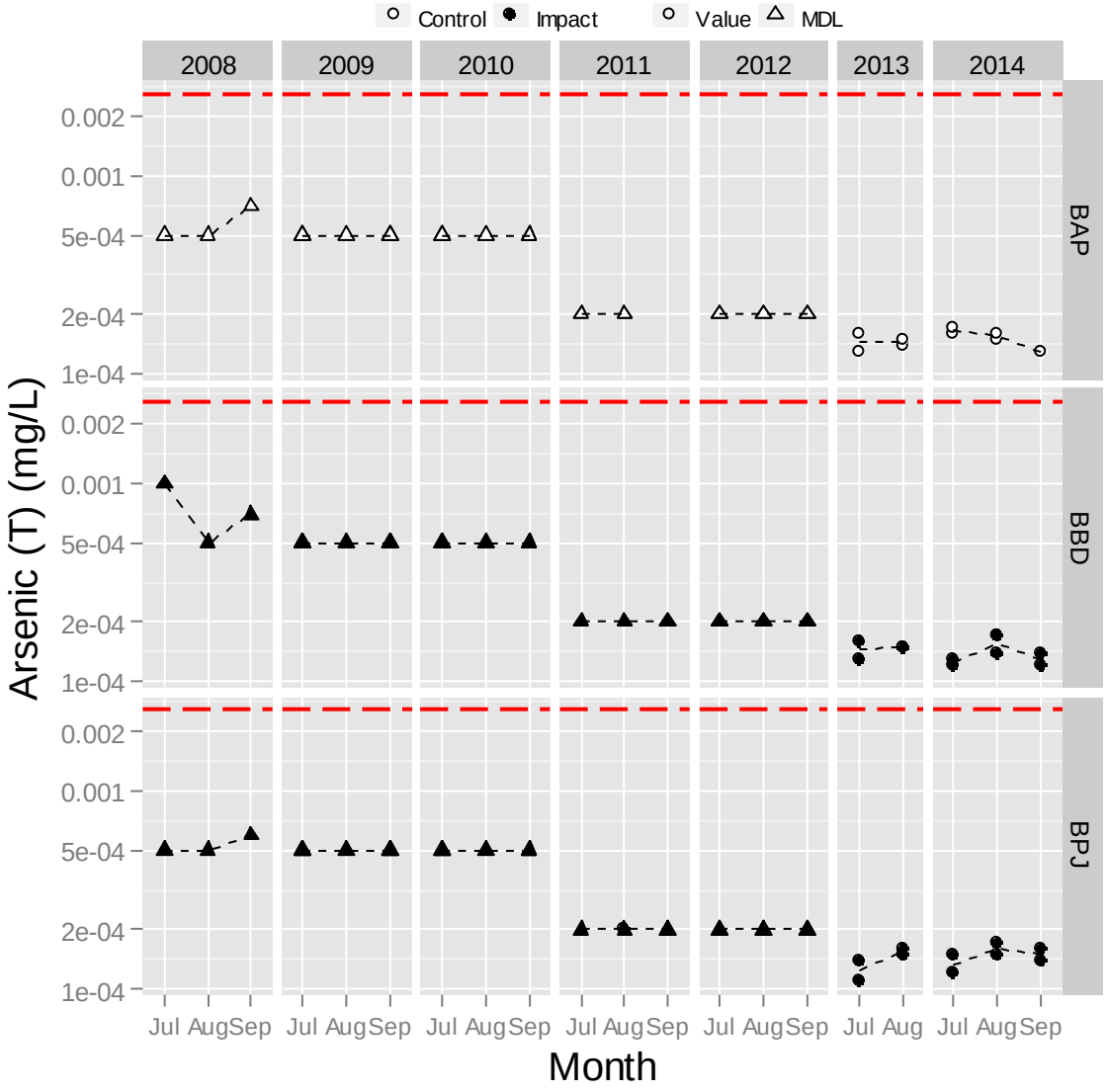


Figure 3.3-60. Total Barium (mg/L) in water samples from Baker Lake since 2008.

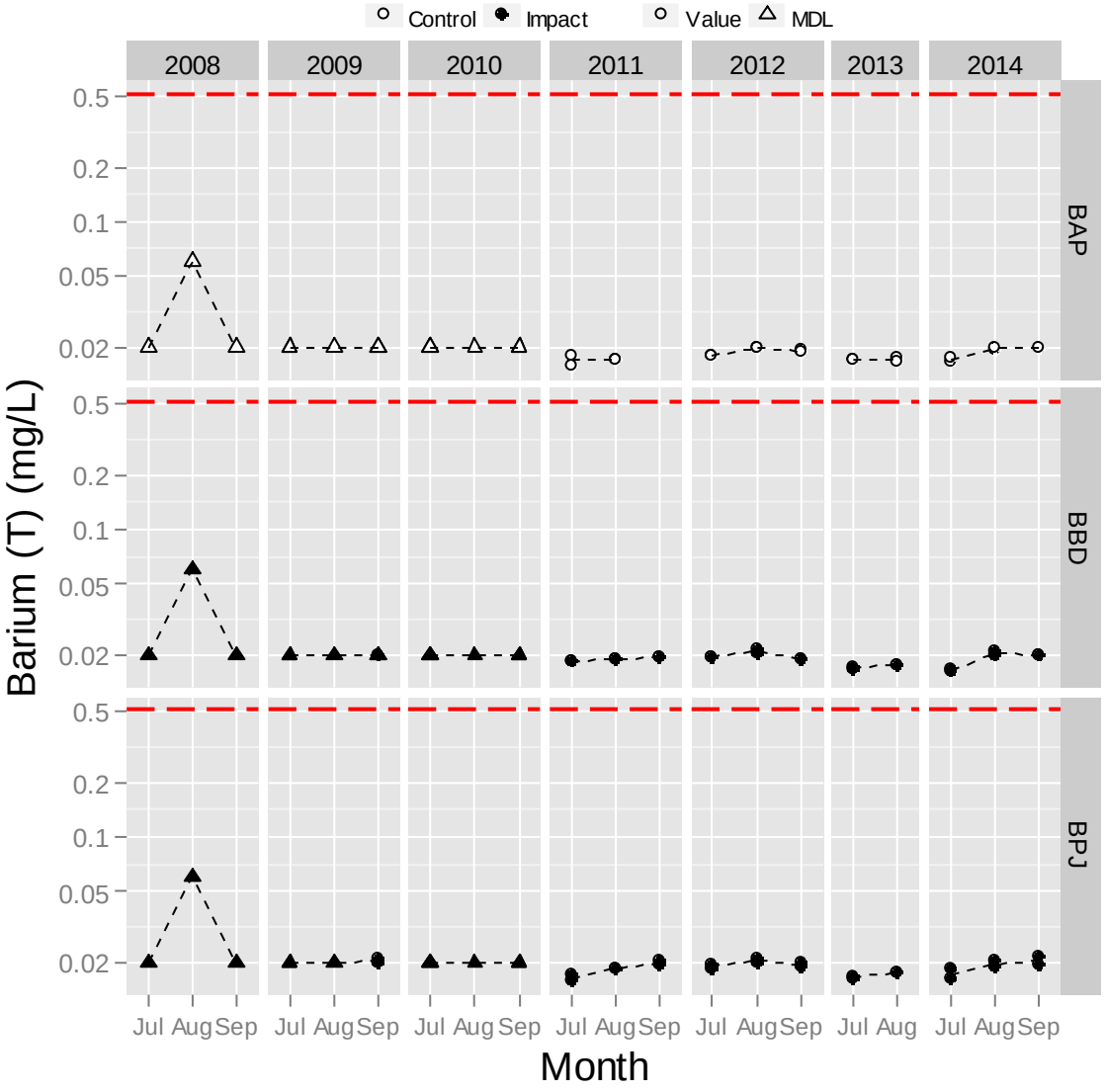


Figure 3.3-61. Total (mg/L) Boron in water samples from Baker Lake since 2008.

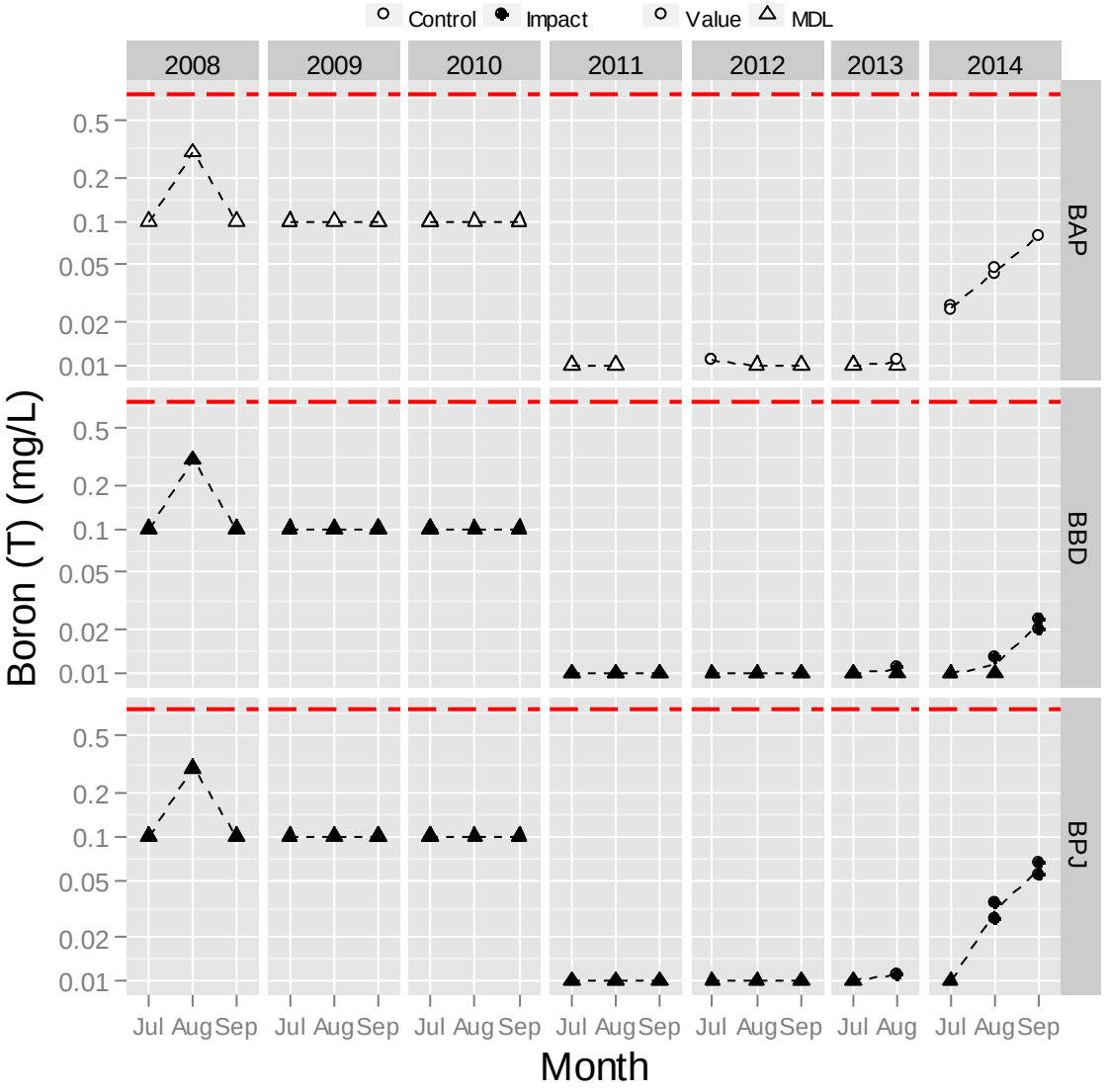


Figure 3.3-62. Total Calcium (mg/L) in water samples from Baker Lake since 2008.

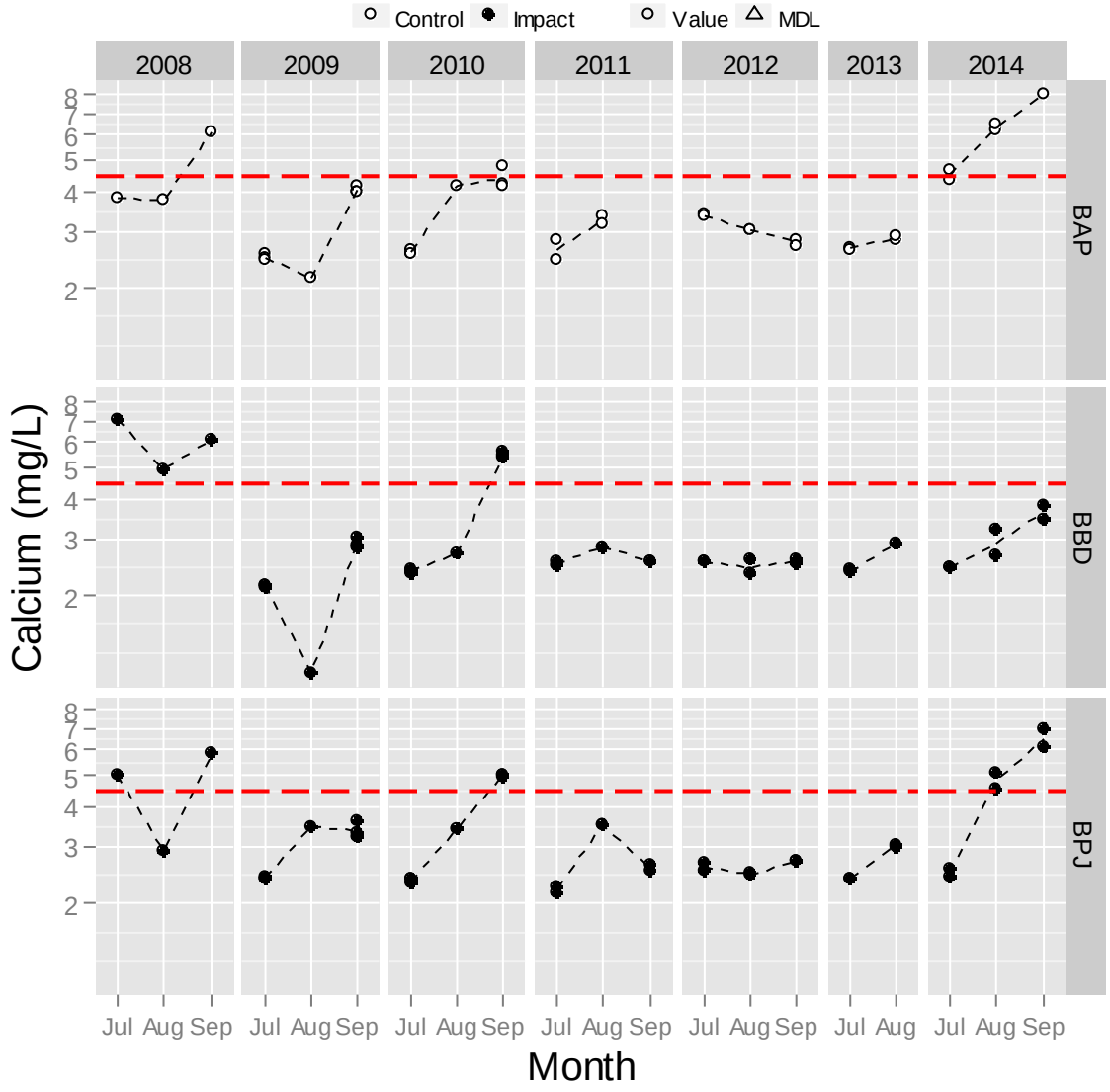


Figure 3.3-63. Total Chromium (mg/L) in water samples from Baker Lake since 2008.

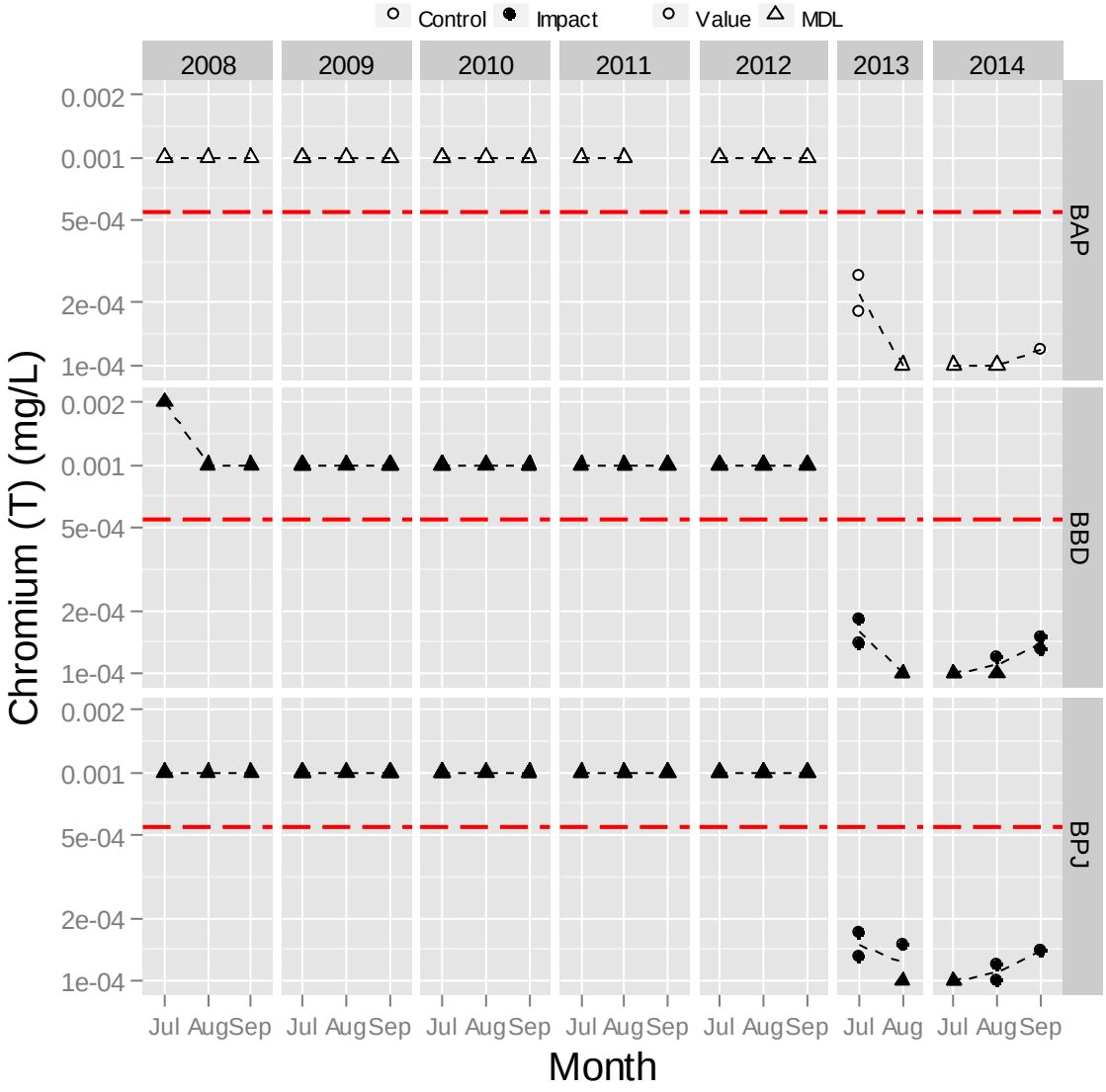


Figure 3.3-64. Total Copper (mg/L) in water samples from Baker Lake since 2008.

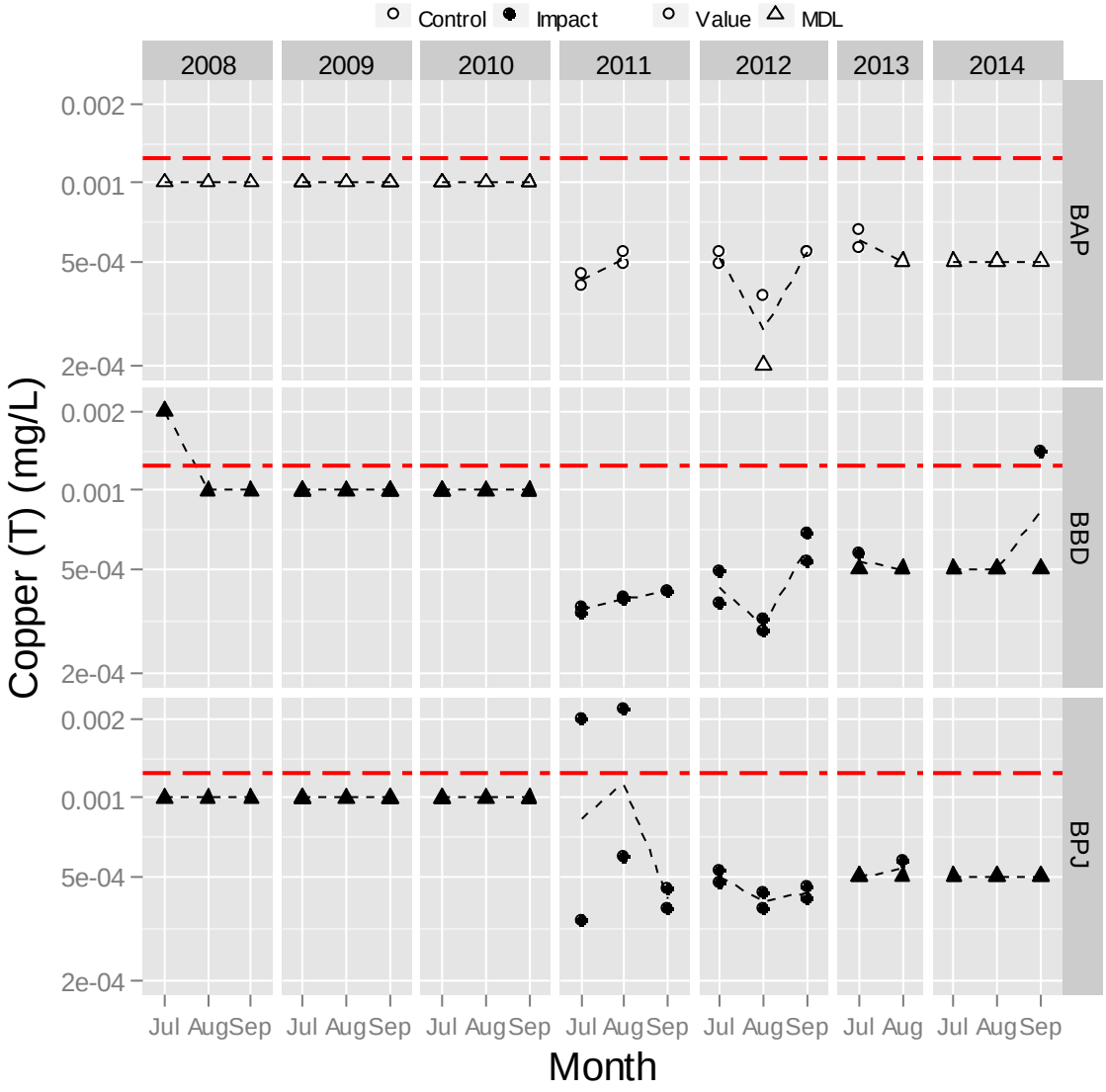


Figure 3.3-65. Total Iron (mg/L) in water samples from Baker Lake since 2008.

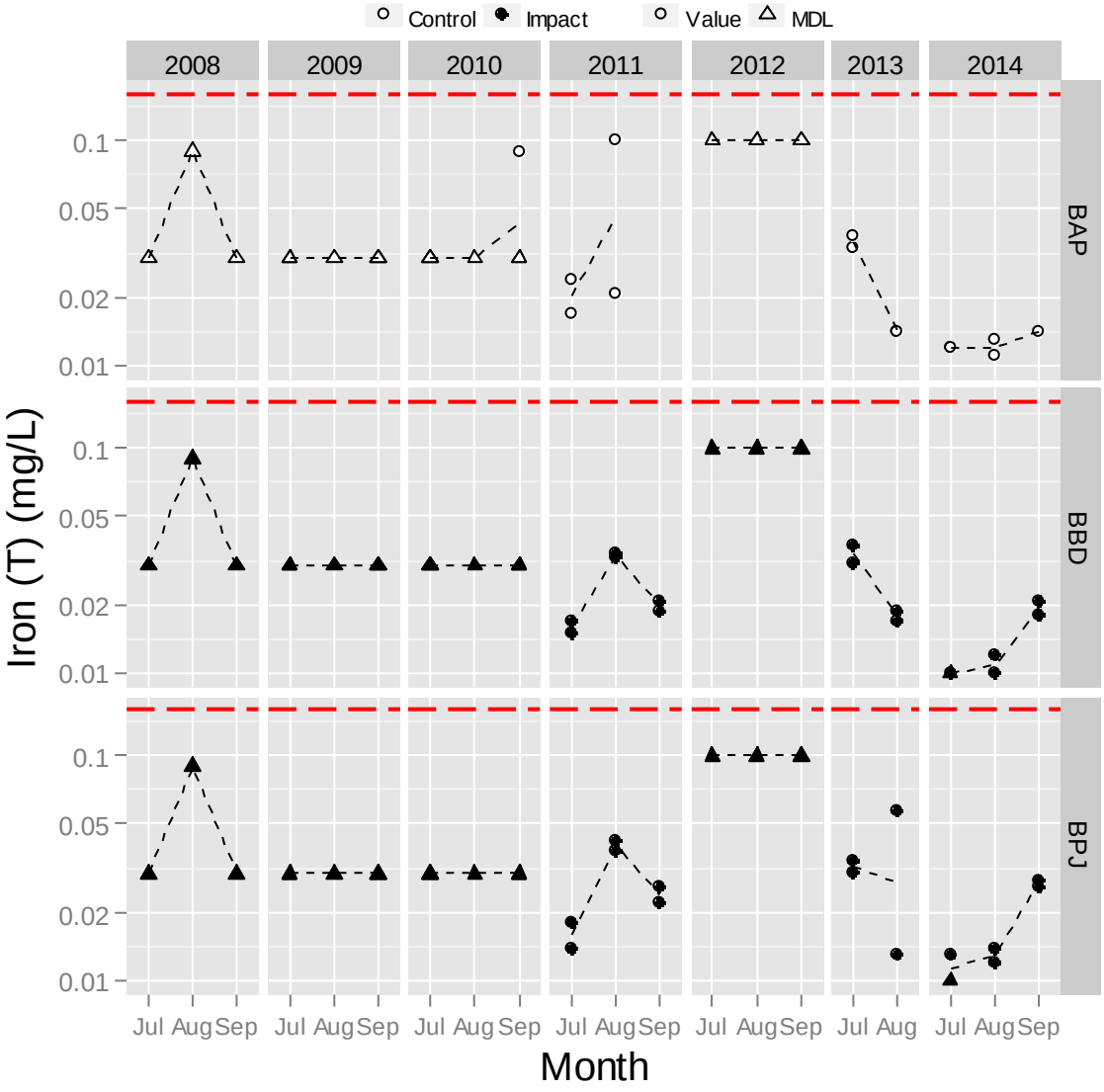


Figure 3.3-66. Total Lead (mg/L) in water samples from Baker Lake since 2008.

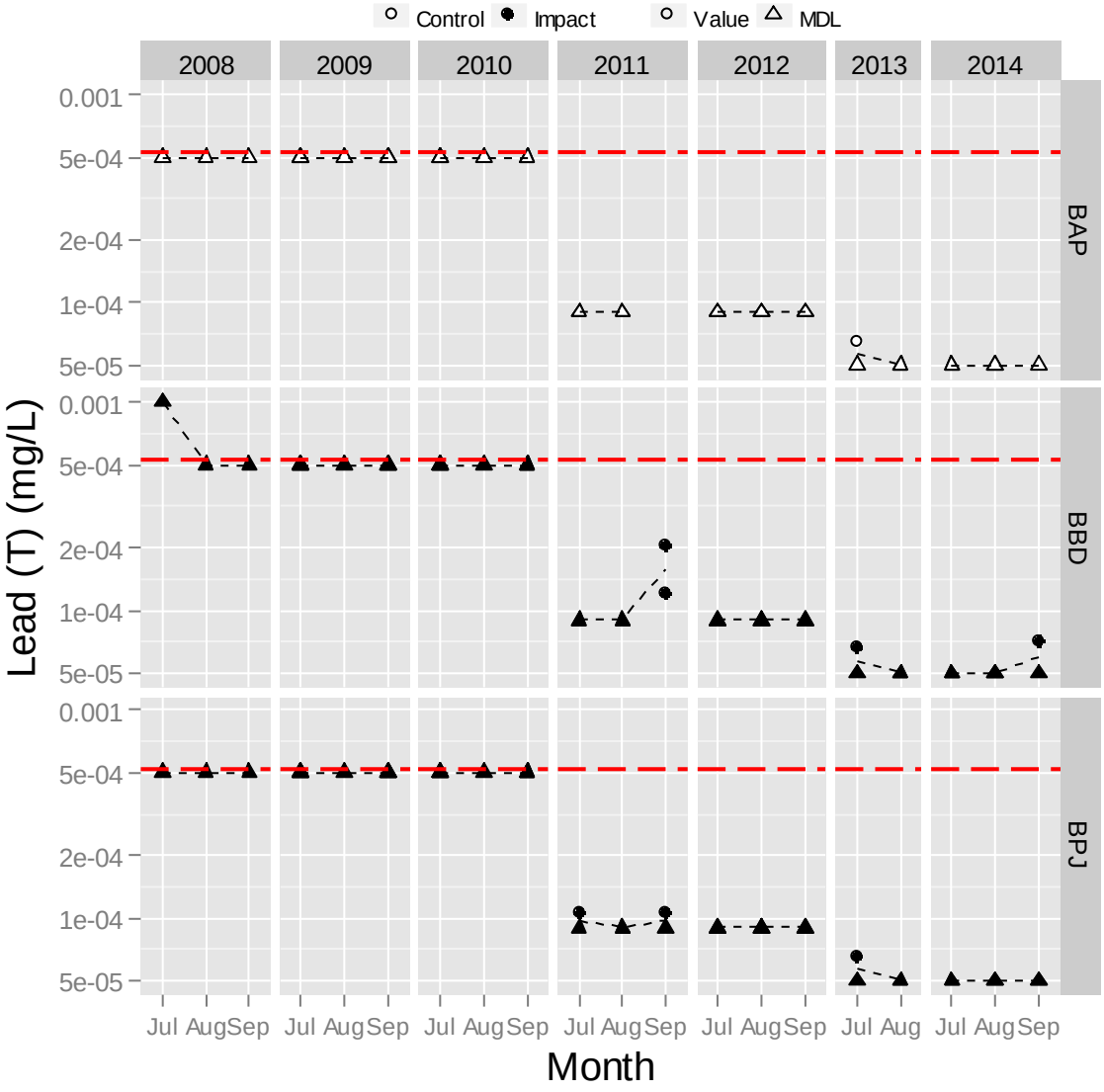


Figure 3.3-67. Total Lithium (mg/L) in water samples from Baker Lake since 2008.

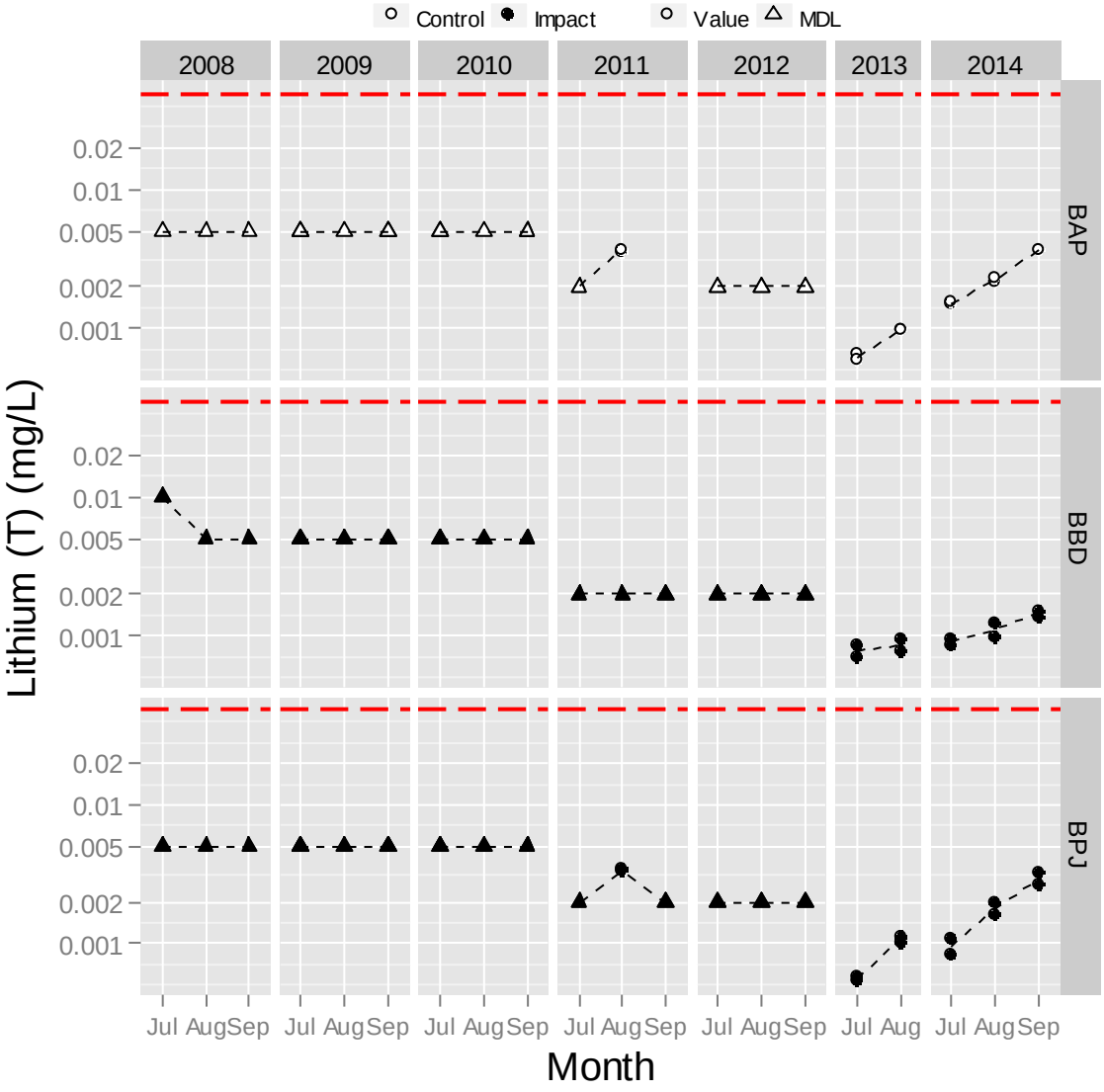


Figure 3.3-68. Total Magnesium (mg/L) in water samples from Baker Lake since 2008.

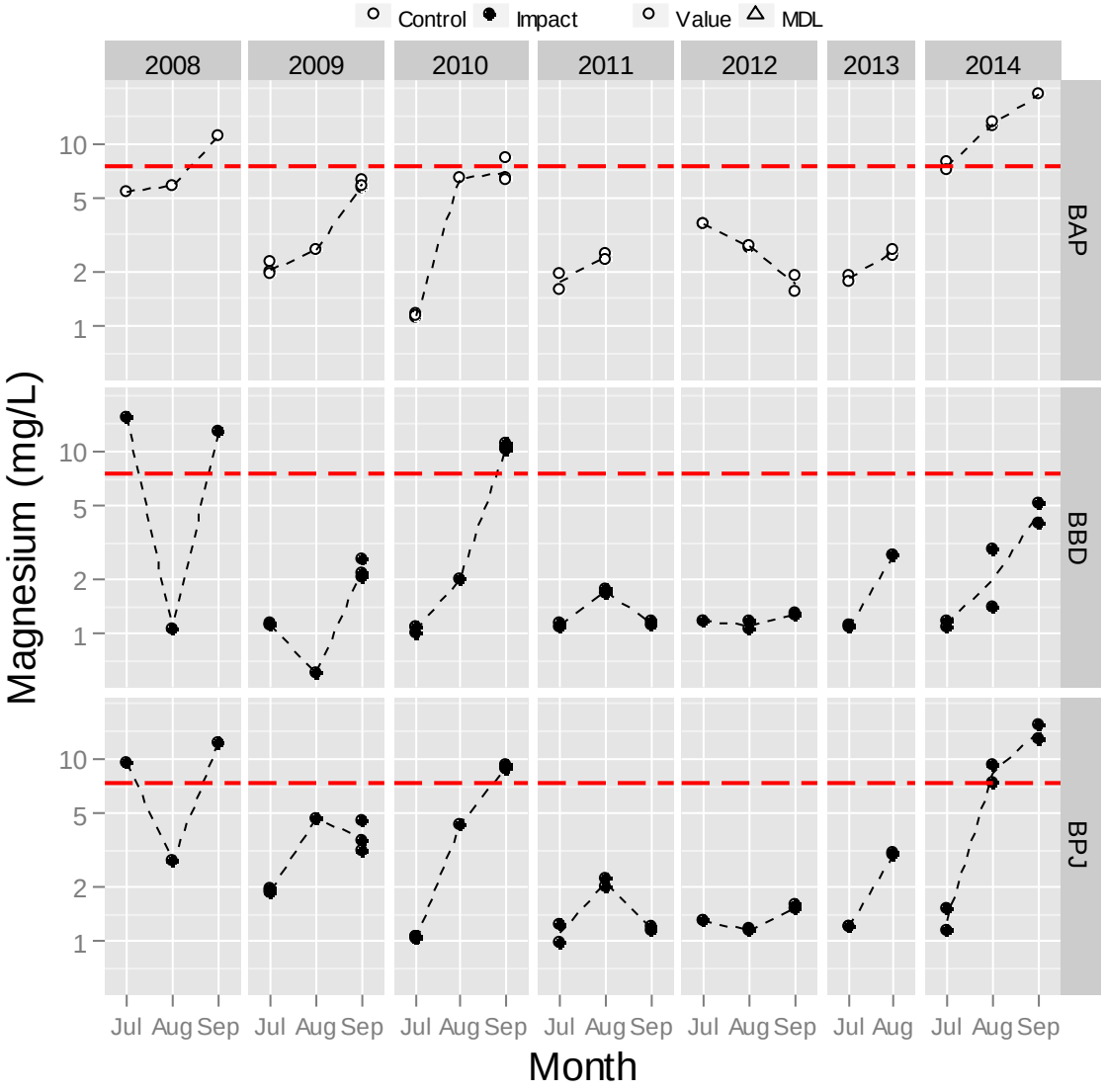


Figure 3.3-69. Total Manganese (mg/L) in water samples from Baker Lake since 2008.

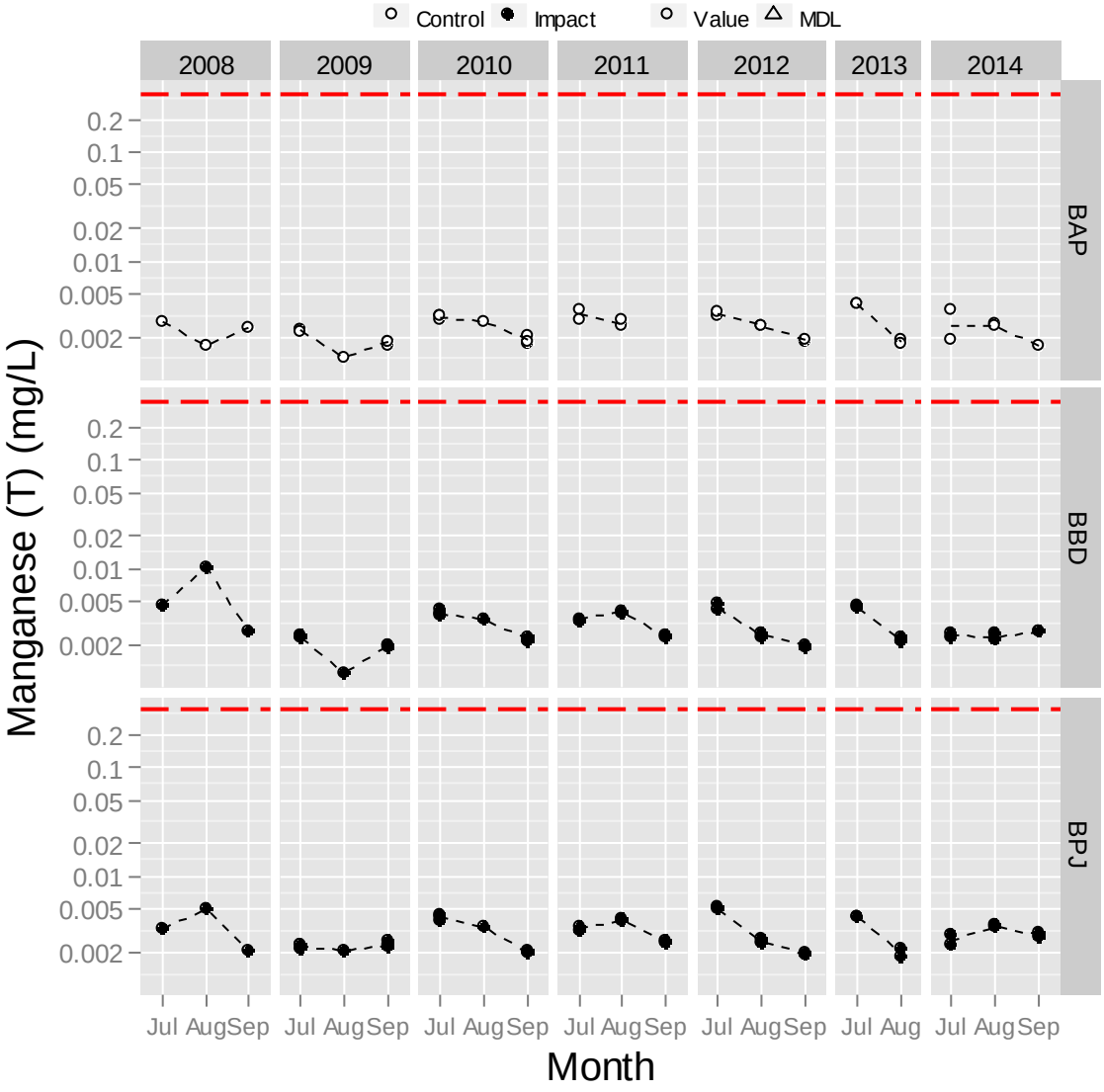


Figure 3.3-70. Total Molybdenum (mg/L) in water samples from Baker Lake since 2008.

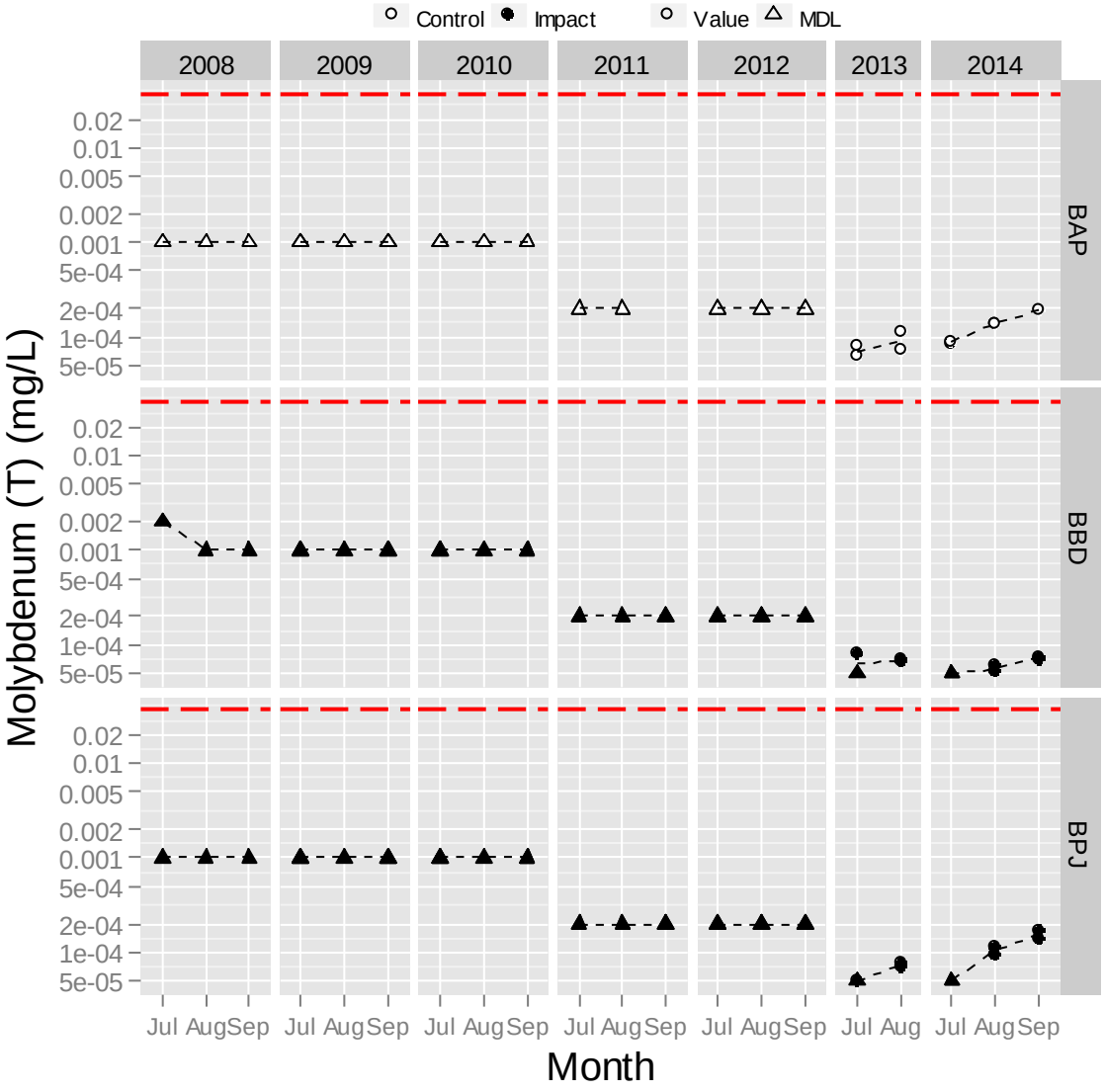


Figure 3.3-71. Total Potassium (mg/L) in water samples from Baker Lake since 2008.

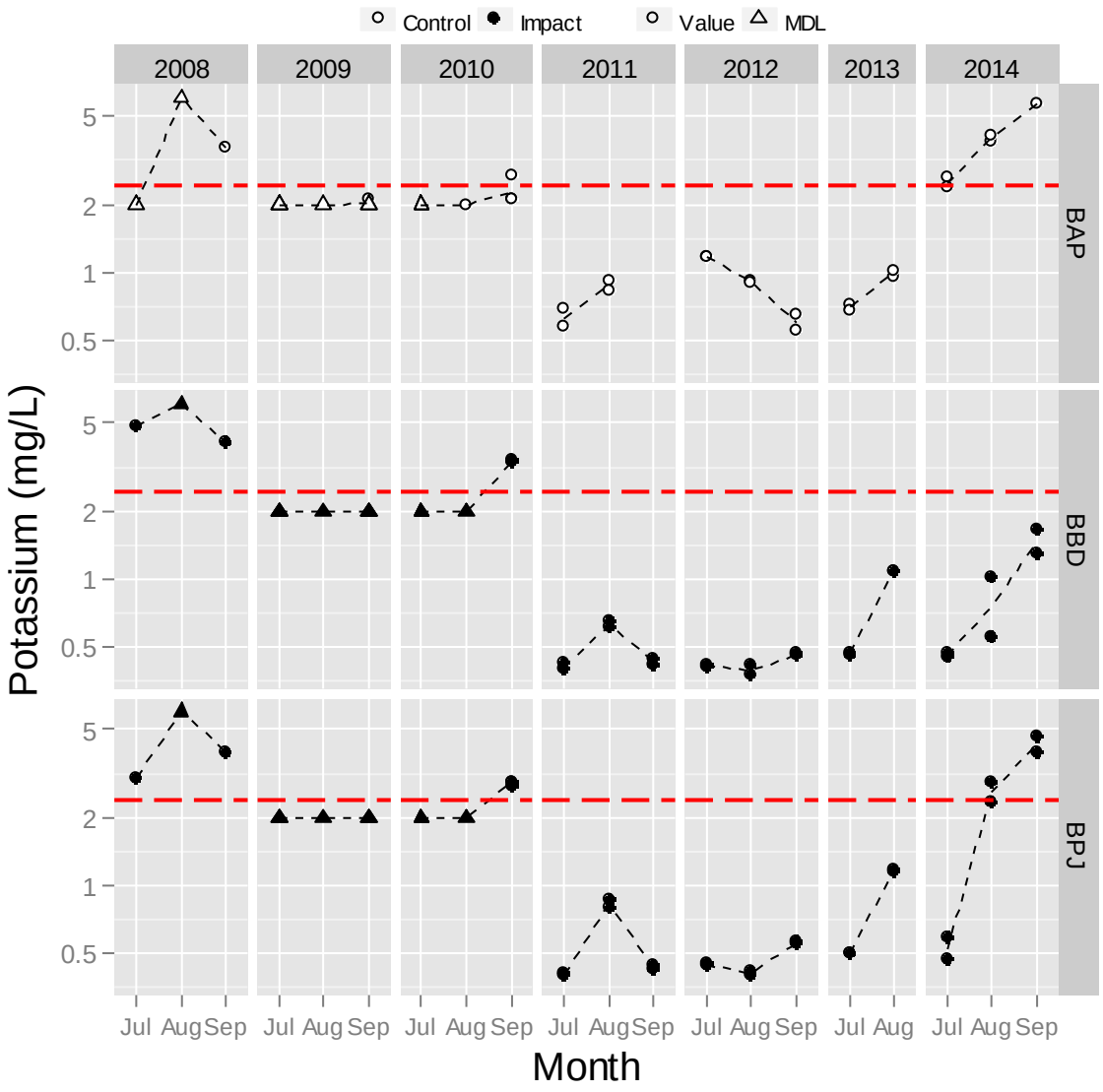


Figure 3.3-72. Total Sodium (mg/L) in water samples from Baker Lake since 2008.

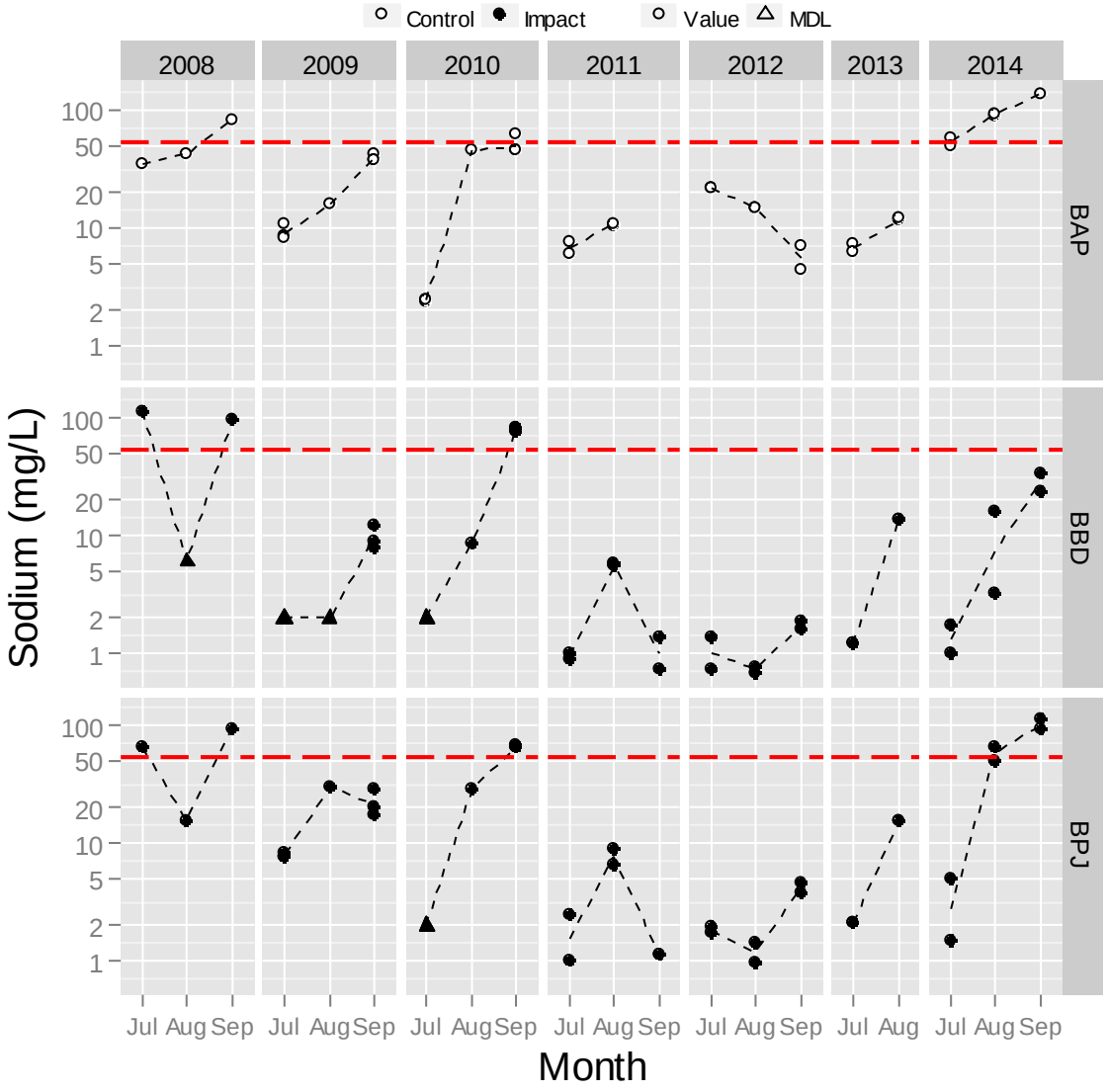


Figure 3.3-73. Total Strontium (mg/L) in water samples from Baker Lake since 2008.

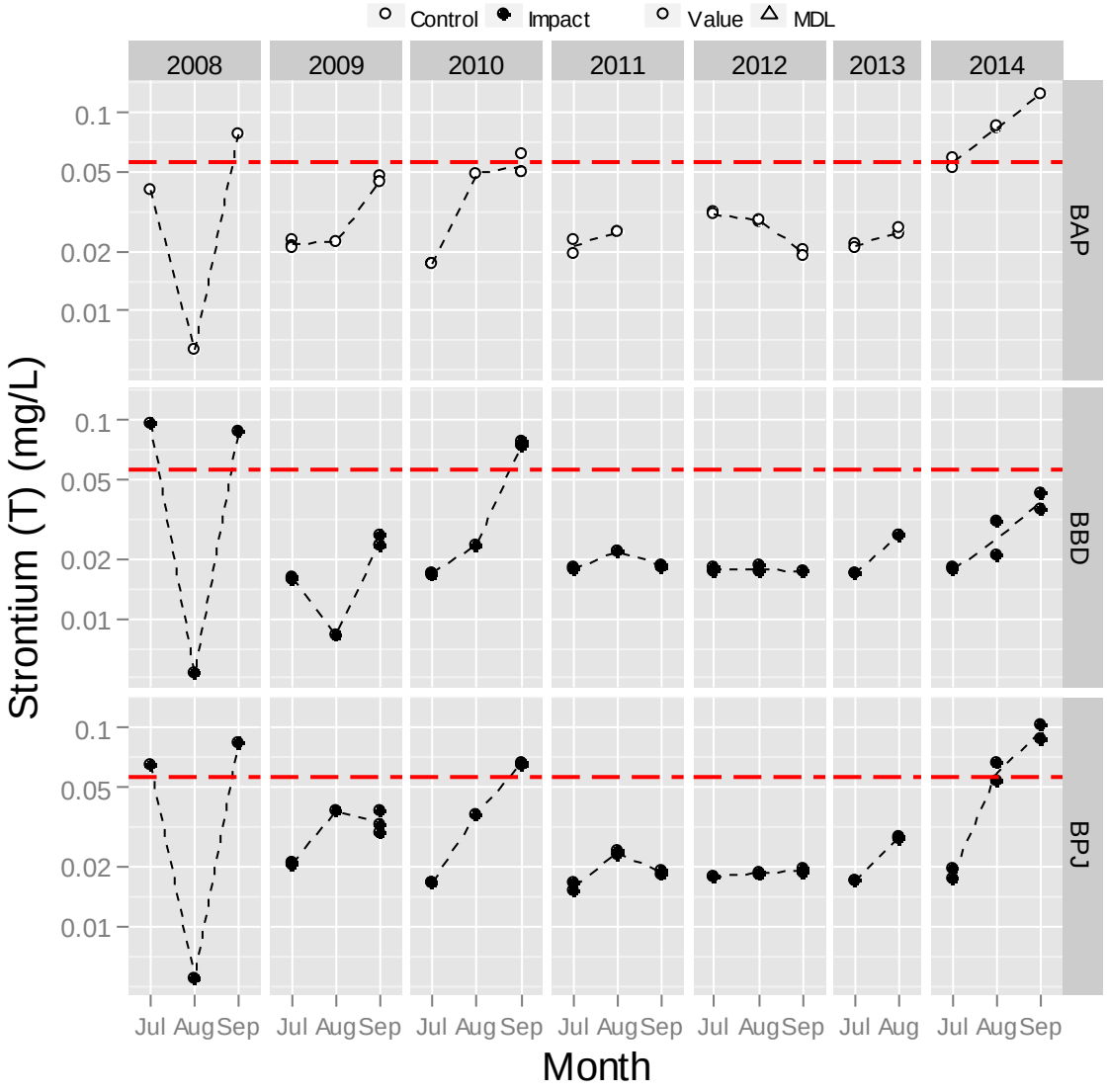


Figure 3.3-74. Total Titanium (mg/L) in water samples from Baker Lake since 2008.

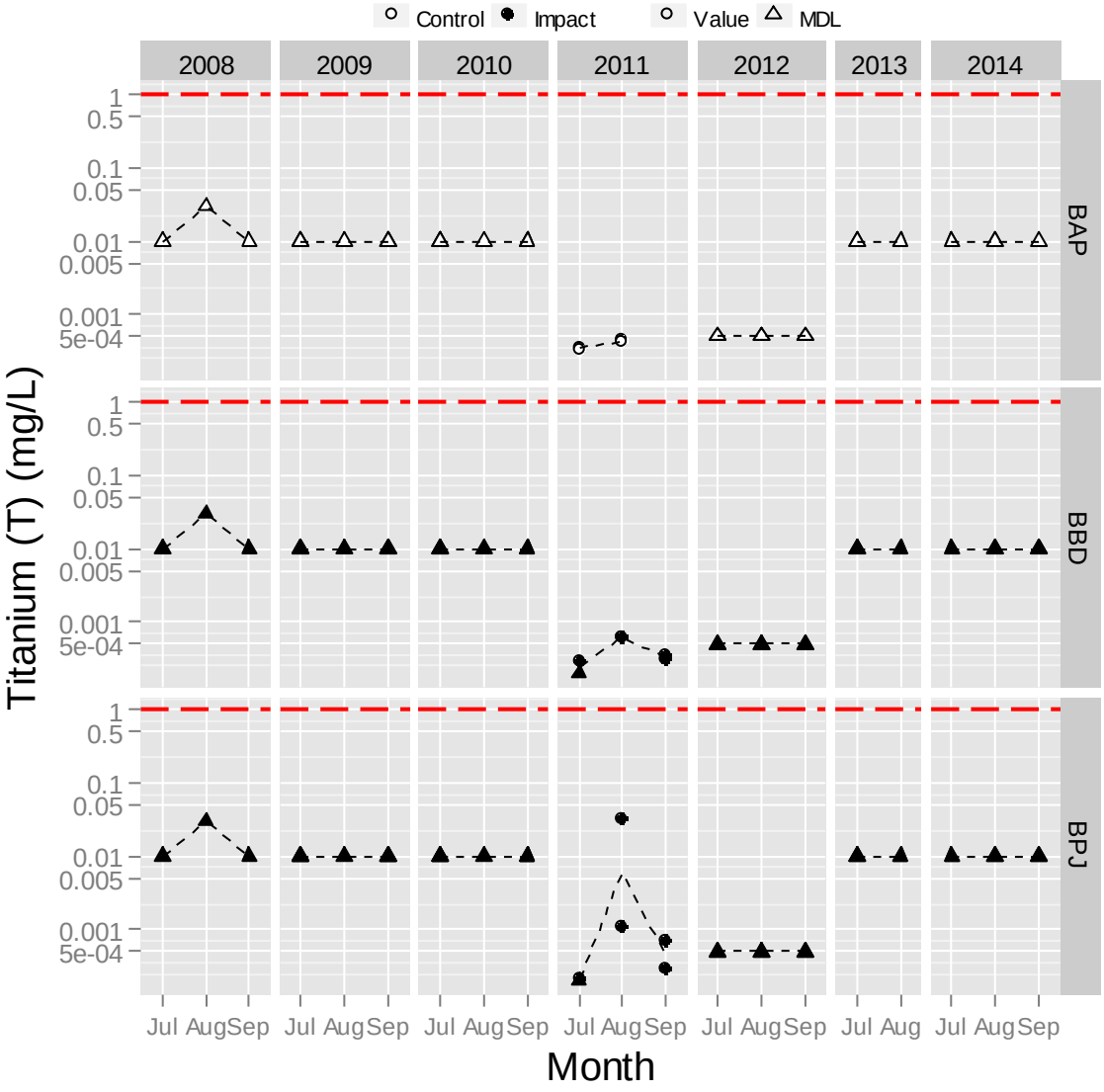


Figure 3.3-75. Total Uranium (mg/L) in water samples from Baker Lake since 2008.

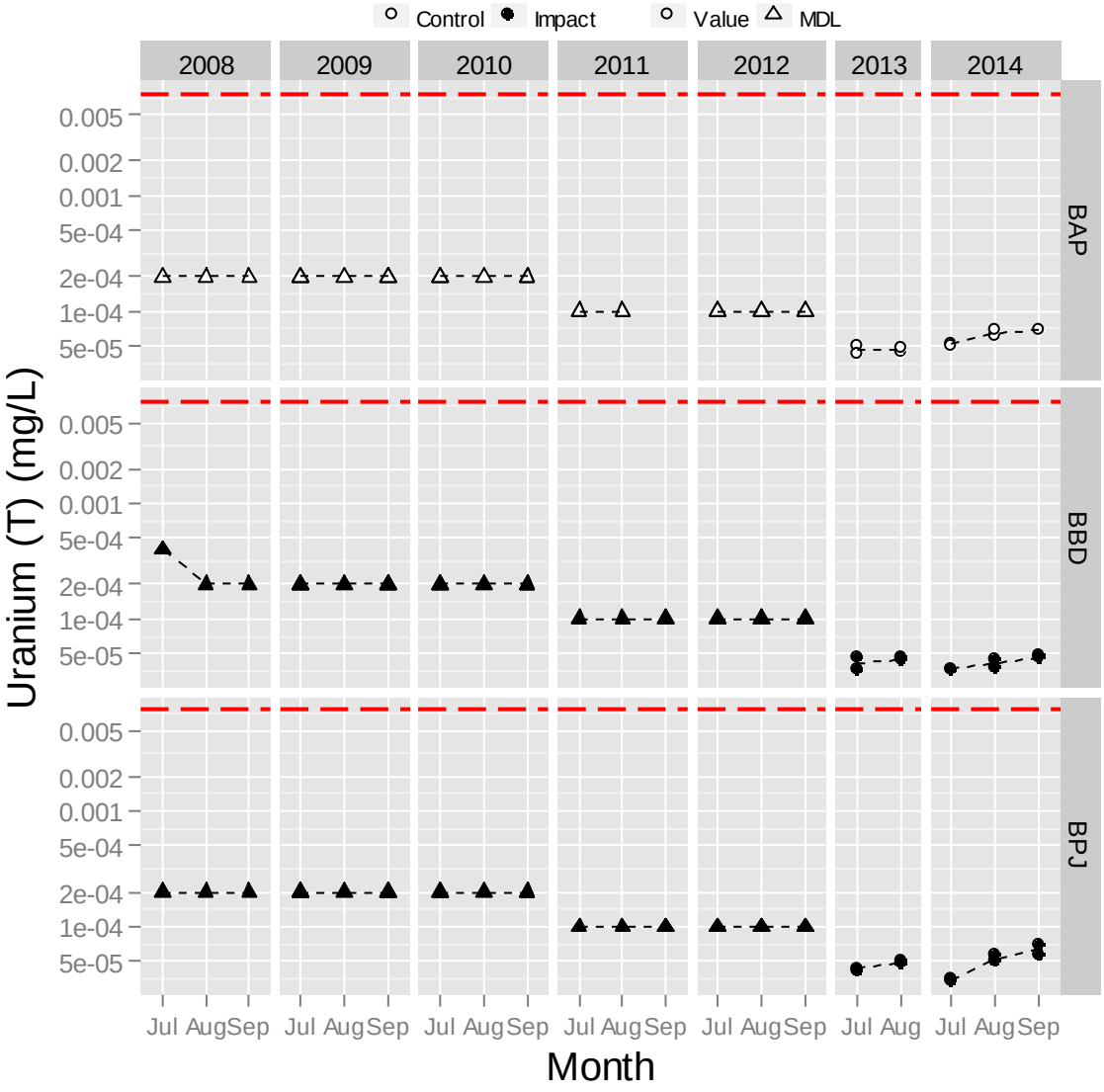


Figure 3.3-76. Dissolved Aluminum (mg/L) in water samples from Baker Lake since 2008.

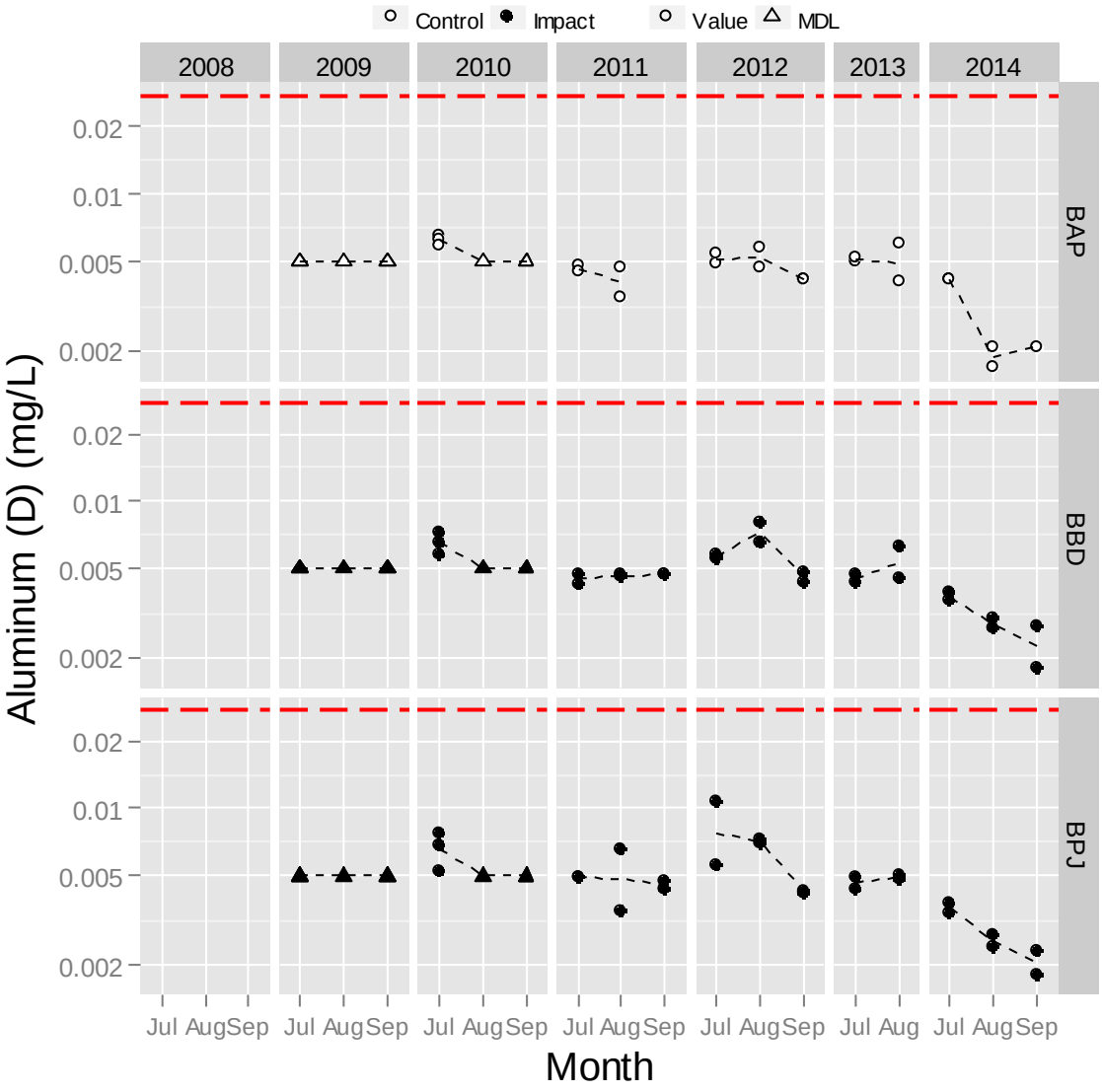


Figure 3.3-77. Dissolved Arsenic (mg/L) in water samples from Baker Lake since 2008.

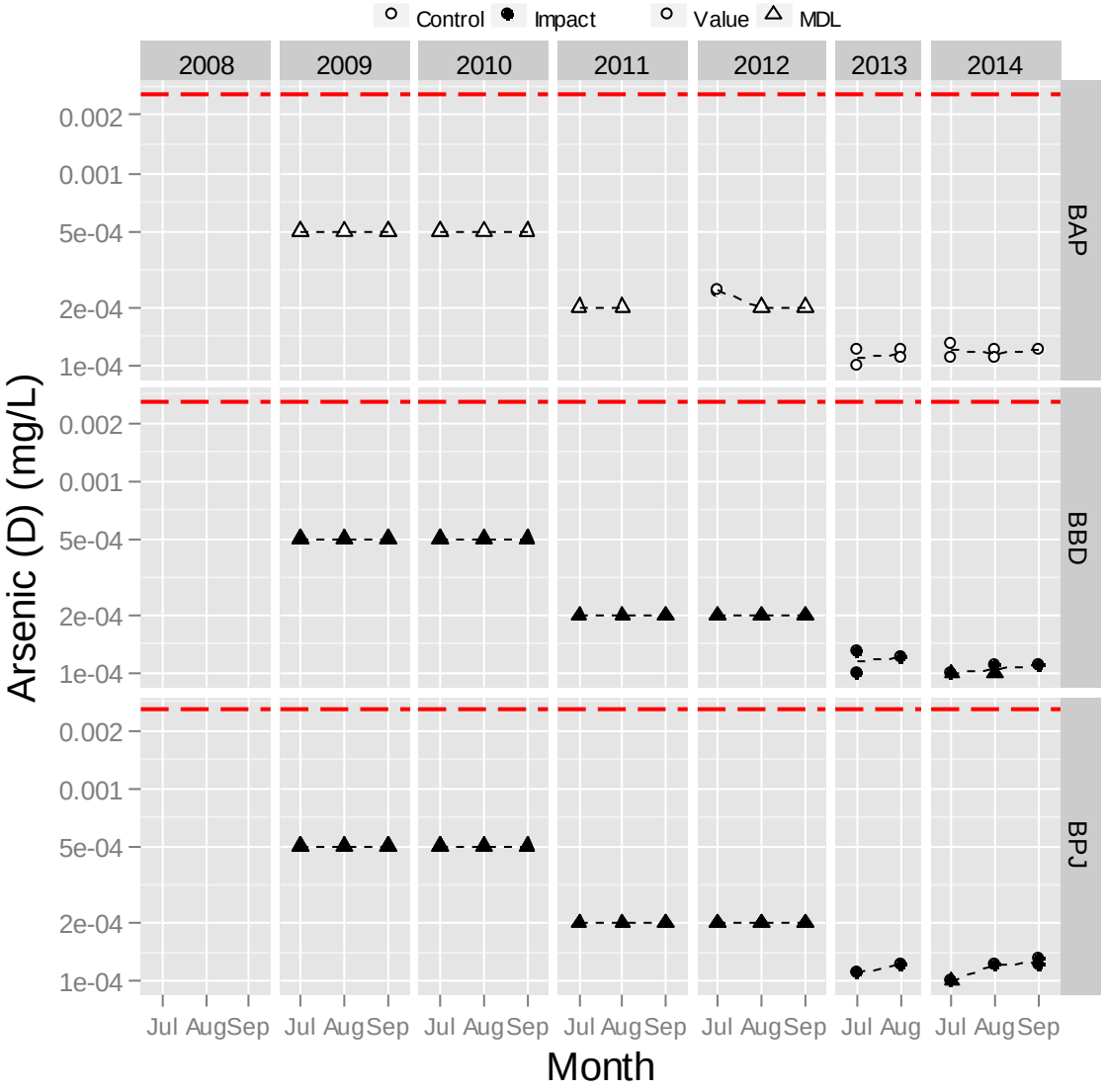


Figure 3.3-78. Dissolved Barium (mg/L) in water samples from Baker Lake since 2008.

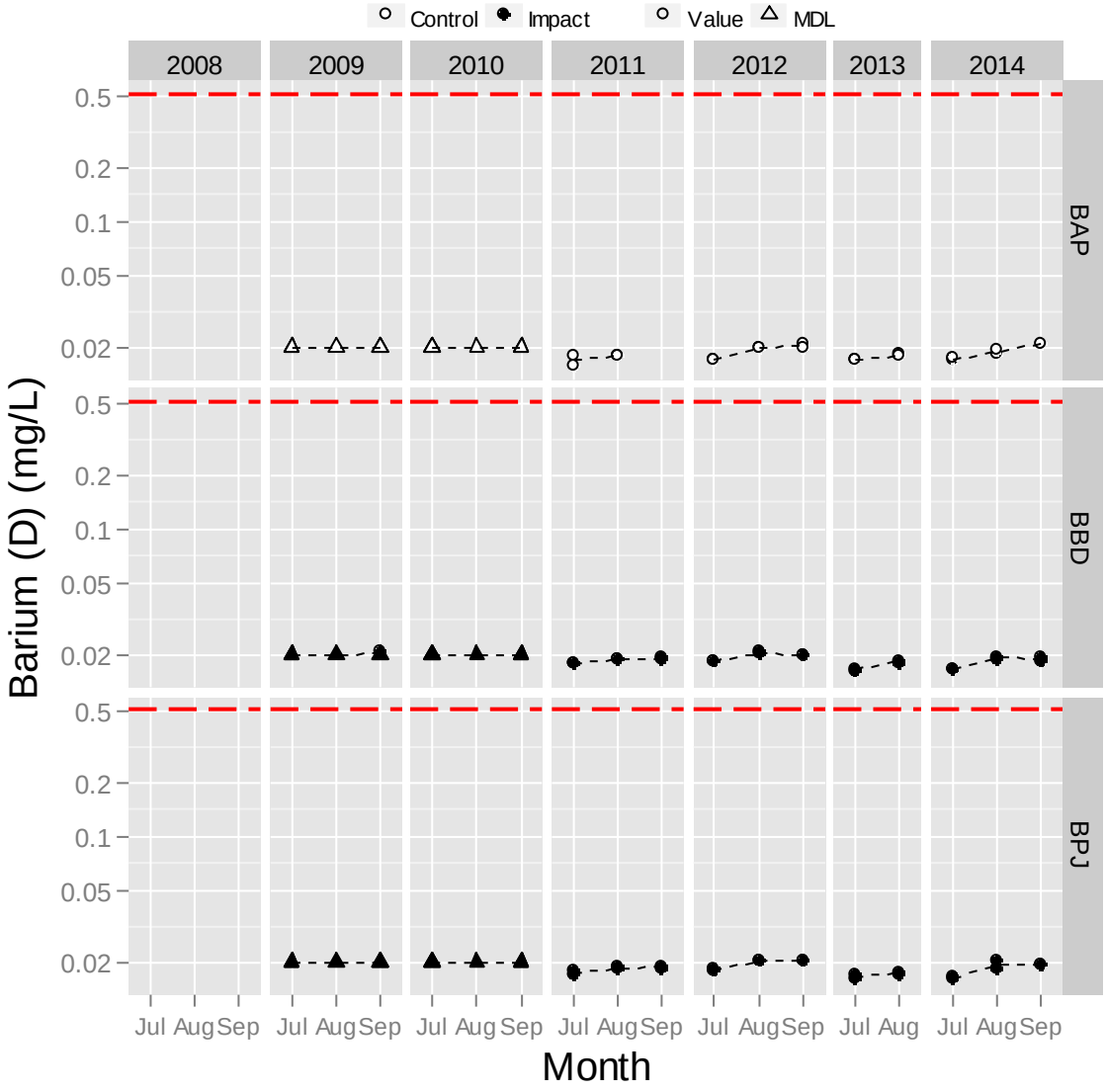


Figure 3.3-79. Dissolved Boron (mg/L) in water samples from Baker Lake since 2008.

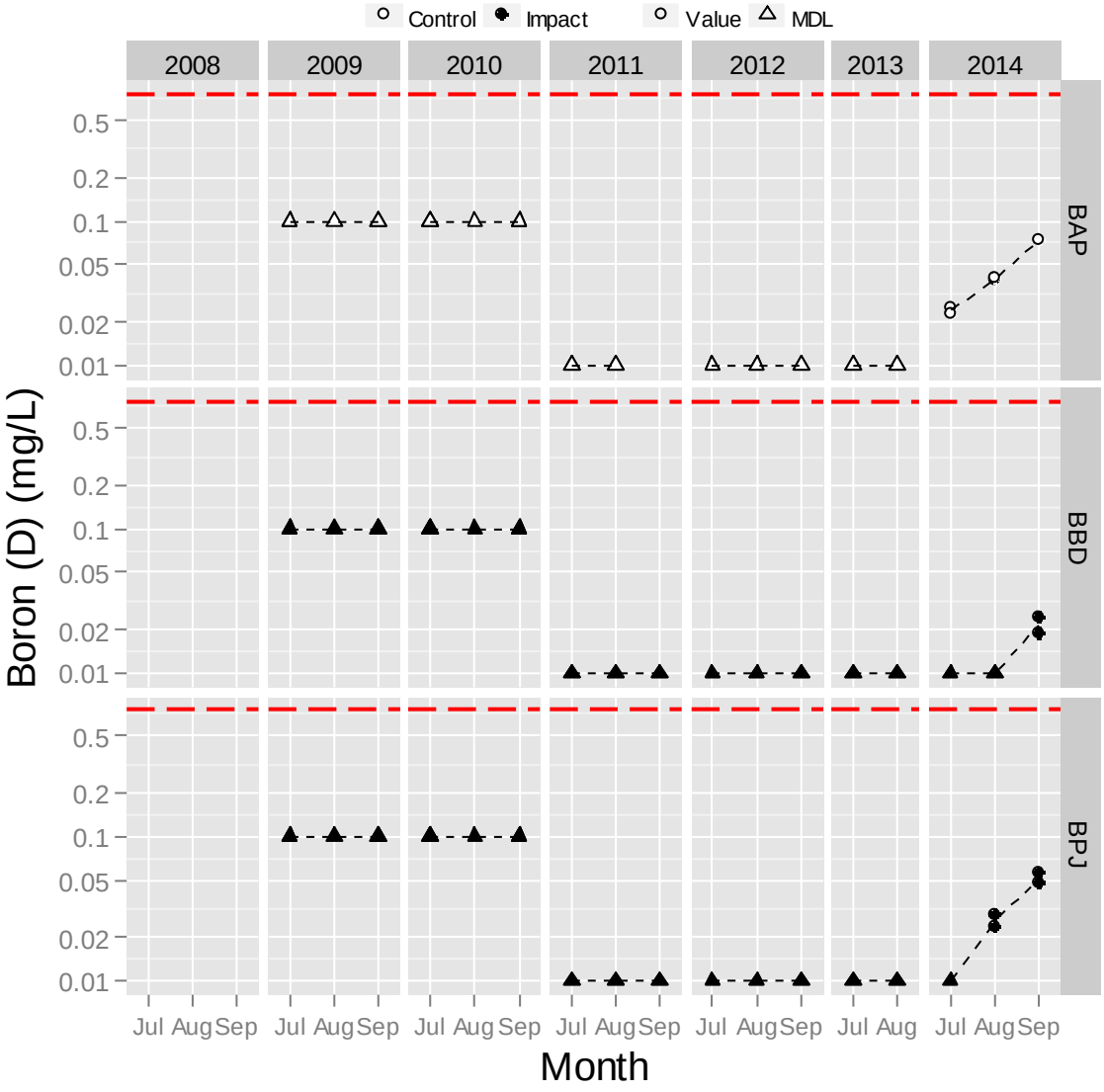


Figure 3.3-80. Dissolved Copper (mg/L) in water samples from Baker Lake since 2008.

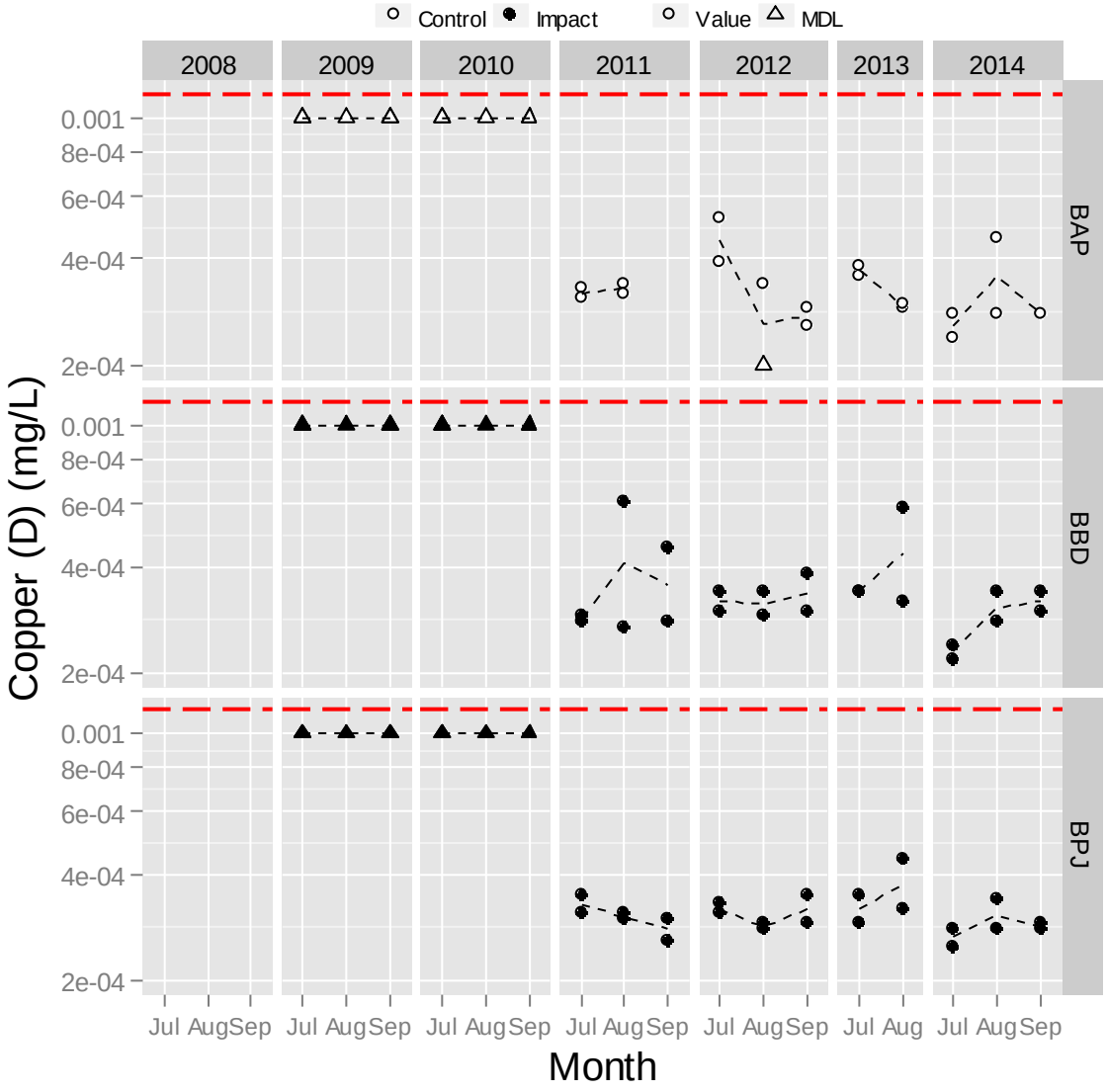


Figure 3.3-81. Dissolved Lithium (mg/L) in water samples from Baker Lake since 2008.

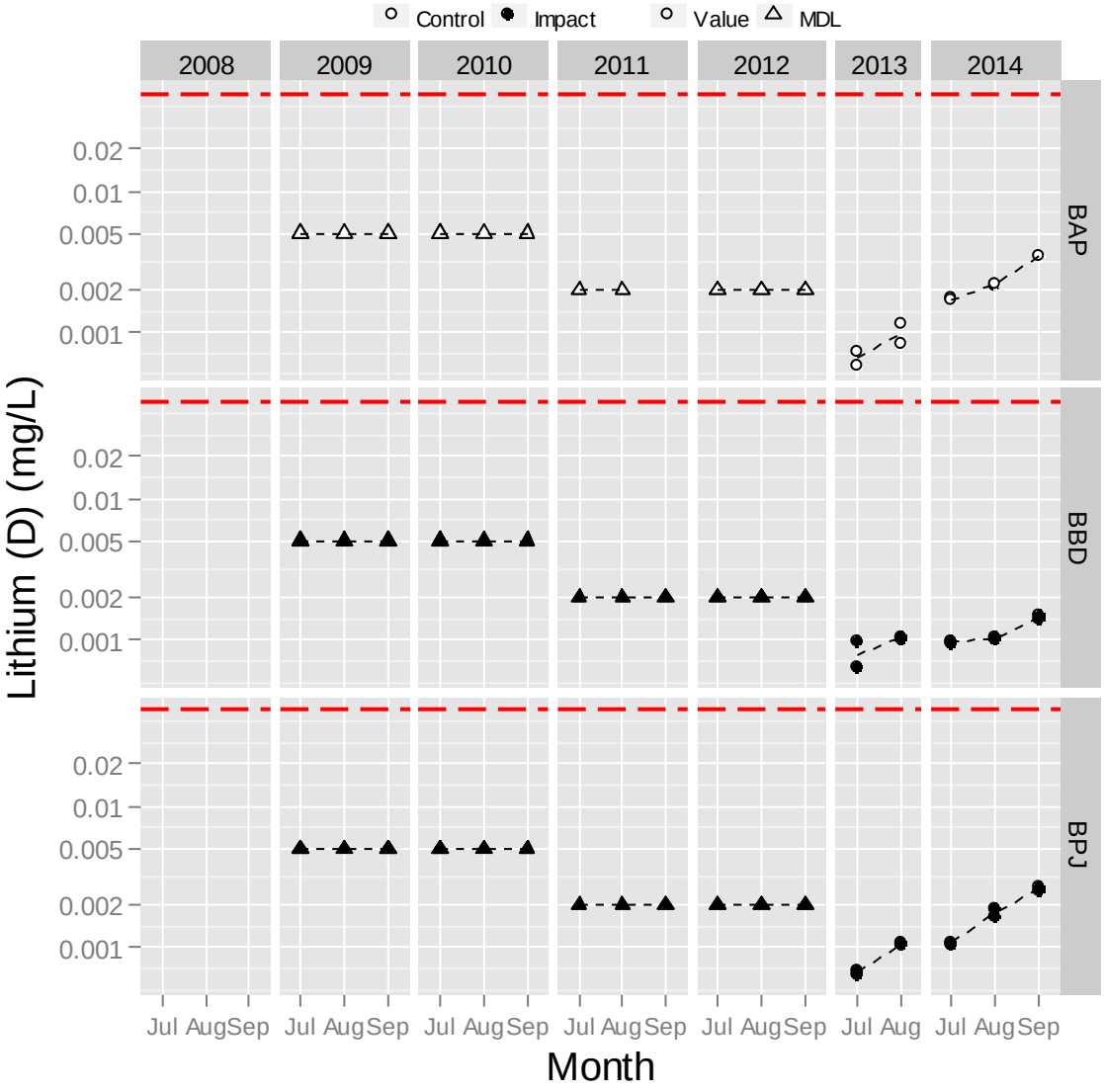


Figure 3.3-82. Dissolved Manganese (mg/L) in water samples from Baker Lake since 2008.

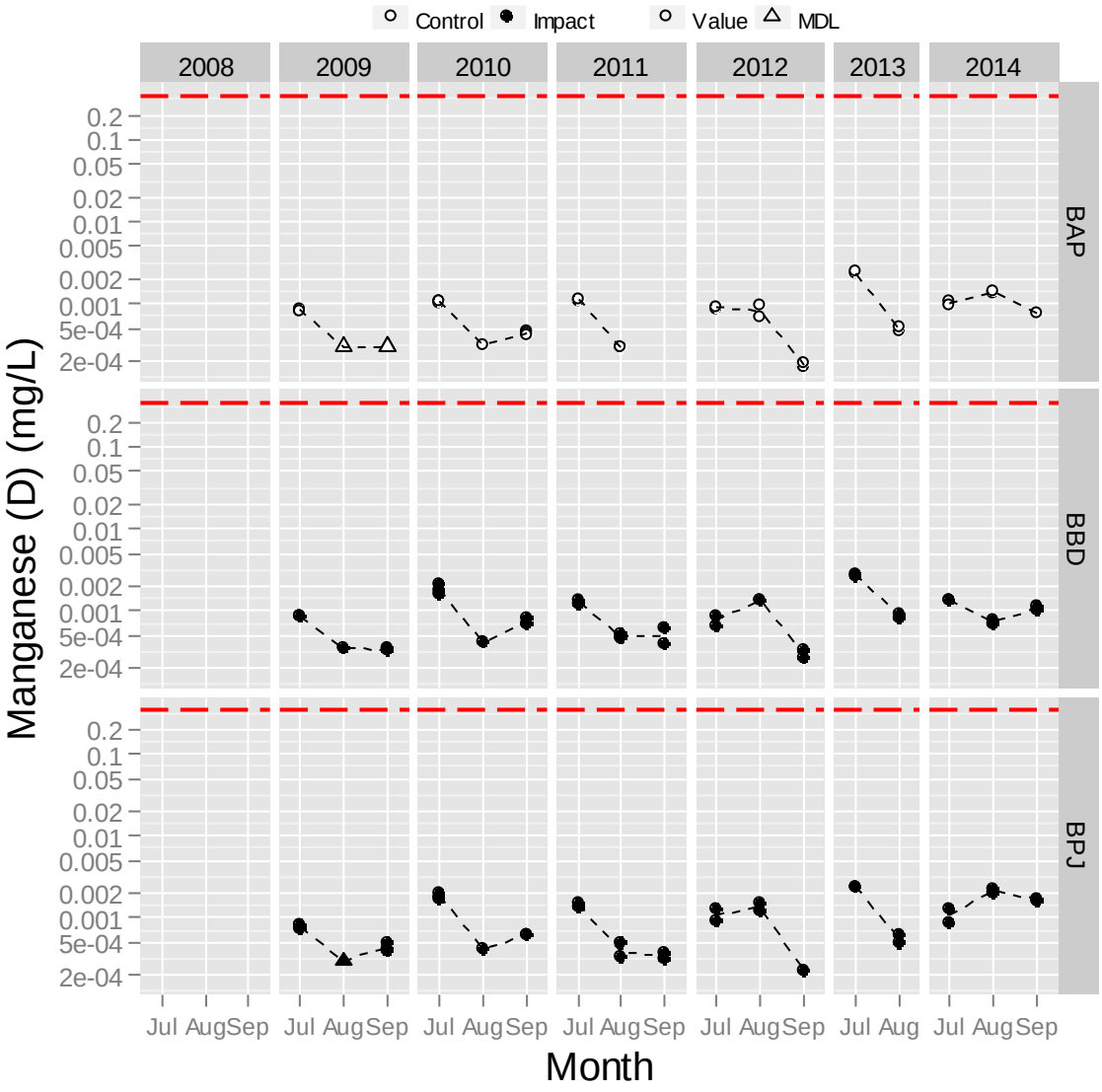


Figure 3.3-83. Dissolved Molybdenum (mg/L) in water samples from Baker Lake since 2008.

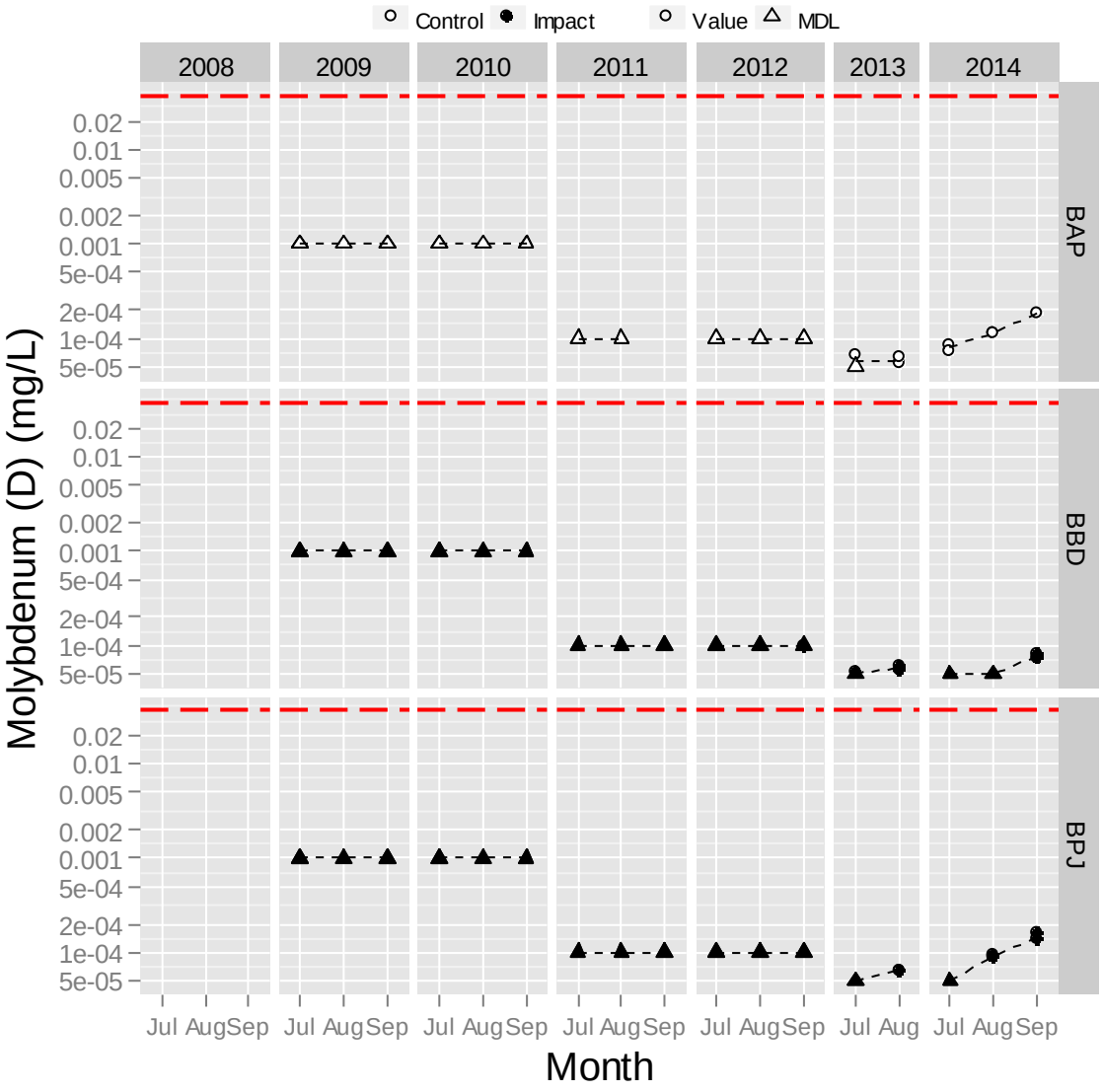


Figure 3.3-84. Dissolved Strontium (mg/L) in water samples from Baker Lake since 2008.

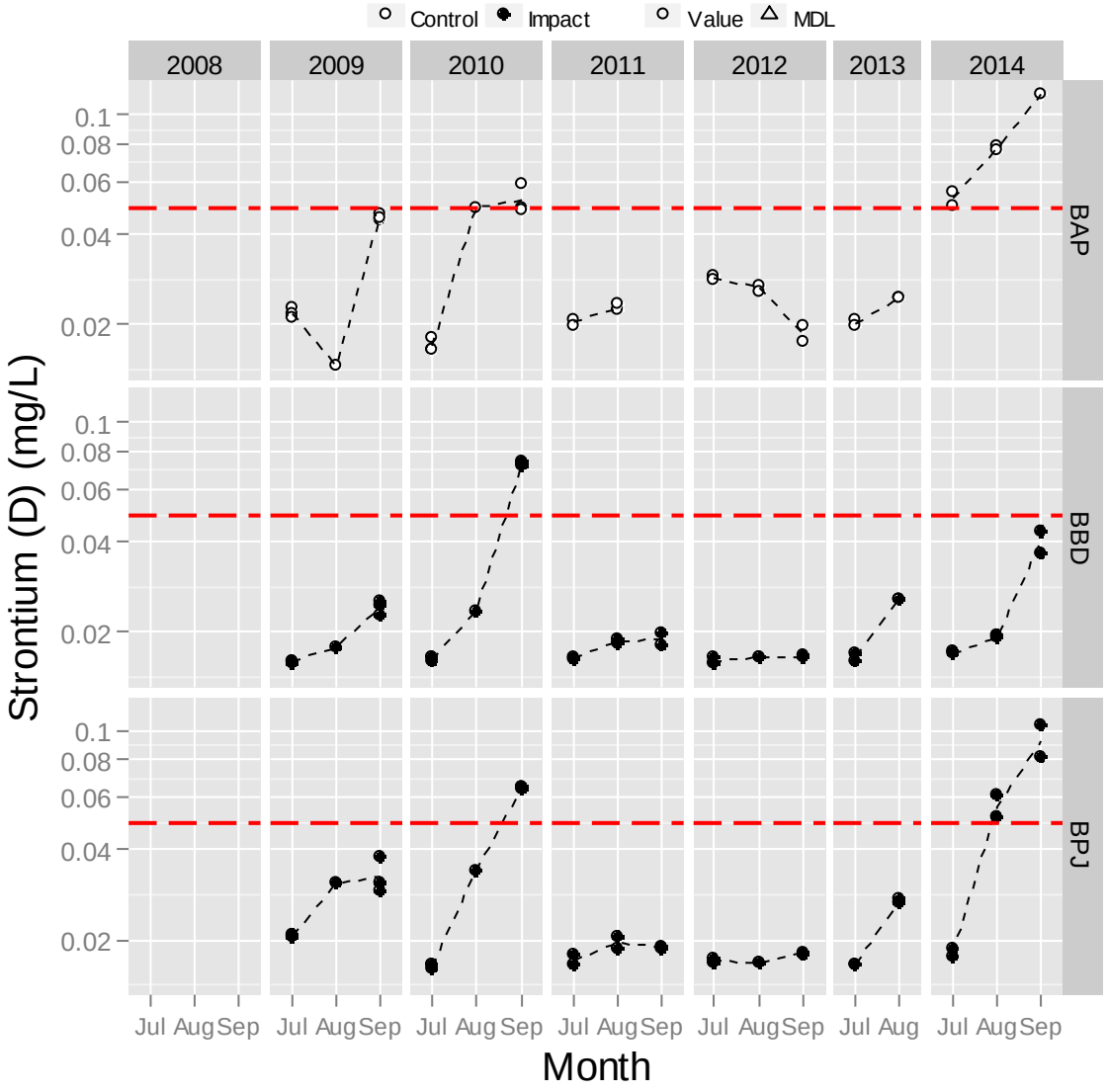


Figure 3.3-85. Dissolved Uranium (mg/L) in water samples from Baker Lake since 2008.

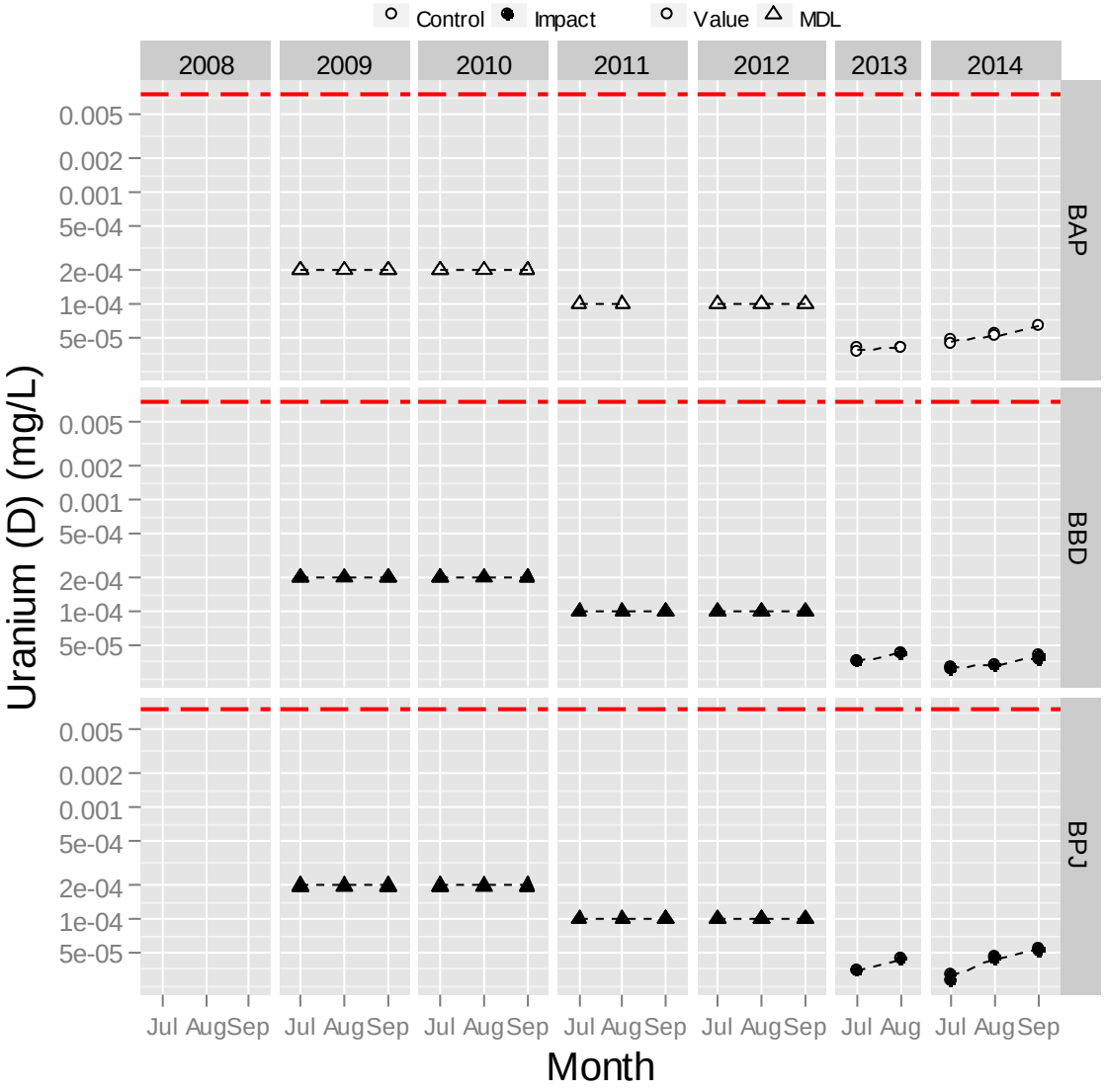
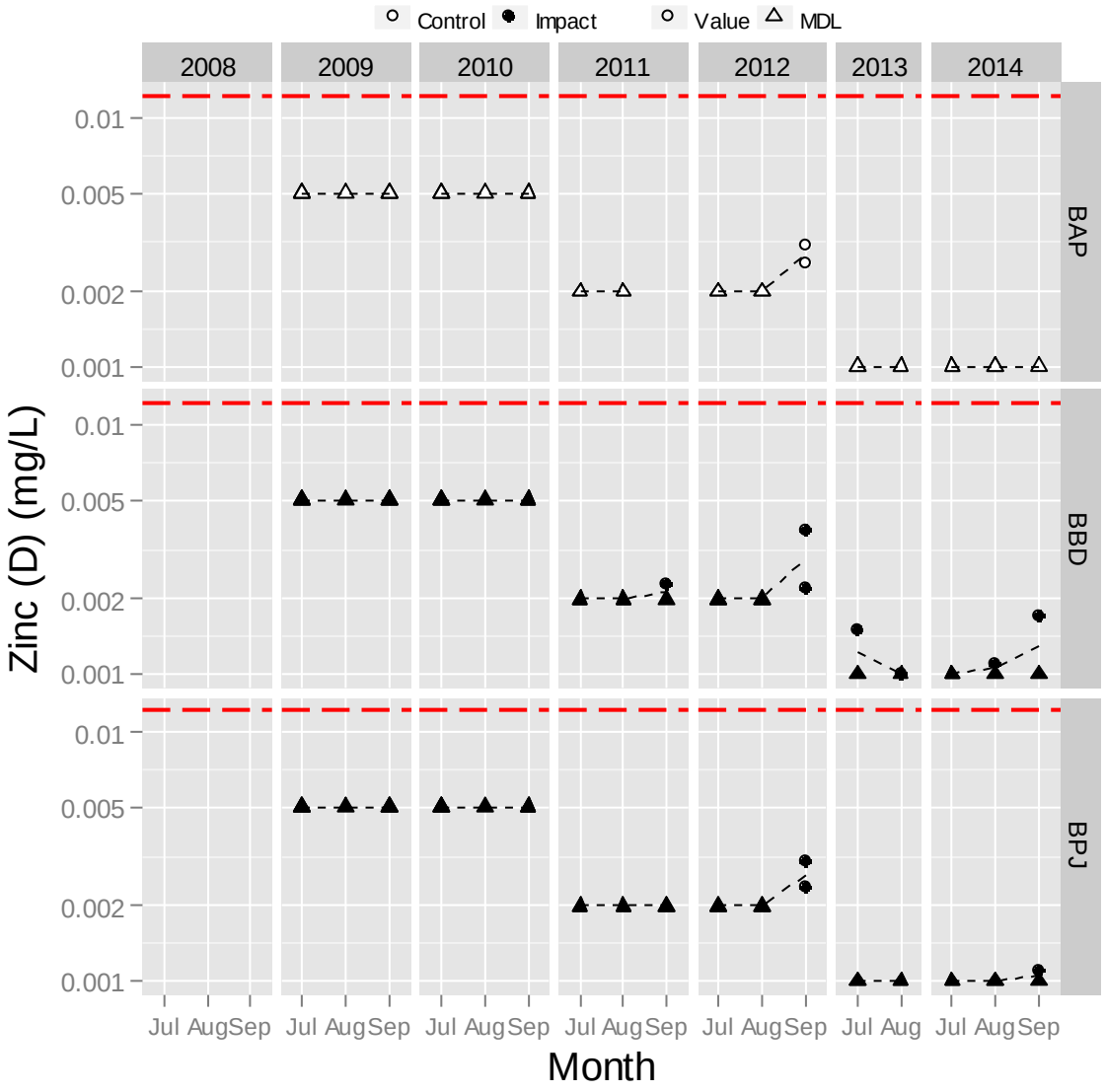


Figure 3.3-86. Dissolved Zinc (mg/L) in water samples from Baker Lake since 2008.



3.4. Sediment Chemistry

3.4.1. Meadowbank Study Lakes

3.4.1.1. General Observations

The natural volume or rate of introduction of particulate materials into the Meadowbank study lakes is low. Because none of the study lakes receives any substantial riverine or tributary inflow, 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 a number of mine-site activities however, that can generate dust, possibly increasing net deposition into project lakes in excess of natural rates.

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. Sediment coring studies were conducted within each major basin in 2008 (to characterize baseline conditions), 2009 (to monitor changes in sediment chemistry in a subset of basins as part of the EAS following East Dike construction; Azimuth, 2010c), 2012 (to generally monitor metals concentrations in the top 1 cm of sediment), and in 2014 (conducted a year early to start the a 3-year cycle matching the EEM program). In addition, the program was expanded spatially in TPE (i.e., with the addition of 10 replicates from TPE-B) to help assess the relative importance of spatial and temporal changes related to chromium (see additional details in **Section 3.4.1.2**). The full coring program will be conducted again in 2017.

Finally, the degree to which sediments metals concentrations may vary, independent of mine-related activities, include the historical (pre-mine) sedimentation patterns, mineralization areas, bioturbation and different grain size distribution. Grain size has a very large influence on metals concentrations – the more coarse the grain size (i.e., sandier), the lower the metals concentrations. Thus, our sediment programs have attempted to target 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 (**Figure 3.4-1**).

3.4.1.2. Temporal and Spatial Trend Interpretation

To help with interpretation of long-term temporal and spatial trends, concentrations of individual metals have been plotted (**Figures 3.4-2 to 3.4-9**) over time within areas and

depict bulk-sediment (i.e., open or closed circles [control versus impact data, respectively] collected using a grab sampler) and surface sediment (i.e., box and whisker plots using a sediment core device). 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 (top 1 cm only) 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 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.

Coring was conducted initially in July 2008 (i.e., prior to onset of East Dike construction) to characterize baseline surface metals concentrations at all monitoring areas. As noted above, the 2009 study monitored 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, with the last two areas serving as reference areas for SP and TE. The 2012 program covered all Meadowbank study lakes sampling areas as well as reference areas. There was no coring program in 2013. The 2014 program covered all Meadowbank study lakes sampling areas and reference areas.

Sediment metals concentrations can naturally be highly variable in mineralized areas, making detection of mine-related events difficult using grab samples (i.e., given the small amount of sediment introduced to the surface layer relative to the volume of sediment sampled from the bottom by the grab). Consequently, while grab data provide insights into sediment chemistry as a result of long-term historical deposition, coring data is much more sensitive and appropriate for assessing changes related to mining activity. Furthermore, given the low sedimentation rates for this region, there is no expectation for inter-annual changes in sediment chemistry due to natural factors; variability seen in the grab data over time in control data is likely due to intra-area spatial heterogeneity (or to laboratory variability or error).

As discussed above (see **Section 1.5**), our approach to identify potential mine-related impacts involved visually searching for temporal/spatial patterns associated with mining activities. In years when sediment cores are collected (2014 included), the core chemistry

results are compared to site-specific triggers/thresholds and cases where means exceed triggers are formally tested using a before-after (BA) statistical model.

As noted above, and as recommended in last year's CREMP report (Azimuth, 2014), the spatial intensity of coring was doubled in TPE 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 are discussed below.

Trend plots for sediment chemistry parameters (including comparison to trigger values) are provided in **Figures 3.4-2 to 3.4-9**. The 2014 sediment chemistry data are screened against site-specific triggers/thresholds in **Table 3.4-1** (for grab samples) and in **Table 3.4-3** (for core samples). Areas where individual replicate sediment cores exceeded the trigger values[5] are highlighted in **Table 3.4-3**, as follows:

- *Near-field areas*: 10 cores from TPE (including TPE-B) and 2 cores from TPN exceeded chromium trigger; 5 cores from WAL exceeded copper trigger; 4 cores from WAL exceeded lead trigger (2 of which also exceeded threshold value); 3 cores from TPE, 1 core from SP, and 4 cores from WAL exceeded zinc trigger.
- *Mid- and Far-field areas*: 2 cores from TPS exceeded chromium trigger; 1 core from TPS exceeded zinc trigger.
- *Reference areas*: 1 core from INUG exceeded arsenic trigger; 2 cores from INUG and 5 cores from PDL exceeded chromium trigger.

Areas where the 2014 sediment core means exceeded the trigger values are highlighted in **Table 3.4-4**. It is important to note that trigger values were developed independently for the Meadowbank study lakes and for Baker Lake to account for differences between these two regions. While this general approach works for most parameter/lake combinations, there are cases (e.g., lead in WAL [**Figure 3.4-7**] or chromium in PDL [**Figure 3.4-5**]) where baseline concentrations routinely exceed the trigger naturally due to lake-specific spatial trends within a region. Thus, it is important to put any trigger exceedences or apparent temporal trends into context by comparing to baseline conditions.

[5] Sediment core samples, which only target the upper 1.5 cm of sediment, are intended for use in formal comparisons of trigger/threshold exceedences and are collected on a three-year cycle (or more often if needed). Grab samples, which target the upper 3 to 5 cm of sediment, are collocated with benthic invertebrate sampling locations and provide ancillary data (e.g., total organic carbon, grain size and metals) to help explain within- and among-area variability. Grab samples are not used for formal testing of triggers/thresholds, but are included in the temporal plots for context.

Results of BA statistical model tests for trigger exceedances are presented in **Table 3.4-5**; key results, including comparisons to baseline conditions for context, were as follows:

- *Chromium* – TPE showed a statistically significant increase relative to baseline conditions (at $p<0.1$). Furthermore, consideration of all the data (**Figure 3.4-5**) suggests a strong temporal trend in chromium concentrations since mine development started in that basin (see further discussion below).
- *Copper* – WAL showed a slight increase (6%) relative to baseline conditions, but the results were not statistically different ($p=0.37$). Furthermore, copper concentrations in 2014 were clearly well within the range of WAL baseline conditions (**Figure 3.4-6**). This is clearly not a mining-related trend.
- *Lead* – WAL (**Figure 3.4-7**) showed a slight, but statistically significant ($p=0.08$), increase (7%) in lead concentrations relative to baseline core data. While WAL lead concentrations in the 2014 core data were slightly higher than in either of the baseline coring events, they are still well within the range of baseline grab data. This context suggests that the apparent increases in lead are not mine related; they are more likely due to localized spatial heterogeneity. Notwithstanding, the trend should be watched closely for verification of this conclusion.
- *Zinc* – WAL showed a statistically significant ($p=0.037$) moderate increase (21%) in zinc concentrations relative to baseline conditions in core data. However, this is likely an artefact of pooling the baseline core data for the BA model rather than a real difference. Not only are core zinc concentrations at WAL well within the range of baseline grab concentrations, but they are lower than the 2012 baseline coring data (**Figure 3.4-9**). Similar to lead and copper, these data suggest the influence of localized spatial heterogeneity in WAL rather than a mine-related temporal trend. Notwithstanding, the trend should be watched closely for verification of this conclusion.

As discussed above, there were no anomalous temporal/spatial patterns observed in 2014 for any sediment contaminants except chromium at TPE (**Figure 3.4-5**). 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); those results highlighted spatial heterogeneity in chromium concentrations within TPE (i.e., the results were attributed to inadvertent spatial bias in sampling). However, the increasing concentrations observed since then (**Figure 3.4-5**) suggest a temporal trend. Additional spatial mapping and statistical analyses were conducted as part of last year's CREMP (Azimuth, 2014) to discern the dominant nature of the changes (i.e., spatial or temporal), however the results were inconclusive. Consequently, a targeted study was recommended for 2014 to resolve the nature of the apparent trend. As described earlier, the coring program for TPE was expanded spatially to target the zone sampled in 2008 – 2009 (called TPE-B herein) and

the zone sampled in 2010 – 2013 (TPE). Historical and 2014 coring stations are shown in **Figure 3.4-10.** The compilation of coring data for the basin is shown in **Figure 3.4-11** (along with the grab data). Statistical comparisons found:

- Significantly greater chromium concentrations in TPE-B core samples in 2014 compared to 2009 (p=0.001)
- Marginally greater chromium concentrations in TPE core samples in 2014 compared to 2012 (p=0.063)
- No significant difference in chromium concentrations between TPE and TPE-B core samples in 2014 (p=0.18)

These results clearly show that the observed trend in sediment chromium concentrations is temporal rather than spatial. If the trend was spatial, there would be no difference in the TPE-B samples from 2014 compared to 2009 samples and there would be a difference between TPE and TPE-B in 2014. Thus, while there was initial evidence of spatial heterogeneity based on the 2008 and 2009 coring studies, the trend observed since then is temporal and would seem related to mining activities.

The main potential sources of chromium to TPE would be effluent discharge to TPN, fugitive dust from blasting and general site activities, and/or construction of the Bay-Goose Dike. Key information relevant to identifying the most likely source is as follows:

- *Trend consistent between core and grab samples* – the chromium trend is fairly consistent between grab and core samples (**Figure 3.4-5**). Given that core samples only target the top 1.5 cm of sediment and grabs the top 3 to 5 cm, this suggests that the source is influencing both sample types equally. Particulates associated with effluent discharge or fugitive dust would likely settle as a thin layer over the native substrate. A thin deposition layer would have more influence on core samples relative to grab samples (i.e., resulting in a less prominent change in the grab samples). As this was not the case, the evidence points to a source depositing enough material to affect both sample types to a similar degree (i.e., on the order of 3 to 5 cm or more).
- *No evidence for sediment chromium increases in TPN* – sediment core and grab samples in TPN show no temporal trends in chromium concentrations. Trends due to effluent-related sedimentation would be expected to be more pronounced closer to the discharge point (TPN). The lack of chromium increases in TPN suggests that effluent discharge is an unlikely source of the chromium in the TPE trend.
- *No evidence for elevated chromium in TPN water* – despite identifying temporal changes for a number of water parameters in TPN, sampling results for the past two years show no anomalous results for chromium (**Figure 3.3-22**). This suggests that effluent discharge (which only occurred in 2014 from June 10 to July 5) is an unlikely source of the chromium in the TPE trend.

- *Chromium was elevated in SP sediments after East Dike construction* – dike construction monitoring results from 2008 showed total chromium exceeding CCME water quality guidelines in routine water samples collected in Second Portage Lake; the much lower dissolved concentrations suggested association with particulates (Azimuth, 2009a). Chromium concentrations were also elevated (175 to 250 mg/kg dw) in sediment trap samples collected after the construction-related sedimentation event; sediment deposition was estimated at between 1 and 2 mm for the event (Azimuth, 2009b; 2010c). Sediment coring studies showed chromium concentrations increasing from a mean of 65 mg/kg dw in 2008 prior to dike construction to 80 mg/kg dw afterwards in 2009 (Azimuth, 2010c). Despite the change in chromium (and other metals), the results of sediment toxicity testing and sequential extraction analysis conducted in 2010 suggested metals toxicity was not an issue in Second Portage Lake (Azimuth, 2011a).
- *Chromium is associated with ultramafic rock* – ultramafic rock is generally known to contain elevated concentrations of chromium (e.g., on the order of 2000 mg/kg) relative to other rock types (Motzer and Engineers, 2004). It is also one of the three main rock types comprising the Portage, Goose Island and Vault deposits (Cumberland, 2005) and was considered the best dike capping material to reduce the potential for metals leaching/acid rock drainage (ML/ARD) (Cumberland, 2006). AEM conducts quarterly chemical/geochemical sampling of waste rock to facilitate the separation of material based on its ML/ARD characteristics. Chromium concentrations in ultramafic rock, the main type used in dike construction (T. Lepine, pers. comm. March 2015), ranged up to 2400 mg/kg between 2012 and 2014 (M. Marcil, pers. comm. March 2015).
- *Chromium elevated at reference area PDL* – Pipedream Lake sediment chromium concentrations (mean for 2014 was 134 mg/kg dw) were naturally the highest among Meadowbank study lakes (**Figure 3.4-5**) and consistently exceed the CCME ISQG (37.3 mg/kg dw) and PEL (90 mg/kg dw) sediment quality guidelines and the statistically-based trigger for the Meadowbank study lakes (114 mg/kg dw). This is likely reflective of a higher relative influence of ultramafic rocks in the area surrounding the lake.

This information points to Bay-Goose Dike construction as the most likely source of this change in chromium in sediment in TPE. Neither effluent discharge nor fugitive dust would be expected to have caused a similar trend in chromium concentrations observed in both core and grab samples. The specific use of ultramafic rock in dike construction explains why the changes in TPE sediment metals are limited to chromium. It also provides a plausible mechanism for deposition of sufficient material to affect both core and grab samples. For much of its length, the Bay-Goose Dike is situated in close proximity to a steep slope leading towards a series of basins. During the first phase of construction, which occurred in the mid to late open water season of 2009, most fine

particulates associated with the deposition of construction material would have been retained within the work zone by the turbidity barriers. However, after removal of the barriers used in the first phase, fine particulates would have been free to re-suspend and move down slope to depositional areas (i.e., where the sediment and benthic community stations are situated). Given the potential source of the material, local bathymetry and the general lack of widespread sediment or metals changes to water chemistry in TPE, it is likely that the majority of material is localized in extent.

It is important to note that the increased chromium concentrations at TPE have not resulted in adverse changes to the local benthic community. While a decrease in community abundance was initially observed in 2009 (coming down after the final baseline year peaked in 2008), the Bay-Goose TSS Effects Assessment Study (EAS), conducted between 2009 through 2011, concluded that changes to the benthic community observed during that period were more likely due to natural variability than to residual impacts from dike construction (Azimuth, 2012b). CREMP monitoring results since 2011 show total density and taxa richness trending within the range of baseline conditions (see **Section 3.6** for more details). Notwithstanding, given that concentrations exceed the CCME Probable Effects Level (PEL) and have increased by more than 50% relative to baseline conditions, it would still be prudent to verify that metals bioavailability is low and that the sediments are not toxic.

As recommended in last year's CREMP (Azimuth, 2014), confirmation of a temporal trend in chromium sediment concentrations in TPE should be followed up with an assessment of the ecological relevance of the change. Following the East Dike sedimentation event in 2008, where elevated metals (including chromium) concentrations were observed in SP, a targeted study was initiated in 2010 to assess metals bioavailability (Azimuth, 2011a). This included sequential extraction analyses and toxicity testing. While the results verified low metals bioavailability in SP, chromium concentrations were lower there than are currently observed in TPE (and below the CCME PEL). A similar study should be implemented in 2015.

Summary

The only anomalous temporal/spatial pattern observed in 2014 was for chromium in TPE sediment, where this year's core sample results exceeded the trigger value and are consistent with an increasing temporal trend since 2009. As discussed in **Section 3.6**, the benthic invertebrate community at TPE appears healthy and consistent with baseline conditions. Given the 2014 results, the recommended management action is to follow-up with a targeted study to assess metals bioavailability/toxicity in 2015. Coupled with the lack of adverse effects seen for the benthic invertebrate community, confirmation of low metals availability would resolve this issue from an ecological risk perspective.

3.4.2. Baker Lake

3.4.2.1. General Observations

As discussed earlier, 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). Other possible contaminant sources would be spills; there were none reported in 2014. 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 area is generally more sandy, with less silt/clay (**Table 3.4-1 and Figure 3.4-12**). 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.

3.4.2.2. Temporal and Spatial Trend Interpretation

Patterns in metals concentrations within and between areas were 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. Concentrations at exposure or impact areas are uniformly higher than at control / reference areas because of grain size. In 2014, impact area BPJ percent silt/clay was 71.5% with about 28% sand. At the second impact area, BBD, and the reference areas BAP and BES, sand dominated grain size distribution (74%, 70% and 71%) with a much smaller fraction of silt/clay in the sediment (about 25 – 30 %) (**Table 3.4-1 and Figure 3.4-12**).

Aluminum, arsenic, chromium, copper, and zinc concentrations at impact areas were reasonably variable, sometimes ranging over an order of magnitude between minimum and maximum concentrations with a similar range in values for all metals between BBD and BPJ (but always higher concentrations at BPJ) (**Figures 3.4-13, 3.4-14, 3.4-16, 3.4-17, and 3.4-20**). Concentrations of the same metals were about 50% lower at the reference areas and were less variable over time with a narrower range in concentration between minimum and maximum values again, likely due to larger grain size. Cadmium and mercury were consistently at or just above laboratory MDLs (**Figures 3.4-15, and 3.4-19**). When MDLs were lowered for these metals (and for lead; **Figure 3.4-18**) in 2011, concentrations were about an order of magnitude lower and similar across all areas.

Areas where the 2014 sediment core means exceeded the trigger values are highlighted in **Table 3.4-6**. Results of BA statistical model tests for trigger exceedances are presented in **Table 3.4-7**; key results were as follows:

- *Arsenic* – BPJ showed an increase relative to baseline conditions; however, this increase was not statistically different (at $p<0.1$). Furthermore, arsenic data at BPJ were within range of baseline conditions; as in all years previous, BPJ sample means have always exceeded the statistically-based trigger for arsenic (**Figure 3.4-14**). This suggests that the trigger was never appropriate for this area.

Summary

There is no evidence of 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 3.4-1. Conventional sediment grab chemistry, partical size, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Third Portage Lake									
						East Basin					North Basin				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		TPE-1	TPE-2	TPE-3	TPE-4	TPE-5	TPN-1	TPN-2	TPN-3	TPN-4	TPN-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14
Physical & Organic Parameters															
Moisture (%)						82.9	84	87.4	86.6	86.6	32.9	77	55.4	50.6	35.4
pH						5.9	5.86	6.12	6.16	6.14	6.22	5.71	6.04	6.02	6.16
Total Organic Carbon (% dw)						3.21	2.9	3.86	3.59	3.89	0.24	2.21	0.65	0.79	0.22
Particle Size															
% Gravel (>2mm)						*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	0.75	*<0.1*	1.72	0.23	2.34
% Sand (2.00mm - 0.063mm)						4.27	5.55	1.41	1.78	1.05	76.3	17.5	47.2	21.3	11.5
% Silt (0.063mm - 4µm)						67.3	62.7	68.2	67.2	69.6	16.8	59	37.7	46.7	44.3
% Clay (<4µm)						28.4	31.8	30.4	31	29.4	6.09	23.5	13.3	31.8	41.8
Total Metals (mg/kg dw)															
Aluminum						26400	26800	24500	23600	25400	10300	21500	16600	25100	26200
Antimony						0.27	0.22	0.29	0.26	0.27	*<0.1*	0.13	0.11	0.2	0.18
Arsenic*	5.9	120.0	8.3			22.1	18	19.8	19	20.9	5.57	10.2	10.6	17.1	13.4
Barium						114	121	119	114	112	37.3	102	71.6	111	130
Beryllium						1.77	1.97	1.71	1.69	1.75	0.49	1.19	0.99	1.42	1.16
Bismuth						2.56	2.75	2.43	2.33	2.4	0.56	1.39	1.05	1.46	1.44
Cadmium*	0.6	1.10	0.55		0.6	0.152	0.146	0.338	0.259	0.172	*<0.05*	0.075	*<0.05*	0.079	0.117
Calcium						2190	1960	2500	2240	2490	1080	1860	1500	1960	2400
Chromium*	37.3	114.3	27.0		37.3	**146**	110	**142**	**129**	**158**	69.6	**133**	98.8	**131**	110
Cobalt						18.4	17.2	17.9	17	18.1	6.77	10.6	9.22	15.1	17.4
Copper*	35.7	126.0	20.5		35.7	57.9	59.4	54.1	50.8	52.1	19.9	53.7	37.7	56.1	30
Iron						48800	44200	46600	48600	46600	16700	21200	27900	37100	37700
Lead	35	32.5	32.5	35	35	23.4	23.5	21.9	20.2	21.4	7.21	15.9	11.8	18	20
Lithium						49.3	52	47.6	44.6	46.6	20.1	37	31.2	52.2	62.7
Magnesium						11300	10300	10700	10200	11400	5610	9840	8050	11500	12200
Manganese						1640	926	2440	2460	1790	251	267	342	744	829
Mercury	0.17	0.104	0.088	0.17	0.17	0.0171	0.0138	0.0162	0.0129	0.0178	*<0.005*	0.0087	*<0.005*	0.0058	0.0054
Molybdenum						4.34	4.15	3.94	4.02	3.93	0.74	1.24	1.38	3.37	3.63
Nickel						80	67.3	110	92.5	84.1	35.5	74	49.6	74.3	71.6
Phosphorus						458	468	453	404	453	246	530	438	410	478
Potassium						4880	5020	4340	4120	4510	1470	3520	2710	4280	5150
Selenium						0.58	0.57	0.81	0.78	0.76	*<0.2*	0.29	*<0.2*	*<0.2*	*<0.2*
Silver						*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	0.12	*<0.1*	*<0.1*	*<0.1*
Sodium						170	170	160	150	170	*<100*	130	*<100*	140	170
Strontium						20.2	19.2	19.7	18.6	20.3	10.2	18.1	14.9	19.7	22.5
Thallium						0.404	0.437	0.46	0.423	0.382	0.114	0.242	0.181	0.314	0.376
Tin						*<2.0*	2	2.4	*<2.0*	2	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium						977	960	816	800	874	431	697	636	932	1270
Uranium						19	20.6	16.3	15.9	16	6.38	16.3	11.8	19.4	17.1
Vanadium						47.6	45.4	43.2	41.7	44.7	19.3	37.6	30.2	44.1	48.6
Zinc*	123	121.3	73.6		123	117	120	115	110	112	44	89.5	69.2	106	105

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-1. Conventional sediment grab chemistry, partical size, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Third Portage Lake					Second Portage Lake				
						South Basin									
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		TPS-1	TPS-2	TPS-3	TPS-4	TPS-5	SP-1	SP-2	SP-3	SP-4	SP-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	02-Sep-14	02-Sep-14	02-Sep-14	02-Sep-14	02-Sep-14
Physical & Organic Parameters															
Moisture (%)						84	85.4	79.6	82.7	76.1	83.8	83.5	83.4	84.6	84.3
pH						6.21	5.98	5.78	5.83	5.7	5.94	6.04	6.09	6.19	6.34
Total Organic Carbon (% dw)						3.29	3.83	2.49	3.58	2.03	3.63	3.74	3.09	3.85	3.71
Particle Size															
% Gravel (>2mm)						*<0.1*	1.81	0.32	*<0.1*	0.84	*<0.1*	*<0.1*	*<0.1*	0.21	*<0.1*
% Sand (2.00mm - 0.063mm)						5.19	4.32	8.01	12.6	50.6	2.05	2.12	2.69	2.42	1.78
% Silt (0.063mm - 4µm)						66	69.7	66.1	64	38.3	65.8	67.4	61.1	68.5	68.6
% Clay (<4µm)						28.8	24.2	25.6	23.4	10.3	32.2	30.5	36.2	28.9	29.6
Total Metals (mg/kg dw)															
Aluminum						25700	23100	24000	21500	14900	29200	28800	30700	29500	27400
Antimony						0.2	0.22	0.17	0.17	0.13	0.28	0.25	0.26	0.26	0.26
Arsenic*	5.9	120.0	8.3			9.43	14	26.8	10.4	6.52	47.3	39.1	34.4	34.7	28.4
Barium						118	98.9	98.3	95.6	67	132	128	133	129	126
Beryllium						1.5	1.43	1.48	1.37	0.93	2.29	2.34	2.26	2.32	2.07
Bismuth						1.66	1.56	1.52	1.24	0.82	2.55	2.61	2.67	2.55	2.43
Cadmium*	0.6	1.10	0.55		0.6	0.24	0.182	0.139	0.292	0.167	0.234	0.275	0.212	0.228	0.268
Calcium						2090	1670	1600	1860	1440	2370	2200	2200	2500	2030
Chromium*	37.3	114.3	27.0		37.3	**124**	114	**120**	106	68	89.2	85.2	89.9	92.9	83.3
Cobalt						14.4	16.5	12.8	11.1	7.93	18.7	18.1	17.1	17.5	16.2
Copper*	35.7	126.0	20.5		35.7	61.6	65.5	61.7	52	32.9	86.9	84.5	91.2	84.2	78.9
Iron						27300	29000	39000	25500	18800	71900	71300	62800	62400	56100
Lead	35	32.5	32.5	35	35	19.8	18.9	18.8	16.6	12	23.6	22.9	23.9	24.1	22.2
Lithium						44.1	36.7	42.3	36.8	28.6	49.9	48	52	48.8	46.4
Magnesium						10800	9570	10500	9320	6750	10200	9990	10500	10400	9660
Manganese						395	563	461	337	250	2660	2270	2250	2440	2540
Mercury	0.17	0.104	0.088	0.17	0.17	0.013	0.0167	0.0081	0.0117	0.0093	0.028	0.0253	0.0287	0.0288	0.0291
Molybdenum						1.87	3.05	1.62	2.18	1.39	8.05	7.83	8.46	8.21	5.85
Nickel						82.4	72.3	69.3	70.1	44.2	66.1	70.3	67.9	67.7	70.9
Phosphorus						388	431	755	565	303	583	662	542	593	581
Potassium						4250	3610	3750	3380	2390	4920	4890	5190	4980	4660
Selenium						0.47	0.7	0.42	0.58	0.35	0.61	0.63	0.49	0.65	0.71
Silver						0.13	0.14	0.11	0.15	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	0.11
Sodium						150	140	130	130	*<100*	170	170	160	170	170
Strontium						19.5	15.9	15.4	15.8	13	21.7	20.9	21	22.3	19.7
Thallium						0.307	0.271	0.255	0.249	0.173	0.394	0.408	0.406	0.396	0.386
Tin						*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	2	*<2.0*
Titanium						754	630	737	683	566	837	822	903	868	847
Uranium						18.7	18.5	17.3	15.6	9.52	24.2	24.2	25	24.7	21.4
Vanadium						41.3	40.5	41	37.1	25.5	43.4	43.3	46	46.4	41.3
Zinc*	123	121.3	73.6		123	112	97.2	94.4	95.7	66.5	**126**	**126**	**130**	**130**	119

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-1. Conventional sediment grab chemistry, partical size, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Tehek Lake					Tehek Farfield				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		TE-1	TE-2	TE-3	TE-4	TE-5	TEFF-1	TEFF-2	TEFF-3	TEFF-4	TEFF-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	29-Aug-14	29-Aug-14	29-Aug-14	29-Aug-14	29-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14
Physical & Organic Parameters															
Moisture (%)						68.5	78.9	80.1	81.8	85	86.5	84.1	85.6	85.9	84.7
pH						5.82	5.54	5.67	5.87	6.1	6.16	6.3	6.17	5.97	6.08
Total Organic Carbon (% dw)						1.63	2.51	2.34	2.48	3.42	4.26	3.08	3.53	3.46	3.37
Particle Size															
% Gravel (>2mm)						*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	0.1	*<0.1*	*<0.1*
% Sand (2.00mm - 0.063mm)						47.8	18.6	18.9	7.22	3.09	1.6	4.07	2.17	2.57	3.3
% Silt (0.063mm - 4µm)						43.2	67	62.3	69.4	75.3	73.5	64.3	71	66.8	66.7
% Clay (<4µm)						8.98	14.4	18.9	23.4	21.6	24.9	31.7	26.7	30.7	30
Total Metals (mg/kg dw)															
Aluminum						12100	20300	18400	20600	20000	17900	22700	19700	21800	20900
Antimony						0.11	0.18	0.14	0.17	0.18	0.18	0.12	0.16	0.16	0.15
Arsenic*	5.9	120.0	8.3			7.48	11.1	14.3	22.6	19.9	13.4	10.2	23.9	11.4	14.8
Barium						54	99.4	85.1	104	100	116	104	165	111	103
Beryllium						1	1.74	1.41	1.72	1.73	1.43	1.75	1.72	1.8	1.69
Bismuth						1.05	1.87	1.63	1.89	1.9	1.44	1.76	1.56	1.73	1.64
Cadmium*	0.6	1.10	0.55		0.6	0.06	0.187	0.141	0.185	0.224	0.378	0.116	0.563	0.179	0.129
Calcium						1330	1900	1570	1490	1850	1690	1560	1450	1780	1520
Chromium*	37.3	114.3	27.0		37.3	30.6	52.2	46.4	52	50.9	44.2	52.9	45.5	51.6	49
Cobalt						5.07	8.19	9.34	12.5	11.1	13.8	11.8	15.4	14	12.1
Copper*	35.7	126.0	20.5		35.7	28.5	50.1	46.1	51.5	52.7	45.1	49.2	54.7	49.8	50
Iron						22000	36600	45800	61400	52600	70700	37600	98300	44800	54900
Lead	35	32.5	32.5	35	35	10.8	19	16.6	18.3	19.2	17.1	18.7	17.4	18.3	17.8
Lithium						23.4	38.5	35.2	39.4	40.2	37.5	46.1	37.3	43.8	41.4
Magnesium						4670	7630	6790	7440	7270	6280	7710	6460	7480	7130
Manganese						354	520	637	1580	2740	4650	1750	6380	3740	1960
Mercury	0.17	0.104	0.088	0.17	0.17	0.0108	0.018	0.019	0.018	0.0254	0.0194	0.0141	0.0159	0.0134	0.015
Molybdenum						2.04	2.76	6.71	7.14	7.15	6.33	4.07	9.1	4.78	6.1
Nickel						19.2	35.3	31.3	40.9	41.7	54.4	34.6	79.5	38.8	33.5
Phosphorus						389	791	537	786	503	495	463	1470	456	800
Potassium						2230	3810	3410	3780	3660	3390	4320	3700	4210	4040
Selenium						0.32	0.68	0.52	0.65	0.85	0.96	0.43	0.86	0.57	0.67
Silver						*<0.1*	0.18	0.11	*<0.1*	0.15	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Sodium						100	170	140	150	150	150	150	170	170	160
Strontium						10.8	17.1	13.8	14.6	16.2	16.1	15.8	15.4	17	15.7
Thallium						0.181	0.342	0.29	0.35	0.345	0.369	0.378	0.508	0.391	0.354
Tin						*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium						605	978	822	845	744	673	843	717	802	779
Uranium						10.3	18	15.9	18.6	18	17.6	22.8	19.8	22	20.9
Vanadium						19.8	32.6	29.1	32.2	31.6	28.7	35.1	31	34	33
Zinc*	123	121.3	73.6		123	72.7	94.3	85.4	99.1	99.4	92.6	99.4	114	100	97.3

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-1. Conventional sediment grab chemistry, partical size, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Inuggugayualik Lake					Wally Lake				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		INUG-1	INUG-2	INUG-3	INUG-4	INUG-5	WAL-1	WAL-2	WAL-3	WAL-4	WAL-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14
Physical & Organic Parameters															
Moisture (%)						78.8	76.3	81.5	82.3	80.6	91.2	91.1	91.7	88.6	88.3
pH						5.86	5.91	5.74	5.4	5.08	6.25	6.39	6.33	6.5	6.38
Total Organic Carbon (% dw)						2.81	2.23	3.38	3.79	3.13	11	9.97	10.7	6.61	7.79
Particle Size															
% Gravel (>2mm)						*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
% Sand (2.00mm - 0.063mm)						7.15	17.6	4.95	2.49	3.42	1.87	2.06	1.4	6.83	7.67
% Silt (0.063mm - 4µm)						68.6	63.5	71.7	75.3	67.1	85	84.3	84.3	81.1	80.4
% Clay (<4µm)						24.2	18.9	23.4	22.2	29.5	13.1	13.6	14.3	12.1	12
Total Metals (mg/kg dw)															
Aluminum						22800	22100	23400	16900	20200	16800	18800	18800	21200	17500
Antimony						0.14	*<0.1*	0.13	0.14	0.15	0.4	0.37	0.4	0.35	0.42
Arsenic*	5.9	120.0	8.3			8.69	5.74	9.7	**138**	69.1	48.5	39.4	29.6	21.4	21.1
Barium						119	113	129	100	116	95.3	107	103	119	95.7
Beryllium						1.46	1.26	1.45	1.06	1.26	1.32	1.45	1.41	1.61	1.3
Bismuth						1.16	1.12	1.24	0.94	1.12	1.69	1.9	1.82	2.05	1.65
Cadmium*	0.6	1.10	0.55		0.6	0.178	0.072	0.274	0.157	0.174	0.406	0.469	0.449	0.456	0.486
Calcium						2000	2090	1940	1510	1520	3640	3740	3790	3790	3600
Chromium*	37.3	114.3	27.0		37.3	110	108	**116**	80	97.6	49.8	53	52.9	58.9	48.6
Cobalt						9.35	9.01	10.5	10.6	11.4	8.26	8.54	8.61	8.45	7.84
Copper*	35.7	126.0	20.5		35.7	45.5	39.4	49.3	35.3	43.7	**131**	**144**	**137**	**136**	122
Iron						26000	24200	29900	109000	72000	35100	33200	28300	29600	24200
Lead	35	32.5	32.5	35	35	12.5	12	13.2	10.3	11.6	29.7	31.8	31.7	32.4	29.4
Lithium						29.5	30.1	28.9	20.6	23.7	27	30.6	30.7	38.2	32
Magnesium						9710	9700	10000	7220	8440	6220	6860	6930	8000	6840
Manganese						305	291	358	1090	452	321	300	272	322	260
Mercury	0.17	0.104	0.088	0.17	0.17	0.0128	0.0113	0.0168	0.0221	0.0176	0.0669	0.057	0.0604	0.0364	0.0418
Molybdenum						1.72	1.43	3.44	8.35	5.91	9.32	8.97	8.07	5.8	5.03
Nickel						72.8	67.9	87.4	58.8	66.4	47	51.2	49.4	52.4	46.1
Phosphorus						780	648	914	2530	1860	778	624	709	583	564
Potassium						3450	3320	3340	2590	3130	2830	3130	3200	3580	3030
Selenium						0.59	0.41	0.6	0.57	0.73	0.91	1.05	1.02	0.9	0.84
Silver						0.15	0.15	0.19	0.15	0.17	0.59	0.67	0.62	0.44	0.44
Sodium						150	130	150	120	140	150	160	170	170	160
Strontium						25.9	26.1	23.7	18.8	21.2	23.5	25.2	25.3	26.9	24.5
Thallium						0.203	0.172	0.224	0.167	0.199	0.277	0.297	0.297	0.294	0.267
Tin						*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium						678	657	587	466	611	457	520	530	662	579
Uranium						17	15.6	17.6	11.9	15	14.1	15.9	15.1	14.9	13.6
Vanadium						36	35	37.4	26.7	32.3	26.1	28.2	27.9	32.2	26.1
Zinc*	123	121.3	73.6		123	83.3	77.5	95.2	73.4	84.3	110	117	116	112	109

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-1. Conventional sediment grab chemistry, partical size, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Pipedream Lake					Baker Lake				
											Barge Dock				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		PDL-1	PDL-2	PDL-3	PDL-4	PDL-5	BBD-1	BBD-2	BBD-3	BBD-4	BBD-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	01-Sep-14	01-Sep-14	01-Sep-14	01-Sep-14	01-Sep-14
Physical & Organic Parameters															
Moisture (%)						74	74.4	72.6	68	76.8	31.6	40.3	21	34	30.7
pH						6.04	5.88	5.39	6.3	6.14	6.99	5.89	6.2	6.35	6.4
Total Organic Carbon (% dw)						2.33	2.4	1.87	1.63	2.74	0.18	0.47	*<0.1*	0.28	0.21
Particle Size															
% Gravel (>2mm)						*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	1.64	1.76	*<0.1*
% Sand (2.00mm - 0.063mm)						15.2	14.8	19.7	8.02	12.6	90.5	54	94.3	45	84.6
% Silt (0.063mm - 4µm)						73.8	72.6	67.9	70.6	69.8	8.04	40.9	3.32	43.1	13.2
% Clay (<4µm)						11	12.6	12.4	21.3	17.7	1.45	5.05	0.78	10.2	2.13
Total Metals (mg/kg dw)															
Aluminum						19500	20200	16400	23000	19900	4100	6370	3080	6530	4840
Antimony						0.2	0.24	0.19	0.26	0.22	*<0.1*	*<0.1*	*<0.1*	0.11	*<0.1*
Arsenic*	5.9	120.0	8.3			9.76	8.84	**208**	**141**	8.83	2.75	6.13	2.01	3.63	2.78
Barium						92.5	101	72.5	138	98.1	48.4	68.5	23.7	76.6	52.7
Beryllium						0.87	0.97	0.76	1.11	0.93	*<0.2*	0.28	*<0.2*	0.31	0.2
Bismuth						0.77	0.8	0.67	1.02	0.74	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Cadmium*	0.6	1.10	0.55		0.6	0.256	0.324	0.082	0.634	0.296	*<0.05*	0.052	*<0.05*	*<0.05*	*<0.05*
Calcium						2030	2450	1760	1880	2420	1380	1920	734	2180	1430
Chromium*	37.3	114.3	27.0		37.3	**128**	**131**	110	**144**	**127**	9.62	13.4	4.98	14.7	9.65
Cobalt						10.5	10.9	11.8	25	10.4	2.94	4.18	2.07	4.52	3.33
Copper*	35.7	126.0	20.5		35.7	42.5	42.4	33.4	66.9	42.5	2.97	6.28	2.58	5.54	3.71
Iron						24400	25200	62500	65300	24700	9290	12400	6050	11900	9280
Lead	35	32.5	32.5	35	35	12	13.3	11	16.2	12.9	3.08	5.81	1.94	5.58	3.7
Lithium						27.9	29	22.5	29.6	27.4	6.2	8.6	5.5	9	7.4
Magnesium						10500	10800	8970	11100	10500	2650	3580	2040	3400	2990
Manganese						265	279	406	4660	274	243	198	90	223	171
Mercury	0.17	0.104	0.088	0.17	0.17	0.0058	0.0063	0.0084	0.0065	0.0073	*<0.005*	0.0062	*<0.005*	*<0.005*	*<0.005*
Molybdenum						1.24	1.8	3.66	10.3	1.82	*<0.5*	0.64	*<0.5*	0.79	*<0.5*
Nickel						80.5	81.7	62	192	79.1	5.97	8.42	4.16	8.53	6.5
Phosphorus						387	431	1580	544	424	409	668	283	695	407
Potassium						2500	2650	2180	2980	2630	660	1090	470	1340	790
Selenium						0.38	0.38	0.38	0.23	0.41	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Silver						0.16	0.19	0.1	*<0.1*	0.19	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Sodium						*<100*	*<100*	*<100*	*<100*	*<100*	100	160	*<100*	150	100
Strontium						20.3	23.7	19.3	22.7	23.1	27.1	36.4	19.2	38.6	29.3
Thallium						0.145	0.166	0.131	0.297	0.16	*<0.05*	*<0.05*	*<0.05*	0.056	*<0.05*
Tin						*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium						531	590	474	601	588	239	342	152	388	263
Uranium						8.13	8.21	6.03	12.5	7.91	0.579	1.13	0.47	1.9	0.696
Vanadium						33.8	35.1	30	41.1	34.3	12.3	16	7.54	19.8	12.6
Zinc*	123	121.3	73.6		123	77	86.4	61.7	101	82.9	17	25.4	13.7	24	19.1

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-1. Conventional sediment grab chemistry, partical size, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Baker Lake									
						Proposed Jetty					Akilahaarjuk Point				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		BPJ-1	BPJ-2	BPJ-3	BPJ-4	BPJ-5	BAP-1	BAP-2	BAP-3	BAP-4	BAP-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	01-Sep-14	01-Sep-14	01-Sep-14	01-Sep-14	01-Sep-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14
Physical & Organic Parameters															
Moisture (%)						50.7	54.9	49.8	44.4	45.7	42.1	52.9	43.7	41.5	37.1
pH						6.53	6.32	6.17	6.44	7.01	6.01	5.84	5.79	6.17	6.51
Total Organic Carbon (% dw)						0.64	0.83	0.68	0.51	0.53	0.43	1.35	0.55	0.45	0.35
Particle Size															
% Gravel (>2mm)						0.77	0.19	0.89	0.14	0.52	0.16	*<0.1*	*<0.1*	*<0.1*	*<0.1*
% Sand (2.00mm - 0.063mm)						33.6	19.4	21.9	23.4	41.1	80.4	64.4	63.1	68.5	73.8
% Silt (0.063mm - 4µm)						57.2	69	66.8	65.7	49.9	17.5	30.1	32.3	28.2	23.7
% Clay (<4µm)						8.42	11.4	10.4	10.7	8.48	1.95	5.44	4.58	3.24	2.51
Total Metals (mg/kg dw)															
Aluminum						8260	8990	8160	9330	8310	4310	6910	5890	5630	4780
Antimony						0.12	0.12	0.12	0.13	0.11	0.11	0.16	0.14	0.17	0.13
Arsenic*	5.9	120.0	8.3			**25.6**	**30.3**	**58.4**	**35.6**	**9.59**	3.18	4.13	4.66	7.71	7.57
Barium						118	115	146	112	107	242	320	282	337	374
Beryllium						0.4	0.42	0.37	0.38	0.37	0.29	0.42	0.32	0.35	0.31
Bismuth						*<0.2*	0.23	0.21	0.23	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Cadmium*	0.6	1.10	0.55		0.6	0.075	0.089	0.064	0.061	0.064	*<0.05*	0.066	*<0.05*	*<0.05*	*<0.05*
Calcium						2470	2390	2540	2810	2460	1670	2430	2120	2050	2080
Chromium*	37.3	114.3	27.0		37.3	19	21	19	20.7	18.5	13.8	19.6	17.5	17.6	15.9
Cobalt						6.95	6.96	6.13	6.02	6.48	3.2	4.89	4.43	4.36	3.83
Copper*	35.7	126.0	20.5		35.7	7.83	9.34	8.36	8.78	7.7	4.51	8.73	6.03	5.33	4.36
Iron						22100	23000	27700	23300	17500	10700	14900	13700	13100	13500
Lead	35	32.5	32.5	35	35	8.56	9.89	8.28	9.32	8.61	3.94	6.78	5.61	4.98	4.1
Lithium						10.6	11.9	10.8	11.6	10.6	6.6	10.4	8.9	8	6.8
Magnesium						4450	4990	4450	4840	4380	2670	3890	3490	3350	2890
Manganese						1150	1050	1110	943	2230	113	145	142	165	238
Mercury	0.17	0.104	0.088	0.17	0.17	0.0102	0.014	0.008	0.0077	0.0095	*<0.005*	0.0081	0.0078	0.0057	*<0.005*
Molybdenum						1.64	1.55	1.84	1.55	1.39	*<0.5*	0.82	0.51	0.96	0.5
Nickel						12.2	13.6	11.5	12.6	11.9	8.05	12.2	10.3	9.99	8.76
Phosphorus						1170	1050	1620	1240	797	558	775	643	676	756
Potassium						1530	1590	1520	1800	1580	1020	1700	1420	1350	1170
Selenium						*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Silver						*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Sodium						240	270	240	220	180	130	190	160	180	150
Strontium						45.3	45	47.2	54.4	49.5	35.5	48	40.3	43.5	41
Thallium						0.068	0.07	0.063	0.071	0.072	*<0.05*	0.082	0.067	0.076	0.054
Tin						*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium						415	355	374	504	445	240	394	322	340	330
Uranium						1.7	1.87	1.74	1.84	1.66	1.06	2.12	1.5	1.35	1.1
Vanadium						22.6	23.4	22.9	24.1	22.3	16.2	24.4	21.2	19.7	18.8
Zinc*	123	121.3	73.6		123	36.3	40.7	34.5	37.6	36	19.2	32.7	27.8	24.6	22.4

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-1. Conventional sediment grab chemistry, partical size, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Baker Lake				
						East Shore				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		BES-1	BES-2	BES-3	BES-4	BES-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14
Physical & Organic Parameters										
Moisture (%)						42.3	32.3	38.7	44.8	36.8
pH						6.52	7.53	6.3	6.55	6.44
Total Organic Carbon (% dw)						0.37	0.21	0.33	0.43	0.32
Particle Size										
% Gravel (>2mm)						0.23	0.5	*<0.1*	0.42	1
% Sand (2.00mm - 0.063mm)						71.9	82.3	64	67.9	66.6
% Silt (0.063mm - 4µm)						25.2	15.4	32.1	28.5	28.6
% Clay (<4µm)						2.64	1.79	3.84	3.13	3.8
Total Metals (mg/kg dw)										
Aluminum						6020	4670	6100	6220	5850
Antimony						0.11	0.12	0.13	0.17	0.12
Arsenic*	5.9	120.0	8.3			3.33	2.28	4.45	3.47	3.05
Barium						107	127	89.7	119	72.1
Beryllium						0.33	0.28	0.31	0.33	0.29
Bismuth						*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Cadmium*	0.6	1.10	0.55		0.6	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Calcium						1940	1900	2080	2120	2090
Chromium*	37.3	114.3	27.0		37.3	18.3	15.4	17.4	18.2	16.9
Cobalt						4.58	3.6	4.61	4.67	4.27
Copper*	35.7	126.0	20.5		35.7	4.87	3.17	4.82	4.84	4.58
Iron						12400	10700	13300	13300	12500
Lead	35	32.5	32.5	35	35	4.55	3.53	5.3	4.97	4.87
Lithium						8.7	7.4	8.7	8.8	8.4
Magnesium						3820	3130	3650	3780	3500
Manganese						618	320	1570	644	359
Mercury	0.17	0.104	0.088	0.17	0.17	0.0056	*<0.005*	0.0068	0.0067	0.0055
Molybdenum						0.5	*<0.5*	0.99	0.61	*<0.5*
Nickel						10.7	9.09	9.99	10.6	9.6
Phosphorus						597	530	694	671	661
Potassium						1280	970	1300	1330	1180
Selenium						*<0.2*	*<0.2*	*<0.2*	*<0.2*	*<0.2*
Silver						*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Sodium						170	120	150	170	140
Strontium						36	32.7	38	38.3	35.1
Thallium						0.053	*<0.05*	0.053	0.076	*<0.05*
Tin						*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium						326	299	316	376	347
Uranium						1.07	0.998	1.2	1.23	1.21
Vanadium						18.8	16.5	19	19.4	18.2
Zinc*	123	121.3	73.6		123	27.1	19.1	24.9	25.3	22.7

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-2. Composite sediment grab hydrocarbons and PAHs, Meadowbank study lakes and Baker Lake, August 2014.

Lake	CCME (2002) Guidelines[1]	Third Portage Lake			Second Portage	Tehek	Tehek Farfield	Inuggugayualik	Wally	Pipedream	Baker Lake			
Area ID		TPE	TPN	TPS	SP	TE	TEFF	INUG	WAL	PDL	BBD	BPJ	BAP	BES
Date	ISQG	26-Aug-14	22-Aug-14	27-Aug-14	02-Sep-14	29-Aug-14	30-Aug-14	23-Aug-14	28-Aug-14	23-Aug-14	01-Sep-14	01-Sep-14	31-Aug-14	31-Aug-14
Physical Parameters														
Moisture (%)		86.8	53.7	82.0	83.7	79.8	86.1	80.6	91.0	73.6	27.3	48.8	47.2	36.2
Aggregate Organics (mg/kg)														
Mineral Oil and Grease		*<500*	*<500*	*<500*	*<500*	*<500*	*<500*	*<500*	*<500*	*<500*	*<500*	*<500*	*<500*	*<500*
Hydrocarbons (mg/kg)														
EPH10-19		*<600*	*<200*	*<400*	*<600*	*<500*	*<600*	*<400*	*<900*	*<300*	*<200*	*<200*	*<200*	*<200*
EPH19-32		*<600*	*<200*	*<400*	*<600*	*<500*	*<600*	*<400*	*<900*	*<300*	*<200*	*<200*	*<200*	*<200*
LEPH		*<600*	*<200*	*<400*	*<600*	*<500*	*<600*	*<400*	*<900*	*<300*	*<200*	*<200*	*<200*	*<200*
HEPH		*<600*	*<200*	*<400*	*<600*	*<500*	*<600*	*<400*	*<900*	*<300*	*<200*	*<200*	*<200*	*<200*
Polycyclic Aromatic Hydrocarbons (mg/kg)														
Acenaphthene	0.00671	*<0.005*	*<0.005*	*<0.005*	*<0.01*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Acenaphthylene	0.00587	*<0.005*	*<0.005*	*<0.005*	*<0.01*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Anthracene	0.0469	*<0.004*	*<0.004*	*<0.004*	*<0.01*	*<0.004*	*<0.004*	*<0.004*	*<0.004*	*<0.004*	*<0.004*	*<0.004*	0.0185	*<0.004*
Benzo(a)anthracene	0.0317	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Benzo(a)pyrene	0.0319	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Benzo(b)fluoranthene		*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Benzo(b+j+k)fluoranthene		*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*	*<0.015*
Benzo(g,h,i)perylene		*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Benzo(k)fluoranthene		*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Chrysene	0.0571	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Dibenz(a,h)anthracene	0.00622	*<0.005*	*<0.005*	*<0.005*	*<0.01*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Fluoranthene	0.111	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Fluorene	0.0212	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Indeno(1,2,3-c,d)pyrene		*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
2-Methylnaphthalene	0.0202	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Naphthalene	0.0346	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Phenanthrene	0.0419	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Pyrene	0.053	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*

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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Third Portage Lake East									
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		TPE-SC-1	TPE-SC-2	TPE-SC-3	TPE-SC-4	TPE-SC-5	TPE-SC-6	TPE-SC-7	TPE-SC-8	TPE-SC-9	TPE-SC-10
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14
Physical & Organic Parameters															
pH	NG					6.38	6.35	6.19	6.18	6.10	6.07	6.20	6.10	6.15	6.13
Total Organic Carbon (% dw)	NG					2.78	3.38	3.02	3.82	3.59	2.96	4.09	3.52	3.75	3.03
Total Metals (mg/kg dw)															
Aluminum	NG					28200	23500	26700	24500	25800	25800	24900	26000	24400	24800
Antimony	NG					0.22	0.20	0.22	0.26	0.23	0.83	0.24	0.22	0.23	0.22
Arsenic*	5.9	120.0	8.3			14.9	16.1	17.2	20.5	19.5	12.5	16.2	18.3	17.5	22.6
Barium	NG					117	101	117	108	117	123	119	141	111	141
Beryllium	NG					1.9	1.6	1.9	1.8	1.8	2.5	1.9	1.8	1.8	1.8
Bismuth	NG					2.5	2.0	2.3	2.3	2.3	3.2	2.4	2.4	2.2	2.3
Cadmium*	0.6	1.10	0.55		0.6	0.135	0.110	0.156	0.175	0.212	0.220	0.206	0.379	0.159	0.493
Calcium	NG					2140	1880	2030	2330	2270	2040	2430	2290	2340	2230
Chromium*	37.3	114.3	27.0		37.3	**134.0**	105.0	**127.0**	**146.0**	**144.0**	96.3	113.0	108.0	**135.0**	**120.0**
Cobalt	NG					13.5	14.9	16.0	16.0	17.4	16.0	15.7	17.1	16.2	25.2
Copper*	35.7	126.0	20.5		35.7	57.5	47.5	55.6	52.8	53.6	55.7	51.8	53.9	48.1	52.7
Iron	NG					37200	40400	43700	46400	45400	37000	43300	47000	42700	66200
Lead	35.0	32.5	32.5	35	35	22.4	18.6	21.4	21.1	20.5	22.3	20.3	20.1	20.1	19.2
Lithium	NG					53.1	46.3	55.3	49.0	47.1	50.0	47.8	46.8	44.7	43.4
Magnesium	NG					11200	9570	11100	10900	11000	9540	9830	9960	10400	9920
Manganese	NG					614	1170	1080	1440	1980	1070	1820	3790	1620	11900
Mercury	0.170	0.104	0.088	0.17	0.17	0.016	0.012	0.015	0.020	0.016	*<0.018*	0.017	0.016	0.017	0.012
Molybdenum	NG					3.5	3.6	3.8	4.0	3.8	4.9	3.8	3.9	3.6	4.6
Nickel	NG					72.0	59.7	71.7	75.2	83.1	75.4	75.5	112.0	71.5	159.0
Phosphorus	NG					475	402	409	485	458	370	427	414	399	421
Potassium	NG					4960	4090	4750	4280	4380	4910	4630	4590	4100	4160
Selenium	NG					0.66	0.62	0.62	0.91	0.93	0.93	1.06	1.00	0.92	0.97
Silver	NG					0.11	*<0.10*	*<0.10*	0.13	*<0.10*	0.62	*<0.10*	*<0.10*	0.10	*<0.10*
Sodium	NG					190	150	170	170	170	*<400*	200	180	170	170
Strontium	NG					19.3	17.0	19.0	19.4	19.2	19.8	20.3	20.0	19.5	19.6
Thallium	NG					0.383	0.335	0.402	0.371	0.403	1.060	0.405	0.480	0.378	0.524
Tin	NG					4.3	3.7	3.1	5.4	3.6	*<8.0*	3.8	3.5	3.3	3.8
Titanium	NG					1090	958	1050	898	945	1170	941	1020	923	936
Uranium	NG					18.9	15.5	18.4	16.5	16.0	18.7	16.1	16.6	14.7	15.9
Vanadium	NG					48.0	39.4	46.6	44.1	43.7	43.0	41.6	42.5	41.5	41.3
Zinc*	123	121.3	73.6		123	**130.0**	99.1	114.0	108.0	109.0	117.0	111.0	121.0	103.0	**125.0**

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Third Portage Lake East - B									
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		TPE-B-SC-1	TPE-B-SC-2	TPE-B-SC-3	TPE-B-SC-4	TPE-B-SC-5	TPE-B-SC-6	TPE-B-SC-7	TPE-B-SC-8	TPE-B-SC-9	TPE-B-SC-10
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14
Physical & Organic Parameters															
pH	NG					6.01	5.72	5.96	6.19	6.38	6.22	6.19	6.26	6.20	6.26
Total Organic Carbon (% dw)	NG					7.41	5.08	4.57	8.41	3.10	3.00	4.17	3.18	3.77	3.94
Total Metals (mg/kg dw)															
Aluminum	NG					20000	26700	23100	19700	23600	25600	23100	25100	21900	24200
Antimony	NG					0.19	0.27	0.32	0.19	0.30	0.22	0.23	0.27	0.26	0.26
Arsenic*	5.9	120.0	8.3			8.4	19.5	16.9	6.6	9.5	13.0	14.6	20.6	19.3	17.2
Barium	NG					99	143	110	104	137	122	135	127	105	108
Beryllium	NG					1.3	2.1	1.7	1.4	1.6	1.8	1.6	1.8	1.6	1.7
Bismuth	NG					1.4	2.4	2.2	1.5	1.8	2.3	2.2	2.4	2.3	2.3
Cadmium*	0.6	1.10	0.55		0.6	0.323	0.308	0.209	0.377	0.450	0.184	0.488	0.285	0.140	0.140
Calcium	NG					2780	2290	2520	2860	2710	2010	2190	1950	2240	2370
Chromium*	37.3	114.3	27.0		37.3	113.0	**115.0**	**122.0**	77.2	108.0	102.0	109.0	**130.0**	108.0	**136.0**
Cobalt	NG					8.6	10.5	15.7	7.4	9.0	13.5	14.5	19.0	14.6	16.2
Copper*	35.7	126.0	20.5		35.7	45.4	75.7	46.9	48.6	50.1	51.6	49.5	53.2	44.9	49.0
Iron	NG					23500	50600	42700	20600	26100	37200	42800	58700	49900	44700
Lead	35.0	32.5	32.5	35	35	14.6	20.7	21.3	15.9	16.7	20.4	21.1	20.9	20.8	20.4
Lithium	NG					35.7	43.6	41.8	37.9	40.9	45.6	42.2	43.6	41.0	44.0
Magnesium	NG					8660	9460	9640	7620	8880	9290	9030	9990	8580	10200
Manganese	NG					275	359	2020	263	293	2210	5690	5050	7310	1480
Mercury	0.170	0.104	0.088	0.17	0.17	0.036	0.033	0.030	0.039	0.023	0.016	0.022	0.018	0.022	0.016
Molybdenum	NG					1.8	7.4	3.9	1.5	3.4	3.6	4.0	4.6	4.4	3.9
Nickel	NG					63.8	76.6	76.8	57.2	67.4	65.5	117.0	93.4	65.9	70.8
Phosphorus	NG					385	445	423	401	375	425	359	407	425	391
Potassium	NG					3540	4470	4080	3600	4330	4840	4240	4430	3950	4310
Selenium	NG					0.80	1.18	0.92	0.91	0.95	0.89	0.93	1.04	1.03	0.92
Silver	NG					0.36	0.24	0.14	0.29	0.27	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Sodium	NG					190	210	200	200	210	220	190	190	180	190
Strontium	NG					19.9	19.7	20.5	20.5	21.0	19.2	19.5	18.1	19.3	19.9
Thallium	NG					0.271	0.371	0.380	0.299	0.546	0.416	0.458	0.413	0.321	0.377
Tin	NG					3.6	3.3	3.7	4.5	3.5	3.3	3.1	3.3	4.6	3.8
Titanium	NG					818	1030	967	877	947	1050	874	1000	871	973
Uranium	NG					13.3	24.2	15.1	14.9	17.1	16.7	15.5	16.8	14.6	16.5
Vanadium	NG					32.9	45.3	40.1	29.6	38.0	42.2	38.4	43.1	37.1	41.7
Zinc*	123	121.3	73.6		123	95.4	**130.0**	115.0	92.8	112.0	111.0	116.0	117.0	101.0	109.0

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Third Portage Lake North					Third Portage Lake South				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		TPN-SC-1	TPN-SC-3	TPN-SC-5	TPN-SC-7	TPN-SC-9	TPS-SC-1	TPS-SC-2	TPS-SC-3	TPS-SC-4	TPS-SC-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14
Physical & Organic Parameters															
pH	NG					6.12	6.05	6.10	6.21	6.34	6.08	5.96	5.95	5.96	5.64
Total Organic Carbon (% dw)	NG					3.54	1.20	2.01	3.12	0.65	5.71	4.49	4.00	3.96	3.45
Total Metals (mg/kg dw)															
Aluminum	NG					17500	11400	12200	20300	12300	22200	24900	25200	21200	17600
Antimony	NG					0.20	*<0.10*	*<0.10*	0.19	*<0.10*	0.38	0.29	0.25	0.19	0.18
Arsenic*	5.9	120.0	8.3			9.3	6.6	5.1	19.4	4.9	46.4	20.1	62.4	10.0	9.0
Barium	NG					68	42	43	82	47	103	108	106	98	75
Beryllium	NG					1.1	0.6	0.6	1.2	0.6	1.7	1.8	1.7	1.3	1.2
Bismuth	NG					1.1	0.6	0.6	1.3	0.6	1.7	1.8	2.0	1.3	1.0
Cadmium*	0.6	1.10	0.55		0.6	0.076	*<0.050*	*<0.050*	0.068	*<0.050*	1.100	0.251	0.171	0.110	0.193
Calcium	NG					1800	1050	1120	1580	963	2110	1890	1770	2120	1570
Chromium*	37.3	114.3	27.0		37.3	**118.0**	66.4	94.7	**125.0**	67.4	113.0	**123.0**	**128.0**	105.0	80.8
Cobalt	NG					9.1	6.5	6.7	16.2	7.2	31.0	21.4	18.5	12.1	9.4
Copper*	35.7	126.0	20.5		35.7	47.7	23.4	23.5	53.0	20.9	76.4	72.6	77.5	49.1	41.3
Iron	NG					24000	18500	17500	38300	18400	48600	38700	55600	26800	22500
Lead	35.0	32.5	32.5	35	35	15.1	8.0	8.1	16.2	7.6	30.8	22.5	23.3	17.8	15.6
Lithium	NG					29.3	21.7	23.1	36.4	26.8	34.6	39.7	41.2	35.3	31.8
Magnesium	NG					8280	5540	6520	9330	6120	9060	10200	10300	9150	7620
Manganese	NG					249	248	199	989	277	1560	1290	1080	484	278
Mercury	0.170	0.104	0.088	0.17	0.17	0.013	*<0.0050*	0.006	0.010	*<0.0050*	0.032	0.021	0.015	0.016	0.013
Molybdenum	NG					2.0	1.4	0.9	2.9	0.9	6.2	5.0	7.5	1.6	2.3
Nickel	NG					57.0	35.6	44.7	61.4	40.8	109.0	80.5	74.6	65.5	51.0
Phosphorus	NG					568	161	233	430	179	628	617	821	635	393
Potassium	NG					2560	1750	1800	3200	1910	3460	4000	4020	3480	2930
Selenium	NG					0.50	*<0.20*	0.23	0.38	*<0.20*	1.19	1.03	0.81	0.62	0.41
Silver	NG					0.13	*<0.10*	*<0.10*	*<0.10*	*<0.10*	0.25	0.18	0.12	0.16	0.11
Sodium	NG					130	*<100*	*<100*	130	*<100*	170	170	160	150	130
Strontium	NG					16.8	11.8	11.3	16.0	10.2	18.5	18.1	17.0	17.9	14.0
Thallium	NG					0.190	0.118	0.122	0.237	0.138	0.412	0.342	0.306	0.246	0.228
Tin	NG					*<2.0*	*<2.0*	*<2.0*	2.3	*<2.0*	3.1	3.1	2.6	2.2	*<2.0*
Titanium	NG					530	463	452	635	494	600	701	718	794	686
Uranium	NG					14.0	7.3	7.6	16.4	6.6	19.3	20.3	21.0	14.8	11.7
Vanadium	NG					34.6	20.0	20.6	36.8	20.1	41.0	44.6	45.5	36.6	31.3
Zinc*	123	121.3	73.6		123	73.8	48.0	50.0	82.9	53.5	**129.0**	108.0	106.0	90.1	81.9

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Second Portage Lake					Wally Lake				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		SP-SC-1	SP-SC-3	SP-SC-5	SP-SC-7	SP-SC-9	WAL-SC-1	WAL-SC-3	WAL-SC-5	WAL-SC-7	WAL-SC-9
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	02-Sep-14	02-Sep-14	02-Sep-14	02-Sep-14	02-Sep-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14
Physical & Organic Parameters															
pH	NG					5.99	6.08	6.07	6.13	5.90	6.37	6.51	6.51	6.62	6.67
Total Organic Carbon (% dw)	NG					4.69	3.87	4.59	5.05	4.40	11.8	11.6	7.98	8.16	7.59
Total Metals (mg/kg dw)															
Aluminum	NG					26700	28600	23600	26000	25600	18400	20100	25300	23100	20700
Antimony	NG					0.33	0.22	0.29	0.31	0.31	0.38	0.44	0.41	0.42	0.48
Arsenic*	5.9	120.0	8.3			41.3	14.0	37.4	28.0	31.2	32.1	67.0	29.1	21.6	17.0
Barium	NG					127	134	117	120	141	89	114	133	132	115
Beryllium	NG					2.0	2.1	1.9	2.0	1.9	1.4	1.5	2.0	1.7	1.7
Bismuth	NG					2.3	2.3	2.2	2.3	2.2	1.7	2.0	2.4	2.3	2.0
Cadmium*	0.6	1.10	0.55		0.6	0.255	0.188	0.214	0.167	0.345	0.401	0.512	0.505	0.557	0.589
Calcium	NG					2650	2470	2270	2810	2470	3990	4490	4220	4050	3920
Chromium*	37.3	114.3	27.0		37.3	90.5	85.9	75.6	86.8	86.0	52.3	58.0	70.8	64.6	57.9
Cobalt	NG					14.2	12.0	18.6	13.7	17.3	8.7	10.0	10.1	9.9	9.2
Copper*	35.7	126.0	20.5		35.7	73.4	71.1	70.8	70.6	71.4	**128.0**	**159.0**	**176.0**	**158.0**	**147.0**
Iron	NG					70700	37000	78700	53900	65400	27200	47900	37100	32400	24600
Lead	35.0	32.5	32.5	35	35	22.8	21.7	21.6	22.9	22.6	29.8	**34.8**	**37.9**	**37.8**	**34.1**
Lithium	NG					44.1	50.6	40.7	44.4	44.2	30.7	32.0	42.4	41.8	39.1
Magnesium	NG					9550	9960	8480	9490	9200	6840	7090	8940	8470	7740
Manganese	NG					2630	654	2950	1720	5710	283	381	325	339	277
Mercury	0.170	0.104	0.088	0.17	0.17	0.033	0.027	0.030	0.034	0.036	0.066	0.077	0.046	0.045	0.034
Molybdenum	NG					7.6	4.6	6.3	5.5	6.6	7.1	11.4	8.4	6.4	6.0
Nickel	NG					64.0	68.1	56.7	58.0	70.5	49.4	55.8	62.1	58.5	53.4
Phosphorus	NG					644	496	564	586	593	814	1000	852	683	553
Potassium	NG					4590	4900	3880	4430	4450	3420	3510	4350	4040	3660
Selenium	NG					0.81	0.50	0.87	0.88	0.98	0.95	1.14	1.09	0.98	1.02
Silver	NG					0.20	0.14	0.17	0.20	0.22	0.61	0.67	0.61	0.58	0.52
Sodium	NG					210	200	160	200	210	180	190	220	200	190
Strontium	NG					23.6	22.0	19.1	23.2	22.7	27.7	30.1	30.3	29.4	28.0
Thallium	NG					0.369	0.398	0.336	0.369	0.381	0.340	0.310	0.346	0.354	0.326
Tin	NG					4.5	4.9	7.9	6.4	6.3	4.6	4.0	5.1	4.4	4.7
Titanium	NG					741	854	613	749	766	638	646	857	828	853
Uranium	NG					19.1	21.3	18.2	18.6	18.6	14.6	17.3	19.0	17.8	17.4
Vanadium	NG					41.0	41.8	36.7	39.8	39.6	26.9	30.9	38.0	34.9	31.3
Zinc*	123	121.3	73.6		123	114.0	**132.0**	109.0	114.0	116.0	116.0	**124.0**	**135.0**	**125.0**	**130.0**

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Tehek Lake					Tehek Farfield				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		TE-SC-1	TE-SC-3	TE-SC-5	TE-SC-7	TE-SC-9	TEFF-SC-1	TEFF-SC-2	TEFF-SC-3	TEFF-SC-4	TEFF-SC-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	29-Aug-14	29-Aug-14	29-Aug-14	29-Aug-14	29-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14
Physical & Organic Parameters															
pH	NG					6.16	5.62	5.84	6.29	6.34	6.18	6.06	5.90	6.18	5.77
Total Organic Carbon (% dw)	NG					1.39	2.37	2.03	3.30	3.87	3.85	4.21	4.02	3.97	3.46
Total Metals (mg/kg dw)															
Aluminum	NG					13900	21900	18500	22200	24200	22800	21200	25000	22400	22100
Antimony	NG					0.10	0.18	0.12	0.26	0.21	0.19	0.18	0.18	0.17	0.18
Arsenic*	5.9	120.0	8.3			5.6	8.8	7.1	15.9	18.3	10.7	9.87	11.3	8.30	12.9
Barium	NG					64	100	83	106	112	112	102	123	108	166
Beryllium	NG					1.1	1.9	1.4	1.9	2.0	1.79	1.69	1.85	1.77	1.78
Bismuth	NG					1.2	2.0	1.7	2.3	2.2	1.72	1.63	1.93	1.73	1.69
Cadmium*	0.6	1.10	0.55		0.6	0.081	0.104	0.081	0.115	0.156	0.198	0.135	0.137	0.212	0.241
Calcium	NG					1520	1840	1590	2080	2210	1940	1850	2100	1900	1990
Chromium*	37.3	114.3	27.0		37.3	33.6	53.5	45.8	55.0	58.6	52.3	48.9	56.3	50.5	49.1
Cobalt	NG					5.6	9.6	7.9	11.5	12.4	9.89	10.4	12.6	10.6	25.6
Copper*	35.7	126.0	20.5		35.7	31.2	51.0	44.1	54.5	61.7	51.2	44.1	56.6	48.8	53.1
Iron	NG					21200	37700	30400	45200	49100	37500	35400	42600	31800	61800
Lead	35.0	32.5	32.5	35	35	13.0	19.8	16.4	21.5	22.2	19.6	19.2	21.2	20.0	19.1
Lithium	NG					28.7	43.8	37.3	45.0	46.3	46.0	43.3	49.8	46.8	45.1
Magnesium	NG					5240	7820	6620	7890	8380	7340	6870	8000	7200	7130
Manganese	NG					284	354	319	1680	1760	2810	1530	2250	1790	16800
Mercury	0.170	0.104	0.088	0.17	0.17	0.013	0.020	0.018	0.024	0.027	0.0205	0.0180	0.0185	0.0195	0.0183
Molybdenum	NG					2.2	2.8	2.2	4.9	5.5	5.38	3.76	4.69	2.86	5.13
Nickel	NG					23.2	35.1	28.2	39.7	41.7	39.5	33.1	36.9	45.8	41.4
Phosphorus	NG					435	637	439	466	607	473	419	524	456	490
Potassium	NG					2770	4420	3620	4260	4720	4340	4000	4670	4310	4160
Selenium	NG					0.28	0.64	0.43	0.74	1.09	0.80	0.69	0.74	0.79	0.84
Silver	NG					*<0.10*	0.13	*<0.10*	0.12	0.16	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Sodium	NG					110	210	160	170	220	200	200	210	200	190
Strontium	NG					12.5	18.2	14.8	17.9	19.2	18.7	17.7	20.3	18.5	19.3
Thallium	NG					0.241	0.371	0.314	0.578	0.416	0.389	0.355	0.410	0.397	0.460
Tin	NG					*<2.0*	2.2	*<2.0*	3.4	4.1	3.8	23.6	4.8	4.0	5.1
Titanium	NG					731	1070	889	873	1010	789	733	833	775	788
Uranium	NG					12.4	19.4	16.2	19.9	21.1	21.7	19.8	23.9	21.7	21.2
Vanadium	NG					23.0	34.8	29.0	34.6	37.6	34.2	32.5	36.9	33.8	34.0
Zinc*	123	121.3	73.6		123	65.0	99.3	80.6	108.0	114.0	99.6	93.4	106.0	101.0	110.0

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Inuggugayualik Lake					Pipedream Lake				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		INUG-SC-1	INUG-SC-2	INUG-SC-3	INUG-SC-4	INUG-SC-5	PDL-SC-1	PDL-SC-2	PDL-SC-3	PDL-SC-4	PDL-SC-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	03-Sep-14	03-Sep-14	03-Sep-14	03-Sep-14	03-Sep-14	03-Sep-14	03-Sep-14	03-Sep-14	03-Sep-14	03-Sep-14
Physical & Organic Parameters															
pH	NG					5.50	5.89	5.35	5.69	5.69	5.66	5.92	5.65	5.59	5.91
Total Organic Carbon (% dw)	NG					3.45	4.19	4.67	3.76	4.27	2.24	3.27	5.77	2.64	3.30
Total Metals (mg/kg dw)															
Aluminum	NG					22400	18900	22500	24000	20300	20900	23400	19500	20500	20600
Antimony	NG					0.18	0.18	0.19	0.15	0.17	0.22	0.32	0.38	0.27	0.29
Arsenic*	5.9	120.0	8.3			93.9	14.4	15.9	7.92	**158**	11.6	40.9	12.5	27.3	40.8
Barium	NG					113	88	127	131	103	88	96	104	88	87
Beryllium	NG					1.24	1.12	1.42	1.51	1.39	0.98	1.21	0.96	0.94	1.01
Bismuth	NG					1.19	1.02	1.27	1.30	1.22	0.91	1.09	0.82	0.94	0.90
Cadmium*	0.6	1.10	0.55		0.6	0.122	0.151	0.300	0.228	0.141	0.110	0.225	0.330	0.125	0.151
Calcium	NG					2080	1860	2050	2130	1730	2050	2320	2770	1980	2210
Chromium*	37.3	114.3	27.0		37.3	106.0	100.0	**117.0**	**125.0**	109.0	**135.0**	**152.0**	**124.0**	**130.0**	**131.0**
Cobalt	NG					11.1	17.4	11.2	10.9	11.7	11.7	21.6	11.0	14.3	19.0
Copper*	35.7	126.0	20.5		35.7	44.1	39.8	53.1	49.7	48.1	45.9	59.4	48.9	45.8	46.5
Iron	NG					81500	45000	43400	30300	116000	31400	45800	28200	36700	44900
Lead	35.0	32.5	32.5	35	35	13.2	12.2	15.5	14.4	14.2	14.3	16.8	15.7	15.4	15.1
Lithium	NG					27.5	25.0	28.4	32.5	25.4	28.3	29.9	25.8	27.3	25.6
Magnesium	NG					9300	8440	9760	10700	9090	10700	11300	9830	10000	10000
Manganese	NG					707	3050	480	364	977	310	1970	301	616	2170
Mercury	0.170	0.104	0.088	0.17	0.17	0.0185	0.0193	0.0338	0.0208	0.0322	0.0092	0.0151	0.0209	0.0664	0.0167
Molybdenum	NG					6.29	3.38	3.79	2.53	8.23	2.09	3.53	2.30	2.33	2.98
Nickel	NG					65.1	71.8	79.8	82.4	68.2	79.6	104	82.1	81.5	87.8
Phosphorus	NG					2370	524	1120	841	4220	562	570	622	503	548
Potassium	NG					3520	3130	3760	3850	3130	2830	3140	2750	2860	2810
Selenium	NG					0.67	0.56	0.71	0.69	0.72	0.51	0.47	0.58	0.40	0.55
Silver	NG					0.13	*<0.10*	0.21	0.17	0.18	0.11	*<0.10*	0.28	*<0.10*	0.12
Sodium	NG					170	140	200	170	140	110	120	170	110	120
Strontium	NG					26.4	24.3	26.6	26.7	21.6	22.5	24.9	24.4	22.2	23.2
Thallium	NG					0.209	0.231	0.228	0.223	0.199	0.183	0.215	0.204	0.188	0.190
Tin	NG					2.6	2.8	2.2	*<2.0*	3.4	*<2.0*	8.0	2.5	*<2.0*	3.1
Titanium	NG					588	665	679	708	499	581	522	530	548	504
Uranium	NG					14.8	14.7	17.5	17.3	16.0	8.48	10.9	7.73	8.39	8.40
Vanadium	NG					35.4	32.5	39.2	40.5	35.5	37.3	40.5	34.6	35.8	35.8
Zinc*	123	121.3	73.6		123	84.4	75.1	100.0	96.2	90.2	79.0	89.9	81.6	78.5	79.3

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Baker Barge Dock					Baker Proposed Jetty				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		BBD-SC-1	BBD-SC-3	BBD-SC-5	BBD-SC-7	BBD-SC-9	BPJ-SC-1	BPJ-SC-3	BPJ-SC-5	BPJ-SC-7	BPJ-SC-9
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14
Physical & Organic Parameters															
pH	NG					6.71	6.34	6.37	5.82	6.33	6.25	6.30	6.21	6.15	6.13
Total Organic Carbon (% dw)	NG					0.44	0.43	*<0.10*	0.30	*<0.10*	0.65	0.93	0.60	0.51	0.52
Total Metals (mg/kg dw)															
Aluminum	NG					5080	6080	3860	7850	3800	8470	9300	9590	8550	6730
Antimony	NG					*<0.10*	*<0.10*	*<0.10*	0.13	*<0.10*	0.13	0.15	0.14	0.12	0.12
Arsenic*	5.9	120.0	8.3			3.8	**9.0**	3.1	4.9	2.8	**9.4**	**17.0**	**32.7**	**68.1**	**11.8**
Barium	NG					59	67	30	70	39	126	128	116	147	111
Beryllium	NG					0.2	0.3	*<0.20*	0.4	*<0.20*	0.4	0.5	0.4	0.4	0.3
Bismuth	NG					*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	0.2	0.2	0.2	*<0.20*
Cadmium*	0.6	1.10	0.55		0.6	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	0.091	0.092	0.080	*<0.050*	0.067
Calcium	NG					1500	1860	991	2740	1100	2460	2520	2840	2620	2000
Chromium*	37.3	114.3	27.0		37.3	10.9	12.6	6.4	17.7	6.8	20.7	21.8	21.7	19.1	16.1
Cobalt	NG					4.1	4.5	2.8	5.4	2.8	7.7	8.3	6.4	6.2	6.3
Copper*	35.7	126.0	20.5		35.7	4.4	5.6	3.0	7.2	2.6	8.8	10.2	10.0	8.5	7.1
Iron	NG					12100	13200	7620	14900	8270	18900	22100	23500	29700	17600
Lead	35.0	32.5	32.5	35	35	4.7	5.4	2.2	7.0	2.6	8.8	9.8	9.7	8.8	7.5
Lithium	NG					7.2	7.7	6.7	10.4	5.9	11.1	11.5	11.5	10.7	8.9
Magnesium	NG					3240	3510	2620	4030	2500	4710	5150	5070	4660	3930
Manganese	NG					483	324	149	268	152	3500	1830	936	1220	3580
Mercury	0.170	0.104	0.088	0.17	0.17	*<0.0050*	0.005	*<0.0050*	*<0.0050*	*<0.0050*	0.011	0.011	0.010	0.008	0.009
Molybdenum	NG					*<0.50*	*<0.50*	*<0.50*	1.3	*<0.50*	1.7	1.8	1.3	1.9	1.9
Nickel	NG					7.4	7.9	4.9	10.2	5.1	13.8	14.3	13.4	11.5	10.5
Phosphorus	NG					499	684	364	920	299	900	1170	1150	1780	806
Potassium	NG					860	1090	620	1750	600	1630	1790	1820	1520	1170
Selenium	NG					*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*
Silver	NG					*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Sodium	NG					130	170	*<100*	190	*<100*	250	320	270	250	200
Strontium	NG					30.1	36.0	24.4	48.2	24.8	47.2	51.3	52.4	47.8	37.2
Thallium	NG					*<0.050*	*<0.050*	*<0.050*	0.076	*<0.050*	0.082	0.089	0.074	0.057	0.057
Tin	NG					*<2.0*	*<2.0*	*<2.0*	3.1	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	2.0
Titanium	NG					256	325	160	502	222	414	425	477	379	291
Uranium	NG					0.8	1.0	0.4	2.5	0.5	2.0	2.2	1.9	1.8	1.5
Vanadium	NG					14.6	15.9	9.3	24.5	11.0	24.6	25.6	25.4	22.7	19.9
Zinc*	123	121.3	73.6		123	23.0	25.2	16.0	28.7	15.9	41.0	45.8	41.3	35.1	32.1

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-3. Conventional sediment core chemistry, and total metals (mg/kg), Meadowbank study lakes and Baker Lake, August 2014.

Lake & Basin	CCME (2002)					Baker Akilahaarjuk Point					Baker East Shore				
Area-Replicate ID	Guideline[1]	Trigger[2]		Threshold[2]		BAP-SC-1	BAP-SC-2	BAP-SC-3	BAP-SC-4	BAP-SC-5	BES-SC-1	BES-SC-2	BES-SC-3	BES-SC-4	BES-SC-5
Date	ISQG	Meadowbank	Baker Lake	Meadowbank	Baker Lake	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14
Physical & Organic Parameters															
pH	NG					6.69	5.62	5.96	5.90	6.30	6.65	6.61	6.75	6.59	6.65
Total Organic Carbon (% dw)	NG					0.44	0.44	0.31	0.84	0.37	0.58	0.29	0.51	0.50	0.36
Total Metals (mg/kg dw)															
Aluminum	NG					4660	5360	4590	6200	4710	6890	4900	6350	6450	5490
Antimony	NG					0.13	0.13	0.12	0.14	0.11	0.13	*<0.10*	0.11	0.16	0.13
Arsenic*	5.9	120.0	8.3			5.8	3.0	2.4	6.4	5.2	3.9	2.5	3.6	3.9	3.2
Barium	NG					292	382	387	341	326	172	123	144	150	88
Beryllium	NG					0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.4	0.3
Bismuth	NG					*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	0.3	*<0.20*
Cadmium*	0.6	1.10	0.55		0.6	*<0.050*	*<0.050*	*<0.050*	*<0.050*	*<0.050*	0.058	*<0.050*	*<0.050*	*<0.050*	*<0.050*
Calcium	NG					1670	2020	2060	2160	2020	2020	1740	2010	2120	1980
Chromium*	37.3	114.3	27.0		37.3	14.5	15.5	13.8	17.4	13.9	22.2	15.4	18.1	18.6	15.9
Cobalt	NG					3.9	3.9	3.4	4.6	4.0	5.9	3.7	4.9	5.1	4.2
Copper*	35.7	126.0	20.5		35.7	4.1	6.5	4.0	6.3	4.1	5.9	3.4	5.0	4.9	4.1
Iron	NG					12500	13300	11900	15000	12200	14200	10700	12900	13200	12100
Lead	35.0	32.5	32.5	35	35	3.7	4.4	4.0	5.3	4.3	5.6	3.8	5.1	5.4	4.3
Lithium	NG					7.3	8.1	7.0	9.7	7.1	10.3	7.6	9.2	9.6	7.9
Magnesium	NG					3110	3150	2670	3630	2840	4490	3200	3890	3940	3340
Manganese	NG					324	124	108	187	484	671	370	527	451	705
Mercury	0.170	0.104	0.088	0.17	0.17	*<0.0050*	*<0.0050*	*<0.0050*	0.006	*<0.0050*	0.007	*<0.0050*	0.007	0.007	0.006
Molybdenum	NG					*<0.50*	*<0.50*	*<0.50*	0.5	0.6	0.6	*<0.50*	0.5	0.6	0.6
Nickel	NG					8.4	9.0	8.0	10.4	8.4	14.1	9.1	11.3	11.6	9.5
Phosphorus	NG					493	692	685	703	697	729	545	725	672	686
Potassium	NG					1080	1310	1130	1470	1080	1470	1030	1360	1370	1140
Selenium	NG					*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*	*<0.20*
Silver	NG					*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*
Sodium	NG					140	150	130	220	150	240	130	200	210	150
Strontium	NG					39.1	44.6	41.4	45.2	37.6	37.5	31.5	37.9	39.0	33.9
Thallium	NG					*<0.050*	0.054	*<0.050*	0.062	0.050	0.073	*<0.050*	0.063	0.195	0.060
Tin	NG					*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*	*<2.0*
Titanium	NG					292	358	339	400	316	334	282	348	341	311
Uranium	NG					1.0	1.3	1.2	1.5	1.1	1.4	0.9	1.3	1.3	1.1
Vanadium	NG					16.4	18.8	18.7	20.9	17.2	20.6	15.6	18.7	19.2	17.2
Zinc*	123	121.3	73.6		123	19.2	21.5	18.7	26.5	20.6	31.3	20.4	27.0	27.9	22.9

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 "CREMP Design Document 2012" (Azimuth, 2012). 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 3.4-4. Sediment variables for which 2014 means exceeded triggers for Meadowbank areas.

		Meadowbank Sampling Areas								
		REF	REF	NF	NF	NF	NF	MF	MF	FF
Parameter Measured	**Trigger**	**INUG**	**PDL**	**TPN**	**SP**	**TPE**	**WAL**	**TPS**	**TE**	**TEFF**
Chromium	114.3	-	134.4	-	-	117.4	-	-	-	-
Copper	126.0	-	-	-	-	-	153.6	-	-	-
Lead	32.5	-	-	-	-	-	34.9	-	-	-
Zinc	121.3	-	-	-	-	-	126.0	-	-	-

Notes:
REF = reference; NF = near-field; MF = mid-field; FF = far-field;
Reported mean values are all in units of mg/kg;
"-" denotes that the mean value does not exceed the trigger.

Table 3.4-5. Results of BA tests for selected sediment variables and Meadowbank areas in 2014.

Parameter Measured	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Proportional Change		
							Exp(Est.)	LCI	UCI
Chromium	TPE	30	20	0.352	0.039	**0.000**	1.42	1.31	1.54
Copper	WAL	20	5	0.058	0.176	0.371	1.06	0.74	1.52
Lead	WAL	20	5	0.066	0.046	**0.082**	1.07	0.97	1.17
Zinc	WAL	20	5	0.19	0.102	**0.037**	1.21	0.98	1.49

Notes:

*** Bolded** values are P-values < 0.1

Test station = station 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 = BA model estimate of the 2014 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

Exp(Est.) = estimated proportional change (i.e., exp[Estimate])

LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Table 3.4-6. Sediment variables for which 2014 means exceeded triggers for Baker Lake areas.

		Baker Lake Areas			
		REF	REF	NF	NF
Parameter Measured	**Trigger**	BAP	BES	BBD	BPJ
Arsenic	8.3	-	-	-	27.8

Notes:
REF = reference; NF = near-field;
Reported mean values are all in units of mg/kg;
"-" denotes that the mean value does not exceed the trigger.

Table 3.4-7. Results of BA tests for selected sediment variables and Baker Lake areas in 2014.

Parameter Measured	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Proportional Change		
							Exp(Est.)	LCI	UCI
Arsenic	BPJ	20	5	0.009	0.378	0.490	1.01	0.46	2.2

Notes:
*** Bolded** values are P-values < 0.1
Test station = station 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 = BA model estimate of the 2014 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
Exp(Est.) = estimated proportional change (i.e., exp[Estimate])
LCI = lower 95% confidence interval; UCI = upper 95% confidence interval

Figure 3.4-1. Sediment grain size composition in sediment samples from Meadowbank study lakes since 2008.



Figure 3.4-2. Total Aluminum (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

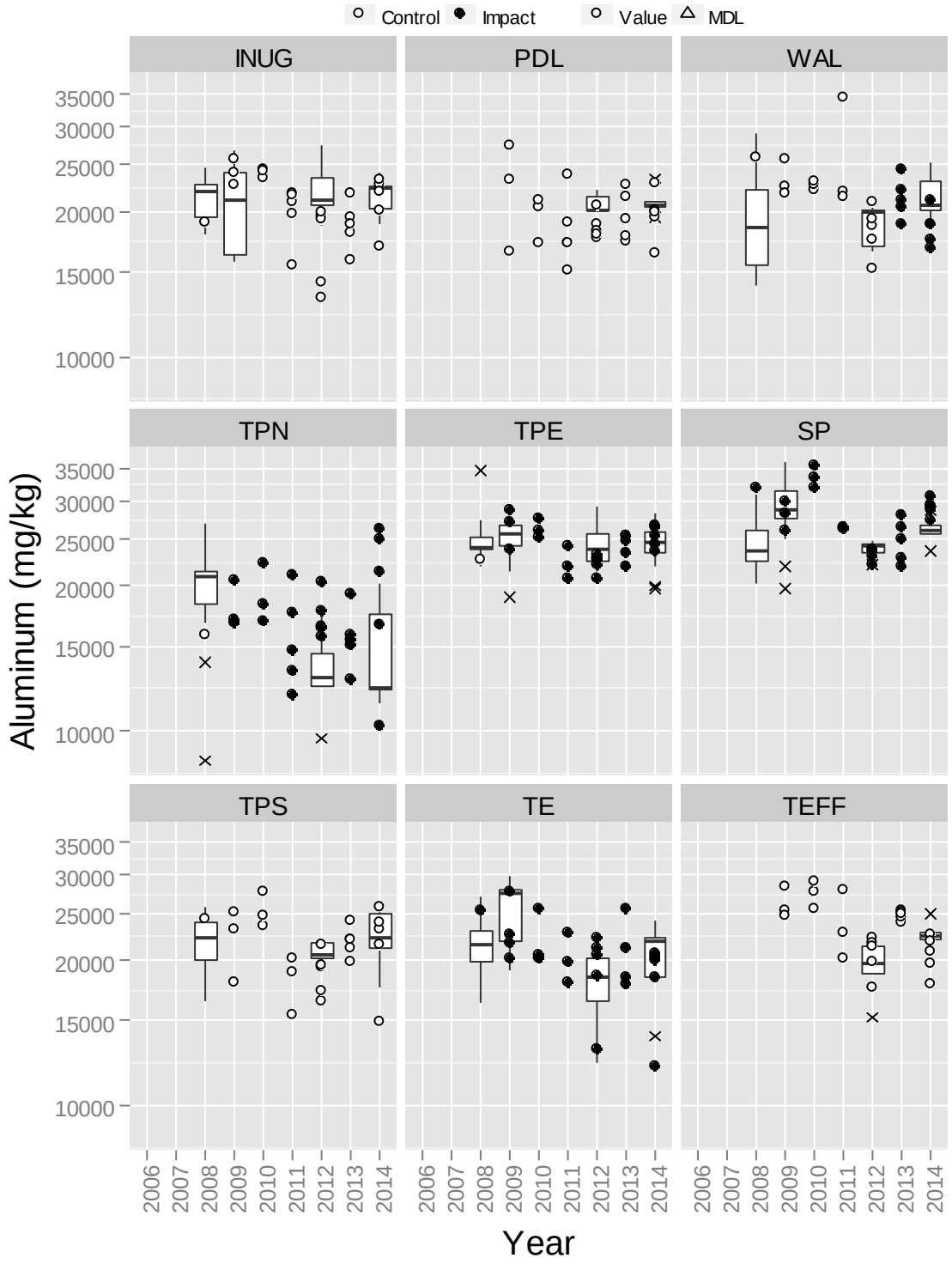


Figure 3.4-3. Total Arsenic (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

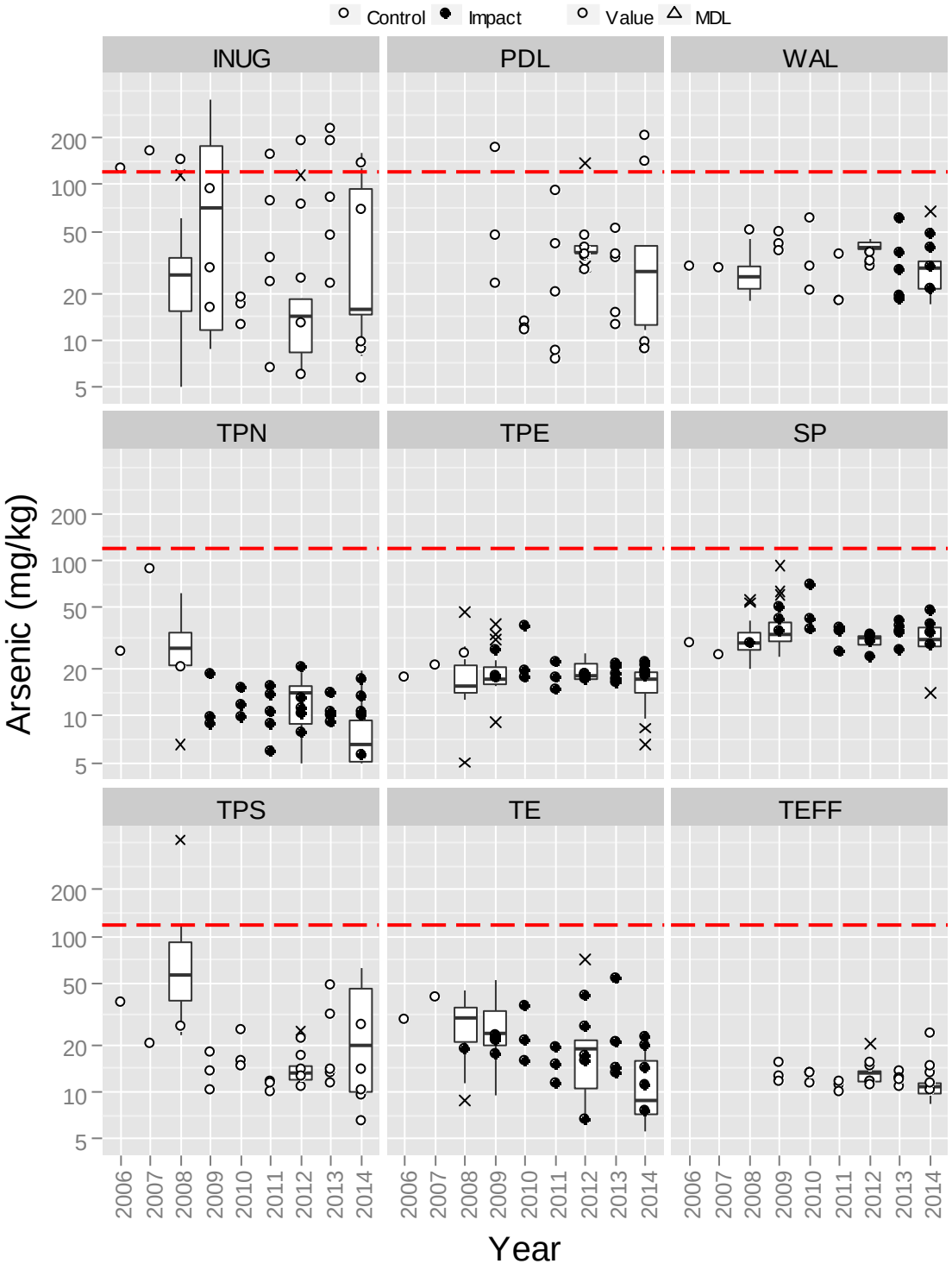


Figure 3.4-4. Total Cadmium (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

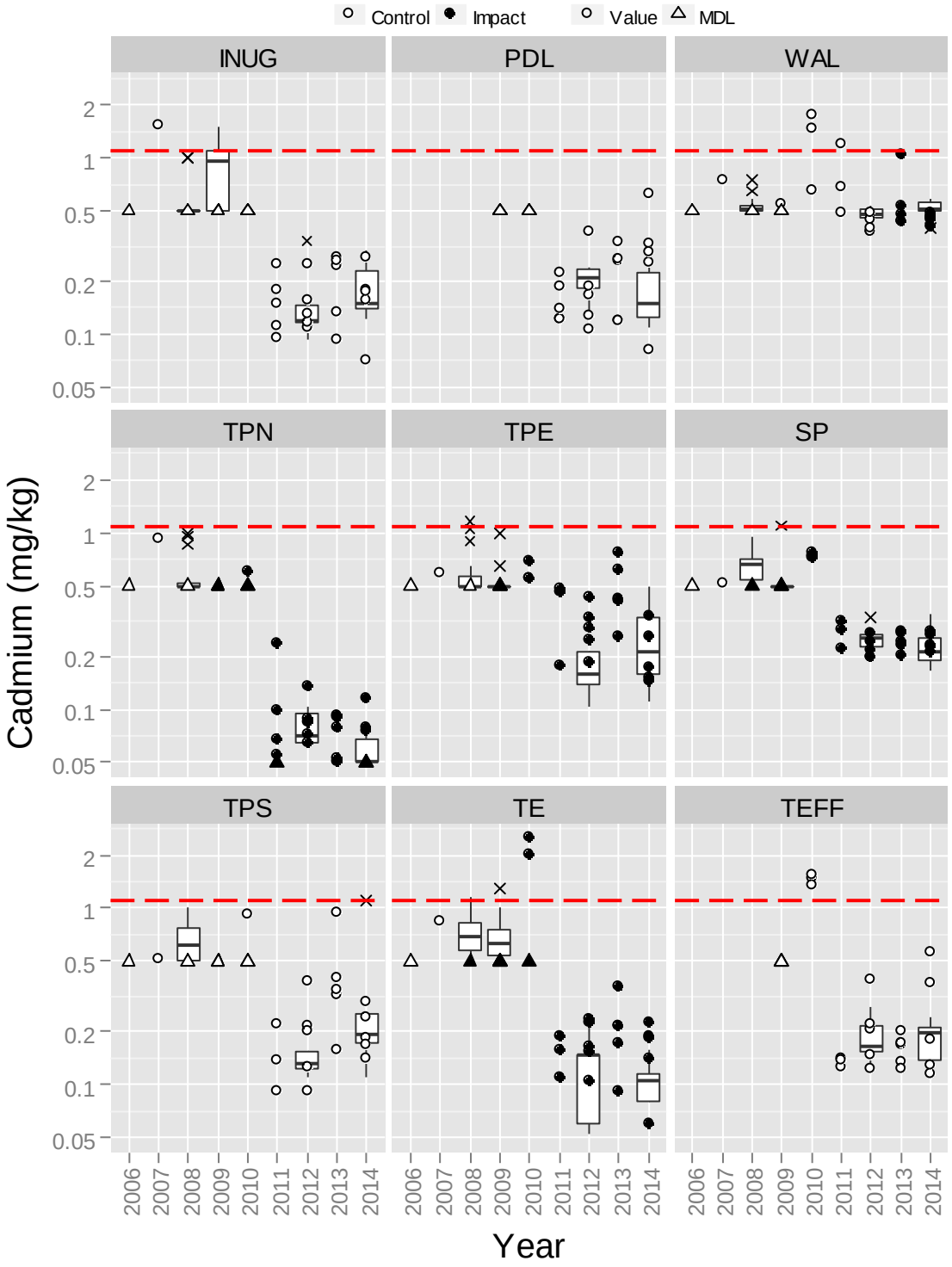


Figure 3.4-5. Total Chromium (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

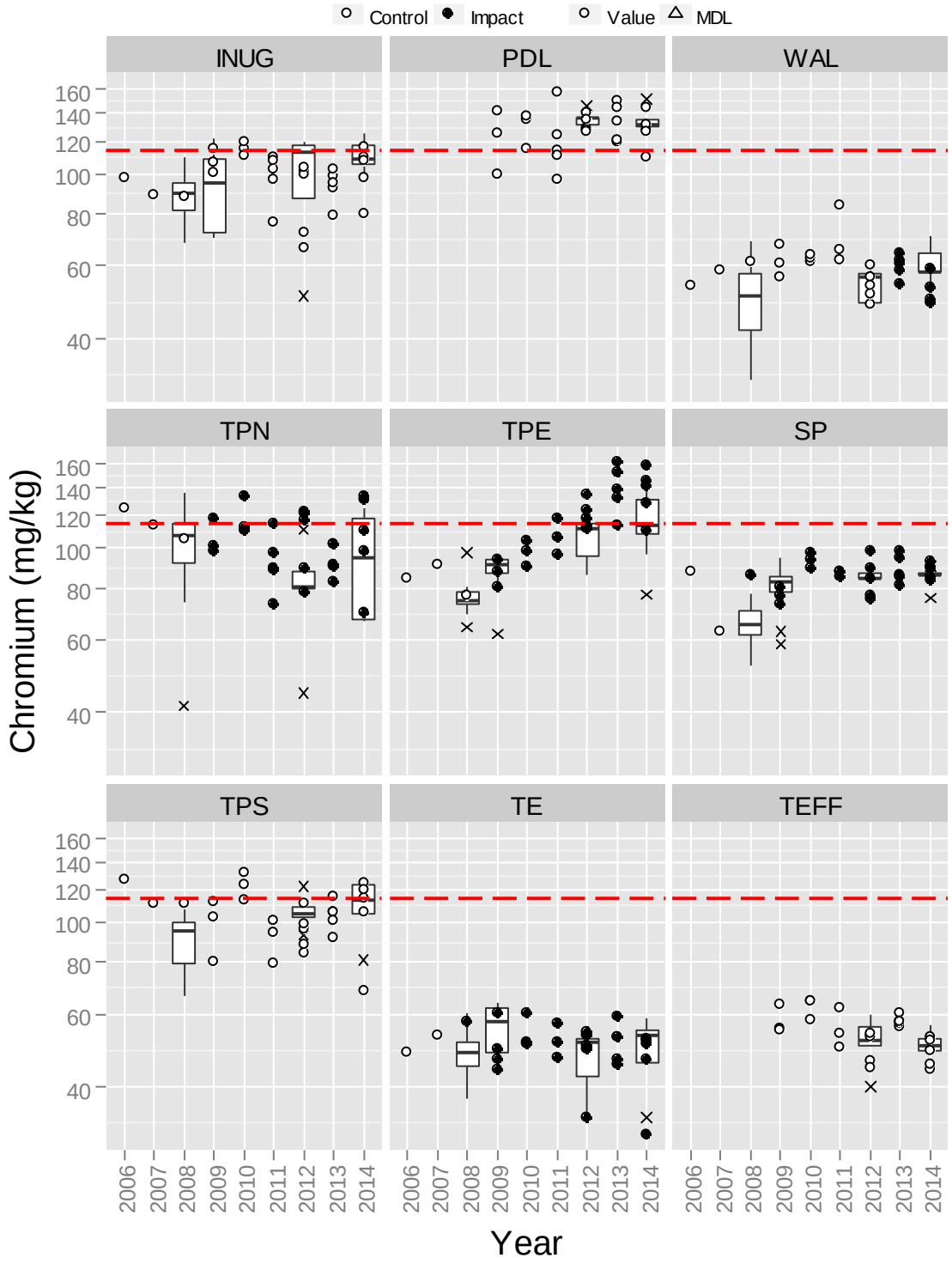


Figure 3.4-6. Total Copper (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

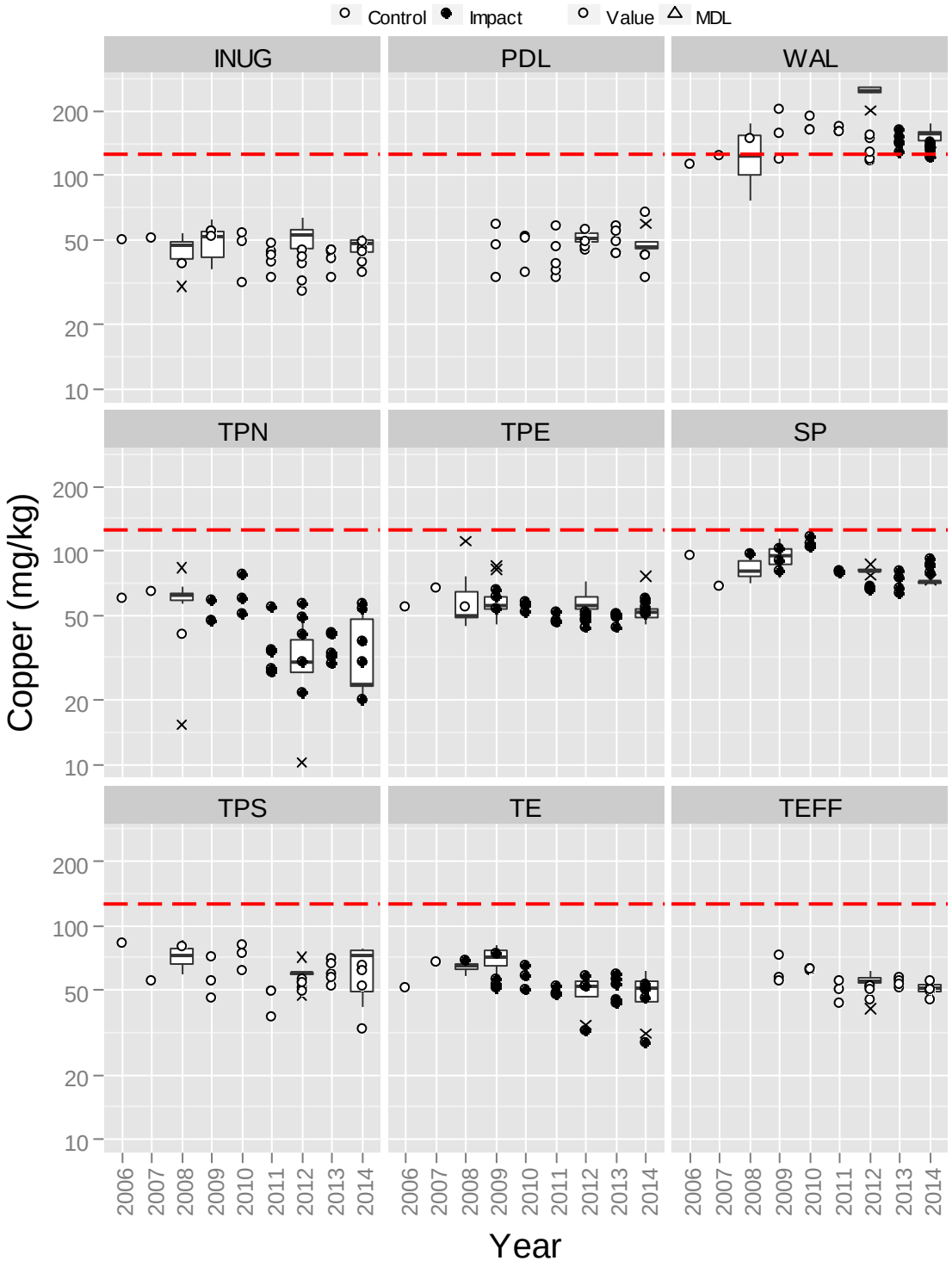


Figure 3.4-7. Total Lead (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

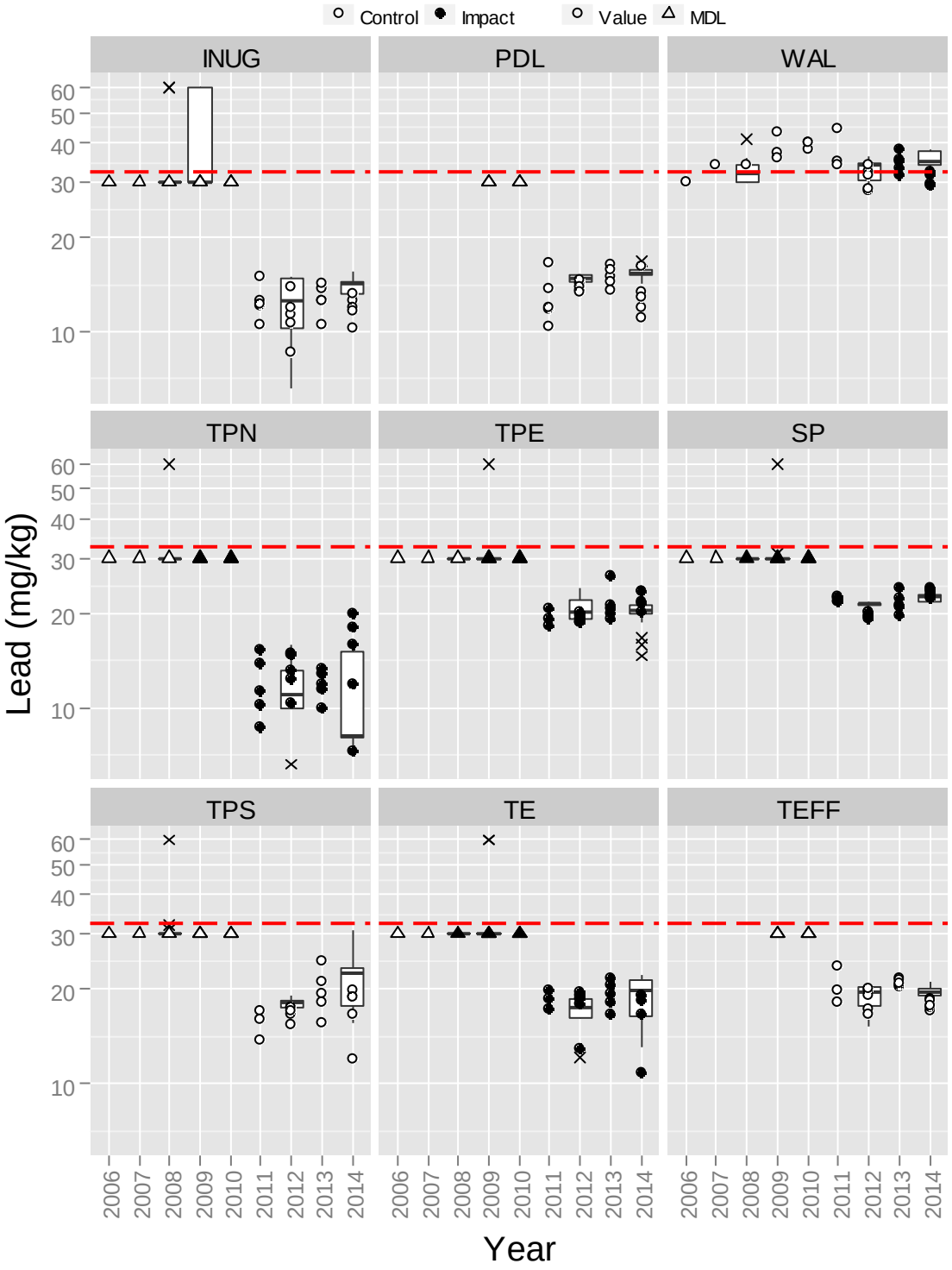


Figure 3.4-8. Total Mercury (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

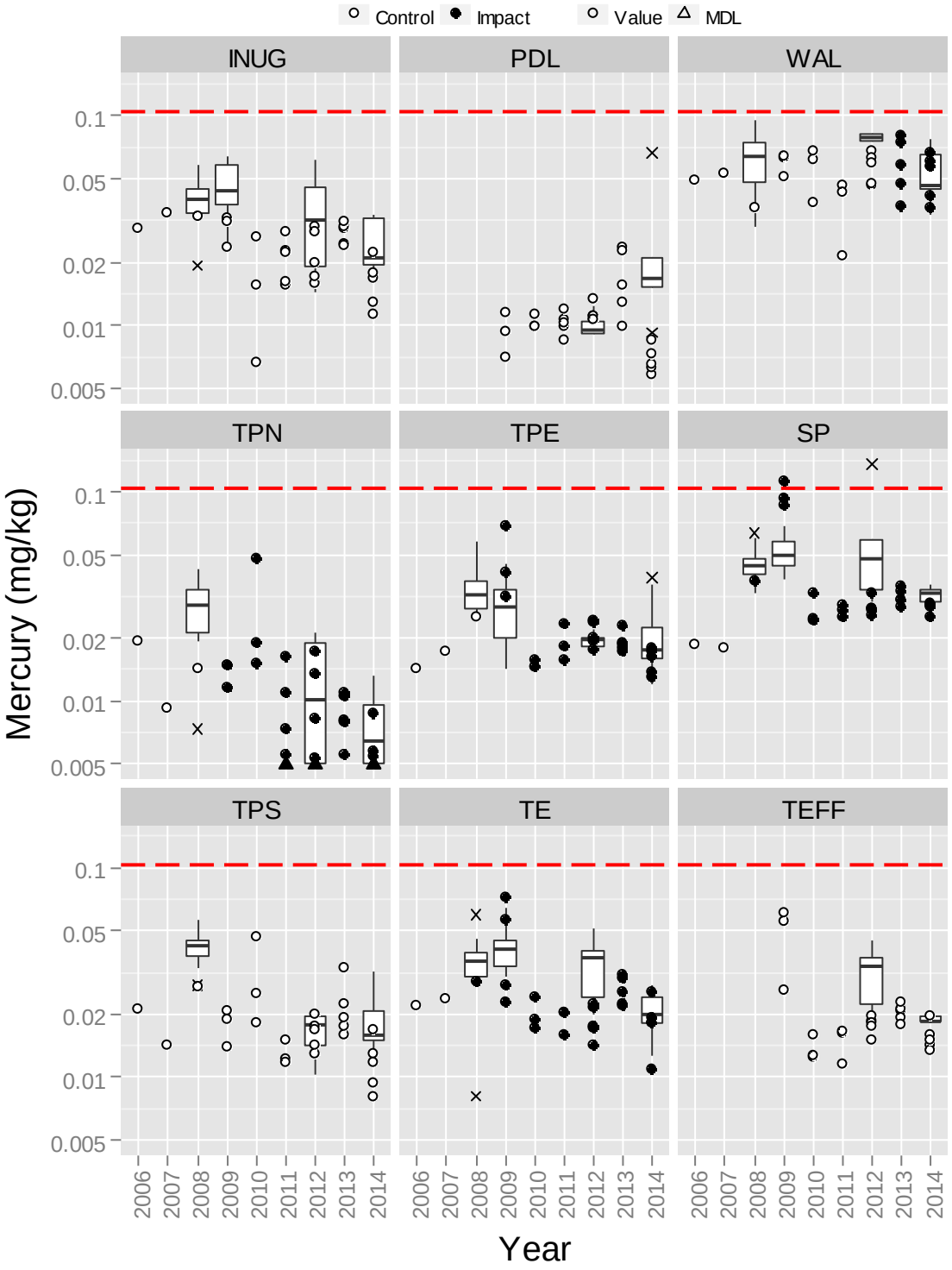


Figure 3.4-9. Total Zinc (mg/kg) in sediment samples (grabs & cores) from Meadowbank study lakes since 2006.

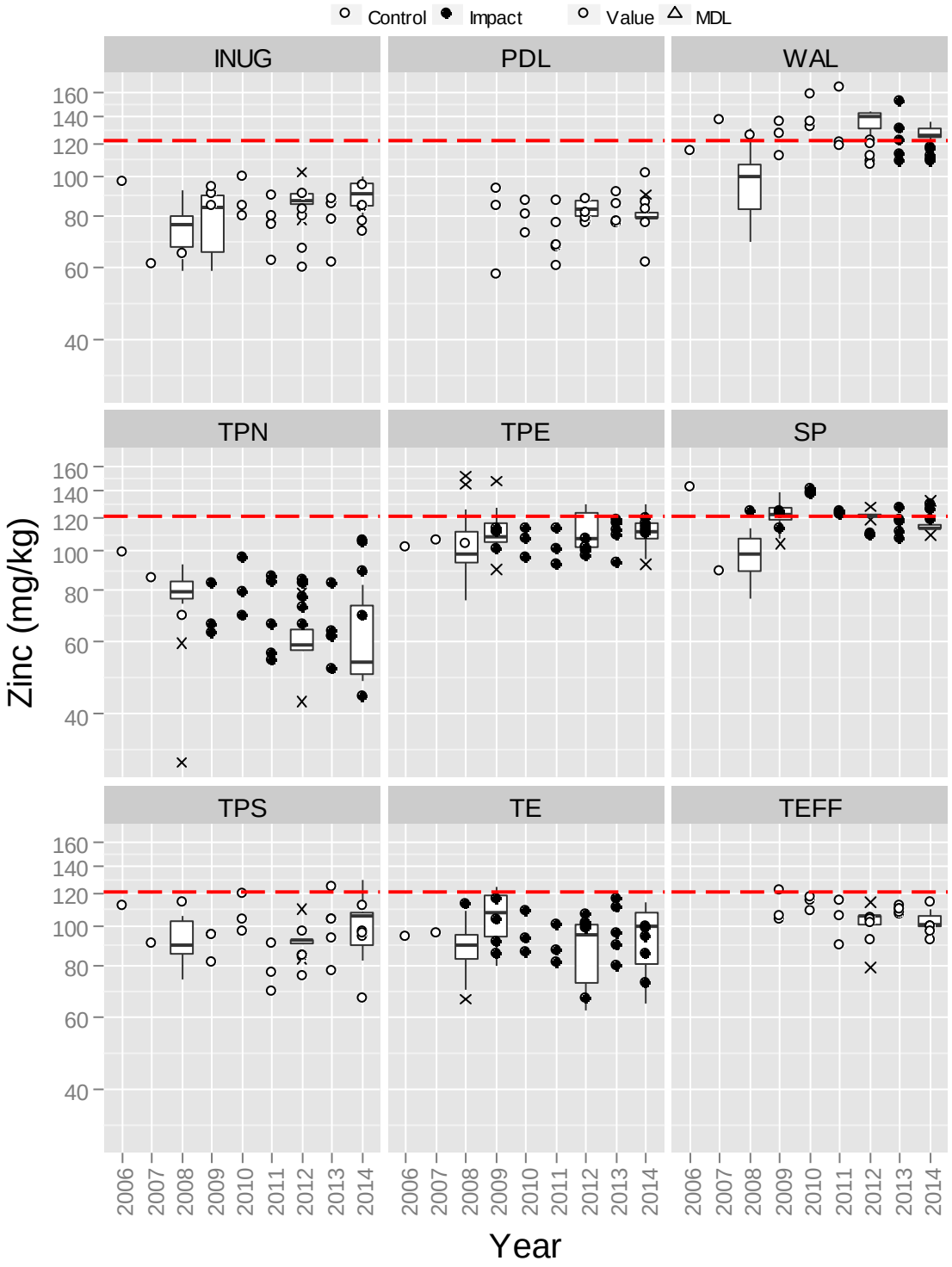


Figure 3.4-10. Sediment core station locations in the East basin of Third Portage Lake, 2008-2014.

In this figure: circles = TPE, triangles = TPE-B, red = pre-impact, and blue = impact; sample year is shown under each point (e.g., 09).

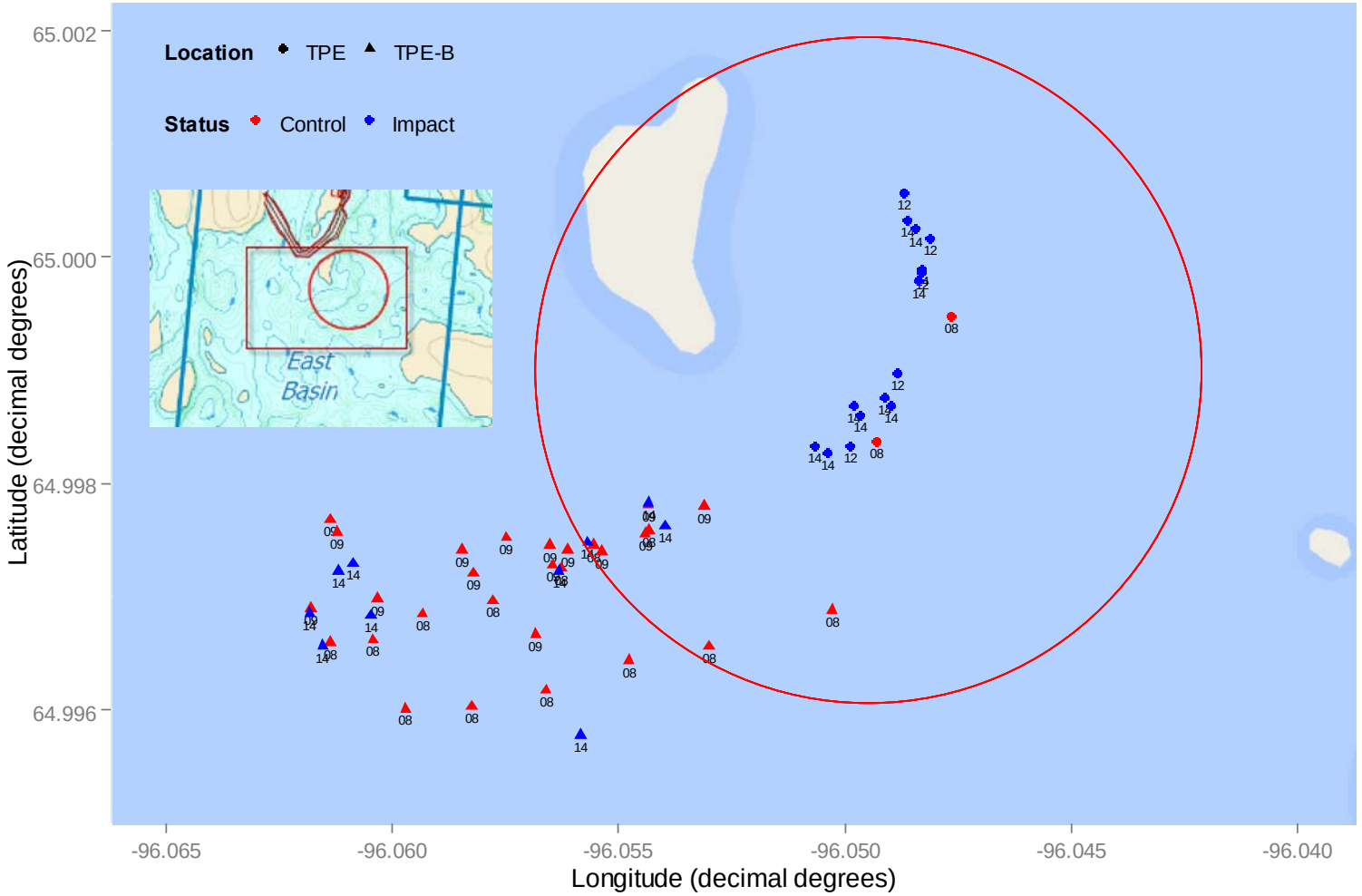


Figure 3.4-11. Total Chromium (mg/kg) in sediment cores (top panel) and grabs (bottom panel) from the East basin of Third Portage Lake since 2006.

In this figure: circles = TPE, triangles = TPE-B, red = pre-impact, and blue = impact.

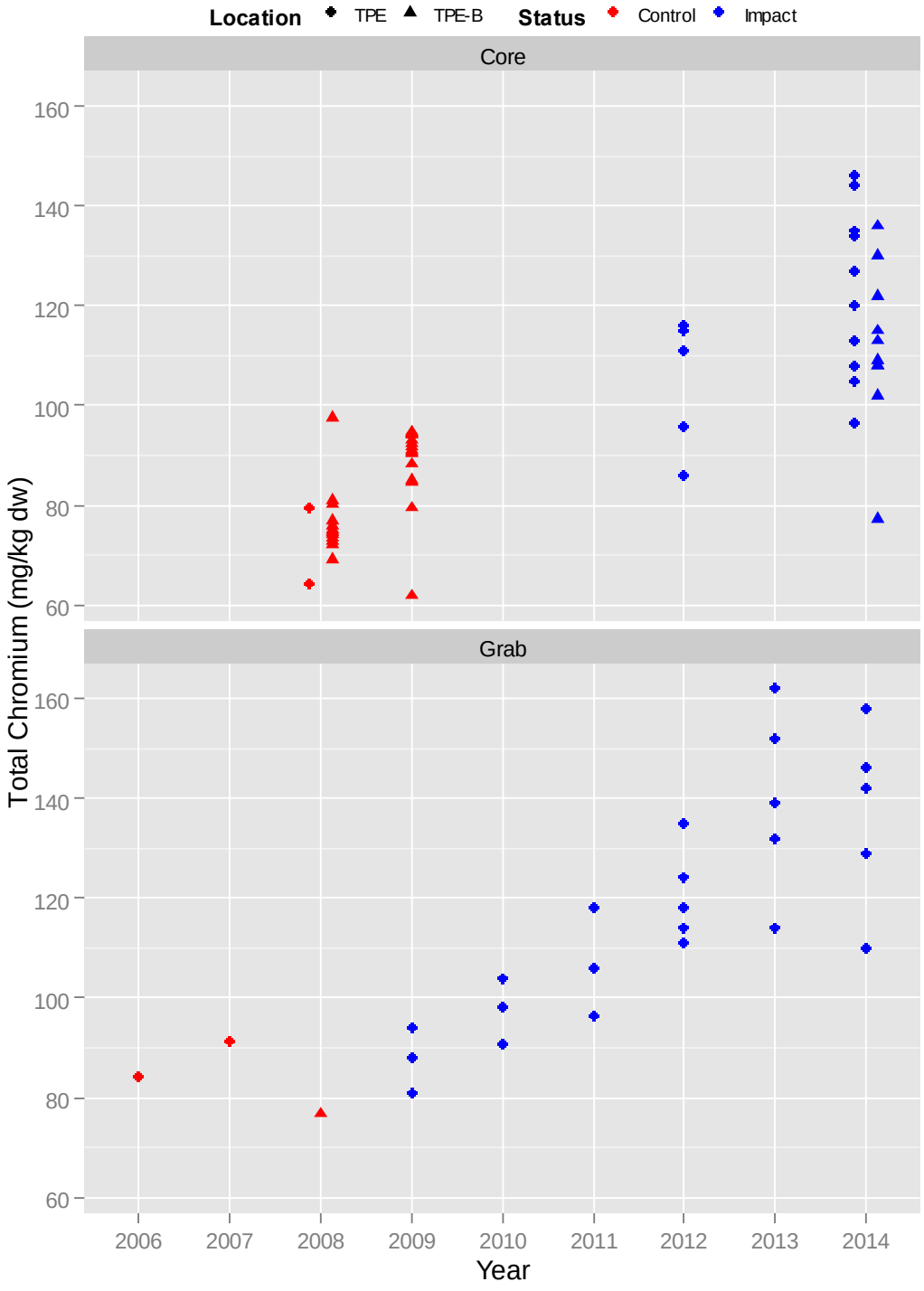


Figure 3.4-12. Sediment grain size composition in sediment samples from Baker Lake since 2008.

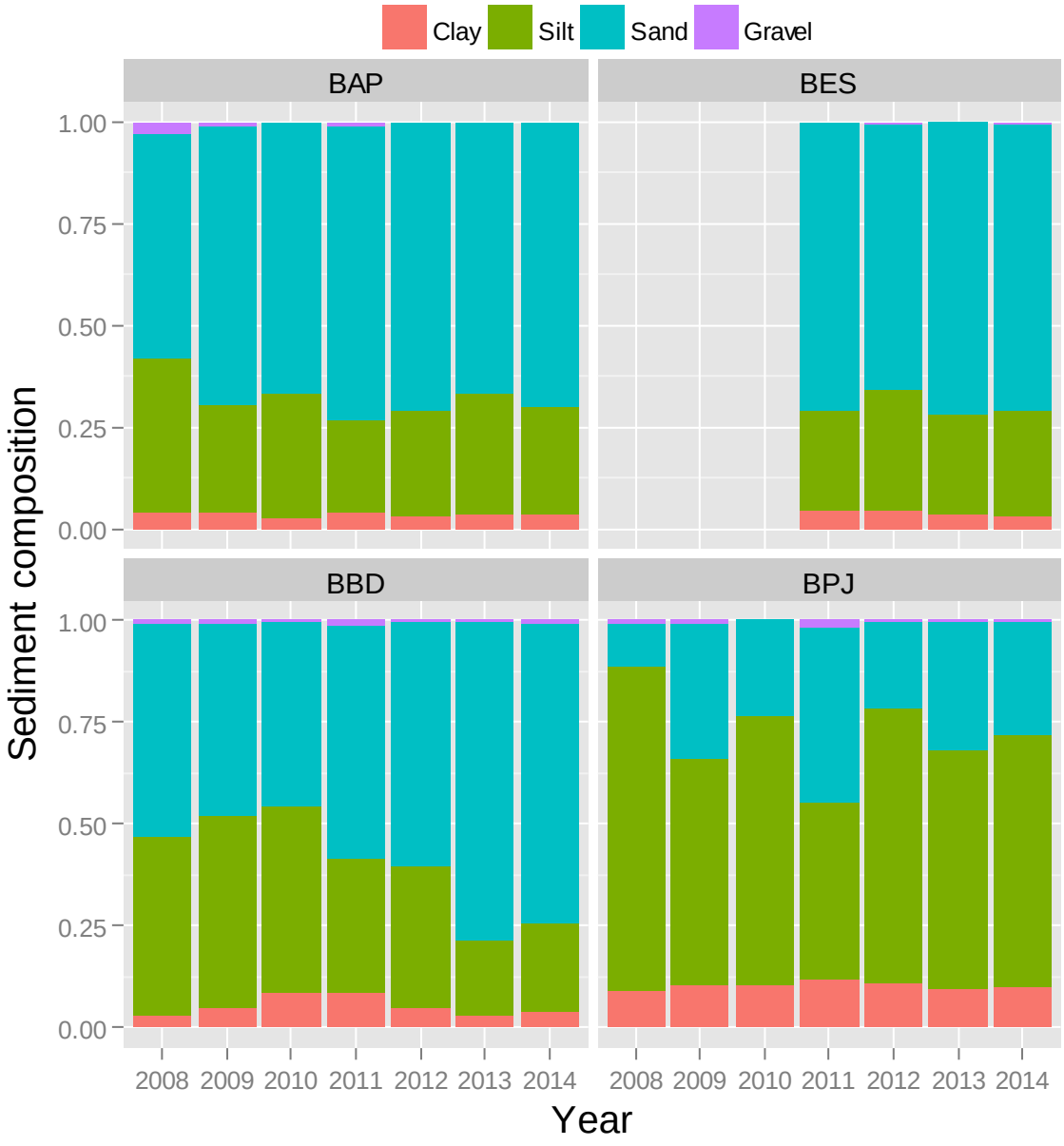


Figure 3.4-13. Total Aluminum (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

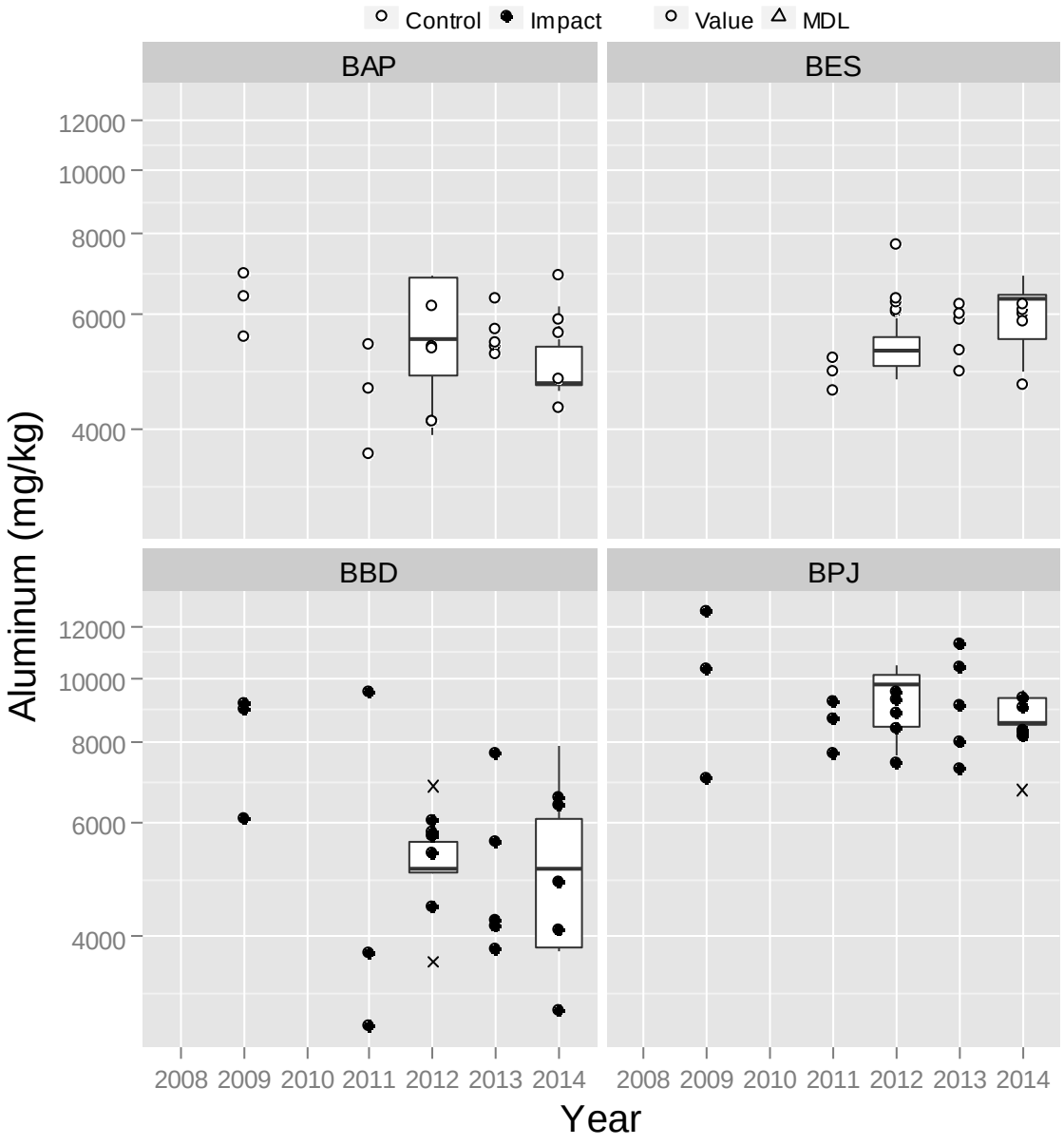


Figure 3.4-14. Total Arsenic (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

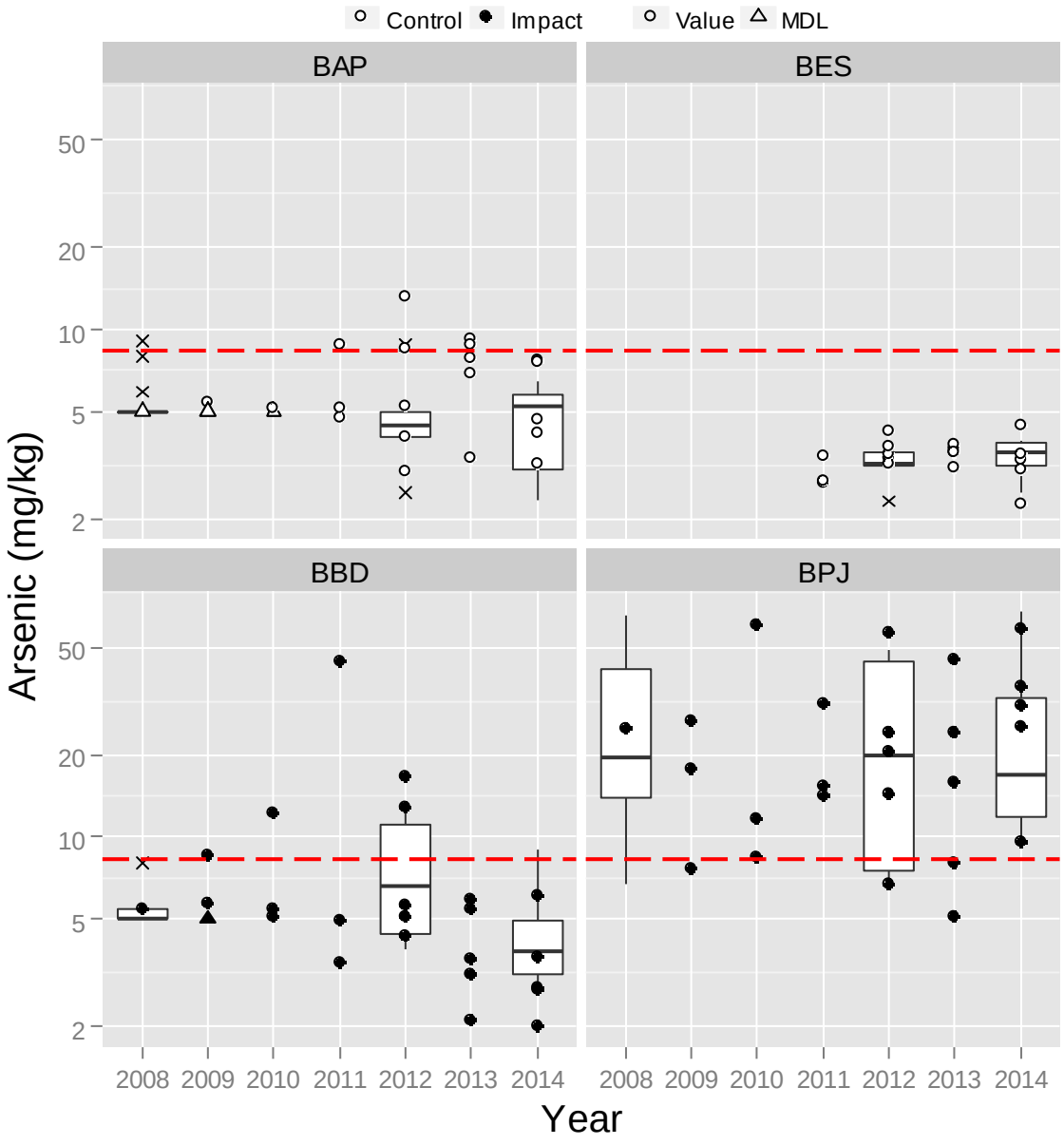


Figure 3.4-15. Total Cadmium (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

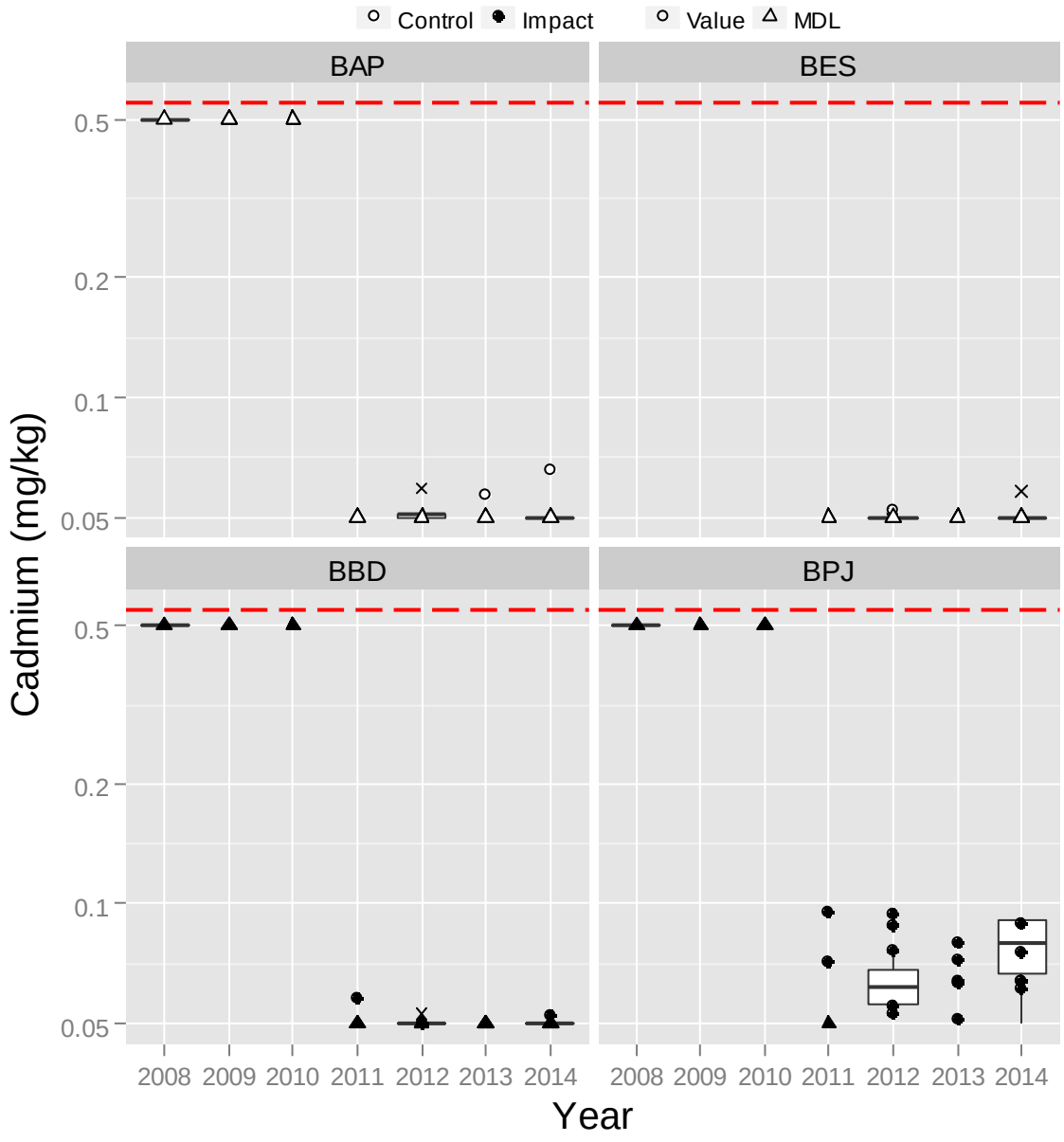


Figure 3.4-16. Total Chromium (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

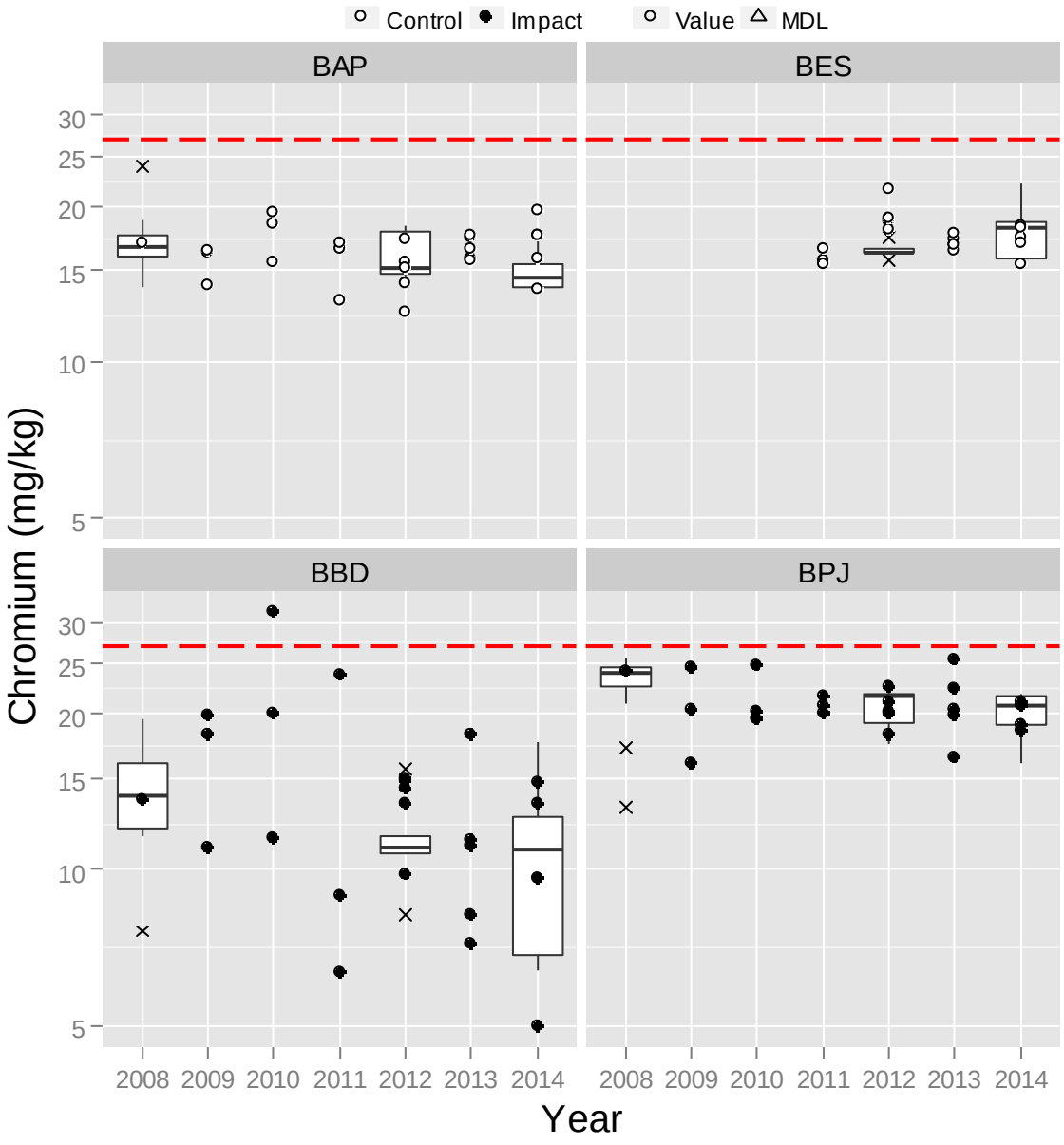


Figure 3.4-17. Total Copper (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

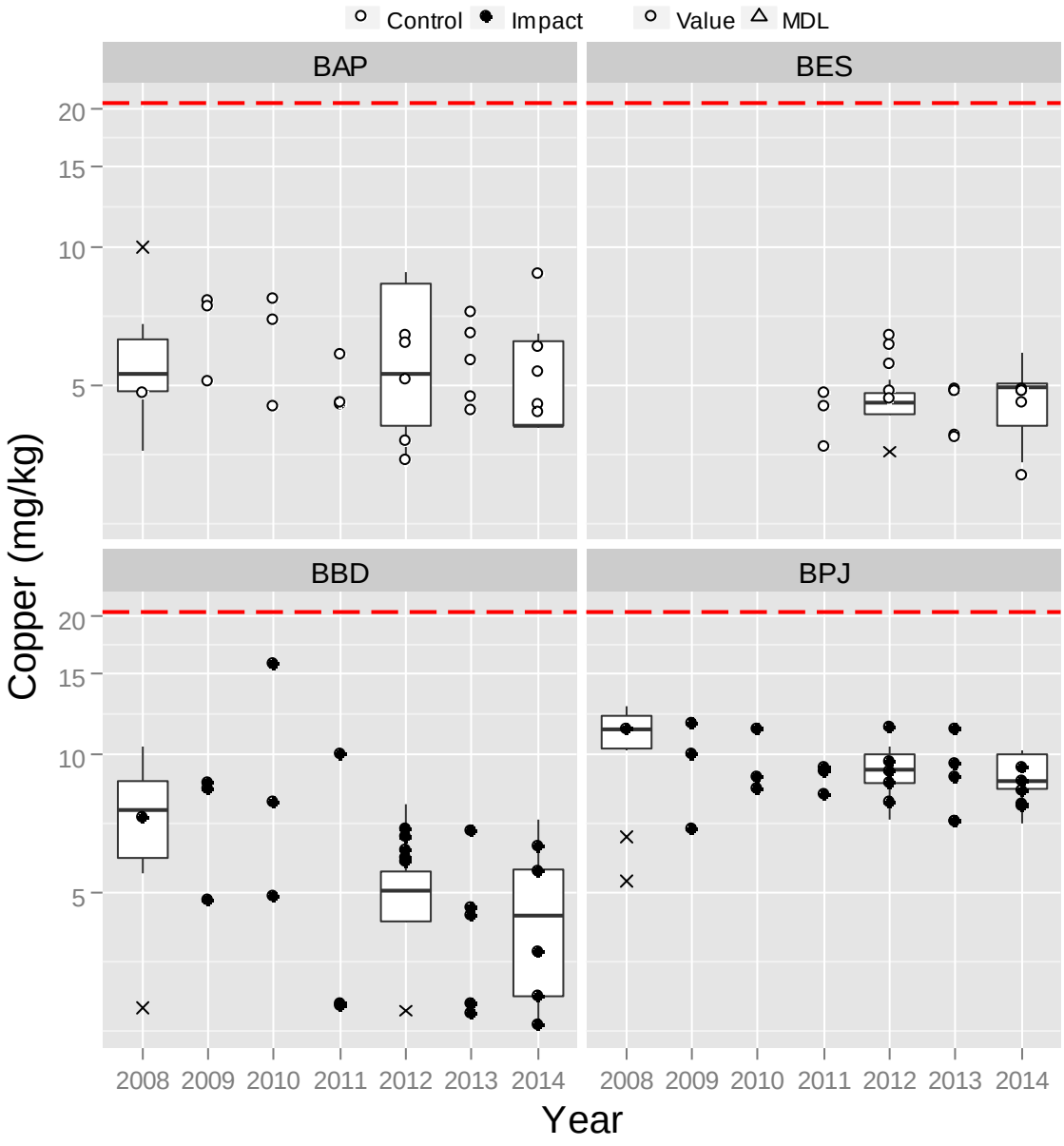


Figure 3.4-18. Total Lead (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

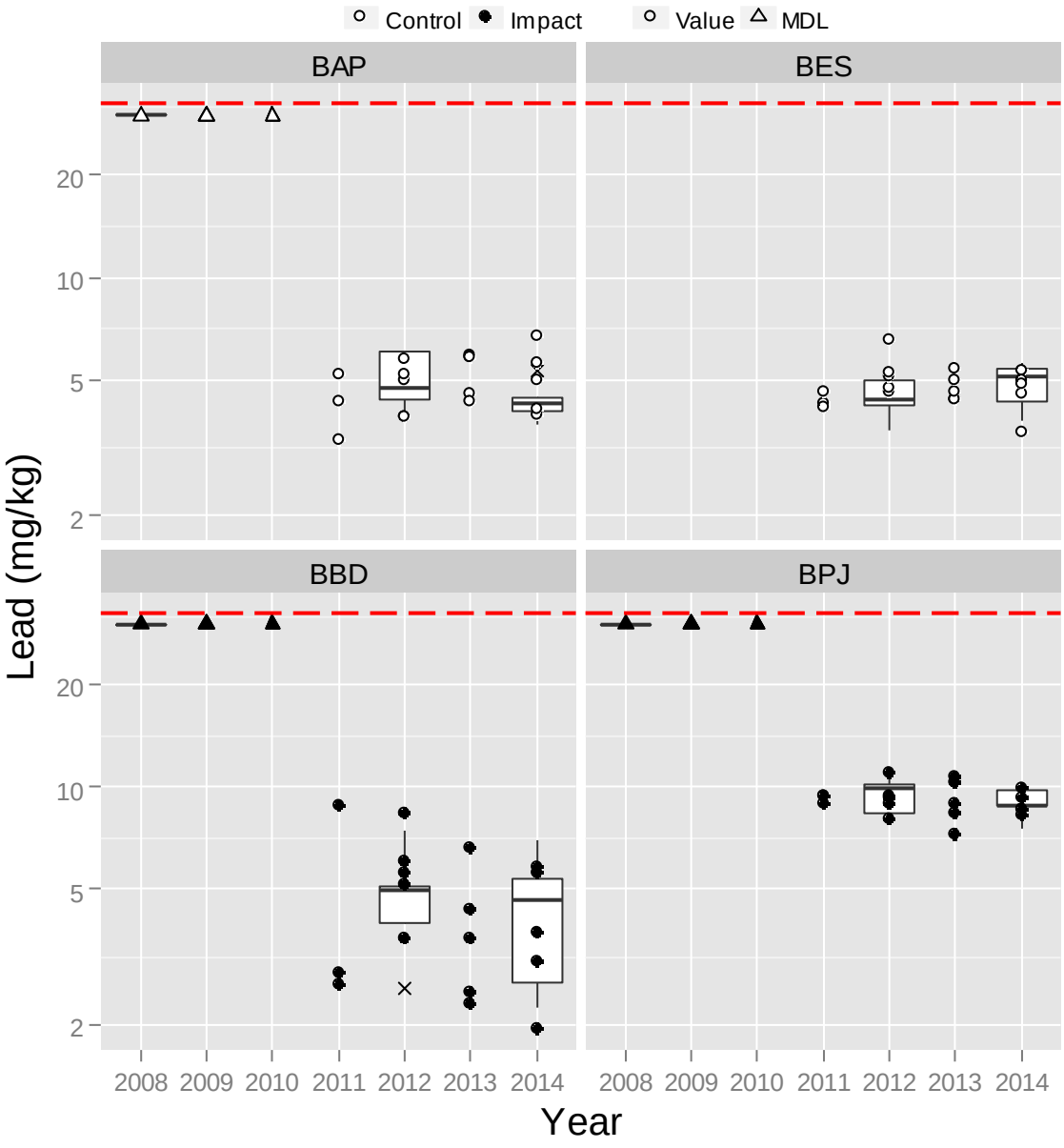


Figure 3.4-19. Total Mercury (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.

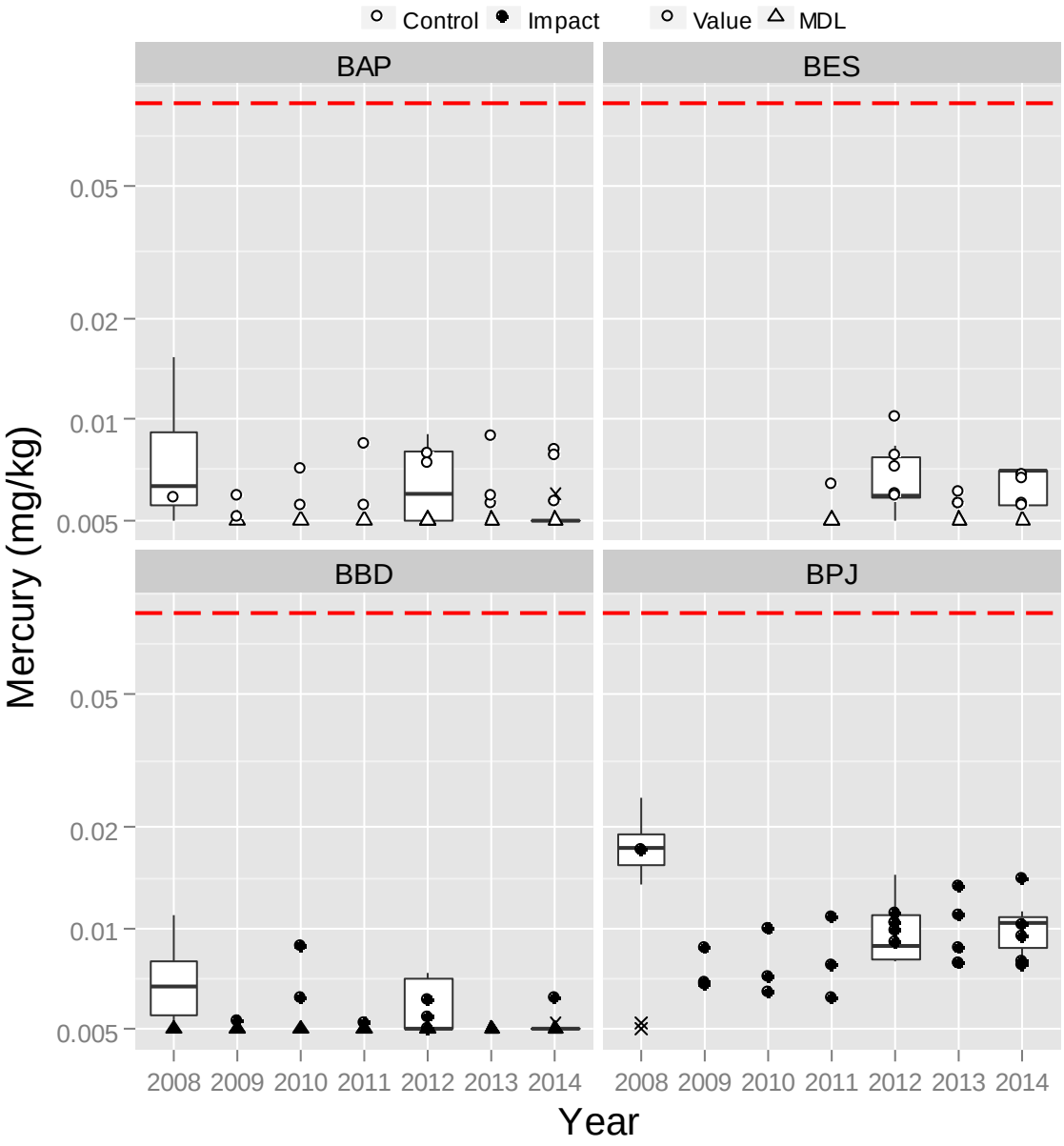
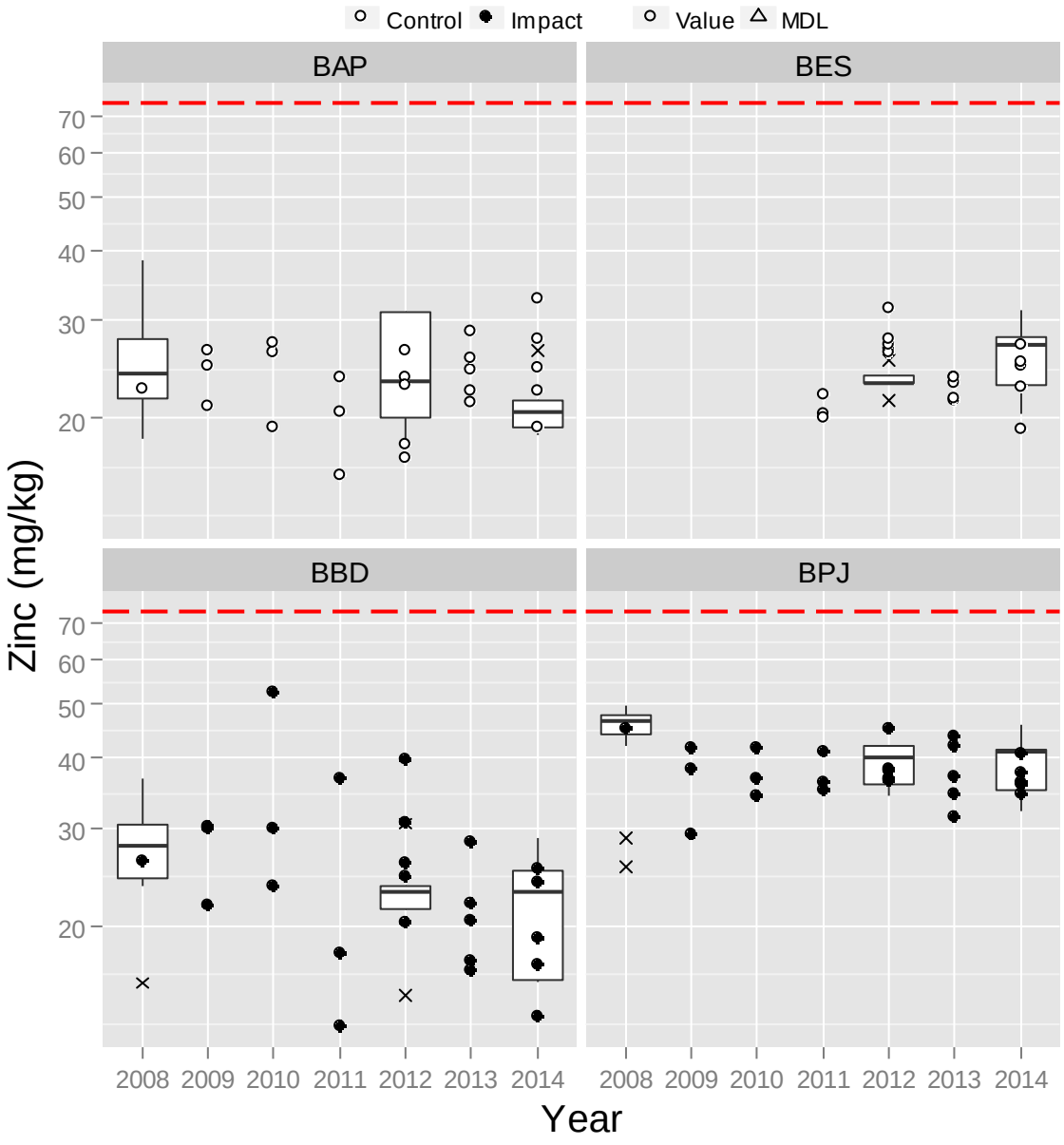


Figure 3.4-20. Total Zinc (mg/kg) in sediment samples (grabs & cores) from Baker Lake since 2008.



3.5. Phytoplankton

3.5.1. Meadowbank Study Lakes

3.5.1.1. 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 sp.* for chlorophytes, *Planktolyngbya sp.* for cyanophytes, *Cyclotella sp.* for diatoms, *Rhodomonas sp.* and *Cryptomonas sp.* for cryptophytes, and *Gymnodinium sp*. and *Peridinium sp.* 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).

3.5.1.2. Temporal and Spatial Trend Interpretation

As previously discussed, our approach to identify potential mine-related impacts involved 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 2014 data to test for changes relative to baseline/reference conditions using the BACIP model (see **Section 2.4.3** 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 or diversity (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 production or food available to zooplankton. The BACIP 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 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.

The 2014 density and biomass results for phytoplankton are provided in **Table 3.5-1** (a presence/absence species matrix is provided in **Appendix F**). The 2012 CREMP (Azimuth, 2013) provides a detailed description of historical trends in phytoplankton-related metrics; this report emphasizes results for 2014. Trend data for chlorophyll-*a*, total biomass, major taxa composition, and species richness are presented in **Figures 3.5-1 to 5** (plots for all other phytoplankton metrics are presented in **Appendix G**). The results for the BACIP model statistical tests of the 2014 results against baseline/reference conditions for total biomass and species richness are provided in **Table 3.5-2**; 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 that has not changed over time. These concentrations have remained fairly consistent since 2006 (**Figure 3.5-1**). No anomalous spatial/temporal trends were evident for near-field areas in 2014, although results need to be viewed cautiously due to the sample transport data quality issue (see **Section 3.1.1** for details). In the worst-case, this would cause chlorophyll-*a* concentration to increase above what is typical and this has not been seen.
- *Total Biomass* – At reference areas, peak summer phytoplankton biomass was approximately 200 mg/m^3 at INUG, TEFF, and PDL, which is consistent with the range in concentrations observed in previous years (**Figure 3.5-2 and Figure 3.5-3**). Winter under-ice biomass is naturally very low at all locations in all years it has been measured. There were no statistically significant changes in total biomass in 2014 relative to baseline/reference conditions (**Table 3.5-2**).

- *Major Taxa Composition* – All areas are dominated by chrysophytes in all open-water months, a pattern that has been consistent since monitoring began in 2006 (**Figure 3.5-4**). No major differences were noted for 2014.
- *Species Richness* – At reference areas, seasonal profiles in species richness were similar in shape to total biomass, with an increase from low diversity (~15-20 species) in under-ice months (when and where measured) to peak diversity (~35 – 40 species) in summer during open water (**Figure 3.5-5**). In 2014, there was a significant decrease in the annual mean species richness at TPS (24%) relative to baseline/reference conditions (**Table 3.5-2**); however, this does not appear to be part of a longer-term trend (**Figure 3.5-5**) and there were no similar changes at near-field areas TPN or TPE in Third Portage Lake.

While subtle, mining-related changes in water quality have been detected in the Meadowbank study lakes (particularly at the near-field areas), they have not in turn resulted in any systematic changes to phytoplankton community taxa richness or biomass (i.e., the 2014 results are generally similar to previous years and within the range of historical baseline/reference conditions).

3.5.2. Baker Lake

3.5.2.1. General Observations

The phytoplankton community of Baker Lake, despite some temporal differences in water quality related to the influence of more saline water (see **Section 3.2.2**), is relatively similar to the Meadowbank Lakes. Similar to the Meadowbank study lakes, taxonomic composition and biomass were comparable as chrysophytes (golden-brown algae) have consistently been the dominant taxonomic group in Baker Lake since monitoring began in 2008, with similar dominant taxa (e.g., *Chrysococcus*, *Kephyrion*, *Dinobryon*). However, Cryptophytes and Diatoms were the next most abundant groups in Baker Lake, each comprising about 20 - 25% of abundance, followed by dinoflagellates. This group was slightly less represented in Baker Lake relative to the Meadowbank study lakes, primarily because of the large size of Baker Lake. Given that dinoflagellates tend to be more sessile and associated with hard substrates and shorelines, the lack of this habitat limited their relative abundance and biomass.

Mean summer phytoplankton biomass in Baker Lake is generally similar to or higher than the Meadowbank lakes, typically reaching a maximum of about 200 to 300 mg/m^3, typically higher than is observed in the study lakes.

3.5.2.2. 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 does coincide 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 2014 density and biomass results for phytoplankton are provided in **Table 3.5-3**. The results for the BACIP model statistical tests of the 2014 results against baseline/reference conditions are provided in **Table 3.5-4**; effect sizes of interest are 20% and 50%.

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 typically range from 0.4 to 1 µg/L (**Figure 3.5-6**). While a decreasing trend is apparent at all areas over the last two years, the results should be interpreted cautiously due to the data quality issue related to sample transport in 2014 (see **Section 3.1.1**).
- *Total biomass* – phytoplankton biomass was similar to 2013 and generally a bit lower than in previous years (**Figure 3.5-7**). BBD showed an 18% decrease relative to reference area (BAP) performance, although the change was not statistically significant (**Table 3.5-4**).
- *Major taxa composition* – there were no apparent differences in relative composition of phytoplankton communities between BAP and impact areas BBD and BPJ in 2014 (**Figures 3.5-8 and 3.5-9**).
- *Species richness* – similar to total biomass, taxa richness was comparable to all previous years except 2013, when richness was low relative to other years (**Figure 3.5-10**). The apparent 'recovery' of species richness in 2014 is indicative of the natural variability that can exist from year to year. There were no statistically significant changes in species richness for 2014 relative to previous years and the BAP reference.

Summary

Some minor (non-significant) changes were observed in 2014 relative to previous years. Given that no major mine-related changes in water quality occurred, these patterns are most likely natural.

Table 3.5-1. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2014.

Area-Replicate	Date	Phytoplankton Density (cells/L)						
		Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
TPE-70	25-Jul-14	400	144880	1507656	930352	14768	10600	2608656
TPE-71	25-Jul-14	400	223704	1529808	1070616	28936	23368	2876832
TPE-72	26-Aug-14	0	927336	1094168	260424	32152	29536	2343616
TPE-73	26-Aug-14	200	819976	1508840	462776	21368	16768	2829928
TPE-74	28-Sep-14	400	294744	539200	729184	19584	1000	1584112
TPE-75	28-Sep-14	200	395320	567536	834144	6800	400	1804400
TPE-76	3-Nov-14	0	208736	740152	546784	34936	1000	1531608
TPE-77	3-Nov-14	0	244256	848112	367184	23752	800	1484104
TPE-78	20-Dec-14	0	74568	226950	4646	4146	200	310511
TPE-79	20-Dec-14	0	10838	283688	32115	14984	100	341726
TPN-70	25-Jul-14	0	72640	1170008	368984	28936	1800	1642368
TPN-71	25-Jul-14	0	136696	1117320	677896	7384	2000	1941296
TPN-72	26-Aug-14	200	438624	934720	201752	31136	200	1606632
TPN-73	26-Aug-14	0	273192	1135472	131512	52288	1400	1593864
TPN-74	28-Sep-14	0	151064	711216	137096	17568	400	1017344
TPN-75	28-Sep-14	800	359600	589088	100976	16568	400	1067432
TPN-76	30-Nov-14	0	124214	315703	74868	22877	0	537661
TPN-77	30-Nov-14	0	120567	372541	92199	15084	4246	604637
TPN-78	19-Dec-14	0	10638	219858	10738	15284	100	256619
TPN-79	19-Dec-14	0	14184	308611	10838	33615	300	367548
TPS-43	25-Jul-14	0	144480	1387728	2473296	30336	7800	4043640
TPS-44	25-Jul-14	0	179800	1695840	513064	23352	9000	2421056
TPS-45	26-Aug-14	0	489312	999976	94992	8384	7784	1600448
TPS-46	26-Aug-14	400	417272	1279952	216920	30136	600	1945280
TPS-47	28-Sep-14	0	337648	524432	1000	1600	7784	872464
TPS-48	28-Sep-14	0	373968	481328	116744	0	200	972240
SP-70	19-Jul-14	400	159248	1357976	572352	117360	17168	2224504
SP-71	19-Jul-14	200	282176	1265384	834376	92624	15768	2490528
SP-72	27-Aug-14	0	3470672	1272968	325280	59088	600	5128608
SP-73	27-Aug-14	800	683280	1063832	261624	70856	400	2080792
SP-74	15-Sep-14	114944	158248	1178576	533216	80240	400	2065624
SP-75	15-Sep-14	200	174216	1364960	384152	64872	400	1988800
SP-76	2-Nov-14	0	172416	1021528	269208	207952	1000	1672104
SP-77	2-Nov-14	100	159575	767258	227204	65630	5146	1224912
SP-78	18-Dec-14	0	42553	131206	4546	2000	300	180605
SP-79	18-Dec-14	0	10638	177305	2500	600	0	191043
TE-70	30-Jul-14	400	65056	1631568	95792	58272	2400	1853488
TE-71	30-Jul-14	600	259424	1150040	131112	51088	8184	1600448
TE-72	30-Aug-14	2600	223904	1856272	217520	72256	7784	2380336
TE-73	30-Aug-14	4200	338048	1200928	146680	81424	22552	1793832
TE-74	14-Sep-14	2600	65256	1244832	46704	104776	800	1464968
TE-75	14-Sep-14	7000	273592	1546160	303128	127128	400	2257408
TE-76	28-Nov-14	1800	14484	385179	142444	65230	0	609137
TE-77	28-Nov-14	3000	3546	399363	173959	61784	100	641752
TE-78	20-Dec-14	200	21777	248327	29369	300	0	299972
TE-79	20-Dec-14	0	63830	265958	11338	4646	200	345972
TEFF-31	30-Jul-14	4600	187584	1377344	152664	29136	17768	1769096
TEFF-32	30-Jul-14	800	352016	1085384	118144	7984	15168	1579496
TEFF-33	30-Aug-14	8600	151664	1504056	166032	94192	22752	1947296
TEFF-34	30-Aug-14	13200	402504	1144456	180400	22352	3400	1766312
TEFF-35	14-Sep-14	38200	180000	1419248	139296	43704	600	1821048
TEFF-36	14-Sep-14	28400	100576	1649536	173016	7584	1200	1960312

Table 3.5-1. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2014.

Area-Replicate	Date	Phytoplankton Density (cells/L)						
		Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	TOTAL
INUG-58	30-Jul-14	400	232088	1619400	232488	64856	7384	2156616
INUG-59	30-Jul-14	87008	194568	2152816	242072	28736	36720	2741920
INUG-60	3-Sep-14	71840	296944	1389712	118144	22152	8384	1907176
INUG-61	3-Sep-14	22352	353416	1977600	66056	86608	9384	2515416
INUG-62	21-Sep-14	14368	196368	1726960	125528	116944	7784	2187952
INUG-63	21-Sep-14	7184	66656	1396808	147680	58272	800	1677400
INUG-64	30-Nov-14	0	29169	312557	267958	42553	100	652336
INUG-65	30-Nov-14	0	82160	408402	125514	50245	300	666621
INUG-66	19-Dec-14	0	7092	213666	35861	28369	0	284988
INUG-67	19-Dec-14	0	49745	174159	3646	50245	400	278196
PDL-31	30-Jul-14	7384	201352	1208712	69656	22352	22752	1532208
PDL-32	30-Jul-14	600	93992	1331840	422272	14768	8784	1872256
PDL-33	3-Sep-14	6200	489112	1948264	177232	29336	29936	2680080
PDL-34	3-Sep-14	5000	496696	1516824	315328	22152	23152	2379152
PDL-35	10-Sep-14	3400	144280	1473920	262456	37320	15768	1937144
PDL-36	10-Sep-14	3200	352416	1322856	344464	15968	16968	2055872
WAL-39	26-Jul-14	7184	368584	2713168	305128	187416	36720	3618200
WAL-40	26-Jul-14	122128	289560	1998552	182400	127744	8584	2728968
WAL-41	27-Aug-14	0	410288	1668488	597872	24168	16168	2716984
WAL-42	27-Aug-14	0	511064	1956248	477744	112192	24152	3081400
WAL-43	22-Sep-14	0	215920	2142432	132512	85640	1600	2578104
WAL-44	22-Sep-14	200	151064	1683856	365400	112592	8784	2321896
WAL-45	2-Nov-14	0	80424	626608	267824	43504	400	1018760
WAL-46	2-Nov-14	14368	65656	1149840	231104	236488	200	1697656
WAL-47	18-Dec-14	0	3846	202128	2700	1400	100	210174
WAL-48	18-Dec-14	0	7692	78114	39515	300	100	125721
Relative Density or Biomass (%)		**0.5**	**16**	**64**	**17**	**2.9**	**0.4**	

Table 3.5-1. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2014.

Area-Replicate	Date	Phytoplankton Biomass (mg/m^3)							Other	
		Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**	# Species	Simp.Div.
TPE-70	25-Jul-14	0.12	6.97	126.47	68.80	1.36	15.47	219.19	25	0.79
TPE-71	25-Jul-14	0.12	7.85	140.89	66.40	1.98	20.80	238.04	29	0.79
TPE-72	26-Aug-14	0.00	9.61	81.74	8.63	14.55	18.54	133.07	33	0.89
TPE-73	26-Aug-14	0.06	10.70	127.96	13.73	9.79	31.92	194.17	34	0.90
TPE-74	28-Sep-14	0.07	4.92	56.02	20.58	15.61	15.14	112.33	30	0.76
TPE-75	28-Sep-14	0.03	12.96	46.77	20.50	8.21	6.52	94.99	27	0.75
TPE-76	3-Nov-14	0.00	3.61	54.74	18.91	11.52	12.55	101.32	29	0.80
TPE-77	3-Nov-14	0.00	3.83	65.72	8.55	4.90	9.88	92.88	23	0.78
TPE-78	20-Dec-14	0.00	1.83	9.44	0.96	1.01	3.09	16.32	15	0.71
TPE-79	20-Dec-14	0.00	0.54	11.77	1.39	2.22	2.40	18.32	13	0.65
TPN-70	25-Jul-14	0.00	2.11	118.89	27.00	1.32	1.90	151.22	28	0.83
TPN-71	25-Jul-14	0.00	3.29	99.63	42.28	0.67	15.35	161.22	27	0.81
TPN-72	26-Aug-14	0.05	14.66	102.51	7.33	7.03	0.21	131.78	31	0.90
TPN-73	26-Aug-14	0.00	5.04	105.60	5.30	8.92	18.92	143.79	30	0.88
TPN-74	28-Sep-14	0.00	2.66	39.95	3.84	5.60	2.97	55.01	24	0.85
TPN-75	28-Sep-14	0.48	4.50	28.24	5.15	6.10	4.98	49.44	23	0.86
TPN-76	30-Nov-14	0.00	3.87	19.73	1.76	4.98	0.00	30.35	13	0.81
TPN-77	30-Nov-14	0.00	0.87	21.41	3.77	3.22	5.03	34.30	16	0.81
TPN-78	19-Dec-14	0.00	0.23	9.58	0.44	2.99	2.36	15.59	14	0.72
TPN-79	19-Dec-14	0.00	0.02	13.30	0.27	4.57	0.38	18.55	14	0.74
TPS-43	25-Jul-14	0.00	4.10	125.44	84.60	3.52	20.41	238.08	28	0.61
TPS-44	25-Jul-14	0.00	4.63	165.88	33.81	3.02	18.54	225.89	30	0.77
TPS-45	26-Aug-14	0.00	17.84	100.71	5.28	2.00	8.80	134.64	31	0.87
TPS-46	26-Aug-14	0.14	13.99	92.04	6.69	3.69	1.87	118.42	30	0.88
TPS-47	28-Sep-14	0.00	4.65	26.86	0.99	2.09	9.76	44.35	15	0.79
TPS-48	28-Sep-14	0.00	4.70	31.29	3.26	0.00	2.06	41.32	21	0.87
SP-70	19-Jul-14	0.17	4.27	114.61	37.86	21.47	17.83	196.21	35	0.84
SP-71	19-Jul-14	0.07	8.65	120.81	48.28	22.09	18.13	218.03	37	0.83
SP-72	27-Aug-14	0.00	43.29	94.49	10.51	16.20	11.48	175.98	33	0.77
SP-73	27-Aug-14	0.19	8.33	83.97	12.19	15.45	2.09	122.22	36	0.87
SP-74	15-Sep-14	38.52	2.79	91.59	14.87	16.75	3.33	167.85	31	0.84
SP-75	15-Sep-14	0.20	5.80	95.95	17.83	17.55	2.75	140.08	33	0.85
SP-76	2-Nov-14	0.00	3.27	83.12	10.95	32.51	1.27	131.11	27	0.84
SP-77	2-Nov-14	0.01	6.42	52.56	10.31	11.31	8.31	88.92	28	0.85
SP-78	18-Dec-14	0.00	1.38	7.58	1.73	1.91	3.96	16.56	14	0.77
SP-79	18-Dec-14	0.00	0.30	6.90	4.23	0.58	0.00	12.01	9	0.68
TE-70	30-Jul-14	0.06	1.29	132.13	5.04	4.09	9.76	152.37	33	0.78
TE-71	30-Jul-14	0.14	4.77	83.63	8.41	3.56	6.19	106.70	34	0.88
TE-72	30-Aug-14	0.86	7.24	125.43	11.07	14.98	6.13	165.72	40	0.84
TE-73	30-Aug-14	1.90	5.96	111.20	8.48	10.30	16.40	154.22	40	0.89
TE-74	14-Sep-14	0.50	2.67	99.13	4.16	12.17	7.85	126.48	33	0.78
TE-75	14-Sep-14	1.70	7.45	130.40	10.87	15.85	2.03	168.31	37	0.86
TE-76	28-Nov-14	0.52	0.49	38.12	5.46	8.47	0.00	53.07	22	0.82
TE-77	28-Nov-14	0.89	0.10	44.59	4.89	8.44	0.64	59.54	20	0.78
TE-78	20-Dec-14	0.05	0.82	17.52	2.36	0.29	0.00	21.04	13	0.74
TE-79	20-Dec-14	0.00	1.11	11.54	1.40	1.58	5.75	21.36	10	0.68
TEFF-31	30-Jul-14	0.76	1.55	114.29	6.91	1.66	20.97	146.14	33	0.84
TEFF-32	30-Jul-14	0.18	2.85	111.56	8.77	1.15	7.82	132.33	30	0.87
TEFF-33	30-Aug-14	3.46	7.12	131.05	12.06	9.01	20.60	183.30	38	0.84
TEFF-34	30-Aug-14	4.79	8.63	109.40	7.12	2.97	37.71	170.63	36	0.90
TEFF-35	14-Sep-14	13.65	3.31	116.44	5.81	4.86	6.65	150.72	33	0.85
TEFF-36	14-Sep-14	9.35	6.23	153.33	11.22	1.27	9.41	190.81	29	0.82

Table 3.5-1. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Meadowbank study lakes, 2014.

Area-Replicate	Date	Phytoplankton Biomass (mg/m^3)							Other	
		Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	TOTAL	# Species	Simp.Div.
INUG-58	30-Jul-14	0.13	8.33	176.72	11.95	3.63	2.34	203.09	35	0.85
INUG-59	30-Jul-14	0.69	3.77	211.06	9.23	1.52	18.29	244.56	37	0.86
INUG-60	3-Sep-14	1.08	8.42	133.72	6.26	3.28	10.37	163.12	38	0.90
INUG-61	3-Sep-14	0.55	8.58	183.40	4.83	10.47	26.60	234.42	36	0.85
INUG-62	21-Sep-14	0.37	3.12	125.53	5.39	11.74	4.03	150.18	36	0.83
INUG-63	21-Sep-14	0.19	2.30	158.49	9.55	5.82	3.11	179.47	32	0.77
INUG-64	30-Nov-14	0.00	1.13	26.29	14.19	2.82	0.13	44.57	28	0.80
INUG-65	30-Nov-14	0.00	2.93	39.46	3.55	7.48	4.91	58.34	23	0.87
INUG-66	19-Dec-14	0.00	0.53	16.02	3.77	2.52	0.00	22.84	15	0.81
INUG-67	19-Dec-14	0.00	0.34	6.97	0.79	4.98	9.51	22.58	17	0.80
PDL-31	30-Jul-14	0.45	2.78	101.39	6.35	1.94	13.93	126.83	30	0.84
PDL-32	30-Jul-14	0.20	2.44	109.24	31.73	1.36	14.32	159.29	29	0.82
PDL-33	3-Sep-14	2.11	9.45	154.76	13.42	2.56	16.68	198.97	39	0.86
PDL-34	3-Sep-14	1.70	13.65	142.93	25.86	3.38	20.62	208.13	37	0.89
PDL-35	10-Sep-14	0.83	4.10	110.75	23.17	4.15	20.10	163.08	34	0.80
PDL-36	10-Sep-14	0.98	9.85	98.46	28.12	2.99	32.44	172.84	42	0.87
WAL-39	26-Jul-14	0.44	10.89	194.84	12.65	25.25	17.63	261.69	36	0.86
WAL-40	26-Jul-14	10.55	11.44	151.53	11.11	21.75	23.57	229.95	40	0.83
WAL-41	27-Aug-14	0.00	7.93	153.58	14.66	13.28	27.56	217.00	36	0.87
WAL-42	27-Aug-14	0.00	10.85	159.48	26.34	32.79	43.09	272.54	45	0.89
WAL-43	22-Sep-14	0.00	8.22	135.39	7.53	24.61	11.49	187.24	34	0.81
WAL-44	22-Sep-14	0.03	4.26	106.37	13.54	31.30	10.68	166.18	37	0.81
WAL-45	2-Nov-14	0.00	3.69	79.98	23.43	5.63	6.33	119.07	28	0.85
WAL-46	2-Nov-14	0.36	1.81	77.61	19.07	35.10	0.20	134.15	28	0.87
WAL-47	18-Dec-14	0.00	0.31	8.19	7.90	1.34	0.64	18.38	11	0.57
WAL-48	18-Dec-14	0.00	0.59	4.97	17.67	0.29	2.50	26.02	13	0.76
Relative Density or Biomass (%)		**1.0**	**4.3**	**69**	**11**	**6.4**	**8.1**			

Table 3.5-2. Results of BACI test for phytoplankton variables at Meadowbank areas.

Parameter Measured	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
Total biomass	TPN	7	5	-0.16	0.19	0.429	-15	-45	31
	TPE	8	5	0.19	0.19	0.339	20	-20	81
	SP	6	5	0.19	0.23	0.449	20	-29	105
	TPS	21	3	-0.37	0.32	0.249	-31	-64	32
	TE	6	5	0.16	0.17	0.373	17	-20	72
	TEFF	14	3	-0.04	0.16	0.813	-4	-32	36
	WAL	19	5	0.34	0.2	0.101	40	-7	110
Species	TPN	7	5	-0.1	0.09	0.307	-9	-26	11
	TPE	8	5	-0.07	0.05	0.212	-7	-18	5
	SP	6	5	0.02	0.08	0.837	2	-16	23
	TPS	21	3	-0.28	0.09	**0.006**	-24	-37	-8
	TE	6	5	0.01	0.1	0.906	1	-19	26
	TEFF	14	3	-0.02	0.06	0.740	-2	-13	11
	WAL	19	5	-0.03	0.06	0.626	-3	-15	11

Notes:

*** Bolded** values are P-values < 0.1

Shaded cells indicate negative effect sizes (reductions) of 20% or more

Test station = station 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

Table 3.5-3. Phytoplankton density (cells/L), biomass (mg/m^3), and diversity by major taxa group, Baker Lake, 2014.

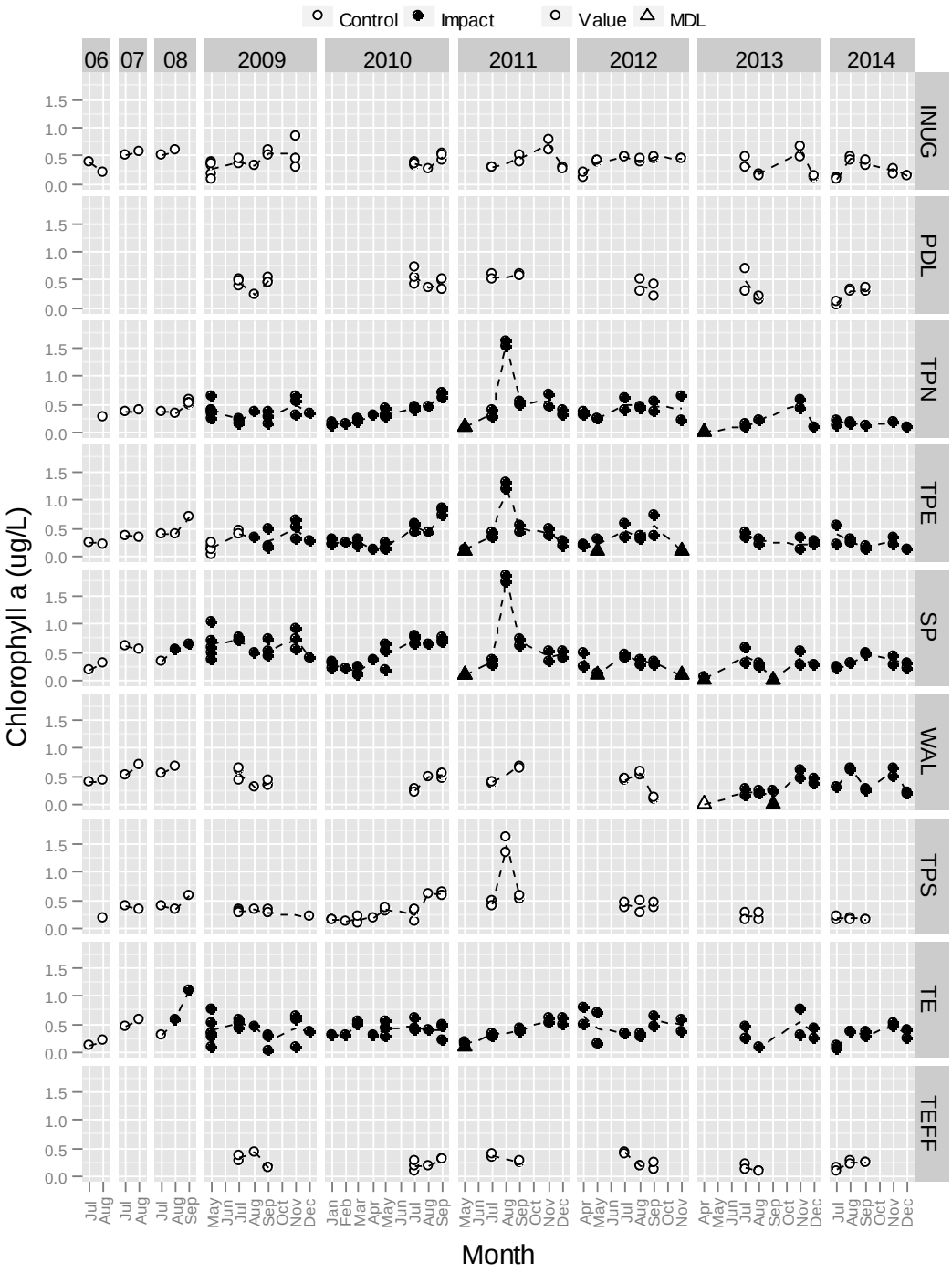
Area-Replicate	Date	Phytoplankton Density (cells/L)							Phytoplankton Biomass (mg/m^3)							Other	
		Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	TOTAL	Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	TOTAL	# Species	Simp.Div.
BAP-31	22-Jul-14	0	230288	1768864	324944	166832	8784	2499712	0.00	4.92	124.84	28.07	17.02	15.82	190.67	35	0.77
BAP-32	22-Jul-14	0	215520	2193320	209432	540000	8184	3166456	0.00	5.61	171.02	42.96	71.68	6.90	298.17	34	0.76
BAP-33	31-Aug-14	161048	344832	1237248	241520	137296	8184	2130128	2.23	10.16	104.48	21.44	17.84	12.01	168.16	37	0.88
BAP-34	31-Aug-14	17168	488912	1359976	180680	50488	15568	2112792	0.83	11.42	122.59	18.94	6.01	14.01	173.80	37	0.88
BAP-36	19-Sep-14	7000	222904	1404280	263168	259024	600	2156976	1.51	8.25	105.23	24.39	22.65	2.06	164.09	33	0.78
BBD-31	22-Jul-14	0	147080	2320432	88040	164248	17368	2737168	0.00	6.40	157.83	15.46	18.87	33.71	232.27	40	0.84
BBD-32	22-Jul-14	0	194768	2133848	38152	233688	3800	2604256	0.00	5.10	138.96	14.18	22.69	29.65	210.58	36	0.83
BBD-33	31-Aug-14	800	720600	999376	69104	228904	9784	2028568	0.11	14.21	60.35	29.09	36.42	10.34	150.51	39	0.89
BBD-34	31-Aug-14	0	547384	820176	64688	211936	14968	1659152	0.00	9.00	65.42	11.92	30.85	6.83	124.02	36	0.89
BBD-35	19-Sep-14	2400	569336	1170992	97240	198568	1800	2040336	0.71	18.68	68.17	21.37	23.01	10.59	142.52	44	0.90
BBD-36	19-Sep-14	1800	224104	1516224	95440	138896	1800	1978264	0.53	8.63	102.96	16.40	16.06	7.21	151.80	37	0.80
BPJ-31	22-Jul-14	200	337848	1472720	68104	155064	3000	2036936	0.05	10.35	103.22	18.85	15.87	32.36	180.70	38	0.86
BPJ-32	22-Jul-14	0	201352	2406840	118776	106576	10984	2844528	0.00	5.11	180.89	21.83	15.45	32.88	256.16	35	0.84
BPJ-33	31-Aug-14	1600	539400	1028112	76472	180600	400	1826584	0.19	7.77	86.59	12.51	24.88	1.85	133.78	36	0.87
BPJ-34	31-Aug-14	73640	388336	1057048	189664	374368	1200	2084256	0.95	7.12	67.81	44.99	49.69	8.49	179.06	40	0.88
BPJ-35	19-Sep-14	3200	258624	1179176	314928	61672	1200	1818800	0.61	10.89	82.28	18.31	9.28	3.86	125.22	29	0.84
BPJ-36	19-Sep-14	7200	409888	1602232	232384	259824	2200	2513728	1.76	18.95	103.20	35.49	25.22	11.19	195.79	39	0.87
Relative Density or Biomass (%)		**0.7**	**16**	**67**	**7.0**	**9.1**	**0.3**		**0.3**	**5.3**	**60**	**13**	**14**	**7.8**			

Table 3.5-4. Results of BACI tests for phytoplankton variables at Baker Lake areas.

Parameter Measured	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
Total biomass	BBD	16	3	-0.20	0.18	0.278	-18	-44	19
	BPJ	16	3	-0.10	0.16	0.551	-9	-35	27
Species	BBD	16	3	0.06	0.05	0.259	6	-5	19
	BPJ	16	3	-0.01	0.05	0.843	-1	-11	11

Notes:
*** Bolded** values are P-values < 0.1
Shaded cells indicate negative effect sizes (reductions) of 20% or more
Test station = station 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 3.5-1. Chlorophyll-*a* (µg/L) in water samples from Meadowbank study lakes since 2006.



*__Note__: Chlorophyll-*a* data from 2014 were potentially compromised due to sample transport issues (see **Section 3.1.1**).

Figure 3.5-2. Total phytoplankton biomass (mg/m^3) from Meadowbank study lakes since 2006.

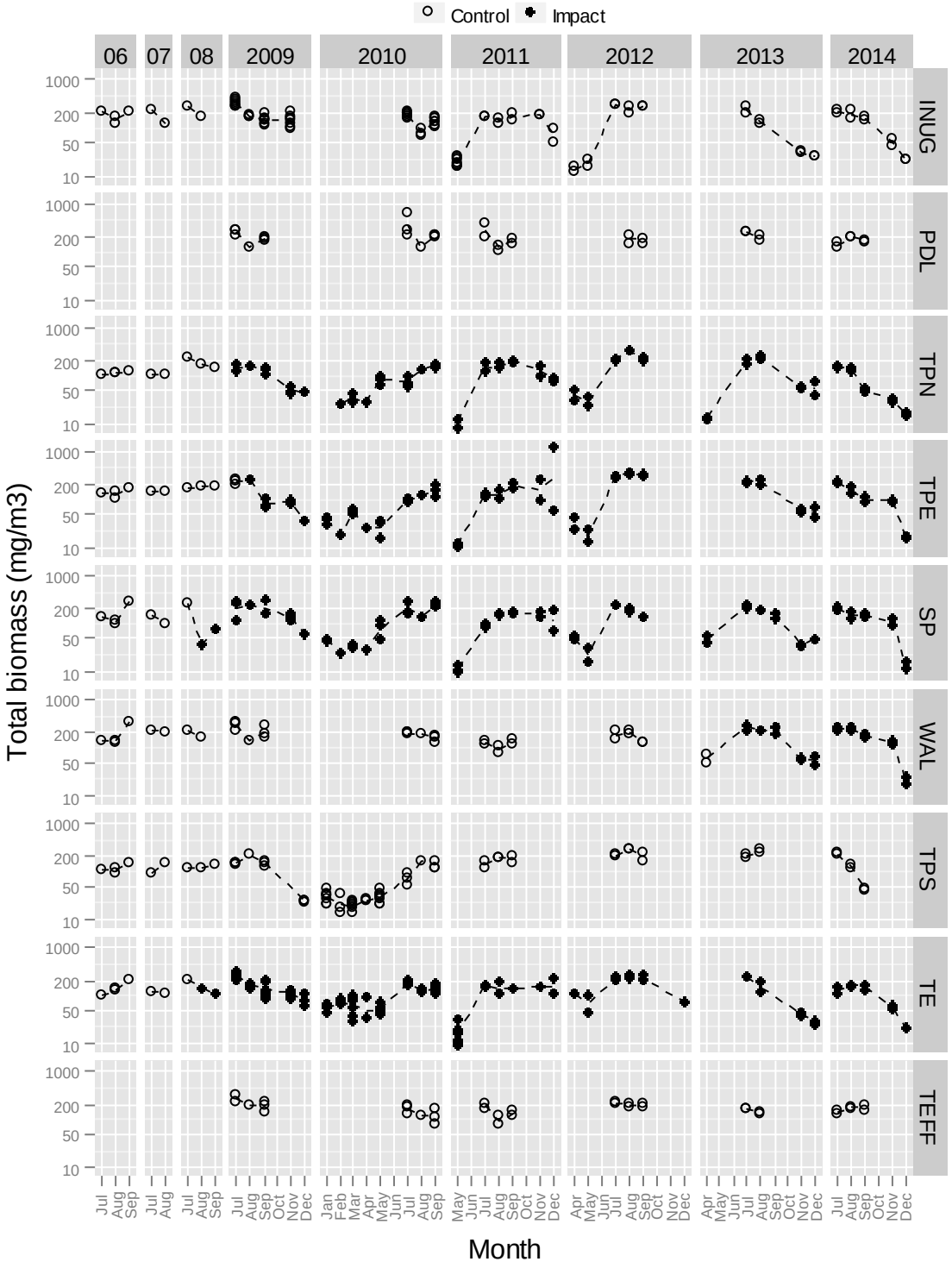


Figure 3.5-3. Phytoplankton biomass (mg/m^3) by major taxa group from Meadowbank study lakes since 2006.



Figure 3.5-4. Phytoplankton relative biomass by major taxa group from Meadowbank study lakes since 2006.

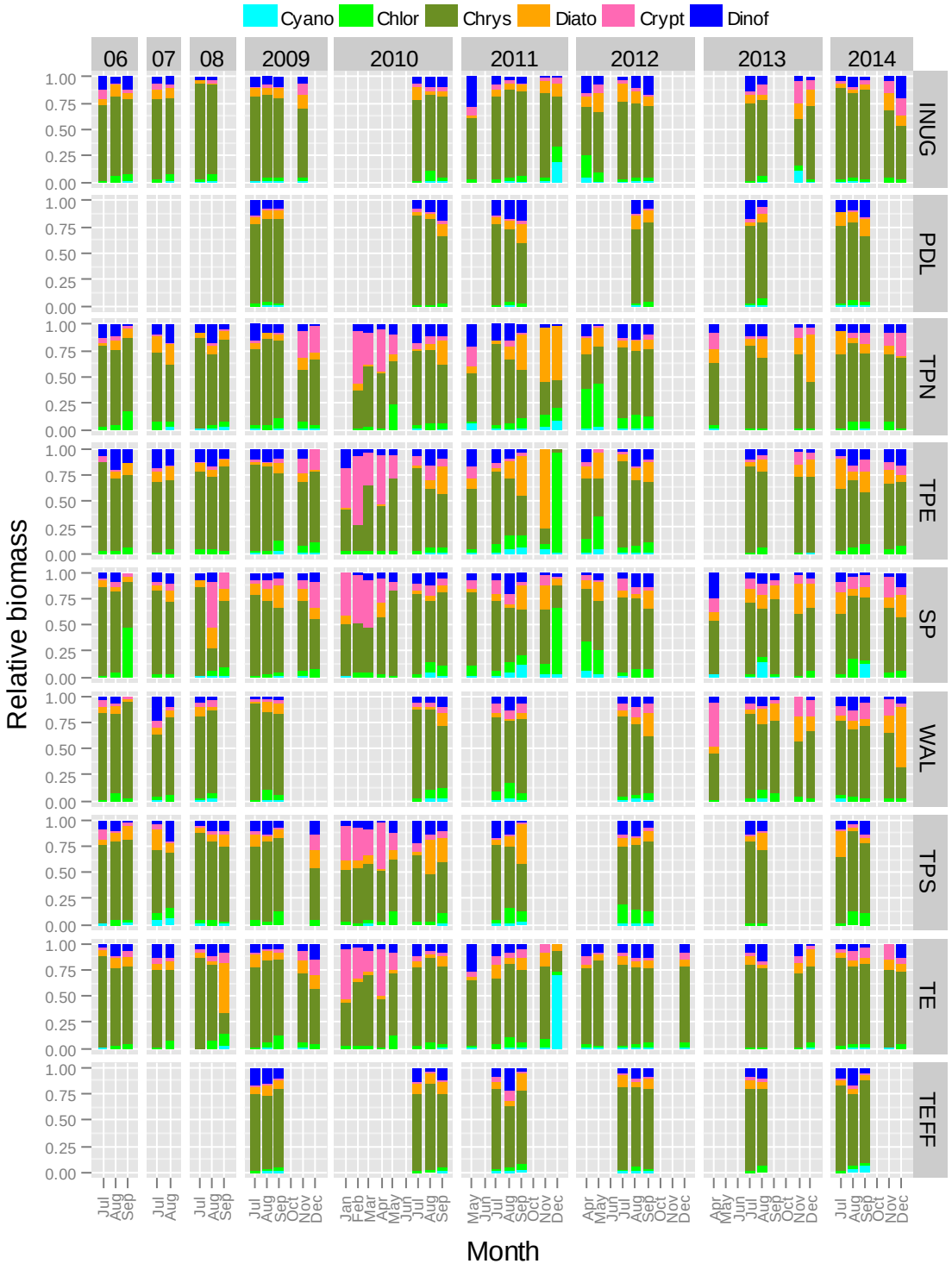


Figure 3.5-5. Phytoplankton species richness from Meadowbank study lakes since 2006.

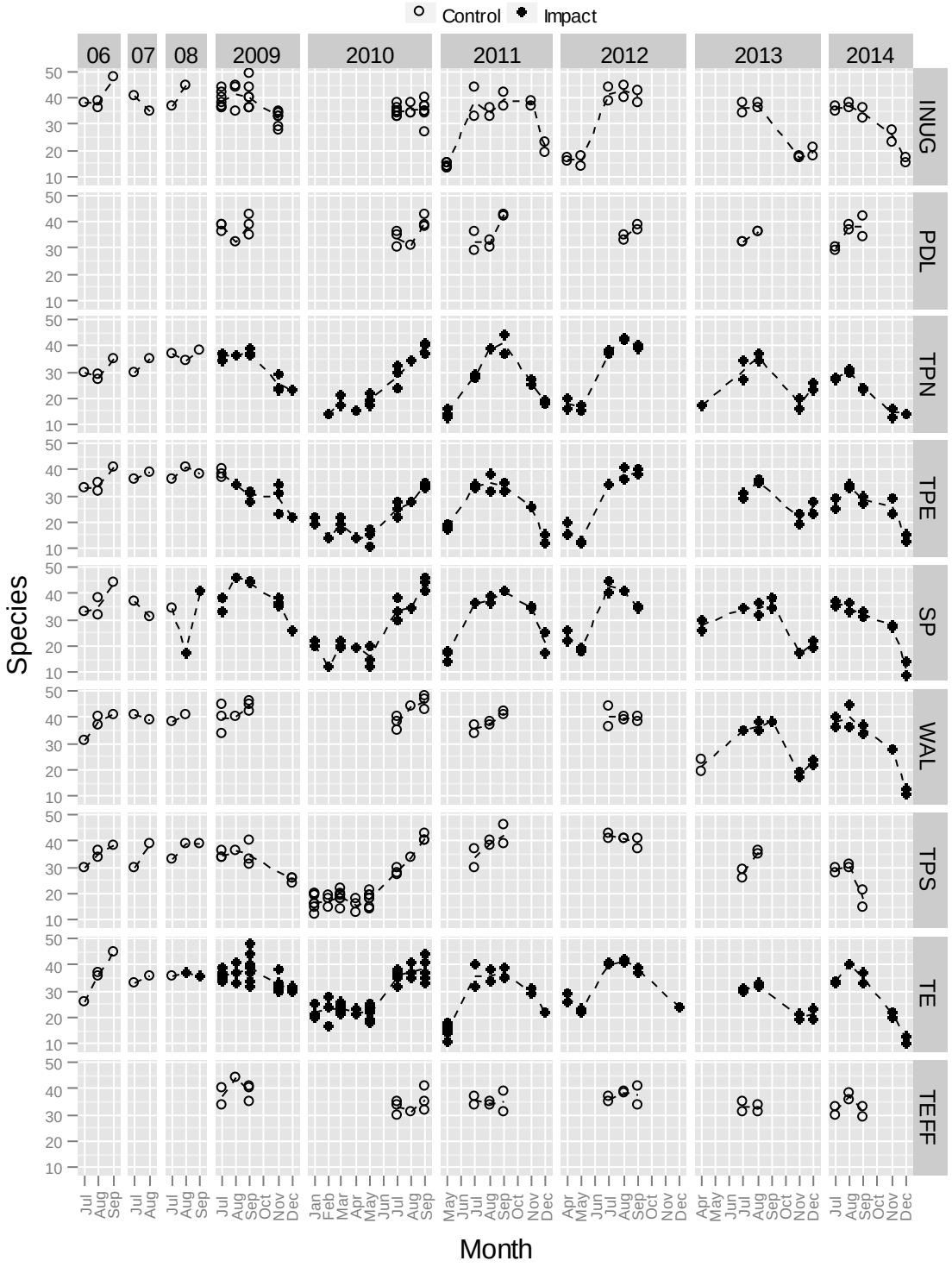
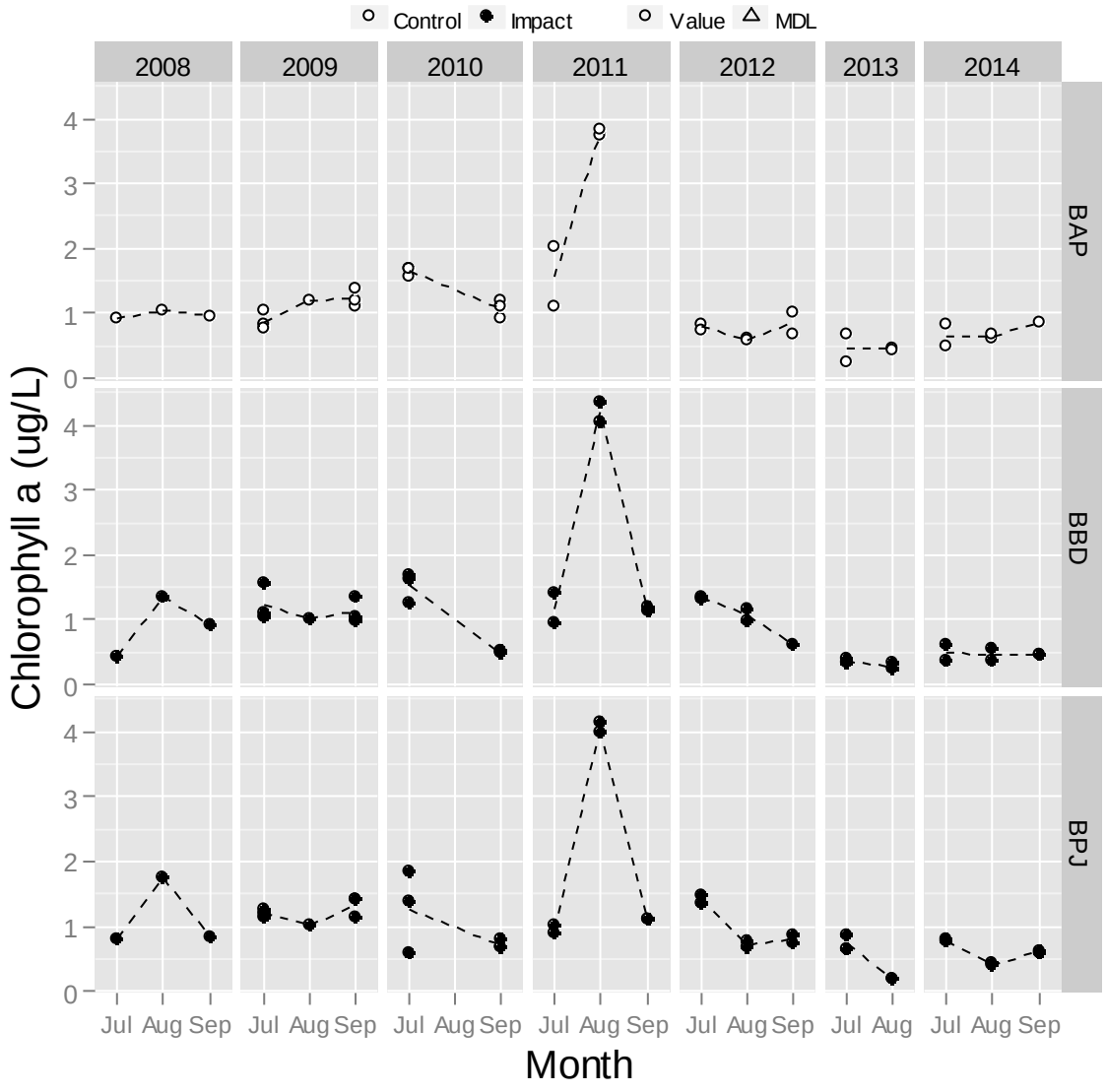


Figure 3.5-6. Chlorophyll-*a* (µg/L) in water samples from Baker Lake since 2008.



*__Note__: Chlorophyll-*a* data from 2014 were potentially compromised due to sample transport issues (see **Section 3.1.1**).

Figure 3.5-7. Total phytoplankton biomass (mg/m^3) from Baker Lake since 2008.

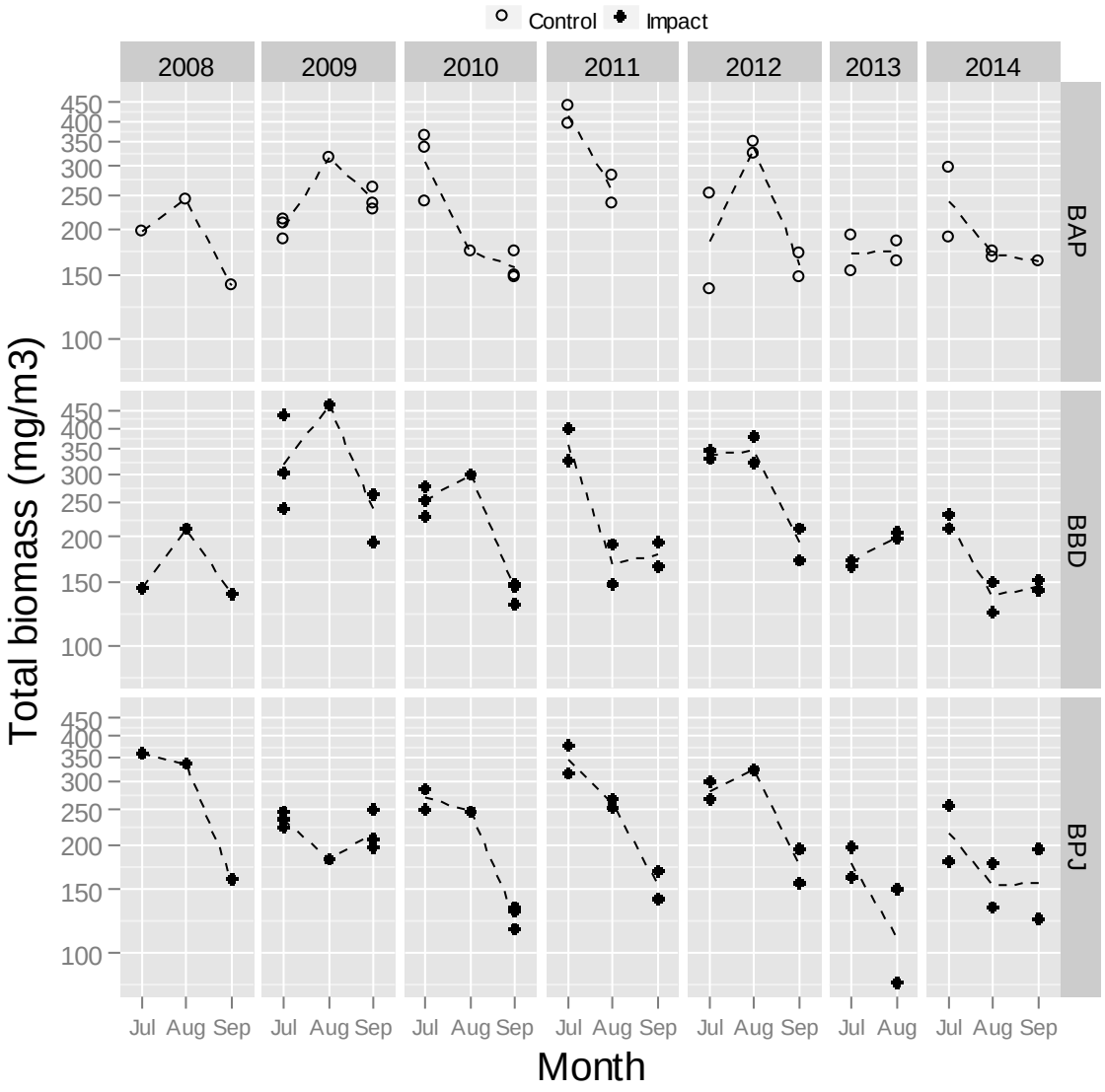


Figure 3.5-8. Phytoplankton biomass (mg/m^3) by major taxa group from Baker Lake since 2008.

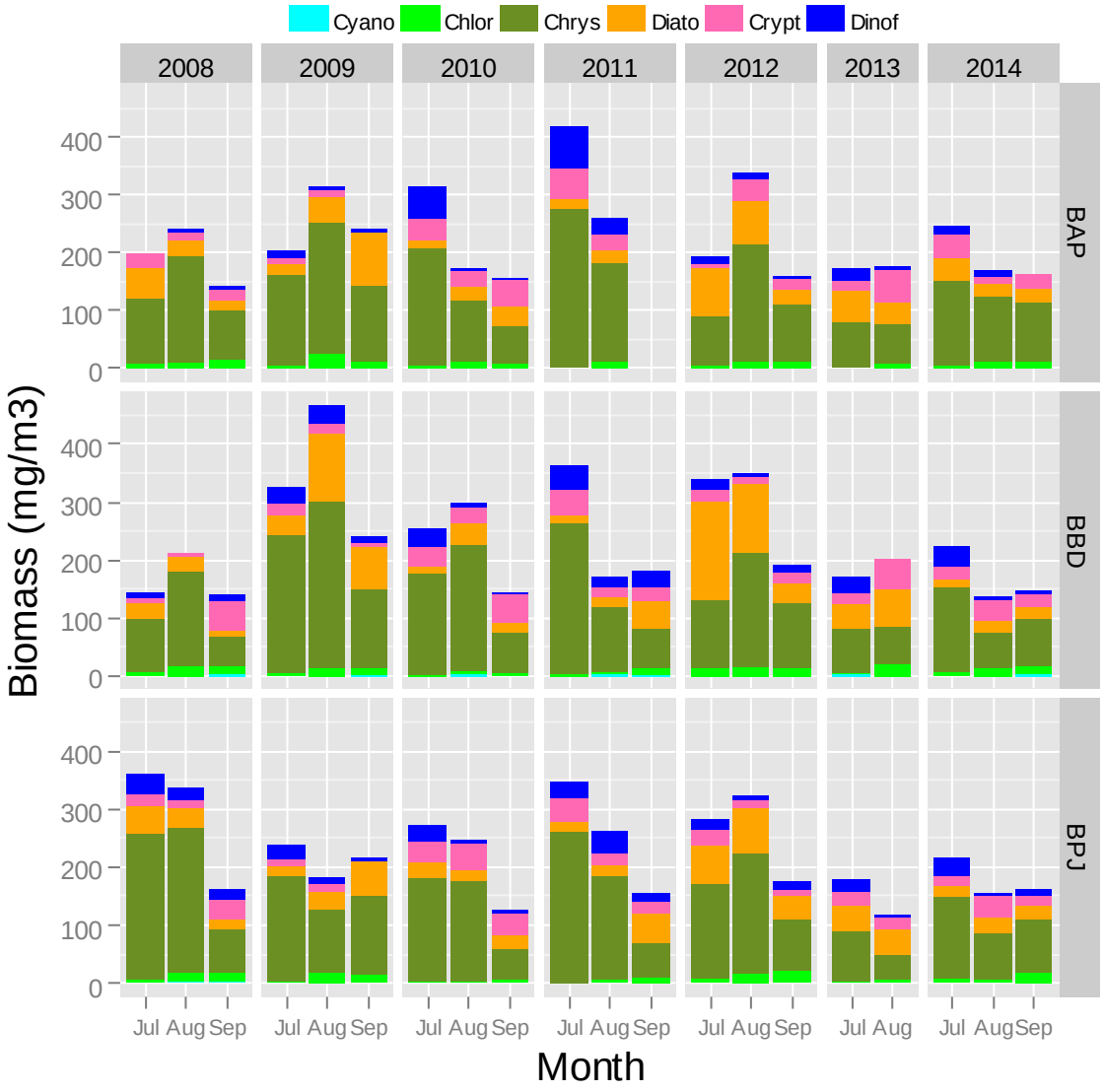


Figure 3.5-9. Phytoplankton relative biomass by major taxa group from Baker Lake since 2008.

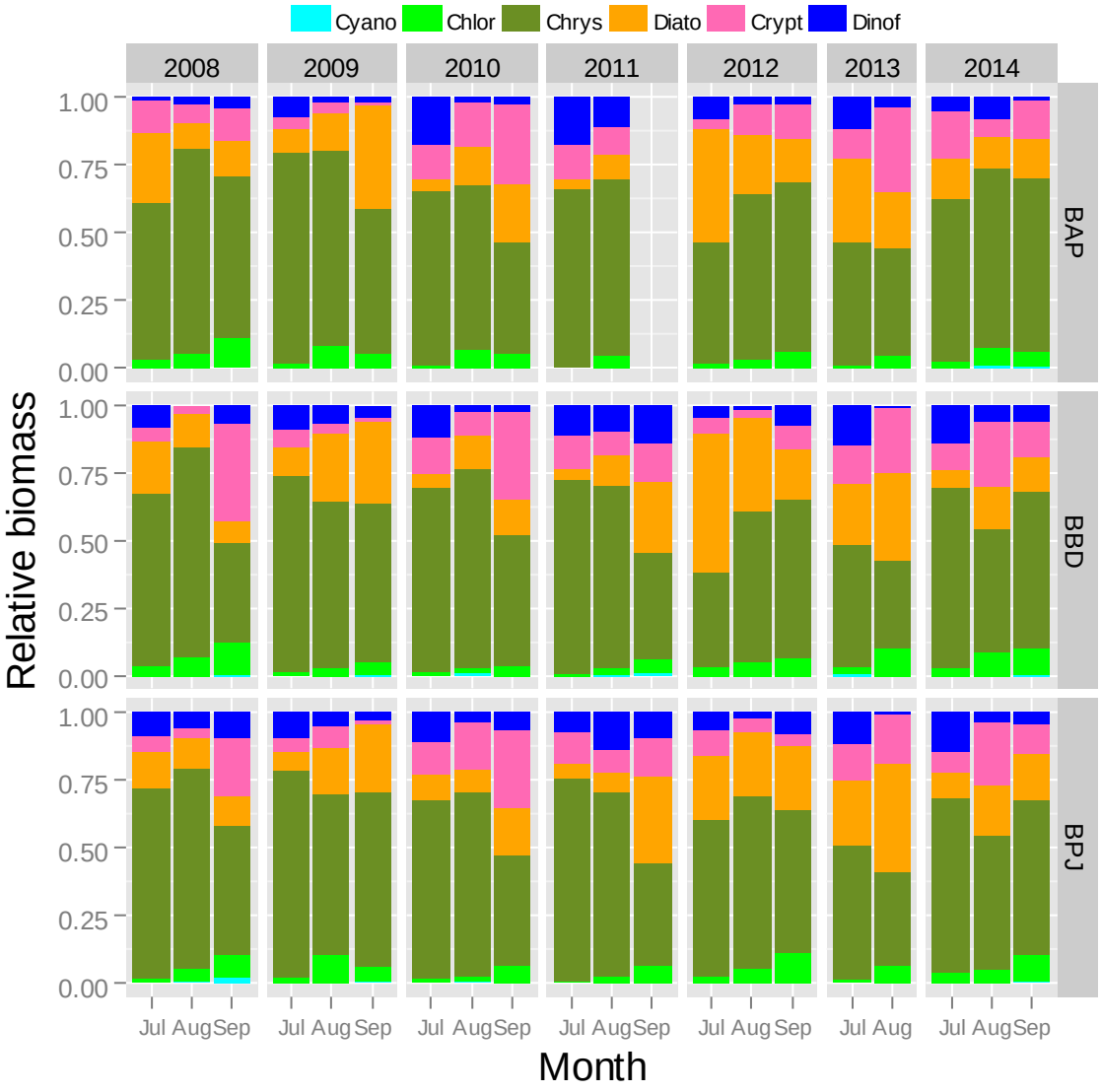
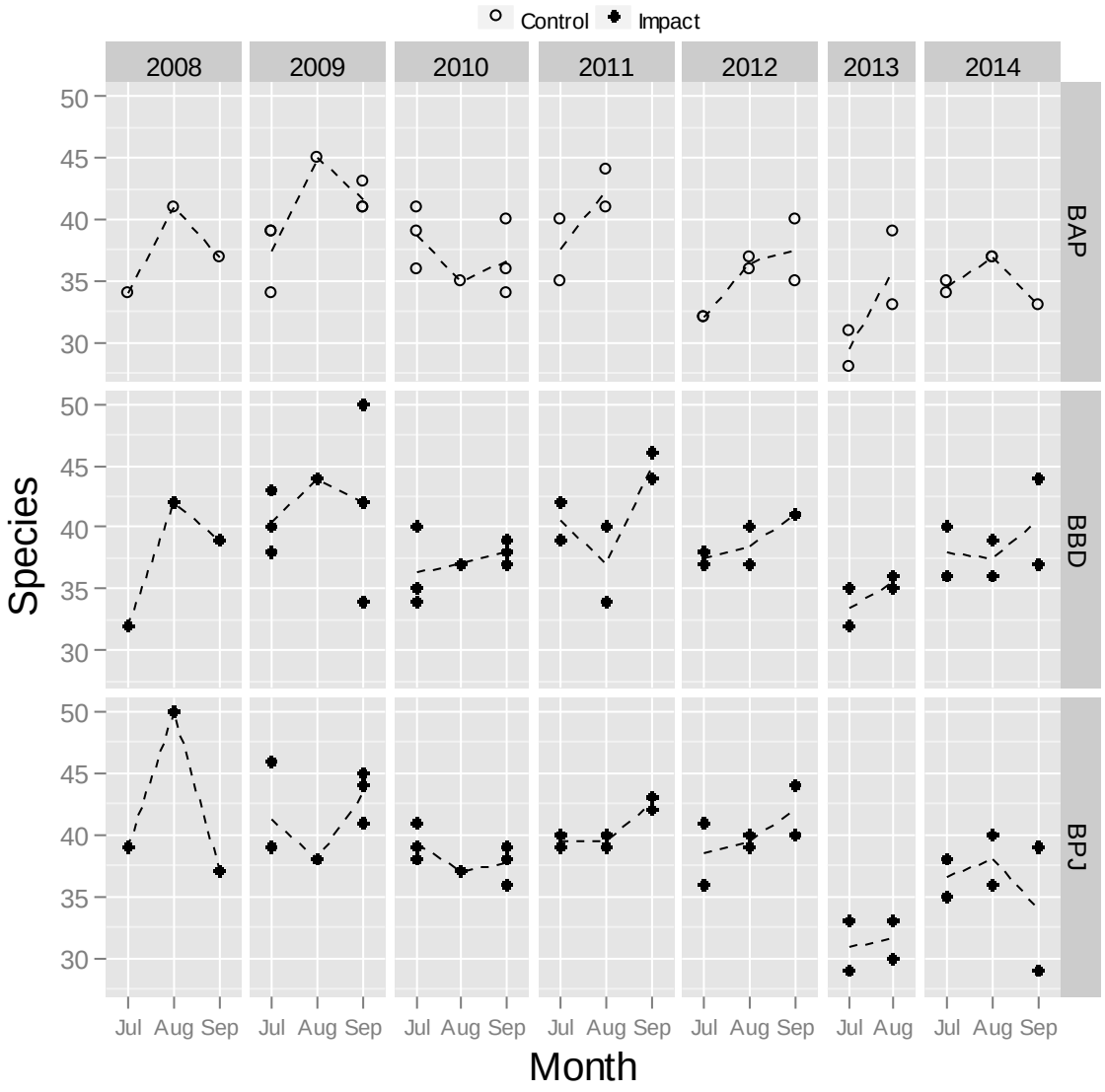


Figure 3.5-10. Phytoplankton species richness from Baker Lake since 2008.



3.6. Benthic Invertebrates

3.6.1. Meadowbank Study Lakes

3.6.1.1. 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.

Low productivity and low nutrient cycling result in a benthic community characterized by low abundance and relatively low taxa richness. Benthos abundance was typically less than 2,000 organisms/m^2 and was often less than 1,000 organisms/m^2 (e.g., **Figures 3.6-1 and 3.6-2**). Annual variability was sometimes high and spatially discrete, as seen at WAL and TPE in 2006 to 2008. There have also been fairly consistent spatial differences in abundance among lakes. For example, biomass in SP and TE has been lower than in other lakes and higher in WAL since baseline monitoring began in 2006 and 2007. Taxa richness typically ranged from 8 to 12 for most area-year combinations (e.g., **Figures 3.6-4 and 3.6-5**).

Typical of most Arctic lakes, the benthic invertebrate community has been generally dominated by the aquatic larval stages of insects, especially chironomids (Family Chironomidae), both in terms of abundance and taxa richness (e.g., **Figures 3.6-2, 3.6-3, 3.6-5, and 3.6-6**). 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. Epibenthic insects such as mayflies and stoneflies are not common in the project lakes.

3.6.1.2. Temporal and Spatial Trend Interpretation

The 2014 results are summarized in **Tables 3.6-1** (Meadowbank) and **Table 3.6-2** (Baker Lake) (raw data are provided in **Appendix H**), and included in the time series graphs (**Figures 3.6-1 to 3.6-12**) that target the following endpoints (descriptions 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.

Other endpoints that are presented in **Appendix I** but not discussed in detail in the text are:

- *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.
- *Bray-Curtis Index* – 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.

As discussed in **Sections 1.4 and 1.5**, the identification of potential mine-related impacts generally involved visually examining the data for spatial/temporal patterns that matched mine-related events (see **Section 1.4** for details). This was augmented by conducting statistical analyses of the 2014 data to test for changes relative to baseline/reference conditions using the BACI model (see **Section 2.4.4** for details); this included 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 2014 results and trends over the last four years. BACI model results for benthic invertebrate abundance and richness are presented in **Tables 3.6-3 and 3.6-4**, respectively. Key results are described below:

- *Total abundance* – The 2013 BACI results were strongly affected by the relatively 'good' or productive sample results at the reference area INUG, resulting in an apparent 'decrease' in relative productivity at a number of near-field areas in the BACI analysis. The opposite occurred in 2014. Mean abundance at reference area INUG was much reduced in 2014 relative to last year (**Figure 3.6-1**). Similar drops were also seen at PDL and TPN and to a lesser extent at TPS. Despite total

abundance at nearly all near-field and mid-field areas tracking within baseline ranges, the BACI results (i.e., comparing actual to expected based on reference/baseline conditions; **Table 3.6-3**) showed large apparent "increases" (ranging from 46 to 425%) relative to reference/baseline conditions in 2014 at all areas except TPN (which showed a relative drop of 37%). The longer-term BACI tests showed some decreases over time (e.g., TPN, TPE and WAL in 2013-2014; TE and WAL in 2012-2014; TPN, TPE, TE, TEFF, and WAL in 2012-2014), but none were statistically significant. 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. The results for WAL suggest that natural variability is likely responsible for the observed changes here; the largest effect size and smallest p-value for WAL were for the 2011-2014 period (i.e., two of those years were actually prior to the onset of mine development in Vault Lake). Similarly, **Figure 3.6-1** shows that while the other three near-field areas (TPN, TPE and SP) have also been variable over time, there is no clear mining-related pattern (i.e., a clear diminishment in abundance and/or species diversity) in the results.

- *Major taxa group abundance and relative abundance* – As expected, insects dominated across areas, followed by molluscs (**Figures 3.6-2 and 3.6-3**). 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).

- *Taxa richness* – Similar to total abundance, the 2013 BACI results were strongly affected by the relatively productive samples at the reference area INUG (i.e., resulting in the apparent "decreases" seen at a number of areas in 2013). The opposite occurred in 2014, with mean taxa richness at reference area INUG dropping sharply relative to 2013 to the lowest level in five years (**Figure 3.6-4**). This is likely a result of natural variability and variability associated with differential hatching of certain chironomid species and small surface area of sediment sampled by grabs. As a consequence, the BACI results (**Table 3.6-4**) showed no statistically significant decreases in richness at near-field areas (TPN, TPE, SP, and WAL) in 2014. The longer term results (i.e., for 2, 3 and 4-yr after periods) consistently show 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%) (**Figures 3.6-5 and 3.6-6**). There were no apparent trends in composition related to mining.

The 2014 results generally contrasted the pattern observed in 2013, when apparent "decreases" in total abundance were identified for most areas in 2013 due to anomalously high abundance at reference area INUG. In 2014, sharp decreases at the main reference area INUG (and PDL) resulted in an apparent "increase" in population metrics at most near-field areas (SP, TPE and WAL). Total abundance and richness at those areas tracked within (TPE, WAL) or above (SP) historic baseline ranges. TPN, the only exception, was similar to the reference areas, but still showed a moderate (but not statistically significant) decrease in total abundance (37%). Given that effluent discharge into TPN was only conducted between June 10 and July 5 in 2014, it seems unlikely that the observed pattern was related to mining. Previous years had much higher effluent discharges without any adverse changes to the benthic community in TPN. Notwithstanding, TPN, INUG and PDL were all sampled as part of the EEM program in 2014, so will be subject to additional analysis and interpretation (the document is due in June 2015). The conclusions from the EEM study and the 2015 results should be reviewed next year with this apparent "trend" in mind. This trend should be tracked for 2015.

3.6.2. Baker Lake

3.6.2.1. General Observations

As discussed in **Section 3.6.1.1**, the abundance and species composition of benthic invertebrates is strongly affected by a variety of parameters, the most important of which are grain size, water depth and organic content of the sediment. 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). However, in Baker Lake, sediment grain size 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. Higher sand content is also typically associated with a lower TOC concentration and a different benthic community. However, this area of Baker Lake appears to be naturally quite sandy, so this represents the 'typical' condition and this is what was sampled. For perspective, the reference areas BAP and BES sediment contain about 60 – 70% sand, while the impact areas at BBD (50 – 65% sand) and BPJ (10 – 40% sand) have a smaller sand component and relatively more silt-clay.

Similar to Meadowbank study lakes, the Baker Lake benthic community is generally characterized by relatively low abundance and taxa richness. Benthos abundance was typically around 5,000 organisms/m^2, which is higher than typical numbers (~2,000/m^2) at Meadowbank (e.g., **Figures 3.6-7 and 3.6-8)**. 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., **Figures 3.6-10 and 3.6-11**).

Typical of most Arctic lakes, the benthic invertebrate community has been generally dominated by the aquatic larval stages of insects, especially chironomids (Family Chironomidae), both in terms of abundance and taxa richness (**Figures 3.6-8, 3.6-9, 3.6-11 and 3.6-12**). The next most abundant group was typically Mollusca (clams) especially, *Cyclocalyx / Neopisidium*, genera of the family Sphaeriidae (fingernail clams). Oligochaete worms were also 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.

3.6.2.2. 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.

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 2014 results and trends over the last four years. BACI model (see **Section 2.4.4**) results for benthic invertebrate abundance and richness are presented in **Tables 3.6-5 and 3.6-6**, respectively. Key results are described below:

- *Total abundance* – Mean abundance at all areas was generally similar in 2014, as in previous years (**Figure 3.6-7**). Reference area BAP increased to an all-time high abundance in 2014, which resulted in 'apparent' decreases at both near-field areas, despite BPJ actually increasing relative to 2013. Consequently, BACI model results (**Table 3.6-5**) showed a 42% decrease at BBD and 4% decrease at BPJ in 2014 relative to reference area BAP; neither change was statistically significant. Furthermore, the second reference area BES also showed a slight drop in abundance relative to 2013. Longer-term BACI results were variable and showed no consistent patterns over time and were not statistically significant. Overall, temporal trends seen at BBD and BPJ (**Figure 3.6-7**) show no clear development-related patterns since 2008.
- *Major taxa group abundance and relative abundance* – Impact areas BBD and BPJ are dominated by insects and the taxonomic community is different than BAP

(apart from 2008; **Figures 3.6-8 and 3.6-9**). Since 2009, between approximately 25 to 60% of individuals at BAP have been oligochaetes, compared to <10% at the other areas. Notwithstanding, compositional patterns have been fairly consistent within each area over the years suggesting no development-related changes.

- *Taxa richness* – Mean taxa richness was generally consistent with historical values at all areas in 2014 (**Figure 3.6-10**). The BACI model results showed no decreasing taxa richness at either of the two near-field areas across all time period lengths (i.e., one-year to four-year "after" periods) (**Table 3.6-6**).
- *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 (**Figures 3.6-11 and 3.6-12**). There were no apparent trends in composition related to mining.

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 3.6-1. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Meadowbank study lakes, August 2014.

Area-Replicate	Date	Depth (m)	Total Abundance (#/m^2)				Total	Total Richness (# taxa)				Total
			Oligochaetes	Insects	Molluscs	Other Taxa		Oligochaetes	Insects	Molluscs	Other Taxa	
Inuggugayualik Lake												
INUG-1	23-Aug-14	7.0	0	435	152	0	587	0	7	1	0	8
INUG-2	23-Aug-14	6.5	0	261	87	0	348	0	5	2	0	7
INUG-3	23-Aug-14	7.4	22	261	130	0	413	1	5	2	0	8
INUG-4	23-Aug-14	8.5	43	913	543	22	1522	1	8	3	1	13
INUG-5	23-Aug-14	8.5	22	413	283	0	717	1	8	2	0	11
	Area Mean		***17***	***457***	***239***	***4***	***717***	***1***	***7***	***2***	***0***	***9***
Pipedream Lake												
PDL-1	23-Aug-14	6.5	0	391	43	22	457	0	3	1	1	5
PDL-2	23-Aug-14	6.7	22	413	348	0	783	0	3	2	0	5
PDL-3	23-Aug-14	8.5	65	196	65	0	326	0	2	1	0	3
PDL-4	23-Aug-14	8.5	43	109	174	22	348	1	2	1	1	5
PDL-5	23-Aug-14	6.8	87	326	152	22	587	1	4	2	1	8
	Area Mean		***43***	***287***	***157***	***13***	***500***	***0***	***3***	***1***	***1***	***5***
Second Portage Lake												
SP-1	2-Sep-14	8.4	0	2174	348	87	2609	0	10	2	3	15
SP-2	2-Sep-14	7.3	0	1130	587	87	1804	0	6	2	4	12
SP-3	2-Sep-14	8.8	22	2087	457	65	2630	1	7	2	2	12
SP-4	2-Sep-14	8.2	22	3978	500	130	4630	1	10	1	3	15
SP-5	2-Sep-14	9.4	22	2413	391	152	2978	0	7	1	4	12
	Area Mean		***13***	***2357***	***457***	***104***	***2930***	***0***	***8***	***2***	***3***	***13***
Tehek Lake												
TE-1	30-Aug-14	6.8	130	826	261	43	1261	2	7	1	2	12
TE-2	30-Aug-14	8.0	22	565	543	65	1196	1	5	1	2	9
TE-3	30-Aug-14	9.5	22	478	370	87	957	1	4	1	2	8
TE-4	30-Aug-14	8.2	43	1152	326	22	1543	1	3	1	1	6
TE-5	30-Aug-14	8.8	0	478	370	87	935	0	6	1	2	9
	Area Mean		***43***	***700***	***374***	***61***	***1178***	***1***	***5***	***1***	***2***	***9***

Table 3.6-1. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Meadowbank study lakes, August 2014.

Area-Replicate	Date	Depth (m)	Total Abundance (#/m^2)				Total	Total Richness (# taxa)				Total
			Oligochaetes	Insects	Molluscs	Other Taxa		Oligochaetes	Insects	Molluscs	Other Taxa	
Tehek Lake - Farfield												
TEFF-1	30-Aug-14	8.8	22	870	217	109	1217	1	8	1	2	12
TEFF-2	30-Aug-14	6.9	65	1326	565	87	2043	0	11	1	2	14
TEFF-3	30-Aug-14	9.0	43	457	130	0	630	1	5	2	0	8
TEFF-4	30-Aug-14	8.0	0	391	217	109	717	0	6	2	2	10
TEFF-5	30-Aug-14	7.6	0	370	109	22	500	0	6	1	1	8
	Area Mean		***26***	***683***	***248***	***65***	***1022***	***0***	***7***	***1***	***1***	***10***
Third Portage Lake - East Basin												
TPE-1	26-Aug-14	7.3	87	1783	717	87	2674	1	8	1	3	13
TPE-2	26-Aug-14	8.1	22	1717	370	0	2109	1	7	1	0	9
TPE-3	26-Aug-14	7.4	196	2174	1065	22	3457	2	8	1	1	12
TPE-4	26-Aug-14	6.5	196	2391	1022	0	3609	2	9	1	0	12
TPE-5	26-Aug-14	7.4	43	1739	739	43	2565	1	6	1	1	9
	Area Mean		***109***	***1961***	***783***	***30***	***2883***	***1***	***8***	***1***	***1***	***11***
Third Portage Lake - North Basin												
TPN-1	22-Aug-14	7.0	0	609	22	22	652	0	5	1	1	7
TPN-2	22-Aug-14	9.0	0	65	0	0	65	0	2	0	0	2
TPN-3	22-Aug-14	7.4	43	543	239	0	826	2	6	1	0	9
TPN-4	22-Aug-14	9.0	0	413	87	0	500	0	7	1	0	8
TPN-5	22-Aug-14	8.5	0	326	43	43	413	0	4	1	1	6
	Area Mean		***9***	***391***	***78***	***13***	***491***	***0***	***8***	***1***	***0***	***6***
Third Portage Lake - South Basin												
TPS-1	27-Aug-14	9.2	0	674	130	0	804	0	9	1	0	10
TPS-2	27-Aug-14	8.8	43	870	348	0	1261	1	7	1	0	9
TPS-3	27-Aug-14	9.0	22	435	196	0	652	1	8	1	0	10
TPS-4	27-Aug-14	7.9	348	1783	1587	0	3717	2	11	1	0	14
TPS-5	27-Aug-14	7.7	22	848	217	0	1087	1	9	1	0	11
	Area Mean		***87***	***922***	***496***	***0***	***1504***	***1***	***9***	***1***	***0***	***11***
Wally Lake												
WAL-1	28-Aug-14	9.2	0	2717	543	43	3304	0	9	2	2	13
WAL-2	28-Aug-14	8.4	0	1370	435	43	1848	0	7	2	2	11
WAL-3	28-Aug-14	9.0	0	2739	696	65	3500	0	9	2	2	13
WAL-4	28-Aug-14	8.0	0	1130	152	43	1326	0	5	2	1	8
WAL-5	28-Aug-14	8.9	0	1543	348	22	1913	0	7	2	1	10
	Area Mean		***0***	***1900***	***435***	***43***	***2378***	***0***	***7***	***2***	***2***	***11***

Table 3.6-2. Benthic invertebrate abundance (#/m^2) and richness (# taxa) by major taxa group, Baker Lake, August 2014.

Area-Replicate	Date	Depth (m)	Total Abundance (#/m^2)				Total	Total Richness (# taxa)				Total
			Oligochaetes	Insects	Molluscs	Other Taxa		Oligochaetes	Insects	Molluscs	Other Taxa	
Baker Akilahaarjuk Point												
BAP-1	31-Aug-14	8.0	2870	16543	1130	478	21022	4	10	2	4	20
BAP-2	31-Aug-14	8.3	6348	6000	174	43	12565	5	9	2	1	17
BAP-3	31-Aug-14	7.8	4870	7152	1000	196	13217	5	17	2	2	26
BAP-4	31-Aug-14	7.7	2717	9630	783	87	13217	4	13	2	1	20
BAP-5	31-Aug-14	8.0	283	2804	130	152	3370	3	13	1	3	20
	Area Mean		***3417***	***8426***	***643***	***191***	***12678***	***4***	***12***	***2***	***2***	***21***
Baker Barge Dock												
BBD-1	1-Sep-14	7.7	65	4261	196	109	4630	1	9	1	2	13
BBD-2	1-Sep-14	9.4	739	3978	1391	65	6174	2	12	2	1	17
BBD-3	1-Sep-14	8.4	435	1652	0	0	2087	2	6	0	0	8
BBD-4	1-Sep-14	6.9	0	1630	0	109	1739	0	10	0	2	12
BBD-5	1-Sep-14	7.0	0	739	478	43	1261	0	5	2	1	8
	Area Mean		***248***	***2452***	***413***	***65***	***3178***	***1***	***8***	***1***	***1***	***12***
Baker East Shore												
BES-1	31-Aug-14	8.3	283	2326	217	109	2935	2	9	1	2	14
BES-2	31-Aug-14	7.2	283	2239	217	130	2870	2	11	1	2	16
BES-3	31-Aug-14	9.1	109	2761	174	261	3304	2	10	1	3	16
BES-4	31-Aug-14	8.7	239	2174	196	152	2761	2	10	1	3	16
BES-5	31-Aug-14	8.9	22	1522	196	87	1826	1	9	1	2	13
	Area Mean		***187***	***2204***	***200***	***148***	***2739***	***2***	***10***	***1***	***2***	***15***
Baker Proposed Jetty												
BPJ-1	1-Sep-14	7.4	152	3674	283	196	4304	1	14	1	4	20
BPJ-2	1-Sep-14	8.4	196	2761	22	43	3022	1	12	1	1	15
BPJ-3	1-Sep-14	8.0	22	3848	0	87	3957	1	14	0	3	18
BPJ-4	1-Sep-14	8.0	0	109	22	0	130	0	4	1	0	5
BPJ-5	1-Sep-14	8.1	370	1630	239	87	2326	1	10	1	2	14
	Area Mean		***148***	***2404***	***113***	***83***	***2748***	***1***	***11***	***1***	***2***	***14***

Table 3.6-3. Results of BACI tests for benthic invertebrate abundance at Meadowbank areas.

After Period	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2014	TPN	2	1	-0.47	0.54	0.27	-37	-100	62170
	TPE	3	1	0.40	0.67	0.69	49	-92	2535
	SP	2	1	1.66	0.32	0.94	425	-91	31230
	TPS	8	1	0.38	0.38	0.82	46	-40	258
	TE	2	1	0.57	0.30	0.85	76	-96	7477
	TEFF	5	1	0.52	0.45	0.84	68	-52	485
	WAL	7	1	0.43	0.98	0.66	54	-86	1604
2013-14	TPN	2	2	-0.39	0.40	0.22	-32	-88	285
	TPE	3	2	-0.30	0.68	0.34	-26	-91	540
	SP	2	2	0.98	0.64	0.87	166	-83	4057
	TPS	7	2	-0.15	0.29	0.31	-14	-56	71
	TE	2	2	-0.21	0.66	0.39	-19	-95	1294
	TEFF	4	2	-0.17	0.40	0.35	-15	-72	159
	WAL	7	2	-0.36	0.73	0.32	-31	-88	293
2012-14	TPN	2	3	-0.21	0.36	0.30	-19	-74	153
	TPE	3	3	-0.14	0.55	0.41	-13	-81	305
	SP	2	3	0.74	0.58	0.85	110	-67	1244
	TPS	6	3	0.03	0.26	0.54	3	-44	88
	TE	2	3	-0.28	0.51	0.31	-24	-85	285
	TEFF	3	3	-0.18	0.38	0.33	-17	-71	137
	WAL	6	3	-0.37	0.65	0.29	-31	-85	217
2011-14	TPN	2	4	-0.29	0.32	0.20	-25	-69	80
	TPE	3	4	-0.23	0.48	0.32	-21	-77	170
	SP	2	4	0.48	0.63	0.76	62	-72	845
	TPS	5	4	-0.11	0.24	0.34	-10	-50	60
	TE	2	4	-0.27	0.45	0.29	-24	-78	164
	TEFF	2	4	-0.42	0.35	0.15	-34	-75	74
	WAL	5	4	-0.72	0.57	0.12	-52	-88	88

Notes:

*** Bolded** values are P-values < 0.1

Shaded cells indicate negative effect sizes (reductions) of 20% or more

Test station = station 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 3.6-4. Results of BACI tests for benthic invertebrate taxa richness at Meadowbank areas.

After Period	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2014	TPN	2	1	-0.07	0.30	0.43	-7	-98	4109
	TPE	3	1	0.24	0.15	0.87	28	-34	146
	SP	2	1	0.73	0.19	0.92	108	-82	2346
	TPS	8	1	0.35	0.18	0.95	42	-8	117
	TE	2	1	0.36	0.22	0.82	43	-92	2373
	TEFF	5	1	0.28	0.29	0.81	32	-41	196
	WAL	7	1	0.25	0.31	0.78	29	-39	174
2013-14	TPN	2	2	0.07	0.22	0.61	7	-58	175
	TPE	3	2	0.12	0.13	0.79	13	-26	73
	SP	2	2	0.40	0.34	0.82	50	-65	545
	TPS	7	2	0.02	0.15	0.54	2	-29	47
	TE	2	2	0.10	0.35	0.60	11	-75	391
	TEFF	4	2	-0.07	0.24	0.39	-7	-52	79
	WAL	7	2	-0.01	0.24	0.48	-1	-44	74
2012-14	TPN	2	3	0.16	0.21	0.76	18	-39	126
	TPE	3	3	0.16	0.11	0.89	18	-14	60
	SP	2	3	0.45	0.26	0.91	58	-31	259
	TPS	6	3	0.06	0.13	0.68	7	-22	46
	TE	2	3	0.11	0.26	0.65	11	-51	152
	TEFF	3	3	-0.14	0.22	0.29	-13	-53	62
	WAL	6	3	0.08	0.21	0.64	8	-34	77
2011-14	TPN	2	4	0.15	0.17	0.79	17	-28	89
	TPE	3	4	0.11	0.11	0.81	12	-16	49
	SP	2	4	0.43	0.23	0.93	53	-19	190
	TPS	5	4	0.00	0.13	0.51	0	-26	37
	TE	2	4	0.05	0.24	0.58	5	-46	105
	TEFF	2	4	-0.20	0.23	0.21	-18	-57	55
	WAL	5	4	-0.07	0.20	0.37	-7	-42	50

Notes:

*** Bolded** values are P-values < 0.1

Shaded cells indicate negative effect sizes (reductions) of 20% or more

Test station = station 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 3.6-5. Results of BACI tests for benthic invertebrate abundance at Baker Lake areas.

After Period	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2014	BBD	6	1	-0.54	1.27	0.34	-42	-98	1441
	BPJ	6	1	-0.04	1.13	0.49	-4	-95	1677
2013-14	BBD	5	2	0.08	0.96	0.53	8	-91	1185
	BPJ	5	2	0.05	0.88	0.52	5	-89	904
2012-14	BBD	4	3	0.80	0.89	0.80	123	-77	2104
	BPJ	4	3	-0.41	0.78	0.31	-33	-91	397
2011-14	BBD	3	4	0.87	0.85	0.82	139	-73	2046
	BPJ	3	4	0.04	0.80	0.52	4	-87	716

See notes below **Table 3.6-6**.

Table 3.6-6. Results of BACI tests for benthic invertebrate taxa richness at Baker Lake areas.

After Period	Test Station	n(B)	n(A)	Estimate	SE	P-value*	Effect size (%)		
							ES	LCI	UCI
2014	BBD	6	1	0.02	0.39	0.52	2	-62	175
	BPJ	6	1	0.33	0.41	0.77	39	-52	301
2013-14	BBD	5	2	0.11	0.21	0.69	12	-35	93
	BPJ	5	2	0.27	0.26	0.83	31	-33	155
2012-14	BBD	4	3	0.20	0.26	0.77	23	-37	138
	BPJ	4	3	0.03	0.31	0.53	3	-54	127
2011-14	BBD	3	4	0.29	0.19	0.91	34	-18	119
	BPJ	3	4	0.17	0.30	0.71	19	-45	157

Notes:
*** Bolded** values are P-values < 0.1
Shaded cells indicate negative effect sizes (reductions) of 20% or more
Test station = station 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 3.6-1. Benthic invertebrate total abundance (#/m^2) from Meadowbank study lakes since 2006.

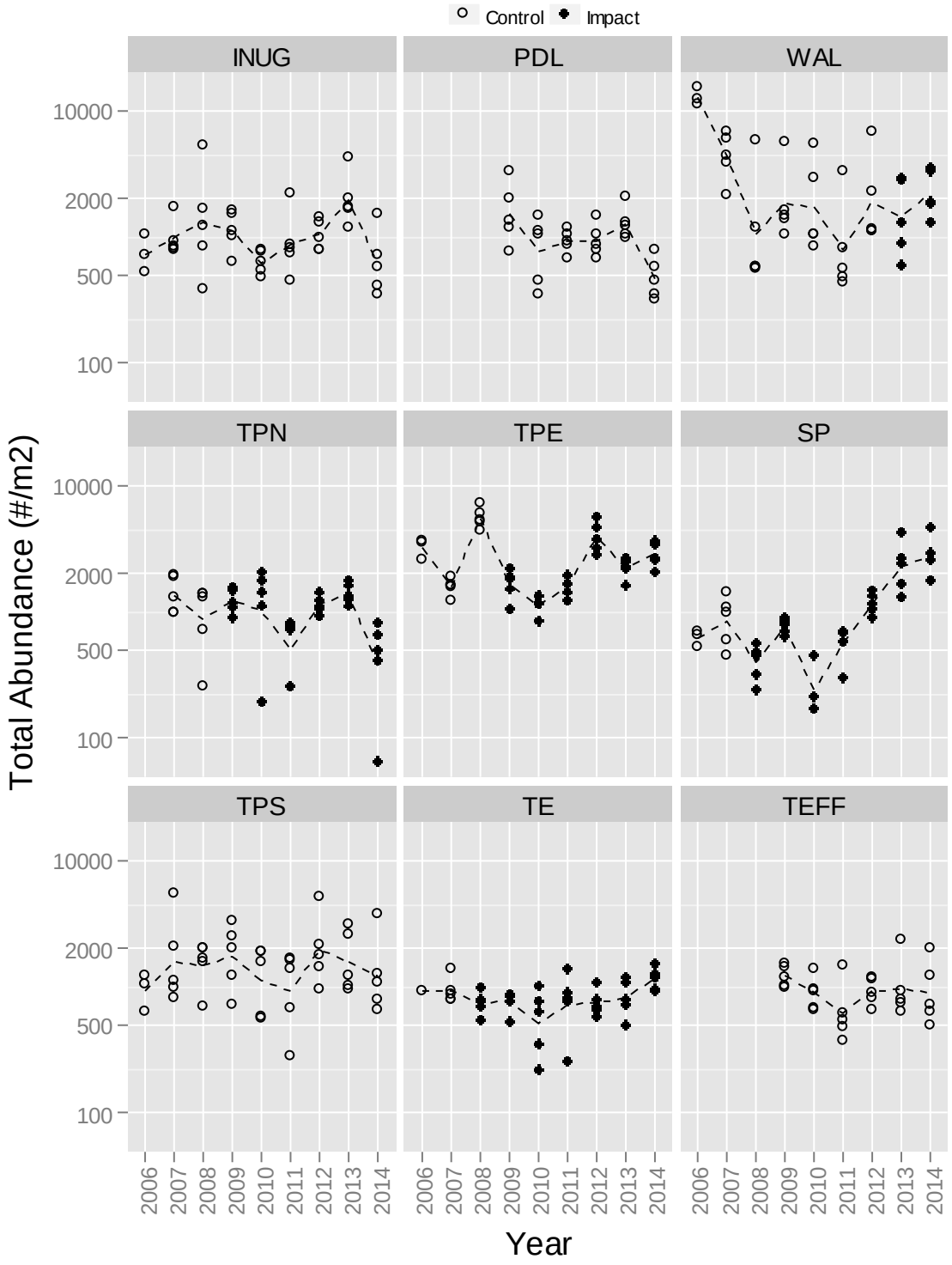


Figure 3.6-2. Benthic invertebrate abundance (#/m^2) by major taxa group from Meadowbank study lakes since 2006.

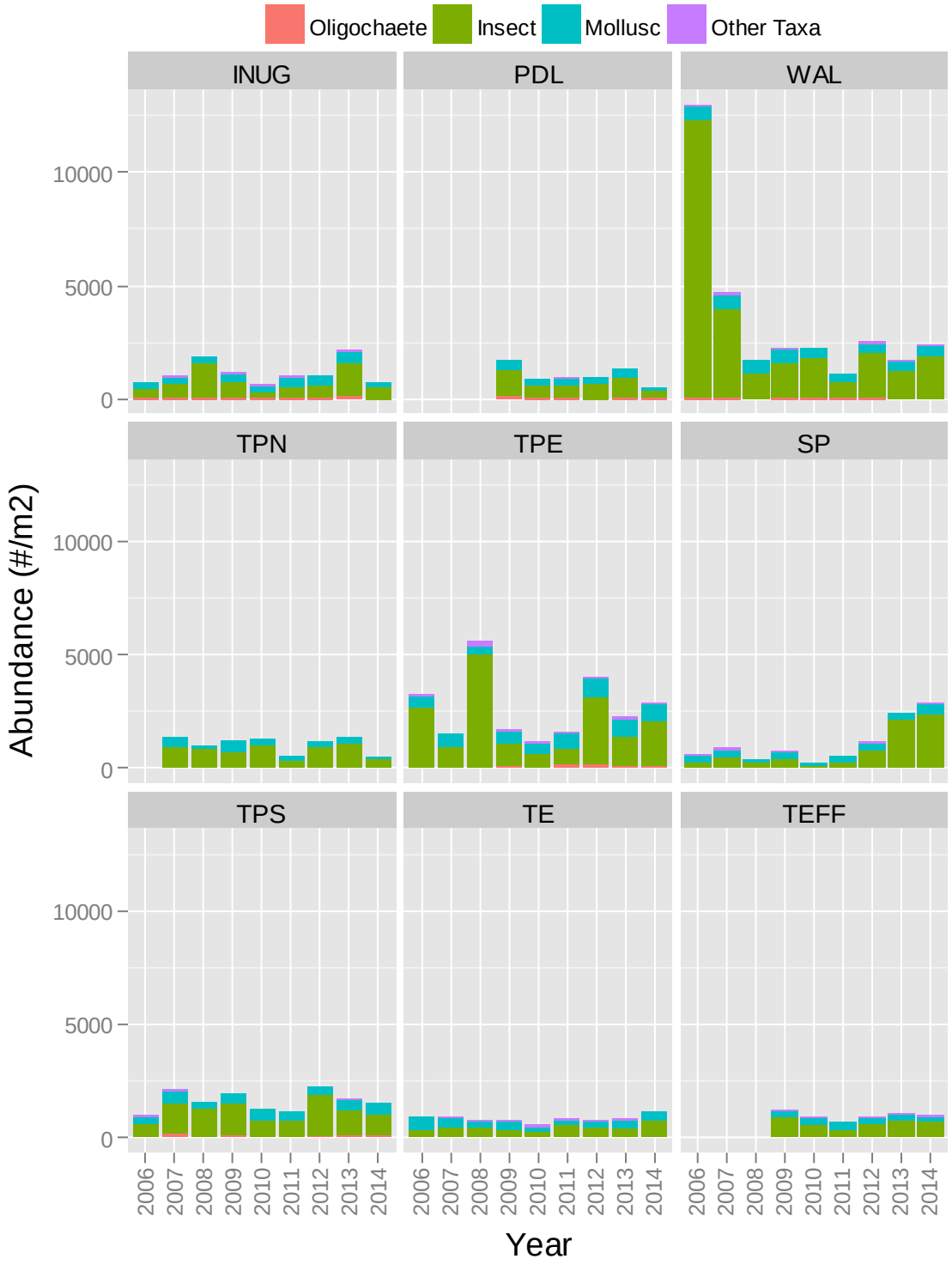


Figure 3.6-3. Benthic invertebrate relative abundance by major taxa group from Meadowbank study lakes since 2006.

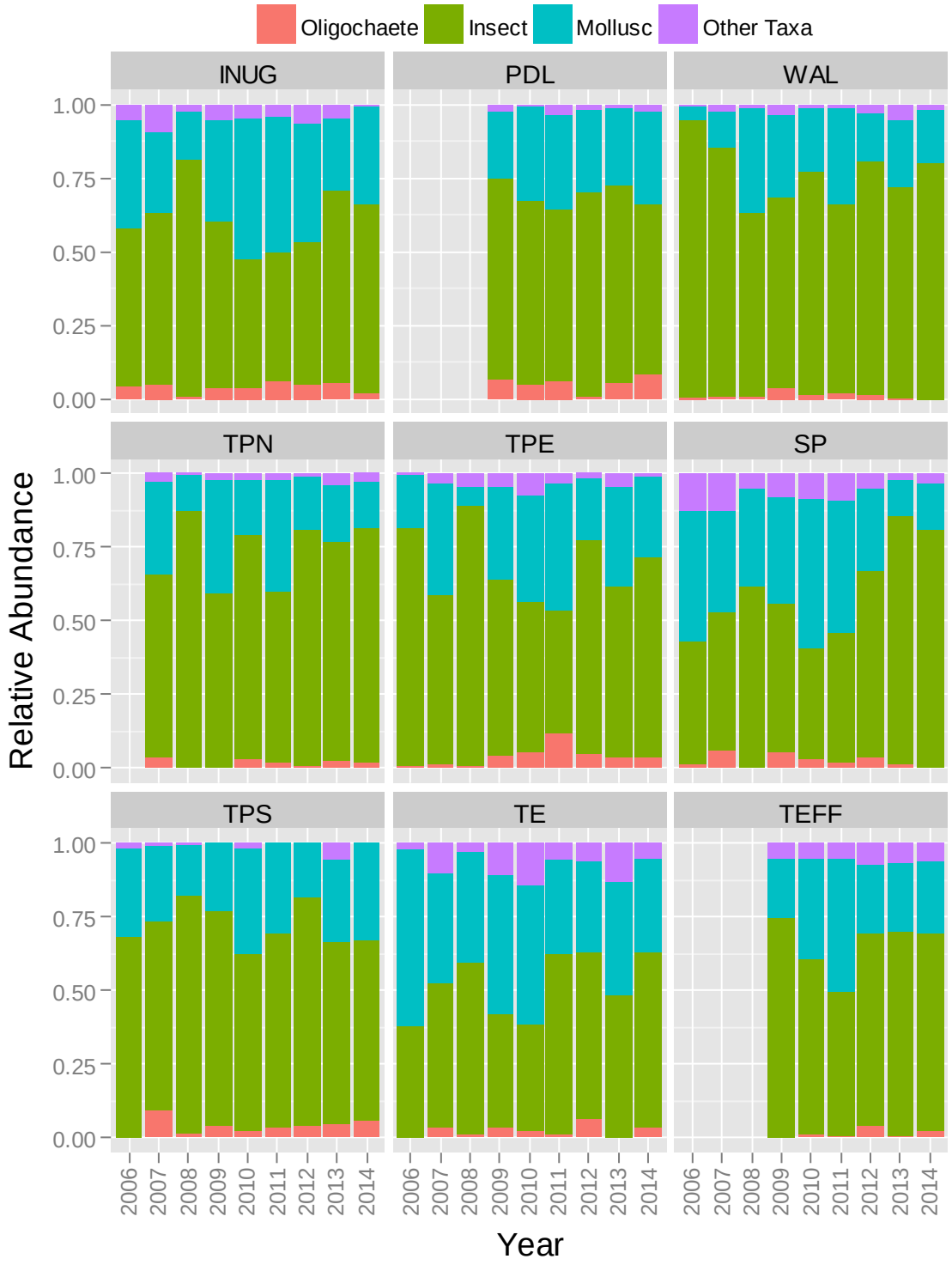


Figure 3.6-4. Benthic invertebrate total richness (# taxa) from Meadowbank study lakes since 2006.

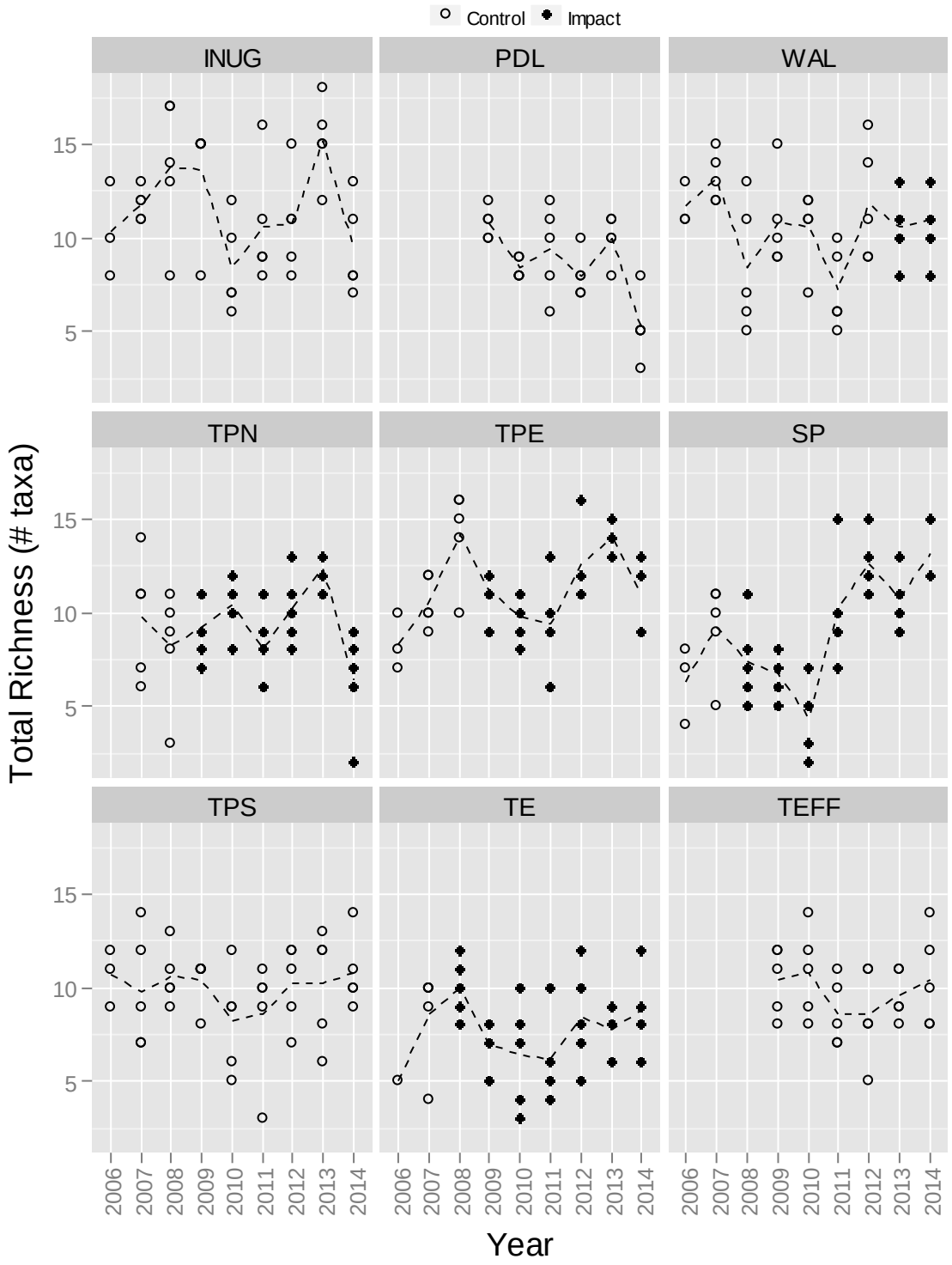


Figure 3.6-5. Benthic invertebrate richness (# taxa) by major taxa group from Meadowbank study lakes since 2006.

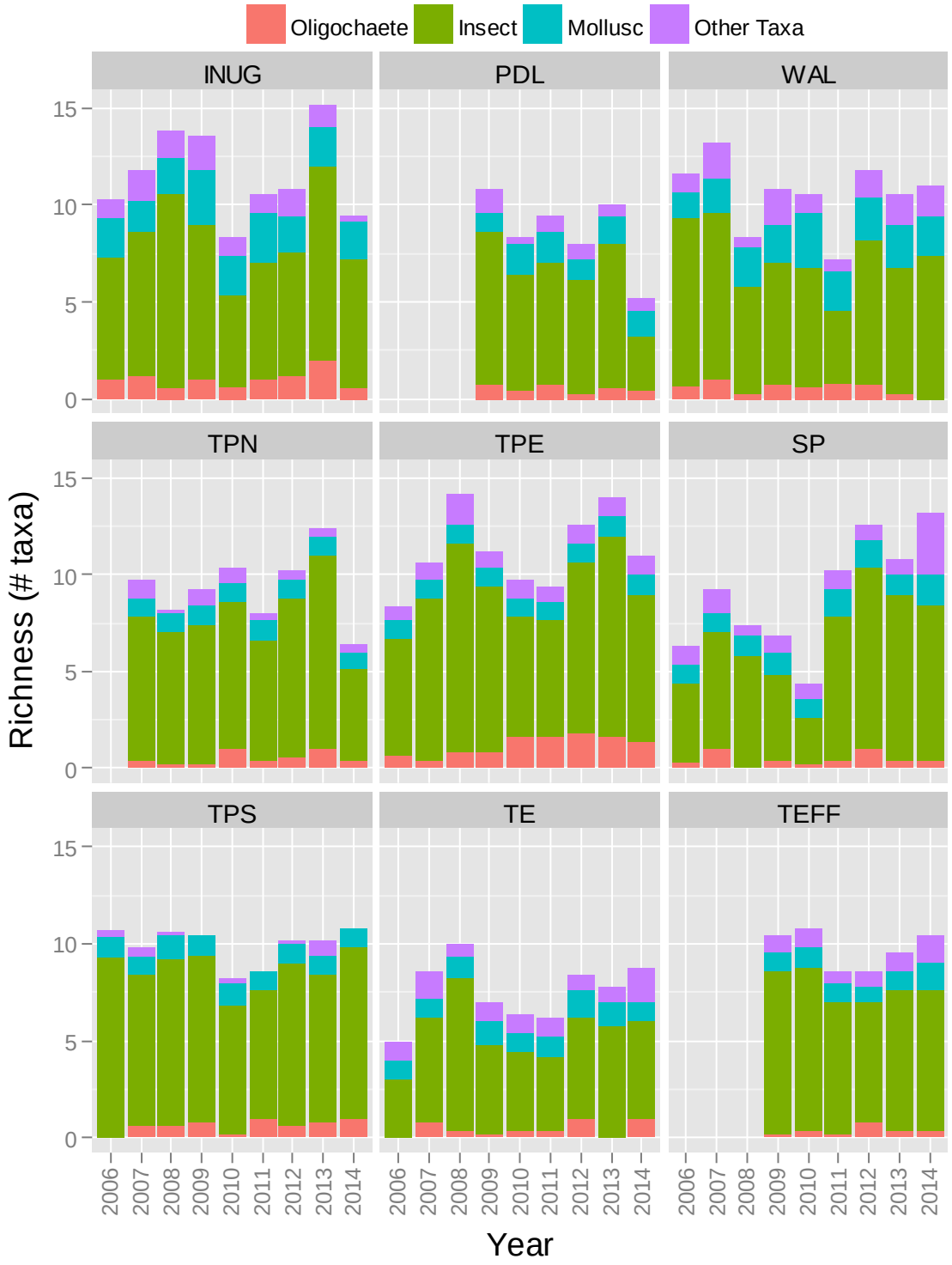


Figure 3.6-6. Benthic invertebrate relative richness by major taxa group from Meadowbank study lakes since 2006.

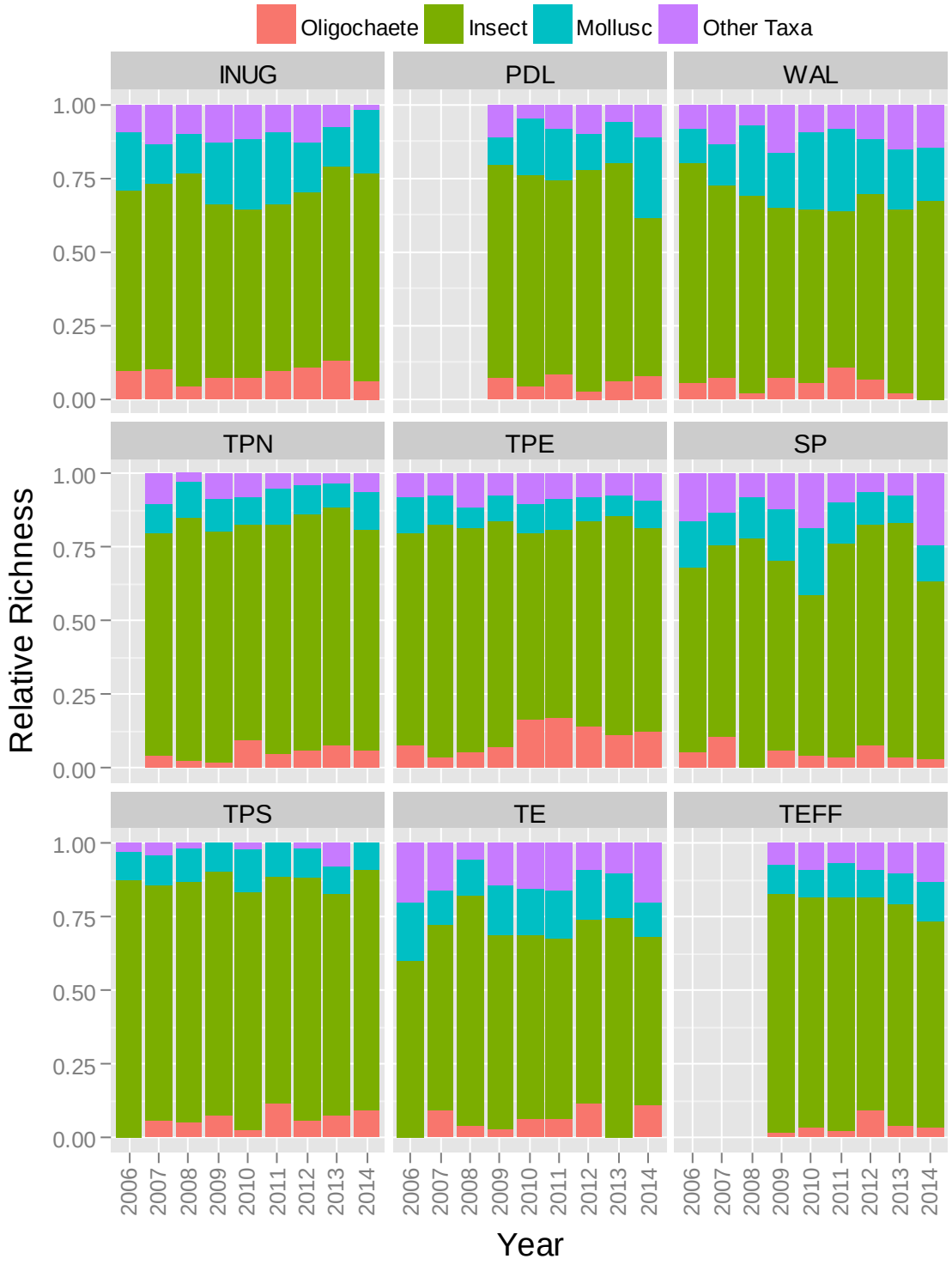


Figure 3.6-7. Benthic invertebrate total abundance (#/m^2) from Baker Lake since 2008.

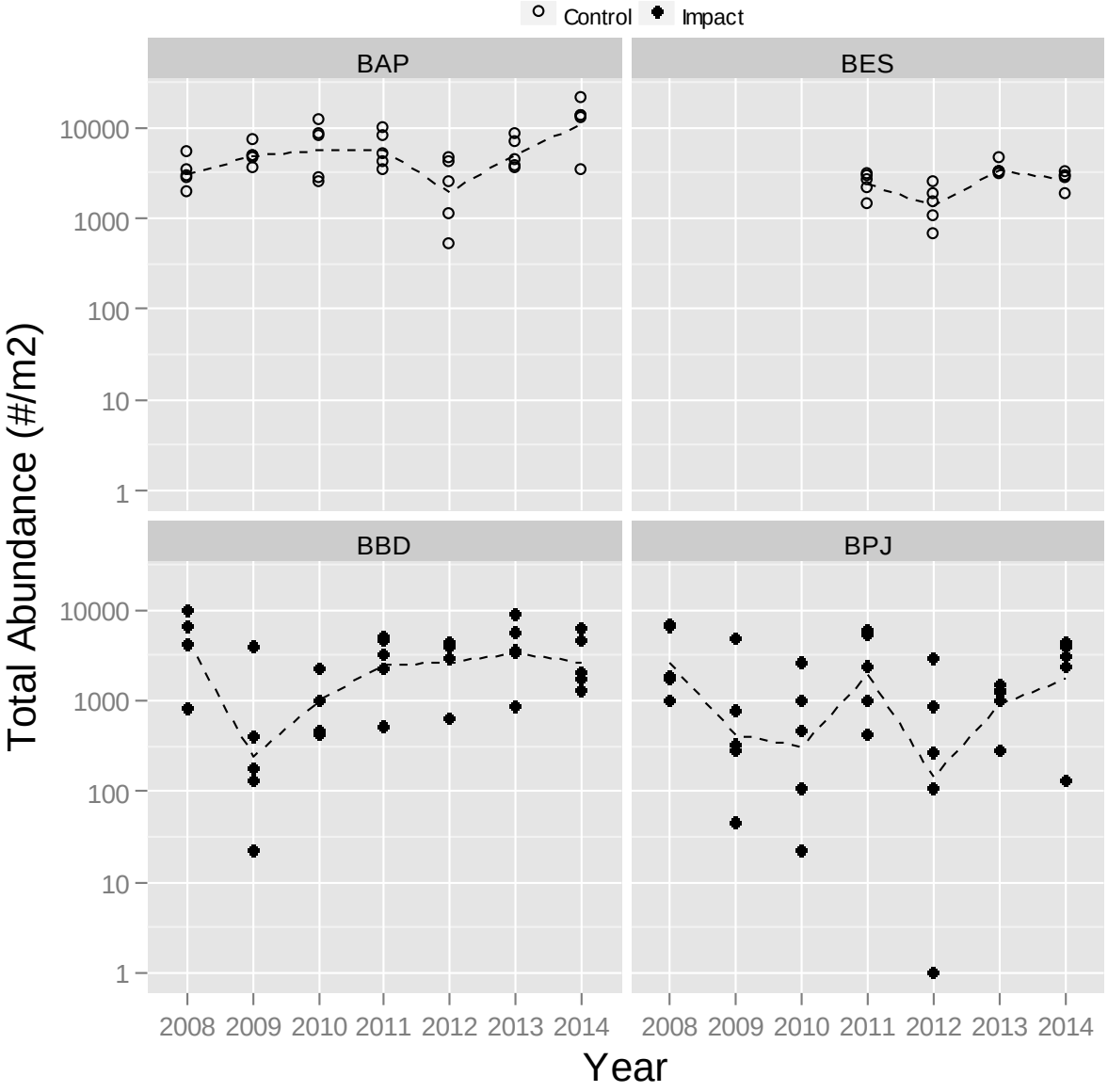


Figure 3.6-8. Benthic invertebrate abundance (#/m^2) by major taxa group from Baker Lake since 2008.

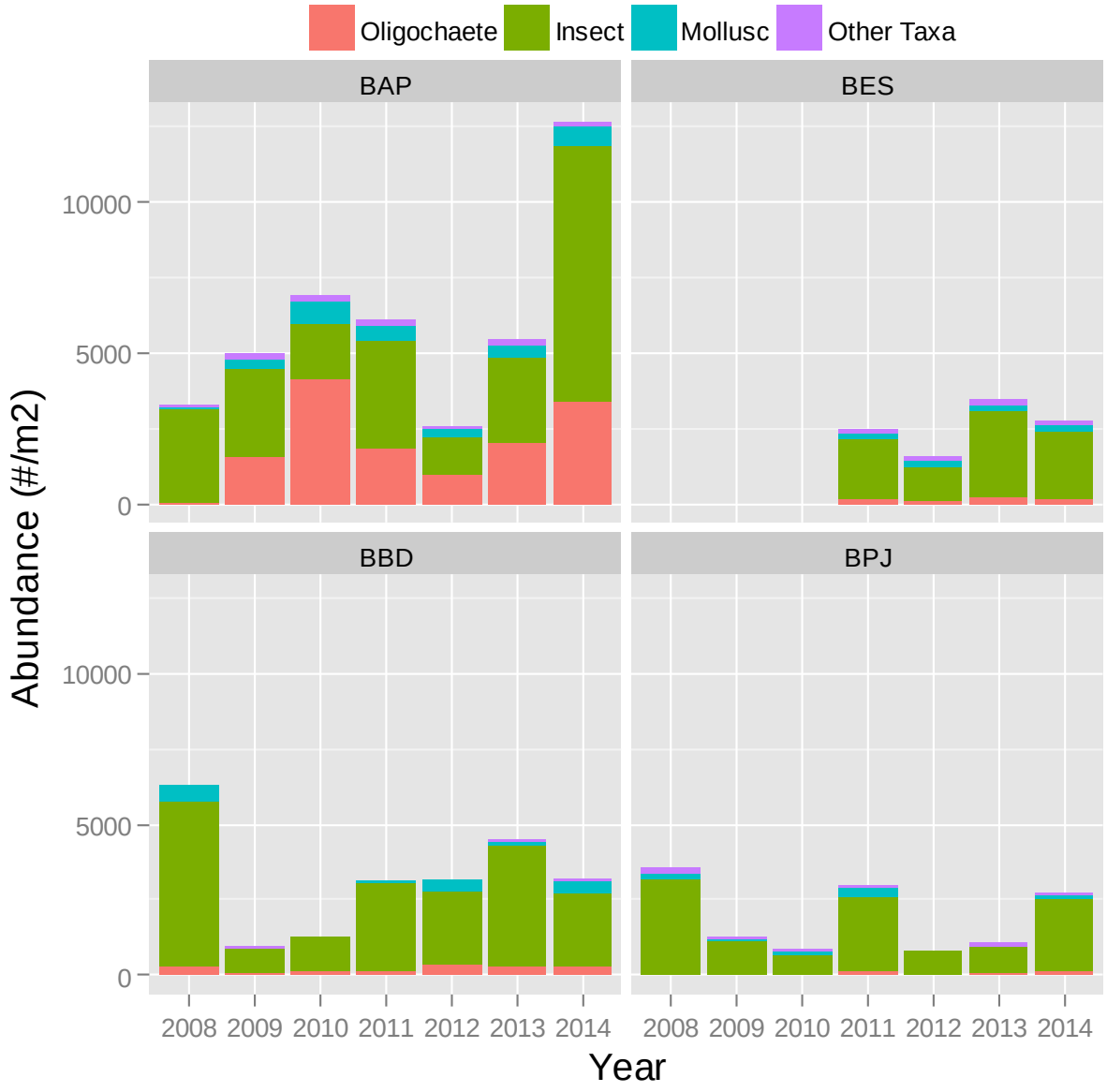


Figure 3.6-9. Benthic Invertebrate relative abundance by major taxa group from Baker Lake since 2008.

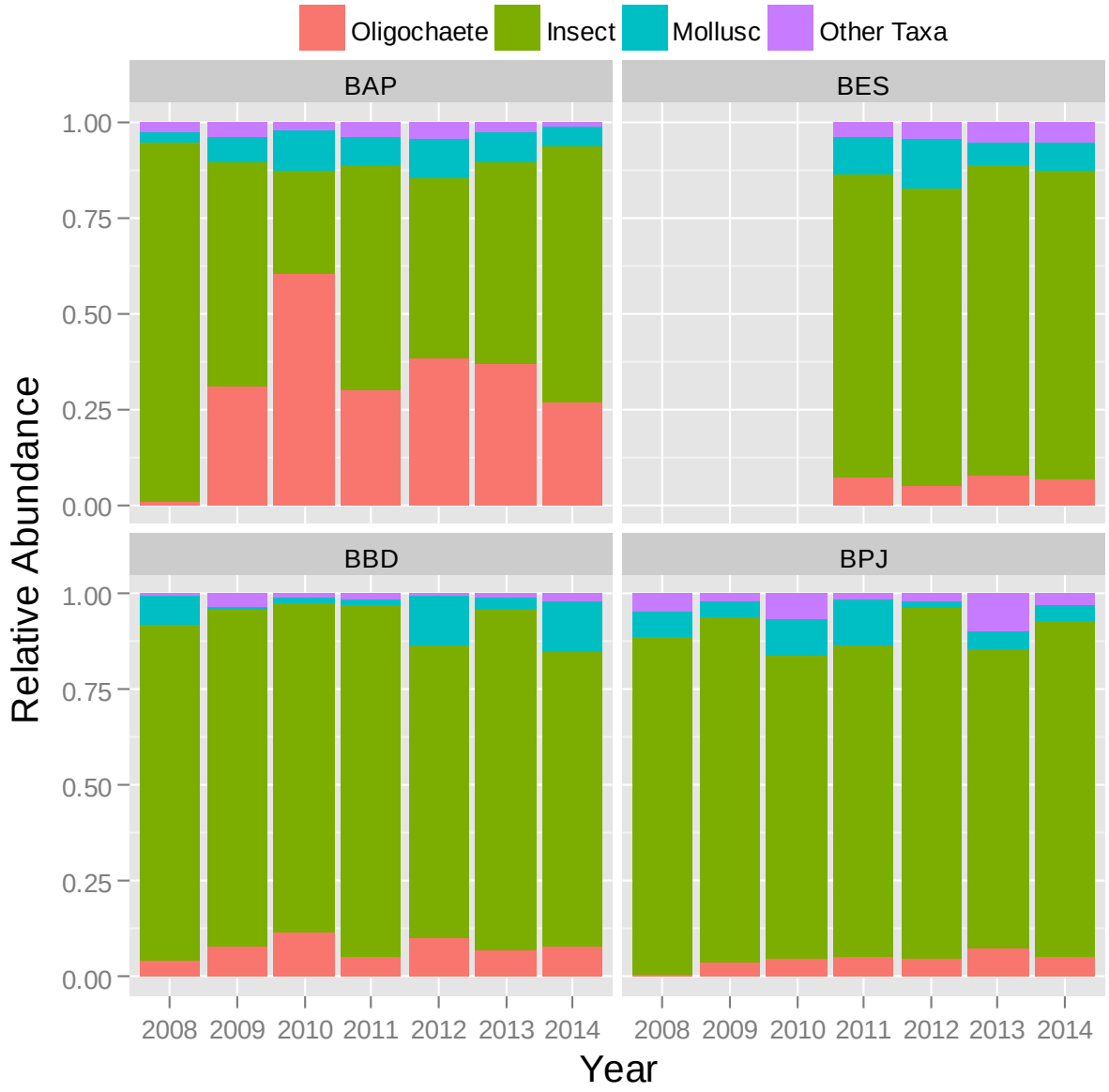


Figure 3.6-10. Benthic invertebrate total richness (# taxa) from Baker Lake since 2008.

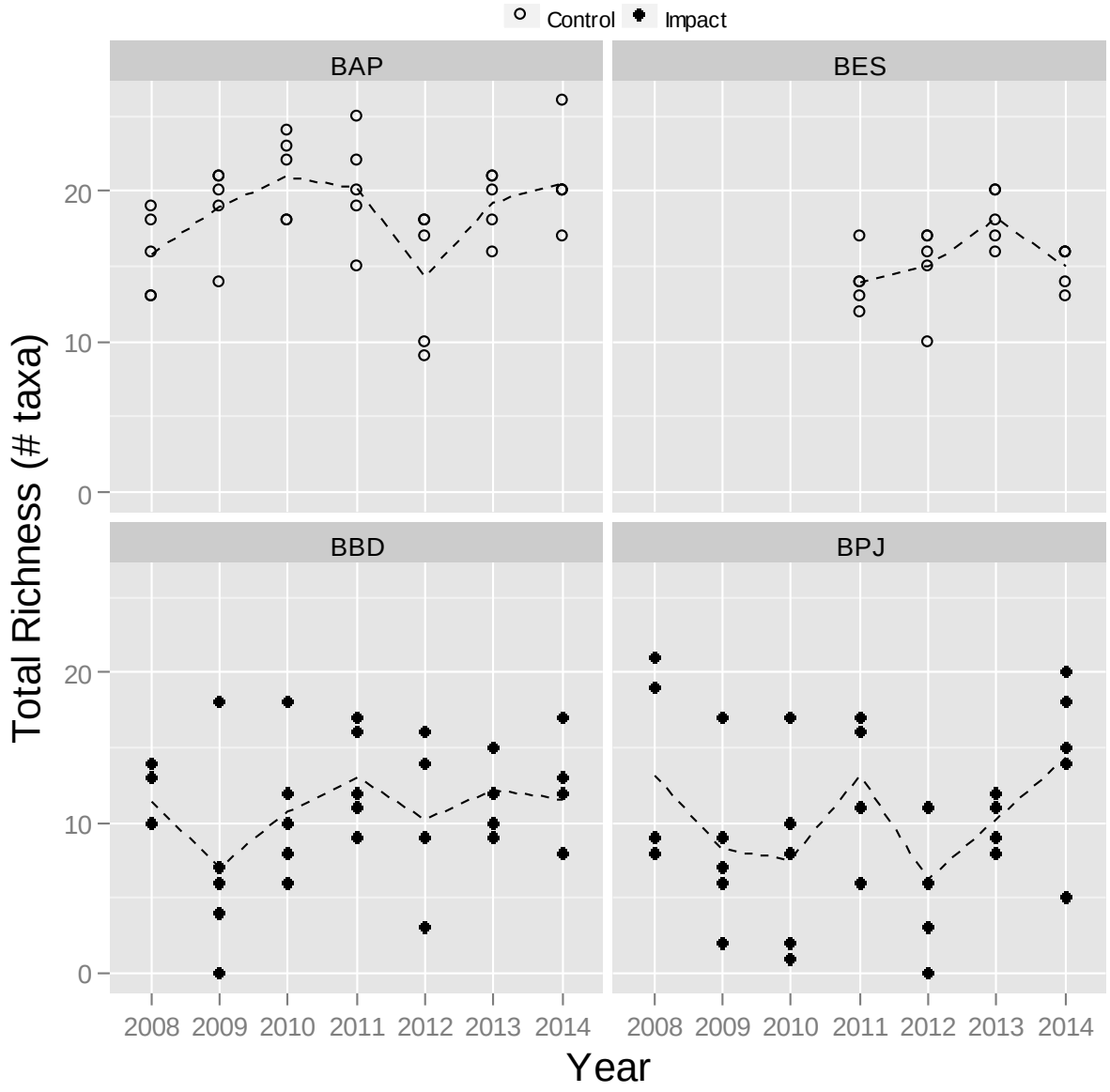


Figure 3.6-11. Benthic invertebrate richness (# taxa) by major taxa group from Baker Lake since 2008.

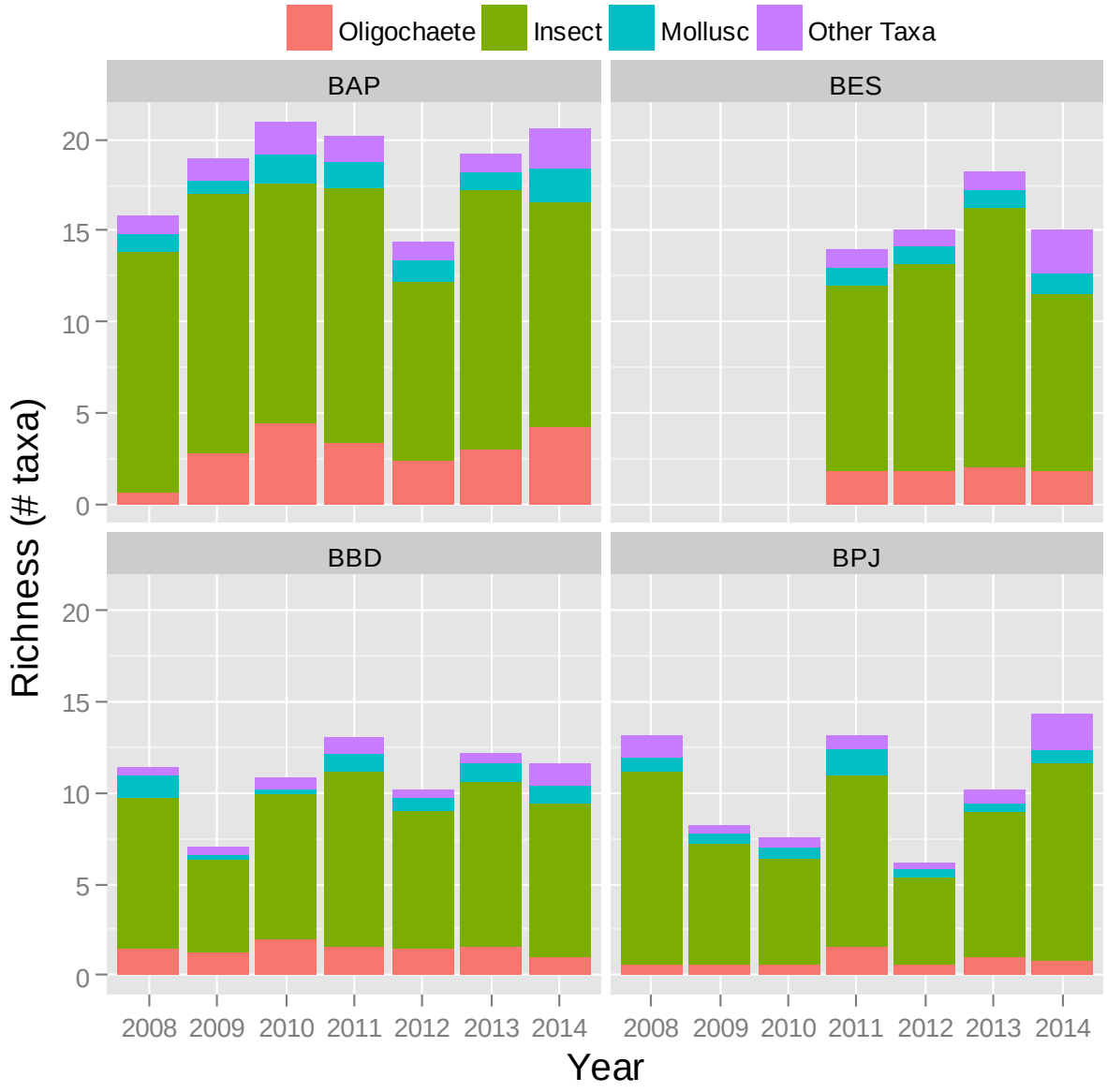


Figure 3.6-12. Benthic invertebrate relative richness by major taxa group from Baker Lake since 2008.



4. SUMMARY AND IMPLICATIONS FOR MANAGEMENT

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"; some of which were updated herein) 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[6]

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 2014 are summarized in **Table 4.0-1**:

- *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: conductivity (TPN, TPE, TPS, SP, WAL); hardness (TPN, TPE, TPS, SP); calcium, potassium, magnesium, and sodium (TPN, TPE, TPS, SP [except sodium]); and TDS (TPN, TPE, TPS, SP, 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 2015**.
- *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 conducted in 2014 and will be conducted next in 2017. Significant increases in sediment metals relative to baseline conditions and triggers were identified in WAL (lead and zinc) and TPE (chromium). The WAL results were deemed as artefacts of the statistical models

[6] Notes: SP = Second Portage Lake; TPN = Third Portage North; TPS = Third Portage South; TPE = Third Portage East; TE = Tehek Lake; WAL = Wally Lake.

used and/or as inconsistent with baseline grab sample results; they were not attributed to mining activities. As per the recommendations in last year's CREMP (Azimuth, 2014), the 2014 coring program was expanded in TPE as a targeted study to address uncertainties regarding the nature (i.e., spatial or temporal) of the apparent temporal trend in chromium concentrations since dike construction. The targeted study confirmed that the trend is temporal and mining-related, with ultramafic rock used to construct the Bay-Goose Dike the most likely source of chromium-enriched sediments. While TPE sediment chromium concentrations have increased by 50% since dike construction and now exceed the CCME PEL, the local benthic invertebrate community has not been impacted. Notwithstanding, **a follow-up study is recommended in 2015** to test the bioavailability and toxicity of the sediments.

- *Phytoplankton Community* – The only statistically significant change in phytoplankton community metrics in 2014 was a 24% decrease in taxa richness at mid-field area TPS. However, given the lack similar changes at any near-field areas, these changes are attributed to natural variability rather than the mine. **While not apparently mine related, this trend should be watched again in 2015**.
- *Benthic Invertebrate Community* – The majority of near-field and mid-field areas showed apparent increases in abundance and taxa richness in 2014 relative to baseline/reference conditions. No statistically significant short-term (i.e., past year) or longer-term (i.e., past two to four years) trends were identified. TPN did show a reduction (37%, but not statistically significant) in total abundance relative to baseline/reference conditions in 2014; those results are being analyzed in more detail in the EEM report due in June 2015.

Baker Lake

CREMP monitoring 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 occurred in the vicinity of the barge dock and jetty in 2014. No changes in the aquatic receiving environment were observed that were attributable to AEM's activities in Baker Lake. No follow-up management actions are required for 2015.

Table 4.0-1. Summary of key findings from the 2014 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	?	Conductivity (TPN, TPE, TPS, SP, WAL); Hardness (TPN, TPE, TPS, SP); Ca/K/Mg/Na (TPN, TPE, TPS, SP [not Na]); TDS (TPN, TPE, TPS, SP, WAL) were all elevated relative to reference/baseline conditions. However, concentrations suggest low potential for adverse effects.	**1**
Nutrients	**0**	n/a	n/a	n/a	?		**0**
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	??	Lead and zinc exceeded the trigger at (WAL), but were clearly within baseline range. Chromium (TPE) temporal trend confirmed in coring study. Target study recommended.	**2** **
Organics	**0**	n/a	n/a	n/a	?		**0**
Effects - Phytoplankton							
Chlorophyll-*a* *	**0**	*	*	*	?		**0**
Total Biomass	**0**	n/a	n/a	n/a	?		**0**
Taxa Richness	**1**	Moderate	Low	Low	?	>20% lower at TPS than reference/baseline conditions. However, attributed to natural variability similar changes were not seen at near-field areas and there was no prior evidence of trend	**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

*Continued data quality issue (chlorophyll-*a*)
** Targeted study recommended; see text for detail.

[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

5. MONITORING COMPONENTS FOR 2015

As discussed in **Section 1**, the rationale, framework, strategy, methods, and scope of receiving environment (now referred to as *Core Receiving Environment Monitoring Program* or "CREMP") monitoring for the Meadowbank Mine were documented in the 2005 AEMP (AEMP, 2005). The CREMP has been implemented every year since 2006, with some modifications (e.g., lake sampling area additions, parameter deletions/additions, sampling frequency and intensity) to improve the program or to comply with regulatory requirements. In 2011, an update report was submitted to document changes to the program made since the 2005 AEMP and present details on sampling and analysis (Azimuth, 2010g). AEM commissioned Azimuth to begin a thorough review of the historical data to ensure that the CREMP design would be able to detect potential mine-related impacts and would address most the requirements of the NWB A License. The 2012 CREMP design report (Azimuth 2012d) details the latest CREMP monitoring program which ensures adequate detection of mine-related impacts (in a timely manner) as part of AEM's integrated adaptive management framework. The current program for 2015 is summarized in **Table 5.0-1**.

Table 5.0-1. Monitoring components planned for 2015 CREMP.

Project Lake	Area ID	Through-Ice						Open-Water			Through-Ice		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Third Portage	TPE	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno[1]
	TPN	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno[1]
	TPS	Limno[1]	Limno[1]	Limno[1]			Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		Limno[1]
Second Portage	SP	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno[1]
Tehek	TE				Limno Water Phyto	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe	Limno Water Phyto	
Tehek	TEFF						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		
Inuggugayualik	INUG				Limno Water Phyto	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe	Limno Water Phyto	
Wally	WAL	Limno[1]	Limno[1]	Limno[1]	Limno Water Phyto	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe	Limno Water Phyto	Limno[1]
Pipedream	PDL						Ice not safe	Limno Water Phyto	Limno Water Phyto Sed Benthos	Limno Water Phyto	Ice not safe		

Table 5.0-1. Monitoring components planned for 2015 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]: 1 depth profile for 4 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.

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APPENDICES

APPENDIX A

UPDATED THRESHOLD AND TRIGGER DEVELOPMENT FOR CREMP WATER PARAMETERS

THRESHOLDS AND TRIGGERS

Data – The data used to develop triggers were the standard control ("baseline") samples – duplicates and depth replicates were excluded as they are pseudo-replicates of standard samples. All baseline samples through December 2013 were used. The number of baseline samples collected for each system was 204 for Meadowbank, 34 for Wally, and 31 for Baker (total = 269). The development of triggers was based on baseline data specific to each system (Meadowbank, Wally, and Baker).

Methods – The main text has described the rationale and approach for development of thresholds and triggers. There were three basic methods of trigger development as follows:

1. When a threshold (e.g., CCME guideline) was established, the trigger was set as the maximum of either (a) the value halfway between the baseline median and the threshold ("Method A"), or (b) the 95th percentile of the baseline data ("Method B").
2. When a threshold was not established, the trigger was set equal to the maximum of either the 95th percentile of the baseline data ("Method B") or two times the current detection limit ("Method C").

Medians and 95th percentiles were chosen as metrics rather than means, standard deviations, or maximums, because the former are generally robust to skewed distributions and potential outliers. When required, robust methods were used to estimate medians and 95th percentiles to account for values below detection limits (i.e., censored data; Helsel 2012). The analytical procedures for a given variable were as follows. First, all data reported detection limits greater than the maximum observed value were removed (such values contain no information regarding summary statistics of the data distribution; Helsel 2012). Next, classical estimates of medians and 95th percentiles were computed if possible (i.e., when there was the required number of observations exceeding detection limits). When there was insufficient data to compute a classical estimate, the median and/or 95th percentile were estimated using the robust "Regression on Order Statistics" (ROS) method as recommended by Helsel (2012) and implemented in the function "cenros" in the R package NADA. However, Helsel (2012) suggests that estimates of summary statistics such as the median are typically unreliable when more than 80% of the observations are censored (below detection limits). Thus, ROS estimates were only used when at least 20% of the observations were above detection limits. When a threshold was established but there was no viable estimate of the median, the current detection limit was used in "Method A" above. When a threshold was not established and there was no viable estimate of the 95th percentile, "Method C" was used.

There were special considerations for several variables, specifically t-Al, t-Cd, t-Mn, t-Zn, d-Al, ammonia-N, t-P, pH and TSS. These cases are explained in detail below.

Results – Thresholds and triggers are summarized in **Tables 1-3** for total metals, dissolved metals, and nutrients/conventionals. Thresholds were established for 54 variables based on

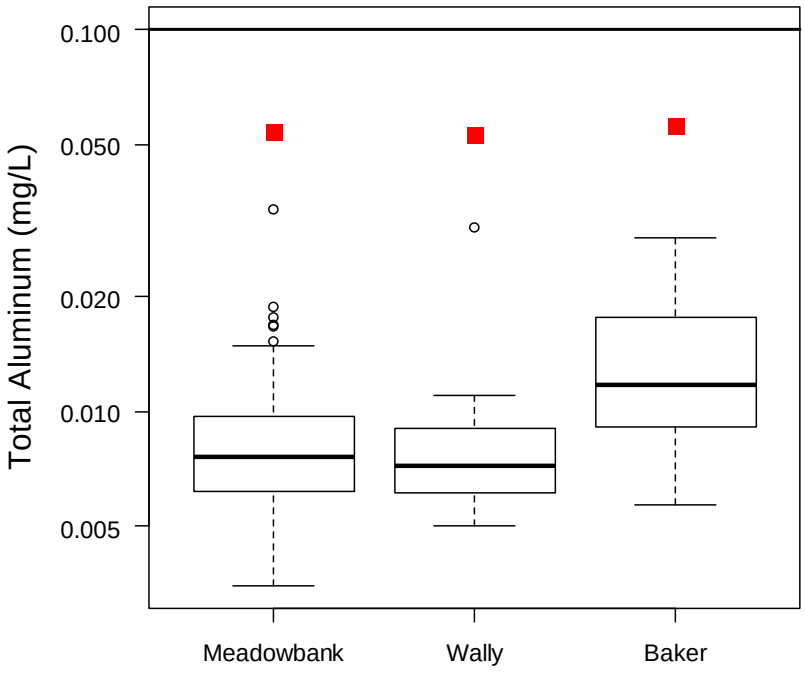
water-quality guidelines (**Table 4**). In most cases, the threshold was equal to a given guideline, but there were exceptions for a few variables as discussed below. Note that in cases where a water quality guideline exists but Method B was used for trigger development (i.e., cases where baseline data already exceed the guideline for > 5% of cases), it is possible for the trigger to equal or exceed the guideline (e.g., this occurs for total phosphorus, the lower pH trigger for Meadowbank, and the Baker triggers for total and dissolved strontium). In such cases, the guideline is reported as the threshold but is not used as a criterion for action; rather, the trigger is the only criterion for action as is the case for variables lacking water quality guidelines.

There are three variables (t-Cu, t-Pb, t-Ni) for which the water quality guidelines are specific to water hardness ranges below 82, 60, and 60 mg/L $CaCO_3$, respectively. Hardness levels for Meadowbank, Wally, and Baker samples were consistently below 60 mg/L $CaCO_3$. For example, as reported in **Table 3**, the 95th percentiles for hardness were 8.5, 16.7, and 41.2 for Meadowbank, Wally, and Baker samples, respectively. Thus for these three variables, the guidelines associated with low hardness ranges were used as thresholds.

Special Cases – There were several variables that warranted special consideration in the development of thresholds and/or triggers. These are discussed in the following pages.

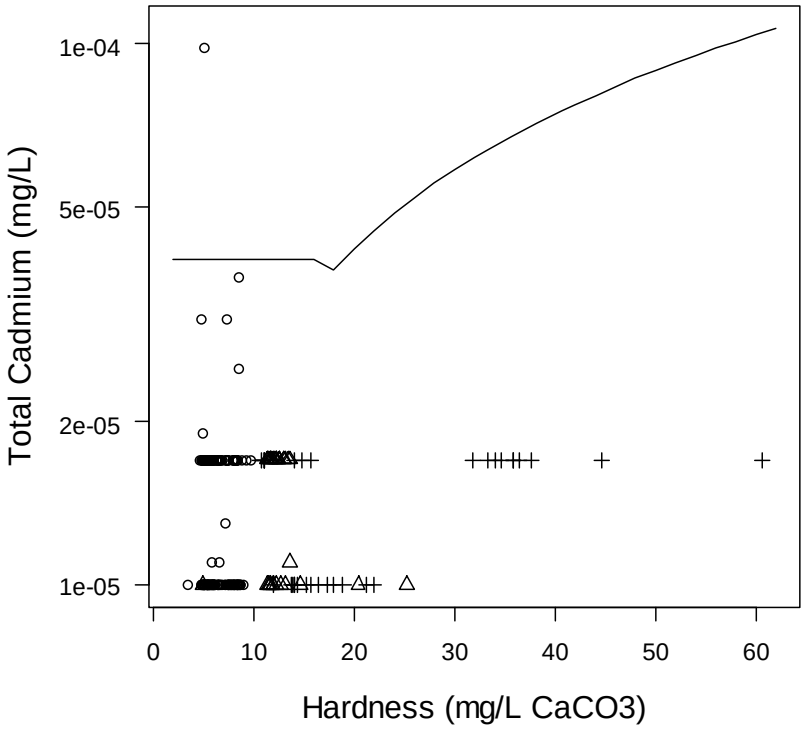
Total aluminum -- The CCME guideline for t-Al in water is 0.005 mg/L when pH < 6.5, and 0.1 mg/L when pH ≥ 6.5. Across baseline samples for Meadowbank/Wally/Baker (n = 269), there were only 9 cases of pH < 6.5 (two for station TPE, six for TPS, and one for INUG), of which only three were below pH = 6.47 (values = 6.18, 6.20, and 6.34). For these nine samples, only four t-Al measurements were above the current DL (0.005 mg/L), with a maximum value of 0.0076 mg/L.

Given the strong tendency for pH to equal or exceed 6.5 across baseline samples, the CCME guideline of 0.1 mg/L was adopted as the threshold for t-Al (**Table 1**). Triggers were computed for each system based on Method A (**Table 1**). For example, across the 204 Meadowbank samples, the median t-Al was 0.007 mg/L and the 95th percentile was 0.014 mg/L (**Table 1**). Based on Method A, the value halfway between the median t-Al and the threshold is 0.054 mg/L (i.e., [0.1 – 0.007]/2 = 0.054), which is larger than the 95% percentile (Method B), and thus the proposed trigger for Meadowbank t-Al is 0.054 mg/L. Similar trigger values were computed for Wally and Baker (**Table 1**). As an example, the following figure shows box-plots of t-Al values (> DL; in log scale) for each of Meadowbank/Wally/Baker, as well as the guideline (solid line) and proposed triggers (solid red squares).



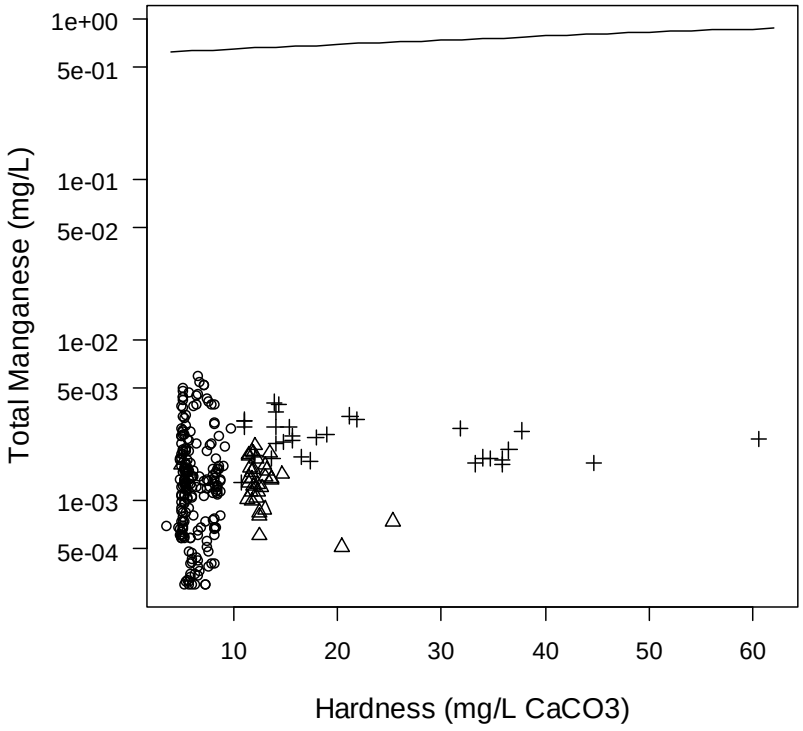
Total cadmium -- The hardness-dependent CCME guideline for t-Cd (mg/L) is 0.00004 when water hardness (mg/L $CaCO_3$) is less than 17.0, and equal to $0.001*10^{0.83*\log10(H)-2.46}$ (where H = hardness) when water hardness is ≥ 17.0 and ≤ 280. The relationship is illustrated in the figure below (solid curve) across the range of baseline observations of hardness for Meadowbank (circles), Wally (triangles), and Baker ("+"). Note that baseline measurements of t-Cd exceeded detection limits for only 10 of 204 Meadowbank samples and one of 34 Wally samples, and just one measure exceeded the CCME guideline (station TPE, hardness = 5.05, t-Cd = 0.000098 mg/L).

For simplicity, we propose a single t-Cd trigger applicable to all three systems (**Table 1**). The median sample values of hardness for Meadowbank (5.7), Wally (12.2), and Baker (16.5) were all less than 17.0 mg/L $CaCO_3$, and hence, the CCME guideline of 0.00004 mg/L was set as the threshold for each system. Because there were insufficient data to compute medians or 95th percentiles, the trigger was computed via Method A using the current detection limit (i.e., halfway between 0.00001 and 0.00004), providing a trigger value of 0.000025 (**Table 1**).



Total manganese -- There is no CCME water quality guideline for t-Mn. The hardness-dependent BC MOE guideline for t-Mn (mg/L) is 0.0044*H + 0.605, where H = hardness (mg/L $CaCO_3$). This guideline is based on numerous studies for fish, invertebrates and plants. The relationship is illustrated in the figure below (solid curve) across the range of baseline observations of hardness for Meadowbank (circles), Wally (triangles), and Baker ("+"). The guideline greatly exceeds observed t-Mn values for all samples.

For simplicity, we propose a single t-Mn trigger for each system. To compute the t-Mn trigger, we first computed the guidelines corresponding to the median values of hardness observed for Meadowbank samples (median hardness = 5.70, t-Mn guideline = 0.63), Wally samples (median hardness = 12.2, t-Mn guideline = 0.66), and Baker samples (median hardness = 16.5, t-Mn guideline = 0.68). The corresponding lake-specific triggers for t-Mn (using Method A) are 0.32 for Meadowbank, 0.33 for Wally, and 0.34 for Baker (**Table 1**).

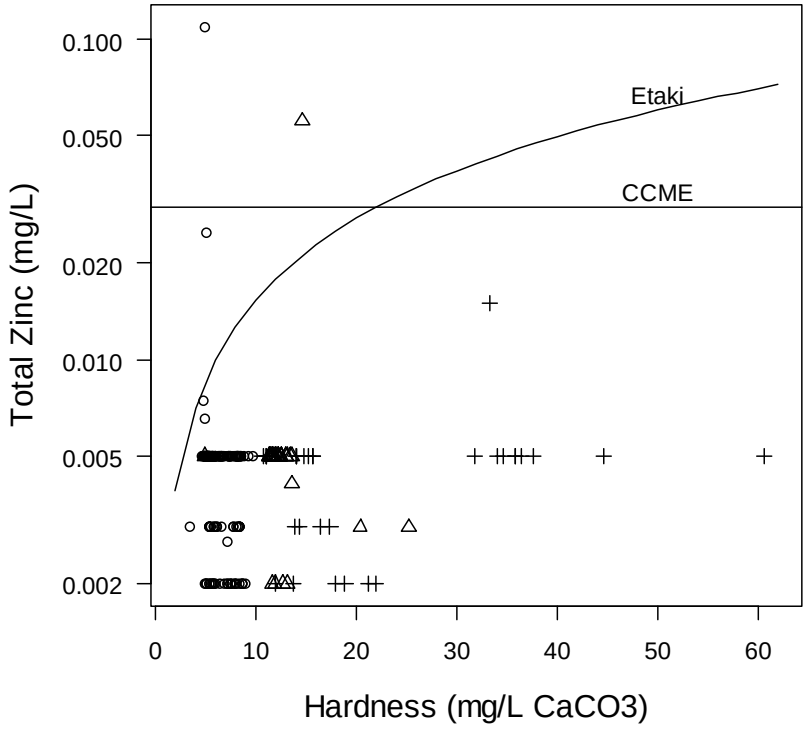


Total zinc -- The CCME water quality guideline for Zn is 0.030 mg/L. However, this guideline does not take into account hardness, and zinc toxicity is known to be hardness-dependent. An assessment for Ekati by EVS (2004) compiled data on species applicable to oligotrophic systems with low hardness, and developed a chronic benchmark for that was hardness dependent. The Ekati benchmark, denoted HC_5, represents the concentration of t-Zn at which 95% of species are likely to be protected against chronic effects (EVS 2004):

Hardness (mg/L CaCO3)	t-Zn level (HC_5) (mg/L)
5	0.0085
10	0.0153
15	0.0216
20	0.0276
25	0.0334
30	0.0389
35	0.0444
40	0.0497
45	0.0549
50	0.0600
55	0.0651
60	0.0700
65	0.0750
70	0.0798
75	0.0846
80	0.0894

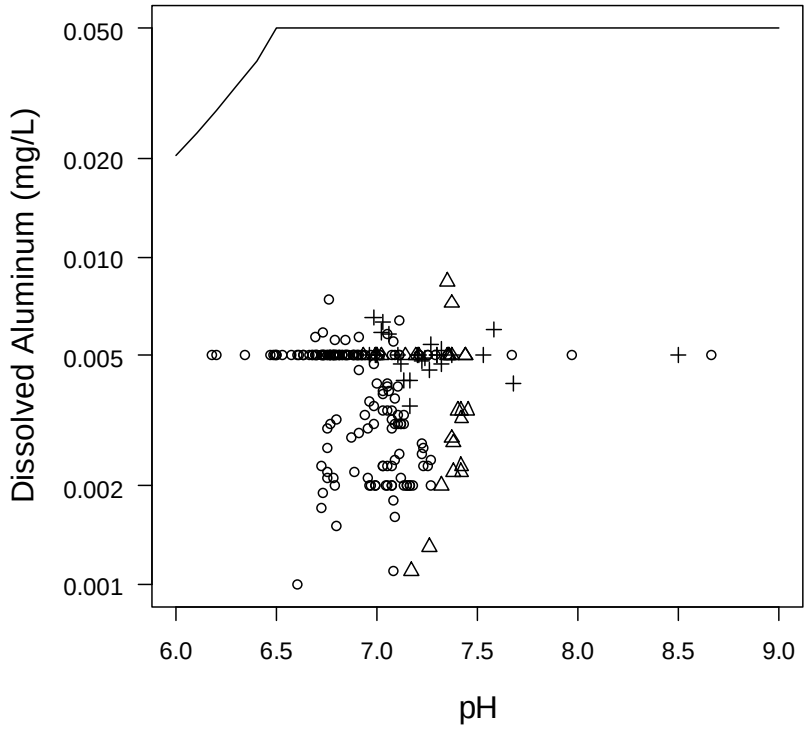
To express benchmarks as a continuous relationship, we fit a power function to the hardness-HC_5 data, which provided a near-perfect fit: t-Zn (HC_5) in mg/L $= 0.00217*H^{0.8486}$, where H = hardness (mg/L $CaCO_3$). This relationship is illustrated in the figure below (solid curve) across the range of baseline observations of hardness for Meadowbank (circles), Wally (triangles), and Baker ("+"). Note that the Ekati t-Zn benchmark is lower than the CCME guideline of 0.03 mg/L for hardness less than about 23. Only six of 269 baseline measurements of t-Zn have exceeded detection limits (four for Meadowbank, including the anomalous high value of t-Zn = 0.109 mg/L that occurred for station TPS in July 2009, and two for Wally).

As for t-Mn, we propose a single t-Zn trigger for each system. First, we computed the t-Zn benchmark (HC_5) corresponding to the median values of hardness observed for Meadowbank samples (median hardness = 5.70, t-Zn benchmark = 0.0095), Wally samples (median hardness = 12.2, t-Zn benchmark = 0.0181), and Baker samples (median hardness = 16.5, t-Zn benchmark = 0.0234). The corresponding lake-specific triggers for t-Zn (using Method A with the current DL = 0.003 mg/L) are 0.006 for Meadowbank, 0.011 for Wally, and 0.013 for Baker (**Table 1**).


0.100
0.050
0.020
0.010
0.005
0.002
Total Zinc (mg/L)
Etaki
CCME
0
10
20
30
40
50
60
Hardness (mg/L CaCO3)

Dissolved aluminum – There is no CCME guideline for d-Al in water. However, a pH-dependent water quality guideline for d-Al (mg/L) has been developed by BC MOE for protection of freshwater aquatic life. For pH < 6.5, the guideline is as follows: $d\text{-}Al = e^{(1.6-3.327*pH + 0.402*K)}$ where $K = pH^2$. For pH ≥ 6.5, the guideline is 0.05 mg/L. This relationship is illustrated in the figure below (solid curve) across the range of baseline observations of pH for Meadowbank (circles), Wally (triangles), and Baker ("+"). The BC MOE guideline greatly exceeds all observed values of d-Al.

Again, we propose a single d-Al trigger for each system. Based on the median pH observed for Meadowbank (6.89), Wally (7.35), and Baker (7.21), the corresponding BC MOE guideline for d-Al is 0.05 mg/L in each case. As documented in **Table 2**, the proposed triggers for d-Al (based on Method A and ROS estimates for median d-Al) are 0.026 for Meadowbank, 0.026 for Wally, and 0.027 for Baker.



Ammonia-N -- The CCME guideline for total ammonia in freshwater is pH and temperature dependent, with more stringent guidelines applying at higher pH and higher temperature. The proposed threshold for Ammonia-N (Meadowbank and Baker) was conservatively derived using two discrete CCME guidelines corresponding to specific pH and temperature values. Note that the maximum pH among baseline data for Meadowbank/Wally/Baker is 8.66, while maximum temperatures in the lakes are around 16 to 18 degrees. The two CCME guidelines that span these maximum (i.e., worst-case) conditions are as follows: (1) total ammonia = 0.239 mg/L for pH = 8.5 and temperature = 15 degrees; and (2) total ammonia = 0.067 mg/L for pH = 9.0 and temperature = 20 degrees. The mid-point of these two values is 0.153 mg/L, which when converted from total ammonia to total ammonia as N is 0.126 mg/L.

Thus, the proposed threshold for ammonia-N is 0.126 mg/L. Application of this threshold provided trigger values of 0.065, 0.067, and 0.067 mg/L respectively for Meadowbank, Wally, and Baker (**Table 3**). Only at extreme pH and temperature would this trigger potentially exceed the CCME guideline. Whenever the trigger is exceeded, the concentrations of ammonia-N should be compared to the CCME guideline based on the specific pH and field temperature of each sample.

Total P -- The CCME does not specify a particular guideline for total phosphorus, but instead establishes a guidance framework for site-specific application. Under that framework, the specification for ultra-oligotrophic lakes is for total-P of <0.004 mg/L. The framework notes that up to a 50% increase in total-P over baseline is generally considered acceptable. Regardless, the 95th percentiles for Total-P exceeded 0.004 mg/L for both Meadowbank samples and Baker samples (**Table 3**). Consequently, the proposed lake-specific triggers were set equal to these 95th percentiles (Method B, **Table 3**).

pH -- The CCME guideline for pH in freshwater is a range from 6.5 to 9.0. Thus, for pH, there is both an upper threshold (9.0) and a lower threshold (6.5), with associated upper and lower triggers (**Table 3**). In the case of Meadowbank data, the lower trigger was based on Method B because the 5th percentile of the baseline data was equal to the lower threshold of 6.50 (**Table 3**).

TSS -- For water bodies with low natural TSS, the CCME guideline is a maximum increase of 25 mg/L over background for short periods (e.g., 24h) and a maximum increase of 5 mg/L over background for longer periods (e.g., 24h to 30 days). If we conservatively assume a background TSS of 0 mg/L, then thresholds of 25 mg/L and 5 mg/L would apply for short-term and long-term exposures, respectively. However, because sampling occurs only at most once per month, it will be unknown whether a given TSS measure is a short-term (< 24 h) or longer term (> 24 h) phenomenon. We therefore propose a TSS trigger based on the lower threshold of 5 mg/L, which thereby addresses both short and long durations. The resulting triggers, based on Method A, were 3.0 mg/L for all three systems (**Table 3**).

Table 1. Total metals: summary of trigger values for Meadowbank, Wally, and Baker stations.

Notes: For each variable, thresholds (guidelines) are shown if applicable (see text for discussion); DL = current detection limit; N = sample measurements; >DL = number of measurements above DL; Med = median if estimable; P95 = 95th percentile if estimable; M = method used to determine the trigger, where A = halfway from median (or DL if median not estimable) to threshold, B = 95th percentile, and C = 2*DL.

			Meadowbank						**Wally**						**Baker**					
Variable	Threshold	DL	N	>DL	Med	P95	Trigger	M	N	>DL	Med	P95	Trigger	M	N	>DL	Med	P95	Trigger	M
Aluminum (T)	0.1	0.003	204	169	0.007	0.014	0.054	A	34	23	0.006	0.011	0.053	A	31	30	0.011	0.023	0.056	A
Antimony (T)	0.02	0.0001	204	0	NA	NA	0.010	A	34	0	NA	NA	0.010	A	31	0	NA	NA	0.010	A
Arsenic (T)	0.005	0.0001	204	14	NA	NA	0.0026	A	34	14	0.00025	0.00029	0.0026	A	31	4	0.00015	NA	0.0026	A
Barium (T)	1.0	0.00005	204	79	0.0021	0.0030	0.50	A	34	14	0.0019	0.0030	0.50	A	31	14	0.0177	0.0196	0.51	A
Beryllium (T)	0.0053	0.0001	204	0	NA	NA	0.0027	A	34	0	NA	NA	0.0027	A	31	0	NA	NA	0.0027	A
Boron (T)	1.5	0.01	204	1	NA	NA	0.76	A	34	0	NA	NA	0.76	A	31	3	0.011	0.011	0.76	A
Cadmium (T)	0.00004	0.00001	204	10	NA	NA	0.000025	A	34	1	NA	NA	0.000025	A	31	0	NA	NA	0.000025	A
Chromium (T)	0.001	0.0001	204	14	0.00011	0.00046	0.00056	A	34	0	NA	NA	0.00055	A	31	2	NA	NA	0.00055	A
Copper (T)	0.002	0.0005	204	61	0.00047	0.00068	0.00124	A	34	16	0.00098	0.00129	0.00149	A	31	11	0.00049	0.00060	0.00125	A
Iron (T)	0.3	0.01	204	26	NA	NA	0.155	A	34	6	0.015	0.025	0.157	A	31	9	0.020	0.063	0.160	A
Lead (T)	0.001	0.00005	204	7	NA	NA	0.00053	A	34	2	NA	0.00015	0.00053	A	31	1	NA	NA	0.00053	A
Lithium (T)	0.096	0.0005	204	6	0.00042	0.00063	0.048	A	34	2	0.00085	NA	0.048	A	31	6	0.0010	0.0036	0.048	A
Manganese (T)	See text	0.00005	204	198	0.0013	0.0043	0.316	A	34	34	0.0014	0.0020	0.330	A	31	31	0.0024	0.0038	0.340	A
Mercury (T)	0.000026	0.00001	204	1	NA	NA	0.000018	A	34	0	NA	NA	0.000018	A	31	0	NA	NA	0.000018	A
Molybdenum (T)	0.073	0.00005	204	5	NA	NA	0.037	A	34	3	0.00013	0.00019	0.037	A	31	4	0.00008	NA	0.037	A
Nickel (T)	0.025	0.0005	204	8	0.0005	0.0007	0.013	A	34	0	NA	NA	0.013	A	31	0	NA	NA	0.013	A
Selenium (T)	0.001	0.0001	204	0	NA	NA	0.00055	A	34	0	NA	NA	0.00055	A	31	0	NA	NA	0.00055	A
Strontium (T)	0.049	0.0002	192	188	0.0068	0.0095	0.028	A	32	32	0.016	0.022	0.033	A	31	31	0.025	0.056	0.056	B
Thallium (T)	0.0008	0.00001	204	0	NA	NA	0.00041	A	34	0	NA	NA	0.00041	A	31	0	NA	NA	0.00041	A
Tin (T)		0.0001	204	2	NA	NA	0.0002	C	34	0	NA	NA	0.0002	C	31	0	NA	NA	0.0002	C
Titanium (T)	2.0	0.01	204	14	0.00016	0.00044	1.0	A	34	3	0.00013	0.00049	1.0	A	31	4	0.00038	NA	1.0	A
Uranium (T)	0.015	0.00001	204	20	0.00004	0.00006	0.0075	A	34	2	0.00004	NA	0.0075	A	31	4	0.00005	NA	0.0075	A
Vanadium (T)	0.006	0.001	204	0	NA	NA	0.0035	A	34	0	NA	NA	0.0035	A	31	0	NA	NA	0.0035	A
Zinc (T)	See text	0.003	204	4	NA	NA	0.0063	A	34	2	NA	NA	0.0106	A	31	0	NA	NA	0.0132	A

Table 2. Dissolved metals: summary of trigger values for Meadowbank, Wally, and Baker stations.

Notes: For each variable, thresholds (guidelines) are shown if applicable (see text for discussion); DL = current detection limit; N = sample measurements; >DL = number of measurements above DL; Med = median if estimable; P95 = 95th percentile if estimable; M = method used to determine the trigger, where A = halfway from median (or DL if median not estimable) to threshold, B = 95th percentile, and C = 2*DL.

			Meadowbank						**Wally**						**Baker**					
Variable	Threshold	DL	N	>DL	Med	P95	Trigger	M	N	>DL	Med	P95	Trigger	M	N	>DL	Med	P95	Trigger	M
Aluminum (D)	0.05	0.001	164	69	0.003	0.005	0.026	A	27	13	0.003	0.006	0.026	A	28	17	0.005	0.006	0.027	A
Antimony (D)	0.02	0.0001	164	0	NA	NA	0.010	A	27	0	NA	NA	0.010	A	28	0	NA	NA	0.010	A
Arsenic (D)	0.005	0.0001	164	12	NA	NA	0.0026	A	27	13	0.00024	0.00034	0.0026	A	28	6	0.00012	0.00024	0.0026	A
Barium (D)	1.0	0.00005	164	79	0.0020	0.0029	0.50	A	27	13	0.0018	0.0030	0.50	A	28	14	0.0178	0.0200	0.51	A
Beryllium (D)	0.0053	0.0001	164	0	NA	NA	0.0027	A	27	0	NA	NA	0.0027	A	28	0	NA	NA	0.0027	A
Boron (D)	1.5	0.01	164	0	NA	NA	0.76	A	27	0	NA	NA	0.76	A	28	0	NA	NA	0.76	A
Cadmium (D)	0.00004	0.00001	164	3	NA	NA	0.000025	A	27	0	NA	NA	0.000025	A	28	0	NA	NA	0.000025	A
Chromium (D)	0.001	0.0001	164	1	NA	NA	0.00055	A	27	0	NA	NA	0.00055	A	28	1	NA	NA	0.00055	A
Copper (D)	0.002	0.0002	164	77	0.00038	0.00049	0.00119	A	27	15	0.00087	0.00148	0.00148	B	28	13	0.00033	0.00044	0.00116	A
Iron (D)	0.3	0.01	164	0	NA	NA	0.155	A	27	0	NA	NA	0.155	A	28	1	NA	NA	0.155	A
Lead (D)	0.001	0.00005	164	3	NA	NA	0.00053	A	27	2	NA	0.00015	0.000525	A	28	0	NA	NA	0.000525	A
Lithium (D)	0.096	0.0005	164	2	NA	0.00053	0.048	A	27	2	0.00099	NA	0.048	A	28	4	0.0008	NA	0.048	A
Manganese (D)	See text	0.00005	164	114	0.0004	0.0029	0.315	A	27	22	0.0004	0.0015	0.330	A	28	24	0.0006	0.0019	0.339	A
Mercury (D)	0.000026	0.00001	153	2	NA	NA	0.000018	A	25	0	NA	NA	0.000018	A	26	0	NA	NA	0.000018	A
Molybdenum (D)	0.073	0.00005	164	17	0.00010	0.00018	0.037	A	27	8	0.00011	0.00019	0.037	A	28	3	0.00006	NA	0.037	A
Nickel (D)	0.025	0.0005	164	6	NA	NA	0.013	A	27	1	NA	NA	0.013	A	28	0	NA	NA	0.013	A
Selenium (D)	0.001	0.0001	164	0	NA	NA	0.00055	A	27	0	NA	NA	0.00055	A	28	0	NA	NA	0.00055	A
Strontium (D)	0.049	0.002	164	161	0.0069	0.0090	0.028	A	27	27	0.016	0.023	0.033	A	28	28	0.023	0.049	0.049	B
Thallium (D)	0.0008	0.00001	164	0	NA	NA	0.00041	A	27	0	NA	NA	0.00041	A	28	0	NA	NA	0.00041	A
Tin (D)		0.0001	164	0	NA	NA	0.0002	C	27	0	NA	NA	0.0002	C	28	0	NA	NA	0.0002	C
Titanium (D)	2.0	0.01	164	0	NA	NA	1.0	A	27	0	NA	NA	1.0	A	28	0	NA	NA	1.0	A
Uranium (D)	0.015	0.00001	164	20	0.00003	0.00005	0.0075	A	27	2	0.00004	NA	0.0075	A	28	4	0.00004	NA	0.0075	A
Vanadium (D)	0.006	0.001	164	0	NA	NA	0.0035	A	27	0	NA	NA	0.0035	A	28	0	NA	NA	0.0035	A
Zinc (D)	See text	0.001	164	6	NA	0.0021	0.0053	A	27	2	NA	NA	0.0096	A	28	2	NA	0.0028	0.0122	A

Table 3. Nutrients and conventional parameters: summary of trigger values for Meadowbank, Wally, and Baker stations.

Notes: For each variable, thresholds (guidelines) are shown if applicable (see text for discussion); DL = current detection limit; N = sample measurements; >DL = number of measurements above DL; Med = median if estimable; P95 = 95th percentile if estimable; M = method used to determine the trigger, where A = halfway from median (or DL if median not estimable) to threshold, B = 95th percentile, and C = 2*DL. **Red bolded** text indicates parameter values that are new for 2014 reporting (Azimuth, 2015).

			Meadowbank						**Wally**						**Baker**					
Variable	Threshold	DL	N	>DL	Med	P95	Trigger	M	N	>DL	Med	P95	Trigger	M	N	>DL	Med	P95	Trigger	M
Ammonia-N	0.126	0.005	204	52	0.005	0.046	0.065	A	34	12	0.007	0.024	0.067	A	31	13	0.007	0.031	0.067	A
TKN		0.05	204	178	0.097	0.170	0.170	B	34	31	0.111	0.163	0.163	B	31	28	0.157	0.214	0.214	B
Nitrate-N	3.0	0.005	204	26	NA	0.025	1.503	A	34	2	NA	NA	1.503	A	31	26	0.014	0.030	1.507	A
Nitrite-N	0.06	0.001	204	6	NA	NA	0.031	A	34	2	NA	NA	0.031	A	31	2	NA	NA	0.031	A
Ortho-phosphate		0.001	192	10	NA	0.0010	0.0020	C	34	3	NA	0.0010	0.0020	C	31	5	0.0007	0.0013	0.0020	C
T. phosphorous	0.004	0.002	192	84	0.0019	0.0060	0.0060	B	34	21	0.0028	0.0067	0.0067	B	31	23	0.0036	0.0096	0.0096	B
TOC		0.5	204	204	1.74	2.79	2.79	B	34	34	2.18	4.11	4.11	B	31	31	3.16	4.25	4.25	B
DOC		0.5	204	204	1.70	2.60	2.60	B	34	34	2.20	3.21	3.21	B	31	31	3.17	4.05	4.05	B
Reactive silica		0.5	185	56	0.28	0.44	1.00	C	32	14	0.74	1.08	1.08	B	28	10	0.31	0.42	1.00	C
Bicarb. alkalinity		2.0	192	192	5.2	8.6	8.6	B	34	34	10.0	17.8	17.8	B	31	31	9.3	10.6	10.6	B
Chloride	120	0.1	204	141	0.550	0.809	60.3	A	34	15	0.469	0.639	60.2	A	31	31	24.4	95.7	95.7	B
Carb. alkalinity		2.0	192	0	NA	NA	4.0	C	34	0	NA	NA	4.0	C	31	0	NA	NA	4.0	C
Conductivity		2.0	204	204	15.2	23.5	23.5	B	34	34	28.7	36.6	36.6	B	31	31	110.0	494.5	494.5	B
Hardness		0.5	204	204	5.7	8.5	8.5	B	34	34	12.2	16.7	16.7	B	31	31	16.5	41.2	41.2	B
Calcium		0.5	204	204	1.30	2.15	2.15	B	34	34	3.34	4.88	4.88	B	31	31	3.02	4.50	4.50	B
Potassium		0.1	204	79	0.37	0.50	0.50	B	34	14	0.37	0.59	0.59	B	31	20	0.93	2.43	2.43	B
Magnesium		0.1	204	204	0.64	0.83	0.83	B	34	34	0.96	1.36	1.36	B	31	31	2.61	7.44	7.44	B
Sodium		0.05	204	79	0.55	0.98	0.98	B	34	14	0.48	0.72	0.72	B	31	31	12.1	54.0	54.0	B
Sulphate	128	0.5	204	204	1.42	2.83	64.7	A	34	34	2.34	3.38	65.2	A	31	31	3.84	13.80	65.9	A
pH **Field** (Upper)	**9.0**	**0.1**	**174**	**174**	**7.24**	**8.25**	**8.25**	**B**	**32**	**32**	**7.67**	**8.26**	**8.34**	**A**	**26**	**26**	**7.41**	**8.32**	**8.32**	**B**
pH **Field** (Lower)	**6.5**	**0.1**	**174**	**174**	**7.24**	**6.30**[a]	**6.30**	**B**	**32**	**32**	**7.67**	**6.54**[a]	**6.54**	**B**	**26**	**26**	**7.41**	**6.50**[a]	**6.50**	**B**
pH Lab (Upper)	9.0	0.1	204	204	6.89	7.27	7.94	A	34	34	7.35	7.44	8.17	A	31	31	7.21	7.66	8.11	A
pH Lab (Lower)	6.5	0.1	204	204	6.89	6.50[a]	6.50	B	34	34	7.35	7.00[a]	**6.92**	A	31	31	7.21	6.99[a]	**6.86**	A
Total Alkalinity		2.0	192	192	5.20	8.55	8.55	B	34	34	10.0	17.8	17.8	B	31	31	9.3	10.6	10.6	B
TDS		3.0	204	134	11.0	18.0	18.0	B	34	34	18.0	25.3	25.3	B	31	31	64.0	208.0	208.0	B
TSS	5.0	1.0	204	9	NA	NA	3.00	A	34	1	NA	NA	3.00	A	31	2	NA	NA	3.00	A

[a] For pH (Lower), the 5th percentile is reported.

Table 4. Summary of thresholds for water variables.

Variable	Source	Description of guidelines
t-Aluminum (Al)	CCME	The CCME guideline for t-Al in water is 0.005 mg/L when pH < 6.5, and 0.1 mg/L when pH ≥ 6.5. See text for details.
t-Arsenic (As) **d-Arsenic	CCME	The CCME water quality guideline (aquatic life) for t-As is 0.005 mg/L.
t-Boron (B) **d-Boron	BC MOE	There is no CCME guideline for t-B. However, the BC Ministry of Environment (BC MOE, www.env.gov.bc.ca) guideline for freshwater aquatic life is 1.2 mg/L.
t-Cadmium (Cd) **d-Cadmium	CCME	The hardness-dependent CCME guideline for t-Cd (mg/L) is 0.00004 mg/L when hardness > 0 to < 17 mg/L $CaCO_3$ and is $0.001*10^{0.83*\log(H)-2.46}$ where H = hardness (mg/L $CaCO_3$) when hardness is >= 17 to <= 280 mg/L $CaCO_3$. For hardness > 280 mg/L $CaCO_3$, the guideline is 0.00037 mg/L.
t-Chromium (Cr) **d-Chromium	CCME	The CCME guideline for hexavalent chromium (the most common form in surface waters) is 0.001 mg/L.
t-Copper (Cu) **d-Copper	CCME	The CCME guideline for t-Cu is 0.002 mg/L for hardness < 82 mg/L $CaCO_3$.
t-Iron (Fe) **d-Iron	CCME	The CCME guideline for t-Fe is 0.3 mg/L.
t-Lead (Pb) **d-Lead	CCME	The CCME guideline for t-Pb is 0.001 mg/L for hardness < 60 mg/L $CaCO_3$.
t-Manganese (Mn) **d-Manganese	BC MOE	There is no CCME guideline for t-Mn in water. The hardness-dependent BC MOE guideline for t-Mn in mg/L is 0.0044*H + 0.605, where H = hardness (mg/L $CaCO_3$). See text for details.
t-Mercury (Hg) **d-Mercury	CCME	The CCME guideline for total inorganic mercury is 26 ng/L (0.00026 mg/L).
t-Molybdenum (Mo) **d-Molybdenum	CCME	The CCME guideline for t-Mo in water is 0.073 mg/L.
t-Nickel (Ni) **d-Nickel	CCME	The CCME guideline for t-Ni is 0.025 mg/L for hardness < 60 mg/L $CaCO_3$.
t-Selenium (Se) **d-Selenium	CCME	The CCME guideline for t-Se in water is 0.001 mg/L.
t-Thallium (Tl) **d-Thallium	CCME	The CCME water quality guideline for t-Tl is 0.0008 mg/L.

t-Zinc (Zn) **d-Zinc	CCME Ekati	The CCME water quality guideline for t-Zn is 0.030 mg/L. However, this guideline does not take into account hardness, and zinc toxicity is known to be hardness-dependent. An assessment for Ekati by EVS (2004) compiled data on species applicable to oligotrophic systems with low hardness, and developed a chronic benchmark for t-Zn that was hardness dependent. See text for details.
d-Aluminum (Al)	BC MOE	A pH-dependent water quality guideline for d-Al (mg/L) has been developed by BC MOE for protection of freshwater aquatic life when pH <6.5 as follows: d-Al = $e^{(1.6-3.327*pH + 0.402*K)}$ where K = pH^2. For pH >= 6.5 the guideline is 0.05 mg/L See text for details.
Ammonia-N	CCME	The CCME guidelines for total ammonia in freshwater are pH and temperature dependent, with more stringent guidelines applying at higher pH and higher temperature. See text for details.
Nitrate-N	CCME	The CCME guideline for NO3-N is 2.9 mg/L.
Nitrite-N	CCME	The CCME guideline for nitrite-N is 0.06 mg/L.
t-Phosphorous (P)	CCME	The CCME does not specify a particular guideline for t-P, but instead establishes a guidance framework for site-specific application. See text for details.
pH	CCME	The CCME guideline for pH is a range from 6.5 to 9.0. See text for details.
TSS	CCME	For water bodies with low natural TSS, the CCME guideline is a maximum increase of 25 mg/L over background for short periods (e.g., 24h) and 5 mg/L for longer periods (e.g., 24h to 30 days). See text for details.

****** where thresholds for total metals were developed, those thresholds were also applied to dissolved metal parameters.

APPENDIX B

STANDARD OPERATING PROCEDURE (SOP) FOR CREMP WATER & PHYTOPLANKTON SAMPLING

Standard Operating Procedure
Meadowbank Project Lakes & Baker Lake
CREMP Water & Phytoplankton Sampling 2014

GENERAL:

Project Coordinator:
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Telephone: 604-730-1220
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In case of **emergency**, contact Gary Mann ([redacted]).
Azimuth office telephone number 604-730-1220.

LOCATION AND TIMING FOR FIELD ACTIVITIES:

Twelve (12) sampling stations have been chosen for water quality monitoring in the Meadowbank project lakes and Baker Lake:

Meadowbank Lakes

- Third Portage Lake – North Basin (TPN)
- Third Portage Lake – East Basin (TPE)
- Second Portage Lake (SP)
- Tehek Lake (TE)
- Inuggugayualik Lake (INUG)
- Tehek Lake – Far-field (TEFF)
- Third Portage Lake – South Basin (TPS)
- Wally Lake (WAL)
- Pipedream Lake (PDL)

Baker Lake

- Baker Lake – Barge Dock (BBD)
- Baker Lake – Proposed Jetty (BPJ)
- Baker Lake – Akilahaarjuk Point (BAP)

Water sampling activities are scheduled roughly once a month for 6 months, including winter ice sampling. The first 5 stations listed above are sampled through the ice in April, May, and November. All of the above stations are sampled during open water in July, August, and September. Sampling will not be conducted in June and October because of thin ice conditions. **Check the monthly water sampling schedule to confirm which samples are to be collected where, BEFORE going into the field.**

All samples are now collected from **3 m below the water surface**, which is indicated by "-S" at the end of the sample ID (S=Surface). **Two** target sample locations for each station listed above have been

randomly pre-determined and recorded in MapSource and in the hand-held GPS units (NAD 83). Confirm before going into the field.

MONTHLY CREMP WATER CHEMISTRY & PHYTOPLANKTON SAMPLING:

1. Prior to leaving camp gather the appropriate type and number of sampling vessels and acid vials for preservation. Prepare appropriate labels for containers, affix them to the appropriate bottle (see below), and wrap label with packing tape. Use the following information:
   - Azimuth company name
   - Station abbreviation (e.g. TPE-36-S, INUG-24-S)
   - Date of sample collection
   - Parameters to be measured from individual bottle (TOC, total metals, etc.)

2. Gather **field collection materials**:
   In the boat:
   - Field collection data forms, pencils, waterproof markers & clipboard
   - GPS unit, batteries
   - Water pump & 12V battery
   - Tubing (4 meter length and 1 meter length) & weight (& extra C-clamps and cable ties)
   - In-line filter and a spare
   - YSI meter, batteries
   - Secchi disk
   - Hand held pH meter, batteries
   - Depth meter, batteries
   - Rope
   - Sampling gloves
   - Field sample bottles & preservatives (per sample) see **Table 1** and **Table 2** below
   - Glass vials (50 mL) for phytoplankton. Preserve with Lugol's back at the laboratory
   - Extra sample bottles in case of breakage or loss
   - QA/QC field duplicate sampling containers & preservatives (same as above)
   - Take one set of Travel Blank bottles into the field and transport and treat as other samples. Note that the Travel Blank bottles are not to be opened and no preservatives added.

   In camp:
   - Hand pump, filters, tweezers, and tinfoil for chlorophyll-a
   - De-ionized water for rinsing equipment and collected field equipment blank
   - Coolers (for storing and shipping samples)
   - Ice packs (for shipping samples to laboratories)
   - Address labels for coolers
   - Chain-of-custody forms
   - Large Ziploc bags (for sending chain-of-custody form in cooler)
   - Packing tape (for affixing labels to sampling containers & sealing cooler)

Starting in 2014, some of the water analyses with short hold-times are being completed by Multilab Direct Laboratory in Val d'Or, QC. A list of the bottles and preservatives for Multilab and ALS are provided in **Table 1**. The specific bottles to be filled, parameters to be measured and preservatives required for each is in **Table 2**. ALS Laboratory data quality objectives for individual water parameter analyses are in **Table 3**. Affix the labels to the sampling containers and then prior to shipping, wrap packing tape around the labels to ensure a waterproof seal.

Table 1. Water samples destined for Multilab (Val d'Or, PQ) versus ALS (Burnaby, BC) collected for the CREMP program.

Water Parameters	Bottle and Sample Volume	Preservative
Multilab Val d'Or		
Alkalinity - Total	1 L plastic bottle from Multilab (one bottle for all these parameters)	None
Bicarbonates		None
Carbonates		None
Hydroxides		None
pH		None
Turbidity		None
Conductivity		None
TSS		None
TDS		None
Total Kjeldahl nitrogen (TKN)	250 ml plastic bottle	H_2SO_4 (in the bottle)
ALS Burnaby		
Chlorophyll-a	15 mL Black Tube +0.45um MCE Filter	None (Freeze)
Cyanide (total and free)	145 mL HDPE Bottle	0.5 mL 50% NaOH
DOC/DKN/TDN/TDP/DNH3	125mL Amber Glass Bottle	1 mL H_2SO_4
General Chemistry	1L HDPE Bottle	None
Total Metals	250 mL HDPE Bottle	3 mL Nitric Acid
Dissolved Metals	250 mL HDPE Bottle	3 mL Nitric Acid
Total Mercury	40 mL Glass Vial	0.5 mL Hydrochloric Acid
Dissolved Mercury	40 mL Glass Vial	0.5 mL Hydrochloric Acid
NUT/TOC/TKN/COD/TN/TP/NH3/PHENOL	250mL Amber glass bottle	1 mL H_2SO_4

Table 2. Water samples collected as part of the CREMP program.

Jar Type	Label as:	Filter in the field?	Preservation / Storage	Collect parameter for:			Lab-prepared for:
				Lake Station	Field DUP	Equipment Blank	Travel Blank
1L plastic	Anions, low level chloride	no	none / refrigerate	yes	yes	yes	yes
1L plastic	Alkalinity, pH, bicarbonate, etc.	no	none / refrigerate	yes	yes	yes	yes
250 mL amber glass	TOC, NUT, TKN, COD, TN, TP, NH3, PHENOL	no	1 mL sulfuric acid / refrigerate	yes	yes	yes	yes
125 mL amber glass	DOC, DKN, TDN, TDP, DNH3	**yes**	1 mL sulfuric acid / refrigerate	yes	yes	yes	yes
250 mL plastic	Total Metals	no	3 mL nitric acid / refrigerate	yes	yes	yes	yes
250 mL plastic	Dissolved Metals	**yes**	3 mL nitric acid / refrigerate	yes	yes	yes	yes
145 mL plastic	Cyanide free and total	no	0.5 mL NaOH / refrigerate	yes	yes	yes	yes
40 mL glass vial	Total Mercury	no	0.5 mL hydrochloric acid / refrigerate	yes	yes	yes	yes
40 mL glass vial	Dissolved Mercury	**yes**	0.5 mL hydrochloric acid / refrigerate	yes	yes	yes	yes
Filter (500mL water)	Chlorophyll-a*	**yes**	none / **freeze**	yes	yes	**no**	**no**
50 mL glass vial	Phytoplankton	no	3-4 drops of Lugol's solution	yes	yes	**no**	**no**
			Total samples for July:	**24**	**3**	**2**	**2**
			Total samples for August:	**24**	**3**	**2**	**2**
			Total samples for September:	**24**	**3**	**2**	**2**

Notes:
For details on the analysis of individual parameters, see **Table 3**.
* The chlorophyll-*a* water sample is an unfiltered sample (500 mL) that is then filtered with a hand-pump at the field office.

Table 3. Laboratory data quality objectives (from ALS) for water chemistry analyses.

Parameter	Target D.L.	Units	Accuracy [1] DQO	Matrix Spike [2] DQO	Precision [3] (RPD) DQO	Hold Times	Bottle Required	Volume Required	Filter (Yes/No)	Preservative	Method Reference
Water - Physical Tests											
Colour, True	5	CU	85-115%	n/a	20%	2 / 3 days	Plastic	1.0 L	No	None	BCMOE Colour Single Wavelength
Conductivity	2	µS/cm	90-110%	n/a	10%	28 days	Plastic	1.0 L	No	None	APHA 2510 Auto. Conduc.
Hardness (as $CaCO_3$)	0.5	S/c	75-125%	65-135%	25%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 2340B
pH	0.1	mg/L	± 0.10 pH units	n/a	± 0.20 pH units	0.25 hours	Plastic	1.0 L	No	None	APHA 4500-H pH Value
Total Dissolved Solids	10	pH	85-115%	n/a	20%	7 days	Plastic	1.0 L	No	None	APHA 2540 C - GRAVIMETRIC
Total Suspended Solids	3	mg/L	85-115%	n/a	20%	7 days	Plastic	1.0 L	No	None	APHA 2540 D - GRAVIMETRIC
Turbidity	0.1	mg/L NTU	85-115%	n/a	15%	2 / 3 days	Plastic	1.0 L	No	None	APHA 2130 Turbidity
Water - Anions and Nutrients											
Alkalinity, Bicarbonate (as $CaCO_3$)	2	mg/L	85-115%	n/a	20%	14 days	Plastic	1.0 L	No	None	EPA 310.2 OR APHA 2320
Alkalinity, Carbonate (as $CaCO_3$)	2	mg/L	85-115%	n/a	20%	14 days	Plastic	1.0 L	No	None	EPA 310.2 OR APHA 2320
Alkalinity, Hydroxide (as $CaCO_3$)	2	mg/L	85-115%	n/a	20%	14 days	Plastic	1.0 L	No	None	EPA 310.2 OR APHA 2320
Alkalinity, Total (as $CaCO_3$)	2	mg/L	85-115%	n/a	20%	14 days	Plastic	1.0 L	No	None	EPA 310.2 OR APHA 2320
Ammonia, Total (as N)	0.005	mg/L	85-115%	75-125%	20%	28 days	Amber Glass	250 ml	No	H_2SO_4	J. ENV. MONIT.,2005,7,37-42,RSC
Anion Sum	0.1										APHA 1030E
Bromide (Br)	0.05	mg/L	85-115%	75-125%	20%	28 days	Plastic	1.0 L	No	None	APHA 4110 B.
Cation - Anion Balance	-100										APHA 1030E
Cation Sum	0.1										APHA 1030E
Chloride (Cl)	0.5	mg/L	85-115%	75-125%	20%	28 days	Plastic	1.0 L	No	None	APHA 4110 B.
Computed Conductivity	0.2	uS/cm	90-110%	n/a	10%						APHA 1030E
Fluoride (F)	0.02	mg/L	85-115%	75-125%	20%	28 days	Plastic	1.0 L	No	None	APHA 4110 B.
Ion Balance	-100										APHA 1030E
Nitrate (as N)	0.005	mg/L	85-115%	75-125%	20%	2 / 3 days	Plastic	1.0 L	No	None	EPA 300.0
Nitrite (as N)	0.001	mg/L	85-115%	75-125%	20%	2 / 3 days	Plastic	1.0 L	No	None	EPA 300.0
Orthophosphate-Dissolved (as P)	0.001	mg/L	80-120%	70-130%	20%	2 / 3 days	Plastic	1.0 L	No	None	APHA 4500-P Phosphorous
Phosphorus (P)-Total	0.003	mg/L	80-120%	70-130%	20%	28 days	Plastic	1.0 L	No	None	APHA 4500-P Phosphorous
Phosphorus (P)-Total Dissolved	0.003	mg/L	80-120%	70-130%	20%	28 days	Plastic	1.0 L	No	None	APHA 4500-P Phosphorous
Sulfate (SO_4)	0.5	mg/L	85-115%	75-125%	20%	28 days	Plastic	1.0 L	No	None	APHA 4110 B.
TDS (Calculated)	1		85-115%	n/a	20%	28 days	Plastic	1.0 L	No	None	APHA 1030E
Total Kjeldahl Nitrogen	0.05	mg/L	75-125%	70-130%	20%	10 days	Amber Glass	250 ml	No	H_2SO_4	APHA 4500-NORG D.
Water - Organic / Inorganic Carbon											
Dissolved Organic Carbon	0.5	mg/L	80-120%	70-130%	20%	28 days	Amber Glass	125 ml	Yes	H_2SO_4	APHA 5310 TOTAL ORGANIC CARBON
Total Organic Carbon	0.5	mg/L	80-120%	70-130%	20%	28 days	Amber Glass	125 ml	No	H_2SO_4	APHA 5310 TOTAL ORGANIC CARBON
Chlorophyll-*a*											
Chlorophyll-*a*	0.01	µg	+/- 20%	n/a	+/- 20%	28 days	Plastic	250ml	Footnote 4	Footnote 4	EPA Method 445.0

Table 3 con't. Laboratory data quality objectives (from ALS) for water chemistry analyses.

Parameter	Target D.L.	Units	Accuracy [1] DQO	Matrix Spike [2] DQO	Precision [3] (RPD) DQO	Hold Times	Bottle Required	Volume Required	Filter (Yes/No)	Preservative	Method Reference
Water - Total Metals											
Aluminum (Al)-Total	0.003	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Antimony (Sb)-Total	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Arsenic (As)-Total	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Barium (Ba)-Total	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Beryllium (Be)-Total	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Bismuth (Bi)-Total	0.0005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Boron (B)-Total	0.01	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Cadmium (Cd)-Total	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Calcium (Ca)-Total	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	EPA 3005A/6010B
Chromium (Cr)-Total	0.0001	mg/L	80-120%	70-130%	20%	30 days	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Cobalt (Co)-Total	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Copper (Cu)-Total	0.0005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Iron (Fe)-Total	0.01	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	EPA 3005A/6010B
Lead (Pb)-Total	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Lithium (Li)-Total	0.0005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Magnesium (Mg)-Total	0.1	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	EPA 3005A/6010B
Manganese (Mn)-Total	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Mercury (Hg)-Total	0.00001	mg/L	80-120%	70-130%	20%	28 days	Plastic, Verified	125 ml	No	HNO_3	EPA 245.7
Molybdenum (Mo)-Total	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Nickel (Ni)-Total	0.0005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Phosphorus (P)-Total	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	EPA 3005A/6010B
Potassium (K)-Total	0.1	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	EPA 3005A/6010B
Selenium (Se)-Total	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Silicon (Si)-Total	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	EPA 3005A/6010B
Silver (Ag)-Total	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Sodium (Na)-Total	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Strontium (Sr)-Total	0.0002	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Sulfur (S)-Total	0.5	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	EPA SW-846 3005A/6010B
Thallium (Tl)-Total	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Tin (Sn)-Total	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Titanium (Ti)-Total	0.01	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Uranium (U)-Total	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Vanadium (V)-Total	0.001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Zinc (Zn) - Total	0.003	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	No	HNO_3	APHA 3030 B&E / EPA SW-846 6020A

Table 3 con't. Laboratory data quality objectives (from ALS) for water chemistry analyses.

Parameter	Target D.L.	Units	Accuracy [1] DQO	Matrix Spike [2] DQO	Precision [3] (RPD) DQO	Hold Times	Bottle Required	Volume Required	Filter (Yes/No)	Preservative	Method Reference
Water - Dissolved Metals											
Aluminum (Al)-Dissolved	0.001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Antimony (Sb)-Dissolved	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Arsenic (As)-Dissolved	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Barium (Ba)-Dissolved	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Beryllium (Be)-Dissolved	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Bismuth (Bi)-Dissolved	0.0005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Boron (B)-Dissolved	0.01	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Cadmium (Cd)-Dissolved	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Calcium (Ca)-Dissolved	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	EPA 3005A/6010B
Chromium (Cr)-Dissolved	0.0001	mg/L	80-120%	70-130%	20%	30 days	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Cobalt (Co)-Dissolved	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Copper (Cu)-Dissolved	0.0002	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Iron (Fe)-Dissolved	0.01	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	EPA 3005A/6010B
Lead (Pb)-Dissolved	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Lithium (Li)-Dissolved	0.0005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Magnesium (Mg)-Dissolved	0.1	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	EPA 3005A/6010B
Manganese (Mn)-Dissolved	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Mercury (Hg)-Dissolved	0.00001	mg/L	80-120%	70-130%	20%	28 days	Plastic, Verified	125 ml	Yes	HNO_3	EPA SW-846 3005A & EPA 245.7
Molybdenum (Mo)-Dissolved	0.00005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Nickel (Ni)-Dissolved	0.0005	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Phosphorus (P)-Dissolved	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	EPA 3005A/6010B
Potassium (K)-Dissolved	0.1	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	EPA 3005A/6010B
Selenium (Se)-Dissolved	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Silicon (Si)-Dissolved	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	EPA 3005A/6010B
Silver (Ag)-Dissolved	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Sodium (Na)-Dissolved	0.05	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Strontium (Sr)-Dissolved	0.0002	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Sulfur (S)-Dissolved	0.5	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	EPA SW-846 3005A/6010B
Thallium (Tl)-Dissolved	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Tin (Sn)-Dissolved	0.0001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Titanium (Ti)-Dissolved	0.01	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Uranium (U)-Dissolved	0.00001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Vanadium (V)-Dissolved	0.001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A
Zinc (Zn) - Dissolved	0.001	mg/L	80-120%	70-130%	20%	6 months	Plastic, Verified	125 ml	Yes	HNO_3	APHA 3030 B&E / EPA SW-846 6020A

Note: All bottles should be kept cool from sampling to lab receiving. If possible, Dissolved Metals should be filtered and preserved as soon as possible.

[1] Accuracy is measured as Percent Difference from True Value or Certified Target for Reference Materials and/or Method Analyte Spikes and Surrogates where applicable. For Matrix Spikes, accuracy is measured as the measured amount minus the sample background amount divided by the spiked amount. For low level results the accuracy objective is for the measured result to lie within +/- 1 times the LOR from the target.

[2] Matrix Spike (MS) recovery, expressed as a percentage is defined as:

100 * {[(Measured Concentration) - (Background Analyte Concentration in Sample)] ÷ (Spike Concentration)}

High analyte background may prevent accurate determination of MS recovery. MS recoveries are not calculated or evaluated when the spiked amount is less than the background analyte concentration in the sample.

[3] Precision is measured as the absolute value of Relative Percent Difference (RPD) for Laboratory Duplicate Samples. RPD = |(Result2 - Result1) / Mean| * 100. For low level results, the precision objective is for the difference of the two results to be less than 2 times the LOR.

[4] Wrap bottle with aluminum foil. If filtered, place filter in 15 mL black plastic tube provided by ALS.

3. For **QAQC** purposes three kinds of samples are required:

Field duplicate: All parameters measured in the original sample are measured in the field duplicate. The sampling station is selected at random and labeled as station CREMP [month] DUP-1, -2, -3, -4, etc. Prepare the QAQC labels and affix to the sampling containers, as described in step 2.

Travel blank: These are to be carried into the field and treated like the other sampling vessels except that the bottles are not to be opened or anything added to them. Ship back to the lab, each set with different shipment.

Equipment blank: To collect an equipment blank, set up the water sampling equipment as if a routine sample was to be collected except that the incurrent and excurrent hoses are placed into the same opening of a container (find an empty and CLEAN container, large enough for >4L; pour 4L of ***de-ionized water sent from ALS laboratories*** into the clean container). Pump for 2 minutes (just like in the field) to flush site water from the equipment (also attach the filter to flush for 30 seconds). Flush and discard 4L, this time with the excurrent hose placed in sink or empty bucket. Now with fresh DI water from ALS, fill all bottles listed in the above tables (except for chlorophyll and phytoplankton). Preserve and treat as other samples, including filtering where necessary. Label as station CREMP [month] EB-1, -2, -3, -4, etc.

4. Before and during sampling fill in the requested information on the field data form; complete one field data form in its entirety for each sampling station and sampling event. Forms are made of waterproof paper; print all information on the form using a lead pencil or a write-in-the-rain pen.

5. With the aid of a GPS unit, navigate the boat to the sampling station using the UTM coordinates (in NAD 83) provided. Approach the station from downstream of the wind direction. In windy conditions, anchor the boat upstream of the station and drift back; it is not necessary to anchor the boat in calm conditions providing the boat remains in the same position. Do not allow the anchor to drag through the sampling station. Record the **UTM coordinates** on the field data form.

6. Measure **water depth** at the sampling station using the 'Hawkeye' hand-held depth meter (or transom-mounted lowrance). Hold the meter in the water, facing the lake bottom, until the meter measures the depth. Record this information on the field data form. If you are in water that is too shallow (i.e., **must have at least 5 meters depth**), move to deeper water near the assigned station.

7. Measure the light attenuation at the sampling station using the **Secchi disk**. Lower the disk into the water, on the shady side of the boat, so that you can no longer see it. Slowly raise the disk to the point that you can see it and measure this depth using the markings on the disk rope.

8. Measure the pH of the water at the sampling station using the **pH meter** (unless the YSI includes this parameter). Hold the probe portion of the meter in the lake until the meter measures the pH. Record this information on the field data form.

9. Calibrate the YSI probe prior to going into the field; confirm elevation (m) of sampling environment. Check the DO calibration (adjust barometric pressure based on airport data) but also check the DO membrane (it may need to be replaced). At Meadowbank DO readings should be about 8 – 12mg/L; if meter is reading much lower/higher than this, membrane likely needs to be replaced. Keep a calibration log which includes date and time, type of calibration, results, and troubleshooting.

10. Lower the **YSI probe** into the lake to just below the water surface level. Measure the temperature (^{o}C), specific conductance (i.e., temperature corrected) (uS/cm) and dissolved oxygen concentration (mg/L) in the water and record on the field data form. Lower the meter to a depth of 1 m and record the field measurements. Allow the concentrations on the meter to stabilize for 10 to 15 seconds before recording the concentrations. Continue recording the field measurements at **1 m depth intervals** until you reach the whole metre mark above the lake bottom (i.e. if the lake depth is 9.3 meters, record field measurements up to a depth of 9 meters).

11. Set up the **water pump** in the boat; attach the tubing to the pump using the C-clamps and attach the 12-V battery. Attach the 4 meter length of tubing to the intake valve, and the 1 meter length to the output valve. Attach the plastic coated ball weight to the end of the 4 meter length of tubing. Lower the 4 meter length of tubing into the water to ***3 meters depth*** and place the 1 meter length of tubing over the edge of the boat. Run the pump for ***2 minutes*** to flush the sampling device.

12. For each sampling station, **fill** the required **pre-labeled sampling containers** with water from the 1 meter length of tubing.

13. Dissolved metals and dissolved organic carbon samples are to be collected with an in-line high capacity filter with 0.45 um pore size. After all unfiltered samples have been collected, disconnect the battery from the pump and fix the filter onto the end of the discharge hose. Re-connect the pump and allow the water to discharge and flush through the filter for 15 – 20 seconds. Direct filtered water into the DOC and dissolved metals (and dissolved Hg) bottles. Flow from the hose can be controlled by pinching the incurrent end of the tube (***not the excurrent***). Once filtered samples have been collected remove the filter and place into a plastic or zip-loc bag for re-use. In the Meadowbank environment where the amount of suspended solids is typically low, filters can be re-used for up to 10 samples. Remember to use the same filter when collecting equipment blank samples, not a new filter.

14. **Add the specified preservatives** to the appropriate sampling containers (according to the information on the labels and tables above), seal and mix thoroughly by turning upside down and then upright a number of times.

15. To collect a phytoplankton sample, add site water from appropriate depth (i.e., 3 m) into the 50 mL vial provided. Make sure that site information is appropriately labeled on the jar. In the field or the lab, add a few drops of Lugol's solution to the sample so that it has the color of weak tea.

16. Back in the office, to process the chlorophyll-a sample, use the hand-held pump apparatus and filters. Using the tweezers, place an ashless filter paper on the screen in the water filter apparatus, then screw the two sections together and attach the hand-held vacuum pump. **Filter 500 mL of water** through the water filter apparatus. After filtering the 500 mL of water, remove the filter and place in the 15 mL black plastic tube provided by ALS. With a sharpie pen, write the appropriate sampling information on a label and stick to the plastic tube. Place the tubes in a Ziploc bag and put into the **freezer**. Mark on the field collection data sheet the volume of water filtered.

17. Until ready for shipping, the water samples are stored **chilled** in a refrigerator in camp, if space is available. The filter for chlorophyll-a analysis must be **frozen**; store this bag in a deep freezer in the camp. Bottles should be put in plastic bubble bags prior to storage on ice to protect the labels from water damage. The phytoplankton samples are stored at **room temperature**.

18. If this sampling station is selected as the QAQC **field duplicate**, collect a second set of water samples, fill the pre-labeled sampling containers, including the phytoplankton vial (repeat step 11-15) and collect a second filtered chlorophyll-a sample (step 16). Record which sampling station the QAQC samples are collected from on the appropriate field data form.

19. Fill out a **chain-of-custody** form for the water samples and filters being sent to **ALS Environmental**. The COC form must be completed carefully and in its entirety to ensure proper analysis. This includes listing all of the specific conventional parameters (see tables above), Azimuth and ALS contact names, and checking off all of the specific boxes for requested analyses. The ALS laboratory quote number must be printed on the COC form to ensure proper billing.

    A **digital COC** form is most commonly used; this form can be filled out in advance to ensure accuracy and efficiency and amended in the field as required. Note that using a digital copy of the COC requires printing 2 copies of the document in the field (one for the laboratory, one for Azimuth). Any questions regarding the COC form should be directed to the Azimuth project coordinator – Eric Franz. Put the completed COC form in a sealed ziploc plastic bag in a cooler with the water samples.

20. Fill out a **chain-of-custody** form for the phytoplankton samples being sent to **Plankton R Us Inc.**, Winnipeg, MB. Complete all of the required fields and then put the form in a sealed ziploc plastic bag in the cooler with the phytoplankton samples.

PACKAGING & SHIPPING SAMPLES:

1. Ensure all **water samples** are **sealed** securely. Prior to shipping, it is advisable to wrap the label of each sample bottle with clear tape to make sure that the label does not come off during shipping and handling. Dry the water bottle and wrap with tape. **Pack** water sampling containers upright in coolers with ice packs, and packing material, to ensure samples do not spill or break during transport. (Ideal storage and transport temperature is 4°C).

2. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler**(s) with the following address:

    Multilab Direct
    900 5ème Avenue
    Val-d'Or, Québec
    J9P 1B9
    819-874-0350
    ATTN: Sonia Gouin

    Ship the water samples to Multilab in Val d'Or as quickly as possible. Please email Sonia Gouin at Multilab (expeditionvd@multilab-direct.com) and Eric Franz at Azimuth (efranz@azimuthgroup.ca) when water samples are being sent from Meadowbank to Val d'Or so that arrangements can be made to pick up the samples upon arrival at the airport.

3. Ensure **phytoplankton samples** are **sealed** securely and **pack** in a cooler with packing material to ensure samples do not break during transport. It is not necessary to keep samples cool.

4. Ensure the COC form is enclosed and then seal the cooler. **Label the cooler** with the following address:

   Plankton R Us Inc.
   Dave Findlay
   39 Alburg Drive
   Winnipeg, MB
   R2N 1M1
   Tel: 204-254-7952

5. Ship the phytoplankton samples to Dave Findlay at the end of each month or event.

6. Send completed **COC forms** and **field data forms** to Azimuth Consulting Group, attention the project coordinator – Eric Franz.

APPENDIX C

STANDARD OPERATING PROCEDURE (SOP) FOR CREMP BENTHOS & SEDIMENT SAMPLING

Standard Operating Procedure
Meadowbank Project Lakes & Baker Lake
CREMP Benthos & Sediment Sampling 2014

GENERAL:

Project Coordinator:
Morgan Finley
Azimuth Consulting Group
304-2537 Beacon Avenue,
Sidney, BC, V8L 1Y3
Telephone: 778-426-0112
Email: mfinley@azimuthgroup.ca

In case of **emergency**, contact Gary Mann ([redacted]).
Azimuth office telephone number 604-730-1220 or 778-426-0112.

LOCATION AND TIMING FOR FIELD ACTIVITIES:

Thirteen (13) sampling stations have been chosen for benthos and sediment quality monitoring in the Meadowbank project lakes. These stations (with their corresponding abbreviation) are:

- Third Portage Lake – North Basin (TPN)
- Third Portage Lake – East Basin (TPE)
- Second Portage Lake (SP)
- Tehek Lake (TE)
- Inuggugayualik Lake (INUG)

- Tehek Lake – Far-field (TEFF)
- Third Portage Lake – South Basin (TPS)
- Wally Lake (WAL)
- Pipedream Lake (PDL)

- Baker Lake – Barge Dock (BBD)
- Baker Lake – Proposed Jetty (BPJ)
- Baker Lake – Akilahaarjuk Point (BAP)
- Baker Lake – East Shore (BES)

Field activities are scheduled for once per year, in **mid/late August**. The **target water depth** at each sampling station is approximately **8 meters +/- 1.5 m**.

BENTHOS & SEDIMENT CHEMISTRY SAMPLING:

1. Gather **field collection materials**:
   In the boat:
   - Field collection data forms, waterproof paper, pencils, waterproof markers & clipboard

- GPS unit, batteries
- Depth meter, batteries
- pH meter, batteries
- Rope
- Petite Ponar grab and rope
- 500 micron sieve bag
- 3 stainless steel bowls
- 2 stainless steel spoons
- Liquinox detergent and dish cleaning brush
- Plastic squirt bottle
- Sampling gloves
- Safety glasses
- Field sample jars & preservatives (per sampling station):
  - 11 – 125 mL glass jars (sediment samples : 2 jars for 5 reps; 1 jar for composite)
  - 5 – 500 mL plastic jars (benthos: 1 jar for each rep)
- QA/QC field duplicate sediment jars
- Ashless filter paper & tweezers; 1-125 mL glass jar

In camp:

- Formalin (10% of pure Formaldehyde)
- Labels for sampling containers
- Coolers, action packers (for storing and shipping samples)
- Ice packs (for shipping sediment samples to lab)
- Address labels for coolers
- Chain-of-custody forms
- Large Ziploc bags (for sending chain-of-custody form in coolers)
- Electrical tape (for sealing benthos jars)
- Packing tape (for affixing labels to sediment sample containers & sealing coolers)

2. Before going into the field, **label the lids** of all sampling containers using a permanent waterproof marker. After sampling, prepare appropriate labels for containers and affix them when bottles are dry enough to stick to. Use the following information:
   - Azimuth company name
   - Station abbreviation (e.g. TPE-1, INUG-3)
   - Date of sample collection
   - Parameters to be measured from individual jar (5 x 125 mL – total metals, pH, moisture; 5 x 125 mL – grain size (PSA), TOC; 1 x 125 mL – PAHs, LEPHs & HEPHs, Mineral Oil & Grease.

   Affix the labels to the sediment jars and then wrap packing tape around the labels to ensure a waterproof seal.

   For the **benthos containers**, print the following information directly onto both the jar and jar lid using a permanent waterproof marker:
   - Azimuth company name
   - Station abbreviation (e.g. TPE, INUG) and replicate number (e.g. TPE-1, TPE-2); there are a total of 5 replicates per sampling station
   - Date of sample collection

   Prepare **internal labels** for each of the benthos containers. On a small piece of waterproof paper, write, using a lead pencil, the station abbreviation and replicate number (e.g. TPE-1). If no

waterproof paper is available, use regular paper. Store the labels in their corresponding sampling container.

3. For **QAQC** purposes, sediment samples are collected in duplicate from 8 replicate station every sampling event (DUP + Swipe). All parameters measured in the original sample are measured in the field duplicate. The sampling station is selected randomly from the 65 replicate stations, and labeled as station DUP (or Swipe). Prepare the QAQC labels and affix to the sediment jars, as described in step 2. And label one new 125 mL glass jars with the Azimuth company name, date, QAQC filter and total metals for each swipe sample.

4. A 100% formalin solution is equivalent to a solution of 37% formaldehyde. The **target formalin concentration** in each of the sampling containers is 10%. A neutral buffered formalin solution is achieved by adding a sufficient amount of calcium carbonate powder or pellets to render the solution pH neutral (pH = 7.0). Borax powder may be substituted for calcium carbonate powder if necessary.

   Transport Canada allows the free transport of formalin at concentrations less than 25% formaldehyde. Consequently, the formalin transported up to Meadowbank will be diluted in half (18.5% formaldehyde / 50% formalin solution).

   To **prepare** the **neutral buffered formalin**, add a small amount of calcium carbonate powder or pellets to the 50% formalin solution, seal the container and shake until mixed. Check the pH of the solution using the pH pen. Continue adding the powder/pellets until the pH of the solution reaches approximately 7.0. Store at room temperature until ready to use. Only prepare the required volume of neutral buffered formalin for that sampling event. Buffered formalin will not store for long periods of time. Follow all **safety precautions** when preparing the formalin solution. Formalin is a carcinogen and irritant. Wear sampling gloves and safety glasses when mixing the solution and prepare the solution in a well ventilated area.

5. Before and during the benthos and sediment sampling fill in the requested information on the **field data form**; complete one field data form in its entirety for each sampling station and sampling event. Forms are made of waterproof paper; **print** all information on the form using a **pencil** or write-in-the-rain pen.

6. With the aid of a GPS unit, **navigate the boat** to the sampling station using the UTM coordinates (in NAD 83) provided. Approach the station from downstream of the wind direction. In windy conditions, anchor the boat upstream of the station and drift back; it is not necessary to anchor the boat in calm conditions providing the boat remains within a 50 meter radius of the position. Do not allow the anchor to drag through the sampling station. Record the UTM coordinates on the field data form.

7. Measure the **water depth** at the sampling station. It is recommended to use a transom mounted sonar to first “view” each rep location looking for a smooth, relatively flat lake bottom. Record the depth information on the field data form. Ensure sample depth is within the target (8 meters +/- 1.5 m).

8. Begin collecting the benthos samples. Collecting the sediment first would disturb the benthic community.

9. Ensure the rope is securely attached to the **Ponar**. Rinse the Ponar grab, 3 stainless steel bowls and a spoon with lake water. **Wash** each of these items with liquinox soap by scrubbing with the dish cleaning brush and then thoroughly rinse with lake water. Put aside two stainless steel bowls and spoon until later (step 18) and ready the largest stainless bowl for the Ponar.

10. Lower the **Ponar** to within 1 meter of the bottom of the lake. Lower the Ponar very slowly over the last meter and allow the rope to go slack. Raise the Ponar to the edge of the boat and check the grab for **acceptability**. The grab is acceptable if the sample:
    - does not contain large foreign objects;
    - has adequate penetration depth (i.e., 10-15 centimeters though in some locations if the substrate is particularly hard it may be necessary to accept smaller grabs);
    - is not overfilled (sediment surface must not be touching the top of the Ponar, though in reality there will be occasions when the Ponar is full, careful judgment is required to determine if the grab is too full);
    - did not leak (there is overlying water present in Ponar); and
    - is undisturbed (sediment surface relatively flat).

    Once the grab is deemed acceptable, open the Ponar jaws and drop the sample into the large stainless steel bowl. Rinse the ponar with squirt bottles to make sure all of the material is in the bowl. Gently pour the contents of the bowl into the 500 micron sieve bag.

11. **Sieve the sample** in the lake water until only the benthic organisms and coarse materials remain. Care must be taken to ensure the benthic organisms are not damaged or crushed. Do not disturb the sample to the point that it is splashing out of the sieve. Do not forcibly push materials through the sieve; gently massage apart any small clay balls. Rinse off any pieces of larger plant material or rocks in the sample and discard.

12. **Flush** the **remaining sample** in the bottom of the sieve into the pre-labeled plastic sampling container (i.e. station-1 jar). A plastic squirt bottle filled with lake water is useful for this purpose.

13. **Repeat steps 10-12**, flushing the sample into the same pre-labeled plastic sampling container (i.e., station-1 jar). Ensure the sample is collected in an area not previously disturbed by the Ponar. The two independent grabs (per replicate) are composited to increase the surface area sampled.

14. **Rinse the sieve** bag to clear out any debris in the screen. To rinse, hold the sieve upside down and raise and lower the sieve into the water.

15. Refer to step 18. At this point while you are still at the first rep you can also collect the Ponar grabs for the sediment chemistry composite.

16. **Repeat steps 10-14** four more times; there must be a separation of ***20 meters*** or more from other replicate stations. Prior to collecting the next REP, clean ponar and both bowls with liquinox and scrub brush, rinse with lake water. Record the depth and GPS coordinates of each replicate station on the field data form. Put the samples from each replicate in pre-labeled station replicate jars 2 through 5. In total, 10 Ponar grabs will be collected for benthos collection, two grabs per replicate.

17. Ensure internal labels are in each sample container. Shake the formalin to ensure all of the calcium carbonate powder is in solution. **Add** a sufficient volume of **formalin** to each sampling container to

make a corresponding formalin solution of approximately 10%. Volumes of formalin are added by 'eye' (for a 10% solution, a ratio of 4 parts water and 1 part 50% formalin solution). Overall, there must be enough liquid in the jar to cover the entire sample. Seal the sample container securely and gently roll the container to mix the sample and formalin solution. Do not shake the sample container; this will crush the benthic organisms inside.

18. Begin collecting the sediment samples. Lower the **Ponar** to within 1 meter of the bottom of the lake, in an area not previously disturbed by the Ponar. Lower the Ponar very slowly over the last meter and allow the rope to go slack. Raise the Ponar to the edge of the boat and check the grab for **acceptability** (see step 10 for criteria).

19. Once the grab is deemed acceptable, open the top of the Ponar and remove any overlying water. Using the pre-cleaned stainless steel spoon, scoop out the **top 3-5 centimeters** of **sediment** and place in the pre-cleaned stainless steel bowl. Empty the remainder of the grab sample into a bucket in the boat, not directly into the lake, to ensure the area is not disturbed.

20. **Repeat steps 18 and 19** one more time, placing the sediment into the bowl with the other sediment sample(s).

21. **Homogenize** the sediment samples in the stainless steel bowl (by stirring with the spoon) until the sediment is thoroughly mixed. Scoop the sediment into pre-labeled sediment sampling containers. **Fill the jars** to the top and seal securely.

22. Add one level-scoop of sediment from the sediment chemistry bowl to the last, clean, stainless bowl. This process is completed at each rep until there are 5 good scoops (one from each rep) in the "composite" bowl. Homogenize thoroughly and fill 1 x 125 mL jar for analysis (LEPHs&HEPHs, MOG, and PAHS). Be sure label ID includes "COMP" (e.g., TPE-COMP).

23. If this station is selected as the QAQC **field duplicate**, using the tweezers and a set of clean sampling gloves, **swipe** the stainless steel bowl and spoon with one piece of ashless **filter paper** (or a "ghost wipe") and store in the pre-labeled 125 mL glass jar. Collect the duplicate sediment sample from the same sediment collected in steps 18-20. Fill the sampling containers labeled as station DUP. Record that the QAQC samples were collected from this sampling station on the field data form.

24. **Complete** the **field data form**, including a description of the sediment (grain size, consistency, colour, presence of biota, sheen, unusual appearance) and the sampling effort (equipment failure, control of vertical descent of sampler) required to collect the benthos and sediment samples.

25. **Rinse** out the Ponar, stainless steel bowl and spoon with lake water. Dump the sediment and water from the plastic bin into the lake.

26. Until ready for shipping, store the sediment samples and QAQC filter paper **chilled** (on ice) in a cooler or in a refrigerator in camp, if space is available. The sediment sampling containers may be put in plastic bags prior to storage on ice to further protect the labels from water damage. Benthos samples are stored in a cooler or action packer at **room temperature**.

27. Fill out a **chain-of-custody** form for the sediment samples being sent to **ALS Environmental**. The COC form must be completed carefully and in its entirety to ensure proper analysis. This includes

listing all of the specific parameters to be analyzed (see step 2), Azimuth and ALS contact names, and checking off all of the specific boxes for requested analyses. The ALS laboratory quote number must be printed on the COC form to ensure proper billing.

A **digital COC** form is most commonly used; this form can be filled out in advance to ensure accuracy and efficiency and amended in the field as required. However, using a digital copy of the COC requires printing 2 copies of the document in the field (one for the laboratory, one for Azimuth). Any questions regarding the COC form should be directed to the Azimuth project coordinator – Morgan Finley. Put the completed COC form in a sealed ziploc plastic bag in the cooler with the samples.

28. Fill out a **chain-of-custody** form for the benthos samples being sent to **Zaranko Environmental Assessment Services** (ZEAS). Complete all of the required fields and then put the form in a sealed ziploc plastic bag in the cooler with the benthos samples.

PACKAGING & SHIPPING SAMPLES:

1. Ensure all **sediment samples** are **sealed** securely. **Pack** sediment sampling containers upright in a cooler with ice packs, and packing material, to ensure containers do not break during transport. (Ideal storage and transport temperature is 4°C).

2. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler**(s) with the following address:

   ALS Environmental
   101-8081 Lougheed Hwy.
   Burnaby, BC, Canada
   V5A 1W9
   Tel: 604-253-4188
   Attention: Brent Mack

3. Ensure **benthos samples** are **sealed** securely. Wrap electrical tape around the edge of the lids to ensure a tight seal. **Pack** benthos sampling containers upright in a cooler or action packer; ensure the cooler/action packer is well packed so the jars are not able to move around.

4. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler**(s) with the following address:

   Zaranko Environmental Assessment Services (ZEAS)
   36 McCutcheon Avenue
   P.O. Box 1045
   Nobleton, ON
   L0G 1N0
   Tel: 905-859-7976

5. **Ship** the sediment **samples** to ALS Environmental as quickly as possible. Ship the benthos samples to ZEAS when convenient. Coordinate shipping with the camp manager.

6. Send completed **COC forms** and **field data forms** to **Azimuth** Consulting Group, attention the project coordinator – Morgan Finley and Eric Franz (efranz@azimuthgroup.ca).

APPENDIX D

STANDARD OPERATING PROCEDURE (SOP) FOR CREMP SEDIMENT CORE SAMPLING

Standard Operating Procedure
Meadowbank Project Lakes & Baker Lake
CREMP Sediment Core Sampling 2014

GENERAL:

Project Coordinator:
Morgan Finley
Azimuth Consulting Group
304-2537 Beacon Avenue,
Sidney, BC, V8L 1Y3
Telephone: 778-426-0112
Email: mfinley@azimuthgroup.ca

In case of **emergency**, contact Gary Mann ([redacted]).
Azimuth office telephone number 604-730-1220 or 778-426-0112.

LOCATION AND TIMING FOR FIELD ACTIVITIES:

Thirteen (13) sampling stations have been chosen for benthos and sediment quality monitoring in the Meadowbank project lakes. These stations (with their corresponding abbreviation) are:

- Third Portage Lake – North Basin (TPN)
- Third Portage Lake – East Basin (TPE)
- Third Portage Lake – East Basin B (TPE-B)
- Second Portage Lake (SP)
- Tehek Lake (TE)
- Inuggugayualik Lake (INUG)

- Tehek Lake – Far-field (TEFF)
- Third Portage Lake – South Basin (TPS)
- Wally Lake (WAL)
- Pipedream Lake (PDL)

- Baker Lake – Barge Dock (BBD)
- Baker Lake – Proposed Jetty (BPJ)
- Baker Lake – Akilahaarjuk Point (BAP)
- Baker Lake – East Shore (BES)

Field activities are scheduled for once per year, in **mid/late August**. The **target water depth** at each sampling station is approximately **8 meters +/- 1.5 m**.

Sediment Coring Program:

An average top 1.5cm of sediment chemistry at all CREMP stations will be characterized using sediment cores. Note that this complements, rather than replaces, the grab samples (top 3 to 5 cm) collected synoptically with benthic community samples in late August. This is in addition to the traditional

composite sample using the petite Ponar grab. Ten (10) independent cores are to be collected from each of the stations. Cores will be collected within a 250 m radius around the center of each sampling area. The intent is to collect cores over a wide area, targeting depths of 6.5-9.5 m to match benthos sampling within the basin being sampled. The protocol for collecting sediment cores is as follows:

1. Core sampling is conducted prior to benthic sampling and will most often be paired with benthic sampling reps. Consideration can be given to identifying core sample locations prior to field collections.
2. If conditions are windy, anchor the boat. If calm, anchoring is not necessary. Survey the area to be sampled with the sonar to determine bottom type.
3. Deploy the corer from the boat and try to ensure that the core barrel is perpendicular with the surface before penetration. Depending on results, the corer can free-fall from 1 m above the surface. Avoid sampling over steep gradient slopes or over coarse grain substrate.
4. When the boat is anchored, deploy the corer from the boat and lower it when the boat has reached its furthest point in its swing to the right. This will be an odd numbered core. For the second core wait until the boat swings to the left, check the GPS to make sure this is around 5 m from the first core. This core will be an even numbered core. Cores can be taken from new locations each time and do not need to be at the exact same location as the other benthos work.
5. Raise the core to just below the water surface and cap prior to bringing above the water to ensure sediment is not lost out the bottom.
6. Check to make sure that the surface of the core is intact and is not mixed or disturbed and that the overlying water is clear. Record water depth and UTM location (NAD 83) of all successful core samples.
7. Process the core on the boat. Decant overlying water and collect only the top 1.5 cm of sediment.
8. Place the entire 1.5 cm slice into a 125 mL glass jar. Discard the remaining core sample.
9. Label the jars as per CREMP protocol (e.g., TE-x) but with a suffix indicating a core sample (e.g., TE-SC-01 to TE-SC-10).
10. Fill in the data sheet and record any observations about the core sample such as presence of varves, distinct changes in color, grain size, or any other unusual features.
11. Repeat the procedure above until all 5 or 10 core samples (depending on the needs outlined in the planning phase) have been collected, randomly covering the general area depicted on the map.
12. For 2014 ten cores from TPE, TPE-B, TPN, SP, TE, WAL, BBD, and BPJ. Five samples from TPS, TEFF, PDL, INUG, BAP, and BES.
13. Randomly from one of the 10 coring locations, take a duplicate core (independent deployment of corer) for QAQC purposes.

14. Even number core samples will be archived for those sites where ten samples are collected. For the 2014 sampling year, TPE and TPE-B will have 10 samples collected in each location with no archival.
15. All core samples are to be analysed for total metals, pH and total organic carbon. Fill in CoCs as necessary.
16. Hold on ice or in the refrigerator until shipping to ALS, Vancouver.
17. Hold times for pH and grease are only 14 days. TOC is 28 days.
18. Fill out a chain-of-custody form for the sediment samples being sent to ALS Environmental. The COC form must be completed carefully and in its entirety to ensure proper analysis. This includes listing all of the specific parameters to be analyzed (see step 2), Azimuth and ALS contact names, and checking off all of the specific boxes for requested analyses. The ALS laboratory quote number must be printed on the COC form to ensure proper billing.
19. A digital COC form is most commonly used; this form can be filled out in advance to ensure accuracy and efficiency and amended in the field as required. However, using a digital copy of the COC requires printing 2 copies of the document in the field (one for the laboratory, one for Azimuth). Any questions regarding the COC form should be directed to the Azimuth project coordinator – Morgan Finley. Put the completed COC form in a sealed ziploc plastic bag in the cooler with the samples.

PACKAGING & SHIPPING SAMPLES:

1. Ensure all **sediment samples** are **sealed** securely. **Pack** sediment sampling containers upright in a cooler with ice packs, and packing material, to ensure containers do not break during transport. (Ideal storage and transport temperature is 4°C).

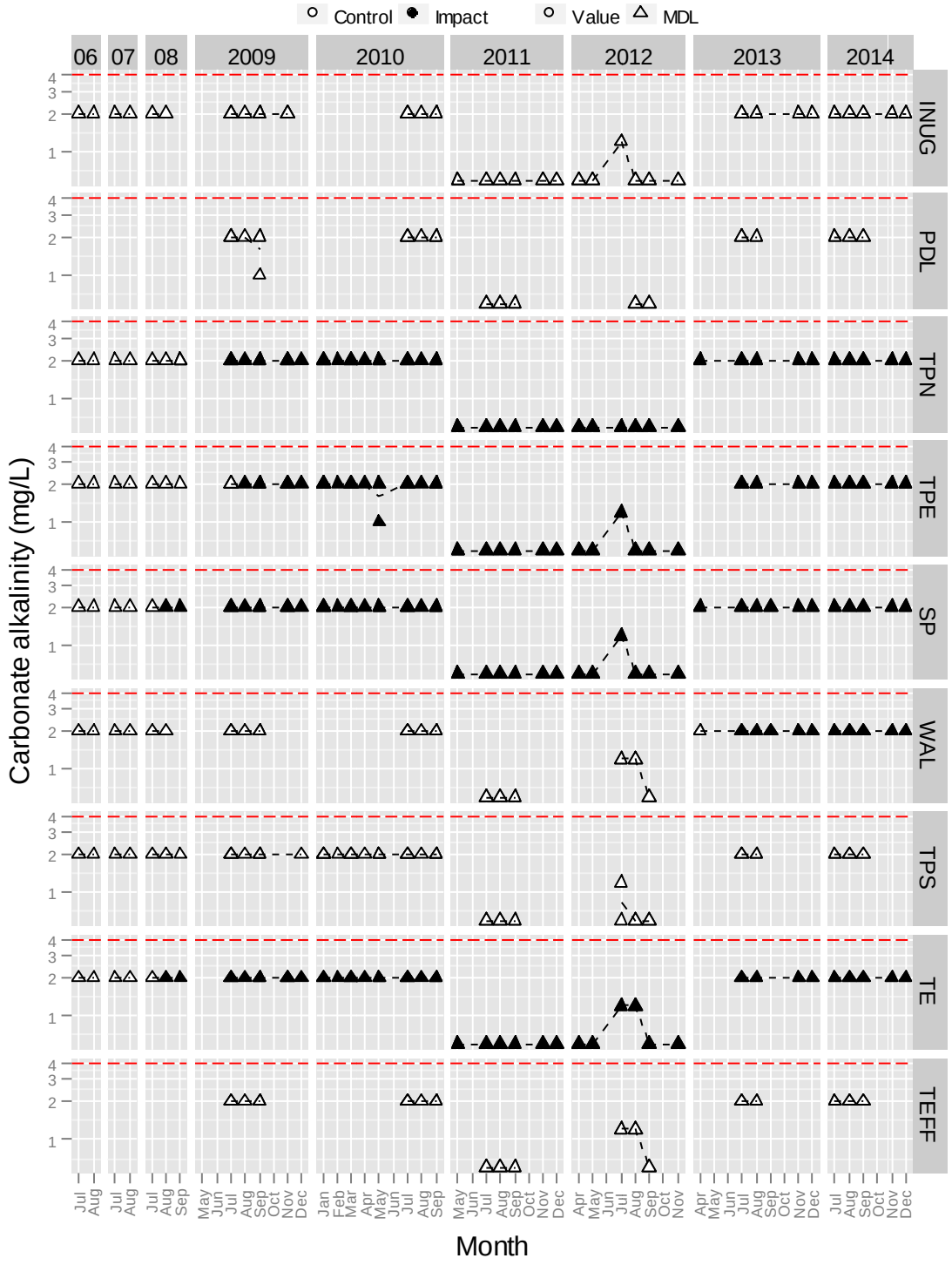
2. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler**(s) with the following address:

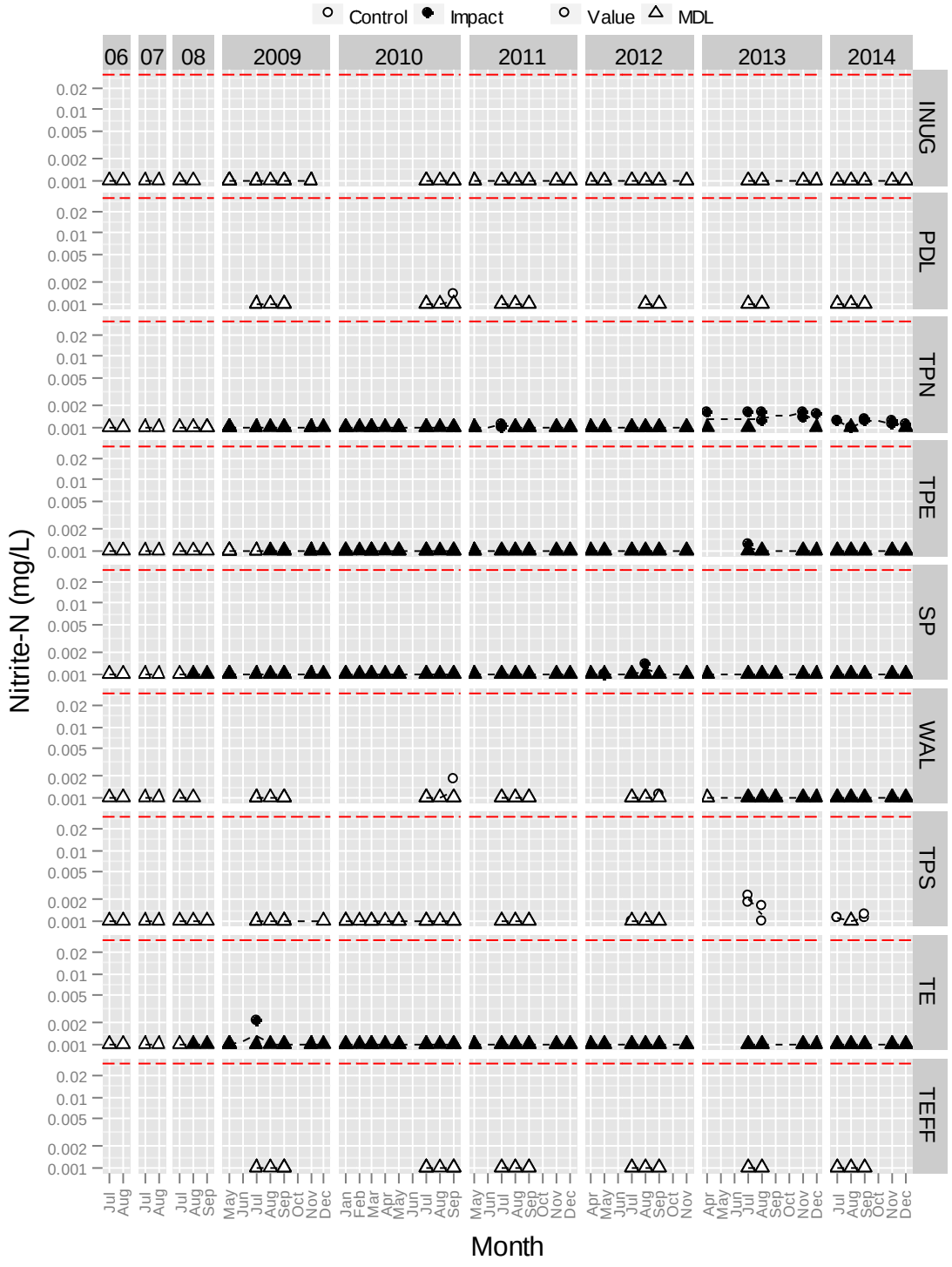
   ALS Environmental
   101-8081 Lougheed Hwy.
   Burnaby, BC, Canada
   V5A 1W9
   Tel: 604-253-4188
   Attention: Brent Mack

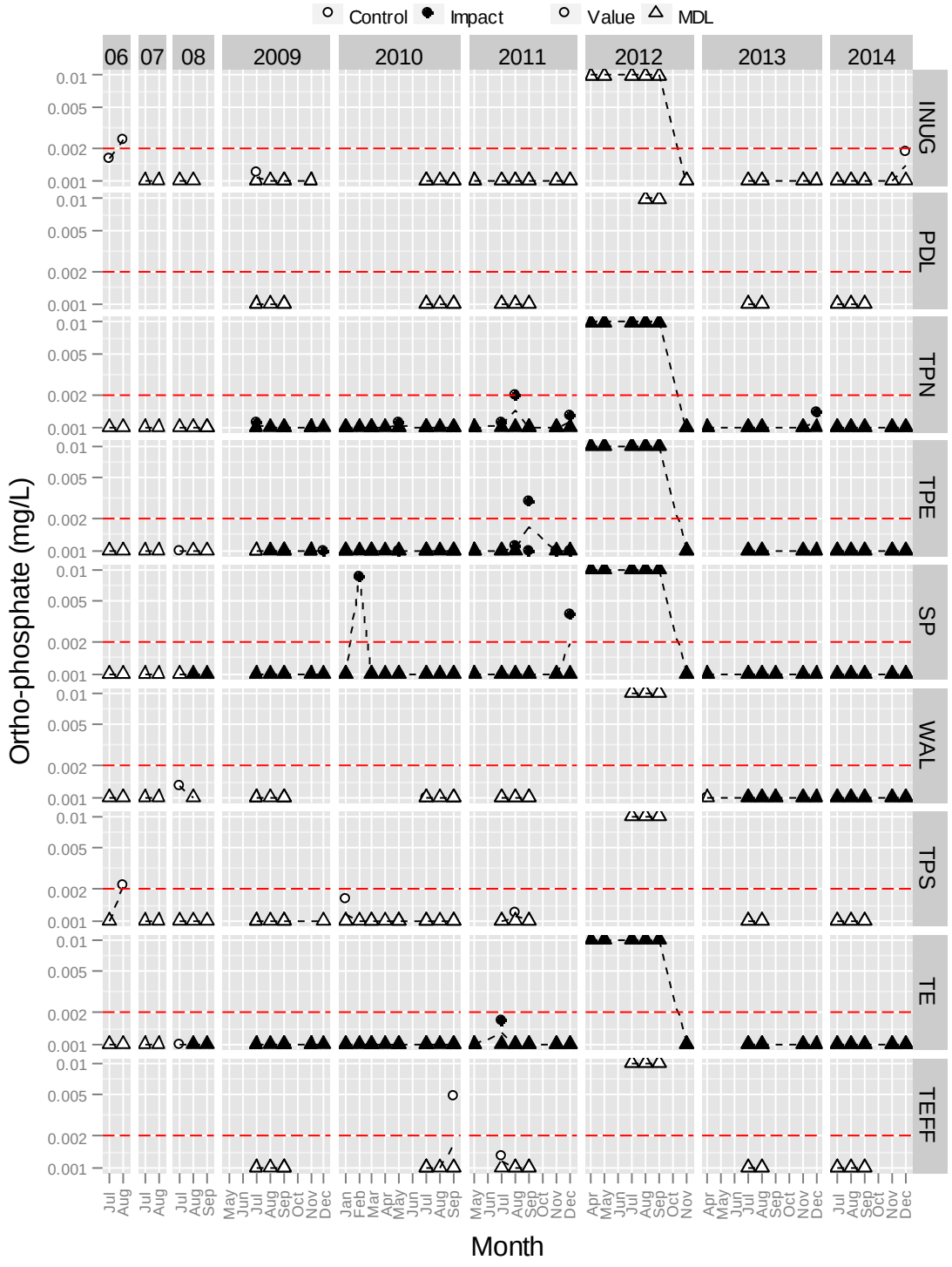
3. Send completed **COC forms** and **field data forms** to **Azimuth** Consulting Group, attention the project coordinator – Morgan Finley and Eric Franz (efranz@azimuthgroup.ca).

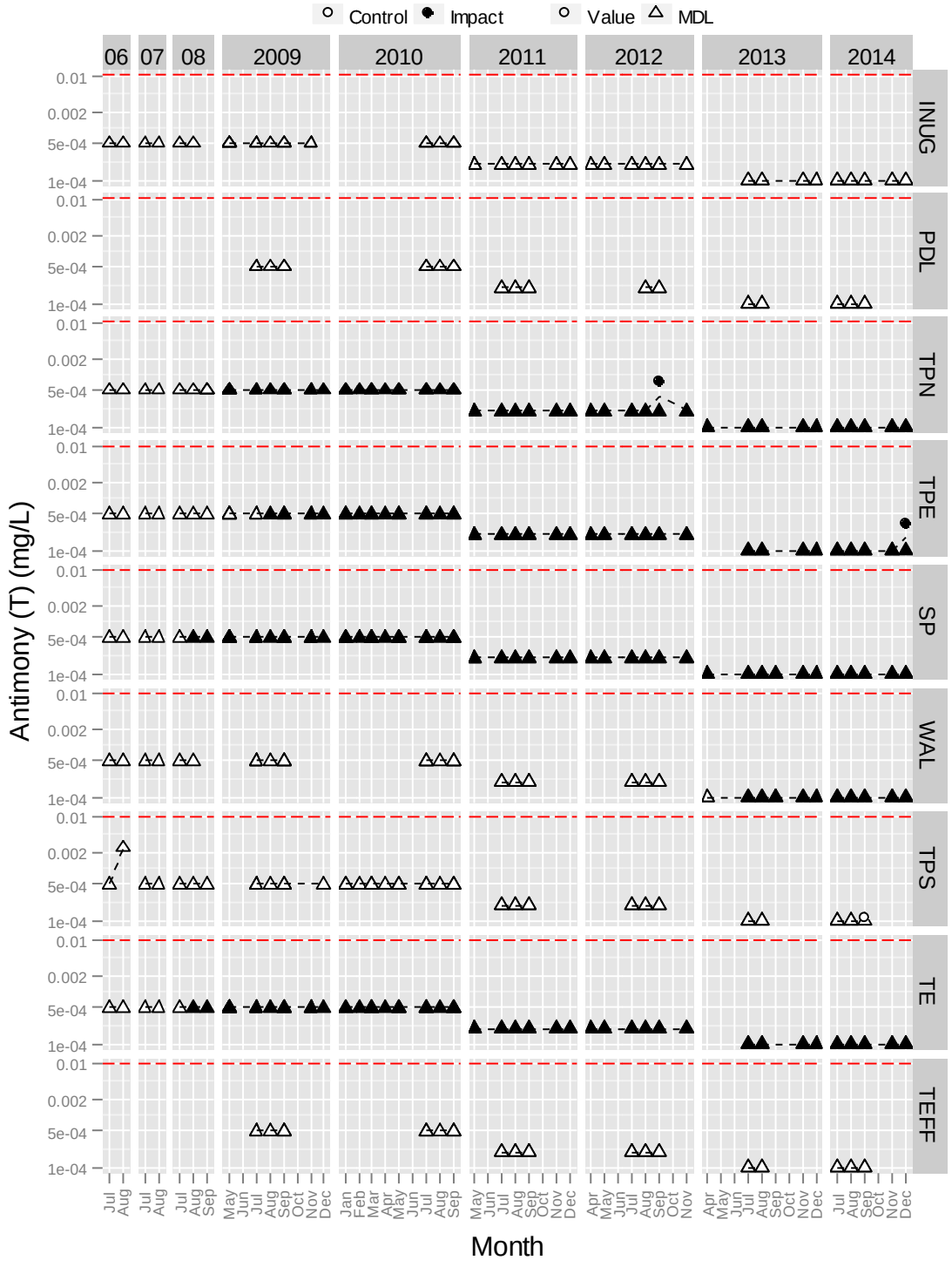
APPENDIX E

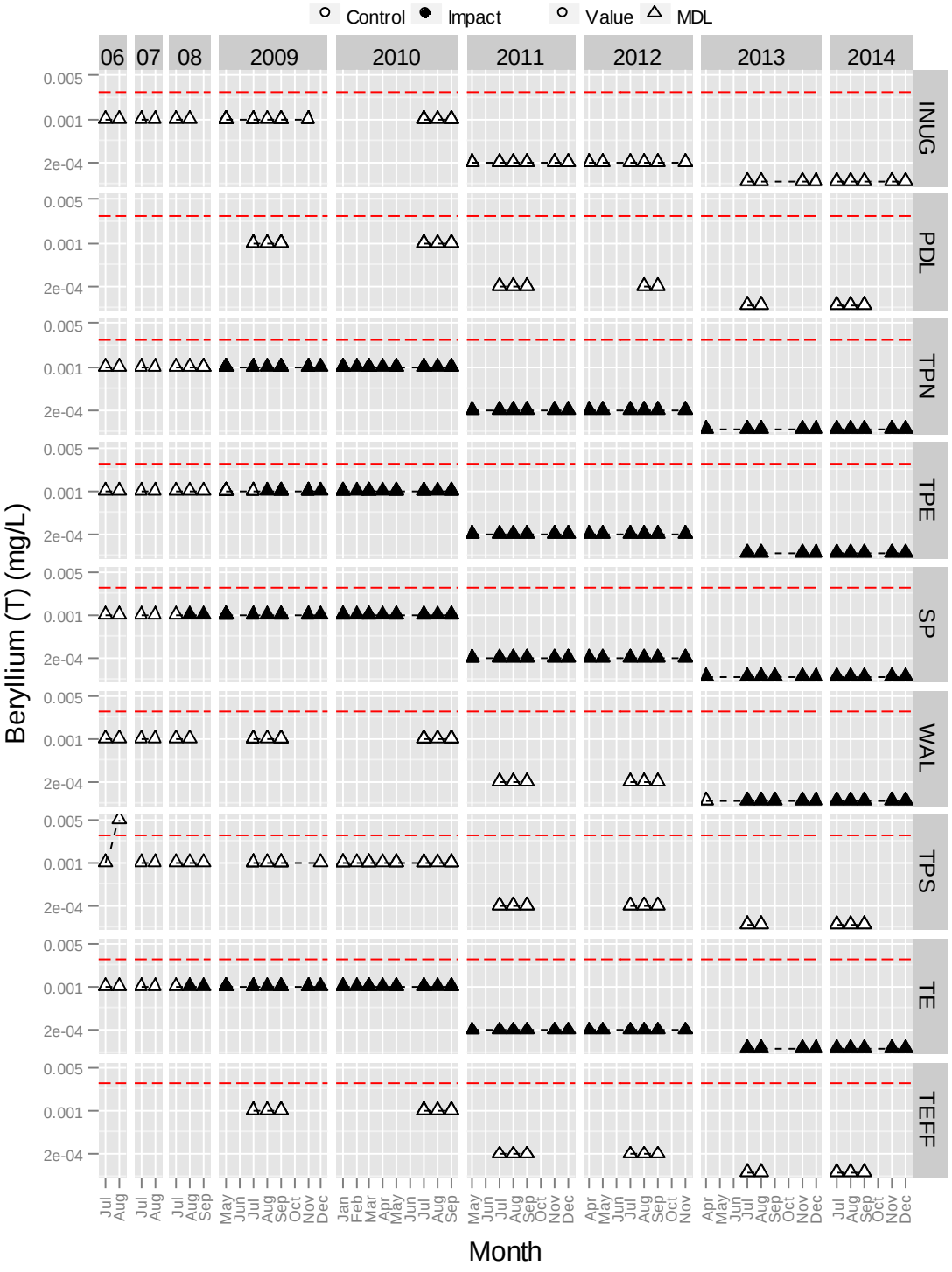
WATER QUALITY PARAMETER PLOTS 2006 – 2014

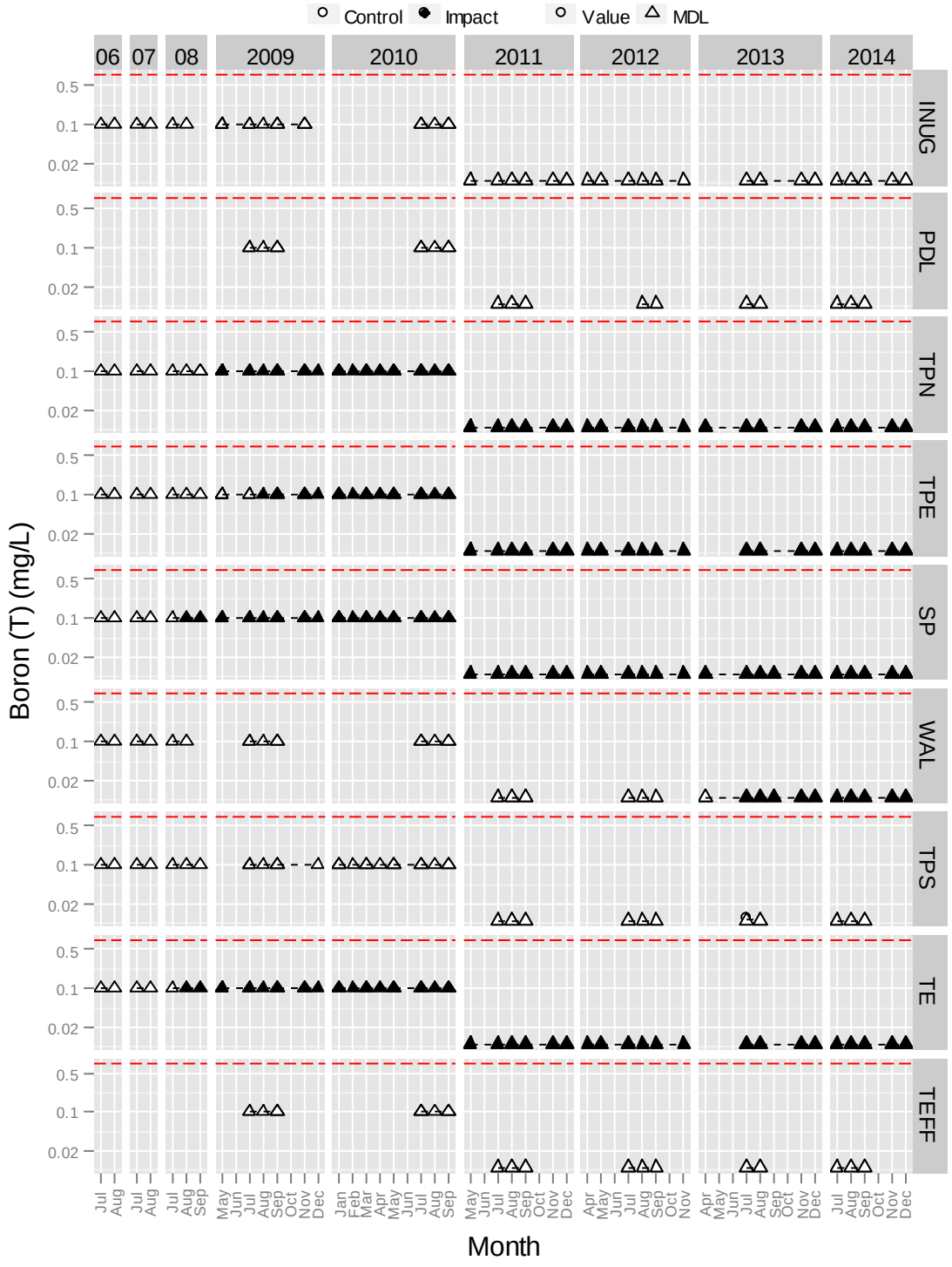

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
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2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Carbonate alkalinity (mg/L)
Month

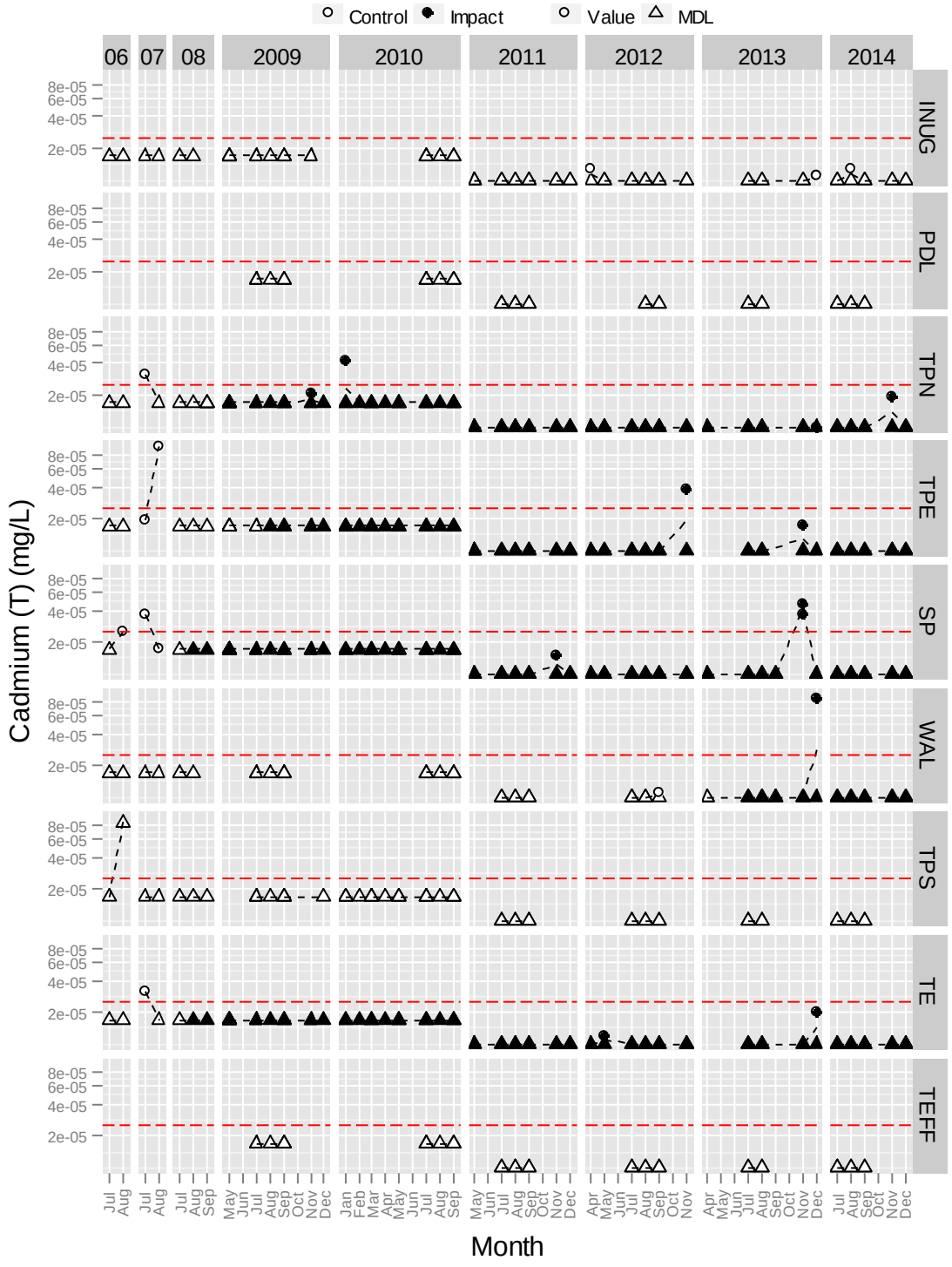

Control
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MDL
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2009
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2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Nitrite-N (mg/L)
0.02
0.01
0.005
0.002
0.001
Jan
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Nov
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Month

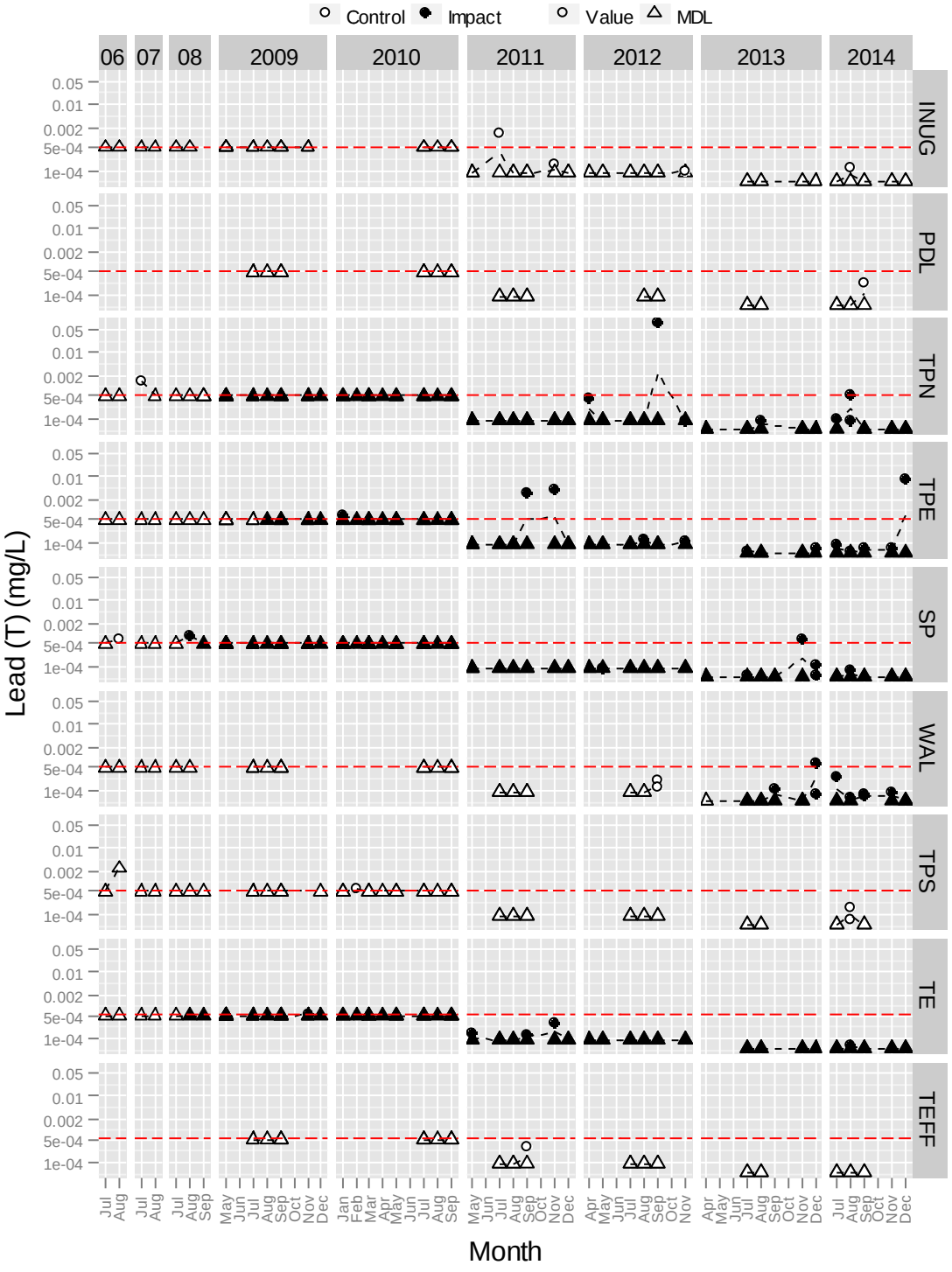

Control
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2014
INUG
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WAL
TPS
TE
TEFF
Ortho-phosphate (mg/L)
0.01
0.005
0.002
0.001
Jul
Aug
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Month

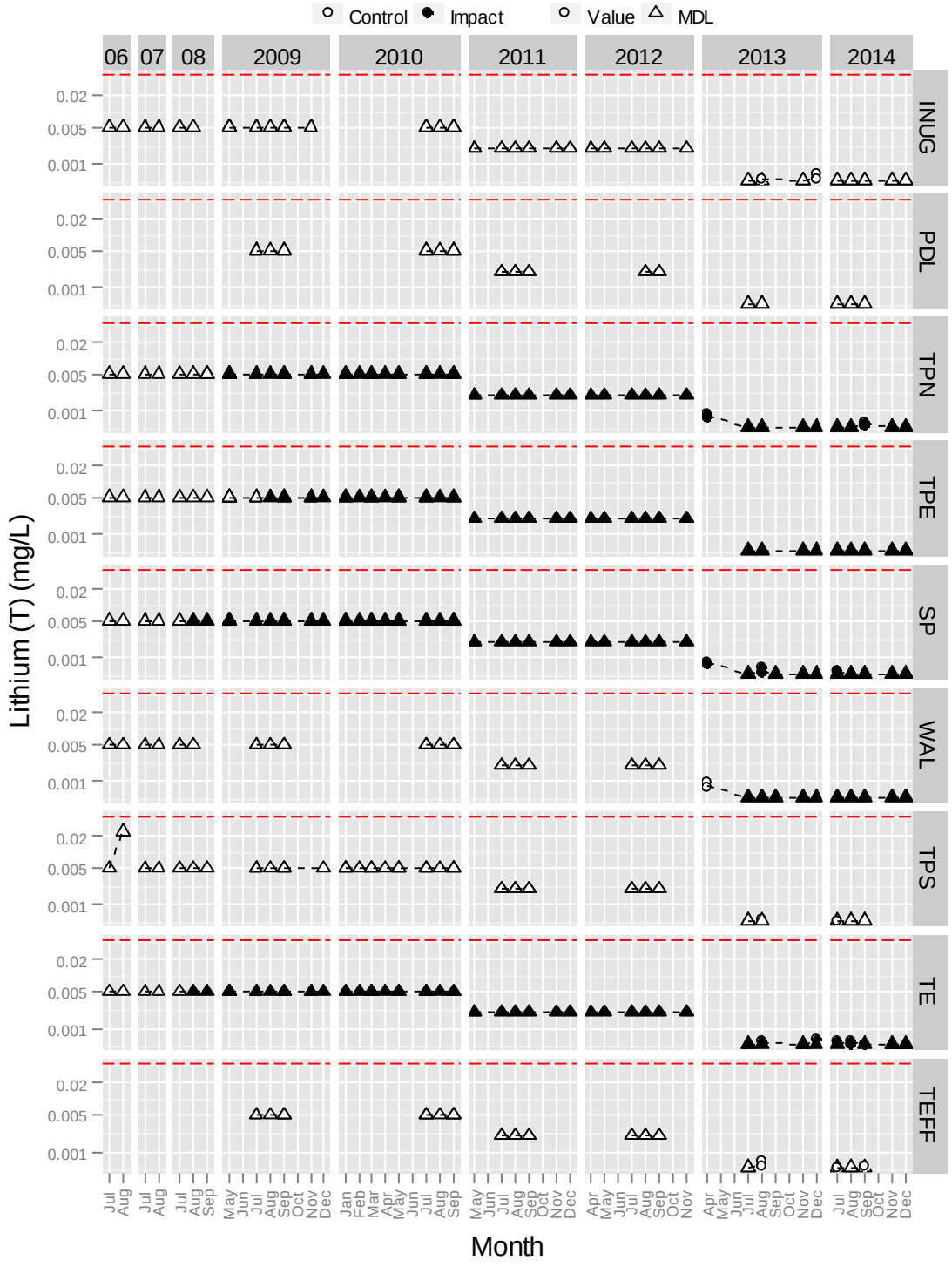

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WAL
TPS
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TEFF
0.01
0.002
5e-04
1e-04
Antimony (T) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

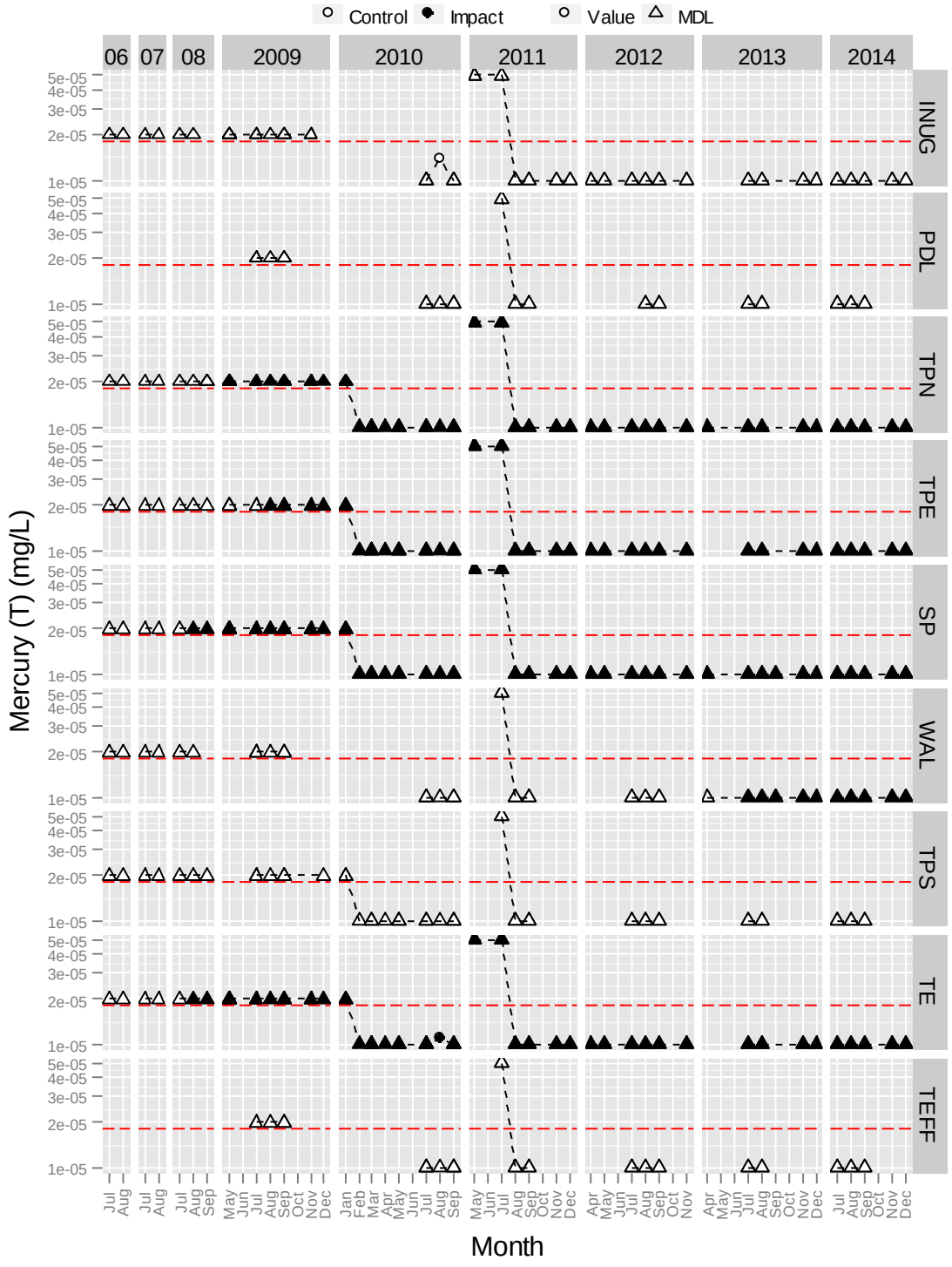

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2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.005
0.001
2e-04
Beryllium (T) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

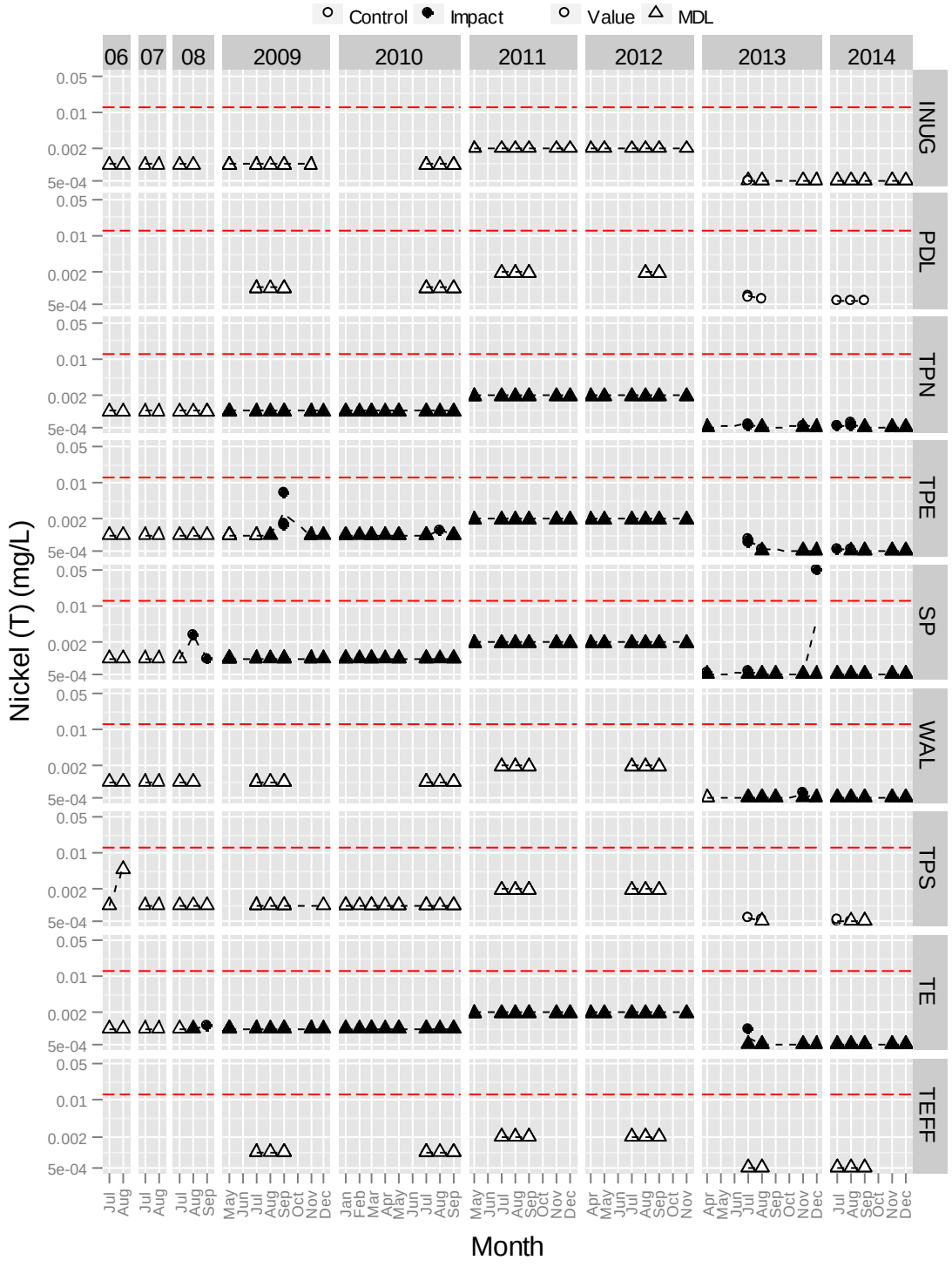

Control
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INUG
PDL
TPN
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WAL
TPS
TE
TEFF
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0.1
0.02
Boron (T) (mg/L)
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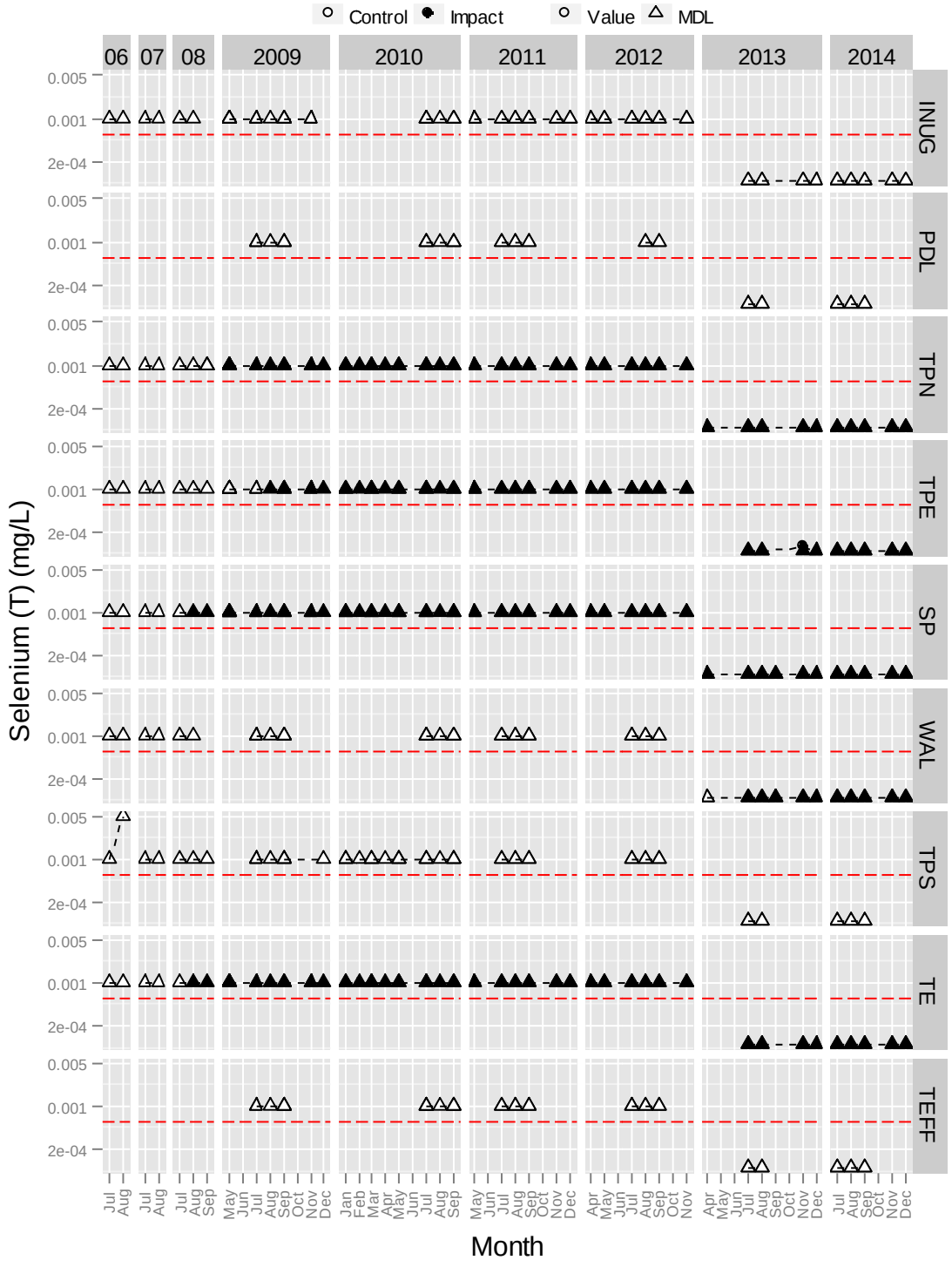

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WAL
TPS
TE
TEFF
8e-05
6e-05
4e-05
2e-05
Cadmium (T) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

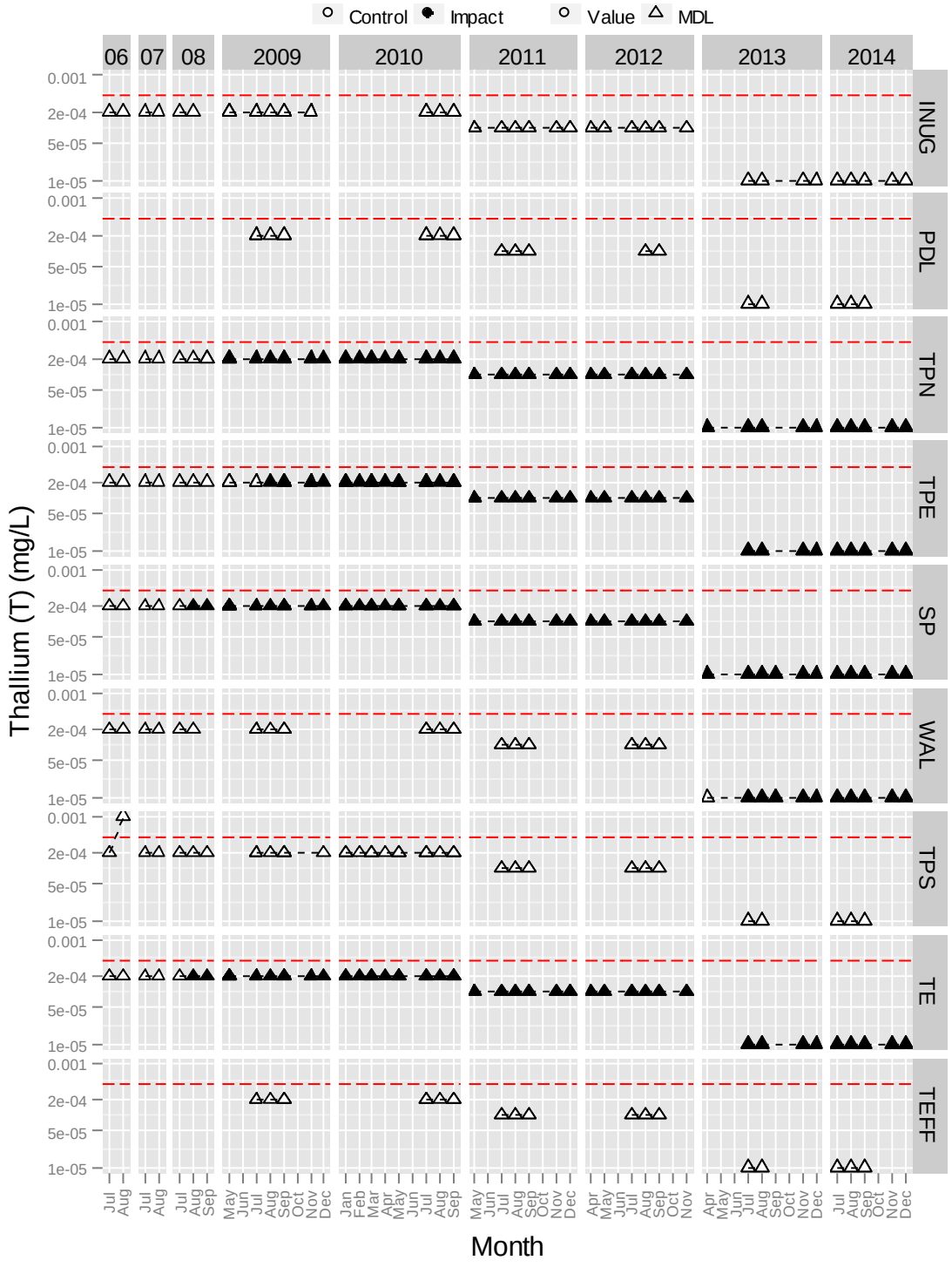

Control
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2014
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SP
WAL
TPS
TE
TEFF
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0.01
0.002
5e-04
1e-04
Lead (T) (mg/L)
Jul
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Month

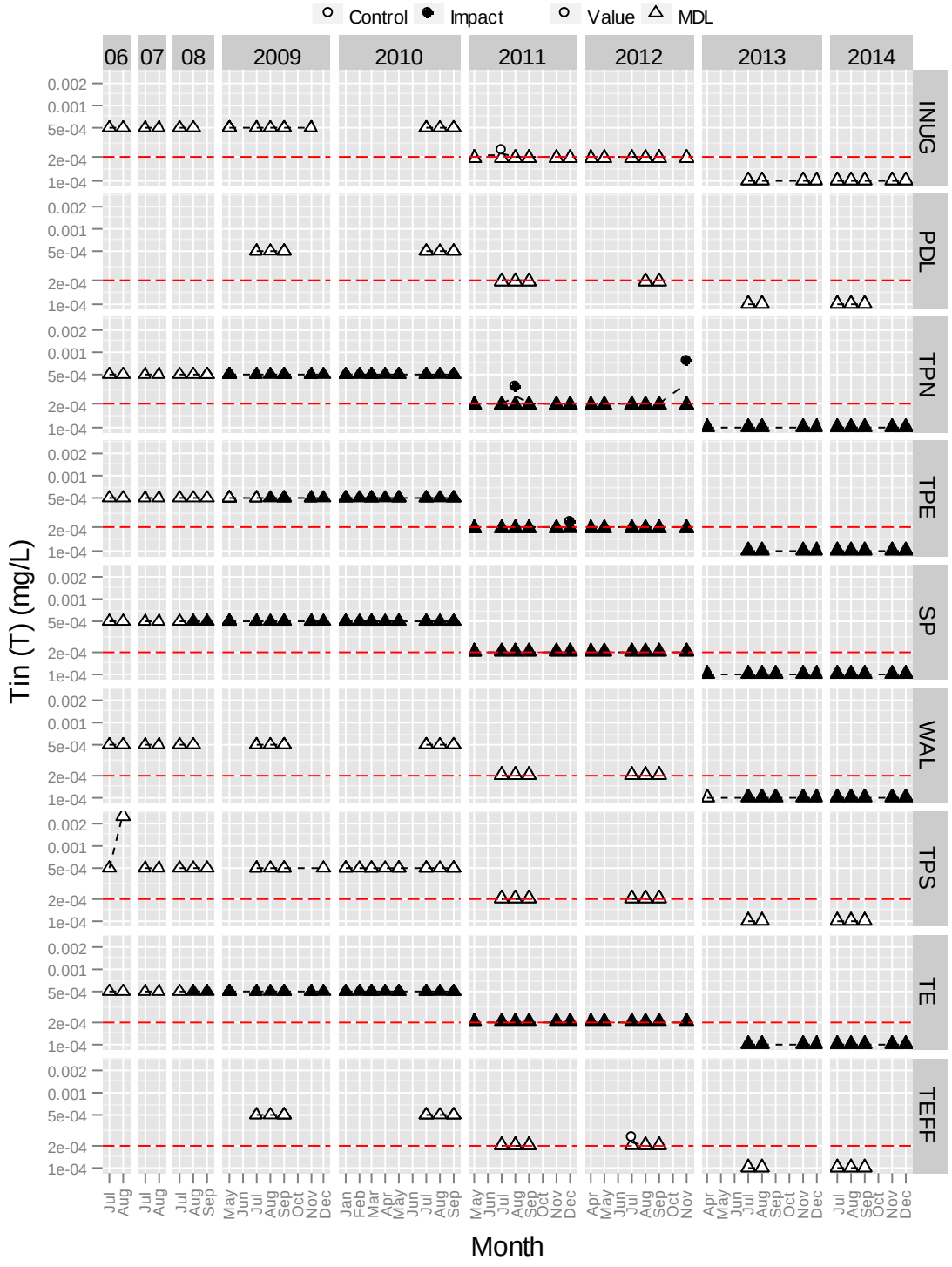

Control
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INUG
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TPN
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SP
WAL
TPS
TE
TEFF
0.02
0.005
0.001
Lithium (T) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

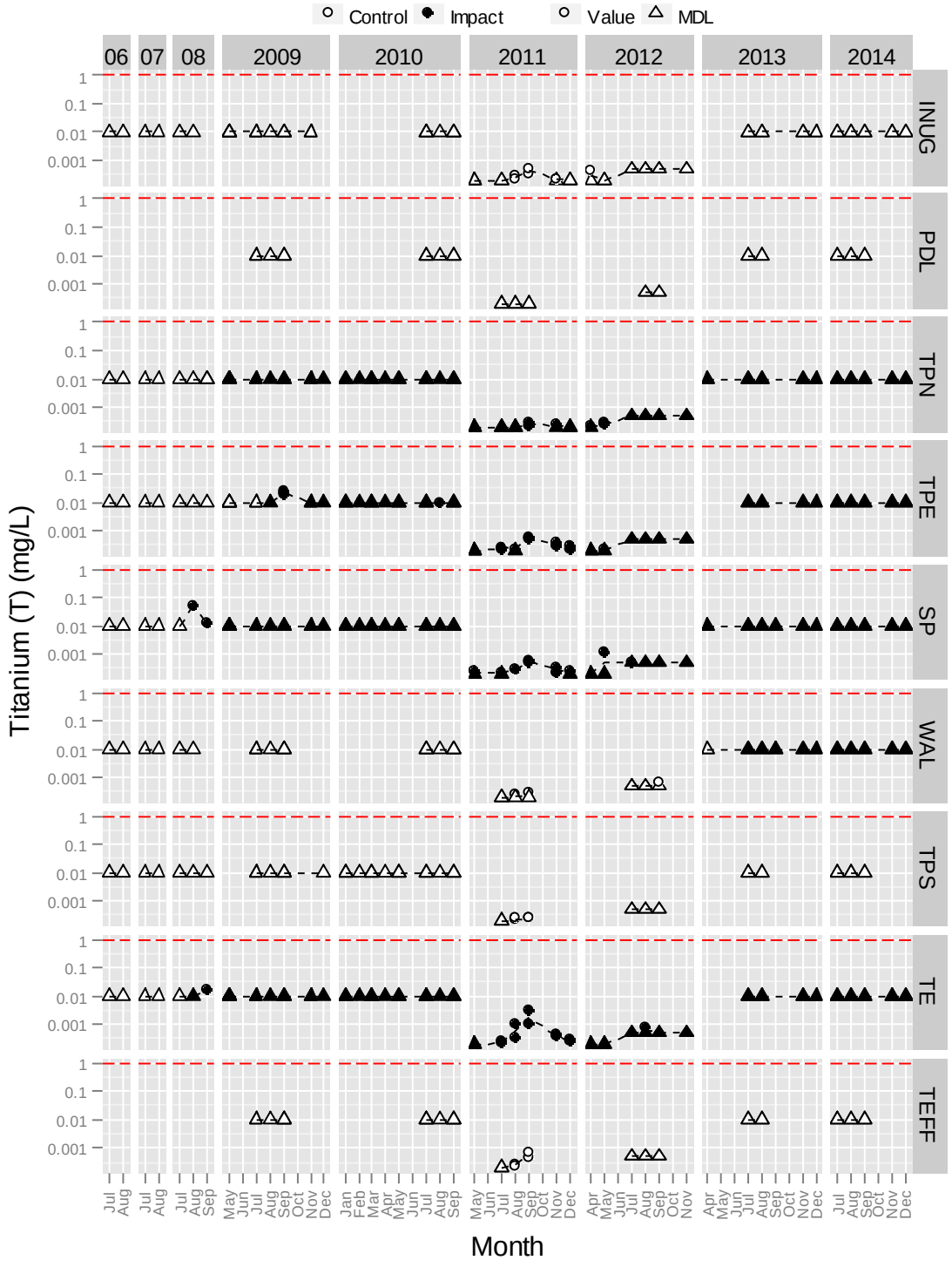

Control
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MDL
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2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Mercury (T) (mg/L)
5e-05
4e-05
3e-05
2e-05
1e-05
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
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Jul Aug Sep Oct Nov Dec
Month

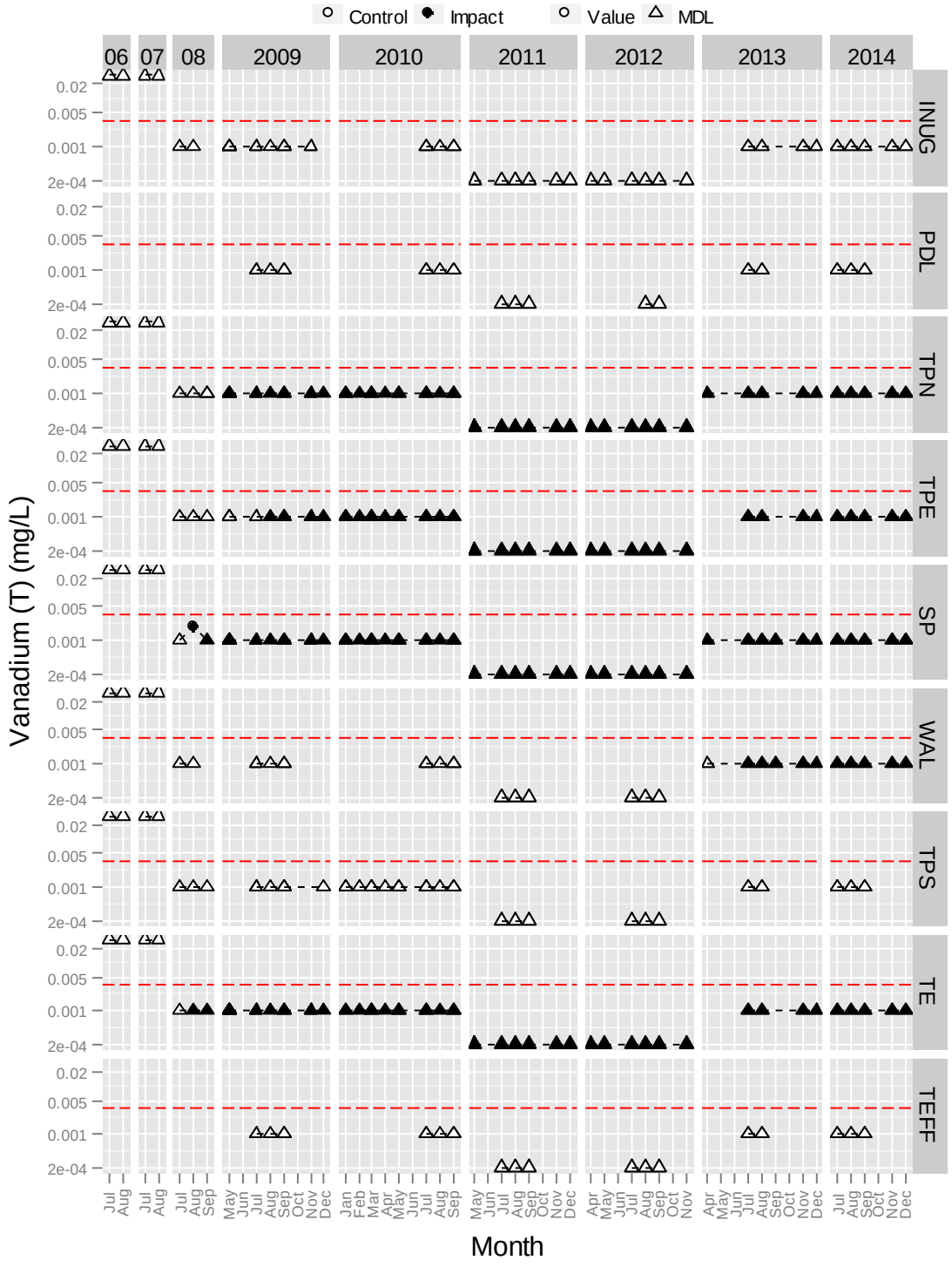

Control
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INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.05
0.01
0.002
5e-04
Nickel (T) (mg/L)
Month

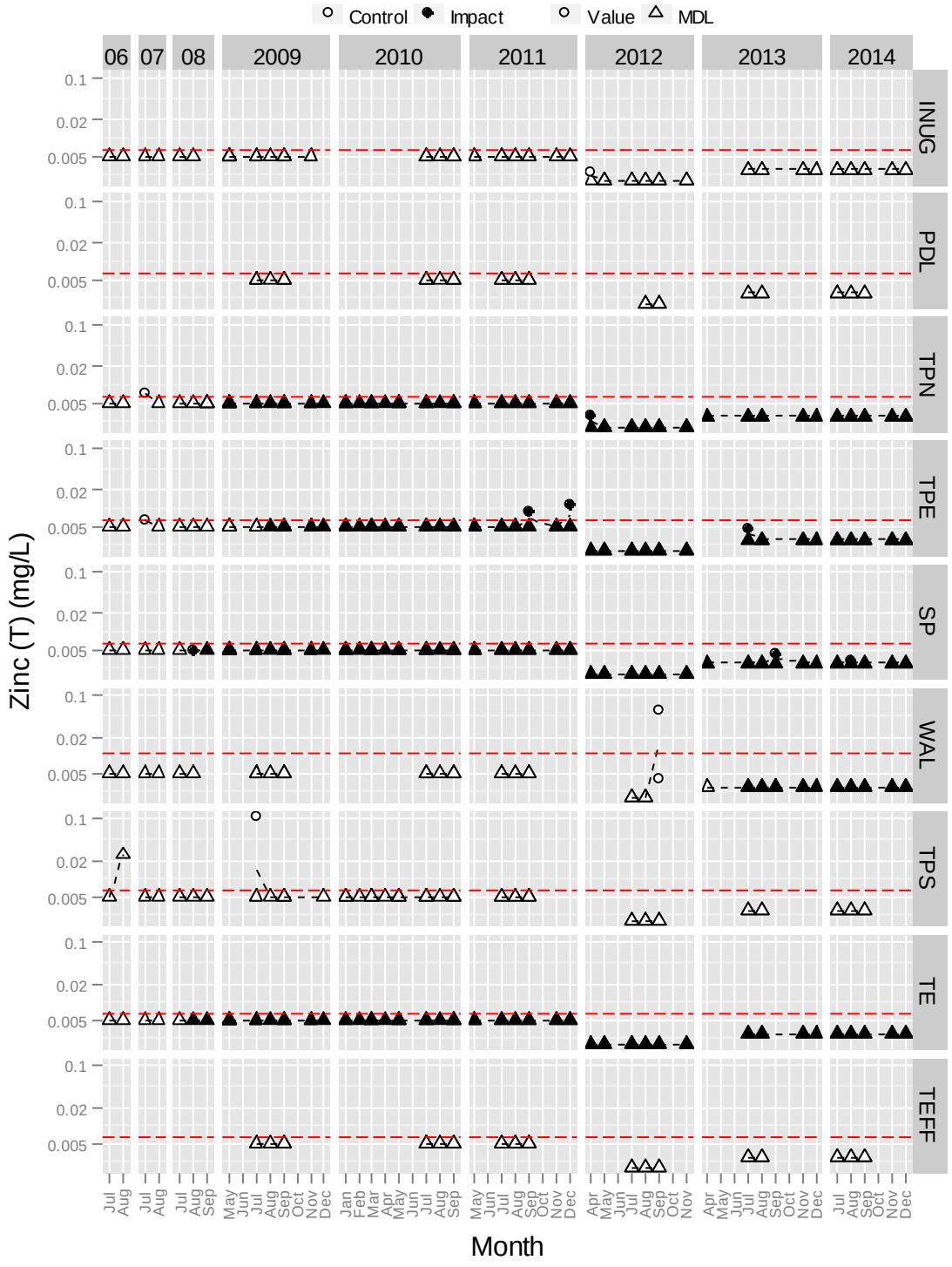

Control
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MDL
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2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.005
0.001
2e-04
Selenium (T) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

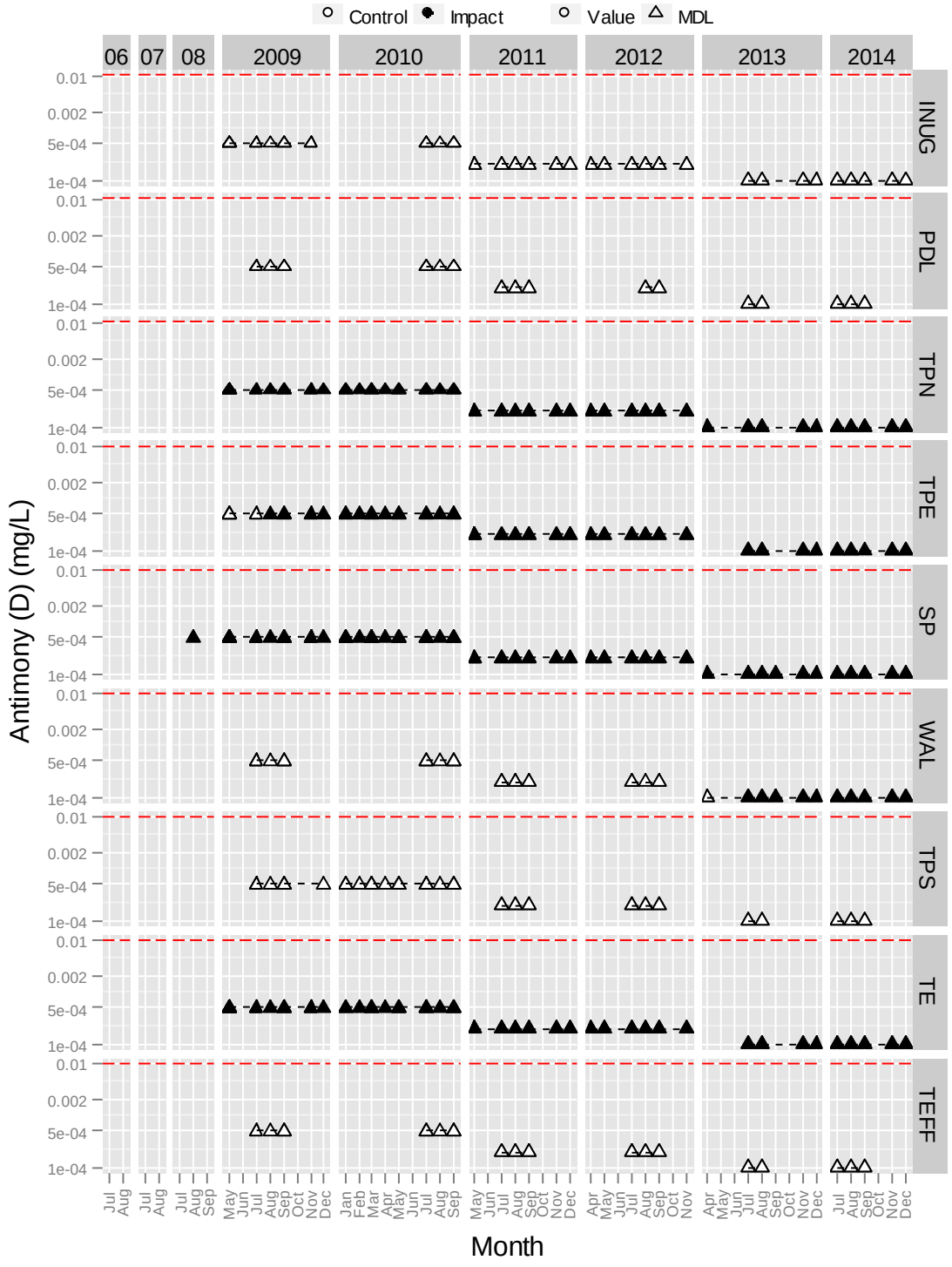

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.001
2e-04
5e-05
1e-05
Thallium (T) (mg/L)
Jul
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Feb
Mar
Apr
Month

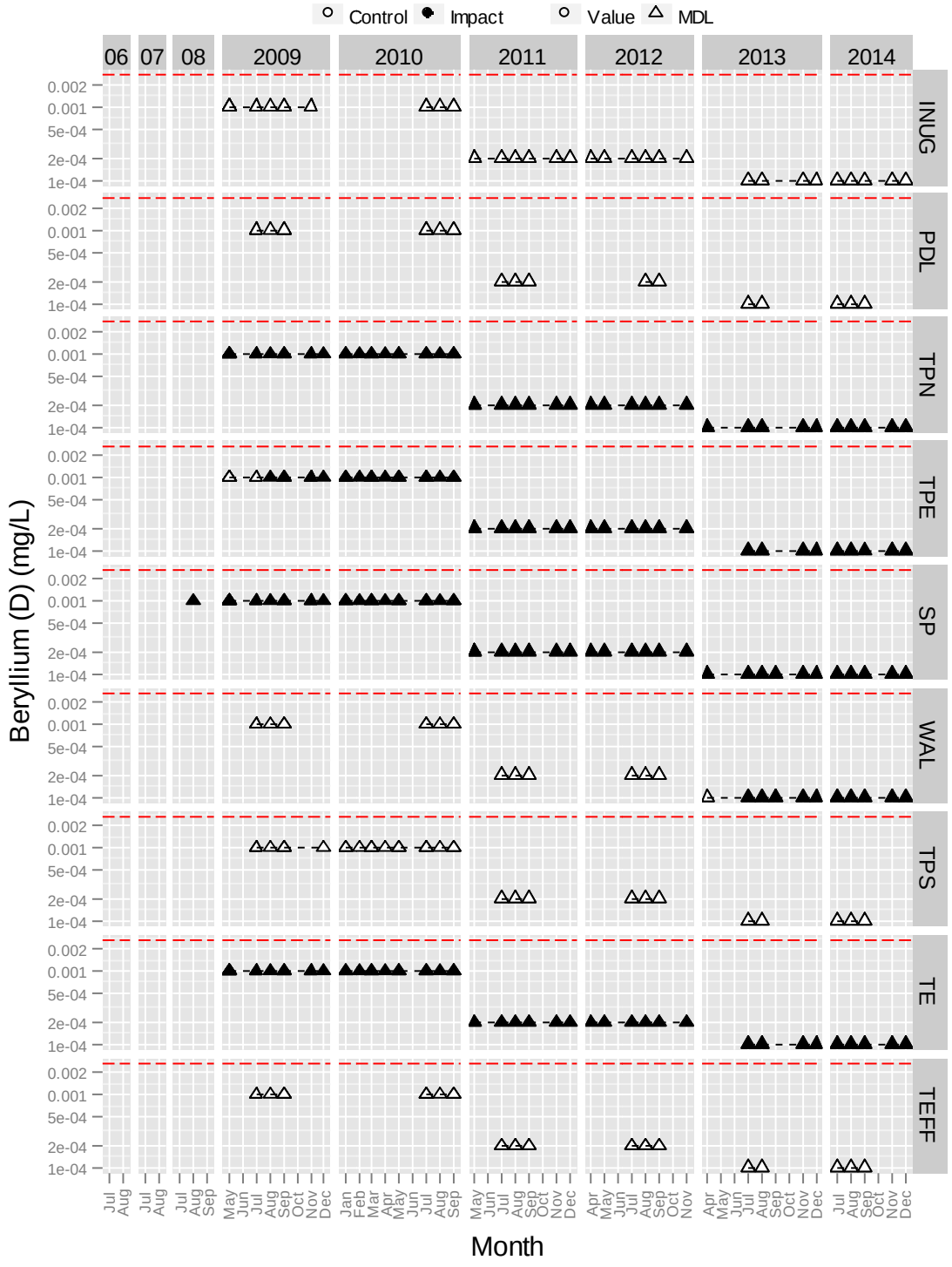

Control
Impact
Value
MDL
06
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2009
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2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.002
0.001
5e-04
2e-04
1e-04
Tin (T) (mg/L)
Jul
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Month

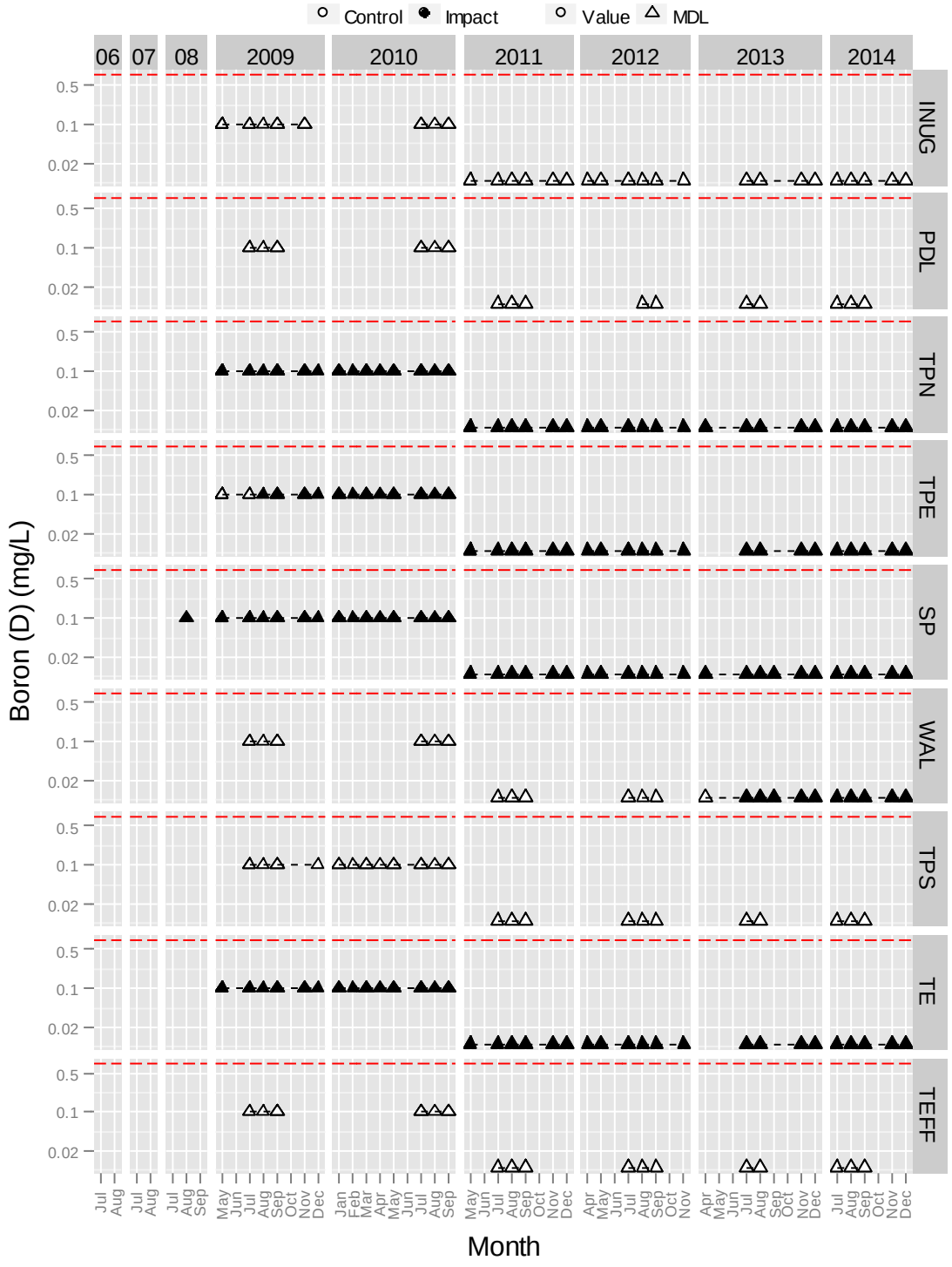

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Titanium (T) (mg/L)
1
0.1
0.01
0.001
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

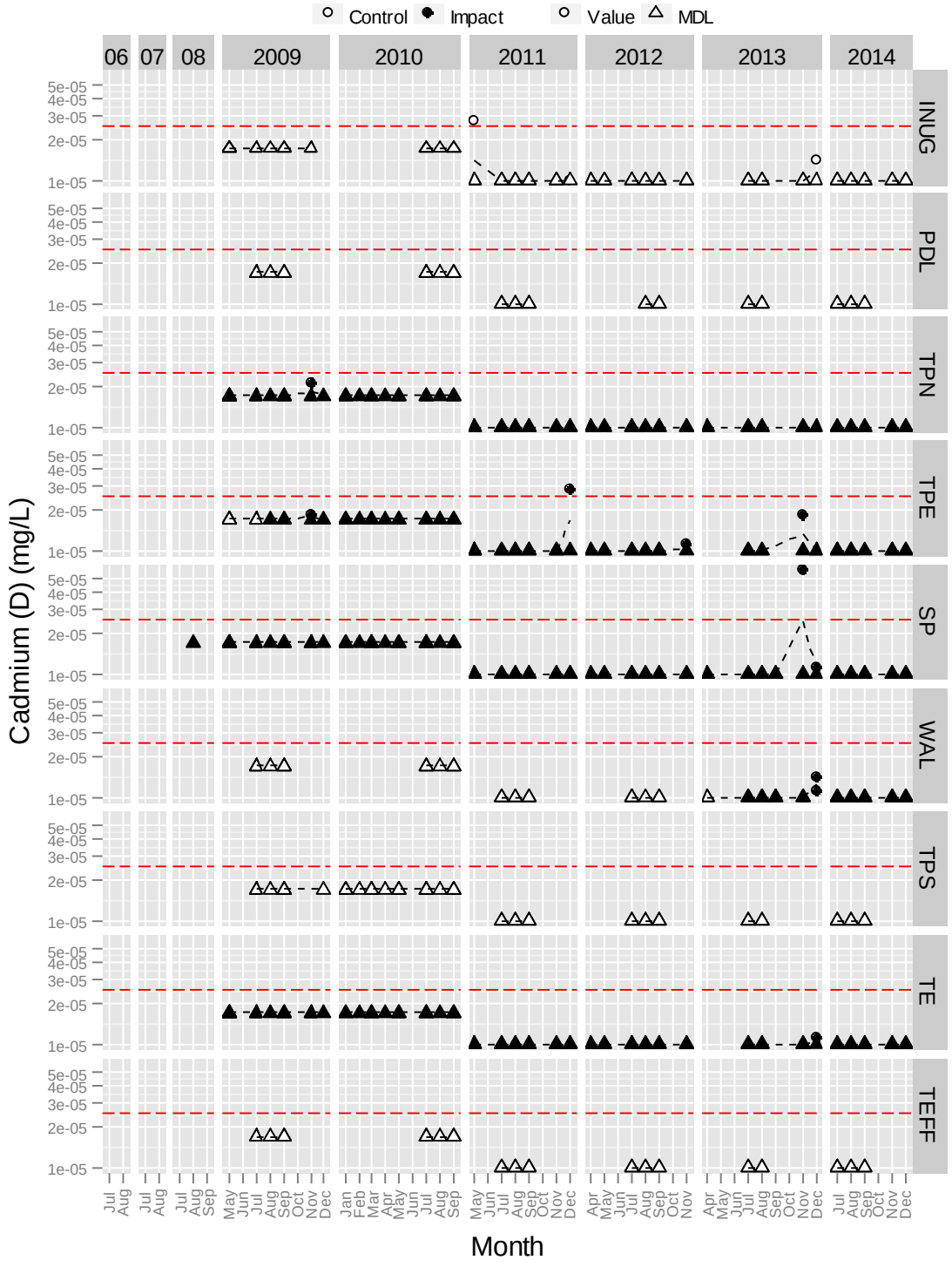

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.02
0.005
0.001
2e-04
Vanadium (T) (mg/L)
Jul
Aug
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Nov
Dec
Jan
Feb
Mar
Apr
Month

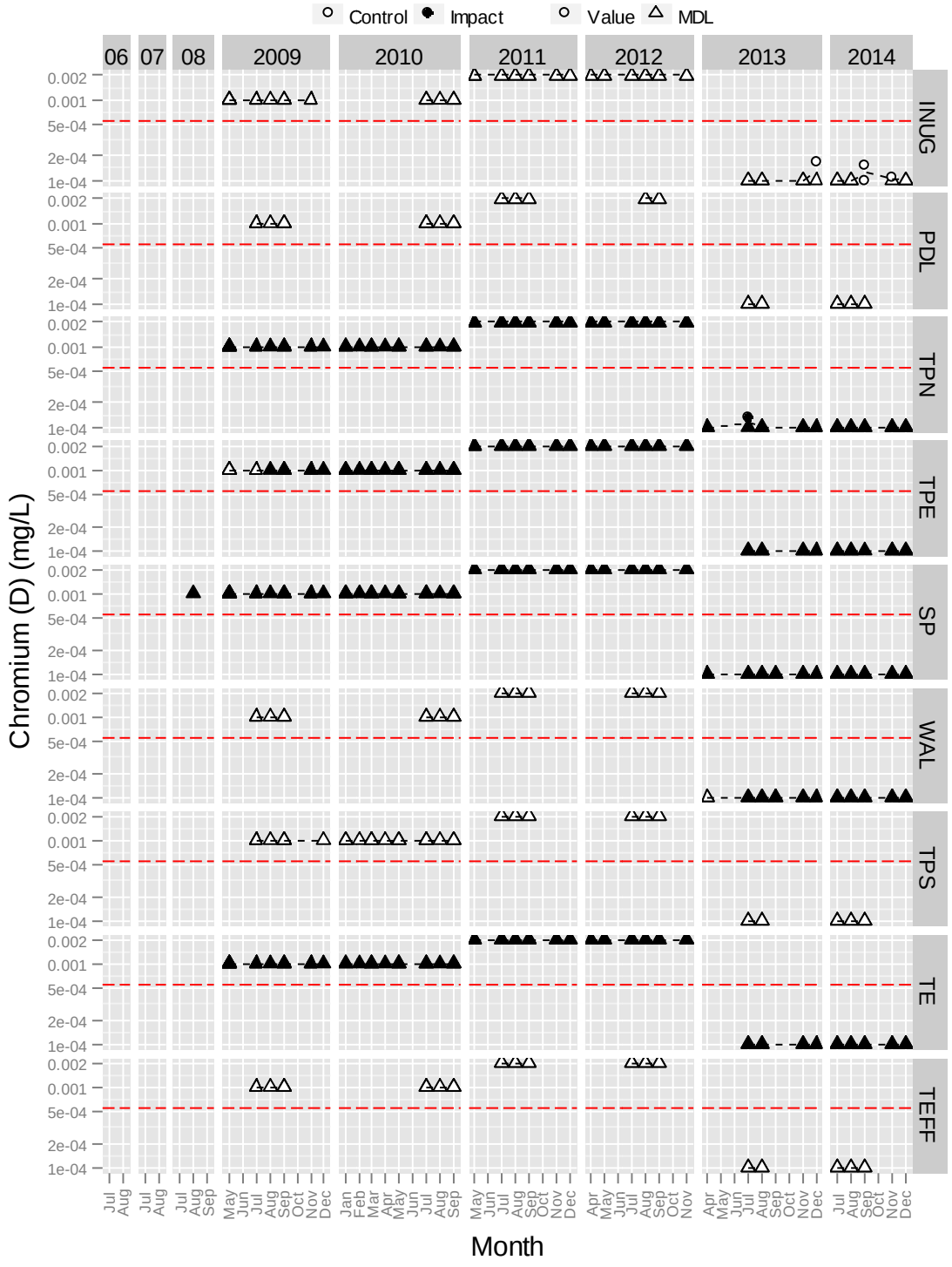

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.1
0.02
0.005
Zinc (T) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
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Jul Aug Sep Oct Nov Dec
Month

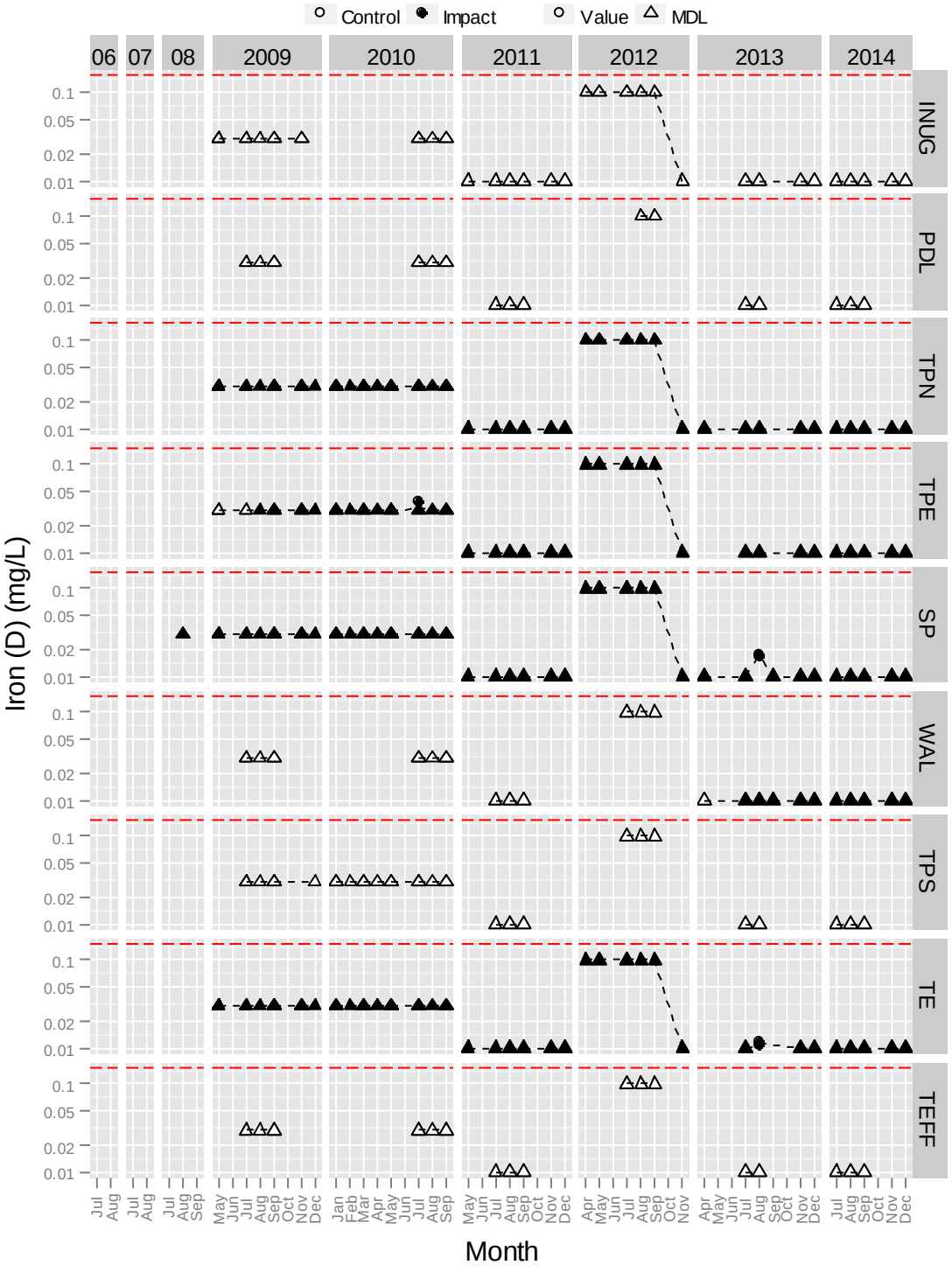

Control
Impact
Value
MDL
06
07
08
2009
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2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.01
0.002
5e-04
1e-04
Antimony (D) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
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Jul Aug Sep Oct Nov Dec
Month

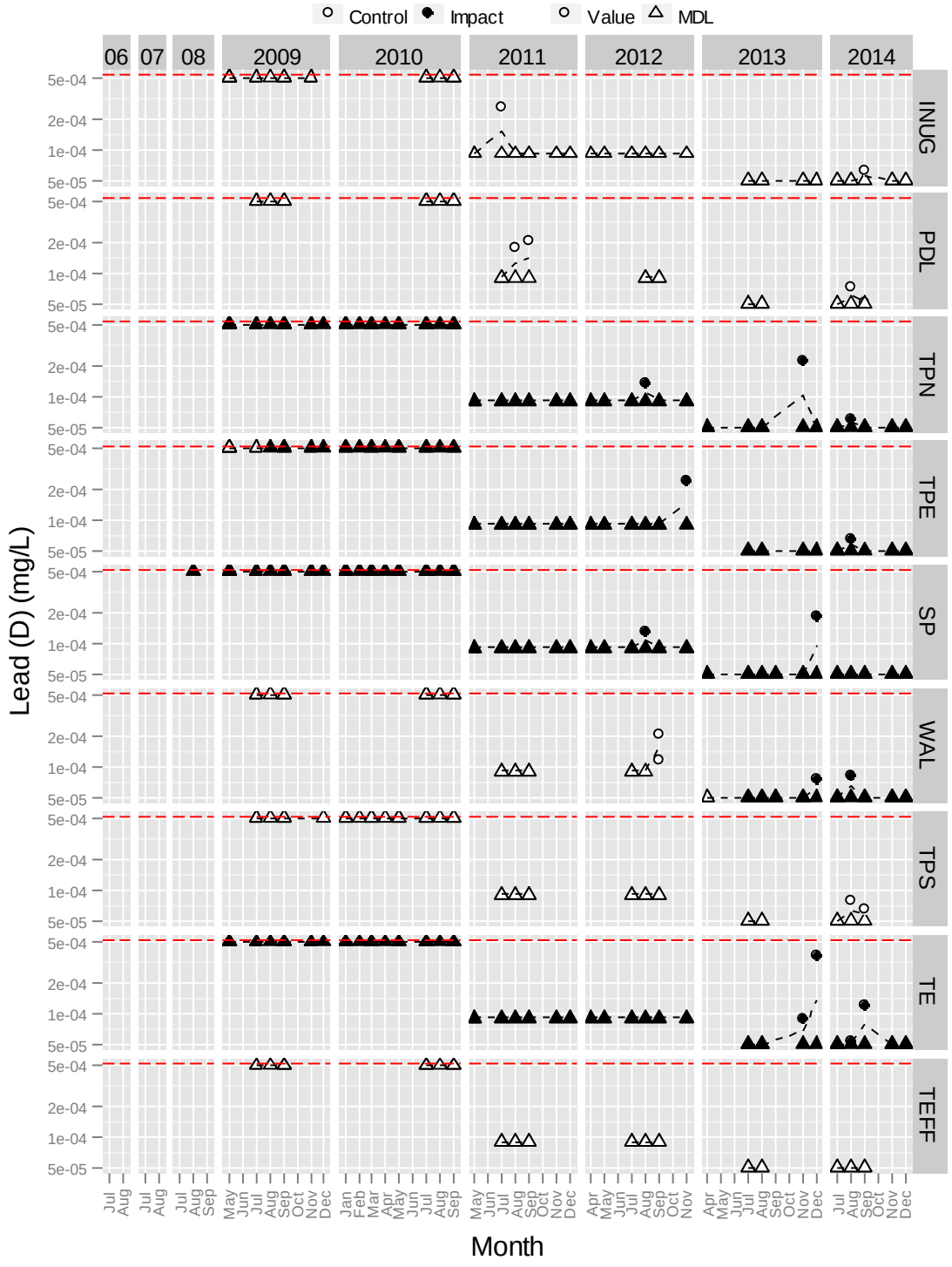

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Beryllium (D) (mg/L)
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

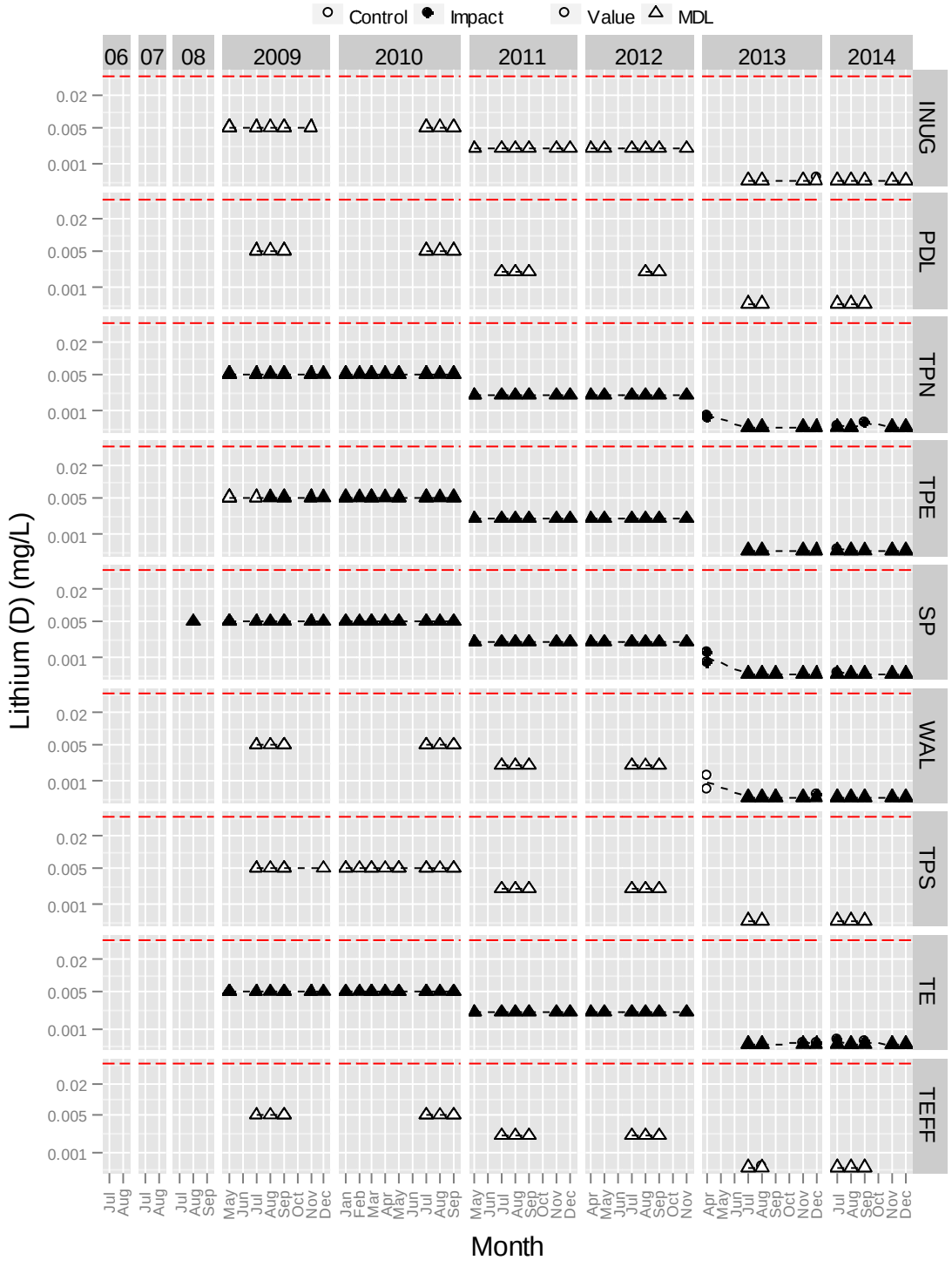

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.5
0.1
0.02
Boron (D) (mg/L)
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

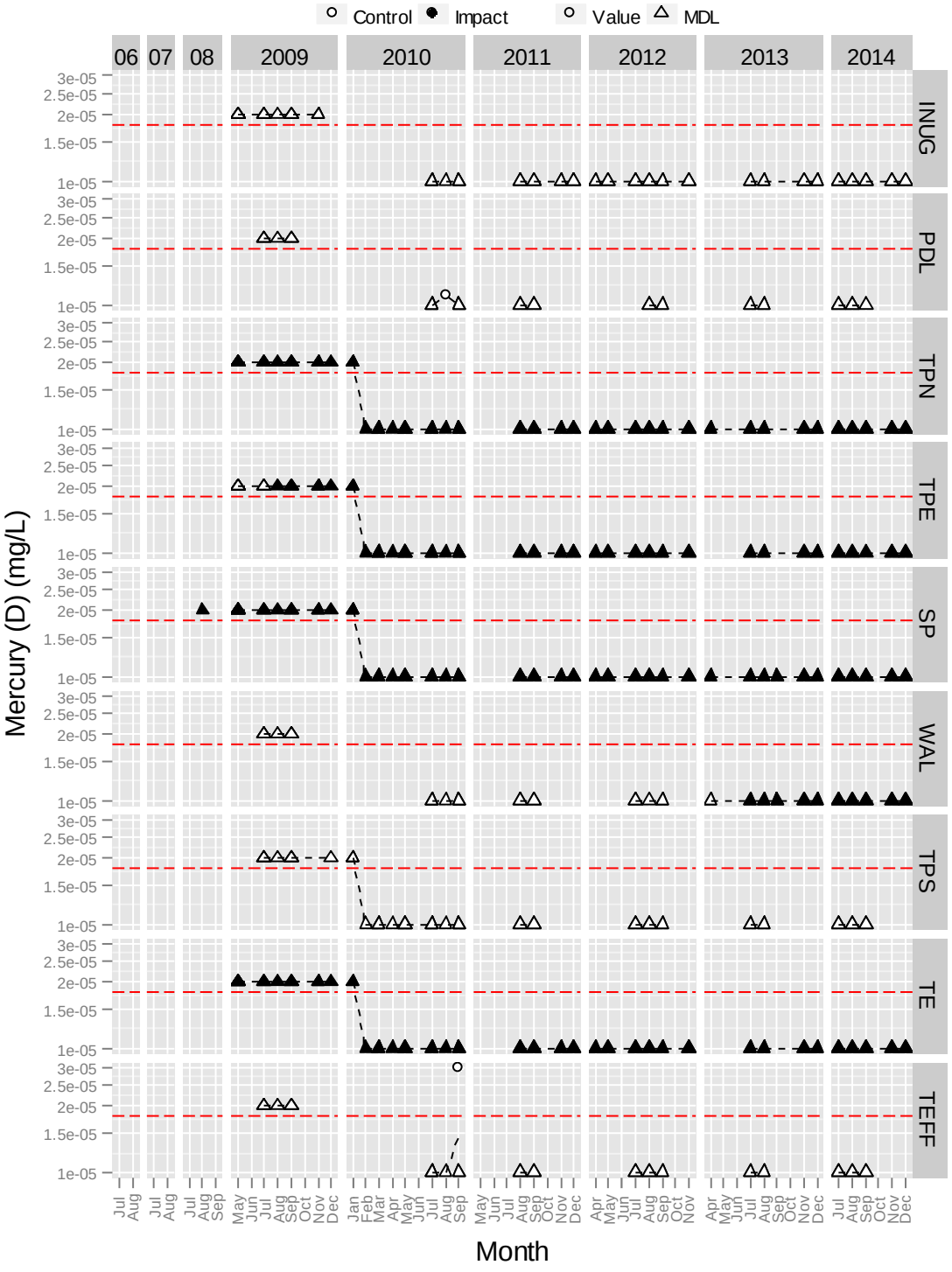

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Cadmium (D) (mg/L)
5e-05
4e-05
3e-05
2e-05
1e-05
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

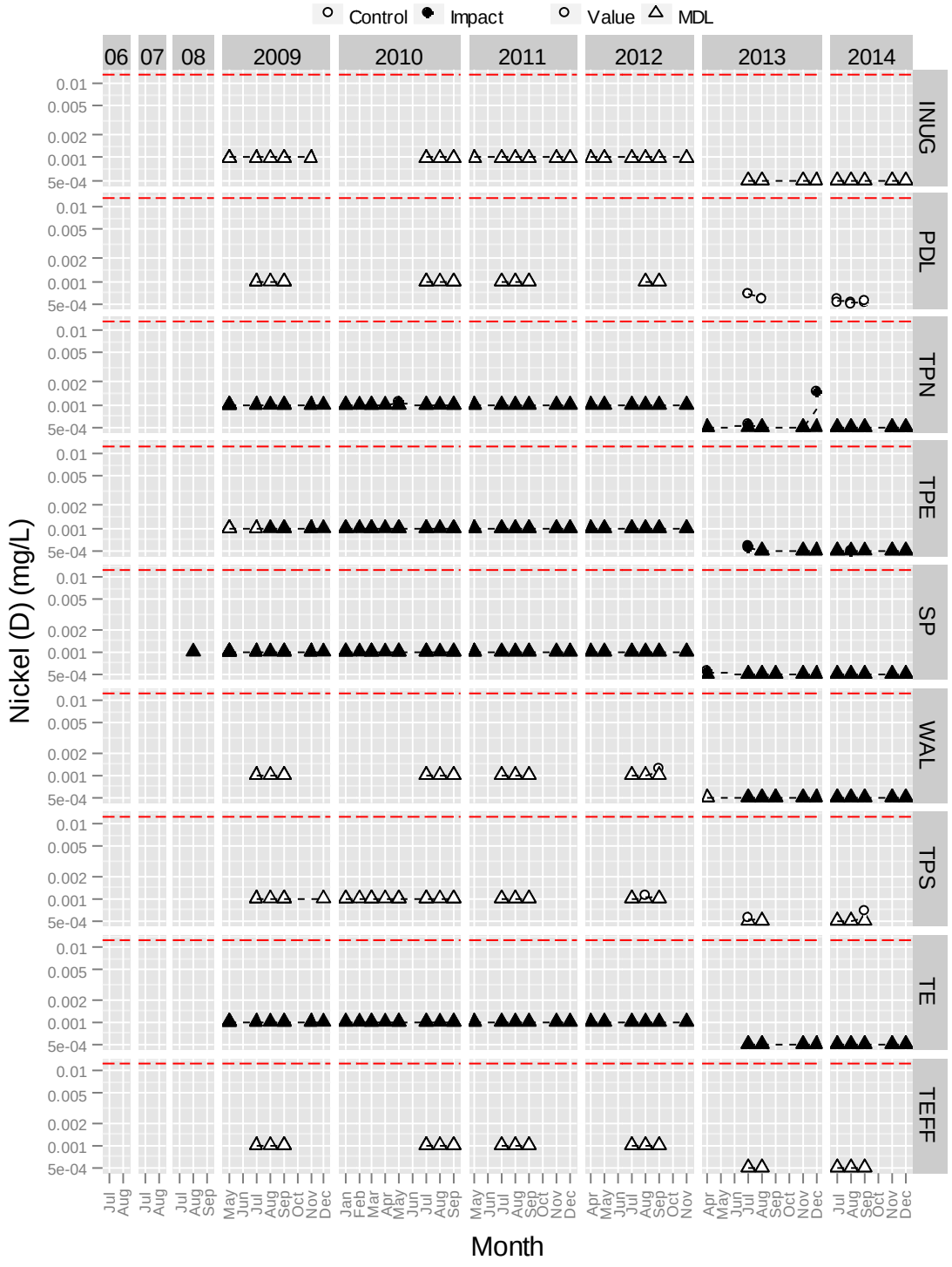

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Chromium (D) (mg/L)
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

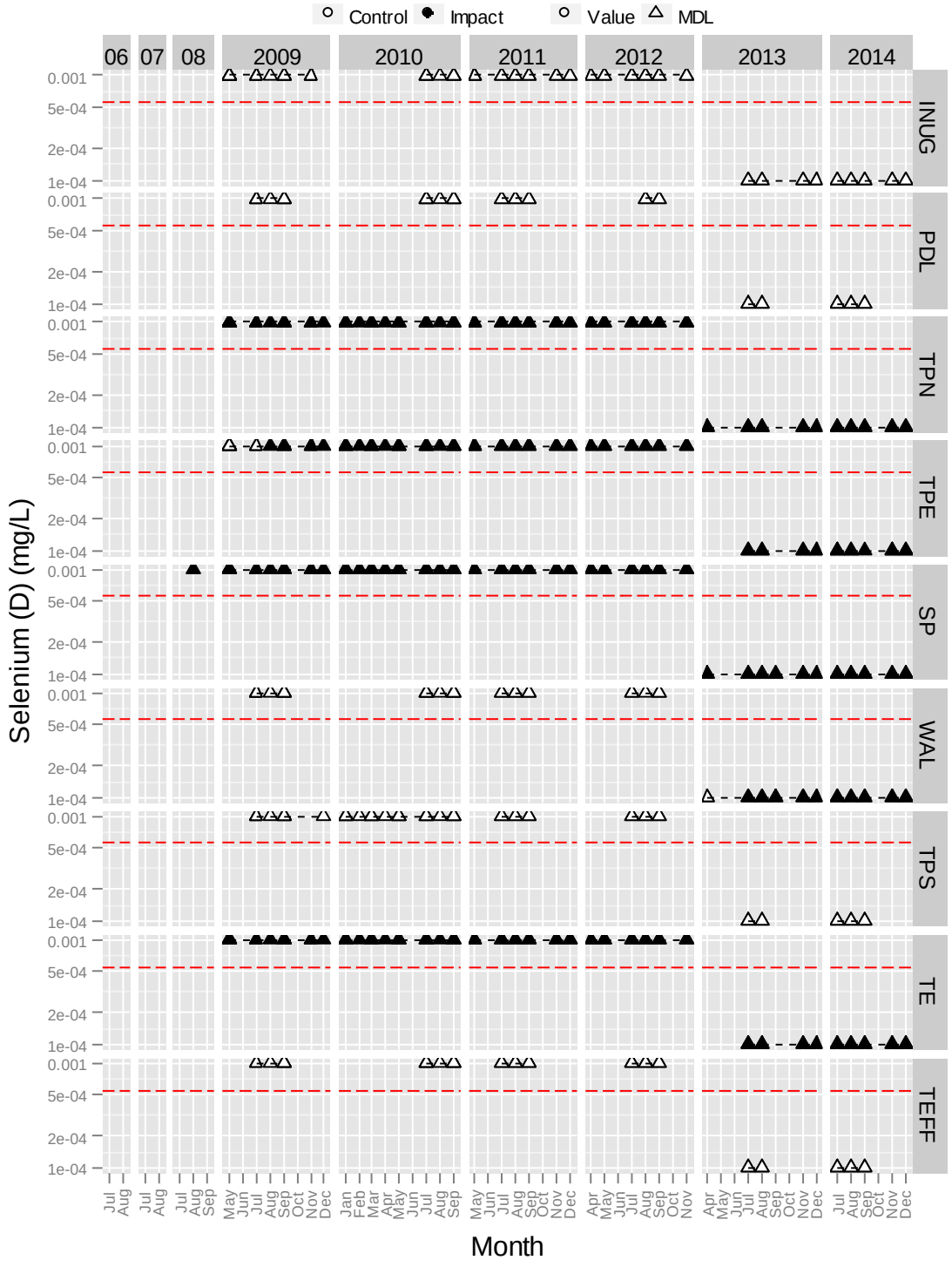

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Iron (D) (mg/L)
0.1
0.05
0.02
0.01
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

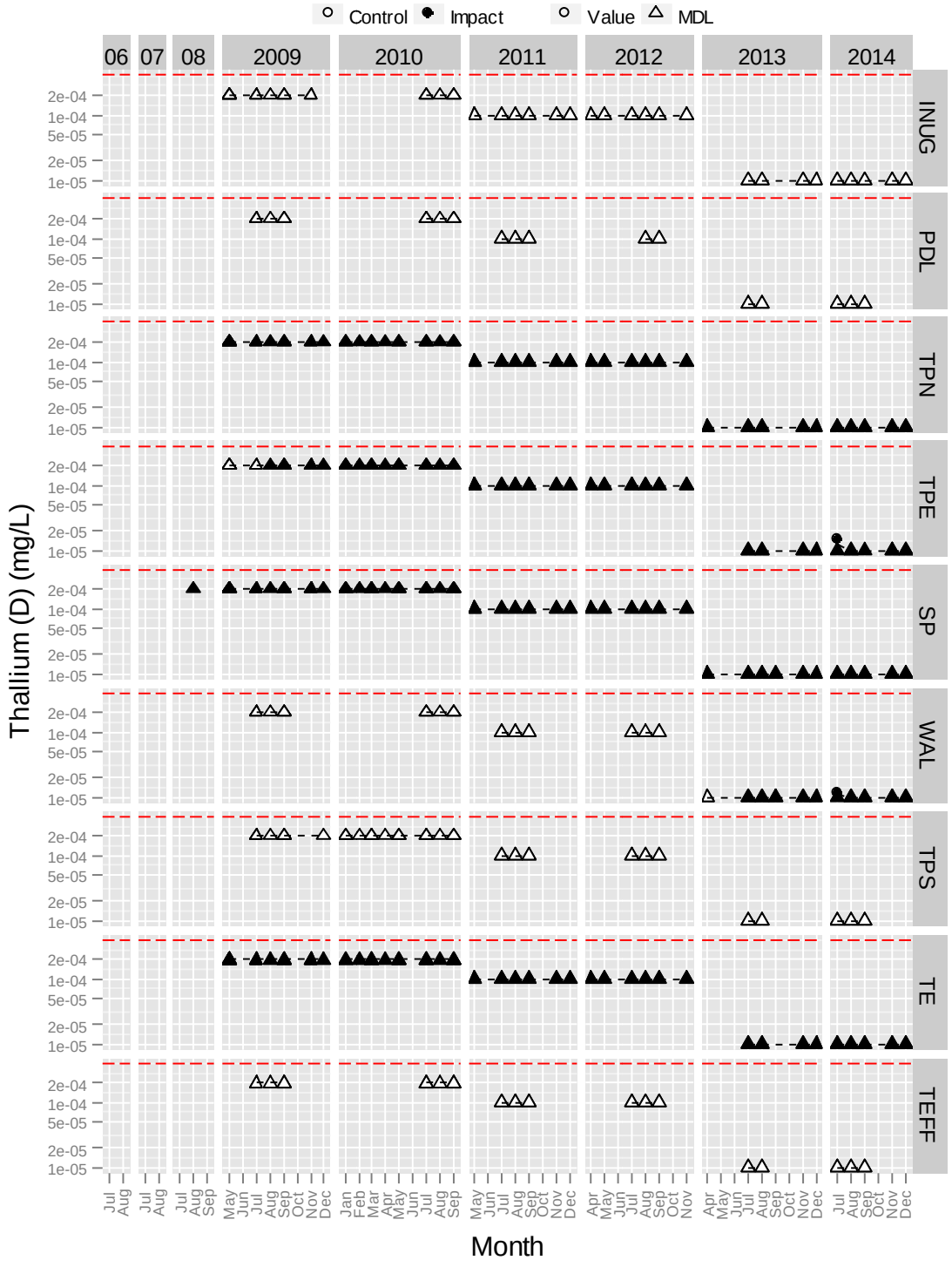

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Lead (D) (mg/L)
5e-04
2e-04
1e-04
5e-05
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

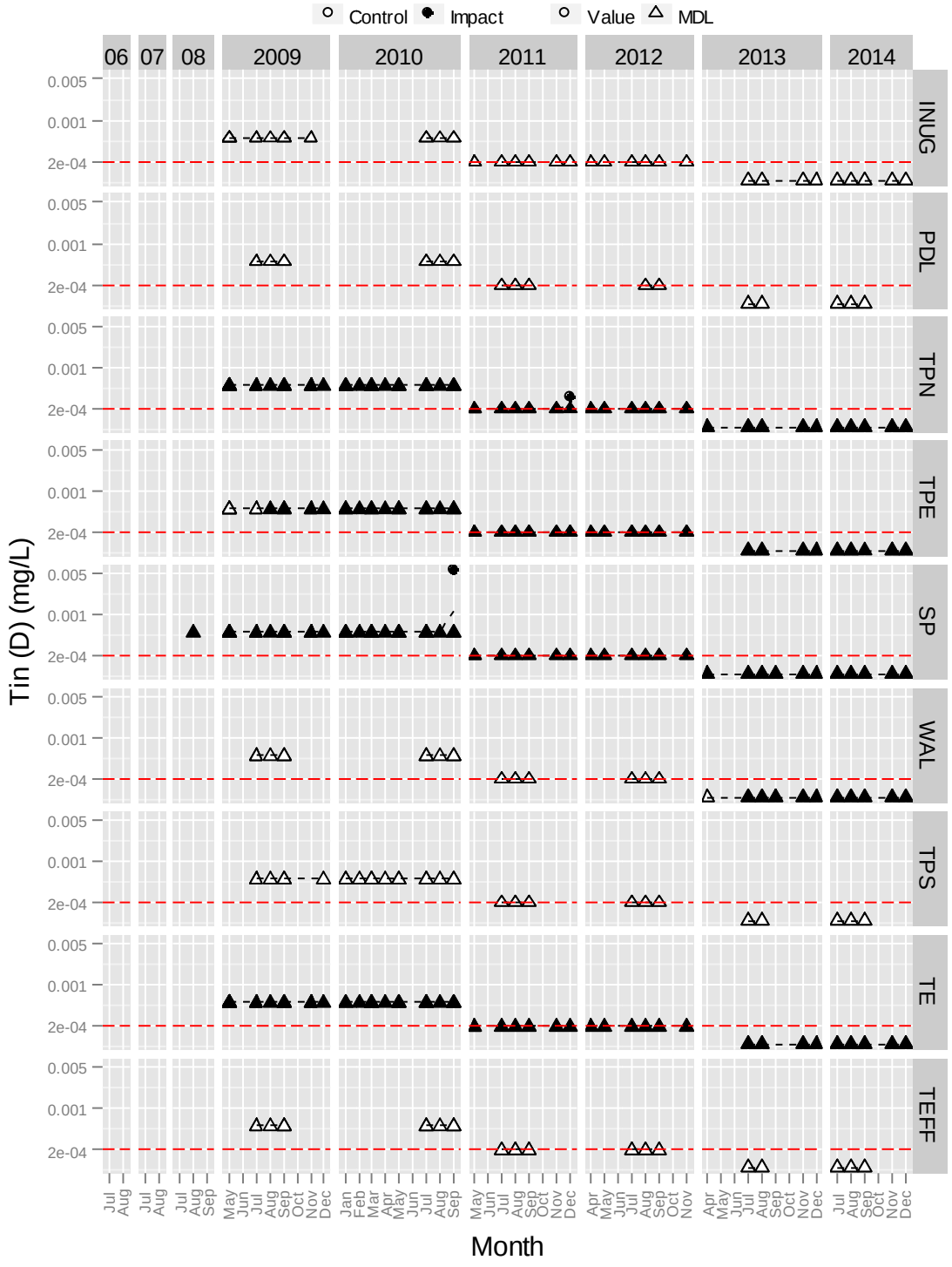

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.02
0.005
0.001
Lithium (D) (mg/L)
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

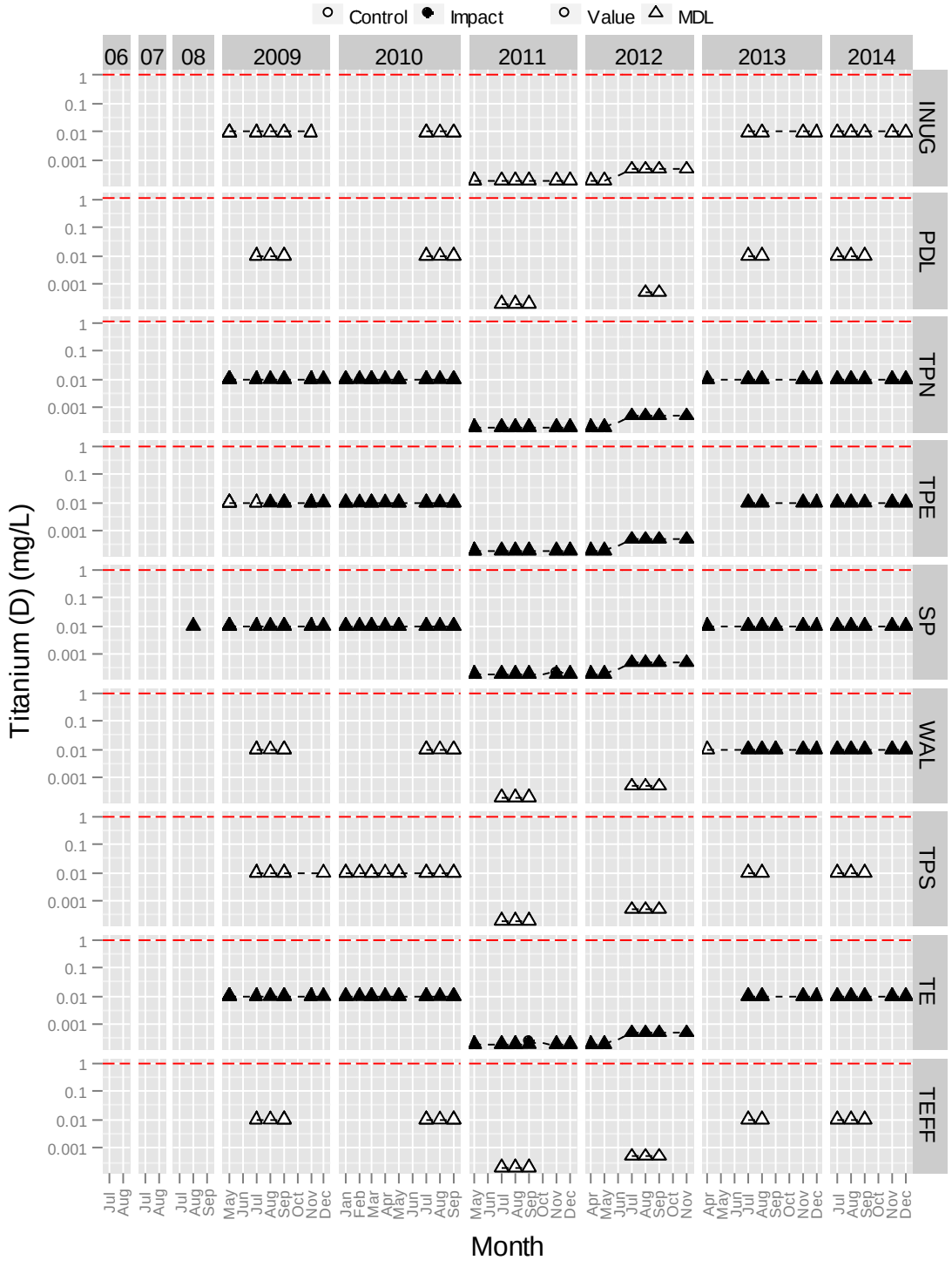

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Mercury (D) (mg/L)
3e-05
2.5e-05
2e-05
1.5e-05
1e-05
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

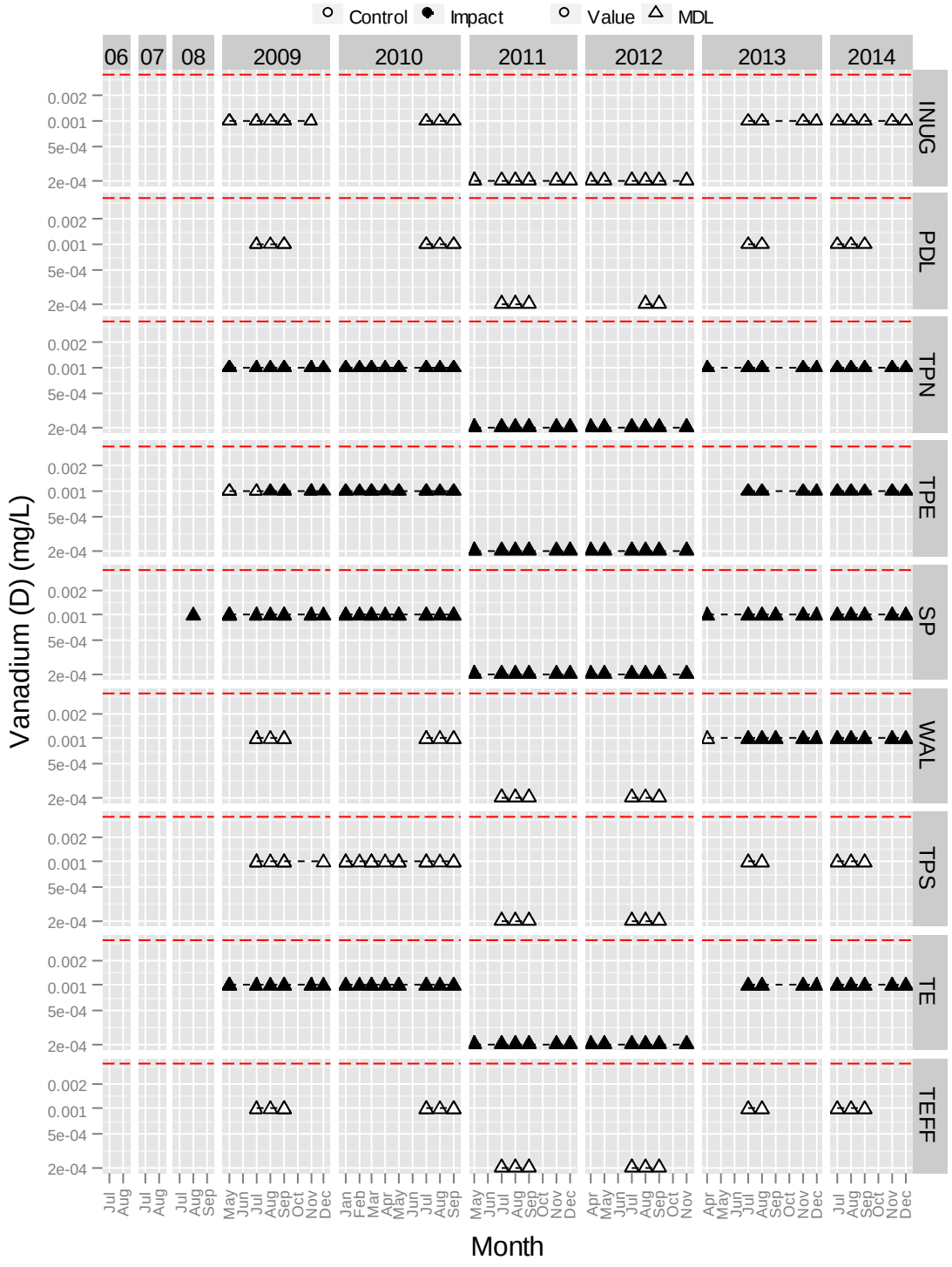

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Nickel (D) (mg/L)
0.01
0.005
0.002
0.001
5e-04
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

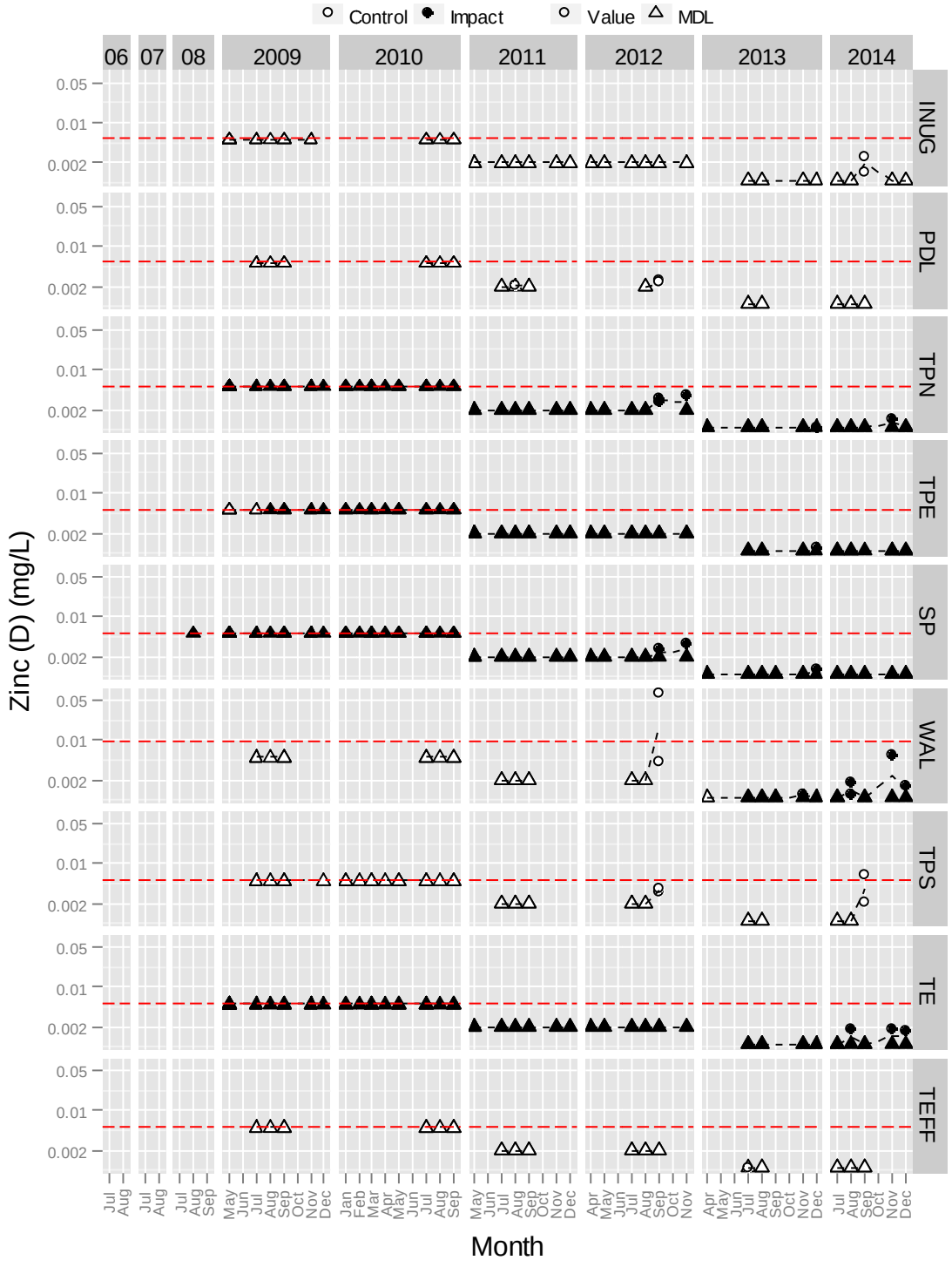

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Selenium (D) (mg/L)
0.001
5e-04
2e-04
1e-04
Month

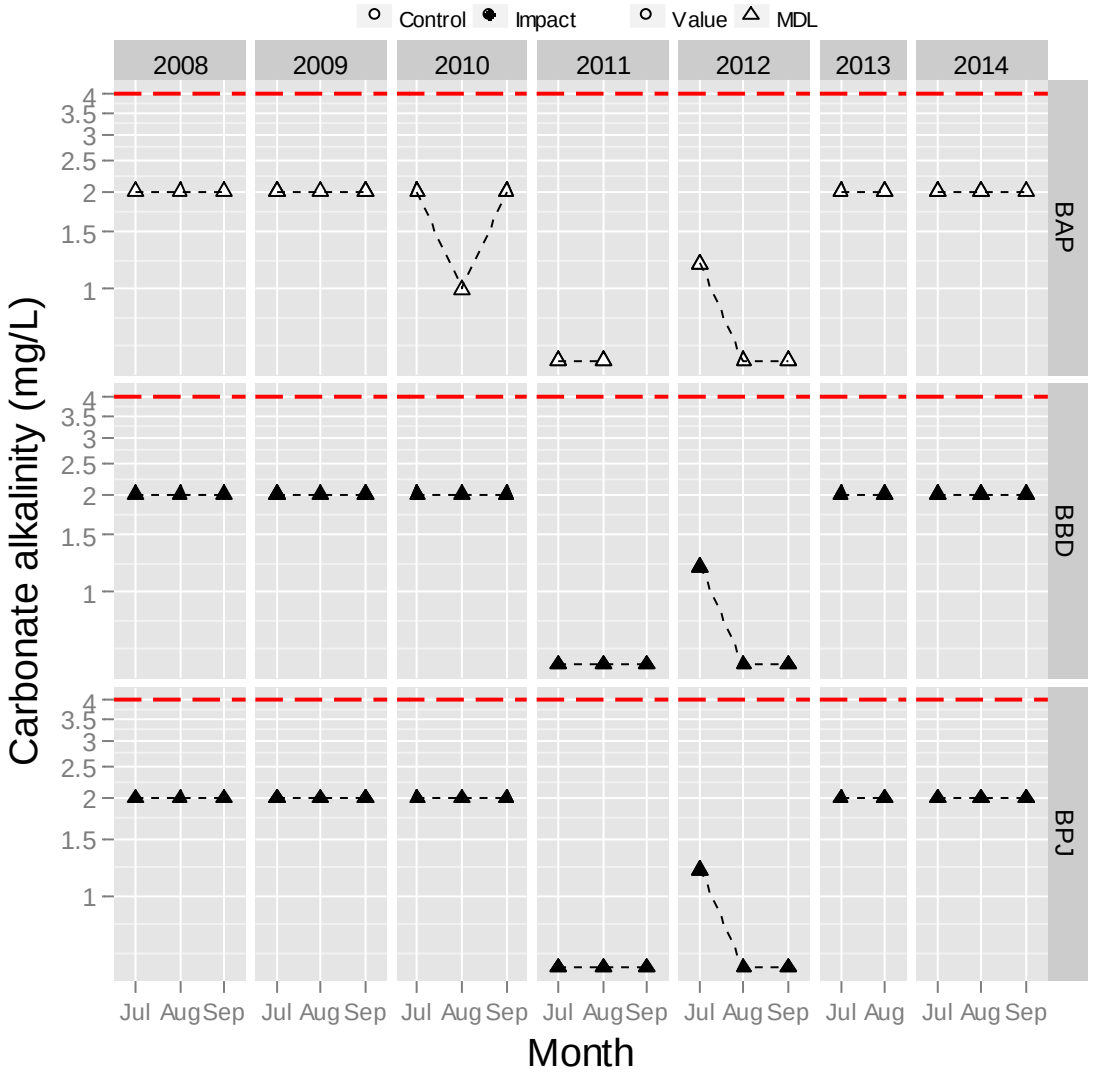

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Thallium (D) (mg/L)
2e-04
1e-04
5e-05
2e-05
1e-05
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

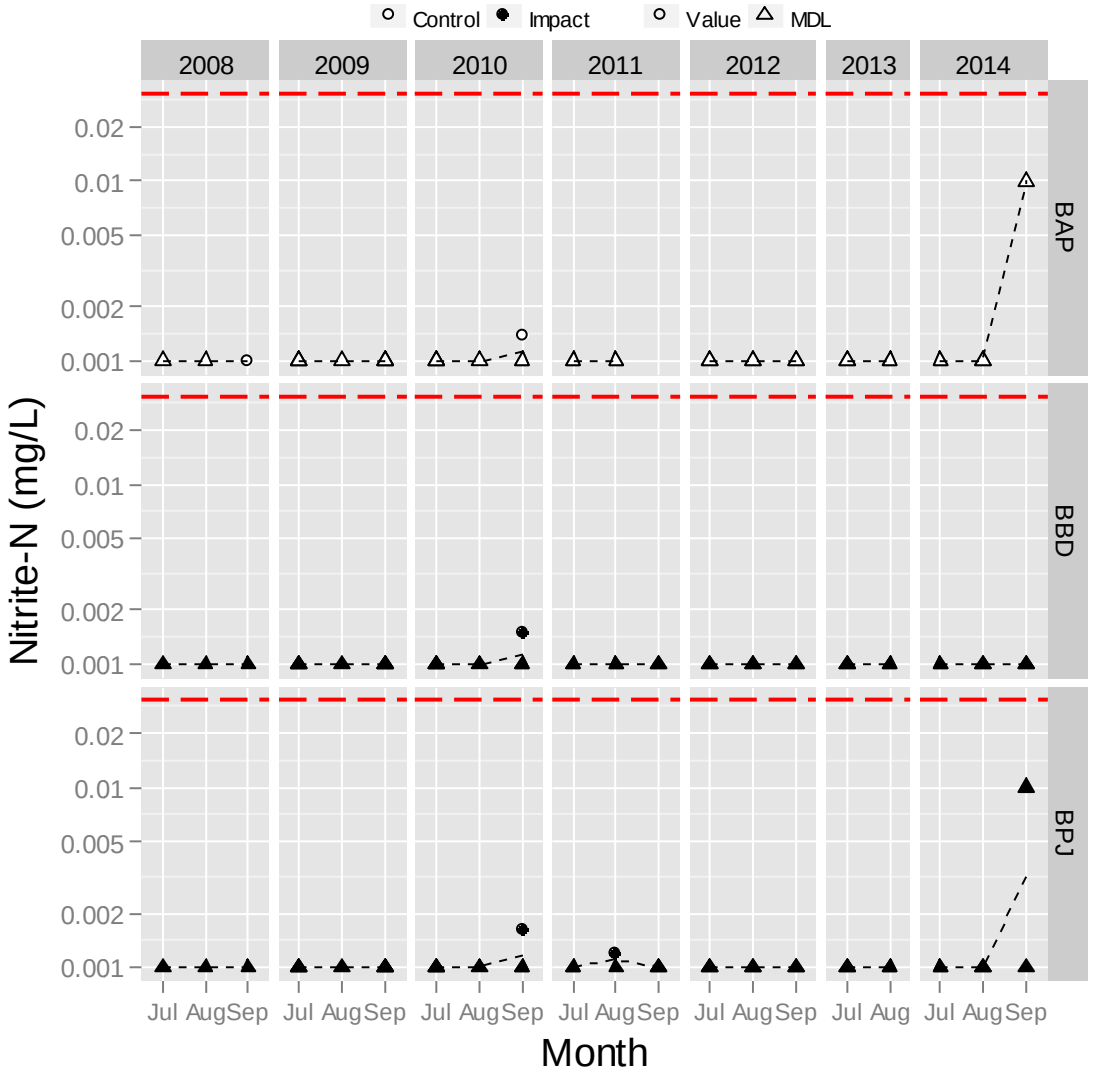

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.005
0.001
2e-04
Tin (D) (mg/L)
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

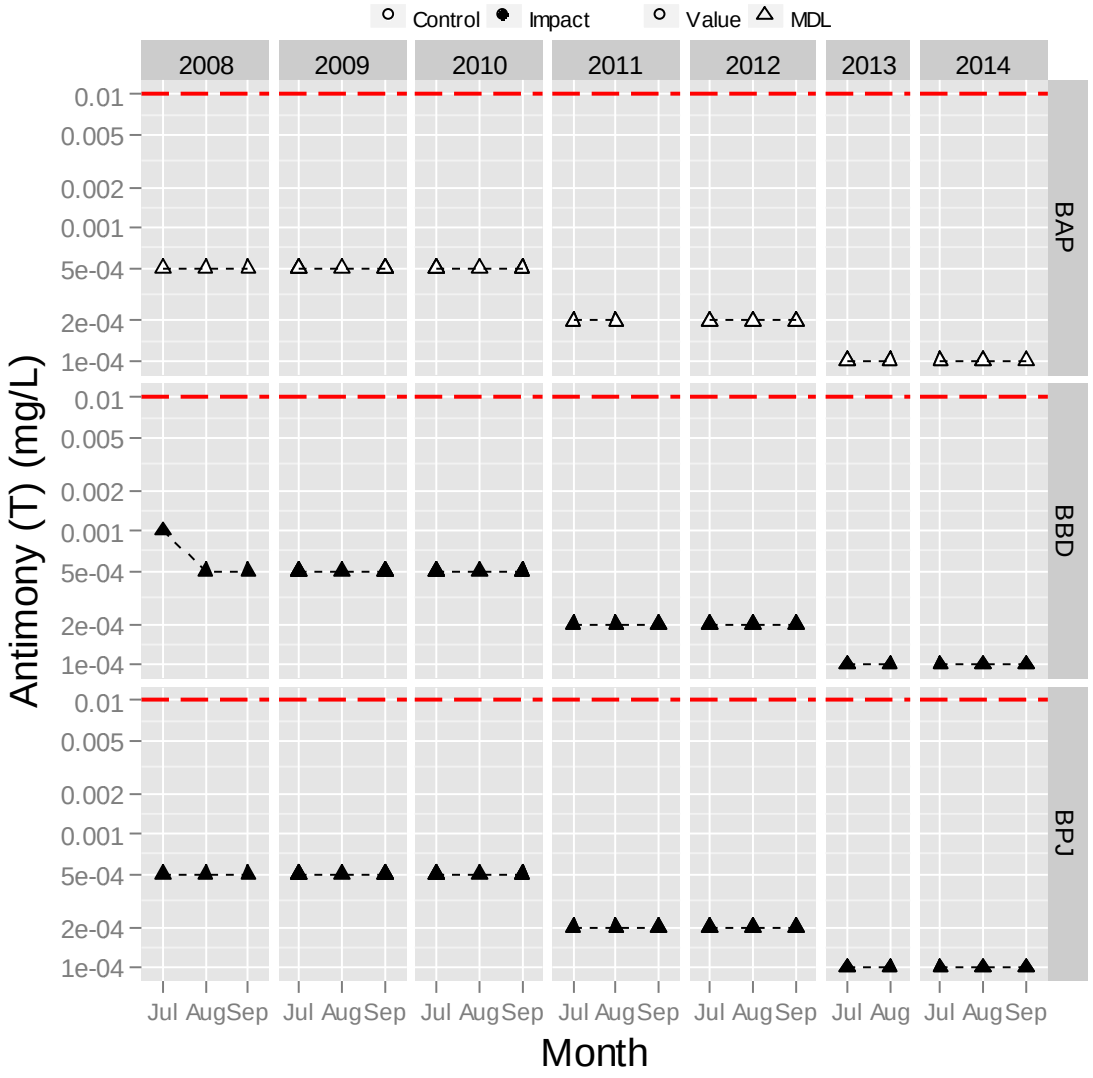

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Titanium (D) (mg/L)
1
0.1
0.01
0.001
Jul
Aug
Sep
May
Jun
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month

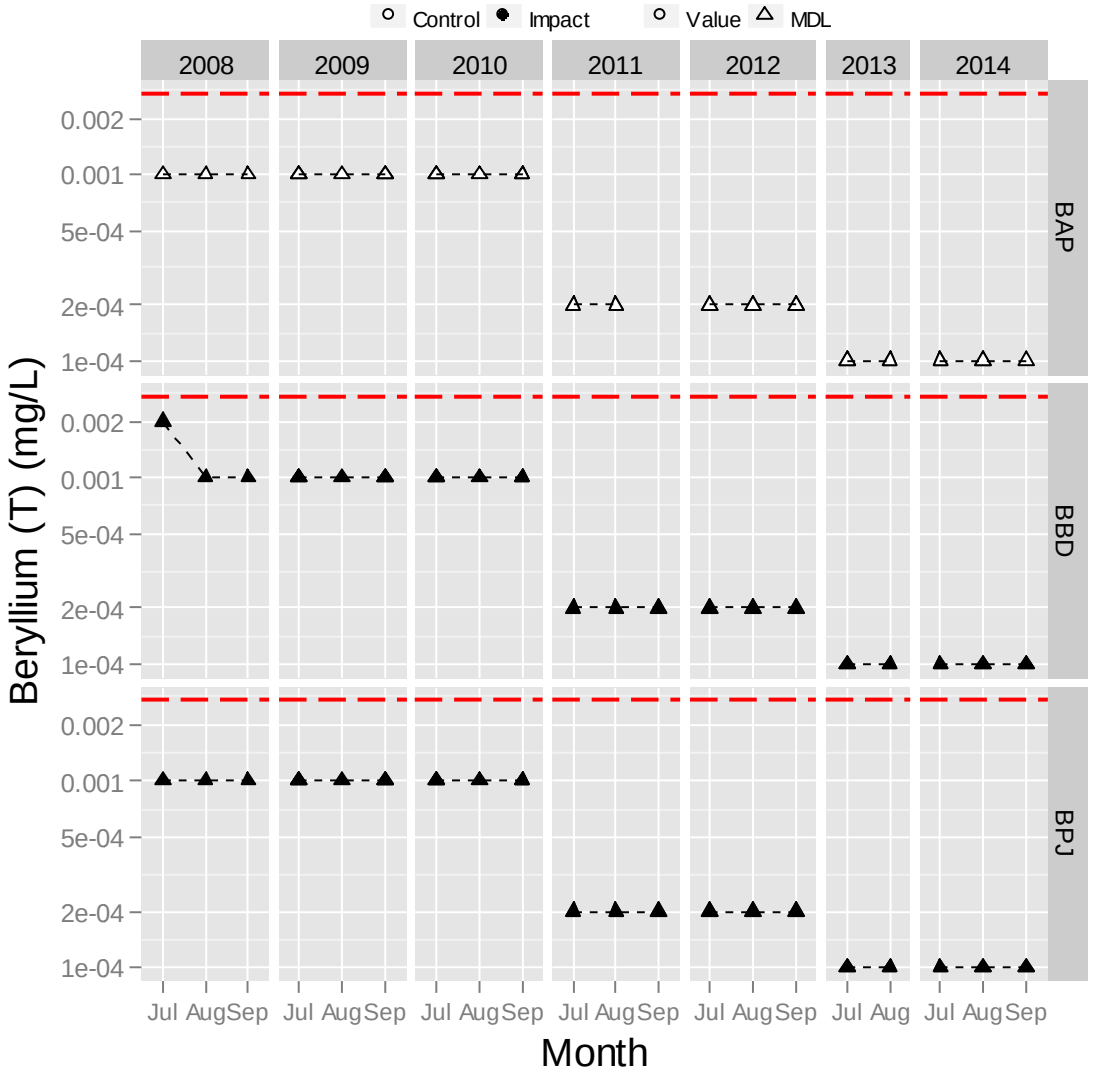

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.002
0.001
5e-04
2e-04
Vanadium (D) (mg/L)
Jul Aug
Jul Aug
Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Jan Feb Mar Apr May Jun Jul Aug Sep
May Jun Jul Aug Sep Oct Nov Dec
Apr May Jun Jul Aug Sep Oct Nov
Apr May Jun Jul Aug Sep Oct Nov Dec
Jul Aug Sep Oct Nov Dec
Month

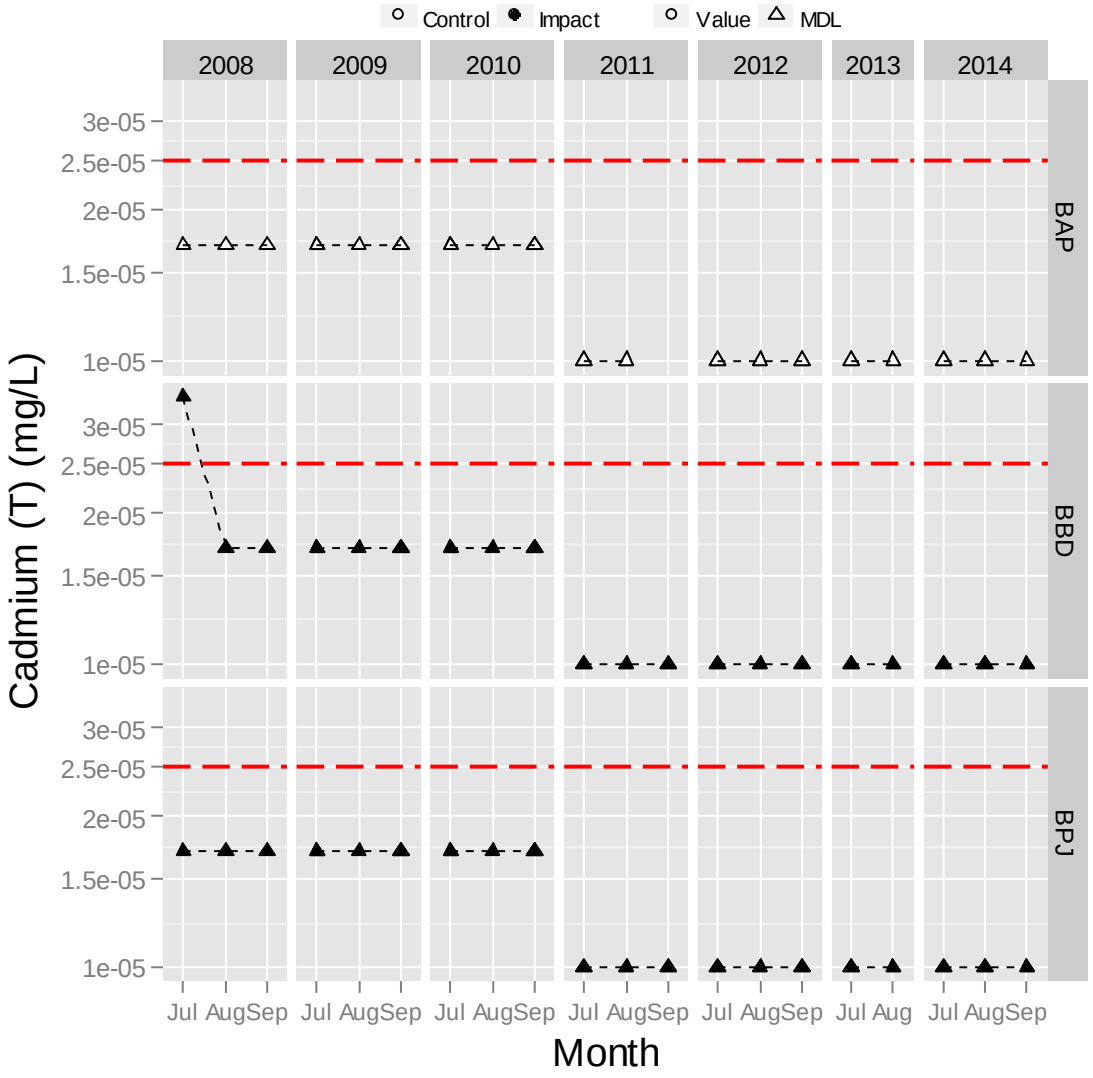

Control
Impact
Value
MDL
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
0.05
0.01
0.002
Zinc (D) (mg/L)
Jul
Aug
Sep
May
Jun
Jan
Feb
Mar
Apr
Oct
Nov
Dec
Month

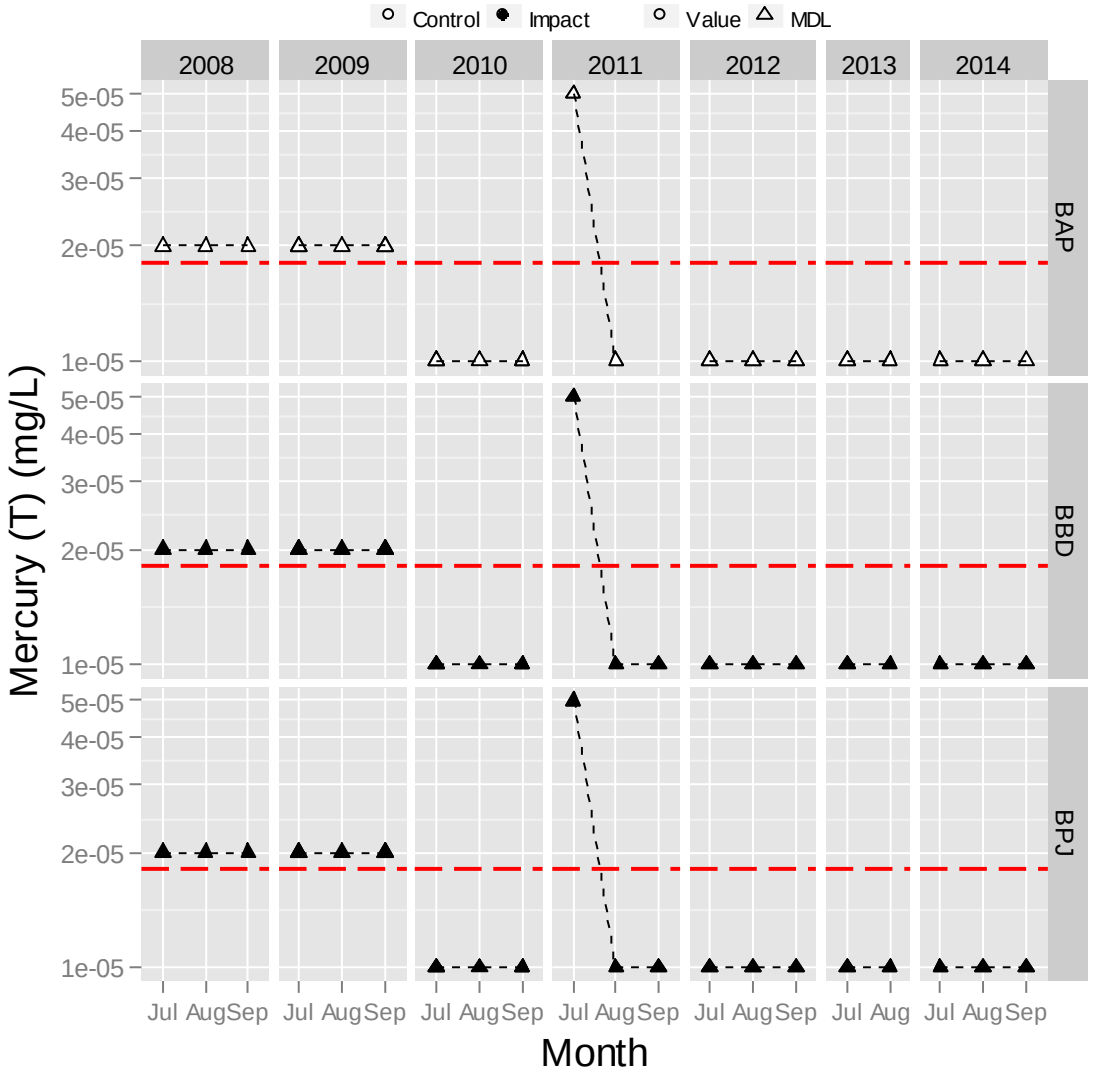

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Carbonate alkalinity (mg/L)
4
3.5
3
2.5
2
1.5
1
Jul
Aug
Sep
Month

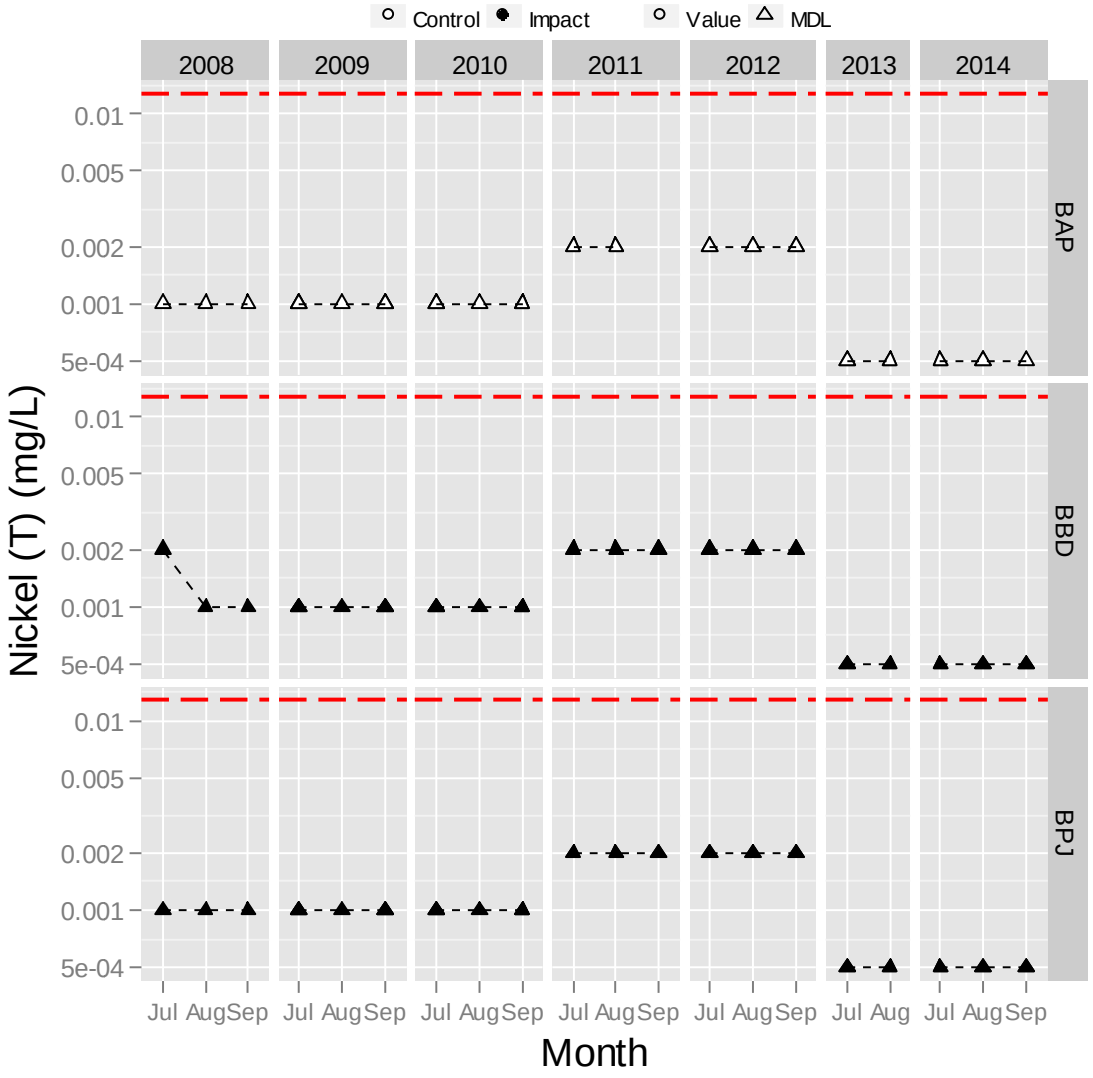

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Nitrite-N (mg/L)
0.02
0.01
0.005
0.002
0.001
Jul
Aug
Sep
Month

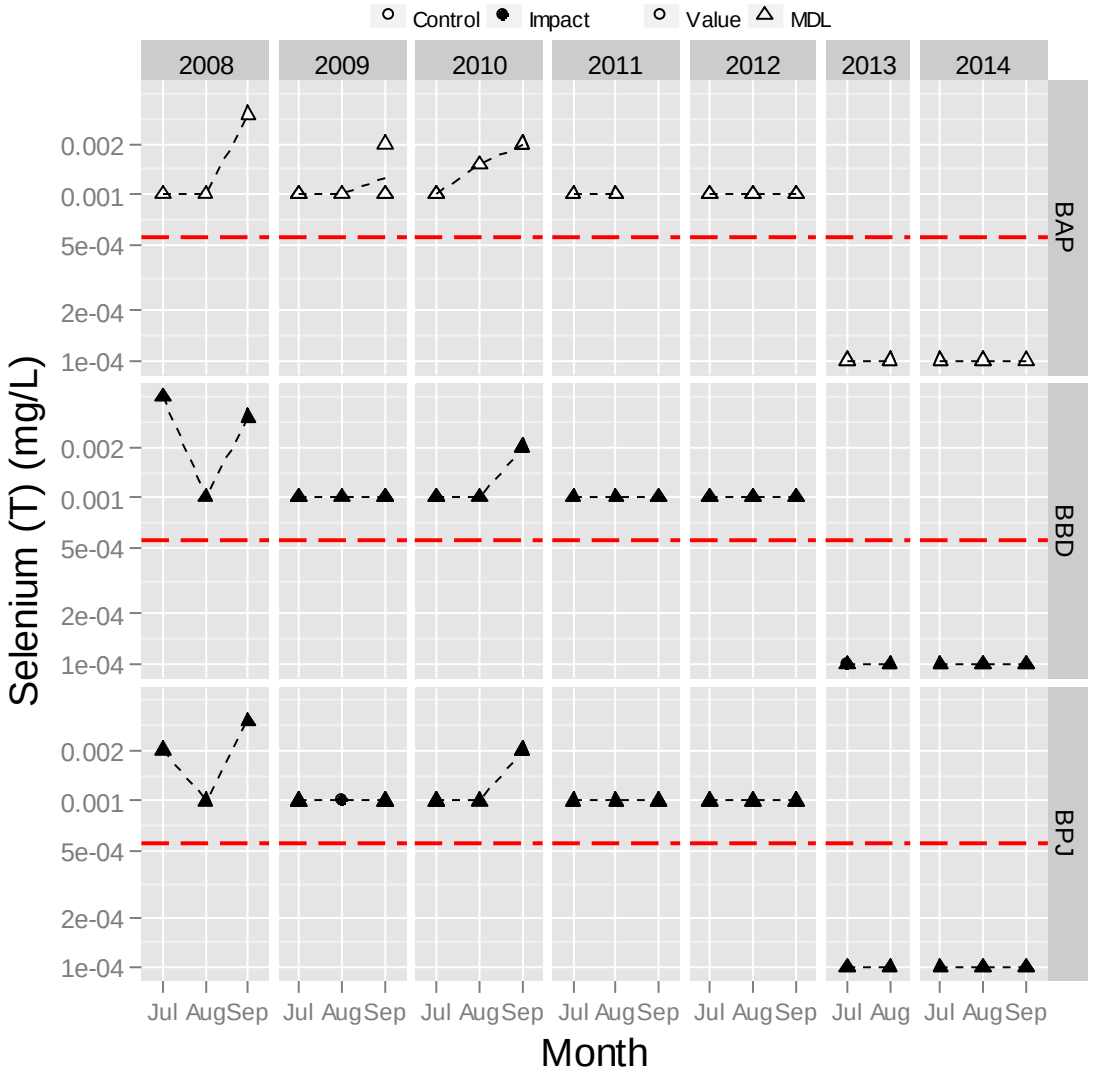

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Antimony (T) (mg/L)
0.01
0.005
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
Month

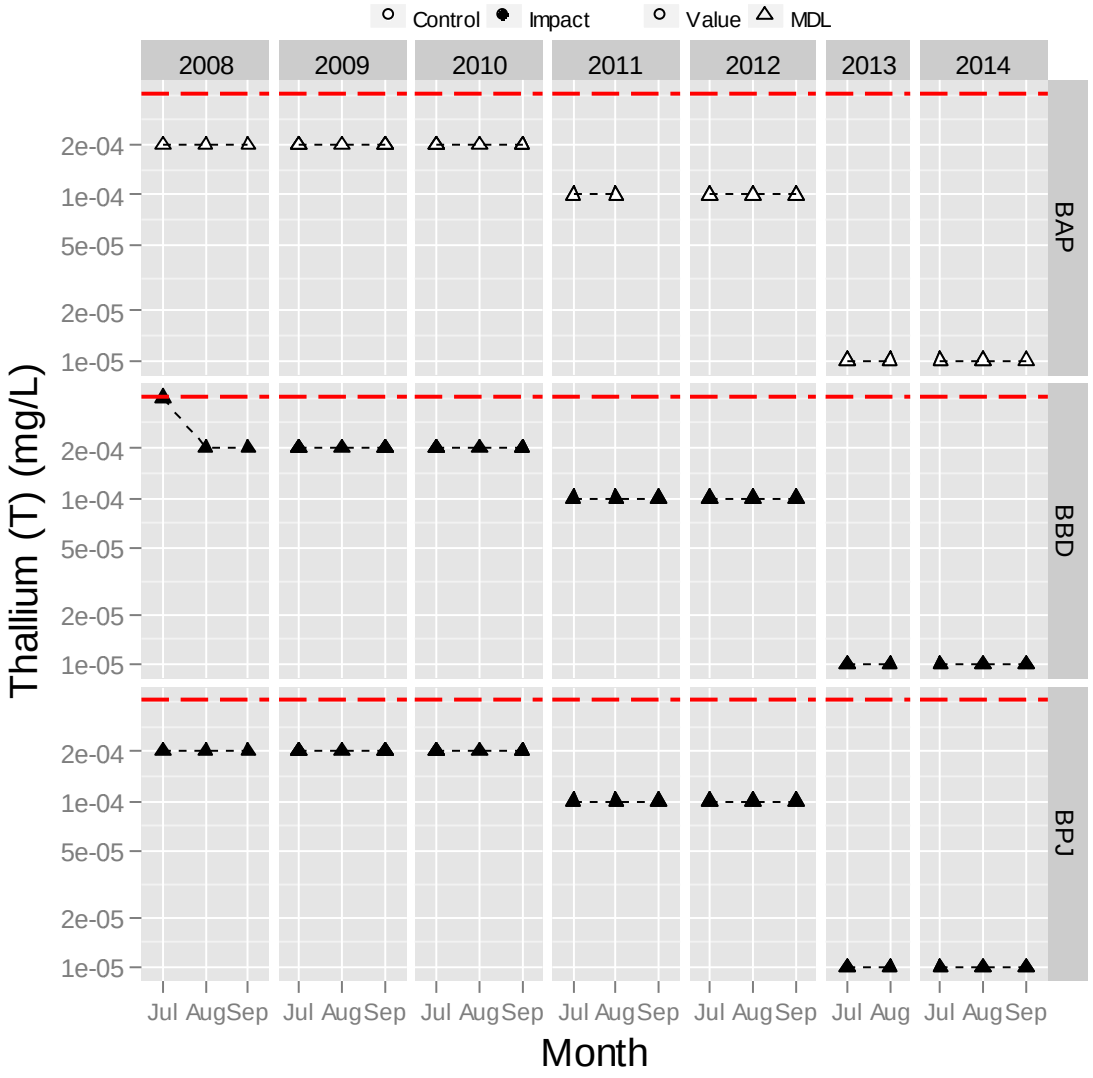

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Beryllium (T) (mg/L)
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
Month

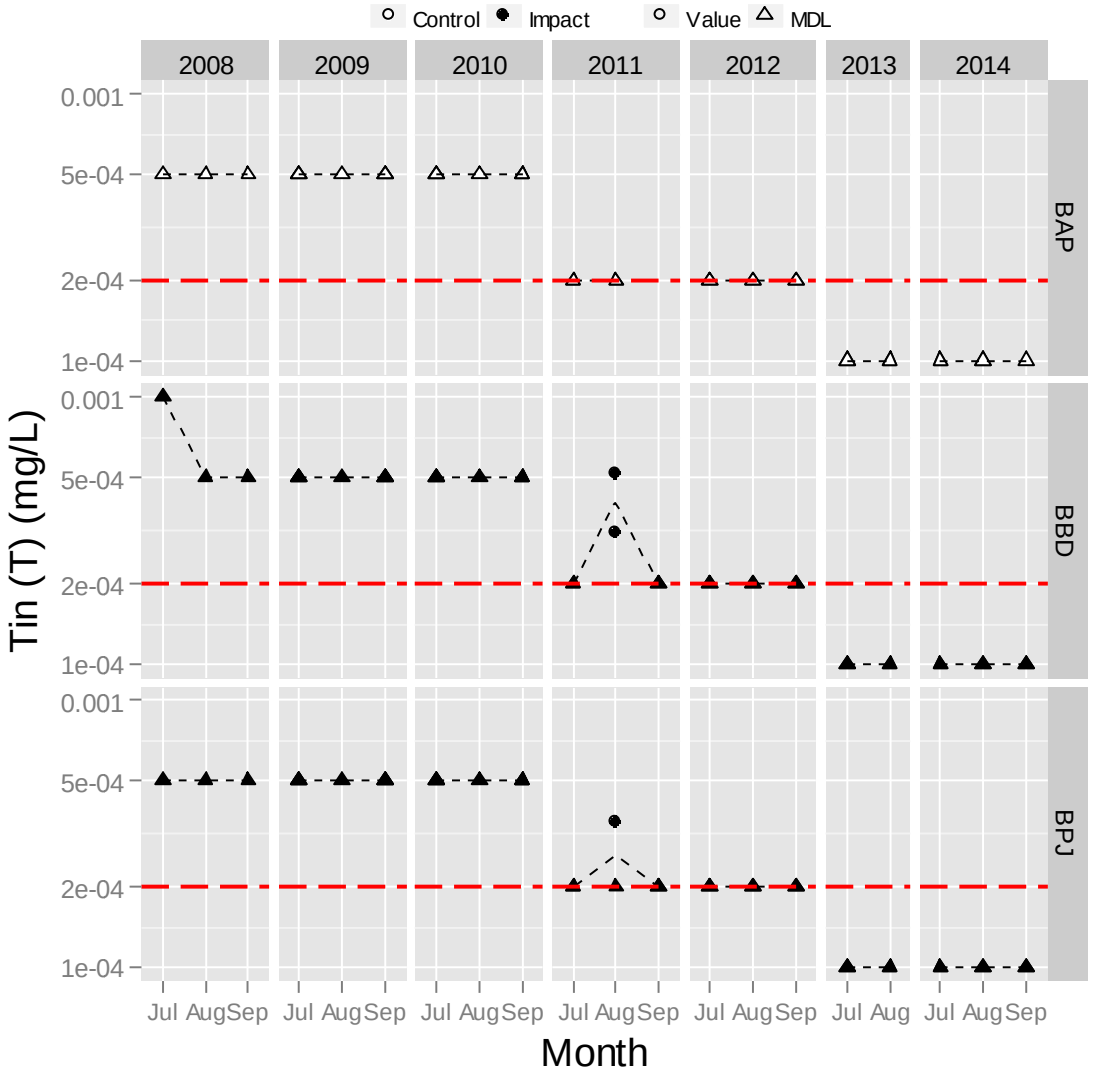

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
3e-05
2.5e-05
2e-05
1.5e-05
1e-05
Cadmium (T) (mg/L)
Jul
Aug
Sep
Month

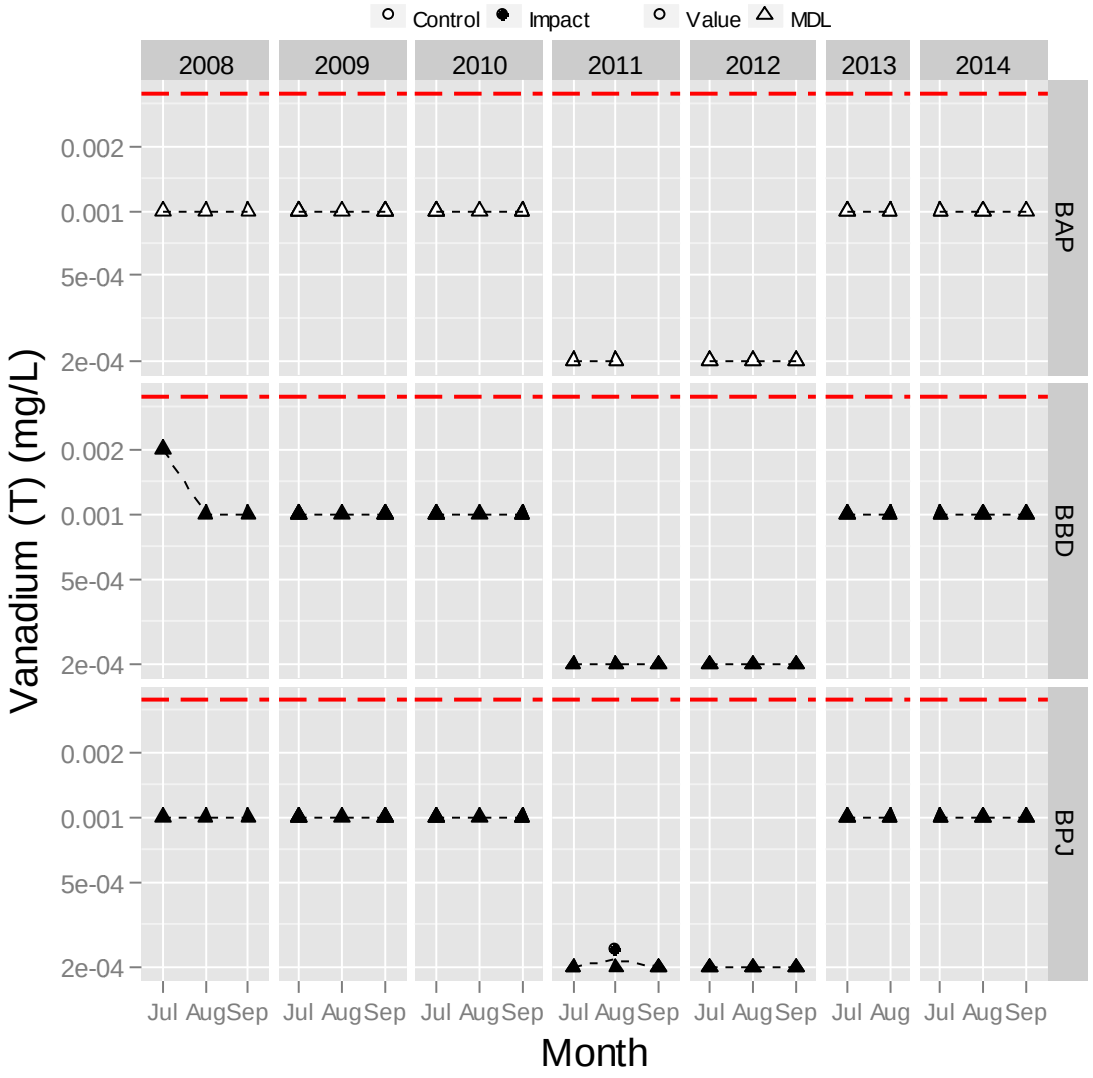

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
5e-05
4e-05
3e-05
2e-05
1e-05
Mercury (T) (mg/L)
Jul
Aug
Sep
Month

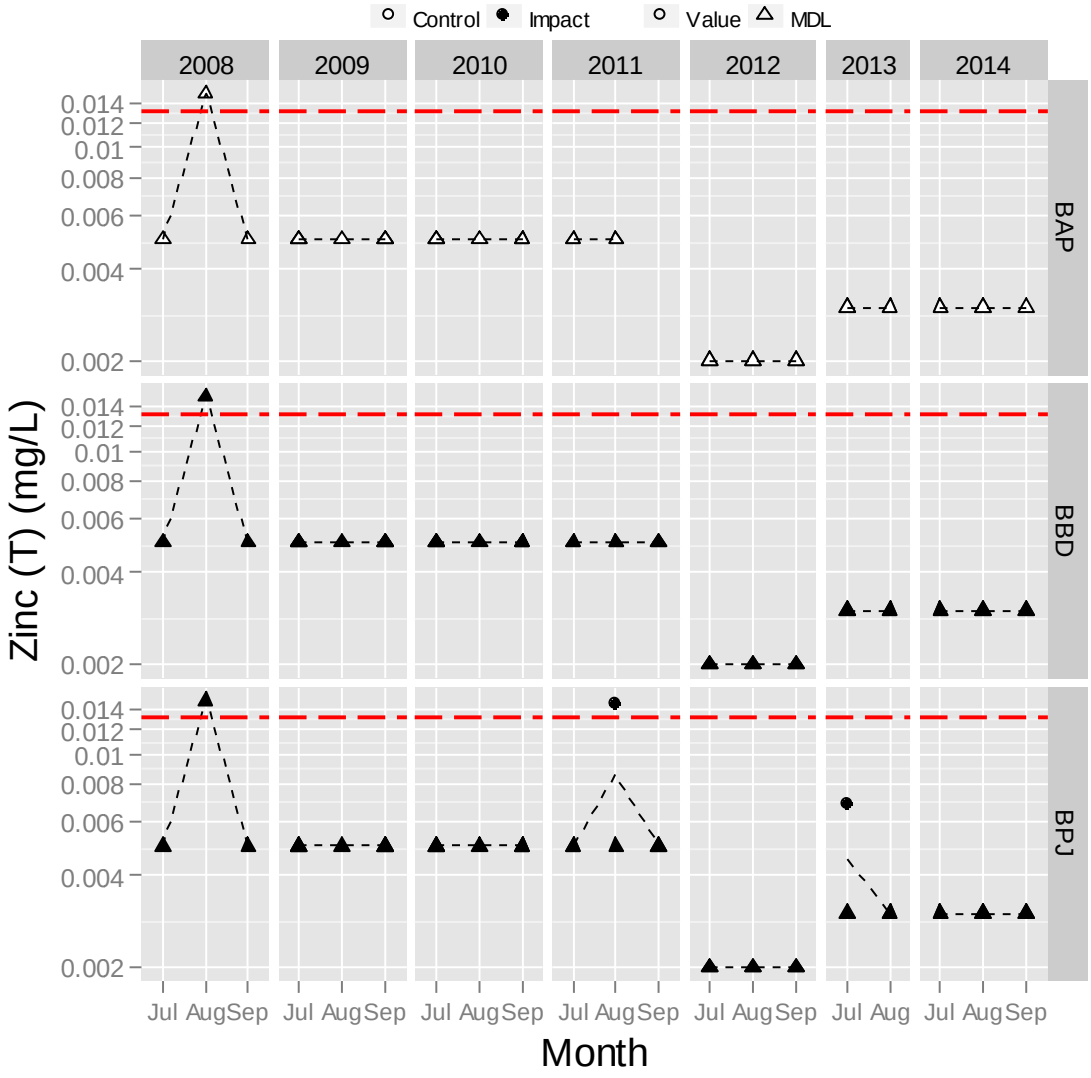

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Nickel (T) (mg/L)
0.01
0.005
0.002
0.001
5e-04
Jul
Aug
Sep
Month

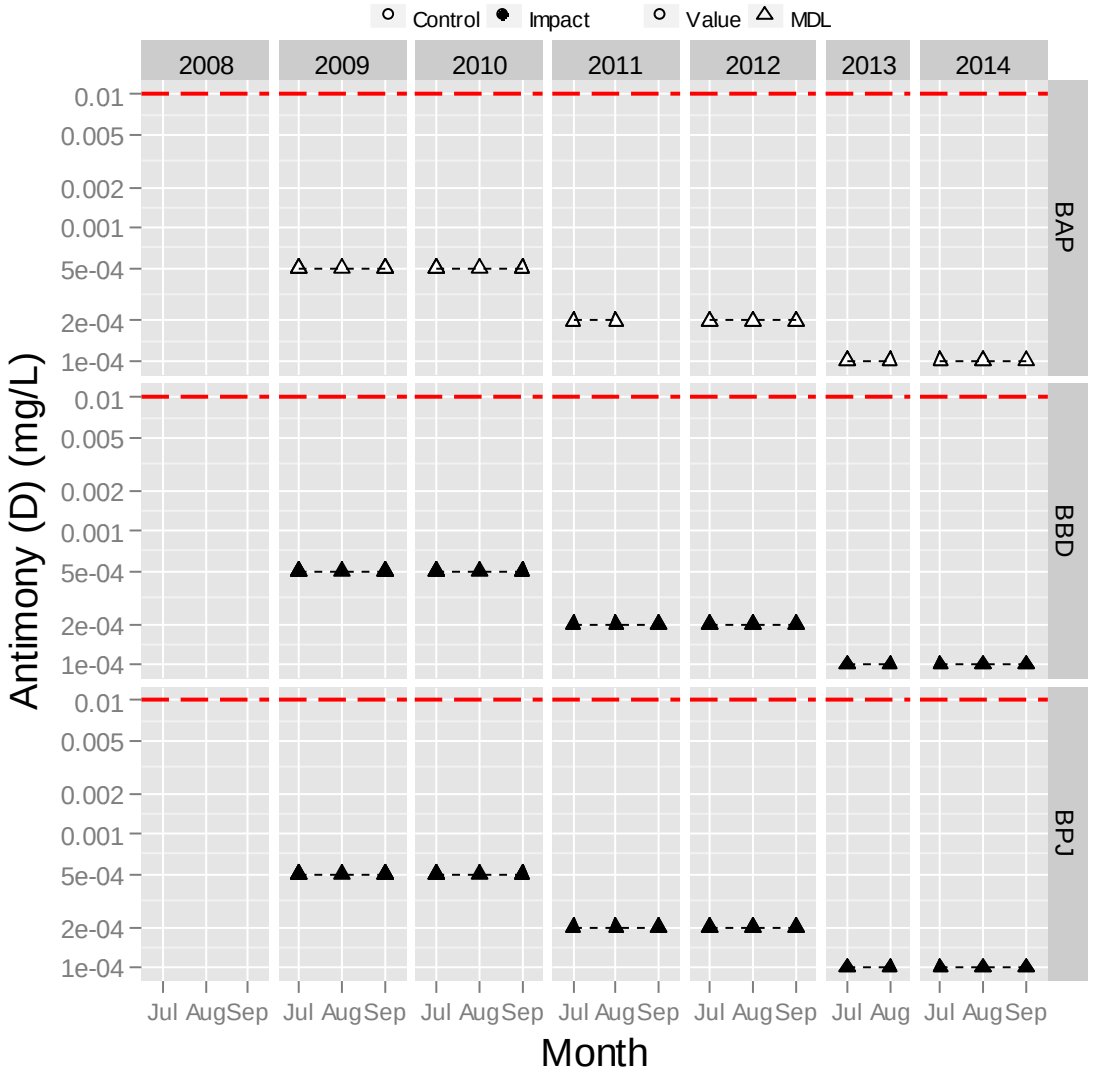

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Selenium (T) (mg/L)
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
Month

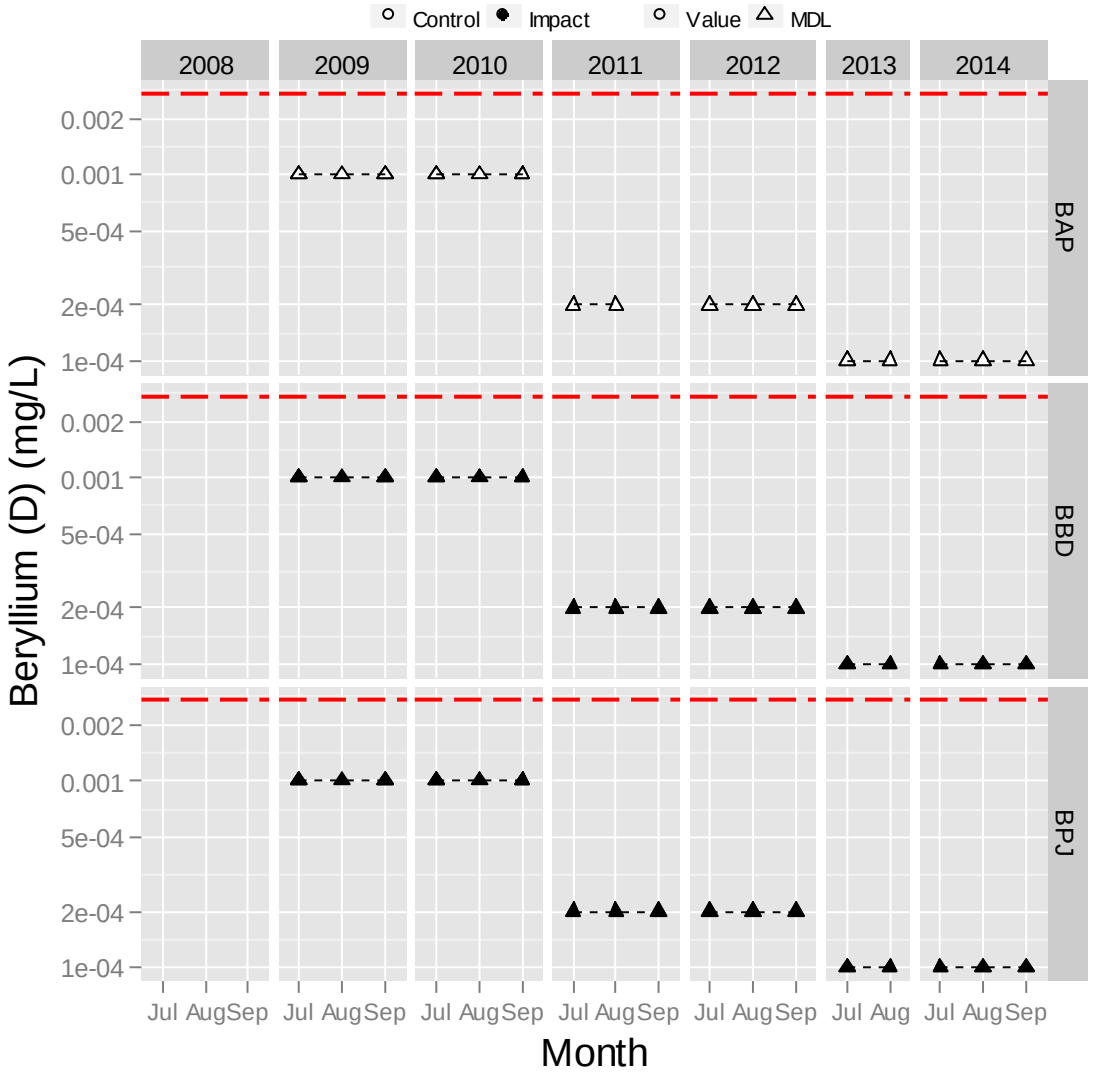

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Thallium (T) (mg/L)
2e-04
1e-04
5e-05
2e-05
1e-05
Jul
Aug
Sep
Month

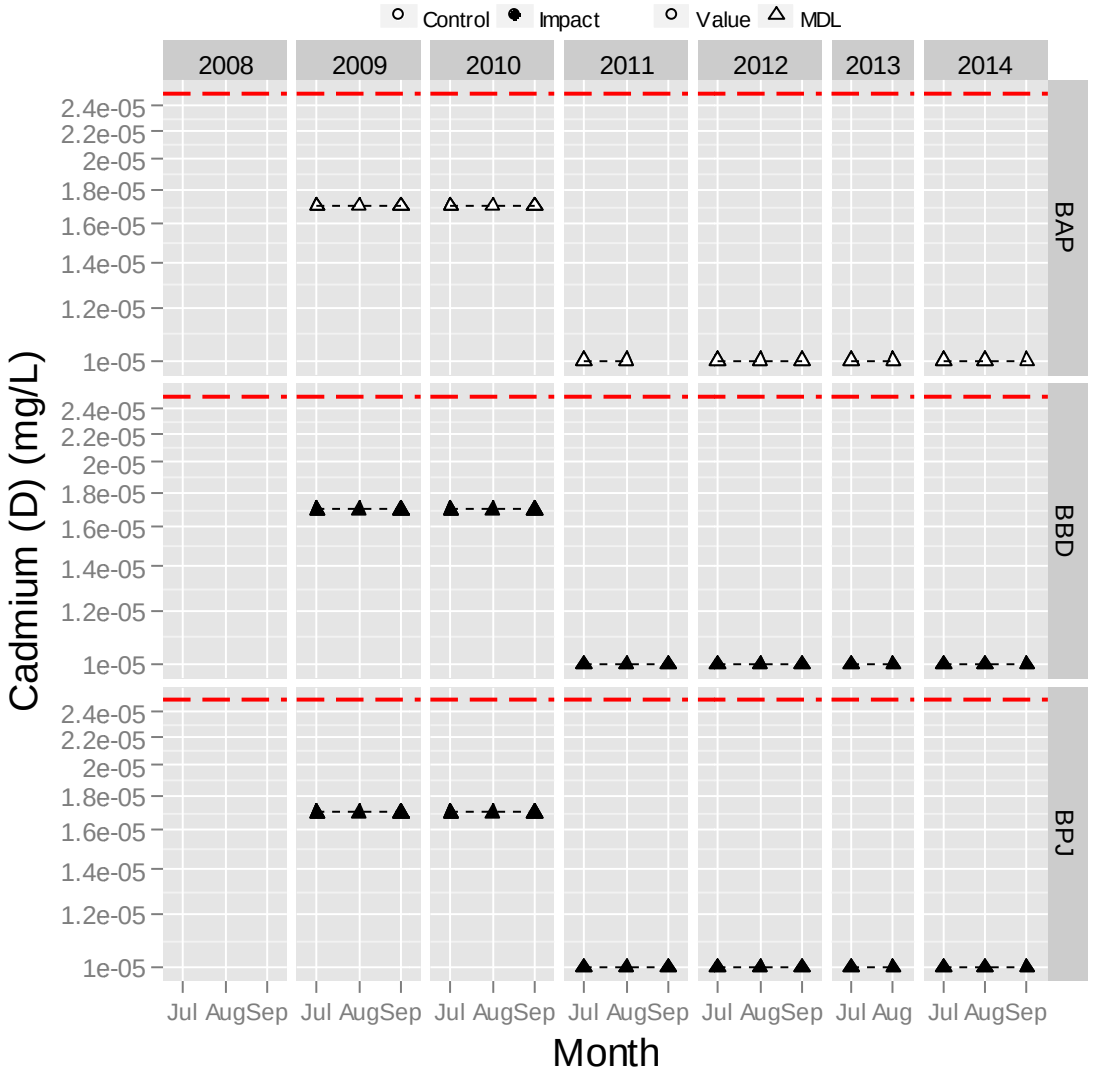

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
0.001
5e-04
2e-04
1e-04
Tin (T) (mg/L)
Jul
Aug
Sep
Month

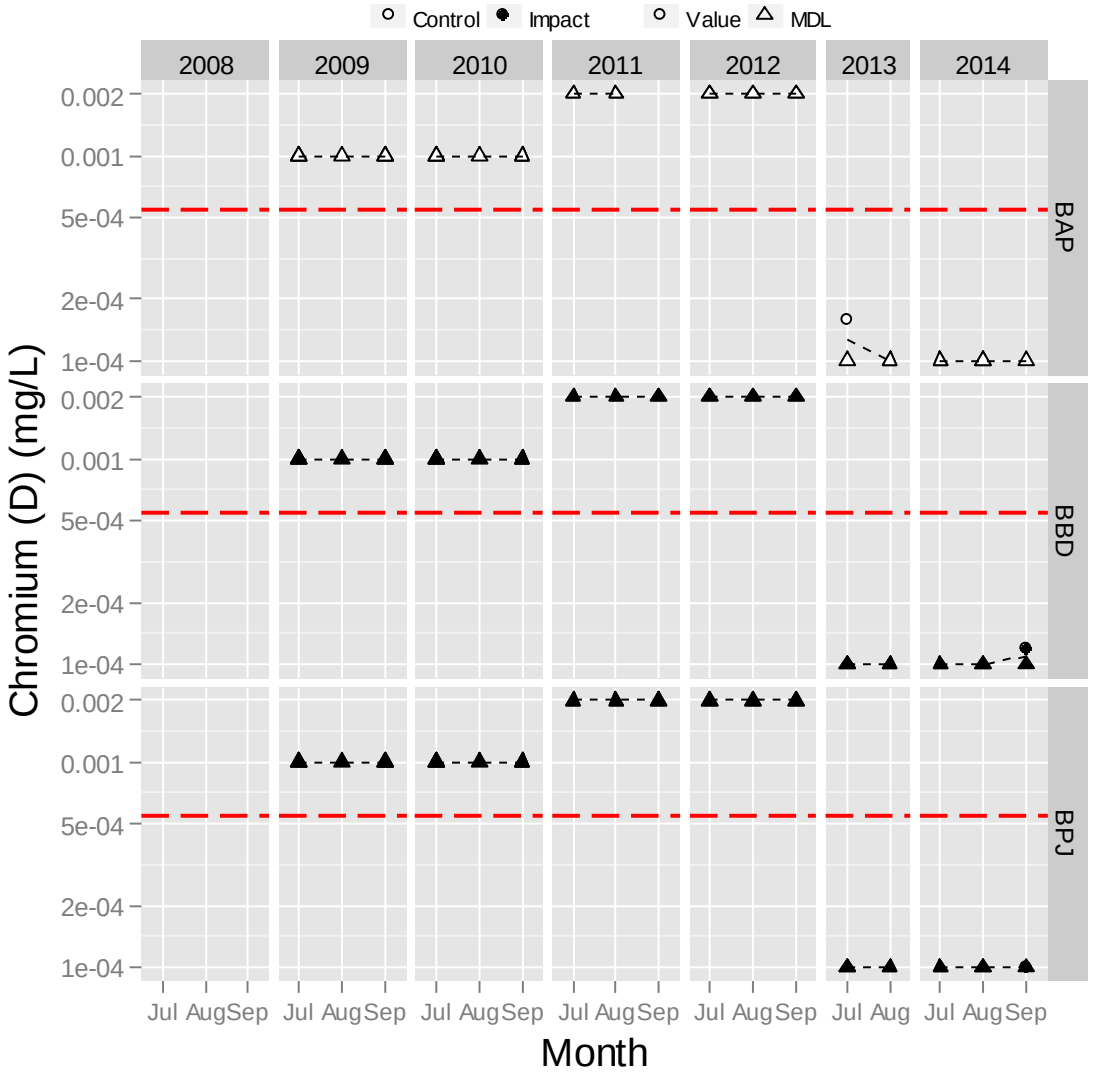

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
0.002
0.001
5e-04
2e-04
Vanadium (T) (mg/L)
Jul
Aug
Sep
Month

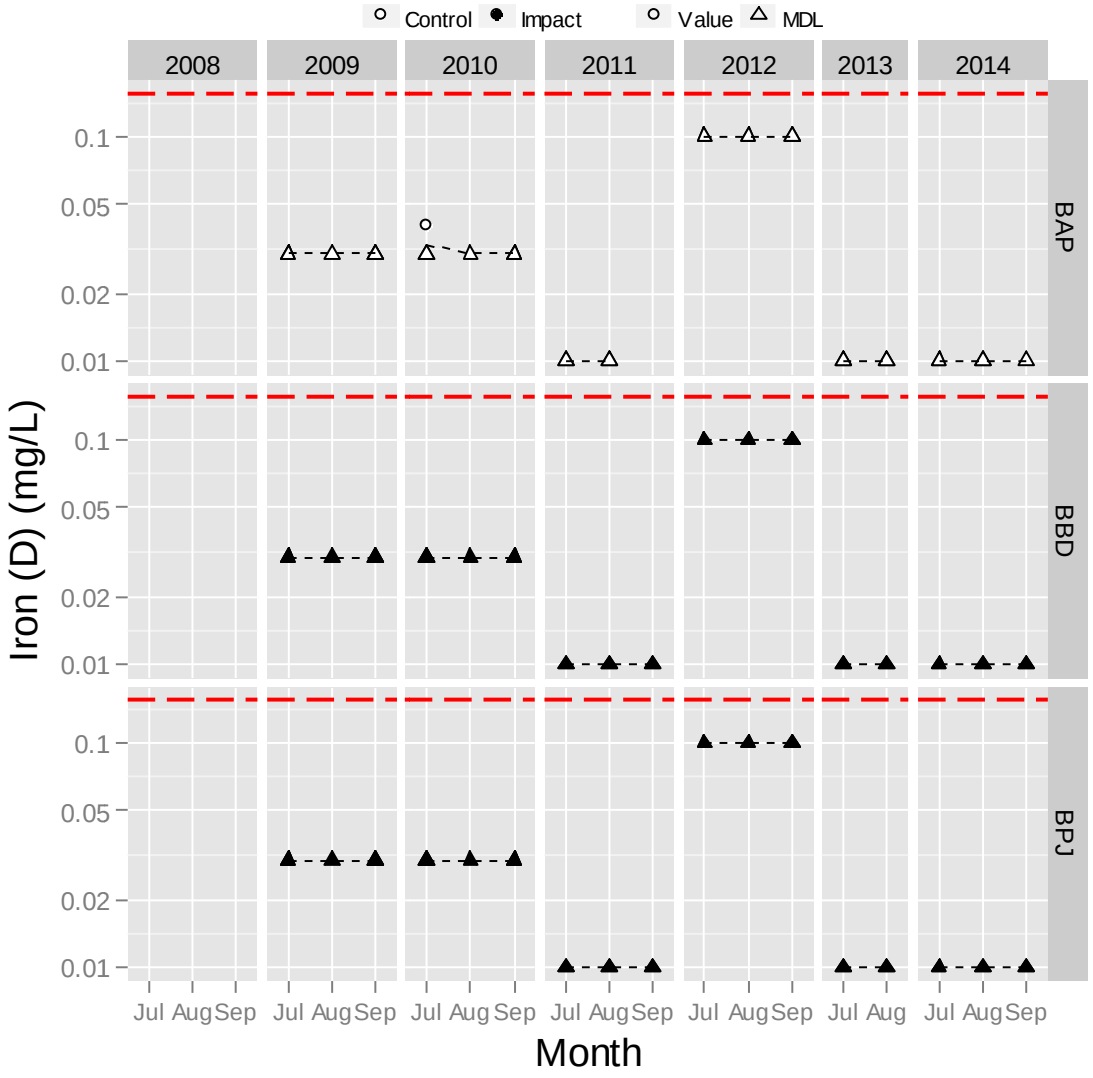

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Zinc (T) (mg/L)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
Jul
Aug
Sep
Month

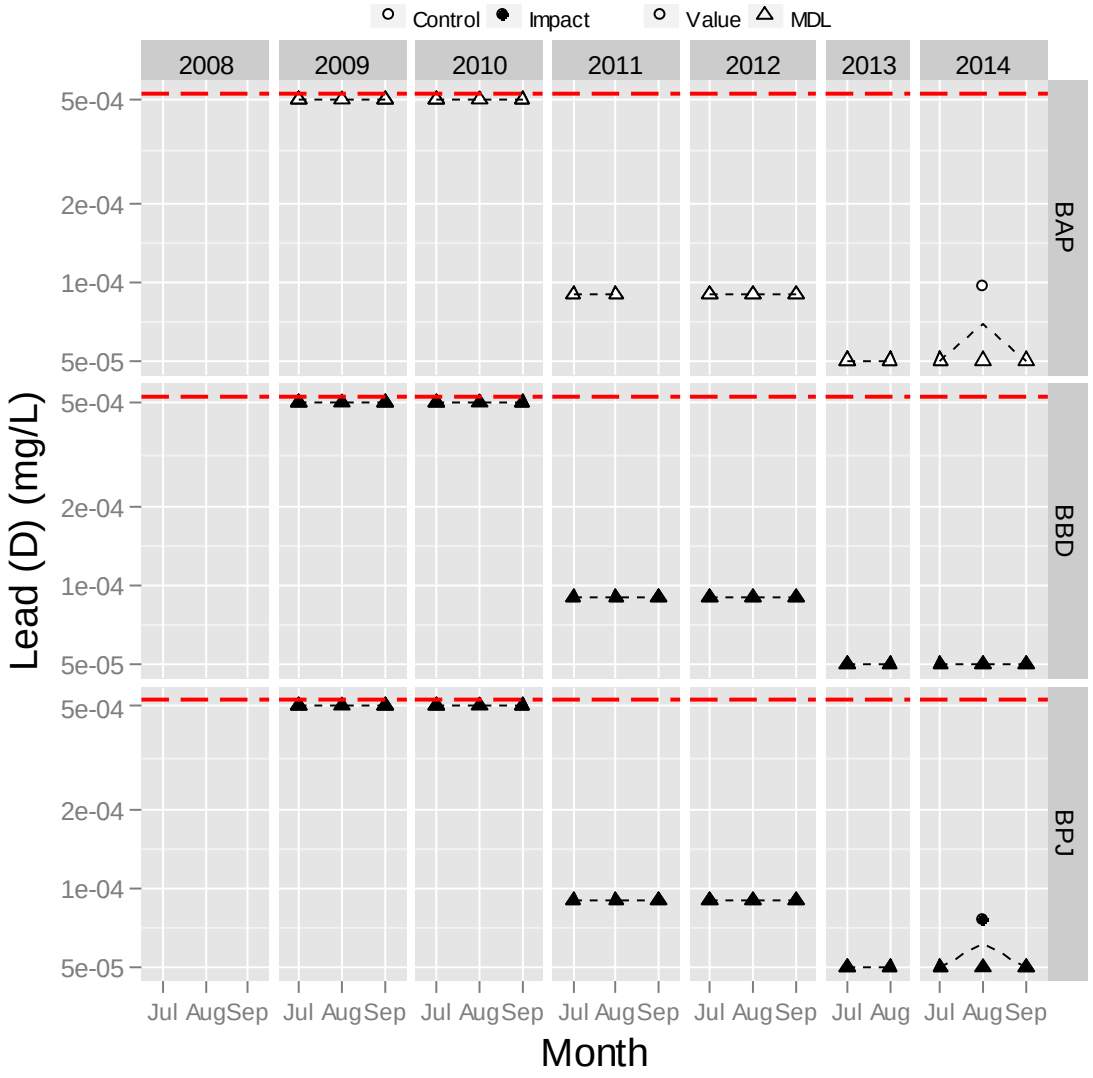

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Antimony (D) (mg/L)
0.01
0.005
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
Month

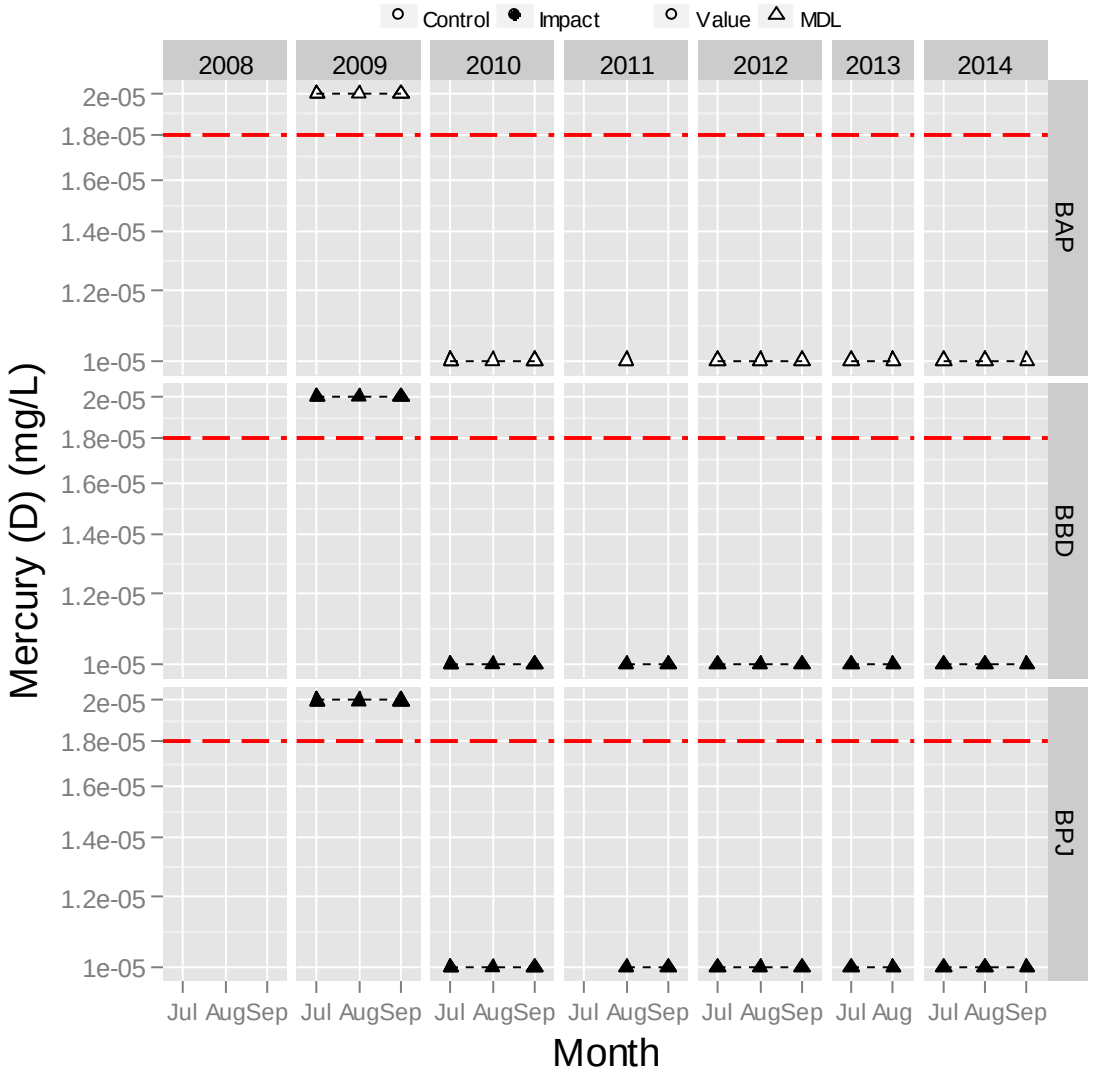

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Beryllium (D) (mg/L)
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
Month

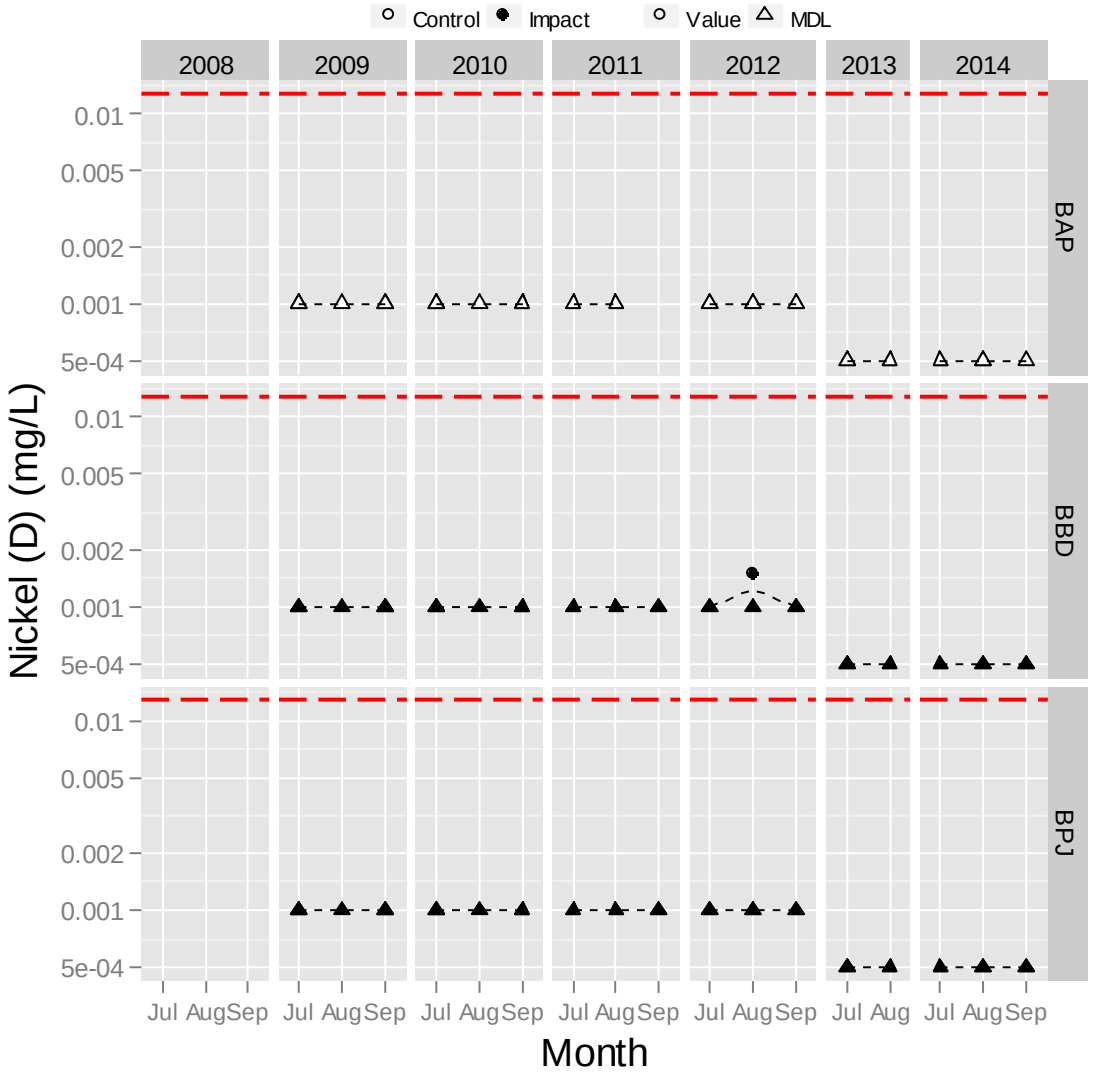

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
2.4e-05
2.2e-05
2e-05
1.8e-05
1.6e-05
1.4e-05
1.2e-05
1e-05
Cadmium (D) (mg/L)
Jul
Aug
Sep
Month

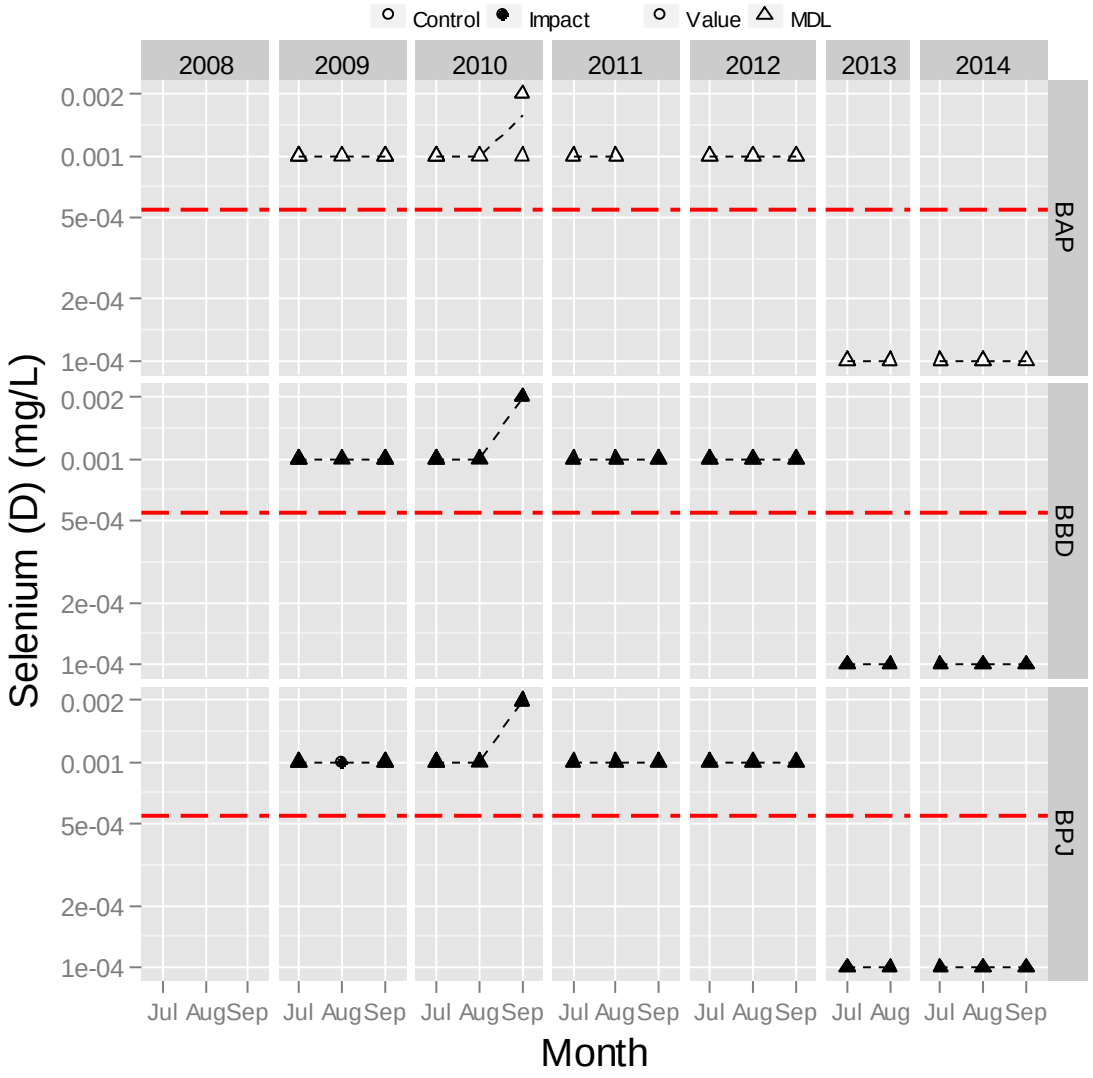

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Chromium (D) (mg/L)
0.002
0.001
5e-04
2e-04
1e-04
Jul
Aug
Sep
Month

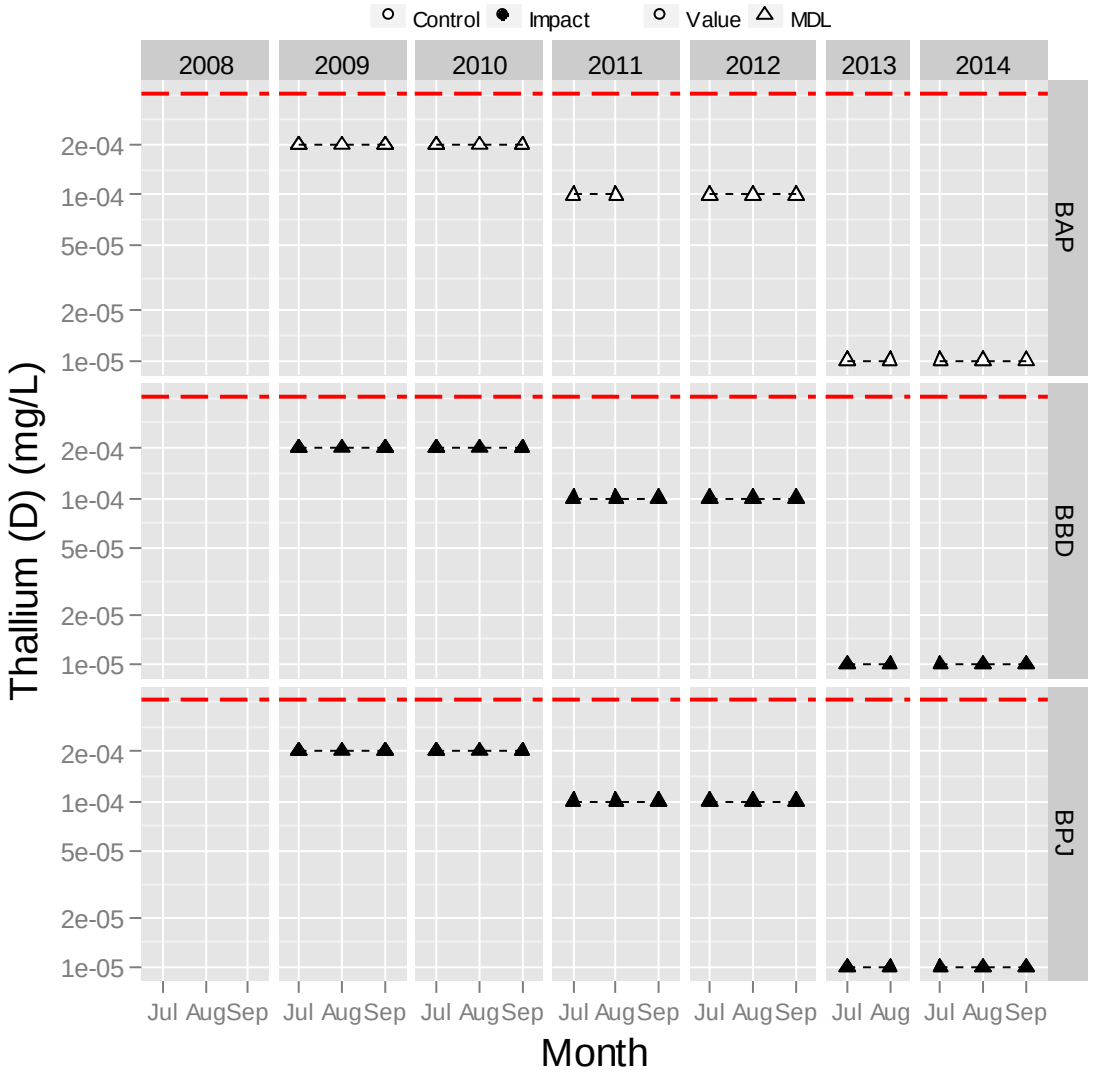

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
0.1
0.05
0.02
0.01
Iron (D) (mg/L)
Jul
Aug
Sep
Month

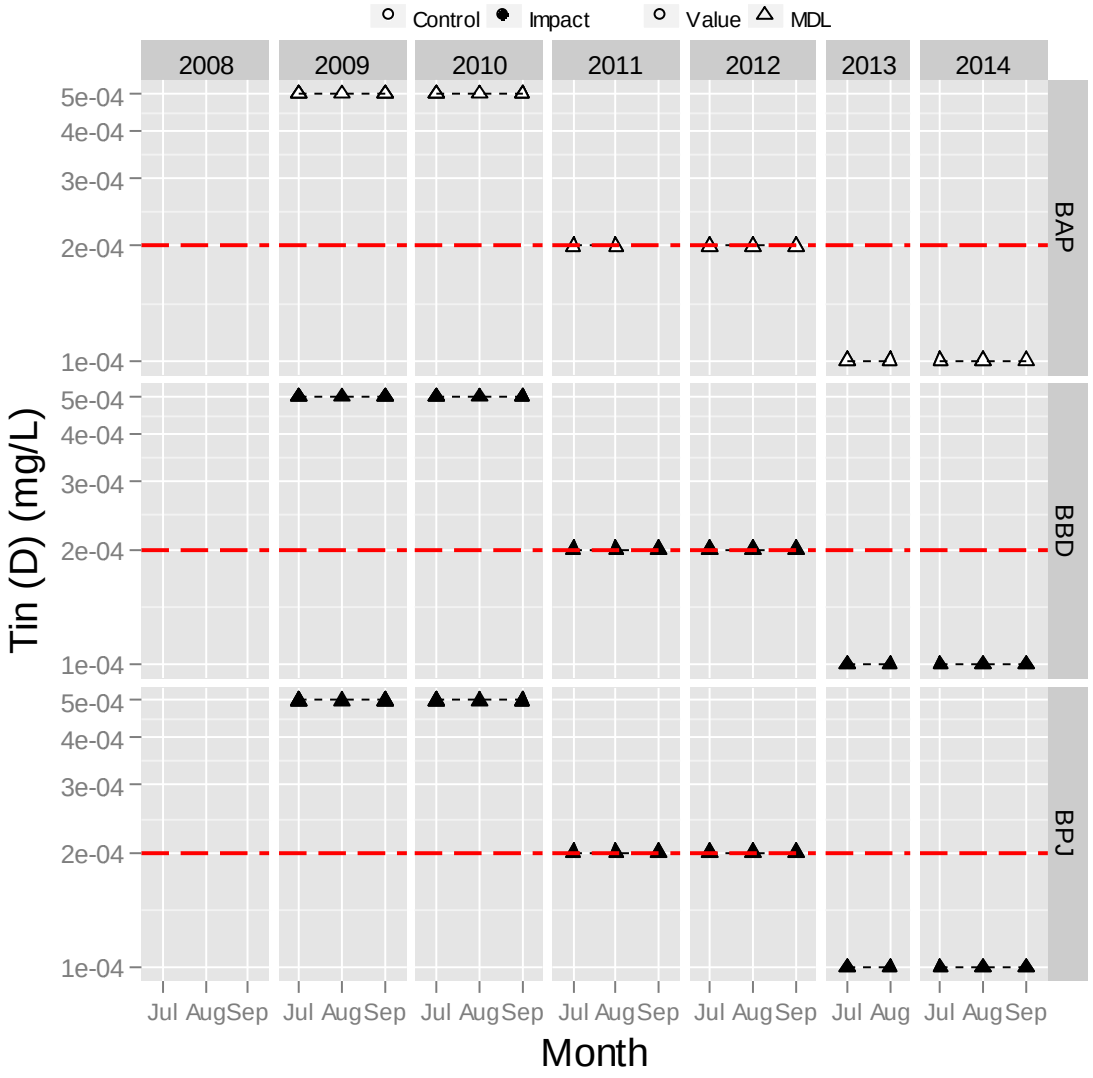

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Lead (D) (mg/L)
5e-04
2e-04
1e-04
5e-05
Jul
Aug
Sep
Month

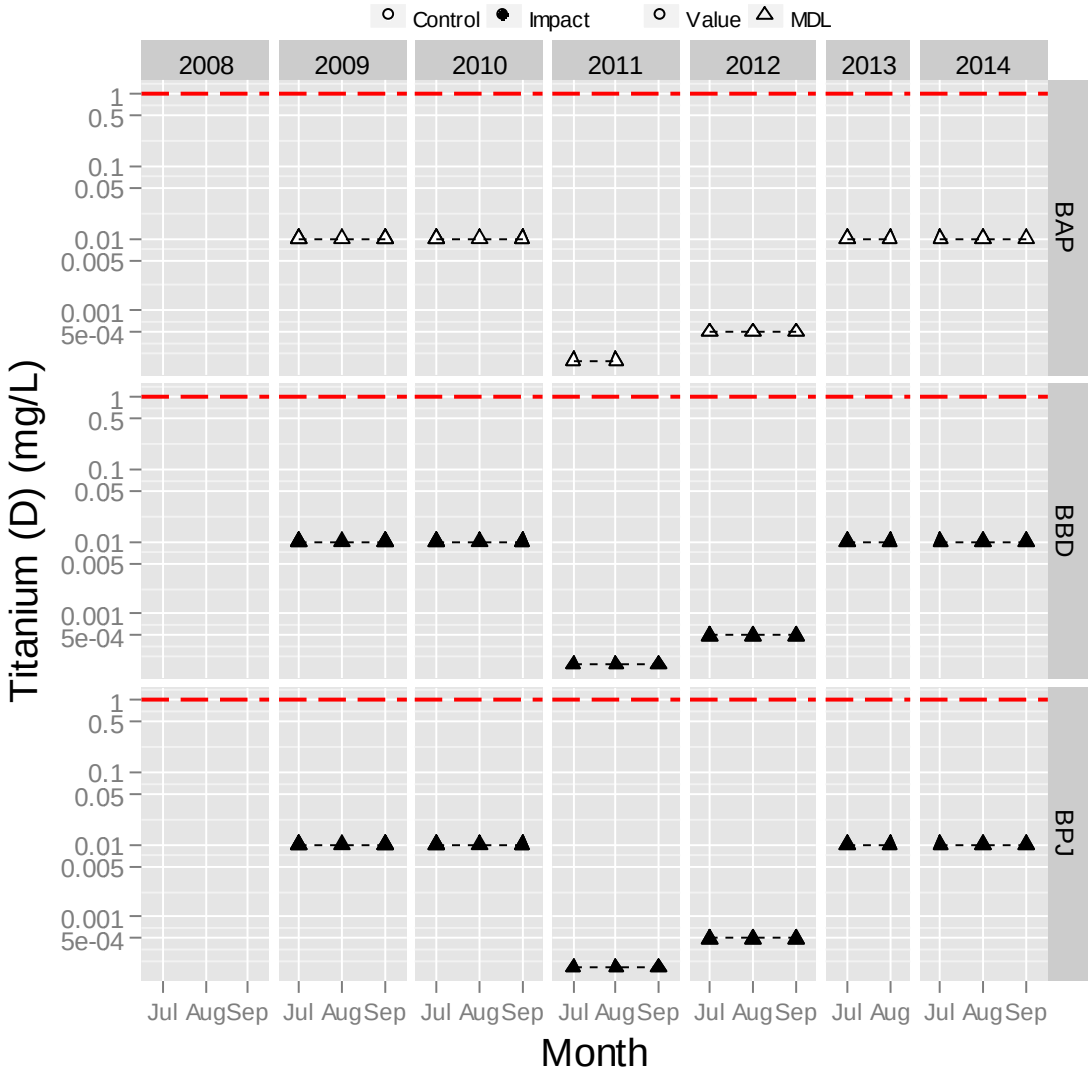

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Mercury (D) (mg/L)
2e-05
1.8e-05
1.6e-05
1.4e-05
1.2e-05
1e-05
Jul
Aug
Sep
Month

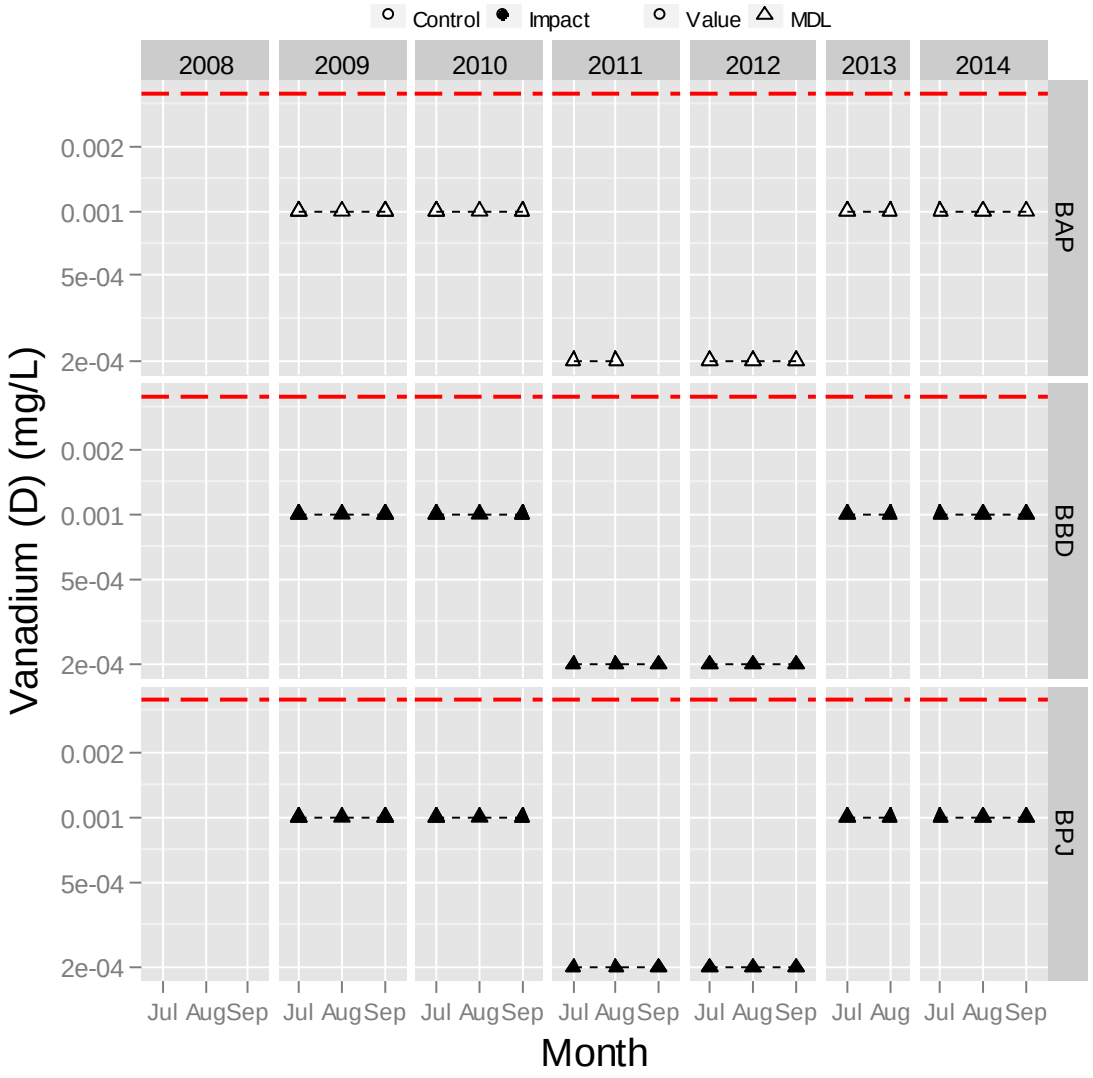

Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
0.01
0.005
0.002
0.001
5e-04
Nickel (D) (mg/L)
Jul
Aug
Sep
Month


Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
0.002
0.001
5e-04
2e-04
1e-04
Selenium (D) (mg/L)
Jul
Aug
Sep
Month


Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Thallium (D) (mg/L)
2e-04
1e-04
5e-05
2e-05
1e-05
Jul
Aug
Sep
Month


Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
5e-04
4e-04
3e-04
2e-04
1e-04
Tin (D) (mg/L)
Jul
Aug
Sep
Month


Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Titanium (D) (mg/L)
1
0.5
0.1
0.05
0.01
0.005
0.001
5e-04
Jul
Aug
Sep
Month


Control
Impact
Value
MDL
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
0.002
0.001
5e-04
2e-04
Vanadium (D) (mg/L)
Jul
Aug
Sep
Month

APPENDIX F

PRESENCE (+) / ABSENCE (-) MATRIX OF PHYTOPLANKTON SPECIES IN MEADOWBANK STUDY LAKES AND BAKER LAKE, 2014

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Baker Lake																
	Area-Replicate ID	BAP31S	BAP32S	BAP33S	BAP34S	BAP36S	BBD31S	BBD32S	BBD33S	BBD34S	BBD35S	BBD36S	BPJ31S	BPJ32S	BPJ33S	BPJ34S	BPJ35S	BPJ36S
Code	Species Name	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14
	Cyanophyte																	
1008	*Aphanocapsa sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1015	*Chroococcus turgidus (Kutzing) Nageli*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1024	*Woronichinia naegelianum (Unger) Elenk.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1026	*Merismopedia tenuissima Lemmermann*	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-
1033	*Rhabdogloea lineare Schmidle and Lauterborn*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*	-	-	+	+	+	-	-	+	-	+	+	+	-	+	+	+	+
1073	*Snowella sp*	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1089	*Cyanodictyon sp.*	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte																	
2100	*Pyramidomonas tetrarhynchus Schmarda*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*	+	+	+	+	+	+	+	+	-	+	+	+	+	+	-	+	+
2112	*Sphaerocystis schroeteri Chodat*	-	-	-	-	-	-	-	+	-	+	+	-	+	+	-	-	-
2121	*Oocystis lacustris Chodat*	+	+	-	+	-	+	+	+	+	+	+	+	+	+	+	-	+
2132	*Scenedesmus denticulatus Lagerhiem*	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
2137	*Dictyosphaerium simplex Sukja*	+	+	+	+	+	-	-	+	+	+	-	-	-	+	+	-	-
2138	*Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	+
2145	*Crucigenia quadrata Morr.*	-	-	-	-	+	-	-	+	+	-	-	+	+	+	+	+	+
2153	*Coelastrum morus W. and G.S. West*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2155	*Selenastrum minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2157	*Kichnerella lunaris (Kirchn.) Moeb.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
2167	*Elakatothrix gelatinosa Willen*	-	+	+	+	-	-	-	+	-	-	-	+	-	+	-	+	+
2171	*Closterium kuetzingii Brebisson*	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
2178	*Cosmarium sp.*	-	-	-	-	-	+	+	+	-	+	+	-	+	+	+	-	-
2182	*Euastrum spp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2183	*Euastrum sinuosum Lenorm.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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*	-	-	-	-	-	-	-	-	+	+	+	+	-	-	+	-	-
2204	*Ankyra judai (G.M. Smith) Fott*	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
2205	*Mougeotia sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii Kutzing*	-	-	-	-	-	-	+	+	+	+	+	-	-	-	-	-	-
2215	*Tetraedron caudatum (Corda) Hansgrig*	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2231	*Bulbochaete sp.*	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
2235	*Ankistrodesmus spiralis Lemmermann*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2247	*Oocystis gigas Archer*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2252	*Scenedesmus acutus Chodat*	+	+	-	-	-	+	+	-	-	-	-	+	+	-	-	-	-
2512	*Scenedesmus acuminatus Chodat*	-	-	+	+	+	-	-	+	+	-	-	-	-	+	+	-	+
	Chrysophyte																	
4351	*Small chrysophyceae*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
4355	*Chrysochromulina parva Lackey*	-	-	-	-	+	+	+	-	-	+	+	-	-	-	-	+	+
4357	*Chrysococcus sp.*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera Scherffel*	+	+	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-
4361	*Kephyrion boreale Skuja*	-	-	-	-	+	-	+	-	+	-	-	-	-	-	+	+	+
4362	*Kephyrion sp.*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********	-	-	+	-	-	+	+	+	-	+	-	+	-	-	-	+	-
4367	*Mallomonas duerrschmidtiae Siver, Hamer and Kling*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama (Asmund) Fott*	-	-	-	+	-	-	-	-	+	-	+	-	-	+	+	-	-
4369	*Mallomonas pseudocoronata Prescott*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos Asmund and Kristiansen*	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Baker Lake																
	Area-Replicate ID	BAP31S	BAP32S	BAP33S	BAP34S	BAP36S	BBD31S	BBD32S	BBD33S	BBD34S	BBD35S	BBD36S	BPJ31S	BPJ32S	BPJ33S	BPJ34S	BPJ35S	BPJ36S
Code	Species Name	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14	22-Jul-14	22-Jul-14	31-Aug-14	31-Aug-14	19-Sep-14	19-Sep-14
4372	*Mallomonas tonsurata Teiling and Krieger*	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei Lemmermann*	+	+	-	+	-	+	+	+	+	+	-	+	+	+	+	+	-
4381	*Dinobryon mucronutom Nygaard*	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	-	-
4383	*Dinobryon bavaricum Imhof*	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+
4384	*Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia Ehrenberg*	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	-	-
4390	*Dinobryon sociale Ehrenberg*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4391	*Dinobryon sociale v. stipitatum (Stein) Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+
4396	*Chrysolkos skuja (Nauwerck) Willen*	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
4400	*Ochromonas sp.*	-	-	+	+	+	-	-	-	-	+	-	-	-	+	+	-	+
4411	*Bitrichia chodatii (Reverdin) Chodat*	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
4413	*Chrysochromulina laurentiana Kling*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4414	*Stichogloea spp.*	-	+	+	-	-	-	-	+	-	-	-	-	+	-	+	-	+
4415	*Bicoeca lacustris Clark*	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima (Zach.) Lemmermann*	-	-	+	+	+	+	-	+	+	+	+	-	+	+	+	+	-
4436	*Dinobryon attenatum Hill*	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4448	*Rhizochrysis scherffelii Pascher*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4453	*Desmarella brachycalyx Skuja*	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diatom																	
5507	*Cyclotella stelligera Cleve and Grunow*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
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*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5540	*Aulacoseira italica v subarctica (O. Muller) Simonsen*	-	-	+	+	+	-	-	+	+	-	-	-	-	+	+	-	+
5551	*Cyclotella michiganiana Skvortzow*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica Eulenst.*	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	+	+
5743	*Aulocoseira ambigua (Grunow) Simonsen*	+	+	-	-	-	+	+	-	-	-	-	+	+	-	-	-	-
5881	*Diatoma elongatum Agardh*	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
	Cryptophyte																	
6554	*Rhodomonas minuta Skuja*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6558	*Cryptomonas erosa Ehrenberg*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6562	*Cryptomonas reflexa (Marsson) Skuja*	-	-	-	-	-	+	+	-	+	-	-	+	-	-	-	-	-
6565	*Cryptomonas rostratiformis Skuja*	-	-	-	-	-	+	+	-	-	+	-	-	+	-	-	-	-
6568	*Katablepharis ovalis Skuja*	+	+	+	+	+	+	+	-	+	+	+	+	+	-	+	+	+
	Dinoflagellate																	
7631	*Gymnodinium helveticum Penard*	-	-	+	+	-	+	-	-	-	-	+	+	-	-	-	-	-
7632	*Gymnodinium sp.*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7635	*Peridinium willei Huitfeldt-Kaas*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7639	*Peridinium pusillum (Penard) Lemmermann*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7641	*Peridinium aciculiferum Lemmermann*	+	+	-	-	-	+	+	-	-	-	-	+	+	-	-	-	+

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Innugugayualik Lake										Pipedream Lake					
	Area-Replicate ID	INUG58S	INUG59S	INUG60S	INUG61S	INUG62S	INUG63S	INUG64S	INUG65S	INUG66S	INUG67S	PDL31S	PDL32S	PDL33S	PDL34S	PDL35S	PDL36S
Code	Species Name	30-Jul-14	30-Jul-14	3-Sep-14	3-Sep-14	21-Sep-14	21-Sep-14	30-Nov-14	30-Nov-14	19-Dec-14	19-Dec-14	30-Jul-14	30-Jul-14	3-Sep-14	3-Sep-14	10-Sep-14	10-Sep-14
	Cyanophyte																
1008	*Aphanocapsa sp.*	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
1012	*Aphanothece sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1015	*Chroococcus turgidus (Kutzing) Nageli*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1024	*Woronichinia naegelianum (Unger) Elenk.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1026	*Merismopedia tenuissima Lemmermann*	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1033	*Rhabdogloea lineare Schmidle and Lauterborn*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*	+	+	-	+	-	-	-	-	-	-	+	+	+	+	+	+
1073	*Snowella sp*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
1089	*Cyanodictyon sp.*	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-
	Chlorophyte																
2100	*Pyramidomonas tetrarhynchus Schmarda*	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*	-	+	+	+	+	+	+	-	-	-	-	-	+	+	-	+
2112	*Sphaerocystis schroeteri Chodat*	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
2121	*Oocystis lacustris Chodat*	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
2132	*Scenedesmus denticulatus Lagerhiem*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex Sukja*	-	-	+	+	-	-	-	-	-	+	+	+	+	+	+	+
2138	*Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
2143	*Monoraphidium minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata Morr.*	-	-	+	+	+	-	-	-	-	+	-	-	+	-	-	-
2153	*Coelastrum morus W. and G.S. West*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2155	*Selenastrum minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2157	*Kichnerella lunaris (Kirchn.) Moeb.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa Willen*	+	+	+	-	+	+	+	+	-	+	-	-	+	+	+	+
2171	*Closterium kuetzingii Brebisson*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2178	*Cosmarium sp.*	+	-	+	+	-	-	+	-	-	-	-	-	-	+	-	-
2182	*Euastrum spp.*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2183	*Euastrum sinuosum Lenorm.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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*	-	-	+	+	-	-	-	-	-	-	+	+	+	+	+	+
2204	*Ankyra judai (G.M. Smith) Fott*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2205	*Mougeotia sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii Kutzing*	+	-	+	+	+	+	+	+	-	+	-	+	+	+	+	-
2215	*Tetraedron caudatum (Corda) Hansgrig*	-	+	-	-	-	-	-	-	-	-	+	+	+	+	-	+
2231	*Bulbochaete sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2235	*Ankistrodesmus spiralis Lemmermann*	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	+
2247	*Oocystis gigas Archer*	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2252	*Scenedesmus acutus Chodat*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus Chodat*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte																
4351	*Small chrysophyceae*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+
4355	*Chrysochromulina parva Lackey*	-	-	+	-	-	+	+	-	-	-	-	-	-	-	+	-
4357	*Chrysococcus sp.*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera Scherffel*	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+
4361	*Kephyrion boreale Skuja*	-	-	+	-	+	+	-	-	-	-	-	-	+	+	-	-
4362	*Kephyrion sp.*	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********	-	+	-	+	+	-	-	-	-	-	+	-	+	+	-	+
4367	*Mallomonas duerrschmidtiae Siver, Hamer and Kling*	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama (Asmund) Fott*	+	+	+	-	+	-	-	-	+	-	-	-	-	-	+	+
4369	*Mallomonas pseudocoronata Prescott*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos Asmund and Kristiansen*	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Innugugayualik Lake										Pipedream Lake					
	Area-Replicate ID	INUG58S	INUG59S	INUG60S	INUG61S	INUG62S	INUG63S	INUG64S	INUG65S	INUG66S	INUG67S	PDL31S	PDL32S	PDL33S	PDL34S	PDL35S	PDL36S
Code	Species Name	30-Jul-14	30-Jul-14	3-Sep-14	3-Sep-14	21-Sep-14	21-Sep-14	30-Nov-14	30-Nov-14	19-Dec-14	19-Dec-14	30-Jul-14	30-Jul-14	3-Sep-14	3-Sep-14	10-Sep-14	10-Sep-14
4372	*Mallomonas tonsurata Teiling and Krieger*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei Lemmermann*	-	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+
4381	*Dinobryon mucronutom Nygaard*	+	+	-	+	+	+	+	-	-	-	+	+	+	+	-	+
4383	*Dinobryon bavaricum Imhof*	+	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-
4384	*Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger*	+	+	+	+	+	+	+	+	-	-	-	-	-	+	-	-
4388	*Dinobryon sertularia Ehrenberg*	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+	+
4390	*Dinobryon sociale Ehrenberg*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4391	*Dinobryon sociale v. stipitatum (Stein) Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*	-	-	+	+	-	+	-	-	-	-	+	-	+	+	+	+
4396	*Chrysolkos skuja (Nauwerck) Willen*	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+
4400	*Ochromonas sp.*	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii (Reverdin) Chodat*	+	+	+	-	+	-	-	-	+	-	-	+	+	-	-	+
4413	*Chrysochromulina laurentiana Kling*	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+
4414	*Stichogloea spp.*	+	+	+	+	+	+	-	-	-	-	-	-	+	+	-	+
4415	*Bicoeca lacustris Clark*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima (Zach.) Lemmermann*	-	-	+	+	+	+	+	+	+	+	-	-	+	+	+	-
4436	*Dinobryon attenatum Hill*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4448	*Rhizochrysis scherffelii Pascher*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4453	*Desmarella brachycalyx Skuja*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diatom																
5507	*Cyclotella stelligera Cleve and Grunow*	+	+	+	-	+	+	+	+	+	-	+	+	+	+	+	+
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*	+	-	-	-	+	-	+	-	-	-	-	-	+	-	+	-
5540	*Aulacoseira italica v subarctica (O. Muller) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana Skvortzow*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica Eulenst.*	-	-	-	+	-	-	+	-	+	+	-	-	+	+	+	+
5743	*Aulocoseira ambigua (Grunow) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5881	*Diatoma elongatum Agardh*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cryptophyte																
6554	*Rhodomonas minuta Skuja*	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+
6558	*Cryptomonas erosa Ehrenberg*	+	-	+	+	+	+	-	+	-	+	+	+	+	+	+	+
6562	*Cryptomonas reflexa (Marsson) Skuja*	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	+
6565	*Cryptomonas rostratiformis Skuja*	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	+
6568	*Katablepharis ovalis Skuja*	+	+	+	+	+	+	+	-	-	-	+	+	+	-	+	+
	Dinoflagellate																
7631	*Gymnodinium helveticum Penard*	-	+	-	-	-	-	-	+	-	+	-	-	-	+	+	+
7632	*Gymnodinium sp.*	+	+	+	+	+	+	-	-	-	-	+	+	+	+	+	+
7635	*Peridinium willei Huitfeldt-Kaas*	-	-	-	-	-	-	-	+	-	+	-	+	-	-	-	+
7639	*Peridinium pusillum (Penard) Lemmermann*	+	-	+	+	+	+	+	+	-	-	-	+	+	+	+	+
7641	*Peridinium aciculiferum Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Second Portage Lake									
	Area-Replicate ID	SP70S	SP71S	SP72S	SP73S	SP74S	SP75S	SP76S	SP77S	SP78S	SP79S
Code	Species Name	19-Jul-14	19-Jul-14	27-Aug-14	27-Aug-14	15-Sep-14	15-Sep-14	2-Nov-14	2-Nov-14	18-Dec-14	18-Dec-14
	Cyanophyte										
1008	*Aphanocapsa sp.*	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus Lemmermann*	-	-	-	-	-	-	-	-	-	-
1015	*Chroococcus turgidus (Kutzing) Nageli*	-	-	-	-	+	-	-	-	-	-
1024	*Woronichinia naegelianum (Unger) Elenk.*	-	-	-	-	-	-	-	-	-	-
1026	*Merismopedia tenuissima Lemmermann*	-	-	-	-	-	-	-	-	-	-
1033	*Rhabdogloea lineare Schmidle and Lauterborn*	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*	+	+	-	+	-	-	-	+	-	-
1073	*Snowella sp*	-	-	-	-	-	+	-	-	-	-
1089	*Cyanodictyon sp.*	-	-	-	-	-	-	-	-	-	-
	Chlorophyte										
2100	*Pyramidomonas tetrarhynchus Schmarda*	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*	+	+	+	+	+	+	+	+	-	-
2112	*Sphaerocystis schroeteri Chodat*	-	+	+	-	-	-	-	-	-	-
2121	*Oocystis lacustris Chodat*	+	+	+	+	+	+	-	+	+	+
2132	*Scenedesmus denticulatus Lagerhiem*	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex Sukja*	+	+	+	+	+	+	+	-	-	-
2138	*Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	+	-
2143	*Monoraphidium minutum (Nag.) Komarkova-Legnerova*	-	-	+	+	-	-	-	-	-	-
2145	*Crucigenia quadrata Morr.*	-	-	-	-	-	-	-	-	-	-
2153	*Coelastrum morus W. and G.S. West*	-	-	-	-	-	-	-	-	-	-
2155	*Selenastrum minutum (Nag.) Komarkova-Legnerova*	+	-	-	-	-	-	-	-	-	-
2157	*Kichnerella lunaris (Kirchn.) Moeb.*	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa Willen*	+	+	+	-	+	+	+	+	-	-
2171	*Closterium kuetzingii Brebisson*	-	-	-	-	-	-	-	-	-	-
2178	*Cosmarium sp.*	-	-	-	-	-	-	-	-	-	-
2182	*Euastrum spp.*	-	+	+	-	-	+	-	-	-	-
2183	*Euastrum sinuosum Lenorm.*	-	-	-	-	-	-	-	-	-	-
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*	-	-	-	-	-	-	-	-	-	-
2204	*Ankyra judai (G.M. Smith) Fott*	-	-	-	-	-	-	-	-	-	-
2205	*Mougeotia sp.*	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii Kutzing*	+	+	+	+	+	+	-	-	-	-
2215	*Tetraedron caudatum (Corda) Hansgrig*	-	+	-	+	+	+	+	-	-	-
2231	*Bulbochaete sp.*	-	-	-	-	-	-	-	-	-	-
2235	*Ankistrodesmus spiralis Lemmermann*	+	-	+	+	+	+	+	+	-	-
2247	*Oocystis gigas Archer*	+	+	+	+	-	-	-	-	-	-
2252	*Scenedesmus acutus Chodat*	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus Chodat*	-	-	-	-	-	-	-	-	-	-
	Chrysophyte										
4351	*Small chrysophyceae*	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*	+	+	+	+	+	+	+	-	+	+
4355	*Chrysochromulina parva Lackey*	-	-	-	+	-	+	-	+	-	-
4357	*Chrysococcus sp.*	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera Scherffel*	-	-	-	-	+	-	+	-	-	-
4361	*Kephyrion boreale Skuja*	-	-	-	+	-	+	+	-	-	-
4362	*Kephyrion sp.*	+	+	+	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********	-	-	+	+	-	+	+	+	-	-
4367	*Mallomonas duerrschmidtiae Siver, Hamer and Kling*	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama (Asmund) Fott*	-	-	+	+	-	-	+	-	-	-
4369	*Mallomonas pseudocoronata Prescott*	-	-	+	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos Asmund and Kristiansen*	-	-	-	-	+	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Second Portage Lake									
	Area-Replicate ID	SP70S	SP71S	SP72S	SP73S	SP74S	SP75S	SP76S	SP77S	SP78S	SP79S
Code	Species Name	19-Jul-14	19-Jul-14	27-Aug-14	27-Aug-14	15-Sep-14	15-Sep-14	2-Nov-14	2-Nov-14	18-Dec-14	18-Dec-14
4372	*Mallomonas tonsurata Teiling and Krieger*	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei Lemmermann*	+	+	+	+	+	+	-	-	-	-
4381	*Dinobryon mucronutom Nygaard*	+	+	+	-	-	+	-	-	-	-
4383	*Dinobryon bavaricum Imhof*	-	-	-	-	-	-	-	-	-	-
4384	*Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger*	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia Ehrenberg*	+	+	-	-	-	-	-	-	+	-
4390	*Dinobryon sociale Ehrenberg*	+	+	+	+	+	+	+	+	-	-
4391	*Dinobryon sociale v. stipitatum (Stein) Lemmermann*	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*	-	-	-	-	-	-	-	-	-	-
4396	*Chrysolkos skuja (Nauwerck) Willen*	+	+	+	+	+	+	+	+	-	-
4400	*Ochromonas sp.*	-	-	-	+	-	-	-	+	-	-
4411	*Bitrichia chodatii (Reverdin) Chodat*	-	-	+	+	+	+	+	-	-	-
4413	*Chrysochromulina laurentiana Kling*	+	+	+	+	+	+	+	+	-	-
4414	*Stichogloea spp.*	+	+	-	+	+	+	-	-	-	-
4415	*Bicoeca lacustris Clark*	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima (Zach.) Lemmermann*	-	-	-	-	+	+	+	+	+	+
4436	*Dinobryon attenatum Hill*	-	+	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*	-	+	-	-	-	-	-	-	-	-
4448	*Rhizochrysis scherffelii Pascher*	-	-	-	-	-	-	-	-	-	-
4453	*Desmarella brachycalyx Skuja*	-	-	-	-	-	-	-	-	-	-
	Diatom										
5507	*Cyclotella stelligera Cleve and Grunow*	+	+	+	+	+	+	+	+	+	+
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*	-	-	-	+	-	+	-	+	-	-
5540	*Aulacoseira italica v subarctica (O. Muller) Simonsen*	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana Skvortzow*	+	+	+	+	+	+	+	+	+	-
5720	*Cyclotella bodanica Eulenst.*	+	+	+	+	-	+	-	-	-	-
5743	*Aulocoseira ambigua (Grunow) Simonsen*	-	-	-	-	-	-	-	-	-	-
5881	*Diatoma elongatum Agardh*	-	-	-	-	-	-	-	-	-	-
	Cryptophyte										
6554	*Rhodomonas minuta Skuja*	+	+	+	+	+	+	+	+	-	-
6558	*Cryptomonas erosa Ehrenberg*	+	+	+	+	+	+	+	+	+	+
6562	*Cryptomonas reflexa (Marsson) Skuja*	+	+	+	+	+	+	+	-	-	-
6565	*Cryptomonas rostratiformis Skuja*	+	+	-	+	+	+	-	-	-	-
6568	*Katablepharis ovalis Skuja*	+	+	+	-	+	-	+	+	-	-
	Dinoflagellate										
7631	*Gymnodinium helveticum Penard*	+	+	+	-	-	-	-	+	-	-
7632	*Gymnodinium sp.*	+	+	-	+	+	+	-	+	+	-
7635	*Peridinium willei Huitfeldt-Kaas*	-	-	-	-	-	-	-	+	+	-
7639	*Peridinium pusillum (Penard) Lemmermann*	+	+	-	+	+	-	+	+	-	-
7641	*Peridinium aciculiferum Lemmermann*	-	-	+	-	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Tehek Lake										Tehek Lake - Farfield					
	Area-Replicate ID	TE70S	TE71S	TE72S	TE73S	TE74S	TE75S	TE76S	TE77S	TE78S	TE79S	TEFF31S	TEFF32S	TEFF33S	TEFF34S	TEFF35S	TEFF36S
Code	Species Name	30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14	28-Nov-14	28-Nov-14	20-Dec-14	20-Dec-14	30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14
	Cyanophyte																
1008	*Aphanocapsa sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1015	*Chroococcus turgidus (Kutzing) Nageli*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1024	*Woronichinia naegelianum (Unger) Elenk.*	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-
1026	*Merismopedia tenuissima Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1033	*Rhabdogloea lineare Schmidle and Lauterborn*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+
1073	*Snowella sp*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1089	*Cyanodictyon sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte																
2100	*Pyramidomonas tetrarhynchus Schmarda*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*	+	+	+	+	+	+	+	+	+	-	+	+	-	+	+	+
2112	*Sphaerocystis schroeteri Chodat*	-	+	-	+	-	-	-	-	-	+	-	-	+	-	-	-
2121	*Oocystis lacustris Chodat*	-	+	+	+	-	+	+	-	+	+	+	+	+	+	-	-
2132	*Scenedesmus denticulatus Lagerhiem*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex Sukja*	+	+	+	+	-	+	-	-	-	-	+	+	-	+	+	-
2138	*Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2145	*Crucigenia quadrata Morr.*	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
2153	*Coelastrum morus W. and G.S. West*	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
2155	*Selenastrum minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2157	*Kichnerella lunaris (Kirchn.) Moeb.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa Willen*	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+
2171	*Closterium kuetzingii Brebisson*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2178	*Cosmarium sp.*	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
2182	*Euastrum spp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2183	*Euastrum sinuosum Lenorm.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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*	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+
2204	*Ankyra judai (G.M. Smith) Fott*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2205	*Mougeotia sp.*	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii Kutzing*	-	+	-	+	+	-	+	-	+	-	+	-	+	+	+	-
2215	*Tetraedron caudatum (Corda) Hansgrig*	-	+	+	+	-	+	-	-	-	-	+	+	-	+	+	-
2231	*Bulbochaete sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2235	*Ankistrodesmus spiralis Lemmermann*	-	+	+	+	+	+	-	-	-	-	-	-	+	+	+	+
2247	*Oocystis gigas Archer*	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2252	*Scenedesmus acutus Chodat*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus Chodat*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chrysophyte																
4351	*Small chrysophyceae*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*	+	+	+	+	-	-	+	+	-	-	+	+	+	+	+	+
4355	*Chrysochromulina parva Lackey*	-	-	+	-	-	+	-	-	-	-	-	-	+	+	-	-
4357	*Chrysococcus sp.*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera Scherffel*	-	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-
4361	*Kephyrion boreale Skuja*	-	-	-	+	+	+	-	+	-	-	-	-	+	+	+	+
4362	*Kephyrion sp.*	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********	+	+	+	+	-	+	-	-	-	-	-	+	+	+	-	+
4367	*Mallomonas duerrschmidtiae Siver, Hamer and Kling*	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-
4368	*Mallomonas crassisquama (Asmund) Fott*	+	-	+	+	-	+	-	-	-	-	-	+	-	-	-	-
4369	*Mallomonas pseudocoronata Prescott*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos Asmund and Kristiansen*	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Tehek Lake										Tehek Lake - Farfield					
	Area-Replicate ID	TE70S	TE71S	TE72S	TE73S	TE74S	TE75S	TE76S	TE77S	TE78S	TE79S	TEFF31S	TEFF32S	TEFF33S	TEFF34S	TEFF35S	TEFF36S
Code	Species Name	30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14	28-Nov-14	28-Nov-14	20-Dec-14	20-Dec-14	30-Jul-14	30-Jul-14	30-Aug-14	30-Aug-14	14-Sep-14	14-Sep-14
4372	*Mallomonas tonsurata Teiling and Krieger*	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-
4378	*Dinobryon borgei Lemmermann*	+	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+
4381	*Dinobryon mucronutom Nygaard*	+	+	+	+	+	+	-	-	-	-	+	+	+	+	+	-
4383	*Dinobryon bavaricum Imhof*	+	-	-	-	+	+	-	-	-	-	-	+	-	-	+	+
4384	*Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger*	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
4388	*Dinobryon sertularia Ehrenberg*	+	+	+	+	-	-	-	-	-	-	+	+	-	-	+	-
4390	*Dinobryon sociale Ehrenberg*	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+
4391	*Dinobryon sociale v. stipitatum (Stein) Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*	-	-	-	-	-	-	-	-	-	-	+	-	+	+	-	-
4396	*Chrysolkos skuja (Nauwerck) Willen*	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+
4400	*Ochromonas sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii (Reverdin) Chodat*	-	+	+	+	-	+	-	-	-	-	+	-	+	+	+	+
4413	*Chrysochromulina laurentiana Kling*	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+
4414	*Stichogloea spp.*	+	+	+	+	+	+	+	+	-	-	+	-	+	+	+	-
4415	*Bicoeca lacustris Clark*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima (Zach.) Lemmermann*	-	-	+	+	+	+	-	-	+	-	-	-	-	-	-	+
4436	*Dinobryon attenatum Hill*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
4448	*Rhizochrysis scherffelii Pascher*	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
4453	*Desmarella brachycalyx Skuja*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diatom																
5507	*Cyclotella stelligera Cleve and Grunow*	+	+	+	+	+	+	+	-	+	+	+	+	-	+	+	+
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*	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica v subarctica (O. Muller) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana Skvortzow*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica Eulenst.*	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
5743	*Aulocoseira ambigua (Grunow) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5881	*Diatoma elongatum Agardh*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cryptophyte																
6554	*Rhodomonas minuta Skuja*	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
6558	*Cryptomonas erosa Ehrenberg*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6562	*Cryptomonas reflexa (Marsson) Skuja*	+	+	+	+	+	+	+	+	-	-	+	+	-	-	-	-
6565	*Cryptomonas rostratiformis Skuja*	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-
6568	*Katablepharis ovalis Skuja*	+	+	-	+	+	+	-	+	-	-	+	-	+	-	-	-
	Dinoflagellate																
7631	*Gymnodinium helveticum Penard*	+	-	-	-	+	-	-	-	-	-	+	-	+	+	+	-
7632	*Gymnodinium sp.*	+	+	+	+	+	-	-	+	-	-	+	+	+	+	+	+
7635	*Peridinium willei Huitfeldt-Kaas*	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
7639	*Peridinium pusillum (Penard) Lemmermann*	+	+	+	+	+	+	-	-	-	-	+	+	+	+	-	+
7641	*Peridinium aciculiferum Lemmermann*	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Third Portage Lake - East Basin										TPN- North Basin		
	Area-Replicate ID	TPE70S	TPE71S	TPE72S	TPE73S	TPE74S	TPE75S	TPE76S	TPE77S	TPE78S	TPE79S	TPN70S	TPN71S	TPN72S
Code	Species Name	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14	3-Nov-14	3-Nov-14	20-Dec-14	20-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14
	Cyanophyte													
1008	*Aphanocapsa sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-
1015	*Chroococcus turgidus (Kutzing) Nageli*	-	-	-	-	-	-	-	-	-	-	-	-	-
1024	*Woronichinia naegelianum (Unger) Elenk.*	-	-	-	-	-	-	-	-	-	-	-	-	-
1026	*Merismopedia tenuissima Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-
1033	*Rhabdogloea lineare Schmidle and Lauterborn*	-	-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*	+	+	-	+	+	+	-	-	-	-	-	-	+
1073	*Snowella sp*	-	-	-	-	-	-	-	-	-	-	-	-	-
1089	*Cyanodictyon sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus Schmarda*	-	-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*	+	-	+	+	+	+	+	+	+	-	+	-	-
2112	*Sphaerocystis schroeteri Chodat*	-	-	-	-	+	+	-	-	+	-	-	+	+
2121	*Oocystis lacustris Chodat*	-	+	+	+	+	+	+	-	+	+	-	+	+
2132	*Scenedesmus denticulatus Lagerhiem*	-	-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex Sukja*	-	-	+	+	+	+	+	+	-	-	-	-	+
2138	*Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	+	+	-	-	-
2143	*Monoraphidium minutum (Nag.) Komarkova-Legnerova*	+	+	-	-	-	-	-	-	-	-	-	+	-
2145	*Crucigenia quadrata Morr.*	-	-	-	-	-	-	-	-	-	-	-	-	+
2153	*Coelastrum morus W. and G.S. West*	-	-	-	-	-	-	-	-	-	-	-	-	-
2155	*Selenastrum minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-
2157	*Kichnerella lunaris (Kirchn.) Moeb.*	-	-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa Willen*	+	+	+	+	-	+	-	+	-	-	+	+	+
2171	*Closterium kuetzingii Brebisson*	-	-	-	-	-	-	-	-	-	-	-	-	-
2178	*Cosmarium sp.*	-	-	-	-	-	-	+	-	-	-	-	-	-
2182	*Euastrum spp.*	-	-	-	+	-	-	-	-	-	-	-	-	+
2183	*Euastrum sinuosum Lenorm.*	-	+	-	-	-	-	-	-	-	-	-	-	-
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*	-	+	-	-	-	-	-	-	-	-	-	-	-
2204	*Ankyra judai (G.M. Smith) Fott*	-	-	-	-	-	-	-	-	-	-	-	-	-
2205	*Mougeotia sp.*	+	-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii Kutzing*	-	+	+	-	+	+	+	-	+	+	+	-	+
2215	*Tetraedron caudatum (Corda) Hansgrig*	+	+	+	+	+	+	+	+	-	-	+	+	+
2231	*Bulbochaete sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
2235	*Ankistrodesmus spiralis Lemmermann*	+	-	+	+	+	+	+	+	-	-	-	-	-
2247	*Oocystis gigas Archer*	-	-	-	-	-	-	-	-	-	-	-	-	-
2252	*Scenedesmus acutus Chodat*	-	-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus Chodat*	-	-	+	+	-	-	-	-	-	-	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*	+	+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*	+	+	+	+	+	+	-	-	-	-	+	+	+
4355	*Chrysochromulina parva Lackey*	-	-	-	-	-	-	-	-	-	-	-	-	-
4357	*Chrysococcus sp.*	+	+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera Scherffel*	-	+	-	-	-	-	-	-	-	-	-	-	-
4361	*Kephyrion boreale Skuja*	-	-	-	-	-	+	+	+	-	-	-	-	-
4362	*Kephyrion sp.*	+	+	+	+	+	+	+	+	-	+	+	+	+
4363	*Spinifiromonas sirratus***********	-	-	+	-	-	-	+	+	-	-	+	+	-
4367	*Mallomonas duerrschmidtiae Siver, Hamer and Kling*	-	-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama (Asmund) Fott*	-	-	+	-	+	-	+	+	-	-	-	-	+
4369	*Mallomonas pseudocoronata Prescott*	-	-	-	-	-	-	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos Asmund and Kristiansen*	-	-	-	-	-	-	-	-	-	-	-	-	-

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		Third Portage Lake - East Basin										TPN- North Basin		
	Area-Replicate ID	TPE70S	TPE71S	TPE72S	TPE73S	TPE74S	TPE75S	TPE76S	TPE77S	TPE78S	TPE79S	TPN70S	TPN71S	TPN72S
Code	Species Name	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14	3-Nov-14	3-Nov-14	20-Dec-14	20-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14
4372	*Mallomonas tonsurata Teiling and Krieger*	-	-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei Lemmermann*	+	-	+	+	+	+	+	-	-	-	+	+	+
4381	*Dinobryon mucronutom Nygaard*	-	+	+	+	-	-	+	-	-	-	+	-	+
4383	*Dinobryon bavaricum Imhof*	-	+	-	-	-	-	-	-	-	-	-	-	-
4384	*Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger*	-	-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia Ehrenberg*	-	+	-	-	-	-	-	-	-	-	+	+	+
4390	*Dinobryon sociale Ehrenberg*	+	+	+	+	+	+	+	+	-	-	+	+	+
4391	*Dinobryon sociale v. stipitatum (Stein) Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	+
4394	*Epiphyxis sp.*	-	-	-	-	-	-	-	-	-	-	+	+	-
4396	*Chrysolkos skuja (Nauwerck) Willen*	+	+	+	+	+	+	-	-	-	-	+	+	+
4400	*Ochromonas sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii (Reverdin) Chodat*	-	-	+	+	+	-	-	-	-	-	-	-	-
4413	*Chrysochromulina laurentiana Kling*	+	+	+	+	+	+	+	+	-	-	+	+	+
4414	*Stichogloea spp.*	-	-	+	+	+	+	-	-	-	-	-	-	+
4415	*Bicoeca lacustris Clark*	-	-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima (Zach.) Lemmermann*	-	-	-	-	+	+	+	+	+	+	-	-	-
4436	*Dinobryon attenatum Hill*	-	-	-	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
4448	*Rhizochrysis scherffelii Pascher*	-	-	-	-	-	-	-	-	-	-	-	-	-
4453	*Desmarella brachycalyx Skuja*	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diatom													
5507	*Cyclotella stelligera Cleve and Grunow*	-	-	+	+	+	-	+	-	+	+	+	+	-
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*	-	-	-	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica v subarctica (O. Muller) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana Skvortzow*	+	+	+	+	+	+	+	+	+	+	+	+	+
5720	*Cyclotella bodanica Eulenst.*	-	-	-	-	-	-	-	-	-	+	-	-	-
5743	*Aulocoseira ambigua (Grunow) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-
5881	*Diatoma elongatum Agardh*	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cryptophyte													
6554	*Rhodomonas minuta Skuja*	+	+	+	+	+	-	+	+	+	+	+	-	+
6558	*Cryptomonas erosa Ehrenberg*	+	+	+	+	+	+	+	+	+	+	+	+	+
6562	*Cryptomonas reflexa (Marsson) Skuja*	-	-	+	+	+	+	+	+	-	-	-	-	+
6565	*Cryptomonas rostratiformis Skuja*	-	-	+	+	+	+	+	+	-	-	-	-	+
6568	*Katablepharis ovalis Skuja*	+	+	+	+	-	-	-	+	-	-	+	+	-
	Dinoflagellate													
7631	*Gymnodinium helveticum Penard*	-	-	-	+	+	+	+	+	+	+	-	-	-
7632	*Gymnodinium sp.*	+	+	+	+	+	-	+	-	+	-	-	+	-
7635	*Peridinium willei Huitfeldt-Kaas*	-	-	-	-	-	-	-	-	-	-	-	+	-
7639	*Peridinium pusillum (Penard) Lemmermann*	+	+	+	+	-	-	+	+	-	-	+	+	+
7641	*Peridinium aciculiferum Lemmermann*	-	-	-	+	-	+	-	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Third Portage Lake - North Basin							Third Portage - South Basin					
	Area-Replicate ID	TPN73S	TPN74S	TPN75S	TPN76S	TPN77S	TPN78S	TPN79S	TPS43S	TPS44S	TPS45S	TPS46S	TPS47S	TPS48S
Code	Species Name	26-Aug-14	28-Sep-14	28-Sep-14	30-Nov-14	30-Nov-14	19-Dec-14	19-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14
	Cyanophyte													
1008	*Aphanocapsa sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
1014	*Chroococcus limneticus Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-
1015	*Chroococcus turgidus (Kutzing) Nageli*	-	-	-	-	-	-	-	-	-	-	-	-	-
1024	*Woronichinia naegelianum (Unger) Elenk.*	-	-	-	-	-	-	-	-	-	-	-	-	-
1026	*Merismopedia tenuissima Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-
1033	*Rhabdogloea lineare Schmidle and Lauterborn*	-	-	-	-	-	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*	-	-	+	-	-	-	-	-	-	-	+	-	-
1073	*Snowella sp*	-	-	+	-	-	-	-	-	-	-	-	-	-
1089	*Cyanodictyon sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorophyte													
2100	*Pyramidomonas tetrarhynchus Schmarda*	-	-	-	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*	+	+	+	-	+	-	-	-	-	+	+	-	+
2112	*Sphaerocystis schroeteri Chodat*	+	+	-	-	-	-	-	+	+	+	+	-	+
2121	*Oocystis lacustris Chodat*	+	+	+	+	-	+	-	-	+	+	+	+	+
2132	*Scenedesmus denticulatus Lagerhiem*	-	-	-	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex Sukja*	+	+	+	+	+	-	-	-	-	+	+	+	+
2138	*Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	+	-	-	-	-	-
2145	*Crucigenia quadrata Morr.*	-	-	+	-	-	-	+	-	-	-	+	+	-
2153	*Coelastrum morus W. and G.S. West*	-	-	-	-	-	-	-	-	-	-	-	-	-
2155	*Selenastrum minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-	-	-	-
2157	*Kichnerella lunaris (Kirchn.) Moeb.*	-	-	-	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa Willen*	+	+	+	-	-	+	-	+	+	+	+	-	+
2171	*Closterium kuetzingii Brebisson*	-	-	-	-	-	-	-	-	-	-	-	-	-
2178	*Cosmarium sp.*	-	-	-	-	-	-	-	+	-	+	-	-	-
2182	*Euastrum spp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
2183	*Euastrum sinuosum Lenorm.*	-	-	-	-	-	-	-	-	-	-	-	-	-
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*	-	-	-	-	-	-	-	-	-	-	-	-	-
2204	*Ankyra judai (G.M. Smith) Fott*	-	-	-	-	-	-	-	-	-	-	-	-	-
2205	*Mougeotia sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii Kutzing*	+	+	+	+	-	-	-	-	+	+	+	-	+
2215	*Tetraedron caudatum (Corda) Hansgrig*	+	-	-	-	-	-	-	+	+	+	+	+	+
2231	*Bulbochaete sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
2235	*Ankistrodesmus spiralis Lemmermann*	-	-	-	-	-	-	-	-	+	-	-	-	-
2247	*Oocystis gigas Archer*	-	-	-	-	-	-	-	-	-	-	-	-	-
2252	*Scenedesmus acutus Chodat*	-	-	-	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus Chodat*	-	-	-	-	-	-	-	-	-	+	-	-	-
	Chrysophyte													
4351	*Small chrysophyceae*	+	+	+	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*	+	-	+	-	+	+	+	+	+	+	+	-	+
4355	*Chrysochromulina parva Lackey*	+	-	-	-	-	-	-	-	-	-	-	-	-
4357	*Chrysococcus sp.*	+	+	+	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera Scherffel*	-	-	-	-	-	-	-	+	-	-	-	-	-
4361	*Kephyrion boreale Skuja*	+	+	-	-	-	-	-	-	-	-	+	+	-
4362	*Kephyrion sp.*	+	+	+	+	+	-	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********	-	-	-	-	-	-	-	-	+	-	-	-	-
4367	*Mallomonas duerrschmidtiae Siver, Hamer and Kling*	-	-	-	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama (Asmund) Fott*	-	-	-	-	+	-	+	-	-	-	+	-	-
4369	*Mallomonas pseudocoronata Prescott*	-	-	-	-	-	-	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos Asmund and Kristiansen*	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

		Third Portage Lake - North Basin							Third Portage - South Basin					
	Area-Replicate ID	TPN73S	TPN74S	TPN75S	TPN76S	TPN77S	TPN78S	TPN79S	TPS43S	TPS44S	TPS45S	TPS46S	TPS47S	TPS48S
Code	Species Name	26-Aug-14	28-Sep-14	28-Sep-14	30-Nov-14	30-Nov-14	19-Dec-14	19-Dec-14	25-Jul-14	25-Jul-14	26-Aug-14	26-Aug-14	28-Sep-14	28-Sep-14
4372	*Mallomonas tonsurata Teiling and Krieger*	-	-	-	-	-	-	-	-	-	-	-	-	-
4378	*Dinobryon borgei Lemmermann*	+	-	-	-	-	-	-	+	+	+	-	-	+
4381	*Dinobryon mucronutom Nygaard*	+	+	-	-	-	+	-	-	-	+	+	-	-
4383	*Dinobryon bavaricum Imhof*	-	-	-	-	-	-	-	-	-	-	-	-	-
4384	*Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger*	-	-	-	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia Ehrenberg*	+	-	-	-	-	-	-	+	+	+	-	-	-
4390	*Dinobryon sociale Ehrenberg*	+	+	+	+	-	-	+	+	+	+	+	+	+
4391	*Dinobryon sociale v. stipitatum (Stein) Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
4396	*Chrysolkos skuja (Nauwerck) Willen*	+	+	-	-	-	+	-	+	+	+	+	-	+
4400	*Ochromonas sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii (Reverdin) Chodat*	+	+	-	-	-	-	-	+	-	-	-	-	-
4413	*Chrysochromulina laurentiana Kling*	+	+	+	+	+	-	-	+	+	+	+	-	+
4414	*Stichogloea spp.*	-	-	+	-	-	-	-	-	+	-	+	-	+
4415	*Bicoeca lacustris Clark*	-	-	-	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima (Zach.) Lemmermann*	-	+	+	+	+	+	+	-	-	-	-	-	+
4436	*Dinobryon attenatum Hill*	-	-	-	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*	-	-	-	-	-	-	-	-	-	-	-	-	-
4448	*Rhizochrysis scherffelii Pascher*	-	-	-	-	-	-	-	-	-	-	-	-	-
4453	*Desmarella brachycalyx Skuja*	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diatom													
5507	*Cyclotella stelligera Cleve and Grunow*	+	+	+	-	-	+	-	+	+	+	+	+	+
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*	+	-	-	-	-	-	-	-	+	+	-	-	-
5540	*Aulacoseira italica v subarctica (O. Muller) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana Skvortzow*	+	+	+	+	+	+	+	+	+	+	+	-	+
5720	*Cyclotella bodanica Eulenst.*	-	-	-	-	-	-	-	-	-	-	-	-	-
5743	*Aulocoseira ambigua (Grunow) Simonsen*	-	-	-	-	-	-	-	-	-	-	-	-	-
5881	*Diatoma elongatum Agardh*	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cryptophyte													
6554	*Rhodomonas minuta Skuja*	+	+	+	+	+	+	+	+	+	+	+	-	-
6558	*Cryptomonas erosa Ehrenberg*	+	+	+	+	+	+	+	+	+	+	+	+	-
6562	*Cryptomonas reflexa (Marsson) Skuja*	+	+	-	-	-	-	-	-	+	-	-	-	-
6565	*Cryptomonas rostratiformis Skuja*	-	+	-	-	-	+	+	-	-	-	-	+	-
6568	*Katablepharis ovalis Skuja*	-	-	-	-	-	-	-	+	+	-	+	-	-
	Dinoflagellate													
7631	*Gymnodinium helveticum Penard*	-	-	+	-	-	+	-	+	-	+	-	-	-
7632	*Gymnodinium sp.*	+	+	-	-	+	-	-	+	+	+	+	+	+
7635	*Peridinium willei Huitfeldt-Kaas*	-	-	-	-	+	-	-	-	-	-	-	+	-
7639	*Peridinium pusillum (Penard) Lemmermann*	+	-	+	-	+	-	+	+	+	+	+	-	-
7641	*Peridinium aciculiferum Lemmermann*	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

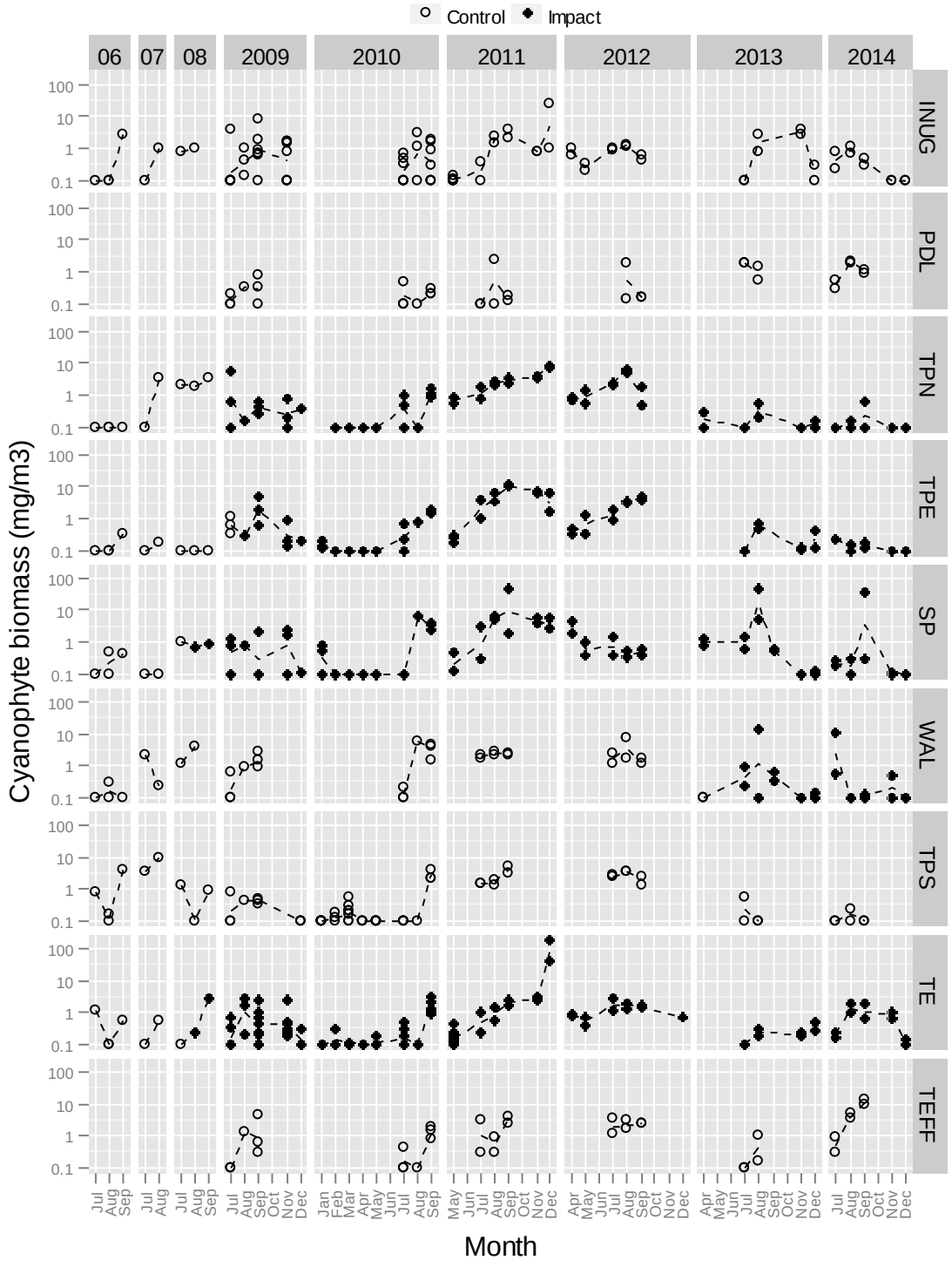
		Wally Lake									
	Area-Replicate ID	WAL39S	WAL40S	WAL41S	WAL42S	WAL43S	WAL44S	WAL45S	WAL46S	WAL47S	WAL48S
Code	Species Name	26-Jul-14	26-Jul-14	27-Aug-14	27-Aug-14	22-Sep-14	22-Sep-14	2-Nov-14	2-Nov-14	18-Dec-14	18-Dec-14
	Cyanophyte										
1008	*Aphanocapsa sp.*	+	+	-	-	-	-	-	-	-	-
1012	*Aphanothece sp.*	-	-	-	-	-	-	-	+	-	-
1014	*Chroococcus limneticus Lemmermann*	-	+	-	-	-	-	-	-	-	-
1015	*Chroococcus turgidus (Kutzing) Nageli*	-	-	-	-	-	-	-	-	-	-
1024	*Woronichinia naegelianum (Unger) Elenk.*	-	-	-	-	-	-	-	-	-	-
1026	*Merismopedia tenuissima Lemmermann*	-	-	-	-	-	-	-	-	-	-
1033	*Rhabdogloea lineare Schmidle and Lauterborn*	-	+	-	-	-	-	-	-	-	-
1054	*Planktolyngbya limnetica*	-	-	-	-	-	+	-	-	-	-
1073	*Snowella sp*	-	-	-	-	-	-	-	-	-	-
1089	*Cyanodictyon sp.*	-	-	-	-	-	-	-	-	-	-
	Chlorophyte										
2100	*Pyramidomonas tetrarhynchus Schmarda*	-	-	-	-	-	-	-	-	-	-
2105	*Chlamydomonas spp.*	+	+	+	+	+	+	+	+	-	-
2112	*Sphaerocystis schroeteri Chodat*	+	-	-	+	-	-	-	-	-	-
2121	*Oocystis lacustris Chodat*	+	+	+	+	+	+	+	-	+	+
2132	*Scenedesmus denticulatus Lagerhiem*	-	-	-	-	-	-	-	-	-	-
2137	*Dictyosphaerium simplex Sukja*	+	+	+	+	+	+	+	+	-	-
2138	*Monoraphidium komarkovae (Nyg.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-
2143	*Monoraphidium minutum (Nag.) Komarkova-Legnerova*	-	-	-	+	-	-	+	-	-	-
2145	*Crucigenia quadrata Morr.*	-	-	-	-	-	-	-	-	-	-
2153	*Coelastrum morus W. and G.S. West*	-	-	-	-	-	-	-	-	-	-
2155	*Selenastrum minutum (Nag.) Komarkova-Legnerova*	-	-	-	-	-	-	-	-	-	-
2157	*Kichnerella lunaris (Kirchn.) Moeb.*	-	-	-	-	-	-	-	-	-	-
2167	*Elakatothrix gelatinosa Willen*	+	+	+	+	+	-	-	+	-	-
2171	*Closterium kuetzingii Brebisson*	-	-	-	-	+	-	-	-	-	-
2178	*Cosmarium sp.*	-	+	-	+	+	-	-	+	-	-
2182	*Euastrum spp.*	+	-	-	-	-	-	-	-	-	-
2183	*Euastrum sinuosum Lenorm.*	-	-	-	-	-	-	-	-	-	-
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*	+	+	+	-	-	-	-	-	-	-
2204	*Ankyra judai (G.M. Smith) Fott*	-	-	-	-	-	-	-	-	-	-
2205	*Mougeotia sp.*	-	-	-	-	-	-	-	-	-	-
2206	*Botryococcus braunii Kutzing*	-	+	+	+	-	+	+	+	+	+
2215	*Tetraedron caudatum (Corda) Hansgrig*	+	+	+	+	+	+	-	-	-	-
2231	*Bulbochaete sp.*	-	-	-	-	-	-	-	-	-	-
2235	*Ankistrodesmus spiralis Lemmermann*	+	+	+	+	+	+	+	+	-	-
2247	*Oocystis gigas Archer*	+	+	-	+	-	-	-	-	-	-
2252	*Scenedesmus acutus Chodat*	-	-	-	-	-	-	-	-	-	-
2512	*Scenedesmus acuminatus Chodat*	-	-	-	-	-	-	-	-	-	-
	Chrysophyte										
4351	*Small chrysophyceae*	+	+	+	+	+	+	+	+	+	+
4352	*Large chrysophyceae*	+	+	+	+	+	+	+	+	-	-
4355	*Chrysochromulina parva Lackey*	-	-	+	+	-	-	-	-	-	-
4357	*Chrysococcus sp.*	+	+	+	+	+	+	+	+	+	+
4358	*Chrysostephanospaera globulifera Scherffel*	-	+	-	-	+	-	-	-	-	-
4361	*Kephyrion boreale Skuja*	+	-	+	-	+	+	+	+	-	-
4362	*Kephyrion sp.*	+	+	+	+	+	+	+	+	+	+
4363	*Spinifiromonas sirratus***********	-	-	+	+	+	+	+	-	-	-
4367	*Mallomonas duerrschmidtiae Siver, Hamer and Kling*	-	-	-	-	-	-	-	-	-	-
4368	*Mallomonas crassisquama (Asmund) Fott*	+	-	+	+	-	+	+	-	-	+
4369	*Mallomonas pseudocoronata Prescott*	-	-	-	-	-	-	-	-	-	-
4370	*Mallomonas akrokomos Asmund and Kristiansen*	-	-	-	-	+	+	-	-	-	-

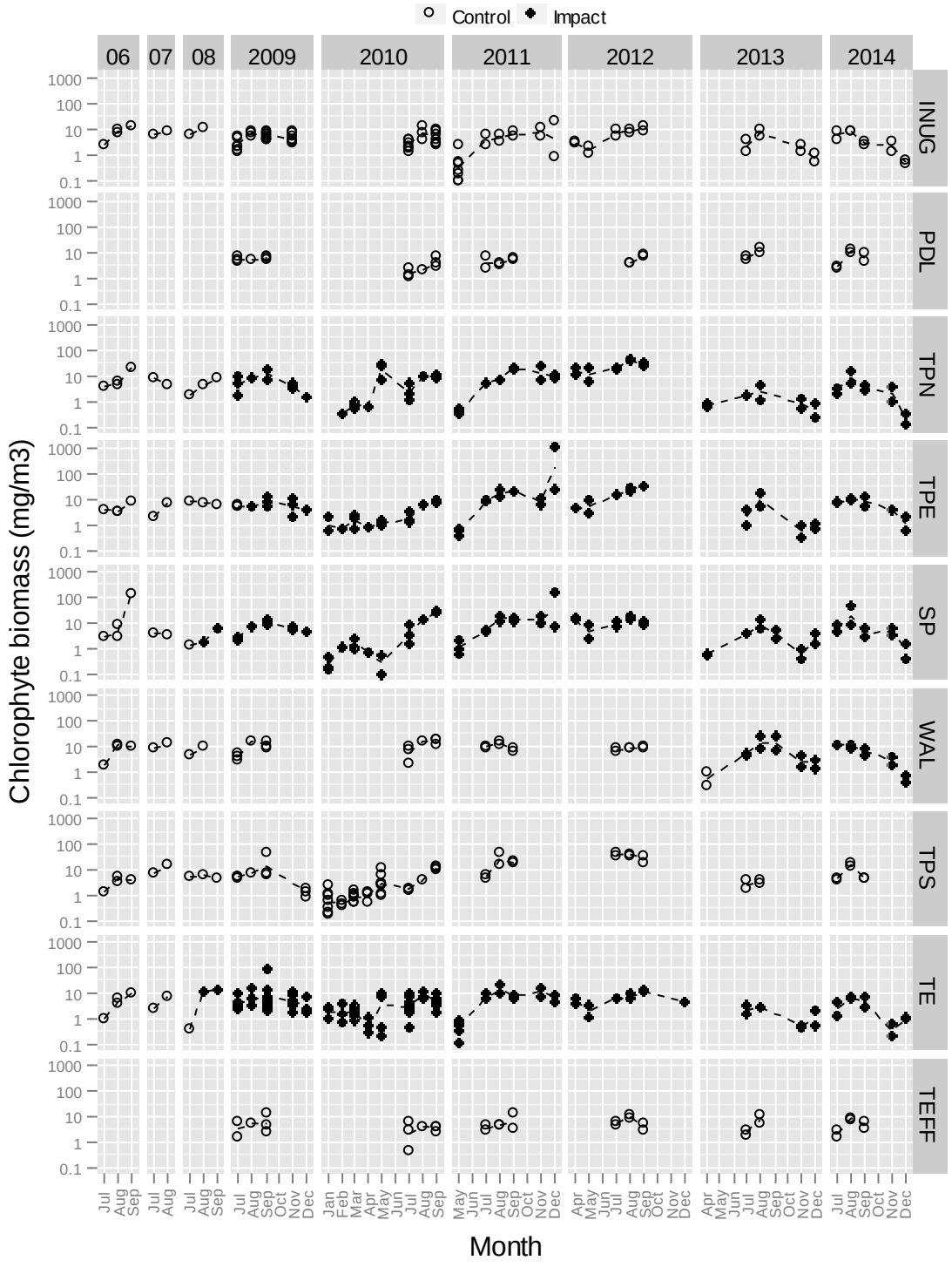
Appendix F. Presence (+) / Absence (-) matrix of phytoplankton species in Meadowbank study lakes and Baker Lake, 2014.

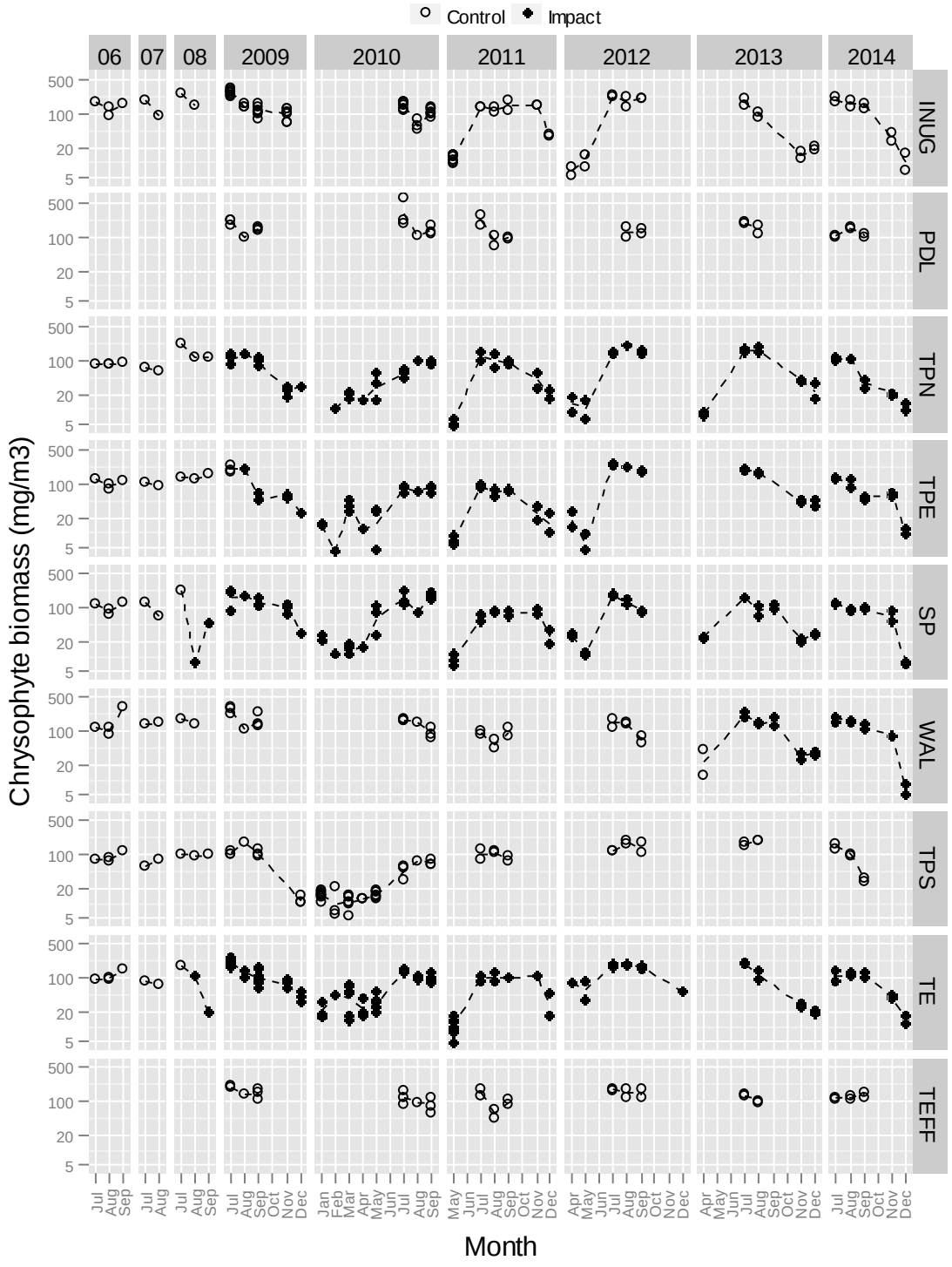
		Wally Lake									
	Area-Replicate ID	WAL39S	WAL40S	WAL41S	WAL42S	WAL43S	WAL44S	WAL45S	WAL46S	WAL47S	WAL48S
Code	Species Name	26-Jul-14	26-Jul-14	27-Aug-14	27-Aug-14	22-Sep-14	22-Sep-14	2-Nov-14	2-Nov-14	18-Dec-14	18-Dec-14
4372	*Mallomonas tonsurata Teiling and Krieger*	-	-	-	+	-	-	-	-	-	-
4378	*Dinobryon borgei Lemmermann*	+	+	+	+	+	+	+	+	-	-
4381	*Dinobryon mucronutom Nygaard*	+	+	+	+	+	+	-	-	-	-
4383	*Dinobryon bavaricum Imhof*	+	+	-	-	-	-	-	-	-	-
4384	*Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger*	-	-	-	-	-	-	-	-	-	-
4388	*Dinobryon sertularia Ehrenberg*	+	+	-	-	-	-	-	-	-	-
4390	*Dinobryon sociale Ehrenberg*	+	+	+	+	+	+	+	+	-	-
4391	*Dinobryon sociale v. stipitatum (Stein) Lemmermann*	-	-	-	-	-	-	-	-	-	-
4394	*Epiphyxis sp.*	-	-	+	+	-	-	-	-	-	-
4396	*Chrysolkos skuja (Nauwerck) Willen*	+	-	+	+	+	+	+	+	+	-
4400	*Ochromonas sp.*	-	-	-	-	-	-	-	-	-	-
4411	*Bitrichia chodatii (Reverdin) Chodat*	-	-	+	+	-	+	-	-	-	-
4413	*Chrysochromulina laurentiana Kling*	+	+	+	+	+	+	+	+	-	+
4414	*Stichogloea spp.*	+	+	+	+	-	+	-	-	-	-
4415	*Bicoeca lacustris Clark*	-	-	-	-	-	-	-	-	-	-
4418	*Salpingoeca frequentissima (Zach.) Lemmermann*	-	-	+	+	+	+	+	+	-	-
4436	*Dinobryon attenatum Hill*	-	-	-	-	-	-	-	-	-	-
4437	*Pteridomonas sp.*	-	-	-	+	-	-	-	-	-	-
4448	*Rhizochrysis scherffelii Pascher*	-	-	-	-	-	-	-	-	-	-
4453	*Desmarella brachycalyx Skuja*	-	-	-	-	-	-	-	-	-	-
	Diatom										
5507	*Cyclotella stelligera Cleve and Grunow*	+	+	+	+	+	+	+	+	+	+
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*	-	-	-	-	-	-	-	-	-	-
5540	*Aulacoseira italica v subarctica (O. Muller) Simonsen*	-	-	-	-	-	-	-	-	-	-
5551	*Cyclotella michiganiana Skvortzow*	+	+	+	+	+	+	+	+	-	+
5720	*Cyclotella bodanica Eulenst.*	-	-	-	+	-	+	+	+	+	+
5743	*Aulocoseira ambigua (Grunow) Simonsen*	-	-	-	-	-	-	-	-	-	-
5881	*Diatoma elongatum Agardh*	-	-	-	-	-	-	-	-	-	-
	Cryptophyte										
6554	*Rhodomonas minuta Skuja*	+	+	+	+	+	+	+	+	-	-
6558	*Cryptomonas erosa Ehrenberg*	+	+	+	+	+	+	+	+	+	+
6562	*Cryptomonas reflexa (Marsson) Skuja*	+	+	+	+	+	+	-	+	-	-
6565	*Cryptomonas rostratiformis Skuja*	+	+	+	+	+	+	-	-	-	-
6568	*Katablepharis ovalis Skuja*	+	+	-	+	+	+	+	+	-	-
	Dinoflagellate										
7631	*Gymnodinium helveticum Penard*	-	+	-	+	+	+	-	-	-	+
7632	*Gymnodinium sp.*	+	+	+	+	+	+	+	-	+	-
7635	*Peridinium willei Huitfeldt-Kaas*	-	-	-	+	-	-	+	-	-	-
7639	*Peridinium pusillum (Penard) Lemmermann*	-	-	+	+	+	+	-	+	-	-
7641	*Peridinium aciculiferum Lemmermann*	-	-	-	-	-	-	-	-	-	-

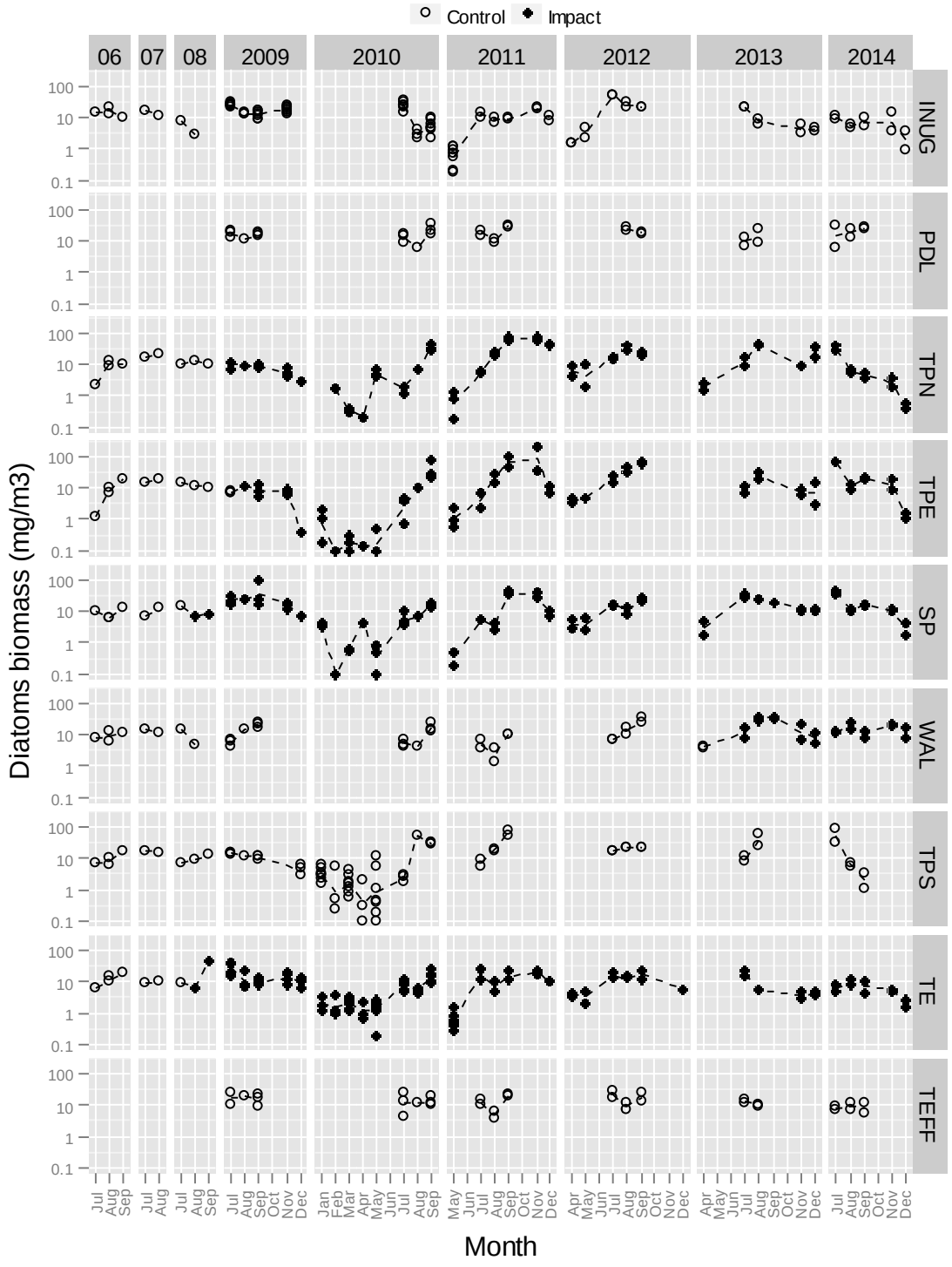
APPENDIX G

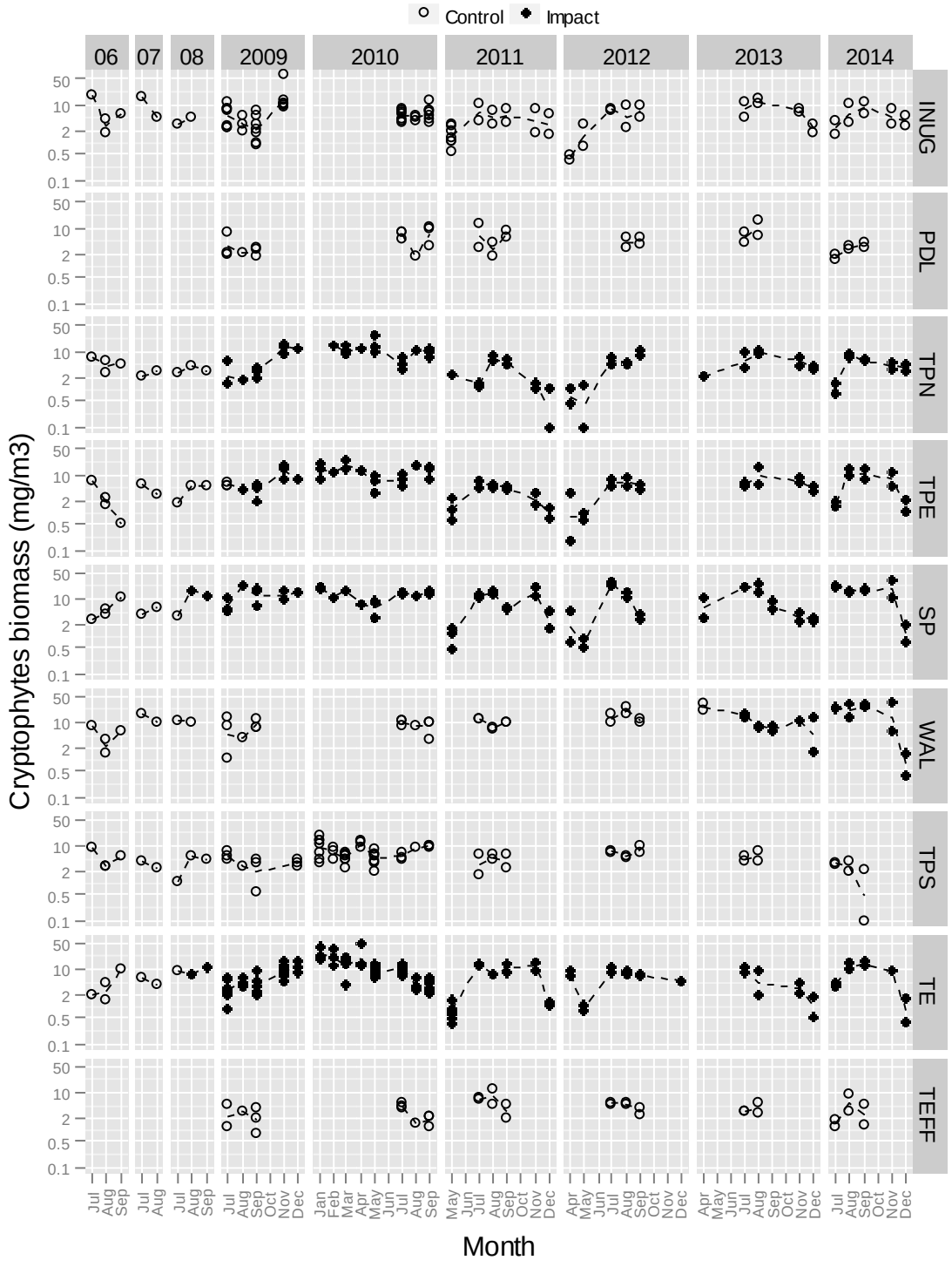
PHYTOPLANKTON PLOTS 2006 – 2014

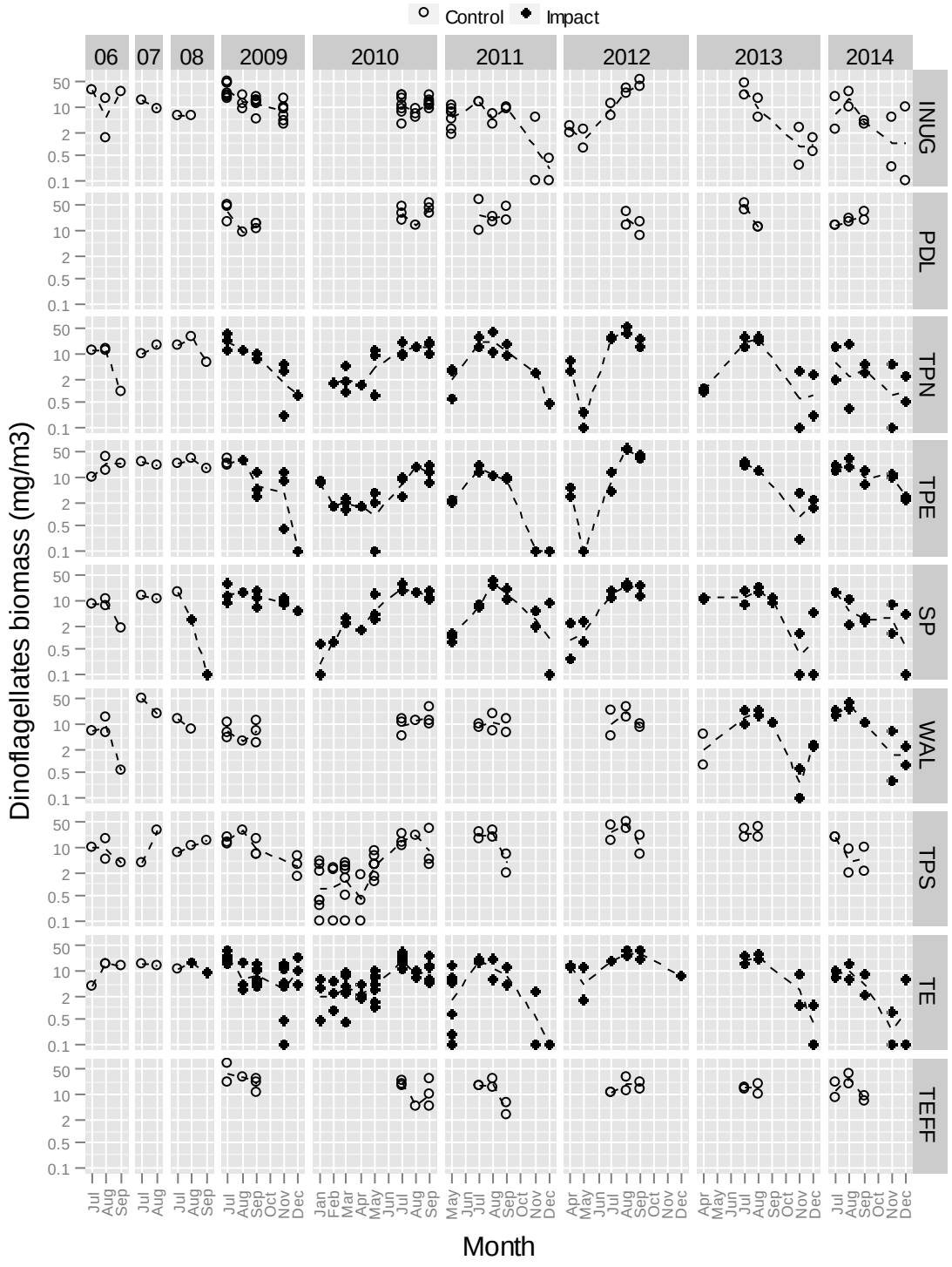

Control
Impact
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Cyanophyte biomass (mg/m3)
100
10
1
0.1
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

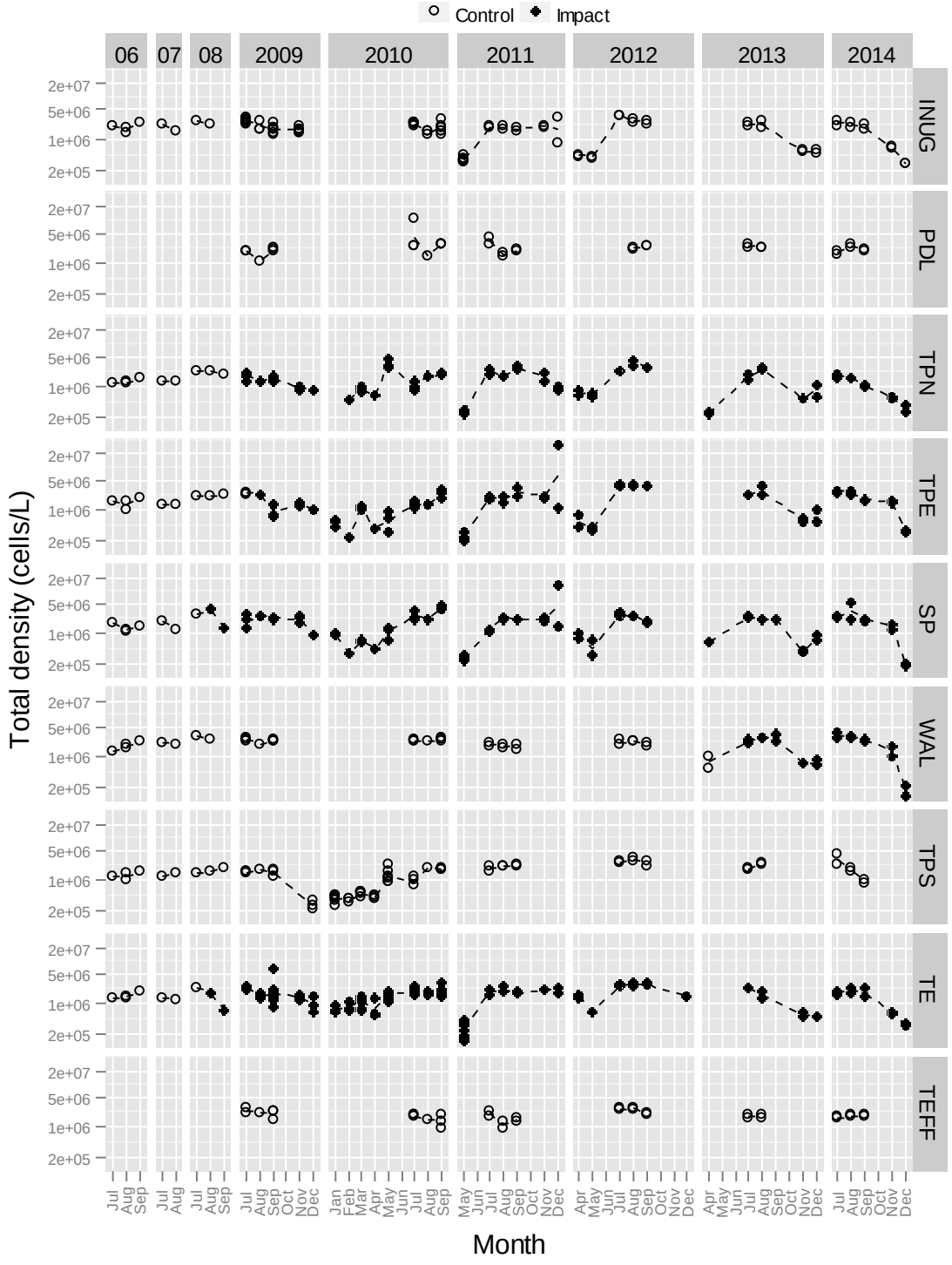

Control
Impact
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2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Chlorophyte biomass (mg/m3)
1000
100
10
1
0.1
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

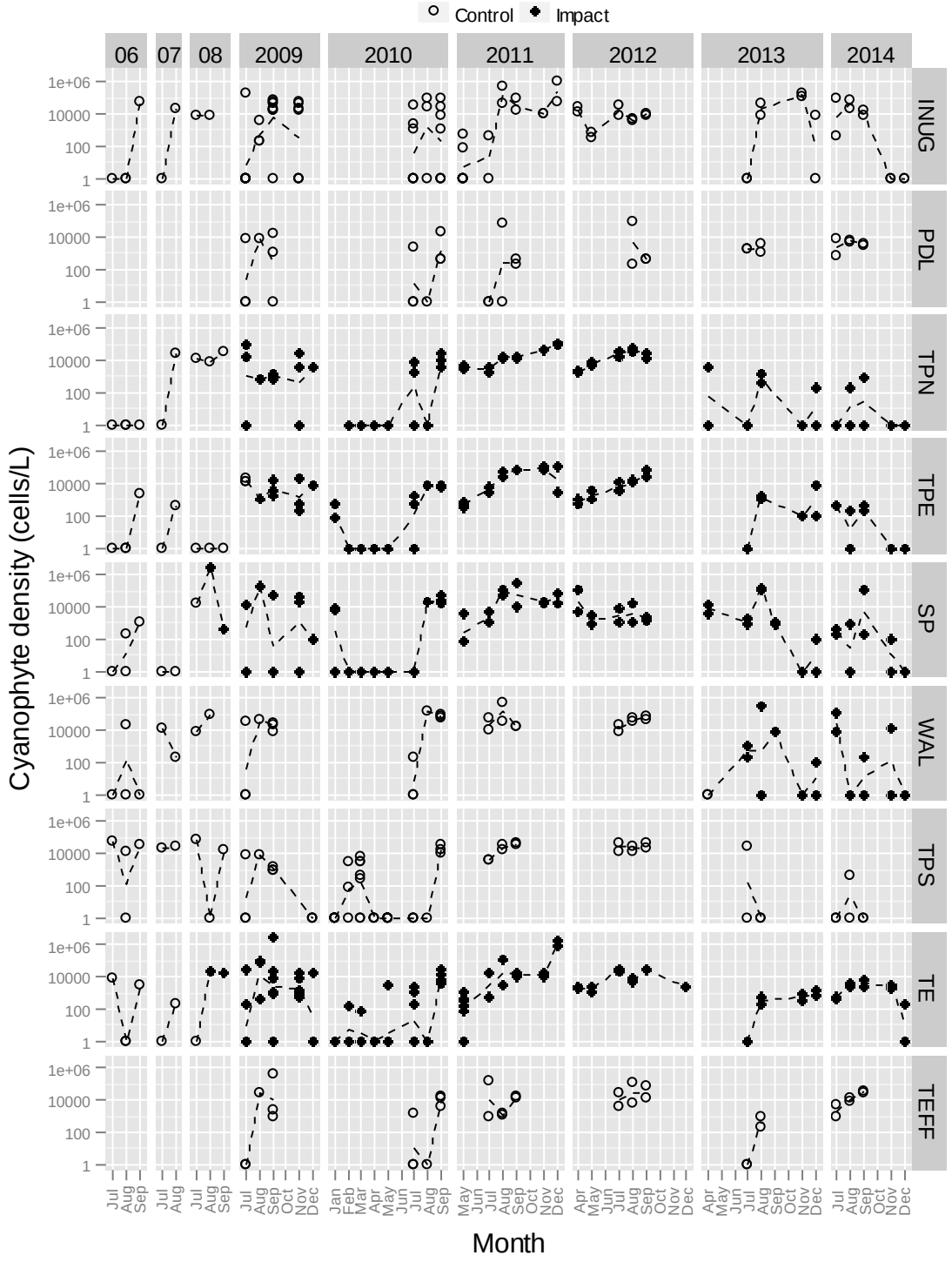

Control
Impact
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2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Chrysophyte biomass (mg/m3)
500
100
20
5
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

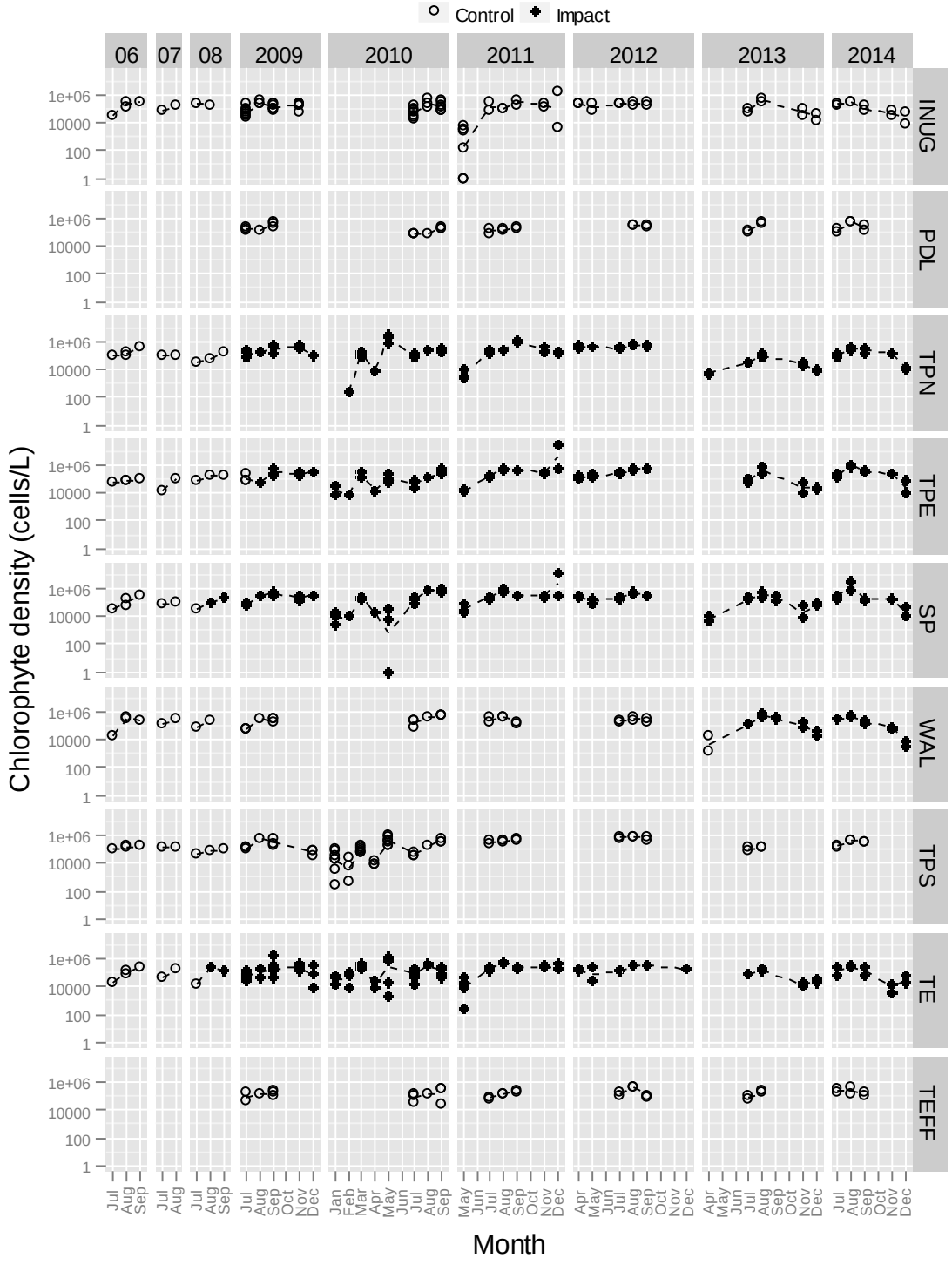

Control
Impact
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2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Diatoms biomass (mg/m3)
100
10
1
0.1
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

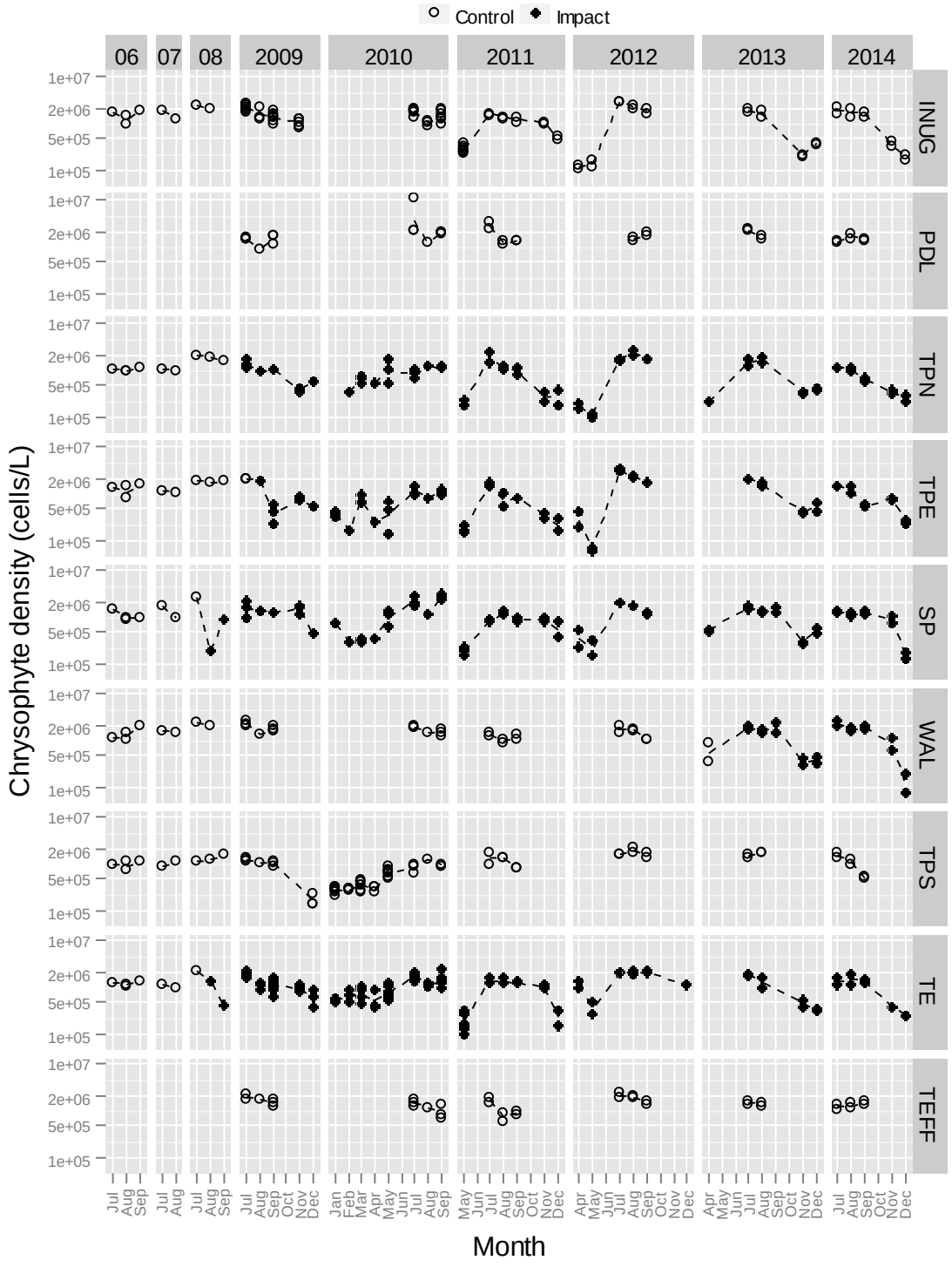

Control
Impact
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2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Cryptophytes biomass (mg/m3)
50
10
2
0.5
0.1
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

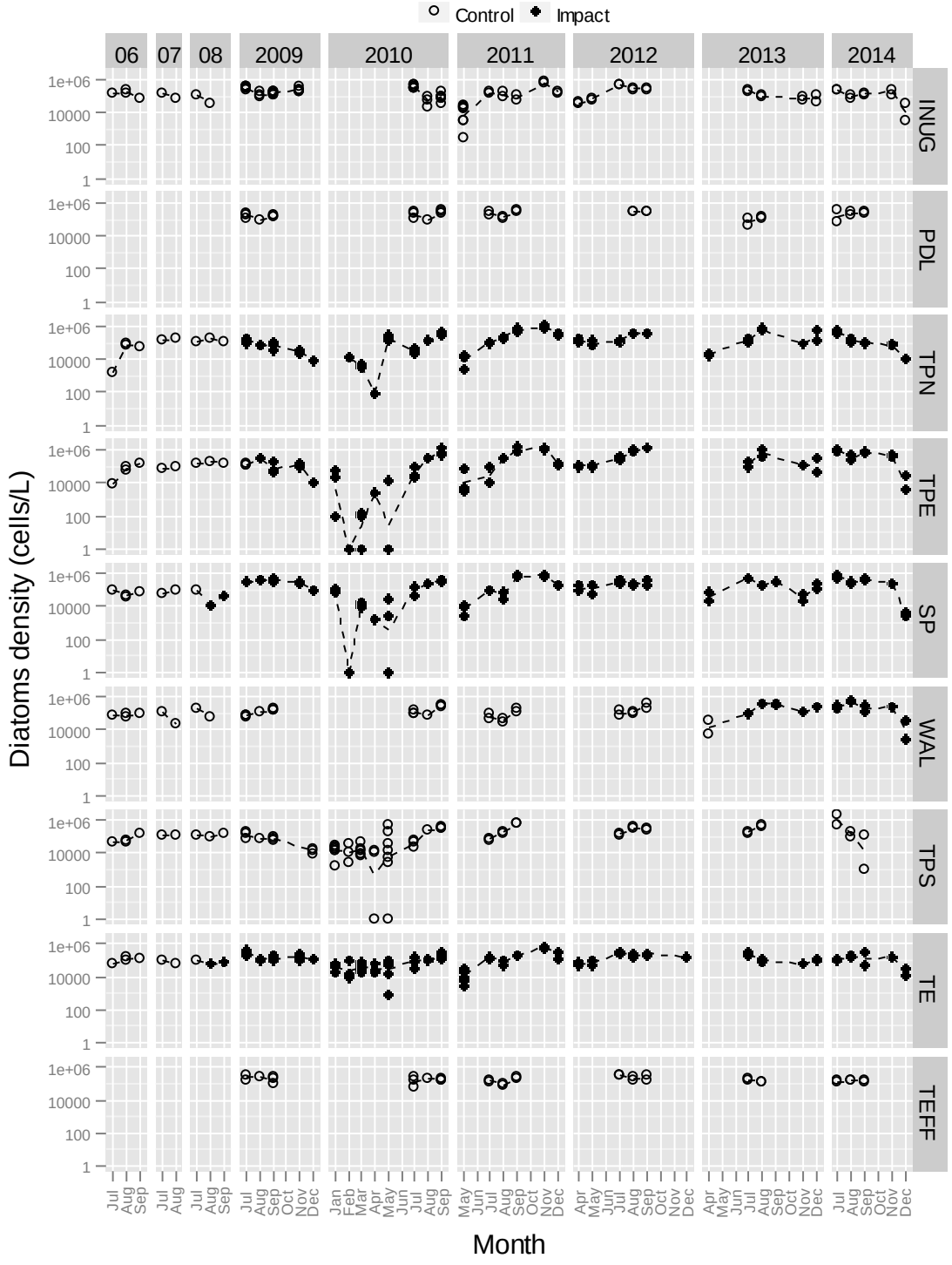

Control
Impact
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2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Dinoflagellates biomass (mg/m3)
50
10
2
0.5
0.1
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month


Control
Impact
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Total density (cells/L)
2e+07
5e+06
1e+06
2e+05
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

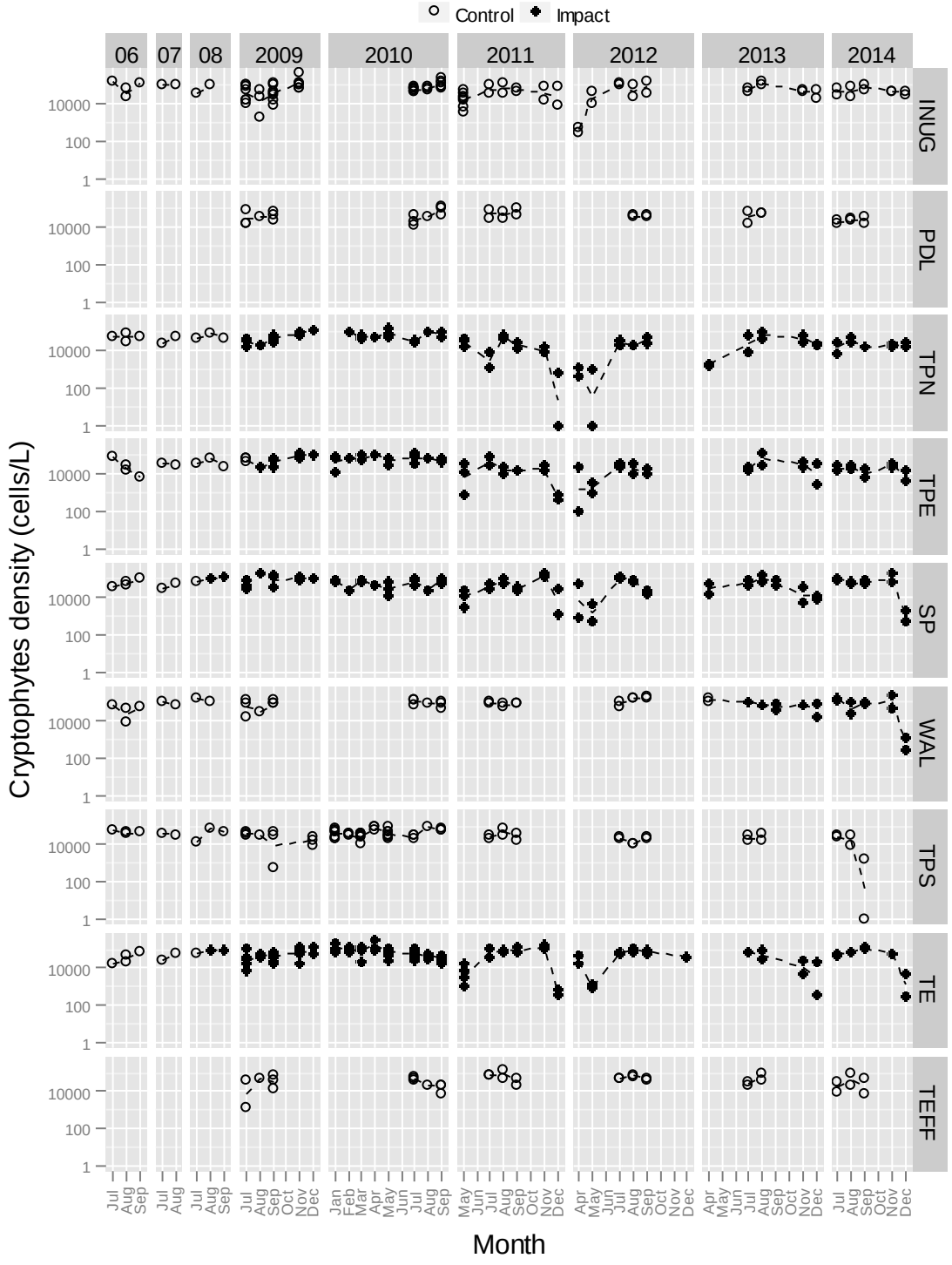

Control
Impact
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2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Cyanophyte density (cells/L)
1e+06
10000
100
1
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

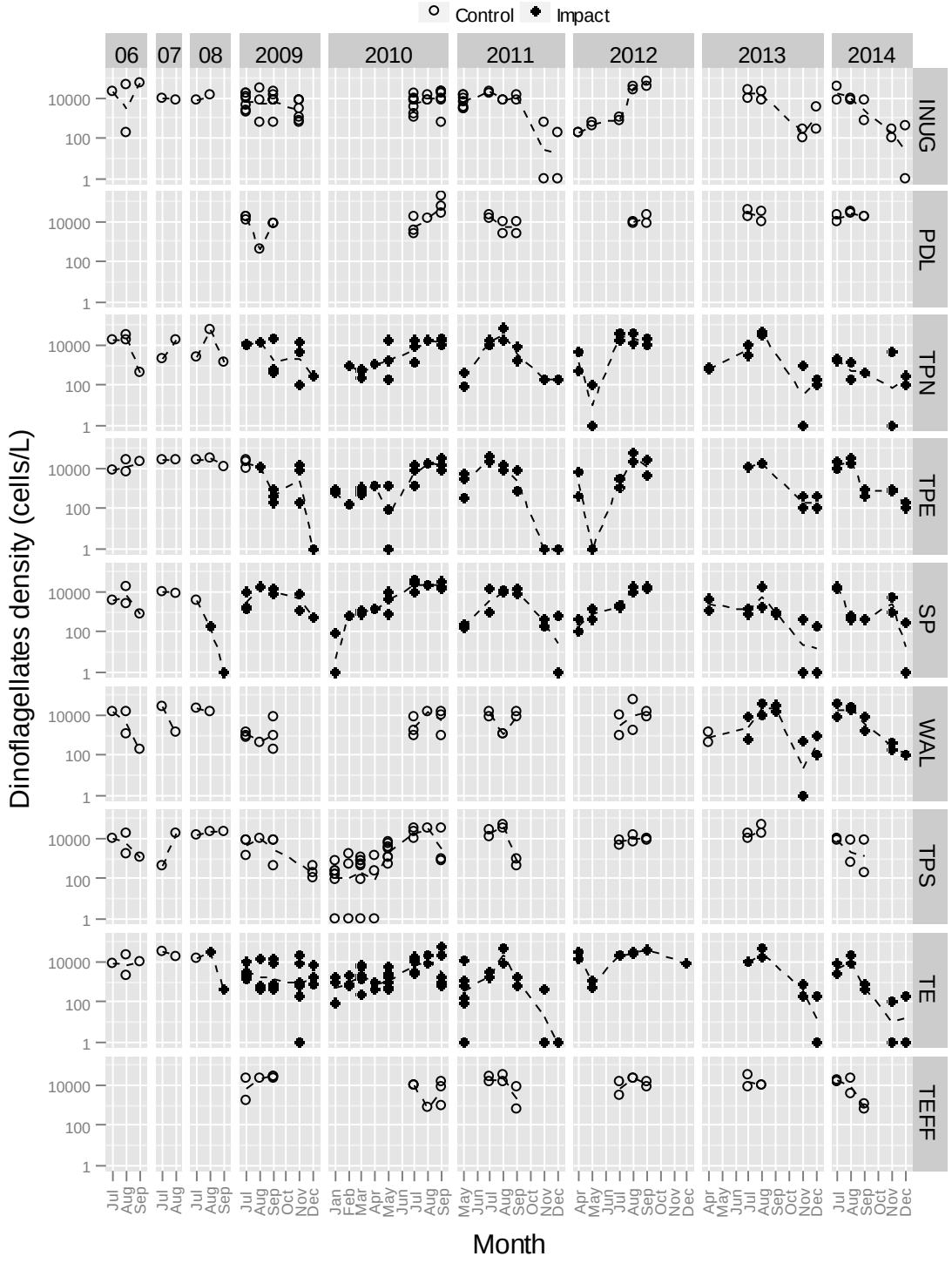

Control
Impact
06
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2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Chlorophyte density (cells/L)
1e+06
10000
100
1
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

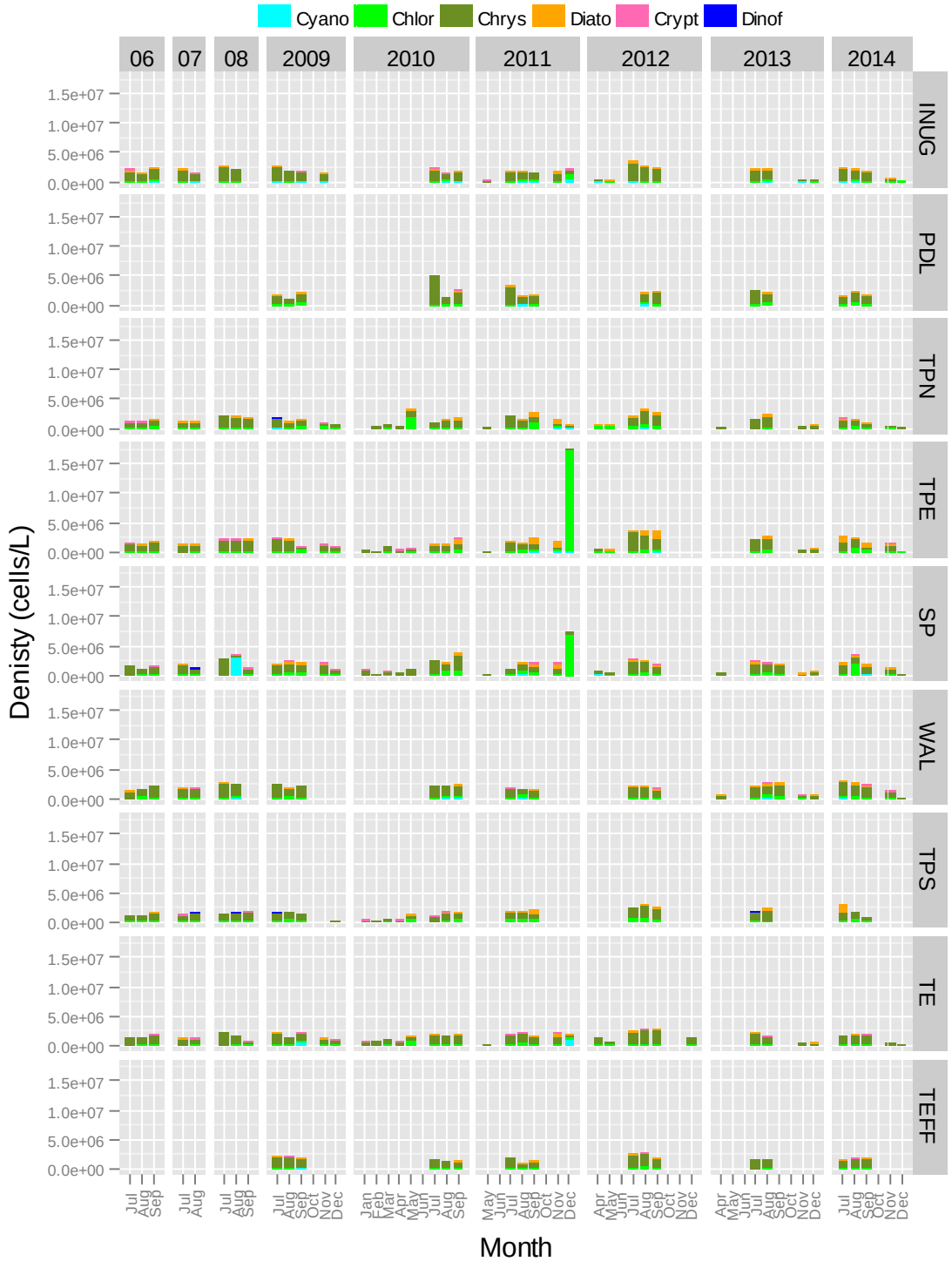

Control
Impact
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Chrysophyte density (cells/L)
1e+07
2e+06
5e+05
1e+05
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

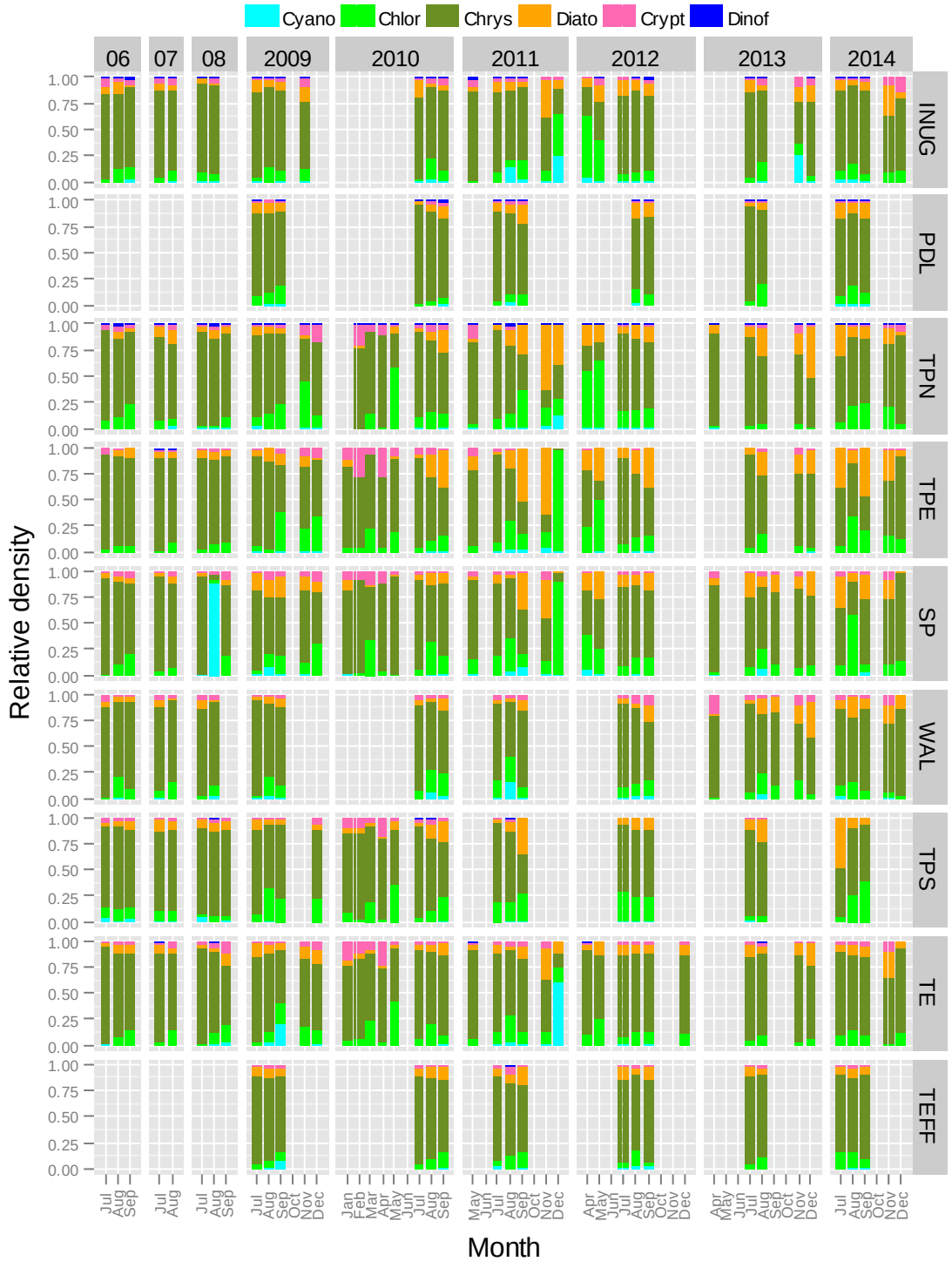

Control
Impact
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Diatoms density (cells/L)
1e+06
10000
100
1
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

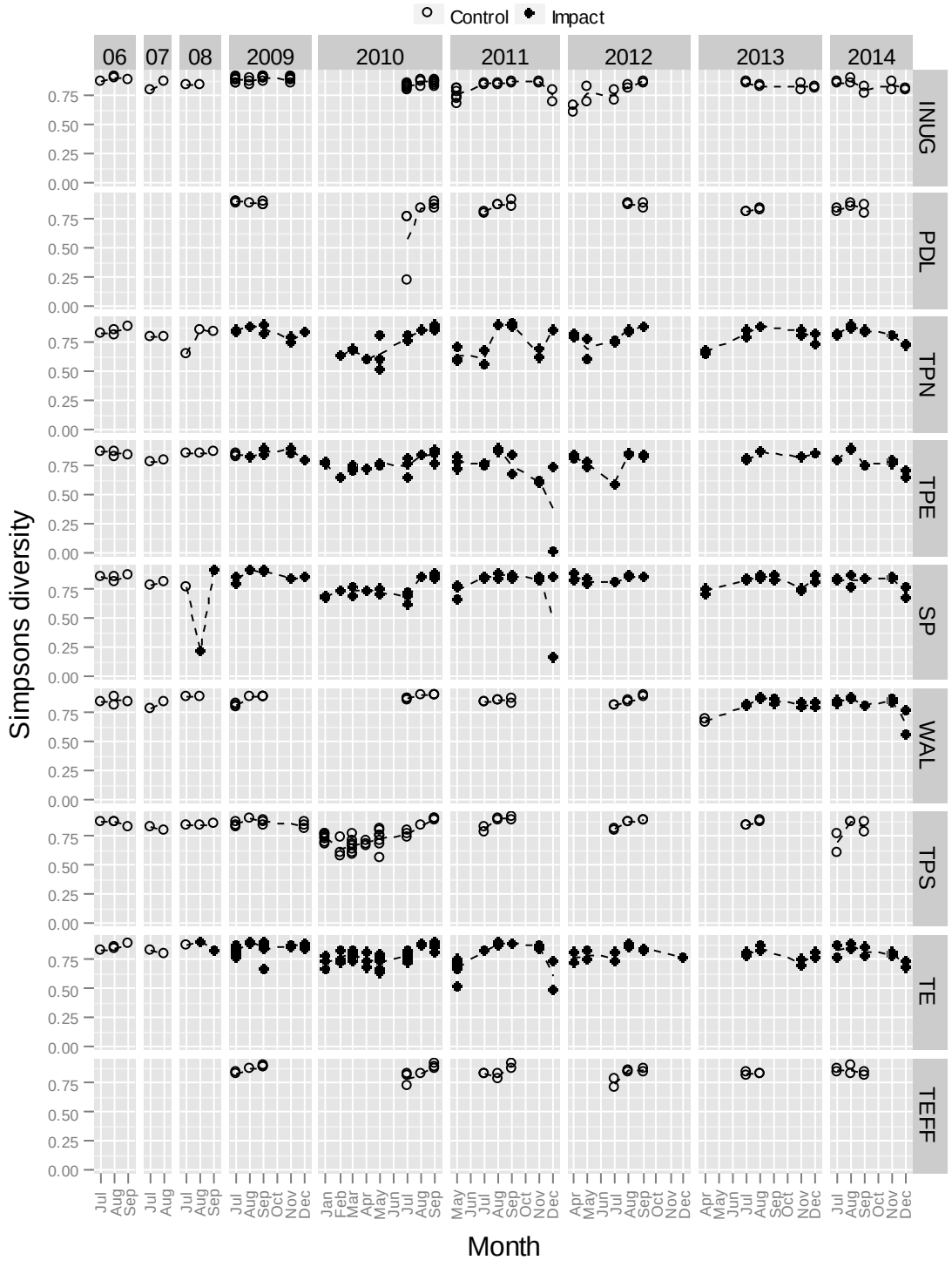
CREMP Phytoplankton Plots 2006 – 2014
Meadowbank Study Lakes

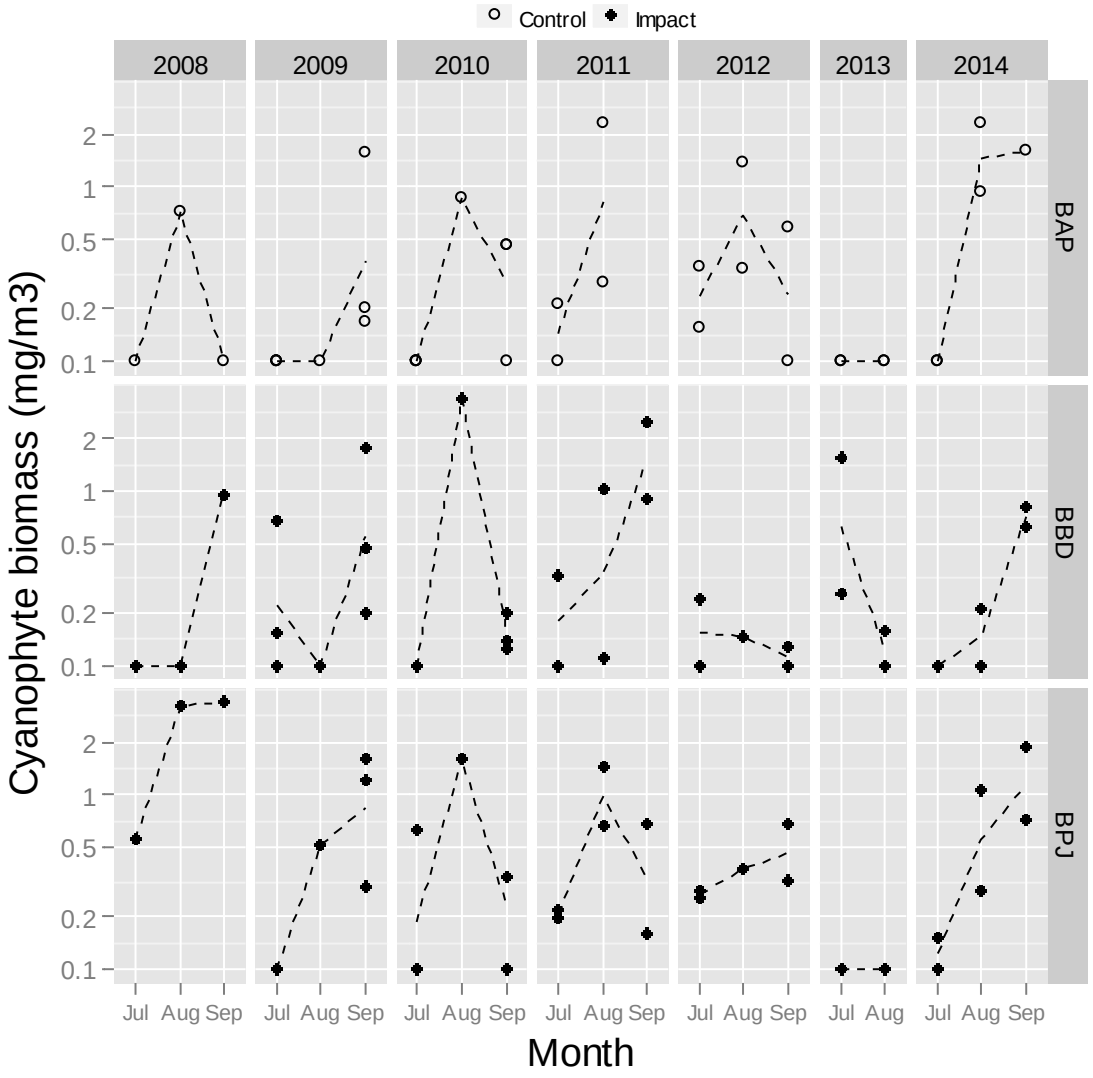



Control
Impact
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Dinoflagellates density (cells/L)
10000
100
1
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

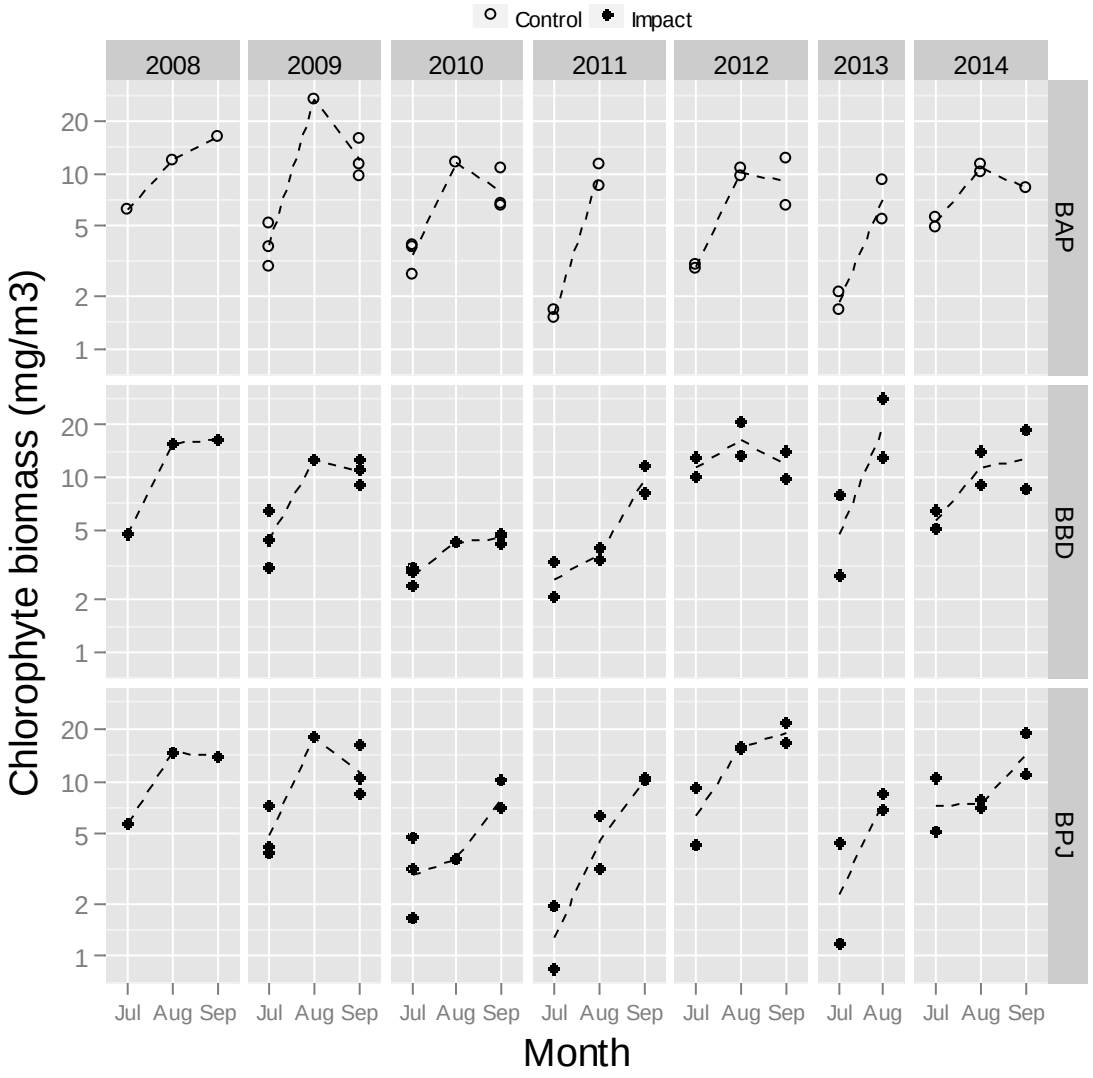

Cyano
Chlor
Chrys
Diato
Crypt
Dinof
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Denisty (cells/L)
1.5e+07
1.0e+07
5.0e+06
0.0e+00
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month


Cyano
Chlor
Chrys
Diato
Crypt
Dinof
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Relative density
1.00
0.75
0.50
0.25
0.00
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

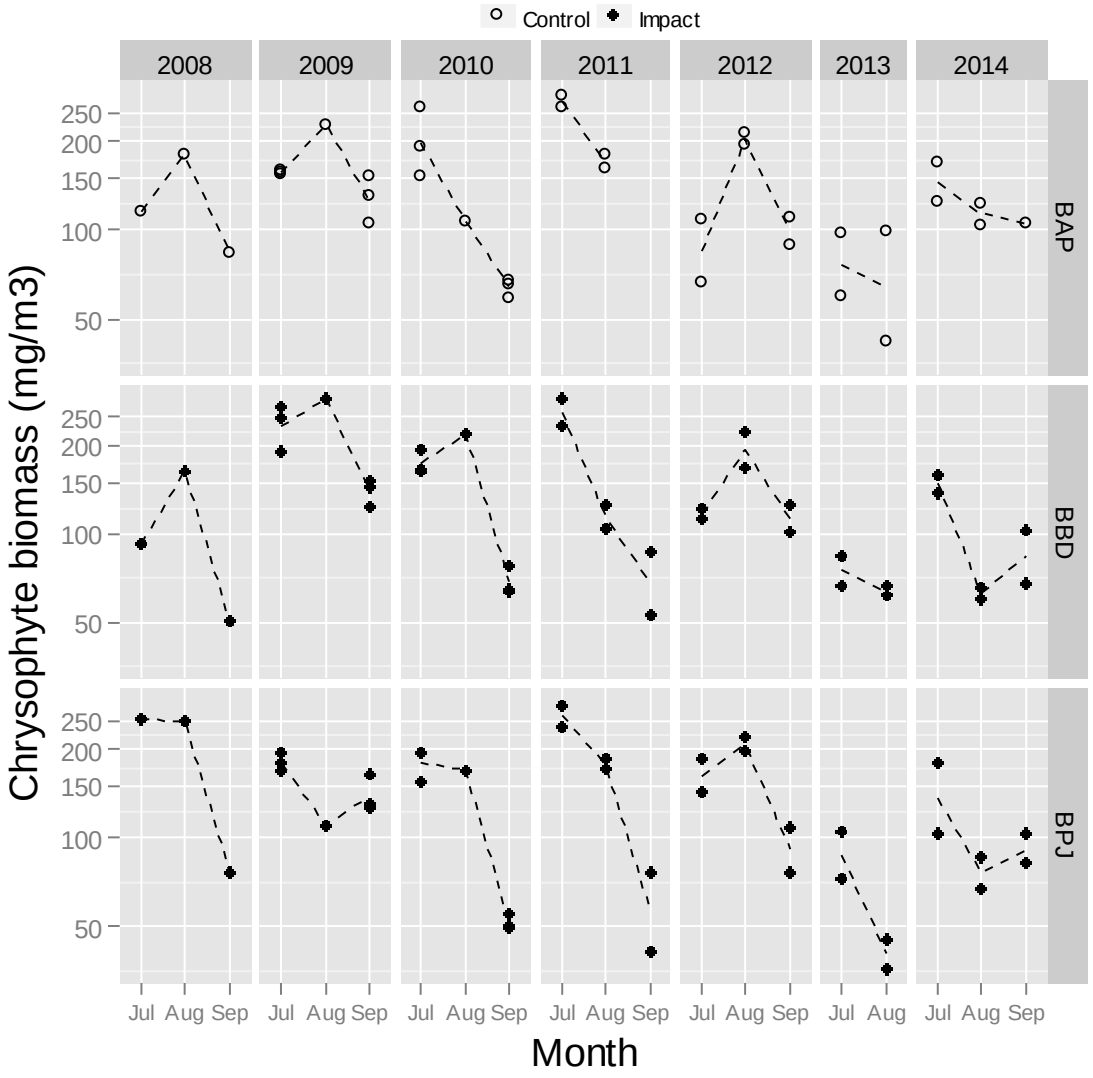

Control
Impact
06
07
08
2009
2010
2011
2012
2013
2014
INUG
PDL
TPN
TPE
SP
WAL
TPS
TE
TEFF
Simpsons diversity
0.00
0.25
0.50
0.75
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Month

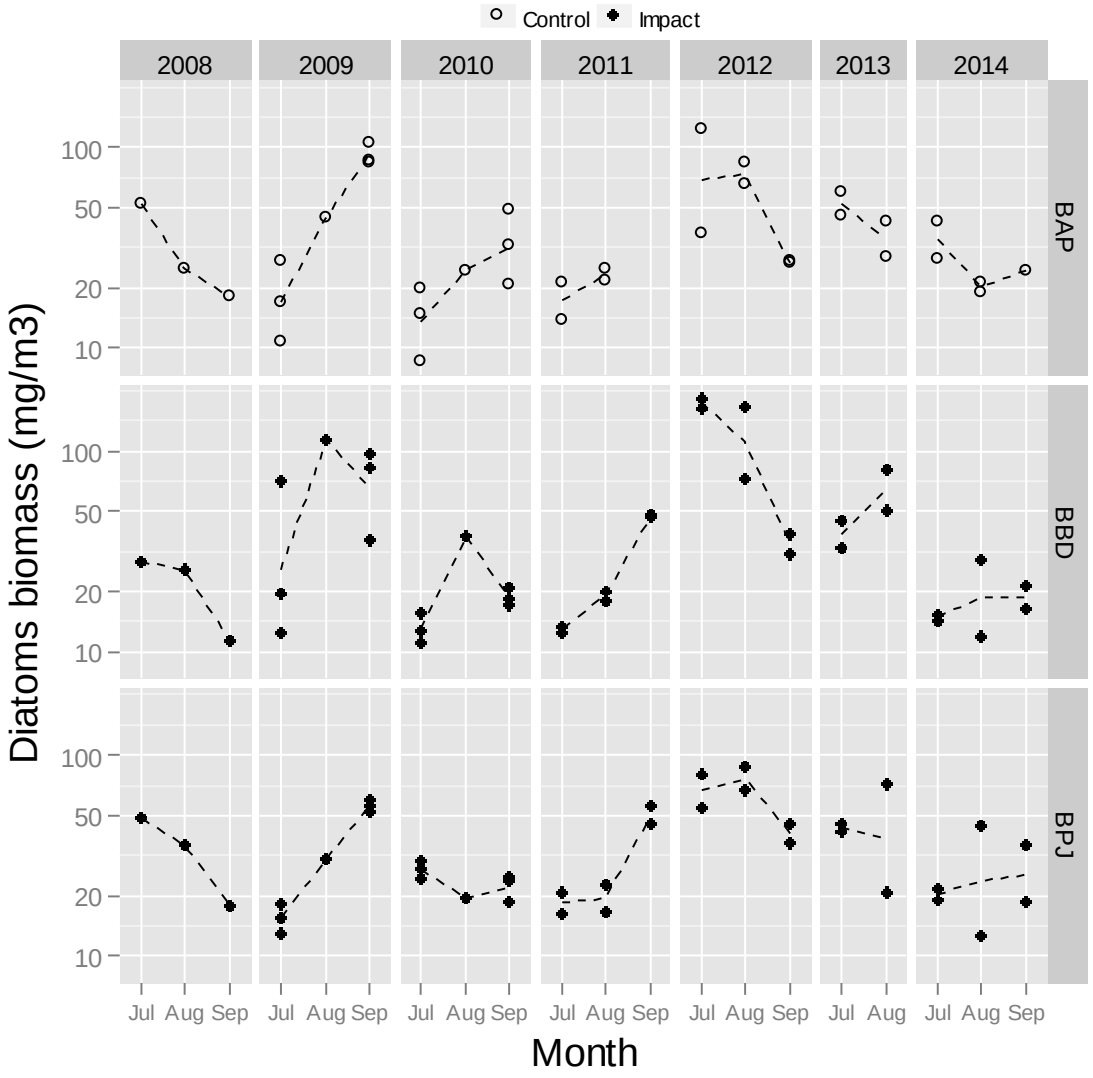

Control
Impact
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Cyanophyte biomass (mg/m3)
2
1
0.5
0.2
0.1
Jul
Aug
Sep
Month

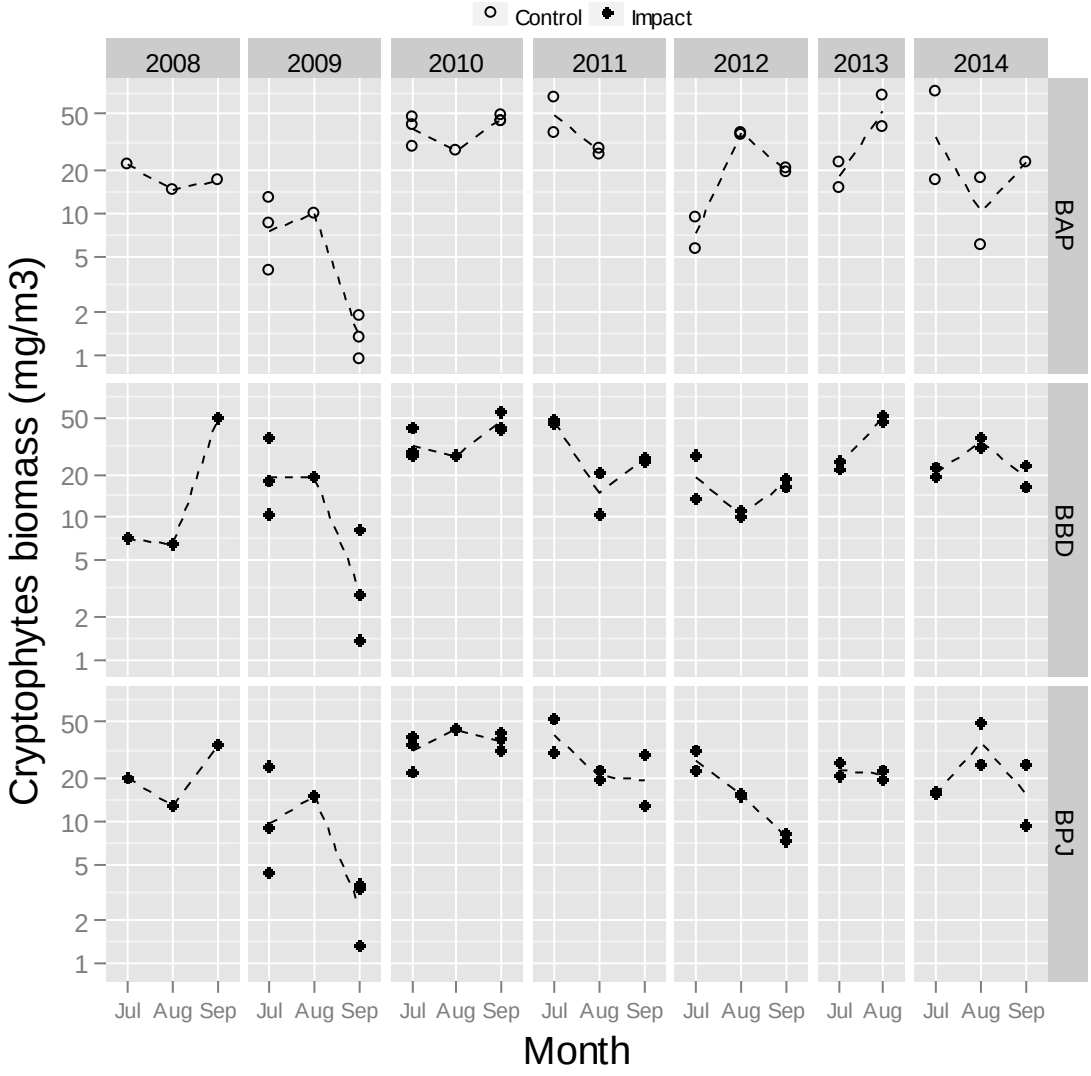
CREMP Phytoplankton Plots 2008 – 2014
Baker Lake

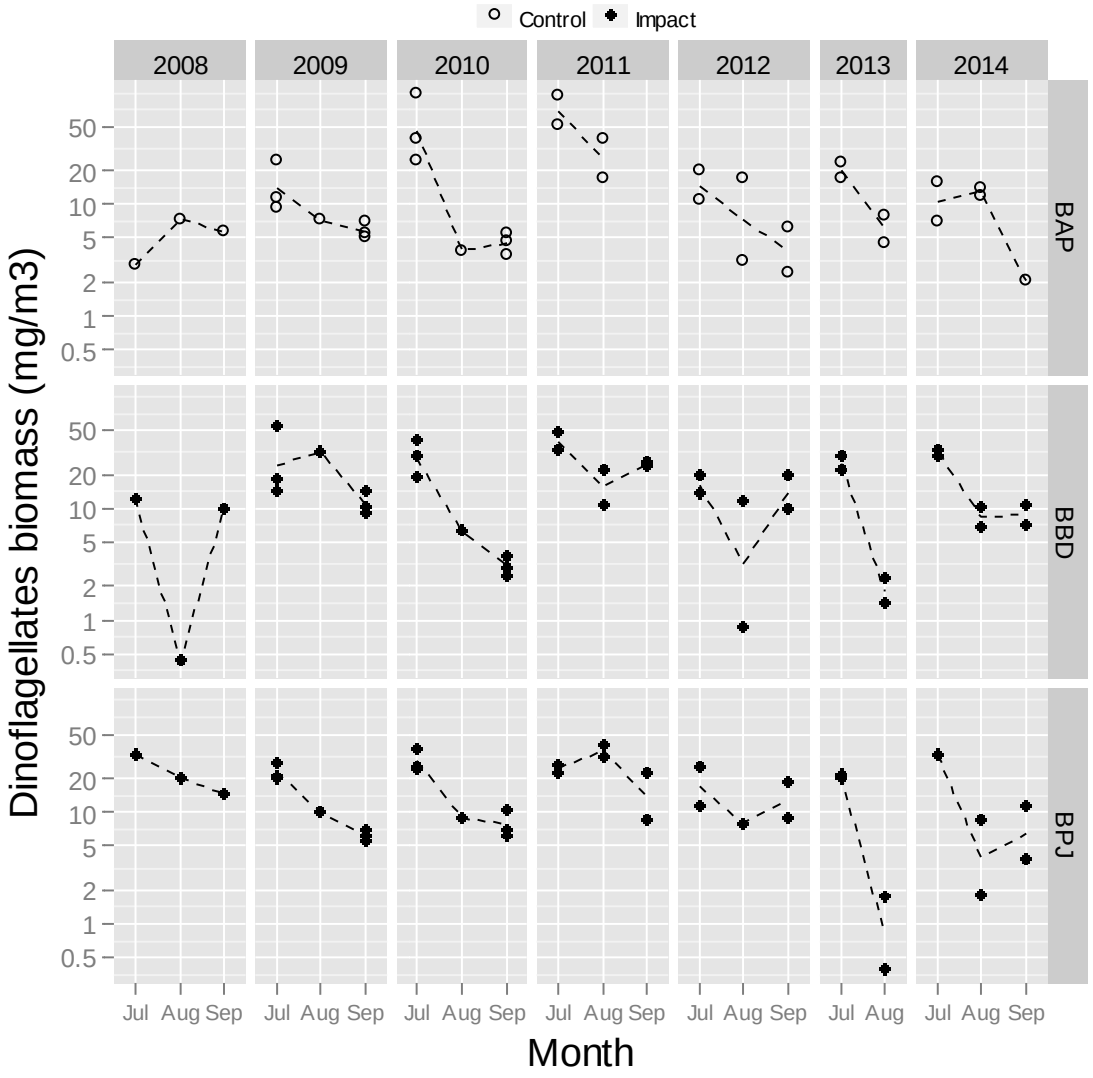


CREMP Phytoplankton Plots 2008 – 2014
Baker Lake

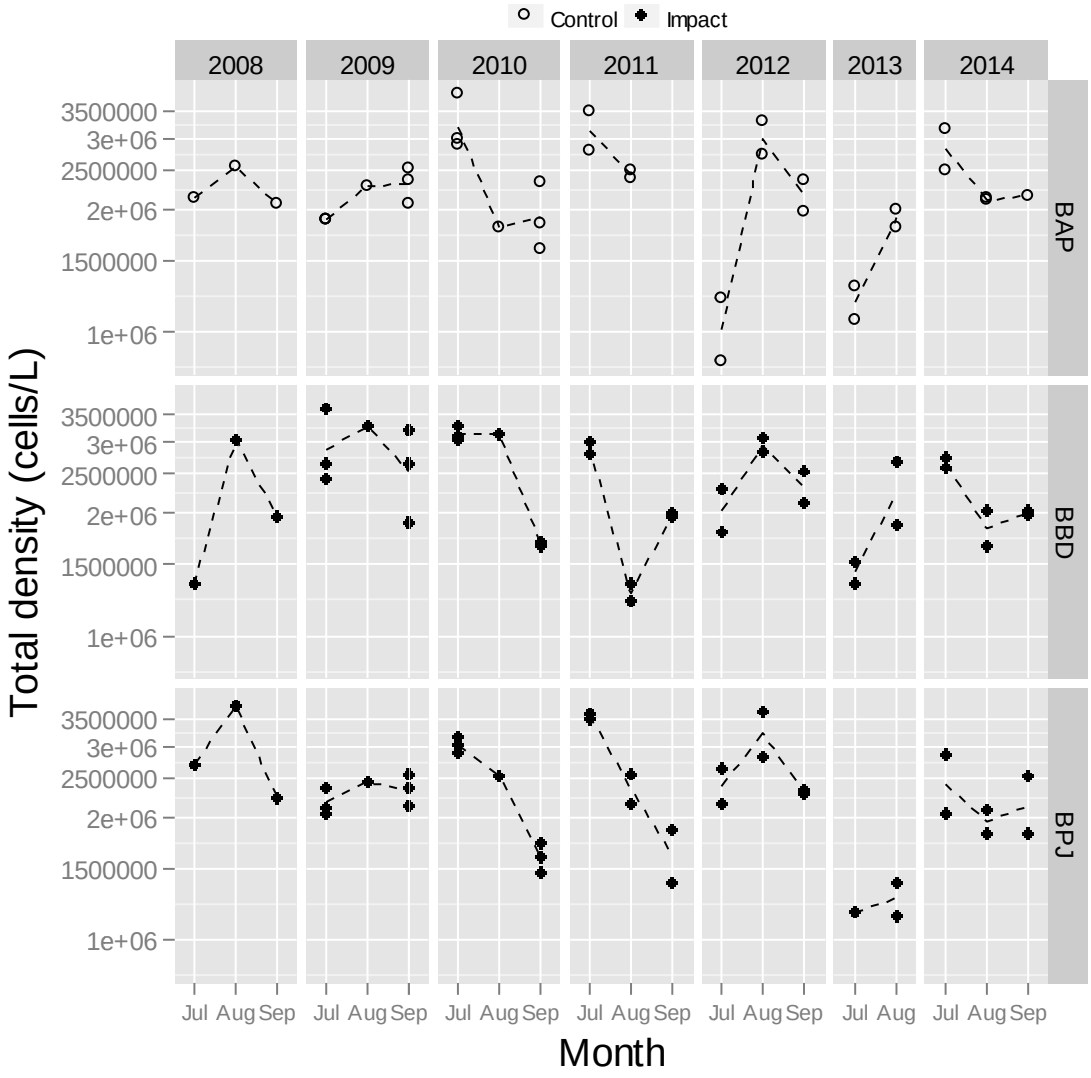



Control
Impact
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Diatoms biomass (mg/m3)
100
50
20
10
Jul
Aug
Sep
Month

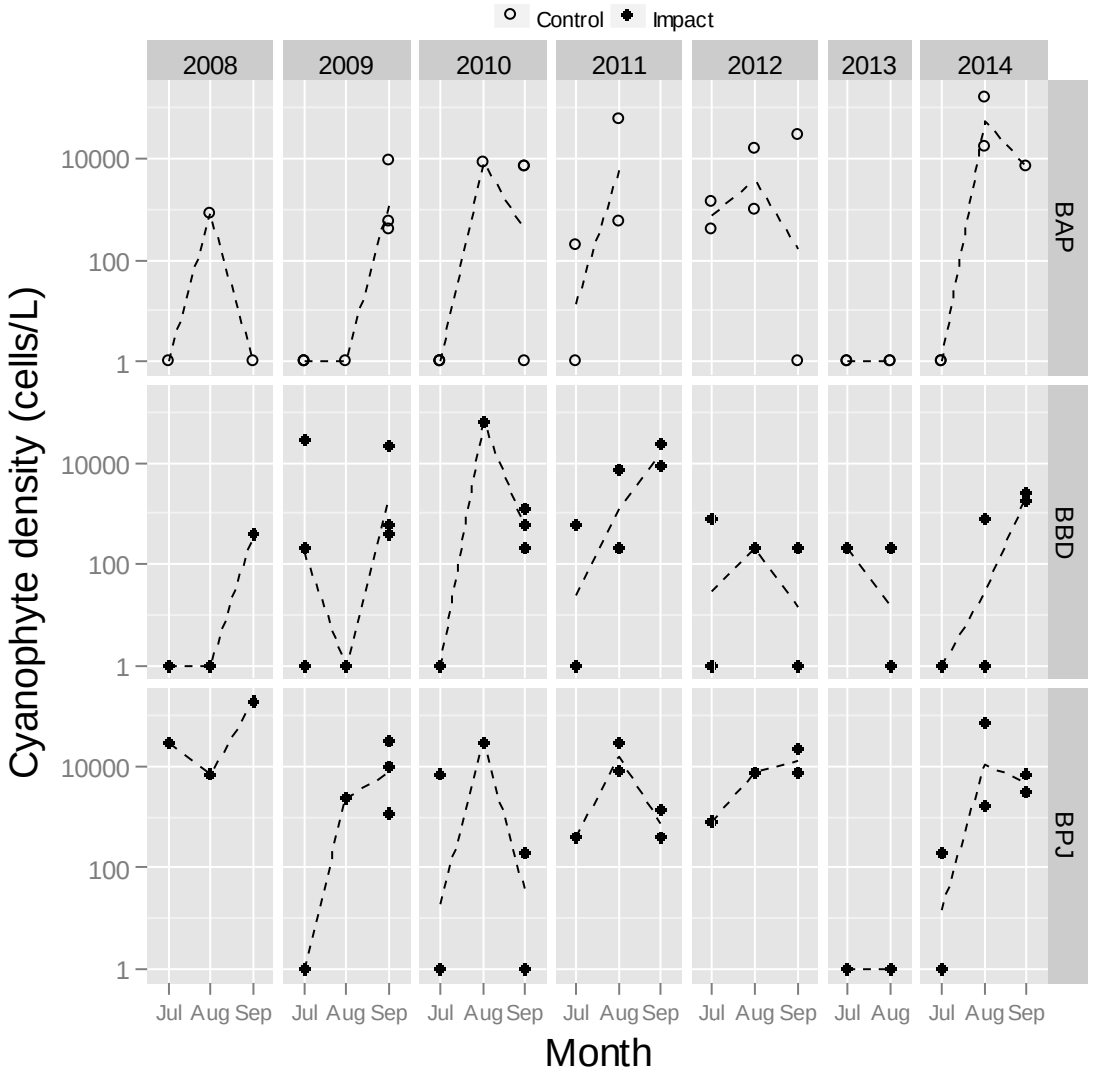

Control
Impact
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Cryptophytes biomass (mg/m3)
50
20
10
5
2
1
Jul
Aug
Sep
Month


Control
Impact
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Dinoflagellates biomass (mg/m3)
50
20
10
5
2
1
0.5
Jul
Aug
Sep
Month

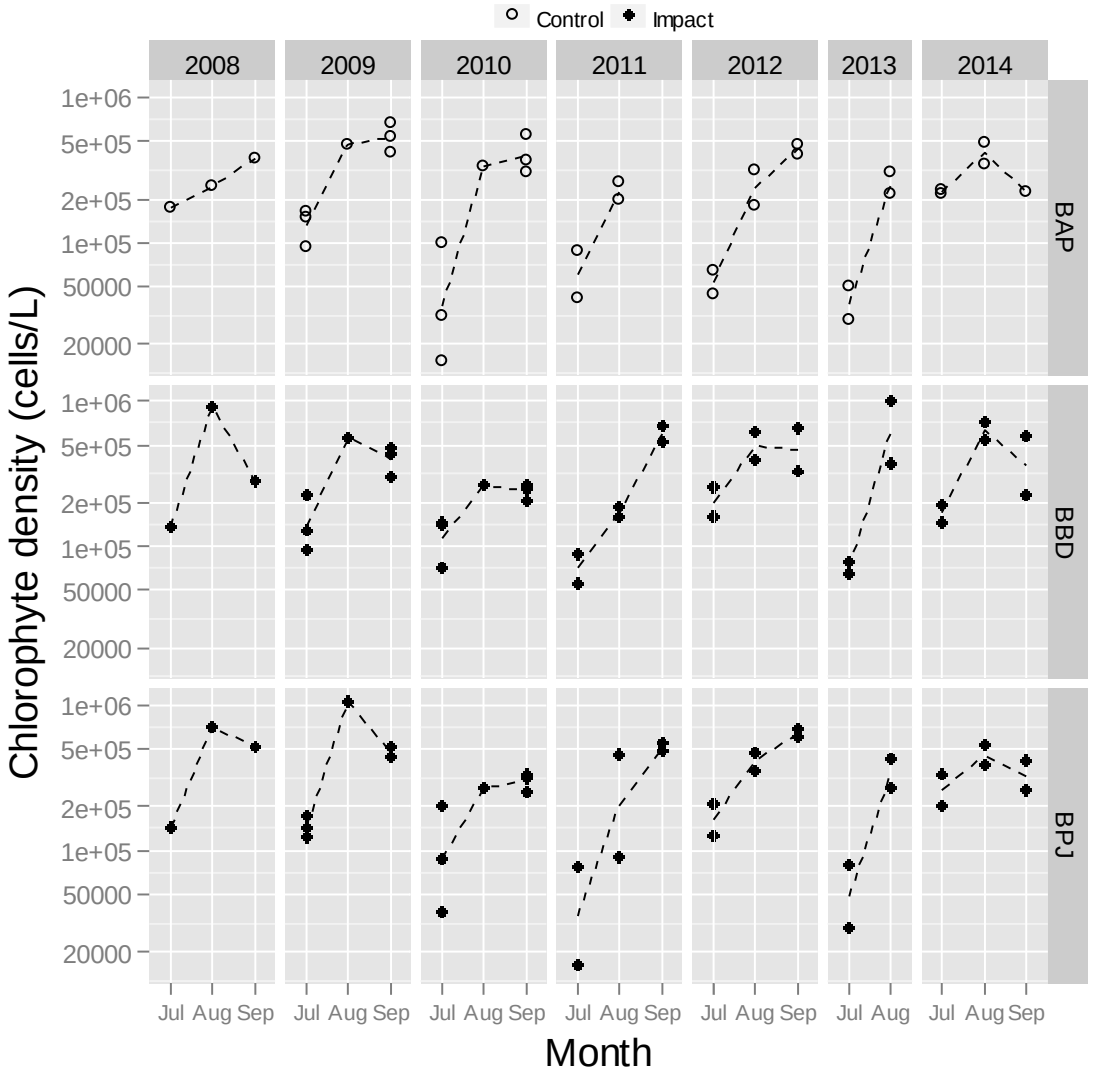
CREMP Phytoplankton Plots 2008 – 2014
Baker Lake

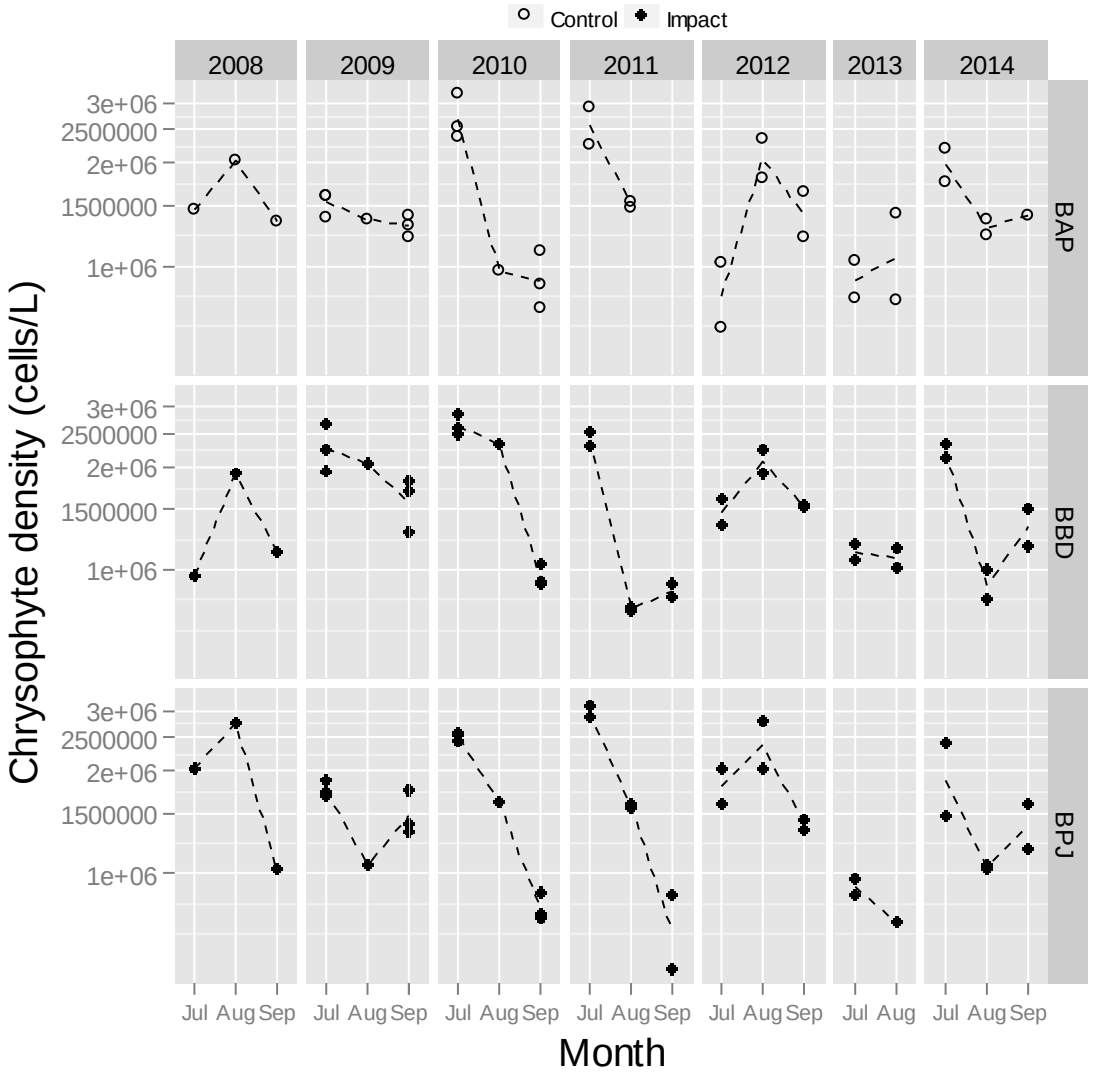


CREMP Phytoplankton Plots 2008 – 2014
Baker Lake

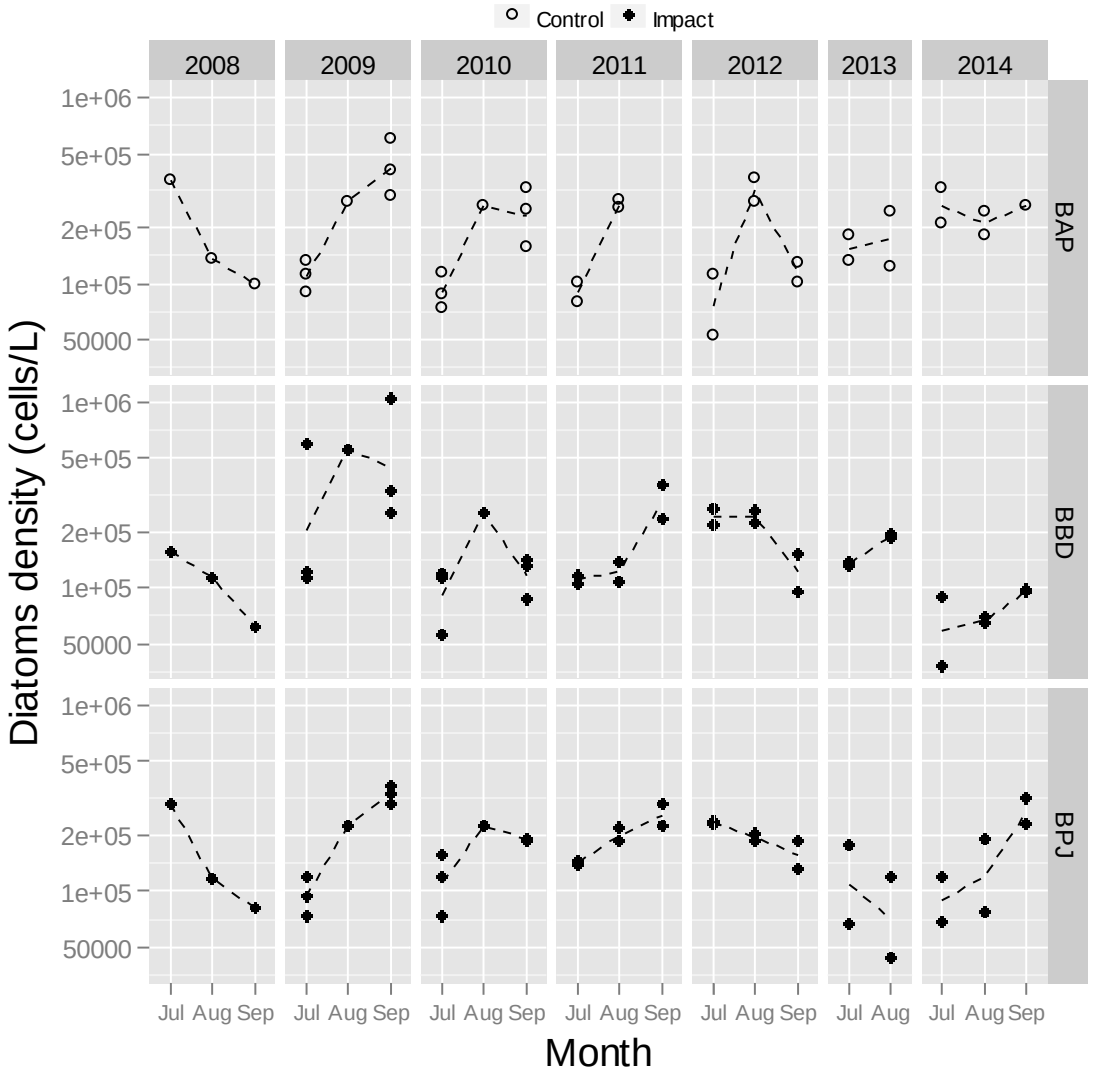


CREMP Phytoplankton Plots 2008 – 2014
Baker Lake

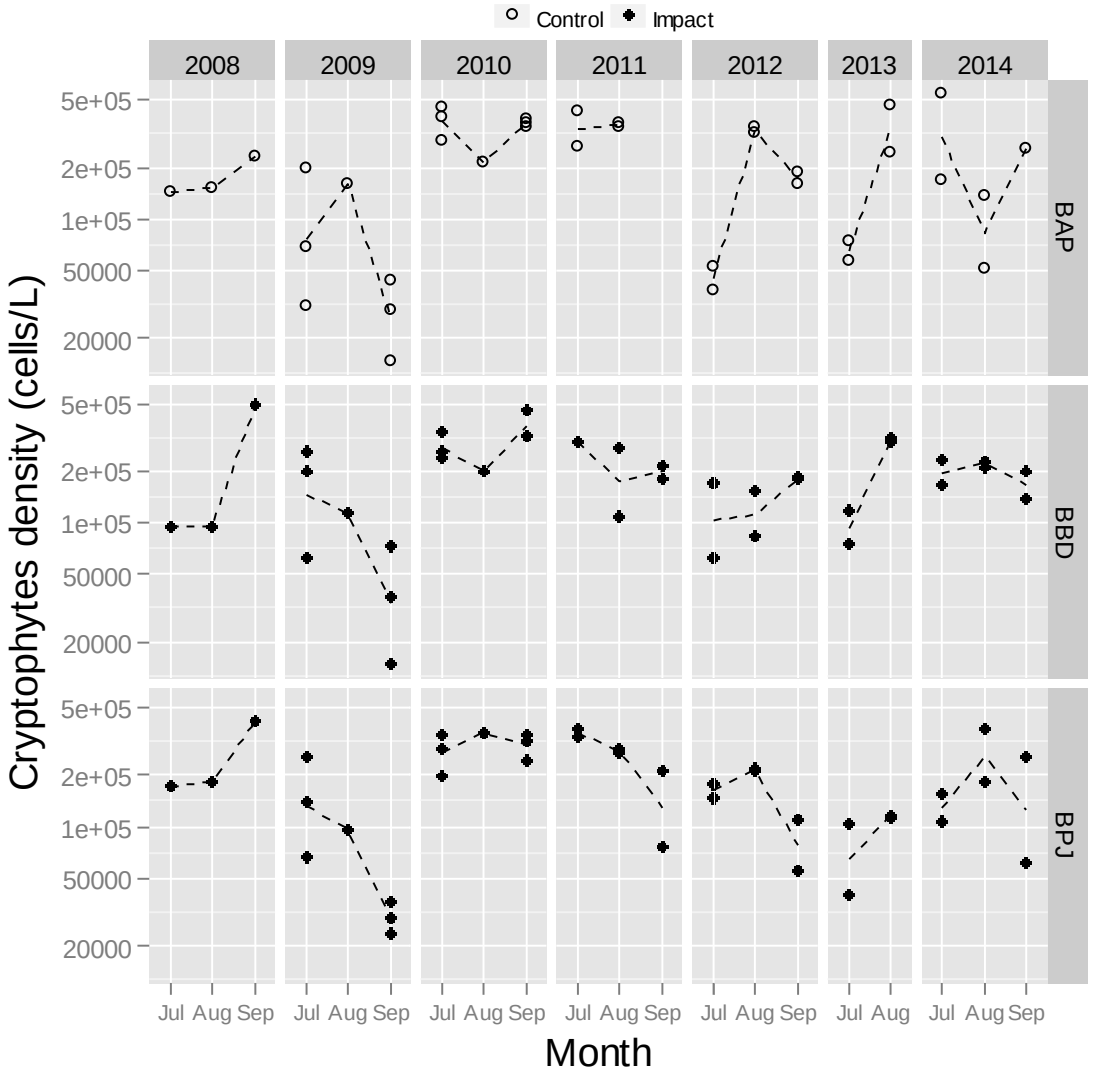



Control
Impact
2008
2009
2010
2011
2012
2013
2014
BAP
BBD
BPJ
Chrysophyte density (cells/L)
3e+06
2500000
2e+06
1500000
1e+06
Jul
Aug
Sep
Month

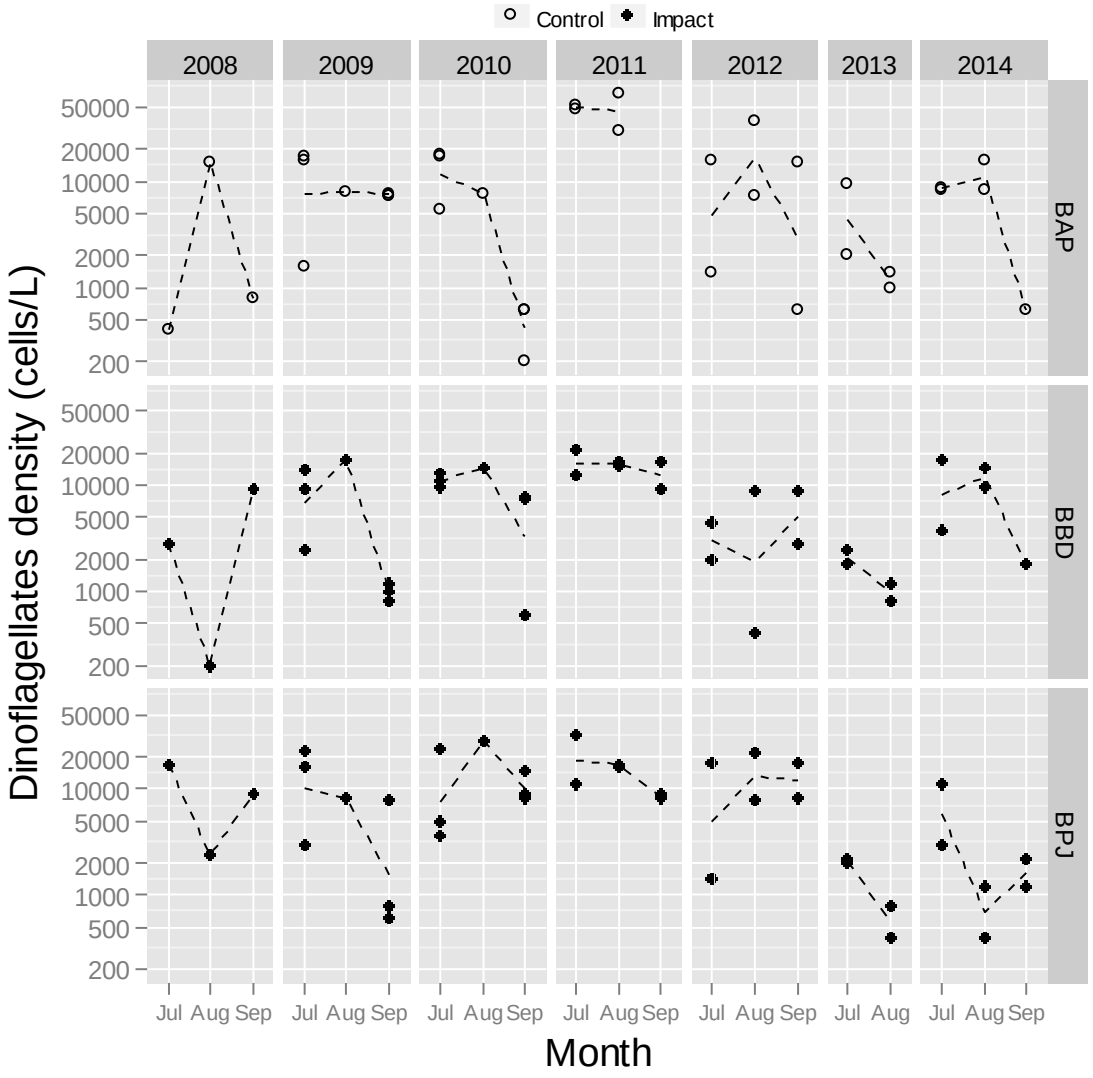
CREMP Phytoplankton Plots 2008 – 2014
Baker Lake



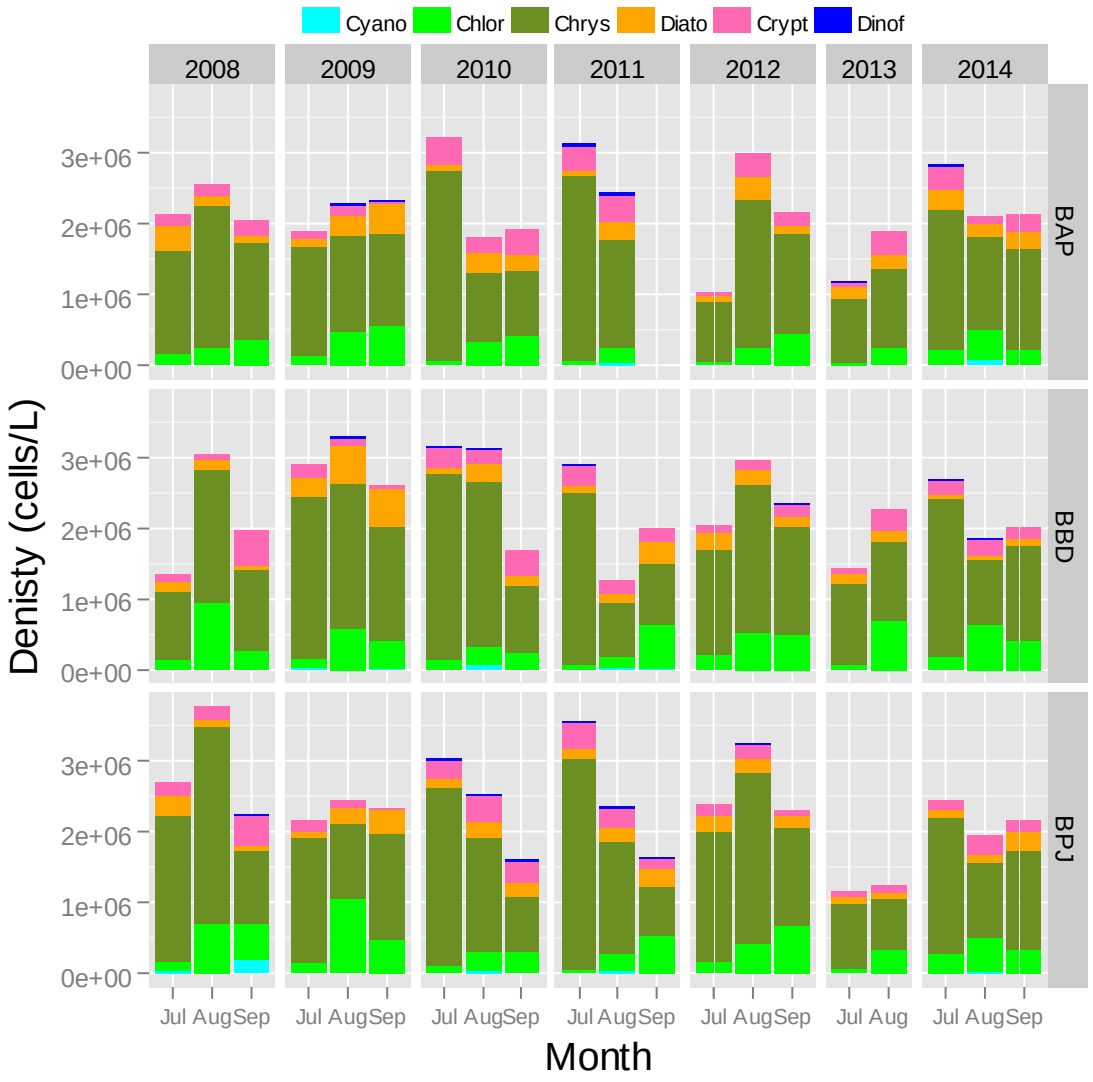
CREMP Phytoplankton Plots 2008 – 2014
Baker Lake



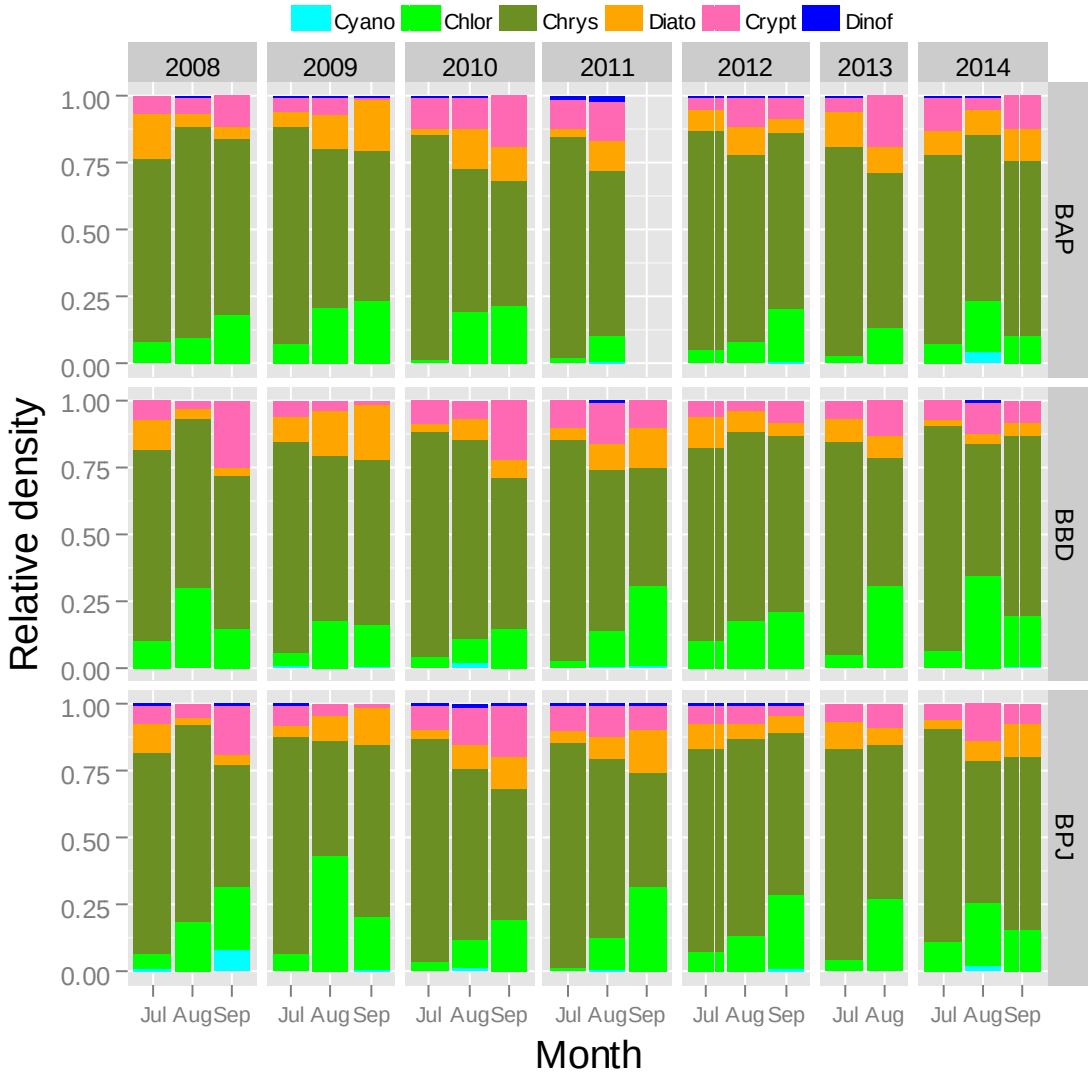
CREMP Phytoplankton Plots 2008 – 2014
Baker Lake



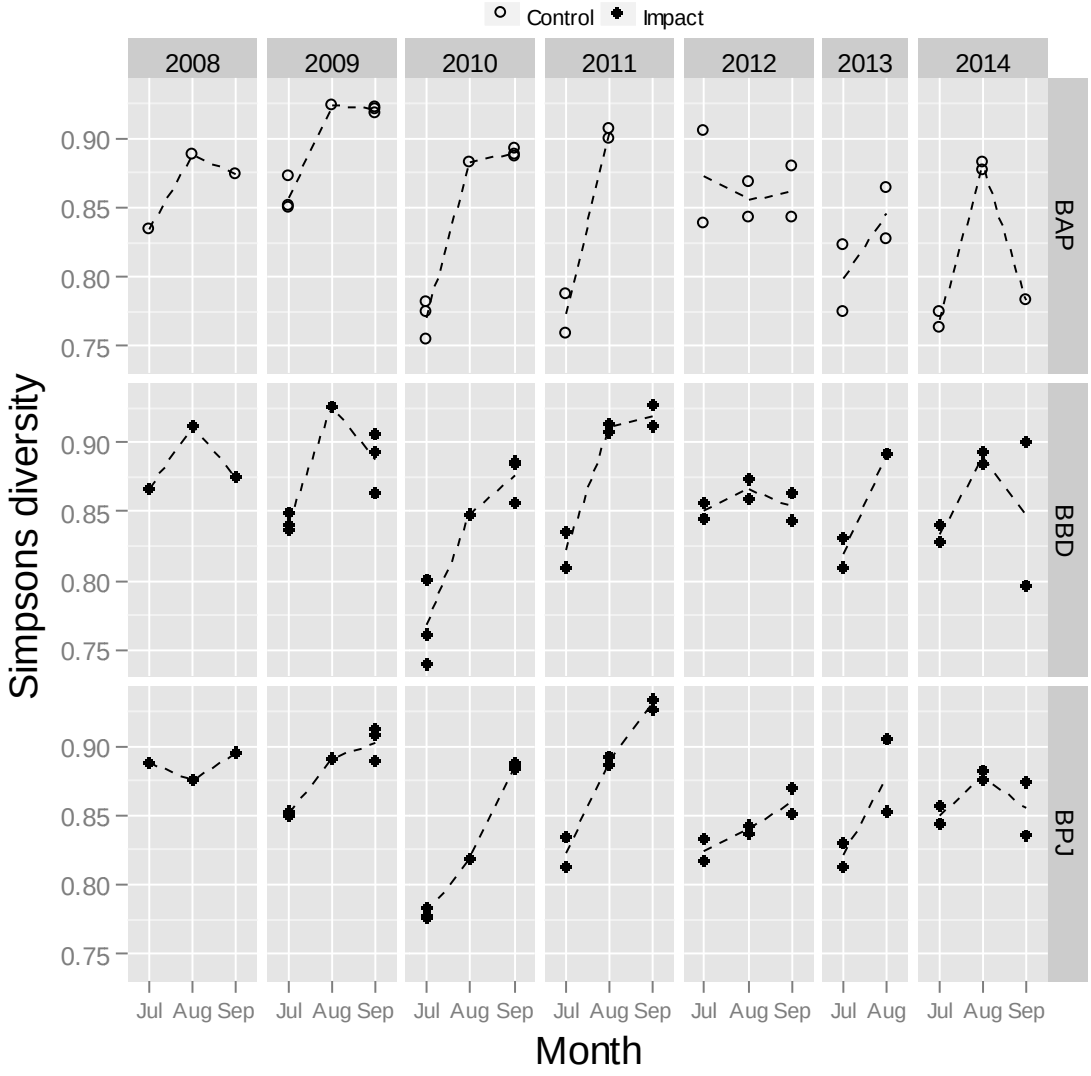
CREMP Phytoplankton Plots 2008 – 2014
Baker Lake



CREMP Phytoplankton Plots 2008 – 2014
Baker Lake



CREMP Phytoplankton Plots 2008 – 2014
Baker Lake



APPENDIX H

BENTHIC INVERTEBRATE RAW DATA, MEADOWBANK STUDY LAKES AND BAKER LAKE, 2014

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Baker Akilahaarjuk Point					Baker Barge Dock					Baker East Shore				
Station	**BAP**	**BAP**	**BAP**	**BAP**	**BAP**	**BBD**	**BBD**	**BBD**	**BBD**	**BBD**	**BES**	**BES**	**BES**	**BES**	**BES**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	8	8.3	7.8	7.7	8	7.7	9.4	8.4	6.9	7	8.3	7.2	9.1	8.7	8.9
# 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	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14
ROUNDWORMS															
P. Nemata	15	24	20	36	24	2	2		4		7		11	17	13
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae	20	42	38	6	1						5	6	1	6	1
F. Naididae															
S.F. Naidinae															
Slavina appendiculata			5												
S.F. Tubificinae															
Limnodrilus hoffmeisteri	24	21	16	18				7							
immatures with hair chaetae	20	115	66	18			3	1			1				
immatures without hair chaetae	8		22	24			3	10							
S.F. Rhyacodrilinae															
Rhyacodrilus coccineus	12	21	22	12	1		3								
Rhyacodrilus montana	48	83	55	47	11	3	25	2			7	7	4	5	
F. Lumbriculidae															
Lumbriculus		10													
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
indeterminate					1										
F. Acalyptonotidae															
Acalyptonotus	8		4		1						1	4	5	1	1
F. Hygrobatidae															
Hygrobates	4								1						
F. Lebertiidae															
Lebertia			5	4	4	3	3		4	2	4	2	6	4	3
F. Oxidae															
Frontipoda	1														
Oxus	9	2			1	2							1	2	
SEED SHRIMPS															
Cl. Ostracoda	84	40	33	56	5	39	67	4	21	5	7	5	1		3
SPRINGTAILS															
Cl. Entognatha															
O. Collembola	1														
INSECTS															
Cl. Insecta															
CADDISFLIES															
O. Trichoptera															
F. Apataniidae															
Apatania	1		4	4	1						1	1			
F. Limnephilidae															
Grensia praeterita															
TRUE FLIES															
O. Diptera															
MIDGES															
F. Chironomidae															
chironomid pupae	8			2	4		1		1	1	11	2	9	2	
S.F. Chironominae															
Chironomus															
Cladotanytarsus															
Constempellina		4	10	12	4		1				1	12	3	2	
Corynocera															
Dicrotendipes															
Micropsectra	313	146	39	138	7	20	3		8		2	3	7	5	1
Microtendipes															

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Baker Akilahaarjuk Point					Baker Barge Dock					Baker East Shore				
Station	**BAP**	**BAP**	**BAP**	**BAP**	**BAP**	**BBD**	**BBD**	**BBD**	**BBD**	**BBD**	**BES**	**BES**	**BES**	**BES**	**BES**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	8	8.3	7.8	7.7	8	7.7	9.4	8.4	6.9	7	8.3	7.2	9.1	8.7	8.9
# 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	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14	31-Aug-14
Paracladopelma			1		1								1		
Paratanytarsus	8	8	18	4	1						3	8	3	2	1
Polypedilum			1												
Sergentia			3	2											
Stempellinella							1								
Stictochironomus	53	40	57	60	3	89	111	61	2	5		1			
Tanytarsus	30	26	15	12	5	20	16		24		12	6	17	10	6
S.F. Diamesinae															
Protanypus			3		1	12	2	1	1						
Potthastia			3	2											
Pseudodiamesa															
S.F. Orthocladiinae															
Abiskomyia	332	46	151	170	91	17	4		1	18	65	62	69	64	49
Cricotopus/Orthocladius			1												
Heterotrissocladius	4	2	3	8	3	29	28	2	12		5		6	2	2
Hydrobaenus															
Mesocricotopus															
Paracladius					4	2		1				1	4	4	3
Psectrocladius															
Zalutschia							1								
Orthocladiinae *Genus "Greenland"* indeterminate											1				
S.F. Prodiamesinae															
Monodiamesa	4		3	3	2	6	5	10	5	1	3	3	5	6	1
S.F. Tanypodinae															
Ablabesmyia						1									
Procladius	4	2	13	2	2		7	1	18	4	3	3	3	1	4
Thienemannimyia complex	4	2	4	24					1						
F. Empididae															
Chelifera/Neoplasta							3		2	5		1		2	3
Wiedemannia															
MOLLUSCS															
P. Mollusca															
CLAMS															
Cl. Bivalvia															
F. Sphaeriidae															
Cyclocalyx/Neopisidium	39	6	1	2	6	9	61			20	10	10	8	9	9
Cyclocalyx	13	2	45	34			3			2					
Sphaerium nitidum															
R (Richness) - totals															
Total	20	17	26	20	20	13	17	8	12	8	14	16	16	16	13
Oligochaete	4	5	5	4	3	1	2	2	0	0	2	2	2	2	1
Insect	10	9	17	13	13	9	12	6	10	5	9	11	10	10	9
Mollusc	2	2	2	2	1	1	2	0	0	2	1	1	1	1	1
Other	4	1	2	1	3	2	1	0	2	1	2	2	3	3	2
N (Abundance) - raw															
Total	967	578	608	608	155	213	284	96	80	58	135	132	152	127	84
Oligochaete	132	292	224	125	13	3	34	20	0	0	13	13	5	11	1
Insect	761	276	329	443	129	196	183	76	75	34	107	103	127	100	70
Mollusc	52	8	46	36	6	9	64	0	0	22	10	10	8	9	9
Other	22	2	9	4	7	5	3	0	5	2	5	6	12	7	4
N (Abundance) - #/m^2															
Total	21022	12565	13217	13217	3370	4630	6174	2087	1739	1261	2935	2870	3304	2761	1826
Oligochaete	2870	6348	4870	2717	283	65	739	435	0	0	283	283	109	239	22
Insect	16543	6000	7152	9630	2804	4261	3978	1652	1630	739	2326	2239	2761	2174	1522
Mollusc	1130	174	1000	783	130	196	1391	0	0	478	217	217	174	196	196
Other	478	43	196	87	152	109	65	0	109	43	109	130	261	152	87
TOTAL NUMBER OF TAXA [1]	**20**	**17**	**26**	**20**	**20**	**13**	**17**	**8**	**12**	**8**	**14**	**16**	**16**	**16**	**13**
TOTAL NUMBER OF ORGANISMS [2]	**967**	**578**	**608**	**608**	**155**	**213**	**284**	**96**	**80**	**58**	**135**	**132**	**152**	**127**	**84**

Notes:

[1] Number of taxa totals exclude P. Nemata, Cl. Ostracoda & O. Collembola, immatures & pupae (Tubificinae, Chironomidae), and indeterminates (Acarina, Orthocladiinae).

[2] Number of organisms totals exclude P. Nemata, Cl. Ostracoda, & O. Collembola.

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Baker Proposed Jetty					Inuggugayualik Lake					Pipedream Lake				
Station	**BPJ**	**BPJ**	**BPJ**	**BPJ**	**BPJ**	**INUG**	**INUG**	**INUG**	**INUG**	**INUG**	**PDL**	**PDL**	**PDL**	**PDL**	**PDL**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	7.4	8.4	8	8	8.1	7	6.5	7.4	8.5	8.5	6.5	6.7	8.5	8.5	6.8
# 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	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14
ROUNDWORMS															
P. Nemata	9	12	4		3		5			1	1	2	1	7	
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae															
F. Naididae															
S.F. Naidinae															
Slavina appendiculata															
S.F. Tubificinae															
Limnodrilus hoffmeisteri															
immatures with hair chaetae					1				1			1	3		3
immatures without hair chaetae															
S.F. Rhyacodrilinae															
Rhyacodrilus coccineus										1					
Rhyacodrilus montana	7	9	1		16										
F. Lumbriculidae															
Lumbriculus								1	1					2	1
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
indeterminate															
F. Acalyptonotidae															
Acalyptonotus	1		2								1			1	1
F. Hygrobatidae															
Hygrobates	1								1						
F. Lebertiidae															
Lebertia	6	2	1		3										
F. Oxidae															
Frontipoda															
Oxus	1		1		1										
SEED SHRIMPS															
Cl. Ostracoda	9	62	35		3		2								
SPRINGTAILS															
Cl. Entognatha															
O. Collembola															
INSECTS															
Cl. Insecta															
CADDISFLIES															
O. Trichoptera															
F. Apataniidae															
Apatania	1														
F. Limnephilidae															
Grensia praeterita						1									
TRUE FLIES															
O. Diptera															
MIDGES															
F. Chironomidae															
chironomid pupae		6	5		2	1			1				1		
S.F. Chironominae															
Chironomus															
Cladotanytarsus															
Constempellina	1	1	1												
Corynocera															
Dicrotendipes															
Micropsectra	14	9	47	1	3	2	3	3	5	1	3				
Microtendipes						2	4	3	19	10					

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Baker Proposed Jetty					Inuggugayualik Lake					Pipedream Lake				
Station	**BPJ**	**BPJ**	**BPJ**	**BPJ**	**BPJ**	**INUG**	**INUG**	**INUG**	**INUG**	**INUG**	**PDL**	**PDL**	**PDL**	**PDL**	**PDL**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	7.4	8.4	8	8	8.1	7	6.5	7.4	8.5	8.5	6.5	6.7	8.5	8.5	6.8
# 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	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	1-Sep-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14	23-Aug-14
Paracladopelma															
Paratanytarsus	6	7	8	1					1	1					
Polypedilum															
Sergentia				1											
Stempellinella			1												
Stictochironomus	73	3	1		20	11	2	3	1	2	13	15	6	4	5
Tanytarsus	9	29	42		12	1		1	6						1
S.F. Diamesinae															
Protanypus	1	5	1						1	1					
Potthastia															
Pseudodiamesa		1													
S.F. Orthocladiinae															
Abiskomyia	34	8	23		3					1					
Cricotopus/Orthocladius															
Heterotrissocladius	3	30	22		4										
Hydrobaenus															
Mesocricotopus															
Paracladius	3	10	7		3										
Psectrocladius												1			
Zalutschia															
Orthocladiinae *Genus "Greenland"* indeterminate			1												
S.F. Prodiamesinae															
Monodiamesa	4	5	2		9	1			3				2		
S.F. Tanypodinae															
Ablabesmyia															
Procladius	17	13	14	2	16	1	2	2	5	2	2	3		1	8
Thienemannimyia complex	2		1				1			1					1
F. Empididae															
Chelifera/Neoplasta	1		1		1										
Wiedemannia					2										
MOLLUSCS															
P. Mollusca															
CLAMS															
Cl. Bivalvia															
F. Sphaeriidae															
Cyclocalyx/Neopisidium	13	1		1	11	7	1	3	22	12	2	12	3	8	3
Cyclocalyx							3	3	1			4			4
Sphaerium nitidum									2	1					
R (Richness) - totals															
Total	20	15	18	5	14	8	7	8	13	11	5	5	3	5	8
Oligochaete	1	1	1	0	1	0	0	1	1	1	0	0	0	1	1
Insect	14	12	14	4	10	7	5	5	8	8	3	3	2	2	4
Mollusc	1	1	0	1	1	1	2	2	3	2	1	2	1	1	2
Other	4	1	3	0	2	0	0	0	1	0	1	0	0	1	1
N (Abundance) - raw															
Total	198	139	182	6	107	27	16	19	70	33	21	36	15	16	27
Oligochaete	7	9	1	0	17	0	0	1	2	1	0	1	3	2	4
Insect	169	127	177	5	75	20	12	12	42	19	18	19	9	5	15
Mollusc	13	1	0	1	11	7	4	6	25	13	2	16	3	8	7
Other	9	2	4	0	4	0	0	0	1	0	1	0	0	1	1
N (Abundance) - #/m^2															
Total	4304	3022	3957	130	2326	587	348	413	1522	717	457	783	326	348	587
Oligochaete	152	196	22	0	370	0	0	22	43	22	0	22	65	43	87
Insect	3674	2761	3848	109	1630	435	261	261	913	413	391	413	196	109	326
Mollusc	283	22	0	22	239	152	87	130	543	283	43	348	65	174	152
Other	196	43	87	0	87	0	0	0	22	0	22	0	0	22	22
TOTAL NUMBER OF TAXA [1]	**20**	**15**	**18**	**5**	**14**	**8**	**7**	**8**	**13**	**11**	**5**	**5**	**3**	**5**	**8**
TOTAL NUMBER OF ORGANISMS [2]	**198**	**139**	**182**	**6**	**107**	**27**	**16**	**19**	**70**	**33**	**21**	**36**	**15**	**16**	**27**

Notes:

[1] Number of taxa totals exclude P. Nemata, Cl. Ostracoda & O. Collembola, immatures & pupae (Tubificinae, Chironomidae), and indeterminates (Acarina, Orthocladiinae).

[2] Number of organisms totals exclude P. Nemata, Cl. Ostracoda, & O. Collembola.

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Second Portage Lake					Tehek Lake					Tehek Lake - Farfield				
Station	**SP**	**SP**	**SP**	**SP**	**SP**	**TE**	**TE**	**TE**	**TE**	**TE**	**TEFF**	**TEFF**	**TEFF**	**TEFF**	**TEFF**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	8.4	7.3	8.8	8.2	9.4	6.8	8	9.5	8.2	8.8	8.8	6.9	9	8	7.6
# 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	2-Sep-14	2-Sep-14	2-Sep-14	2-Sep-14	2-Sep-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14
ROUNDWORMS															
P. Nemata	1	1	2	3	15	1	1			1		4	1	4	
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae															
F. Naididae															
S.F. Naidinae															
Slavina appendiculata															
S.F. Tubificinae															
Limnodrilus hoffmeisteri															
immatures with hair chaetae					1	2			1			3			
immatures without hair chaetae															
S.F. Rhyacodrilinae															
Rhyacodrilus coccineus											1				
Rhyacodrilus montana						1									
F. Lumbriculidae															
Lumbriculus			1	1		3	1	1	1				2		
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
indeterminate															
F. Acalyptonotidae															
Acalyptonotus	1	1	2	2	1	1					4	3		3	1
F. Hygrobatidae															
Hygrobates		1			1				1						
F. Lebertiidae															
Lebertia	1	1	1	3	3		1	1		1	1	1		2	
F. Oxidae															
Frontipoda															
Oxus	2	1		1	2	1	2	3		3					
SEED SHRIMPS															
Cl. Ostracoda	17	5	7	12	4	3	6	6	1	8	10	30	8	7	3
SPRINGTAILS															
Cl. Entognatha															
O. Collembola															
INSECTS															
Cl. Insecta															
CADDISFLIES															
O. Trichoptera															
F. Apataniidae															
Apatania															
F. Limnephilidae															
Grensia praeterita	1			1		1	2	1		1		1	1		1
TRUE FLIES															
O. Diptera															
MIDGES															
F. Chironomidae															
chironomid pupae															
S.F. Chironominae															
Chironomus															
Cladotanytarsus															
Constempellina															
Corynocera						1	1								
Dicrotendipes															
Micropsectra	76	33	68	138	76	24	1	12	37	9	13	38	7	8	3
Microtendipes															

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Second Portage Lake					Tehek Lake					Tehek Lake - Farfield				
Station	**SP**	**SP**	**SP**	**SP**	**SP**	**TE**	**TE**	**TE**	**TE**	**TE**	**TEFF**	**TEFF**	**TEFF**	**TEFF**	**TEFF**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	8.4	7.3	8.8	8.2	9.4	6.8	8	9.5	8.2	8.8	8.8	6.9	9	8	7.6
# 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	2-Sep-14	2-Sep-14	2-Sep-14	2-Sep-14	2-Sep-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14	30-Aug-14
Paracladopelma															
Paratanytarsus											1	3	1	1	
Polypedilum															
Sergentia															
Stempellinella															
Stictochironomus	1	6	2	8	6	3	16			1	14	1	8		
Tanytarsus	9			13	7						1			2	8
S.F. Diamesinae															
Protanypus	1	1	2	2	1					1	3	1			
Potthastia															
Pseudodiamesa															
S.F. Orthocladiinae															
Abiskomyia	3	2	13	4	7									1	
Cricotopus/Orthocladius															
Heterotrissocladius			1	2								2		1	2
Hydrobaenus												1			
Mesocricotopus	1					1									
Paracladius											1	7			1
Psectrocladius															
Zalutschia				2											
Orthocladiinae *Genus "Greenland"* indeterminate											1				
S.F. Prodiamesinae															
Monodiamesa	1	1	2	1	1	3		2		1		1			
S.F. Tanypodinae															
Ablabesmyia									2						
Procladius	6	9	8	12	13	5	6	7	14	9	6	5	4	5	2
Thienemannimyia complex	1											1			
F. Empididae															
Chelifera/Neoplasta															
Wiedemannia															
MOLLUSCS															
P. Mollusca															
CLAMS															
Cl. Bivalvia															
F. Sphaeriidae															
Cyclocalyx/Neopisidium	15	24	16	23	18	12	25	17	15	17	10	26	4	9	5
Cyclocalyx	1	3	5										2	1	
Sphaerium nitidum															
R (Richness) - totals															
Total	15	12	12	15	12	12	9	8	6	9	12	14	8	10	8
Oligochaete	0	0	1	1	0	2	1	1	1	0	1	0	1	0	0
Insect	10	6	7	10	7	7	5	4	3	6	8	11	5	6	6
Mollusc	2	2	2	1	1	1	1	1	1	1	1	1	2	2	1
Other	3	4	2	3	4	2	2	2	1	2	2	2	0	2	1
N (Abundance) - raw															
Total	120	83	121	213	137	58	55	44	71	43	56	94	29	33	23
Oligochaete	0	0	1	1	1	6	1	1	2	0	1	3	2	0	0
Insect	100	52	96	183	111	38	26	22	53	22	40	61	21	18	17
Mollusc	16	27	21	23	18	12	25	17	15	17	10	26	6	10	5
Other	4	4	3	6	7	2	3	4	1	4	5	4	0	5	1
N (Abundance) - #/m^2															
Total	2609	1804	2630	4630	2978	1261	1196	957	1543	935	1217	2043	630	717	500
Oligochaete	0	0	22	22	22	130	22	22	43	0	22	65	43	0	0
Insect	2174	1130	2087	3978	2413	826	565	478	1152	478	870	1326	457	391	370
Mollusc	348	587	457	500	391	261	543	370	326	370	217	565	130	217	109
Other	87	87	65	130	152	43	65	87	22	87	109	87	0	109	22
TOTAL NUMBER OF TAXA [1]	**15**	**12**	**12**	**15**	**12**	**12**	**9**	**8**	**6**	**9**	**12**	**14**	**8**	**10**	**8**
TOTAL NUMBER OF ORGANISMS [2]	**120**	**83**	**121**	**213**	**137**	**58**	**55**	**44**	**71**	**43**	**56**	**94**	**29**	**33**	**23**

Notes:

[1] Number of taxa totals exclude P. Nemata, Cl. Ostracoda & O. Collembola, immatures & pupae (Tubificinae, Chironomidae), and indeterminates (Acarina, Orthocladiinae).

[2] Number of organisms totals exclude P. Nemata, Cl. Ostracoda, & O. Collembola.

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Third Portage Lake - East Basin					Third Portage Lake - North Basin					Third Portage Lake - South Basin					Wally Lake				
Station	**TPE**	**TPE**	**TPE**	**TPE**	**TPE**	**TPN**	**TPN**	**TPN**	**TPN**	**TPN**	**TPS**	**TPS**	**TPS**	**TPS**	**TPS**	**WAL**	**WAL**	**WAL**	**WAL**	**WAL**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	7.3	8.1	7.4	6.5	7.4	7	9	7.4	9	8.5	9.2	8.8	9	7.9	7.7	9.2	8.4	9	8	8.9
# Grabs/sample	2	2	2	2	2	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	500	500	500	500	500
Date	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14
ROUNDWORMS																				
P. Nemata	1	1		2	1				1		1	7	13	4	6	2				
ANNELIDS																				
P. Annelida																				
WORMS																				
Cl. Oligochaeta																				
F. Enchytraeidae																				
F. Naididae																				
S.F. Naidinae																				
Slavina appendiculata																				
S.F. Tubificinae																				
Limnodrilus hoffmeisteri																				
immatures with hair chaetae														9						
immatures without hair chaetae																				
S.F. Rhyacodrilinae																				
Rhyacodrilus coccineus	4	1	8	8	2							2		2						
Rhyacodrilus montana								1							1					
F. Lumbriculidae																				
Lumbriculus			1	1				1					1	5						
ARTHROPODS																				
P. Arthropoda																				
MITES																				
Cl. Arachnida																				
O. Acarina																				
indeterminate																				
F. Acalyptonotidae																				
Acalyptonotus	1		1		2											1		2		
F. Hygrobatidae																				
Hygrobates	1					1														
F. Lebertiidae																				
Lebertia	2									2						1	1	1	2	1
F. Oxidae																				
Frontipoda																				
Oxus																	1			
SEED SHRIMPS																				
Cl. Ostracoda	5	7	70	32	38	1	1				4	9	6	58	33	16	28	23	21	20
SPRINGTAILS																				
Cl. Entognatha																				
O. Collembola																				
INSECTS																				
Cl. Insecta																				
CADDISFLIES																				
O. Trichoptera																				
F. Apataniidae																				
Apatania																				
F. Limnephilidae																				
Grensia praeterita											1			1	1			1		
TRUE FLIES																				
O. Diptera																				
MIDGES																				
F. Chironomidae																				
chironomid pupae				1					1								1	1		
S.F. Chironominae																				
Chironomus															1					
Cladotanytarsus																14		11		
Constempellina																				
Corynocera																20	1	5		
Dicrotendipes																1				1
Micropsectra	10	6	6	7	8	4		2	3	2	6	9		24	5	14	4	3	30	17
Microtendipes																				

Appendix H. Benthic Invertebrate raw data (total number of organisms in two 0.023 m2 grabs), Meadowbank Study Lakes and Baker Lake, August 2014.

Location	Third Portage Lake - East Basin					Third Portage Lake - North Basin					Third Portage Lake - South Basin					Wally Lake				
Station	**TPE**	**TPE**	**TPE**	**TPE**	**TPE**	**TPN**	**TPN**	**TPN**	**TPN**	**TPN**	**TPS**	**TPS**	**TPS**	**TPS**	**TPS**	**WAL**	**WAL**	**WAL**	**WAL**	**WAL**
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
DepthOfSample (m)	7.3	8.1	7.4	6.5	7.4	7	9	7.4	9	8.5	9.2	8.8	9	7.9	7.7	9.2	8.4	9	8	8.9
# Grabs/sample	2	2	2	2	2	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	500	500	500	500	500
Date	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	26-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	22-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	27-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14	28-Aug-14
Paracladopelma																				
Paratanytarsus	53	57	58	64	40	8		2	3		5	5	2	18	14				1	
Polypedilum																				
Sergentia															2					
Stempellinella																1				
Stictochironomus	3	3	7	3	4		2	6	3			1		4	4	19	19	9	14	13
Tanytarsus	2	1	1	3									2	2		43	29	76		30
S.F. Diamesinae																				
Protanypus							1		1		2		2	1			1			
Potthastia																				
Pseudodiamesa																				
S.F. Orthocladiinae																				
Abiskomyia			1		1						1		2							
Cricotopus/Orthocladius																				
Heterotrissocladius				3		1		4	4	10	7	10	3	6						
Hydrobaenus																				
Mesocricotopus	1																			
Paracladius																				
Psectrocladius				1							1	2		1	1	2		1		1
Zalutschia										1										
Orthocladiinae *Genus "Greenland"* indeterminate															1					
S.F. Prodiamesinae																				
Monodiamesa	1	1	2	1									2	1			1	1	1	1
S.F. Tanypodinae																				
Ablabesmyia																				
Procladius	8	3	11	9	5	6		7	1	2	4	2	3	7		11	7	18	6	8
Thienemannimyia complex	4	8	14	18	22	9		4	3		4	11	4	17	10					
F. Empididae																				
Chelifera/Neoplasta																				
Wiedemannia																				
MOLLUSCS																				
P. Mollusca																				
CLAMS																				
Cl. Bivalvia																				
F. Sphaeriidae																				
Cyclocalyx/Neopisidium	33	17	49	47	34	1		11	4	2	6	16	9	73	10	15	13	16	5	12
Cyclocalyx																10	7	16	2	4
Sphaerium nitidum																				
R (Richness) - totals																				
Total	13	9	12	12	9	7	2	9	8	6	10	9	10	14	11	13	11	13	8	10
Oligochaete	1	1	2	2	1	0	0	2	0	0	0	1	1	2	1	0	0	0	0	0
Insect	8	7	8	9	6	5	2	6	7	4	9	7	8	11	9	9	7	9	5	7
Mollusc	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	2	2	2	2	2
Other	3	0	1	0	1	1	0	0	0	1	0	0	0	0	0	2	2	2	1	1
N (Abundance) - raw																				
Total	123	97	159	166	118	30	3	38	23	19	37	58	30	171	50	152	85	161	61	88
Oligochaete	4	1	9	9	2	0	0	2	0	0	0	2	1	16	1	0	0	0	0	0
Insect	82	79	100	110	80	28	3	25	19	15	31	40	20	82	39	125	63	126	52	71
Mollusc	33	17	49	47	34	1	0	11	4	2	6	16	9	73	10	25	20	32	7	16
Other	4	0	1	0	2	1	0	0	0	2	0	0	0	0	0	2	2	3	2	1
N (Abundance) - #/m^2																				
Total	2674	2109	3457	3609	2565	652	65	826	500	413	804	1261	652	3717	1087	3304	1848	3500	1326	1913
Oligochaete	87	22	196	196	43	0	0	43	0	0	0	43	22	348	22	0	0	0	0	0
Insect	1783	1717	2174	2391	1739	609	65	543	413	326	674	870	435	1783	848	2717	1370	2739	1130	1543
Mollusc	717	370	1065	1022	739	22	0	239	87	43	130	348	196	1587	217	543	435	696	152	348
Other	87	0	22	0	43	22	0	0	0	43	0	0	0	0	0	43	43	65	43	22
TOTAL NUMBER OF TAXA [1]	**13**	**9**	**12**	**12**	**9**	**7**	**2**	**9**	**8**	**6**	**10**	**9**	**10**	**14**	**11**	**13**	**11**	**13**	**8**	**10**
TOTAL NUMBER OF ORGANISMS [2]	**123**	**97**	**159**	**166**	**118**	**30**	**3**	**38**	**23**	**19**	**37**	**58**	**30**	**171**	**50**	**152**	**85**	**161**	**61**	**88**

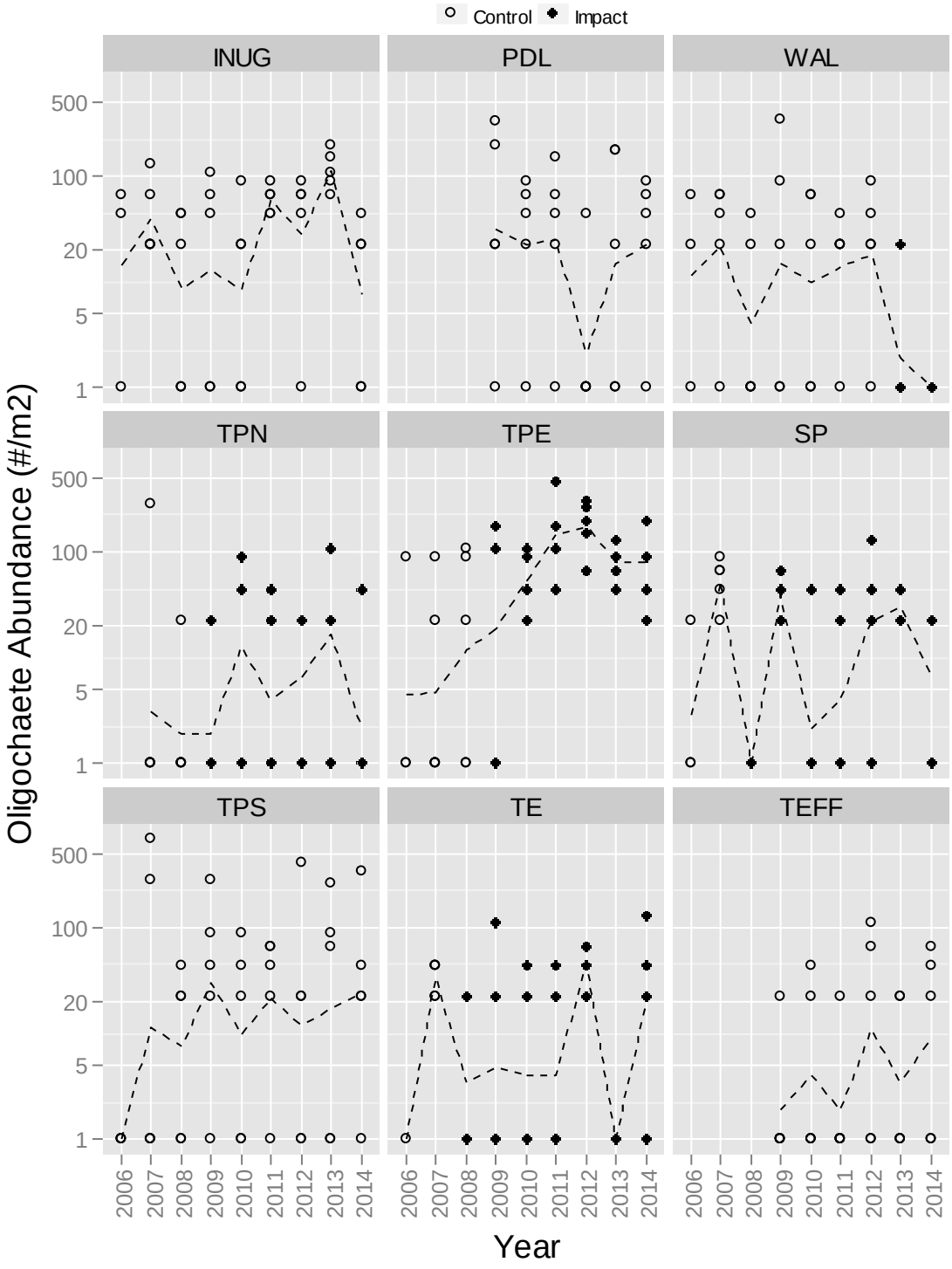
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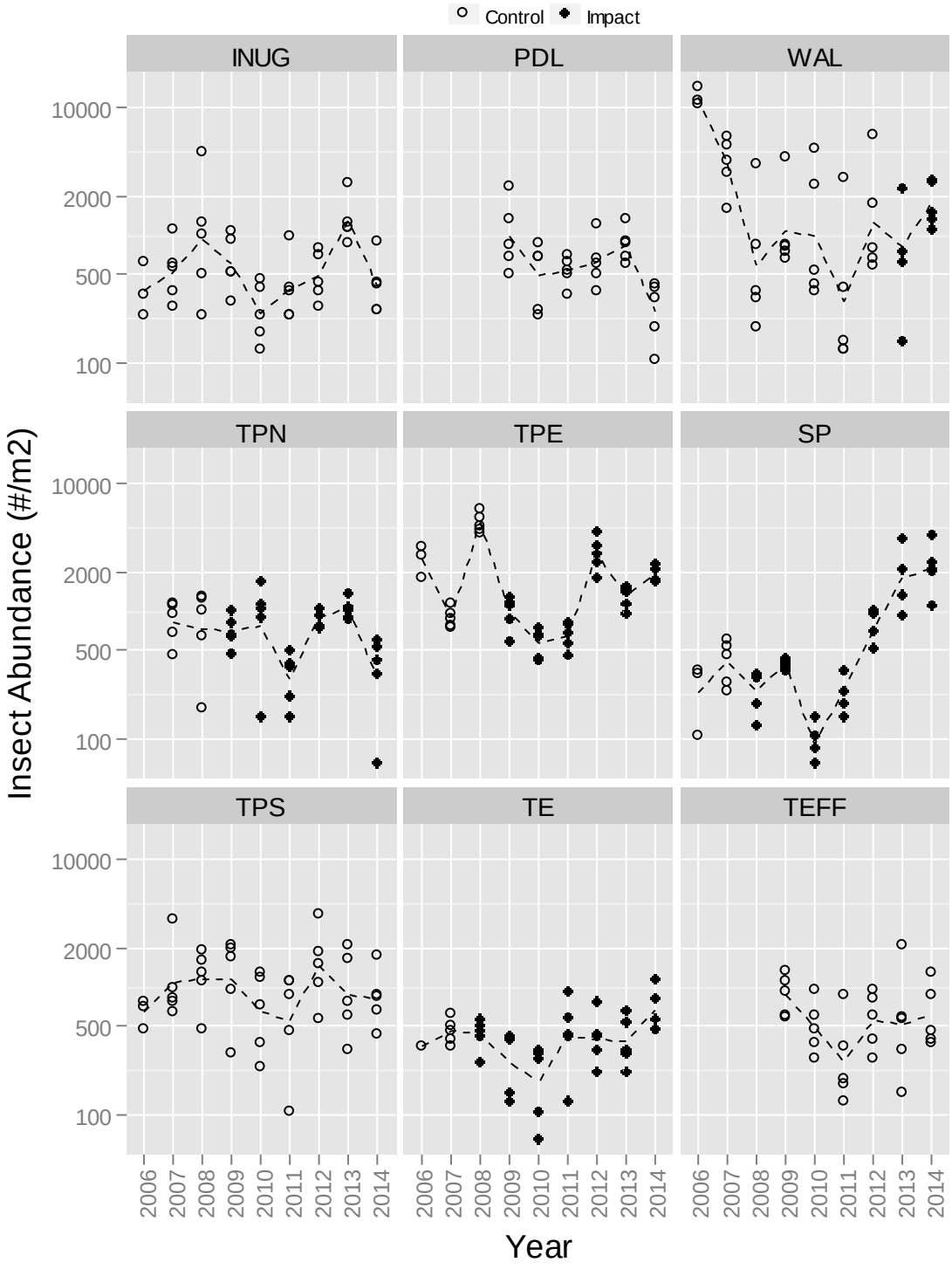
[1] Number of taxa totals exclude P. Nemata, Cl. Ostracoda & O. Collembola, immatures & pupae (Tubificinae, Chironomidae), and indeterminates (Acarina, Orthocladiinae).

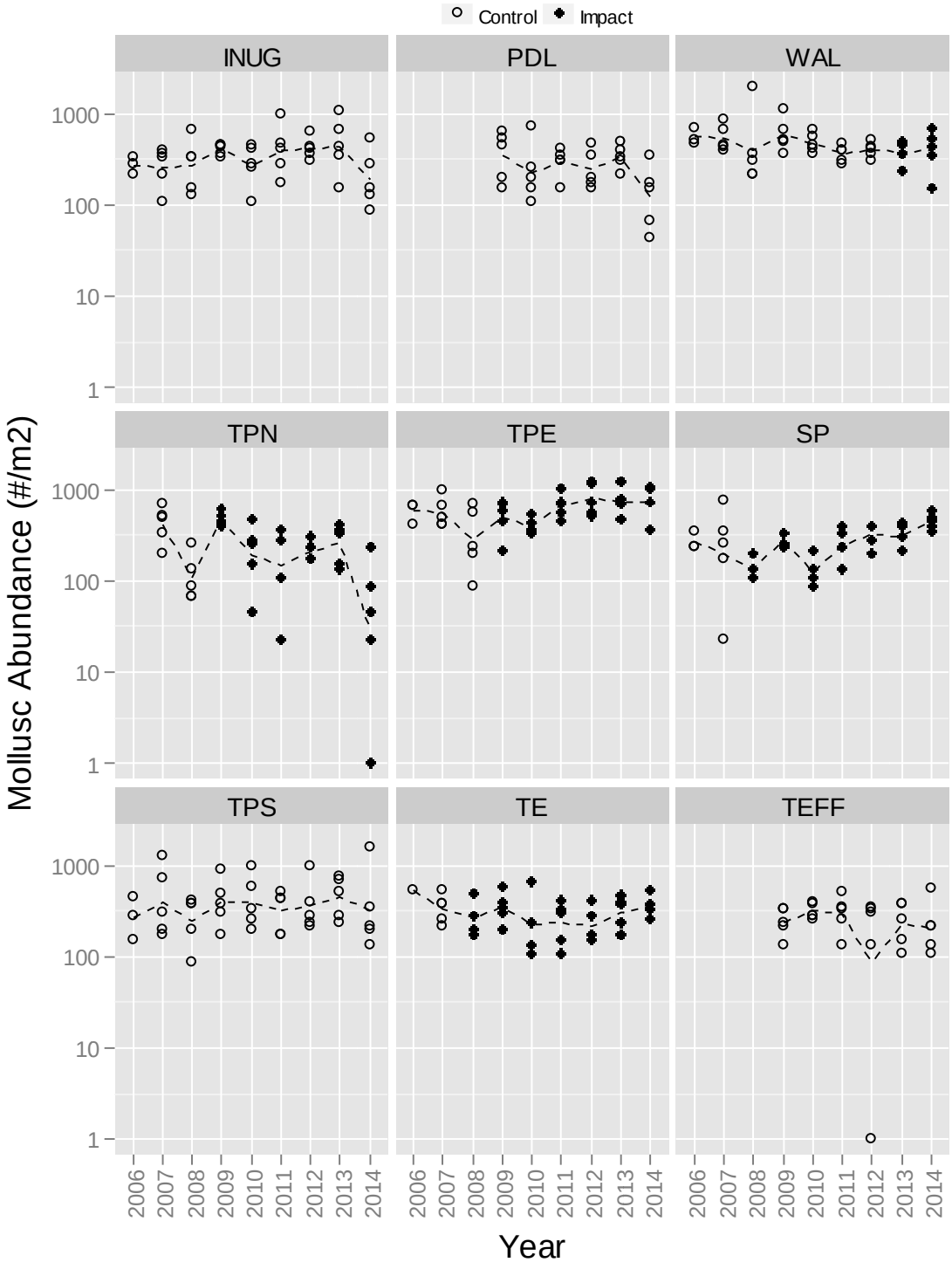
[2] Number of organisms totals exclude P. Nemata, Cl. Ostracoda, & O. Collembola.

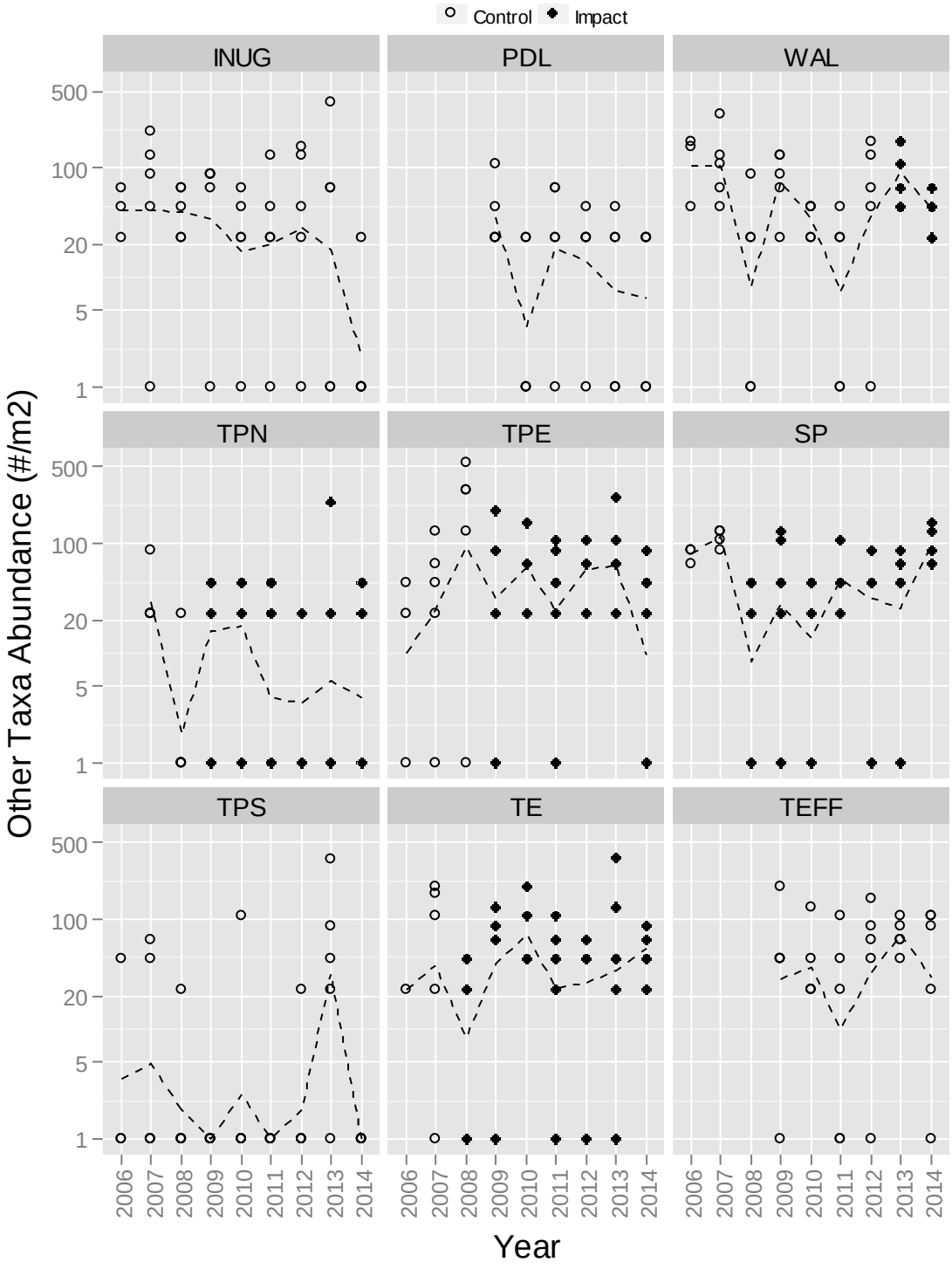
APPENDIX I

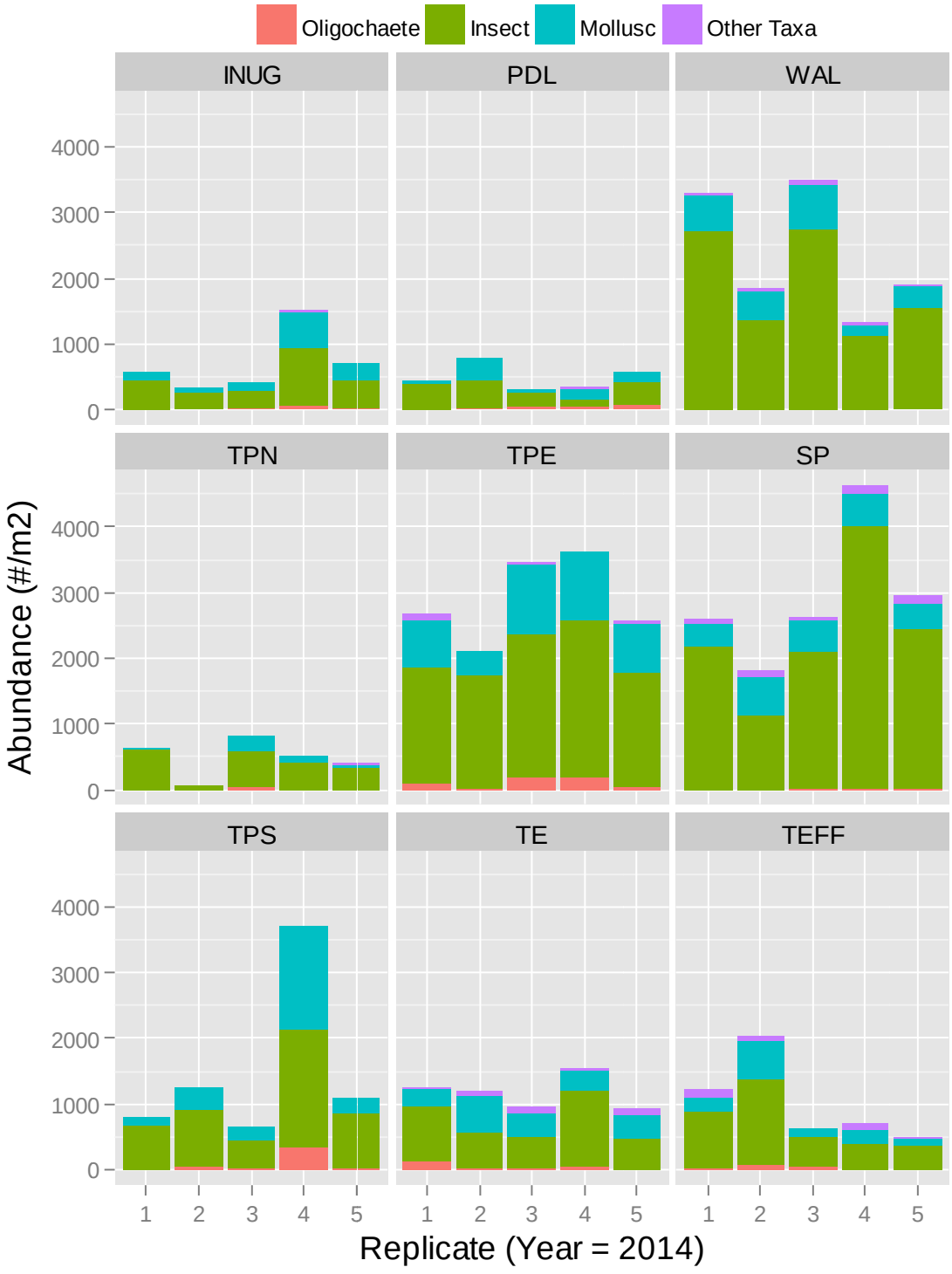
BENTHIC INVERTEBRATE PLOTS 2006 – 2014

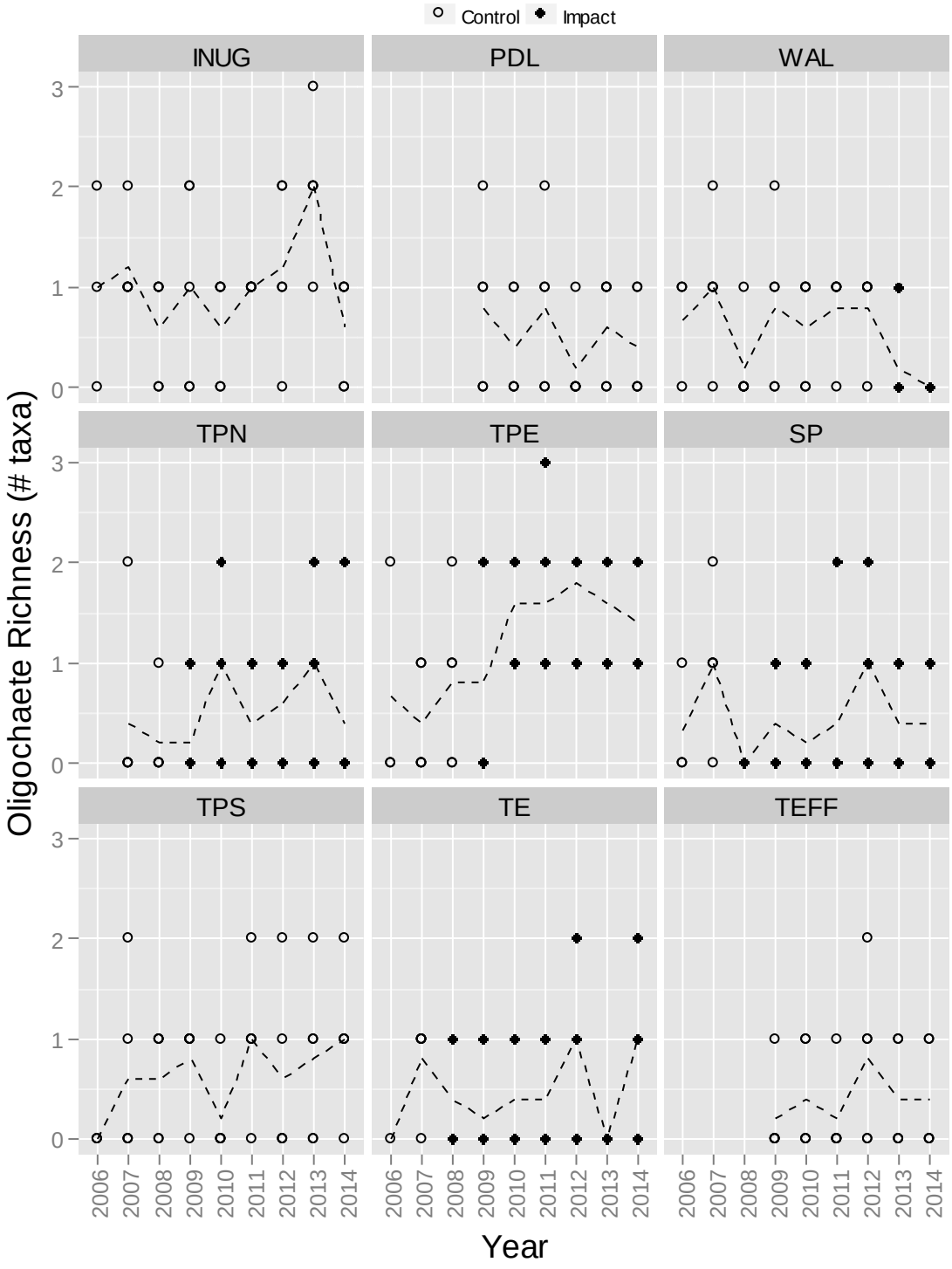

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Oligochaete Abundance (#/m2)
500
100
20
5
1
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

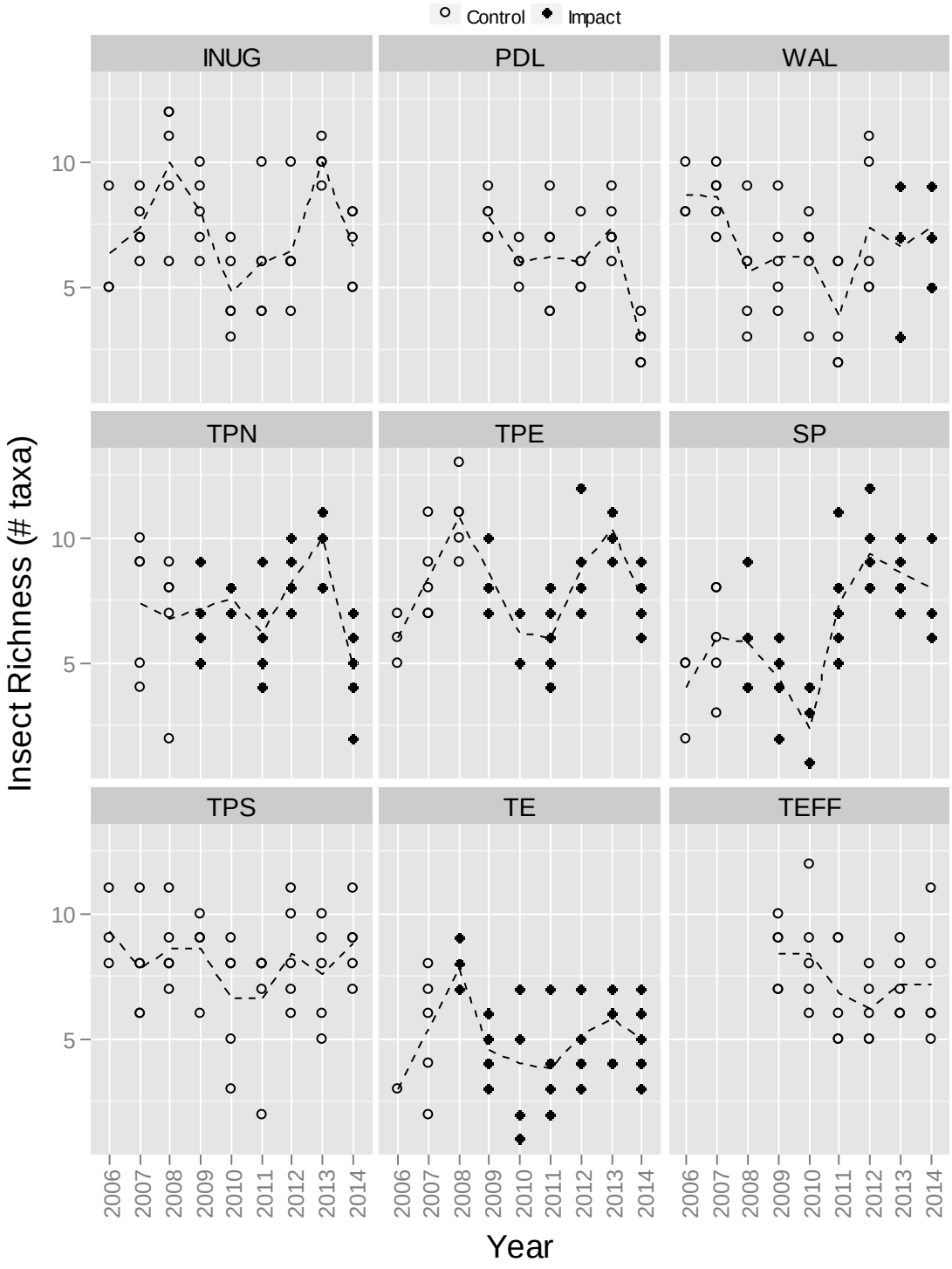

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Insect Abundance (#/m2)
10000
2000
500
100
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

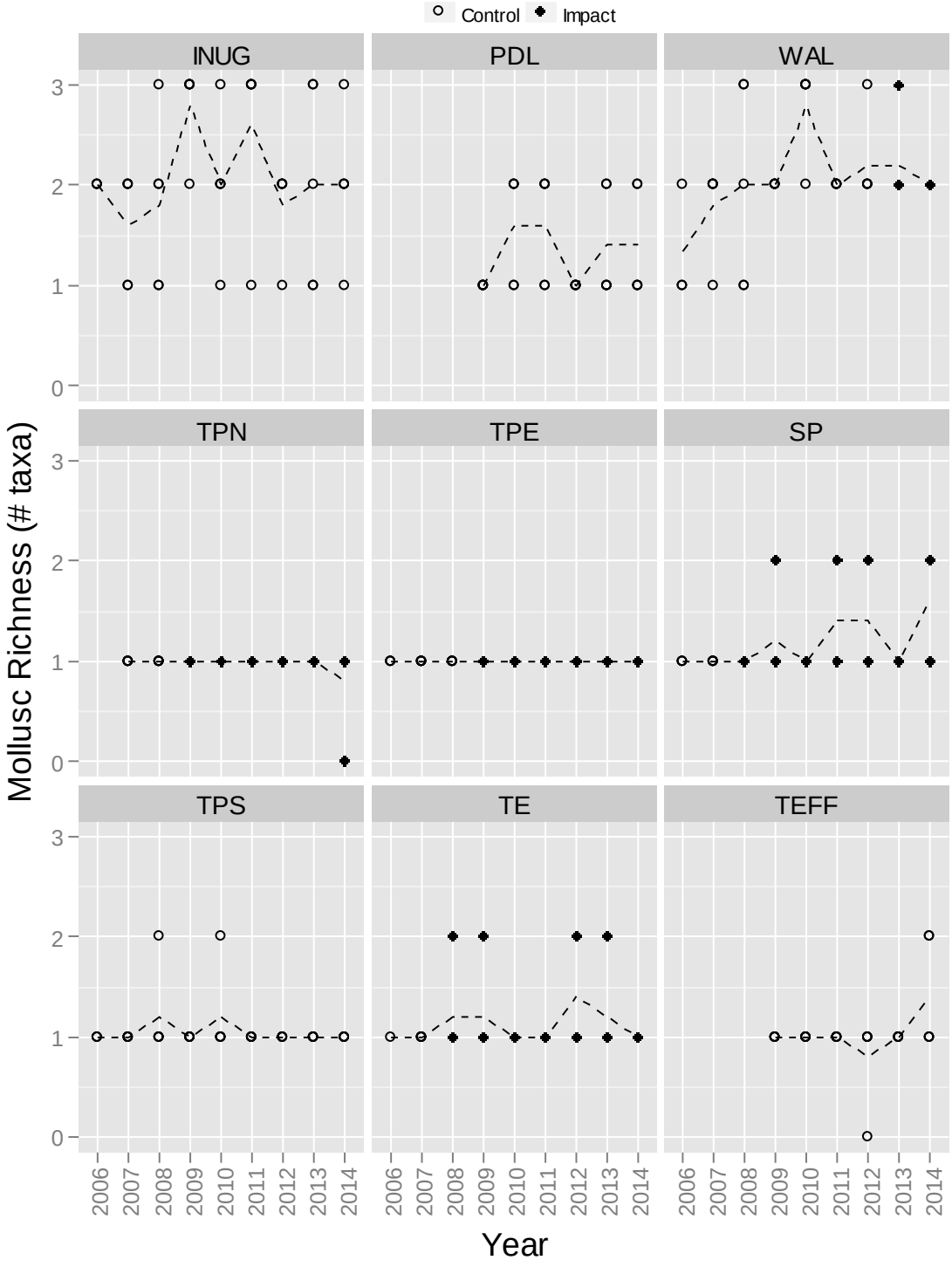

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Mollusc Abundance (#/m2)
1000
100
10
1
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

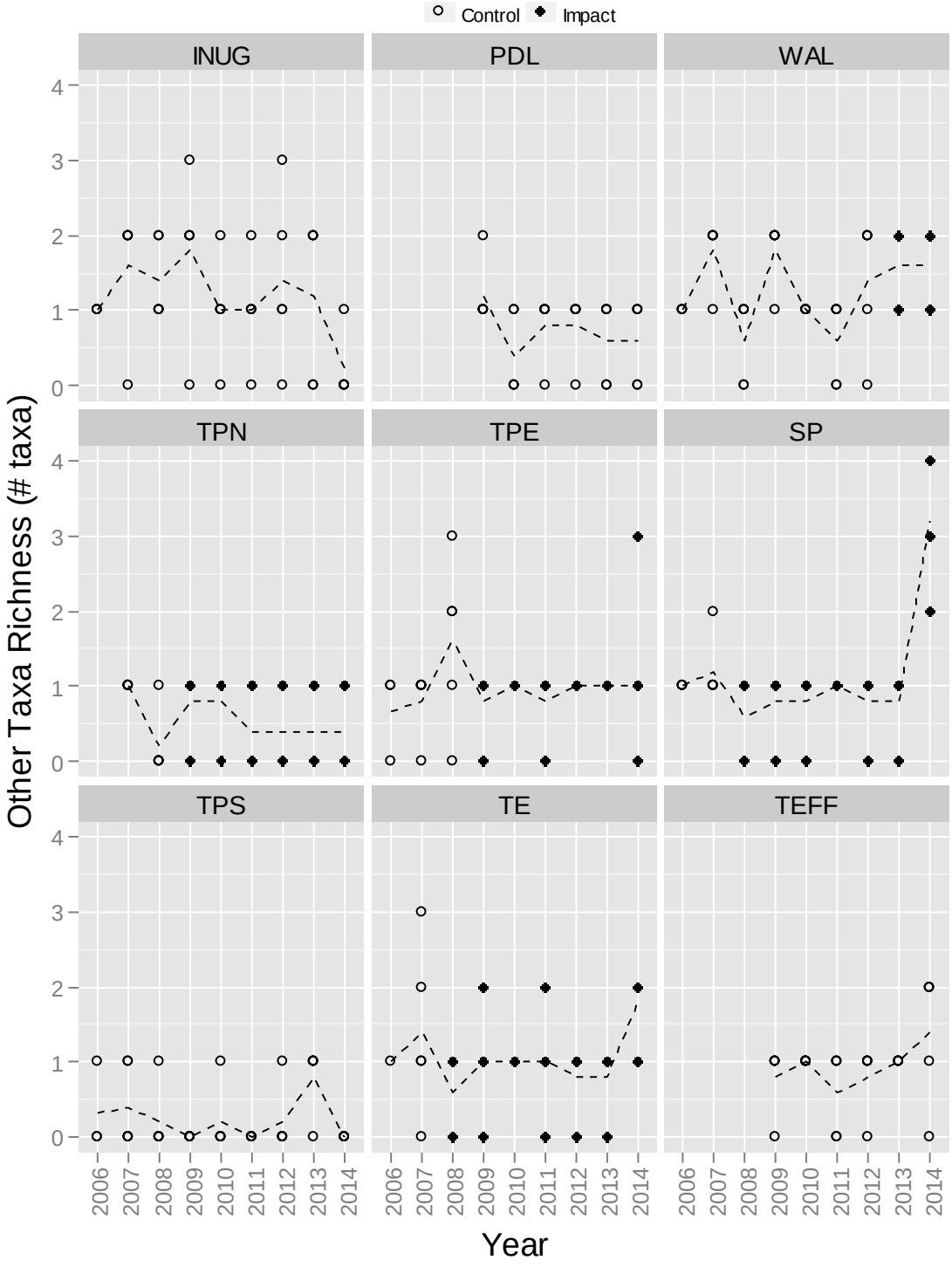

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Other Taxa Abundance (#/m2)
500
100
20
5
1
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

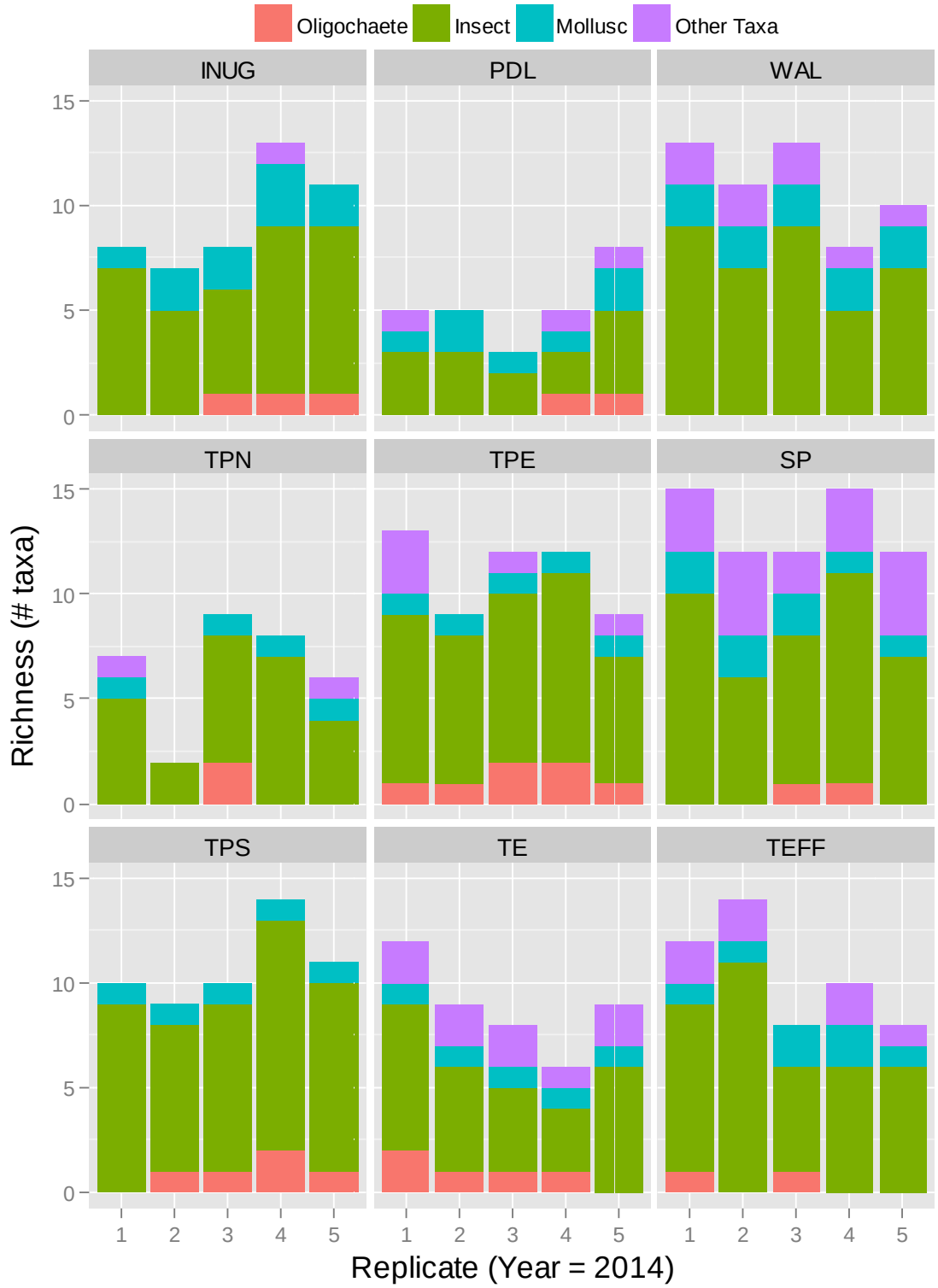

Oligochaete
Insect
Mollusc
Other Taxa
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Abundance (#/m2)
0
1000
2000
3000
4000
1
2
3
4
5
Replicate (Year = 2014)

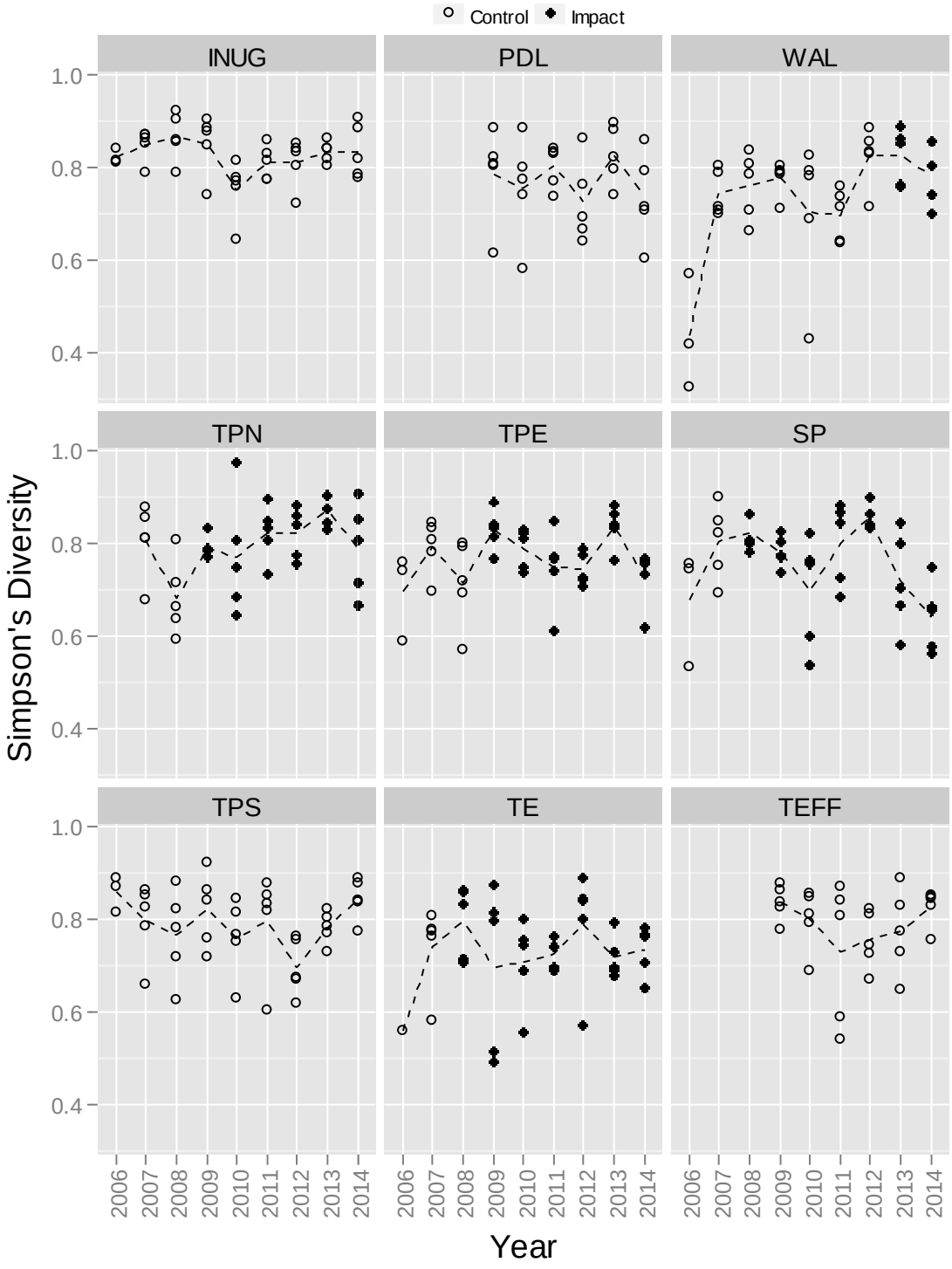

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Oligochaete Richness (# taxa)
0
1
2
3
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

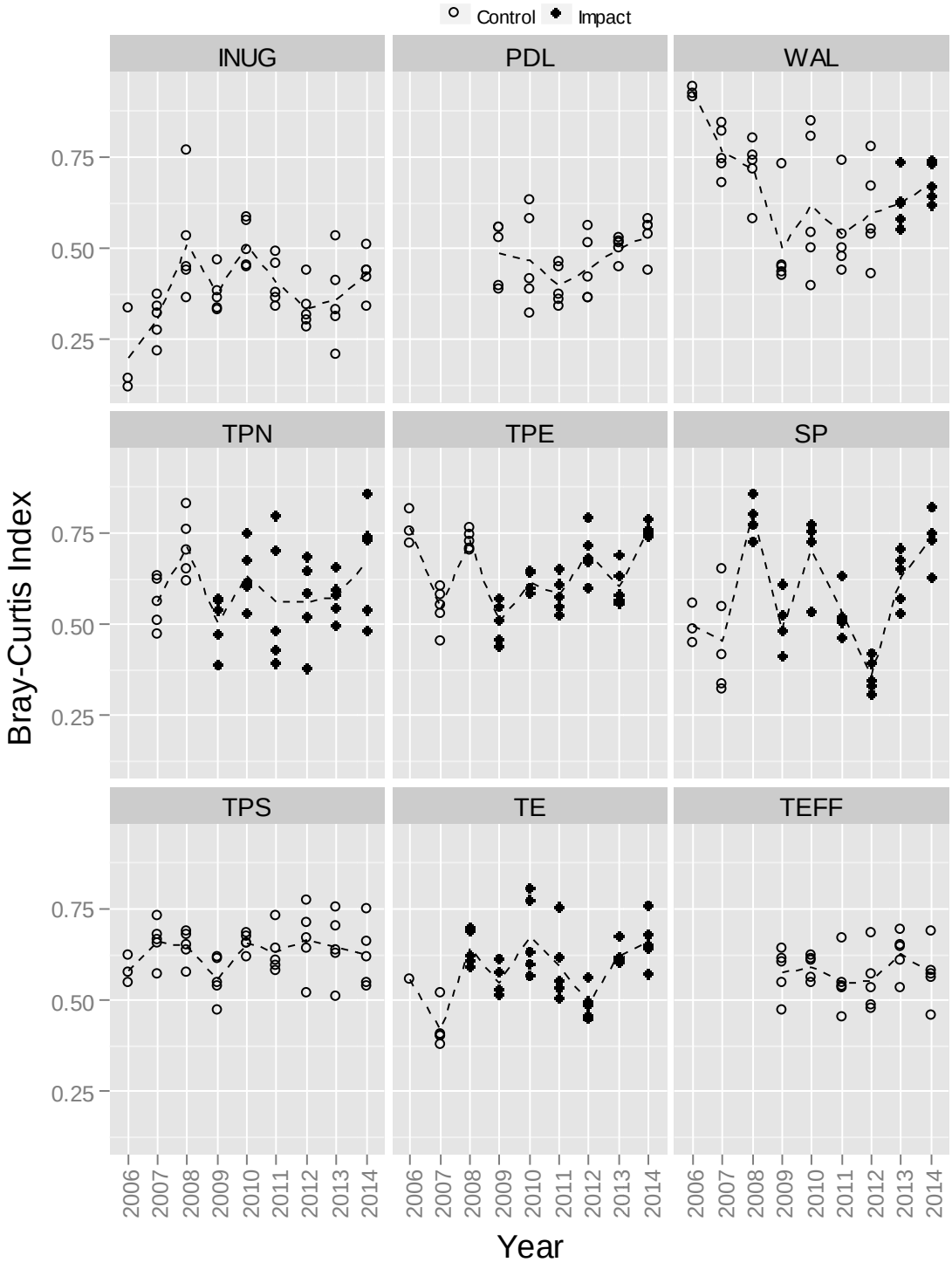

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Insect Richness (# taxa)
10
5
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

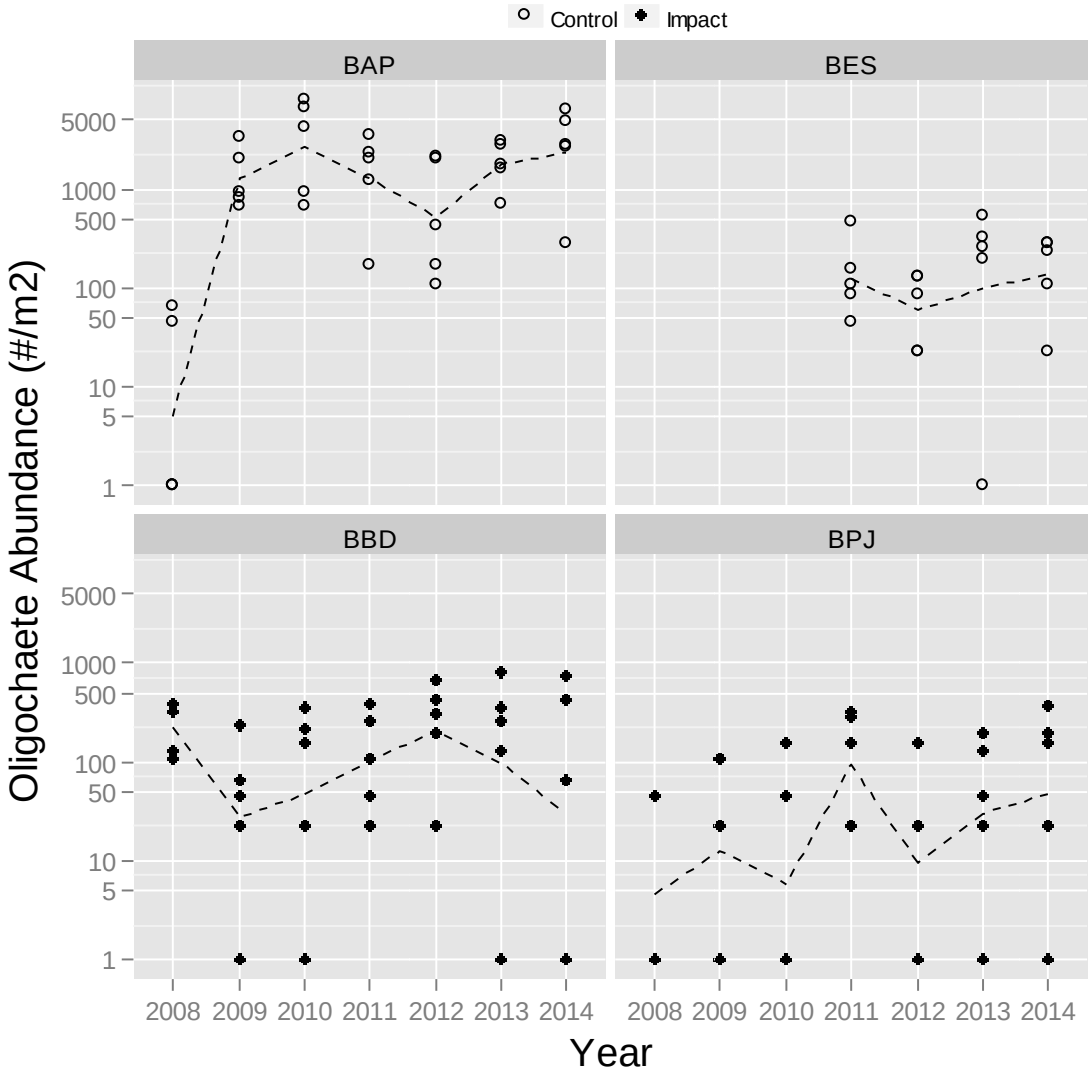

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Mollusc Richness (# taxa)
0
1
2
3
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year


Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Other Taxa Richness (# taxa)
0
1
2
3
4
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

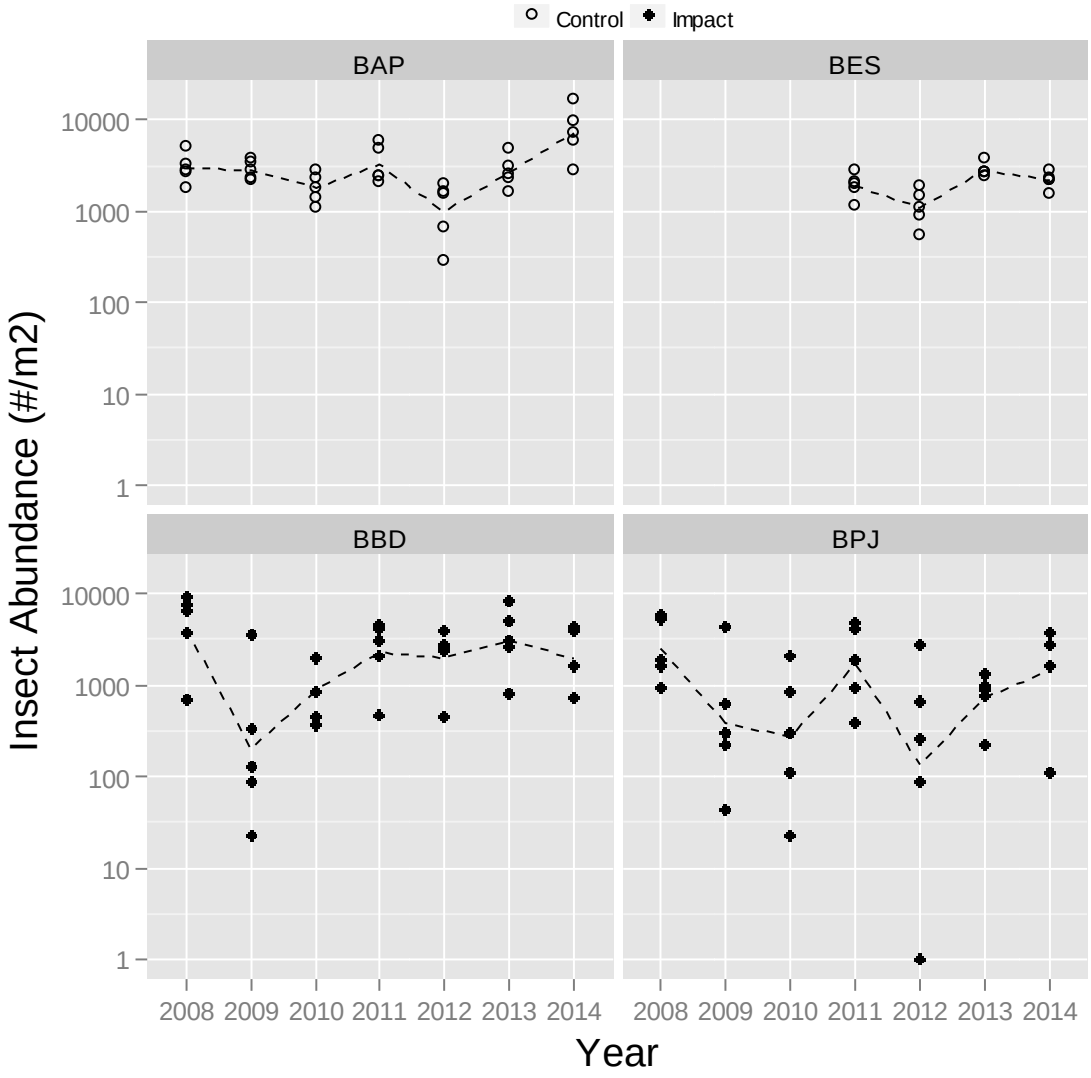

Oligochaete
Insect
Mollusc
Other Taxa
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Richness (# taxa)
0
5
10
15
1
2
3
4
5
Replicate (Year = 2014)

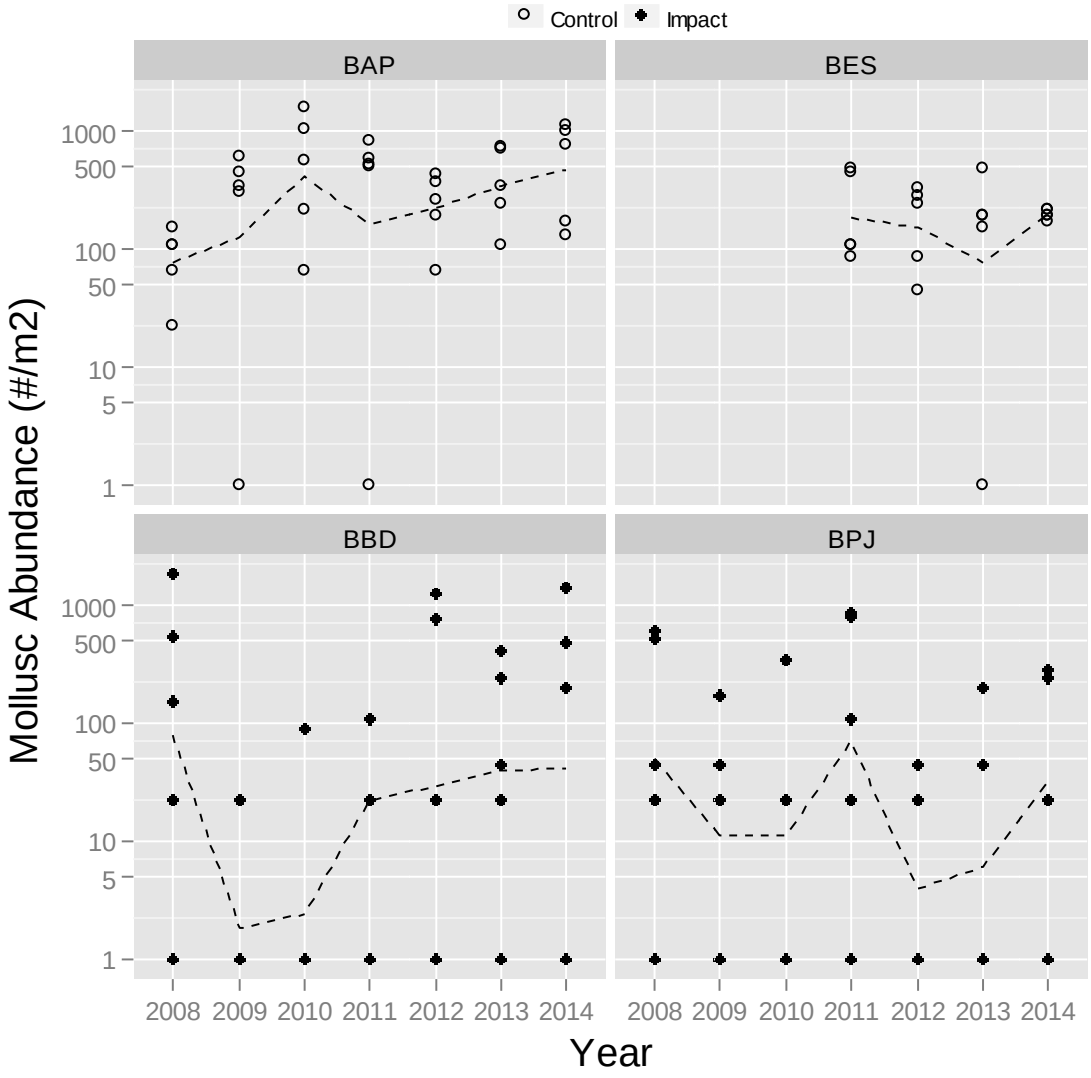

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Simpson's Diversity
1.0
0.8
0.6
0.4
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

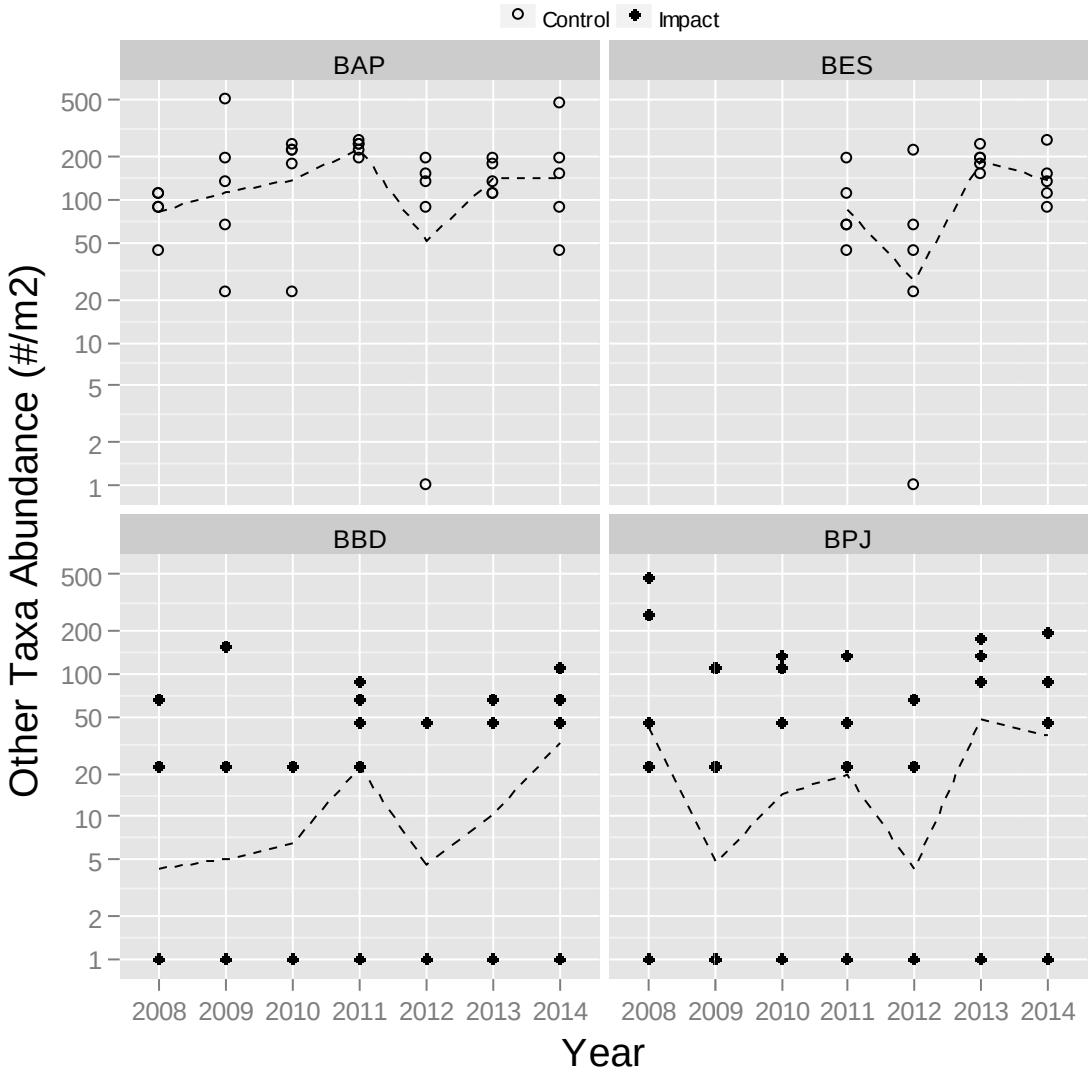

Control
Impact
INUG
PDL
WAL
TPN
TPE
SP
TPS
TE
TEFF
Bray-Curtis Index
0.25
0.50
0.75
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

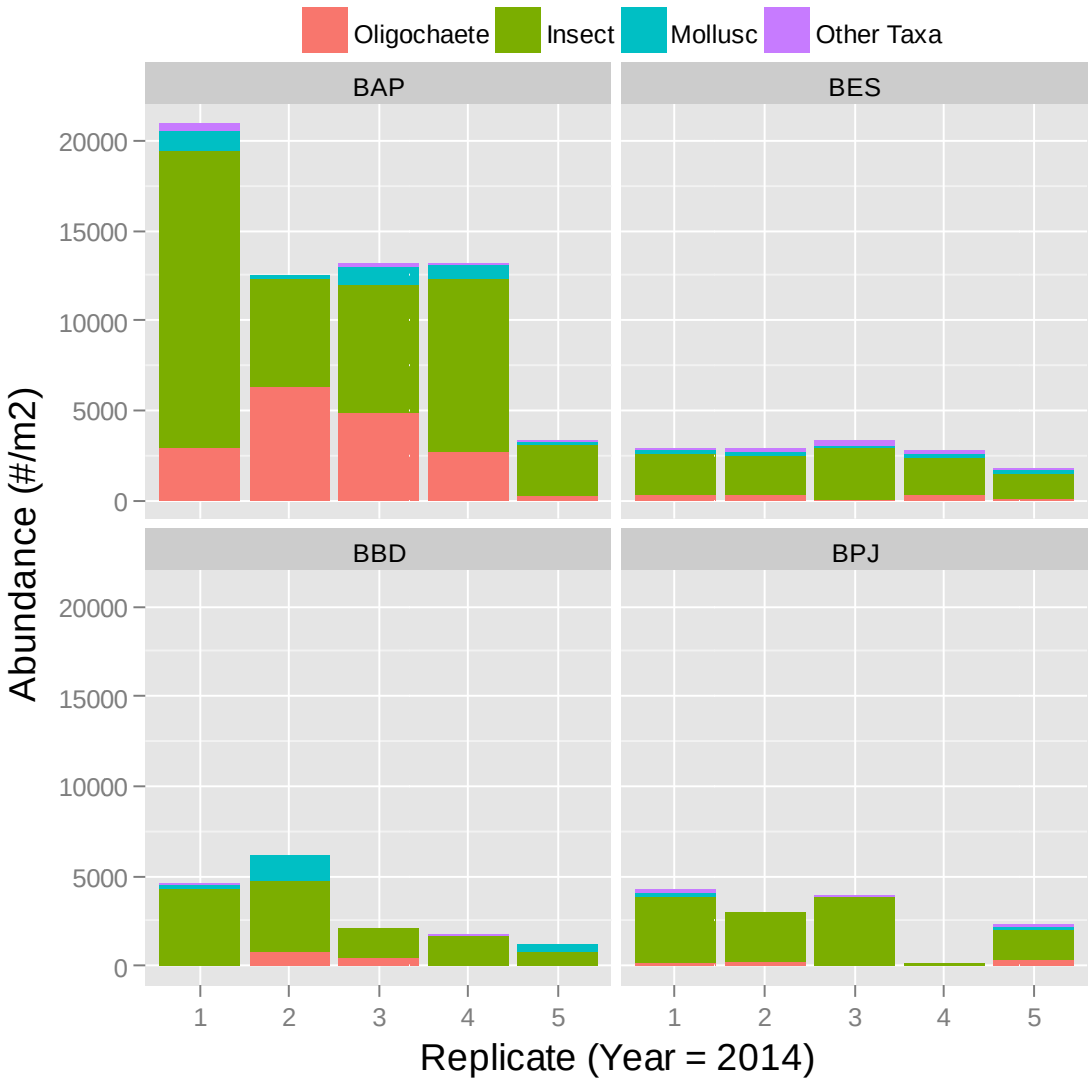

Control
Impact
BAP
BES
BBD
BPJ
Oligochaete Abundance (#/m2)
5000
1000
500
100
50
10
5
1
2008
2009
2010
2011
2012
2013
2014
Year

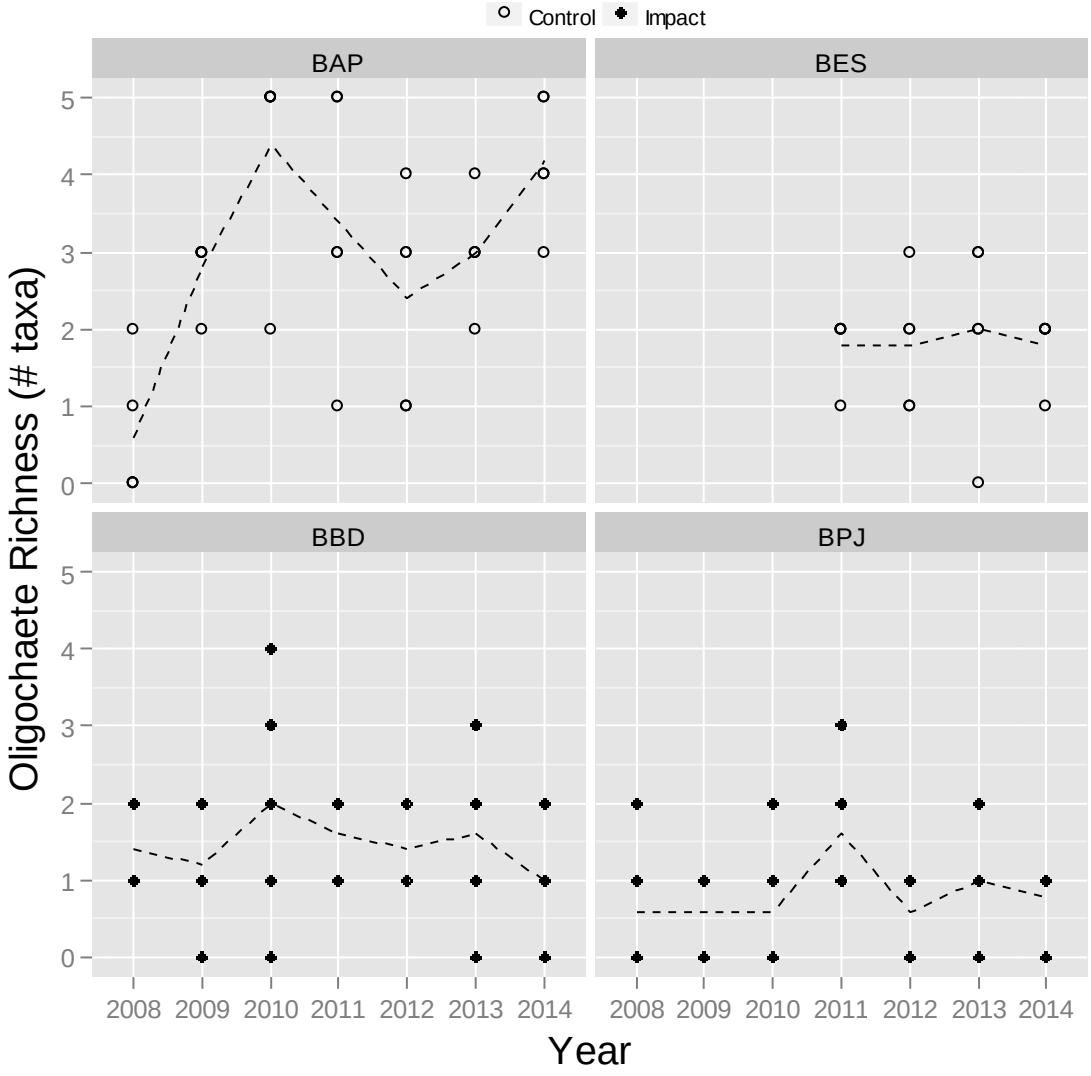
CREMP Benthic Invertebrate Plots 2008 – 2014
Baker Lake

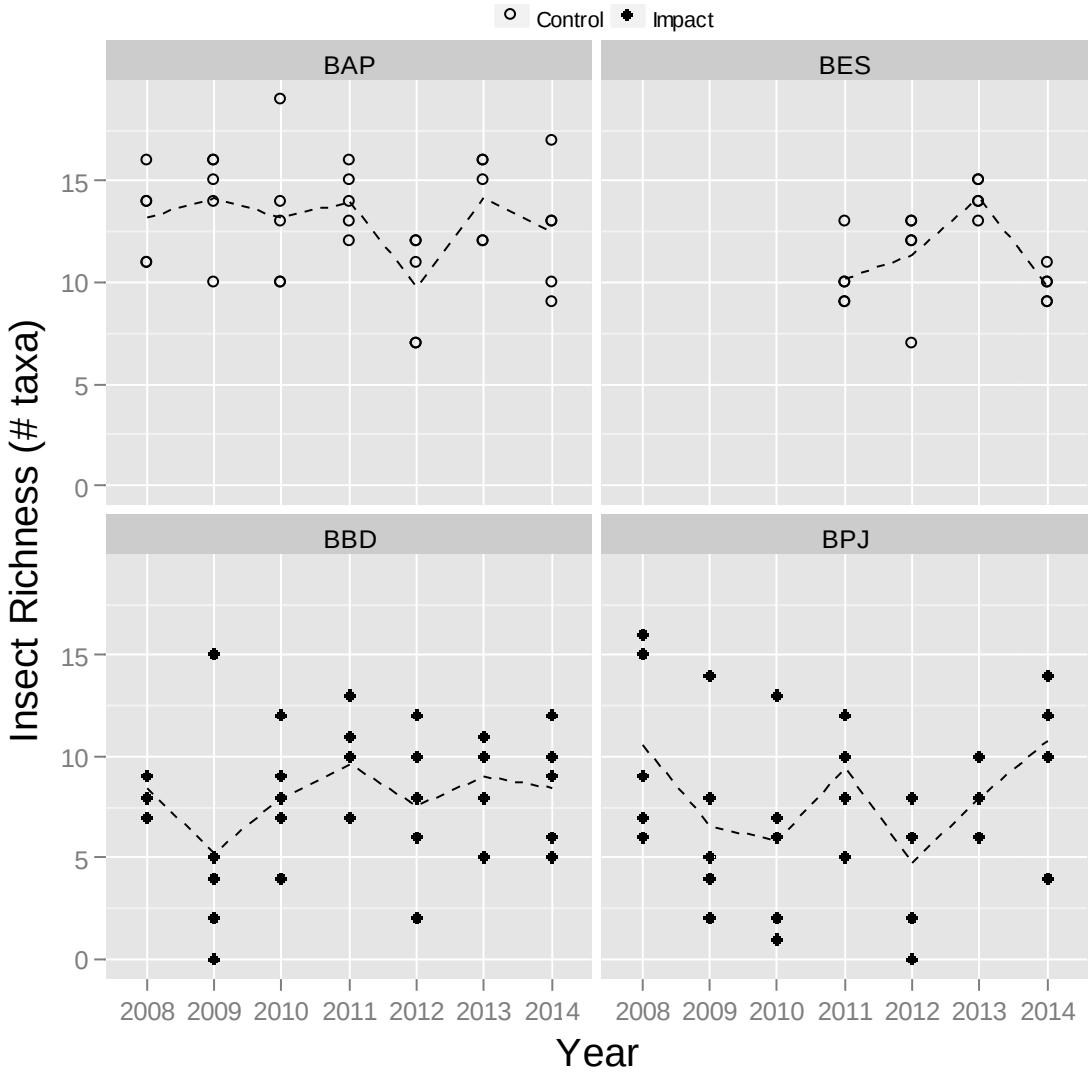


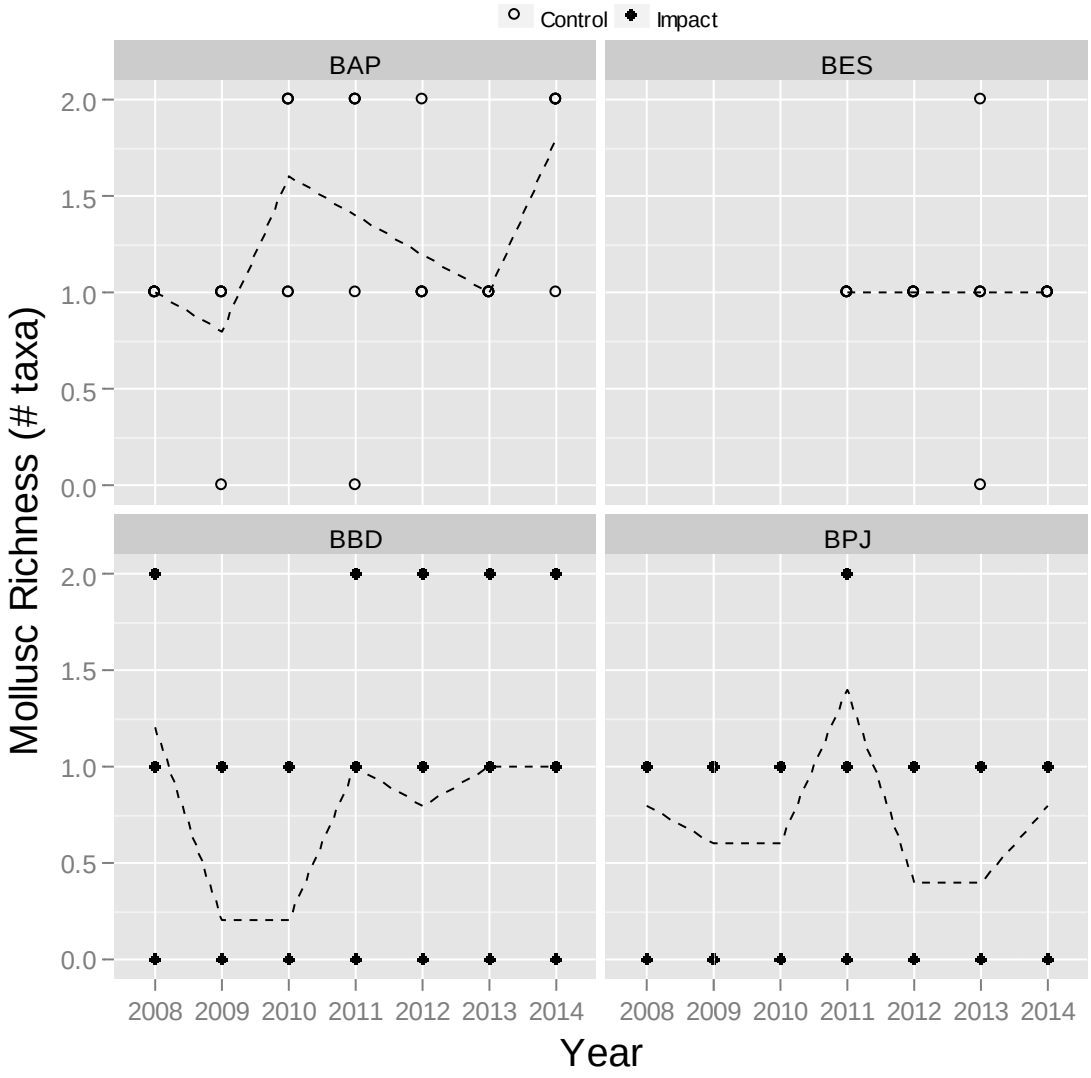

Control
Impact
BAP
BES
BBD
BPJ
Mollusc Abundance (#/m2)
1000
500
100
50
10
5
1
2008
2009
2010
2011
2012
2013
2014
Year

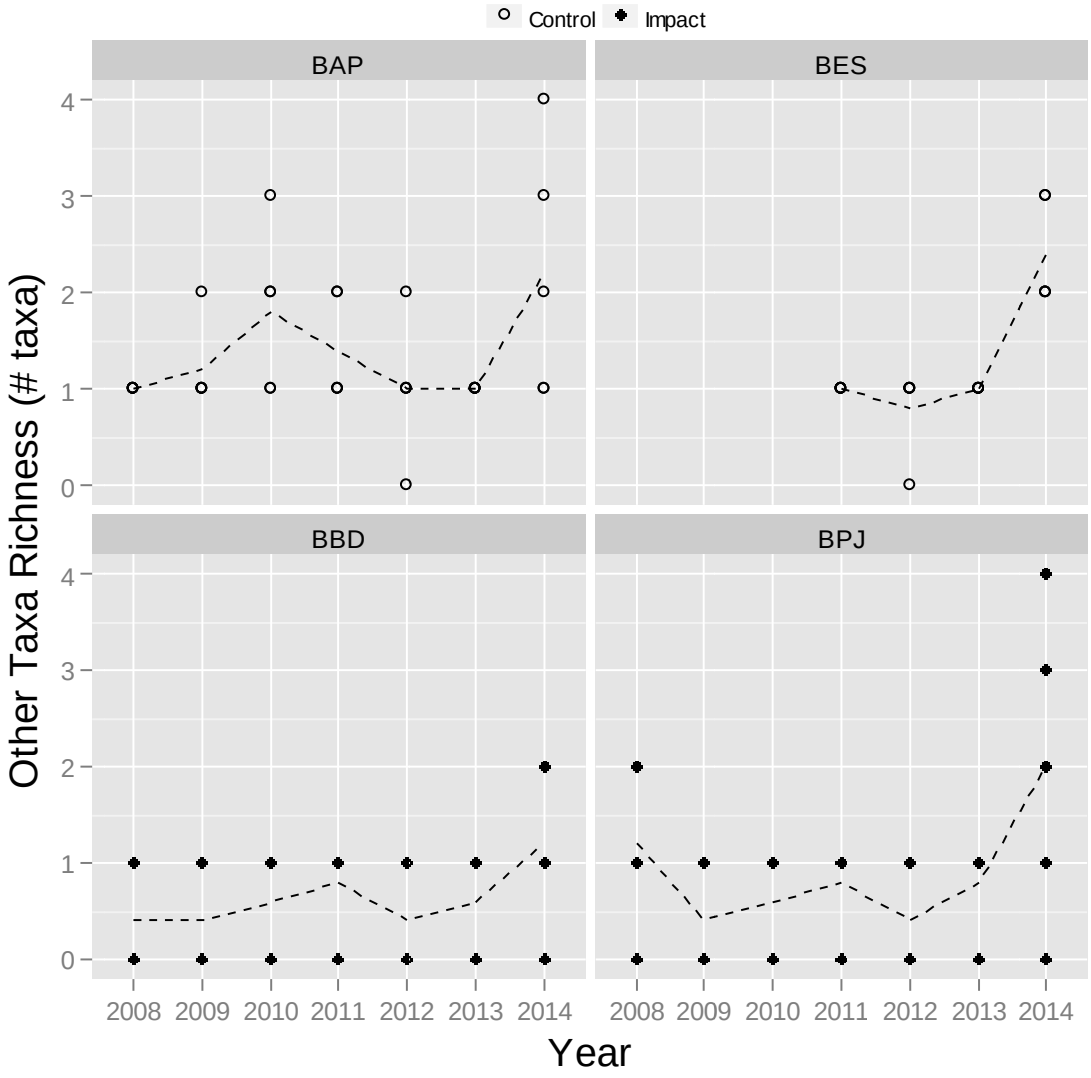

Control
Impact
BAP
BES
BBD
BPJ
Other Taxa Abundance (#/m2)
500
200
100
50
20
10
5
2
1
2008
2009
2010
2011
2012
2013
2014
Year

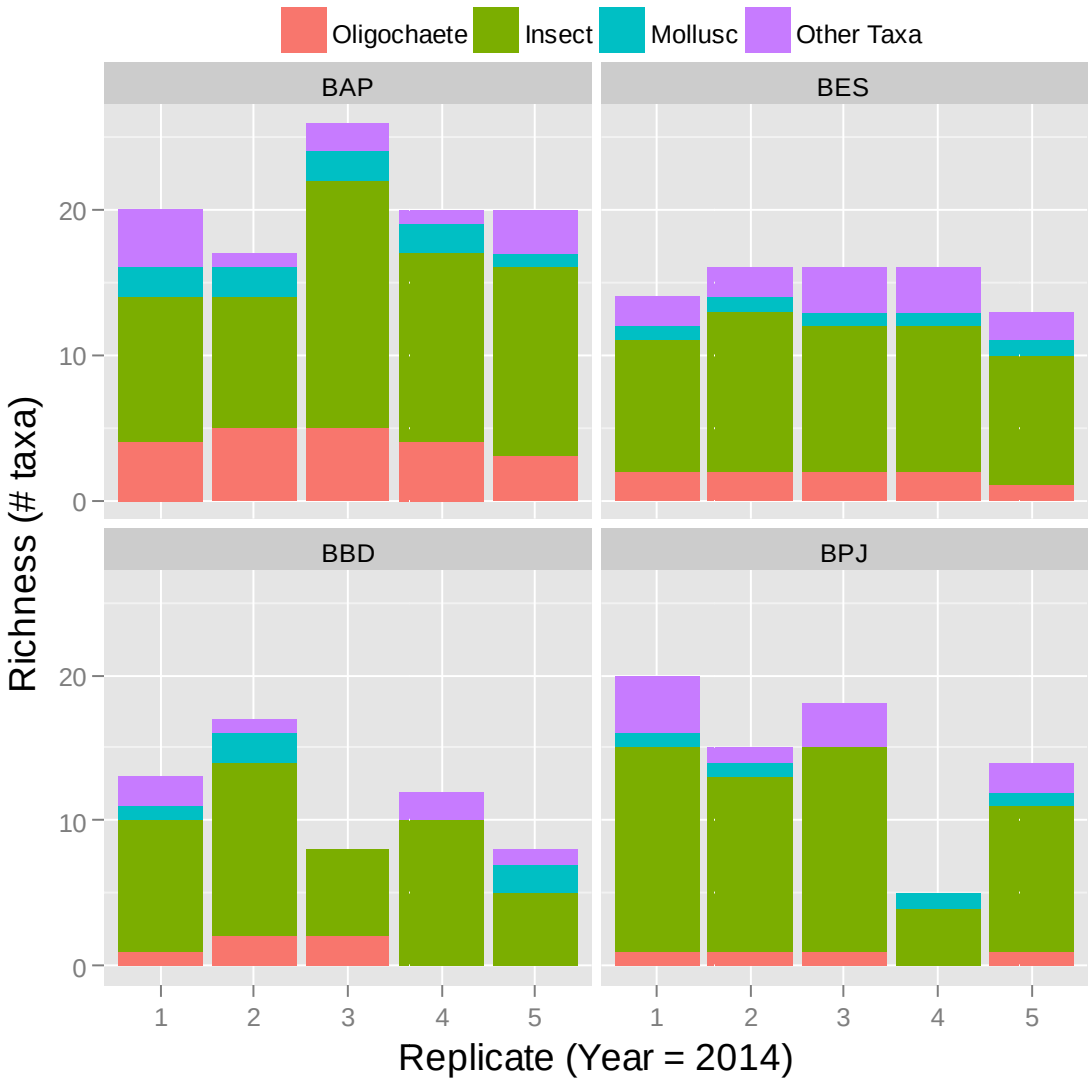

Oligochaete
Insect
Mollusc
Other Taxa
BAP
BES
BBD
BPJ
Abundance (#/m2)
0
5000
10000
15000
20000
1
2
3
4
5
Replicate (Year = 2014)

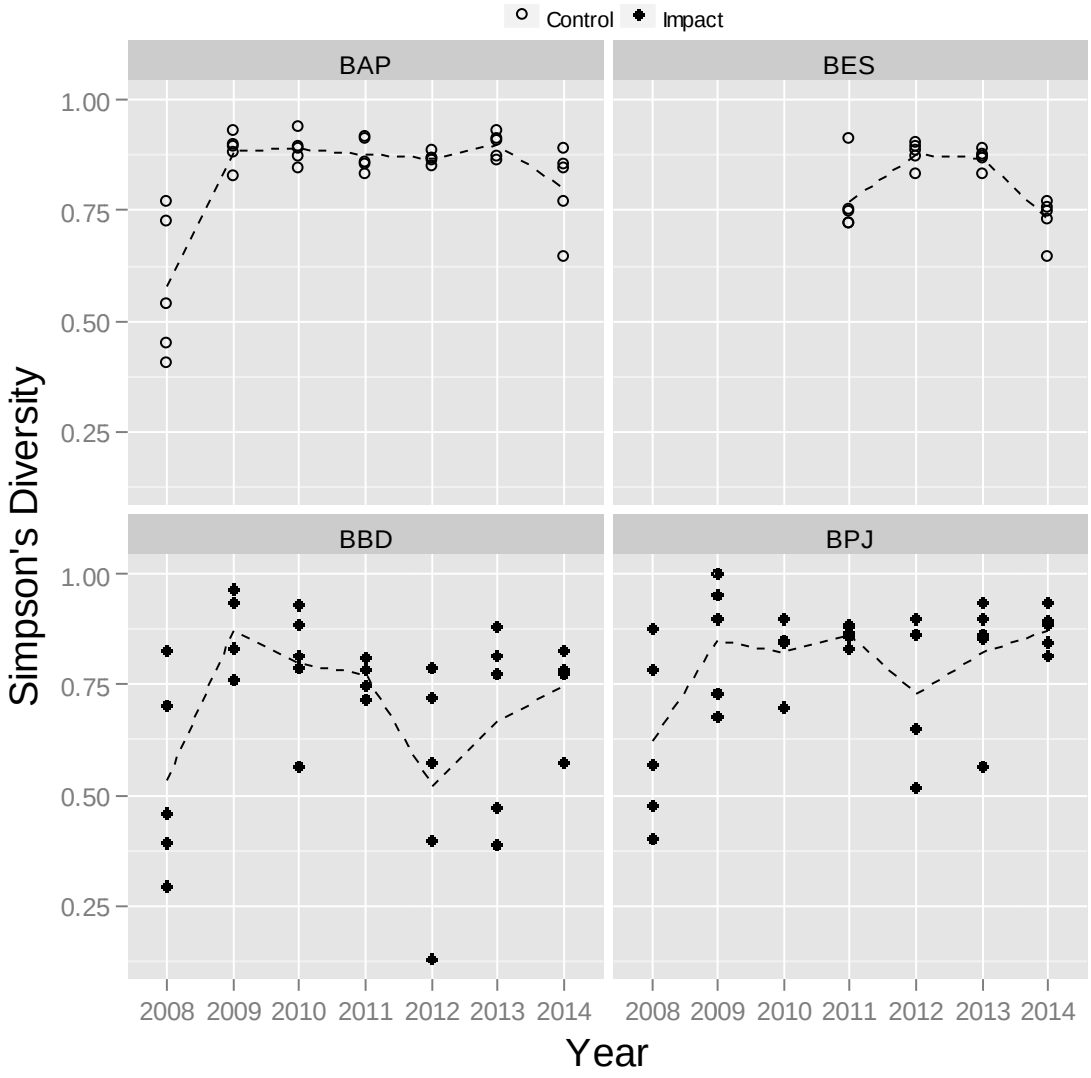

Control
Impact
BAP
BES
BBD
BPJ
Oligochaete Richness (# taxa)
0
1
2
3
4
5
2008
2009
2010
2011
2012
2013
2014
Year

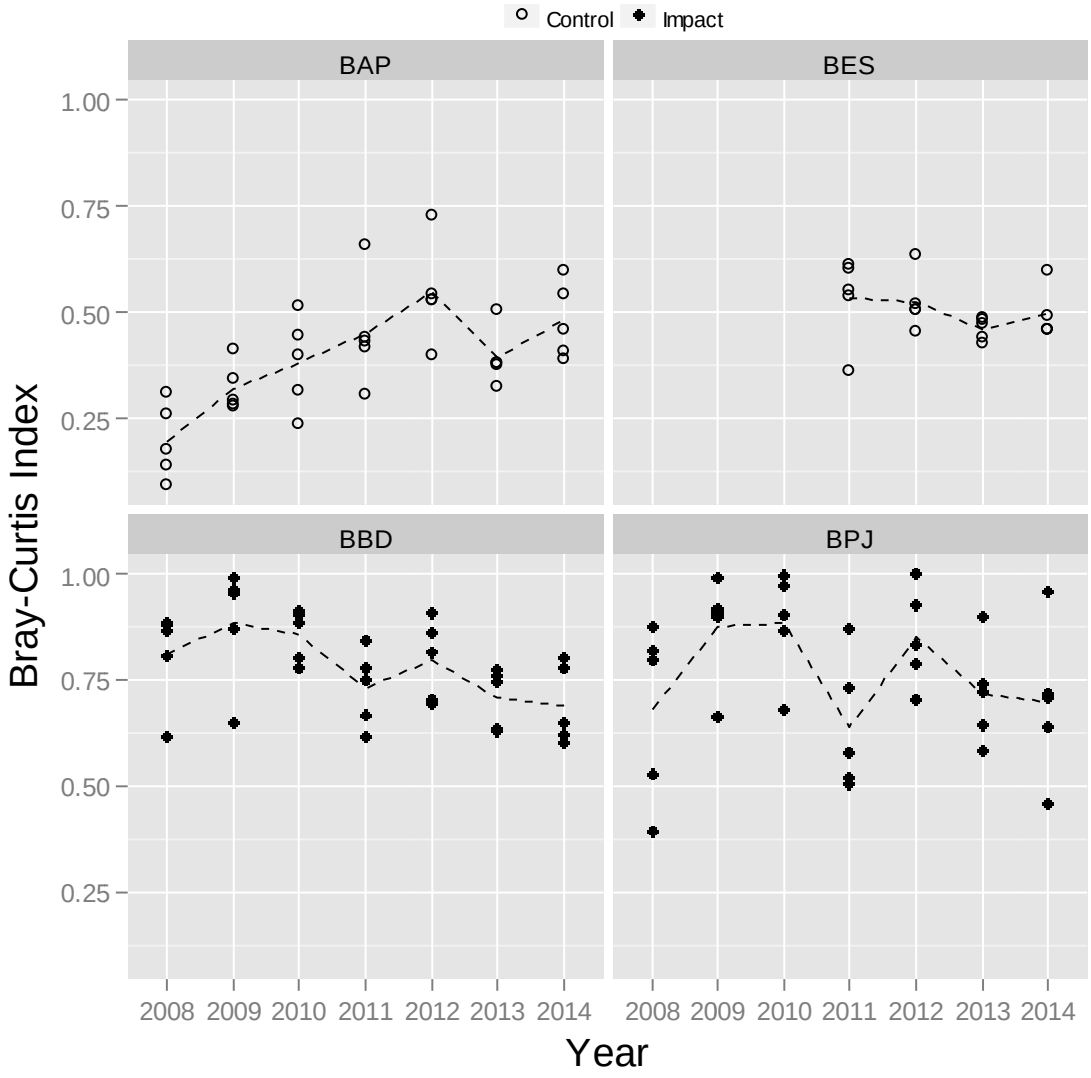

Control
Impact
BAP
BES
BBD
BPJ
Insect Richness (# taxa)
0
5
10
15
2008
2009
2010
2011
2012
2013
2014
Year


Control
Impact
BAP
BES
BBD
BPJ
Mollusc Richness (# taxa)
0.0
0.5
1.0
1.5
2.0
2008
2009
2010
2011
2012
2013
2014
Year


Control
Impact
BAP
BES
BBD
BPJ
Other Taxa Richness (# taxa)
0
1
2
3
4
2008
2009
2010
2011
2012
2013
2014
Year


Oligochaete
Insect
Mollusc
Other Taxa
BAP
BES
BBD
BPJ
Richness (# taxa)
0
10
20
1
2
3
4
5
Replicate (Year = 2014)


Control
Impact
BAP
BES
BBD
BPJ
Simpson's Diversity
1.00
0.75
0.50
0.25
2008
2009
2010
2011
2012
2013
2014
Year


Control
Impact
BAP
BES
BBD
BPJ
Bray-Curtis Index
1.00
0.75
0.50
0.25
2008
2009
2010
2011
2012
2013
2014
Year

APPENDIX J

ALS LABORATORY REPORTS 2014

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 05-AUG-14
Report Date: 20-AUG-14 11:01 (MT)
Version: FINAL REV. 2

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1496820

Project P.O. #:	NOT SUBMITTED
Job Reference:	MEADOWBANK SURFACEWATER
C of C Numbers:	1
Legal Site Desc:	

Comments:

20-AUG-2014 This report replaces the previous version and contains additional analysis, as requested.

Brent Mack
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	L1496820-1 Water 22-JUL-14 12:49 BAP-31-S	L1496820-2 Water 22-JUL-14 13:18 BAP-32-S	L1496820-3 Water 22-JUL-14 14:00 BPJ-31-S	L1496820-4 Water 22-JUL-14 14:30 BPJ-32-S	L1496820-5 Water 22-JUL-14 15:10 BBP-31-S
FILTER							
Plant Pigments	Chlorophyll a (ug/L)		0.839	0.477	0.793	0.767	0.608

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1496820-6				
Description	Water				
Sampled Date	22-JUL-14				
Sampled Time	15:40				
Client ID	BBP-32-S				
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.362				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1496820-1 Water 22-JUL-14 12:49 BAP-31-S	L1496820-2 Water 22-JUL-14 13:18 BAP-32-S	L1496820-3 Water 22-JUL-14 14:00 BPJ-31-S	L1496820-4 Water 22-JUL-14 14:30 BPJ-32-S	L1496820-5 Water 22-JUL-14 15:10 BBP-31-S
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	45.7	40.7	12.6	11.0	10.6
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	0.343	0.319	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	103	91.9	7.77	3.04	2.07
	Fluoride (F) (mg/L)	0.069	0.069	0.060	0.060	0.061
	Nitrate (as N) (mg/L)	0.0155	0.0134	0.0108	0.0097	0.0098
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.202	0.197	0.194	0.212	0.203
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	<0.0020	0.0022	0.0021	<0.0020	0.0020
	Phosphorus (P)-Total (mg/L)	0.0040	0.0031	0.0044	0.0033	0.0045
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	15.1	13.5	1.60	0.92	0.81
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.07	3.03	3.12	3.01	3.04
	Total Organic Carbon (mg/L)	3.12	3.00	3.00	3.01	3.18
Total Metals	Aluminum (Al)-Total (mg/L)	0.0083	0.0101	0.0075	0.0070	0.0062
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00016	0.00017	0.00015	0.00012	0.00013
	Barium (Ba)-Total (mg/L)	0.0168	0.0174	0.0186	0.0162	0.0166
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.026	0.024	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	4.65	4.36	2.55	2.41	2.44
	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)	0.012	0.012	<0.010	0.013	0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.00151	0.00153	0.00107	0.00084	0.00087
	Magnesium (Mg)-Total (mg/L)	8.00	7.15	1.50	1.15	1.10
	Manganese (Mn)-Total (mg/L)	0.00189	0.00350	0.00288	0.00231	0.00249
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000086	0.000091	<0.000050	<0.000050	<0.000050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496820-6
	Description	Water
	Sampled Date	22-JUL-14
	Sampled Time	15:40
	Client ID	BBP-32-S
Grouping	**Analyte**	
WATER		
Physical Tests	Hardness (as CaCO3) (mg/L)	11.1
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050
	Bromide (Br) (mg/L)	<0.050
	Chloride (Cl) (mg/L)	4.93
	Fluoride (F) (mg/L)	0.061
	Nitrate (as N) (mg/L)	0.0083
	Nitrite (as N) (mg/L)	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.213
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	0.0025
	Phosphorus (P)-Total (mg/L)	0.0035
	Silicate (as SiO2) (mg/L)	<0.50
	Sulfate (SO4) (mg/L)	1.21
Cyanides	Cyanide, Total (mg/L)	<0.0050
	Cyanide, Free (mg/L)	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.03
	Total Organic Carbon (mg/L)	3.08
Total Metals	Aluminum (Al)-Total (mg/L)	0.0065
	Antimony (Sb)-Total (mg/L)	<0.00010
	Arsenic (As)-Total (mg/L)	0.00012
	Barium (Ba)-Total (mg/L)	0.0164
	Beryllium (Be)-Total (mg/L)	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050
	Boron (B)-Total (mg/L)	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010
	Calcium (Ca)-Total (mg/L)	2.44
	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)	0.00095
	Magnesium (Mg)-Total (mg/L)	1.18
	Manganese (Mn)-Total (mg/L)	0.00237
	Mercury (Hg)-Total (mg/L)	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.000050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1496820-1 Water 22-JUL-14 12:49 BAP-31-S	L1496820-2 Water 22-JUL-14 13:18 BAP-32-S	L1496820-3 Water 22-JUL-14 14:00 BPJ-31-S	L1496820-4 Water 22-JUL-14 14:30 BPJ-32-S	L1496820-5 Water 22-JUL-14 15:10 BBP-31-S
WATER						
Total Metals	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)	2.65	2.38	0.58	0.47	0.45
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.143	0.142	0.109	0.113	0.109
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	57.1	49.8	5.02	1.50	0.991
	Strontium (Sr)-Total (mg/L)	0.0584	0.0530	0.0196	0.0175	0.0175
	Sulfur (S)-Total (mg/L)	5.03	4.44	0.60	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000053	0.000051	0.000035	0.000034	0.000037
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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	0.0042	0.0038	0.0034	0.0036
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00013	0.00011	<0.00010	0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0169	0.0174	0.0165	0.0162	0.0167
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.025	0.023	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	4.79	4.44	2.57	2.46	2.45
	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	0.00024	0.00025	0.00028	0.00022
	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)	0.00175	0.00167	0.00106	0.00108	0.00098
	Magnesium (Mg)-Dissolved (mg/L)	8.18	7.19	1.49	1.17	1.09
	Manganese (Mn)-Dissolved (mg/L)	0.00107	0.000948	0.00128	0.000866	0.00135
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000085	0.000074	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496820-6				
	Description	Water				
	Sampled Date	22-JUL-14				
	Sampled Time	15:40				
	Client ID	BBP-32-S				
Grouping	**Analyte**					
WATER						
Total Metals	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)	<0.00010				
	Silicon (Si)-Total (mg/L)	0.104				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	1.71				
	Strontium (Sr)-Total (mg/L)	0.0182				
	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)	<0.010				
	Uranium (U)-Total (mg/L)	0.000037				
	Vanadium (V)-Total (mg/L)	<0.0010				
	Zinc (Zn)-Total (mg/L)	<0.0030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0039				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00010				
	Barium (Ba)-Dissolved (mg/L)	0.0167				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	Calcium (Ca)-Dissolved (mg/L)	2.49				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	0.00024				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.00096				
	Magnesium (Mg)-Dissolved (mg/L)	1.17				
	Manganese (Mn)-Dissolved (mg/L)	0.00138				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496820-1	L1496820-2	L1496820-3	L1496820-4	L1496820-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	22-JUL-14	22-JUL-14	22-JUL-14	22-JUL-14	22-JUL-14
	Sampled Time	12:49	13:18	14:00	14:30	15:10
	Client ID	BAP-31-S	BAP-32-S	BPJ-31-S	BPJ-32-S	BBP-31-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	2.63	2.30	0.55	0.45	0.44
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.136	0.129	0.107	0.098	0.097
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	57.5	50.2	4.30	1.59	0.934
	Strontium (Sr)-Dissolved (mg/L)	0.0556	0.0496	0.0188	0.0176	0.0169
	Sulfur (S)-Dissolved (mg/L)	5.18	4.46	0.59	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000047	0.000044	0.000032	0.000028	0.000031
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496820-6				
	Description	Water				
	Sampled Date	22-JUL-14				
	Sampled Time	15:40				
	Client ID	BBP-32-S				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	0.46				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	0.098				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	1.63				
	Strontium (Sr)-Dissolved (mg/L)	0.0173				
	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)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.000032				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	<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)
Method Blank	Copper (Cu)-Total	MB-LOR	L1496820-1, -2, -3, -4, -5, -6
Method Blank	Lead (Pb)-Total	MB-LOR	L1496820-1, -2, -3, -4, -5, -6
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1496820-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1496820-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1496820-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1496820-1, -2, -3, -4, -5, -6
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1496820-1, -2, -3, -4, -5, -6
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1496820-1, -2, -3, -4, -5, -6
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1496820-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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.

Reference Information

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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

Reference Information

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.

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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

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.

L1496820-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

(ALS) Environmental

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:	Brent Mack	Sampler:		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA		Number of Containers
					F/P	P	F	P	P	F/P	F								
	BAP-31-S	22-Jul-14	12:49	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		10
	BAP-32-S	22-Jul-14	13:18	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		10
	BPJ-31-S	22-Jul-14	14:00	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		10
	BPJ-32-S	22-Jul-14	14:30	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		10
	BBP-31-S	22-Jul-14	15:10	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		10
	BBP-32-S	22-Jul-14	15:40	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		10

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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
Martin Theriault	24-Jul-14	8:30	PAUL	4 AUG	9:35	21.3 °C				

GENF 20.00 Front

Short Holding Time

Rush Processing

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 05-AUG-14
Report Date: 20-AUG-14 11:06 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1496831

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACE WATER
C of C Numbers: 1
Legal Site Desc:

Comments: ADDITIONAL 15-AUG-14 17:42

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496831-1	L1496831-2	L1496831-3	L1496831-4	L1496831-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14
	Sampled Time	09:00	09:30	10:35	11:28	12:00
	Client ID	INNUG-58-S	INNUG-59-S	TE-71-S	TE-70-S	TEFF-31-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.118	0.075	0.139	0.070	0.169

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496831-6	L1496831-7	L1496831-8	L1496831-9	L1496831-11
	Description	Water	Water	Water	Water	Water
	Sampled Date	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14
	Sampled Time	12:20	13:56	14:25		
	Client ID	TEFF-32-S	PDL-31-S	PDL-32-S	CREMP-JULY-DUP-3	CREMP-JULY EB
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.094	0.055	0.107	0.160	<0.010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1496831-1 Water 30-JUL-14 09:00 INNUG-58-S	L1496831-2 Water 30-JUL-14 09:30 INNUG-59-S	L1496831-3 Water 30-JUL-14 10:35 TE-71-S	L1496831-4 Water 30-JUL-14 11:28 TE-70-S	L1496831-5 Water 30-JUL-14 12:00 TEFF-31-S
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5.67	5.56	8.77	7.24	5.67
Anions and Nutrients	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)	0.71	0.71	0.60	0.58	0.55
	Fluoride (F) (mg/L)	0.061	0.061	0.065	0.061	0.057
	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)	0.144	0.136	0.127	0.129	0.119
	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)	0.0037	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)	0.86	0.87	2.51	2.18	1.90
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.86	1.56	1.22	1.15	1.05
	Total Organic Carbon (mg/L)	1.71	1.52	1.46	1.21	1.23
Total Metals	Aluminum (Al)-Total (mg/L)	0.0035	0.0044	0.0084	0.0058	0.0045
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00015	0.00012	<0.00010
	Barium (Ba)-Total (mg/L)	0.00172	0.00178	0.00207	0.00208	0.00198
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	1.07	1.11	2.14	1.75	1.37
	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	<0.010	0.016	0.014	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	0.00058	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	0.67	0.69	0.78	0.68	0.57
	Manganese (Mn)-Total (mg/L)	0.00135	0.00137	0.00113	0.000997	0.000754
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	0.000077	0.000057	<0.000050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1496831-6 Water 30-JUL-14 12:20 TEFF-32-S	L1496831-7 Water 30-JUL-14 13:56 PDL-31-S	L1496831-8 Water 30-JUL-14 14:25 PDL-32-S	L1496831-9 Water 30-JUL-14 CREMP-JULY-DUP-3	L1496831-11 Water 30-JUL-14 CREMP-JULY EB
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	6.31	8.72	8.71	8.83	<0.50
Anions and Nutrients	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)	0.56	0.60	0.60	0.60	<0.10
	Fluoride (F) (mg/L)	0.058	0.038	0.038	0.066	<0.020
	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)	0.122	0.142	0.125	0.117	<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	<0.0020	<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)	1.97	1.61	1.61	2.52	<0.50
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.02	1.35	1.37	1.16	<0.50
	Total Organic Carbon (mg/L)	1.10	1.41	1.36	1.20	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0042	<0.0030	0.0032	0.0068	0.0201
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00010	0.00015	0.00015	0.00015	<0.00010
	Barium (Ba)-Total (mg/L)	0.00203	0.00186	0.00190	0.00218	0.000279
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	1.46	2.19	2.21	2.16	<0.050
	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	0.016	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000105
	Lithium (Li)-Total (mg/L)	0.00050	<0.00050	<0.00050	0.00055	<0.00050
	Magnesium (Mg)-Total (mg/L)	0.60	0.78	0.78	0.80	<0.10
	Manganese (Mn)-Total (mg/L)	0.000808	0.000701	0.000738	0.00111	0.000060
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.000078	0.000136

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496831-12				
	Description	Water				
	Sampled Date					
	Sampled Time					
	Client ID	TRAVEL BLANK				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	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)	<0.50				
Cyanides	Cyanide, Total (mg/L)	<0.0050				
	Cyanide, Free (mg/L)	<0.0050				
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)	<0.00010				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000010				
	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)	<0.00050				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.000050				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496831-1	L1496831-2	L1496831-3	L1496831-4	L1496831-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14
	Sampled Time	09:00	09:30	10:35	11:28	12:00
	Client ID	INNUG-58-S	INNUG-59-S	TE-71-S	TE-70-S	TEFF-31-S
Grouping	**Analyte**					
WATER						
Total Metals	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)	0.39	0.40	0.40	0.44	0.37
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.089	0.088	0.163	0.130	0.102
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.493	0.513	0.576	0.555	0.516
	Strontium (Sr)-Total (mg/L)	0.00605	0.00629	0.0105	0.00890	0.00720
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	0.86	0.81	0.70
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000037	0.000039	0.000052	0.000040	0.000052
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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	0.0056	0.0034	0.0018	0.0021
	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	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00166	0.00167	0.00210	0.00206	0.00199
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	1.13	1.11	2.21	1.77	1.34
	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)	0.00034	0.00030	0.00038	0.00030	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)	<0.00050	<0.00050	0.00062	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.69	0.68	0.79	0.69	0.56
	Manganese (Mn)-Dissolved (mg/L)	0.000432	0.000431	0.000629	0.000626	0.000516
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000076	<0.000050	0.000072	0.000051	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1496831-6 Water 30-JUL-14 12:20 TEFF-32-S	L1496831-7 Water 30-JUL-14 13:56 PDL-31-S	L1496831-8 Water 30-JUL-14 14:25 PDL-32-S	L1496831-9 Water 30-JUL-14 CREMP-JULY-DUP-3	L1496831-11 Water 30-JUL-14 CREMP-JULY EB
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	<0.00050	0.00056	0.00056	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.38	0.37	0.31	0.47	<0.10
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.111	0.122	0.125	0.159	0.070
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.528	0.448	0.455	0.589	47.3
	Strontium (Sr)-Total (mg/L)	0.00771	0.00888	0.00908	0.0107	<0.00020
	Sulfur (S)-Total (mg/L)	0.73	0.61	0.56	0.91	<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	0.00013
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000036	0.000022	0.000023	0.000050	<0.000010
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0015	<0.0010	<0.0010	0.0025	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00012	0.00014	0.00013	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00197	0.00190	0.00192	0.00219	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	1.52	2.21	2.20	2.22	<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)	0.00026	0.00043	0.00040	0.00036	<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	0.000079
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.00065	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.61	0.78	0.78	0.80	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.000556	0.000488	0.000462	0.000645	0.000066
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000075	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00056	0.00052	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496831-12				
	Description	Water				
	Sampled Date					
	Sampled Time					
	Client ID	TRAVEL BLANK				
Grouping	**Analyte**					
WATER						
Total Metals	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)	<0.00010				
	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)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.0010				
	Zinc (Zn)-Total (mg/L)	<0.0030				
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)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496831-1	L1496831-2	L1496831-3	L1496831-4	L1496831-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14	30-JUL-14
	Sampled Time	09:00	09:30	10:35	11:28	12:00
	Client ID	INNUG-58-S	INNUG-59-S	TE-71-S	TE-70-S	TEFF-31-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.36	0.38	0.43	0.38	0.33
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.082	0.081	0.149	0.131	0.098
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.522	0.523	0.599	0.561	0.533
	Strontium (Sr)-Dissolved (mg/L)	0.00602	0.00602	0.0105	0.00853	0.00693
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50	0.88	0.73	0.64
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)		0.000034	0.000041	0.000033	0.000027
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1496831-6 Water 30-JUL-14 12:20 TEFF-32-S	L1496831-7 Water 30-JUL-14 13:56 PDL-31-S	L1496831-8 Water 30-JUL-14 14:25 PDL-32-S	L1496831-9 Water 30-JUL-14 CREMP-JULY-DUP-3	L1496831-11 Water 30-JUL-14 CREMP-JULY EB
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.39	0.34	0.33	0.42	<0.10
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.109	0.117	0.114	0.155	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.539	0.467	0.466	0.602	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.00745	0.00878	0.00878	0.0106	<0.00020
	Sulfur (S)-Dissolved (mg/L)	0.72	0.55	0.53	0.86	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000029	0.000020	0.000021	0.000039	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	0.0010	0.0014

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496831-12				
	Description	Water				
	Sampled Date					
	Sampled Time					
	Client ID	TRAVEL BLANK				
Grouping	**Analyte**					
WATER						
Dissolved Metals	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)					
	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)					

* 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	Sulfur (S)-Dissolved	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1496831-2
Matrix Spike	Sodium (Na)-Total	MS-B	L1496831-1, -11, -2, -3, -4, -5, -6, -7, -8, -9

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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

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.

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.

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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

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.

L1496831-COFC

COC # _____

ALS Environmental

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:		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC V6K2G8	Email 2:		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3:		
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 #:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:	Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Brent Mack	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA		Number of Containers
							F/P	P	F	P	P	F/P	F						
	Innug-58-S	30-Jul-14	9:00	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	Innug-59-S	30-Jul-14	9:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	TE-71-S	30-Jul-14	10:55	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	TE-70-S	30-Jul-14	11:28	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	TEFF-31-S	30-Jul-14	12:00	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	TEFF-32-S	30-Jul-14	12:20	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	PDL-31-S	30-Jul-14	13:56	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	PDL-32-S	30-Jul-14	14:25	Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	CREMP-JULY-DUP-3	30-Jul-14		Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	CREMP-JULY FB	30-Jul-14		Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9
	CREMP-JULY EB	30-Jul-14		Water	X	X	X	X	X	X	X	X	X	X	X	X	X		9

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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
Martin Theriault	31-Jul-14	8:30	PAUL	4 AUG	9:40	20.8 °C				

GENF 20.00 Front

Short Holding Time

Rush Processing

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 05-AUG-14
Report Date: 20-AUG-14 11:19 (MT)
Version: FINAL REV. 2

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1496854

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers: 1
Legal Site Desc:

Comments: 20-AUG-2014 This report replaces the previous version and contains additional analyses, as requested.

Brent Mack
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	L1496854-1 Water 26-JUL-14 09:55 WAL-39-S	L1496854-2 Water 26-JUL-14 10:30 WAL-40-S	L1496854-3 Water 25-JUL-14 11:17 TPS-43-S	L1496854-4 Water 25-JUL-14 12:02 TPS-44-S	L1496854-5 Water 25-JUL-14 14:10 TPN-70-S
FILTER							
Plant Pigments	Chlorophyll a (ug/L)		0.296	0.312	0.155	0.218	0.219

* 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	L1496854-6 Water 25-JUL-14 14:35 TPN-71-S	L1496854-7 Water 25-JUL-14 15:17 TPE-70-S	L1496854-8 Water 25-JUL-14 16:02 TPE-71-S	L1496854-9 Water 25-JUL-14 JULY-CREMP-DUP-1	L1496854-10 Water 26-JUL-14 JULY-CREMP-DUP-2
FILTER							
Plant Pigments	Chlorophyll a (ug/L)		0.119	0.203	0.560	0.283	0.392

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1496854-1 Water 26-JUL-14 09:55 WAL-39-S	L1496854-2 Water 26-JUL-14 10:30 WAL-40-S	L1496854-3 Water 25-JUL-14 11:17 TPS-43-S	L1496854-4 Water 25-JUL-14 12:02 TPS-44-S	L1496854-5 Water 25-JUL-14 14:10 TPN-70-S
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	14.5	14.4	9.08	9.02	9.19
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	0.0103	0.0112	0.0140
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.65	0.65	0.73	0.72	0.75
	Fluoride (F) (mg/L)	0.049	0.049	0.066	0.066	0.066
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	0.0582	0.0577	0.0573
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0011	0.0011	0.0012
	Total Kjeldahl Nitrogen (mg/L)	0.164	0.172	0.147	0.152	0.172
	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	0.0021	<0.0020
	Silicate (as SiO2) (mg/L)	0.63	0.62	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	2.84	2.83	4.82	4.77	5.02
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.53	1.59	1.14	1.08	1.15
	Total Organic Carbon (mg/L)	1.65	1.74	1.24	1.32	1.30
Total Metals	Aluminum (Al)-Total (mg/L)	0.0052	0.0048	0.0032	0.0035	0.0032
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00030	0.00030	0.00018	0.00017	0.00020
	Barium (Ba)-Total (mg/L)	0.00192	0.00189	0.00313	0.00312	0.00313
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	3.91	3.89	2.16	2.17	2.22
	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)	0.00090	0.00082	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.017	0.015	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	0.000243	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	1.15	1.16	0.88	0.89	0.90
	Manganese (Mn)-Total (mg/L)	0.00139	0.00126	0.00297	0.00268	0.00351
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000141	0.000137	0.000206	0.000203	0.000235

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496854-6	L1496854-7	L1496854-8	L1496854-9	L1496854-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	25-JUL-14	25-JUL-14	25-JUL-14	25-JUL-14	26-JUL-14
	Sampled Time	14:35	15:17	16:02		
	Client ID	TPN-71-S	TPE-70-S	TPE-71-S	JULY-CREMP-DUP-1	JULY-CREMP-DUP-2
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	9.22	10.6	10.4	10.3	14.4
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0135	<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	0.64	0.64	0.64	0.65
	Fluoride (F) (mg/L)	0.066	0.075	0.074	0.074	0.049
	Nitrate (as N) (mg/L)	0.0575	0.0084	0.0106	0.0107	<0.0050
	Nitrite (as N) (mg/L)	0.0012	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.161	0.136	0.141	0.141	0.176
	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	0.0023
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	0.63
	Sulfate (SO4) (mg/L)	4.97	3.93	3.99	3.99	2.84
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.20	1.15	2.55 RRV	1.10	1.47
	Total Organic Carbon (mg/L)	2.26	1.26	1.26	1.24	1.65
Total Metals	Aluminum (Al)-Total (mg/L)	0.0037	0.0070	0.0063	0.0058	0.0046
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00019	0.00059	0.00053	0.00054	0.00028
	Barium (Ba)-Total (mg/L)	0.00325	0.00336	0.00332	0.00302	0.00191
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	2.18	2.63	2.56	2.61	3.83
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00011	0.00012	0.00011	<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	0.00079
	Iron (Fe)-Total (mg/L)	<0.010	0.014	0.013	0.011	0.016
	Lead (Pb)-Total (mg/L)	0.000099	0.000087	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	0.88	0.95	0.93	0.96	1.14
	Manganese (Mn)-Total (mg/L)	0.00326	0.00138	0.00141	0.00141	0.00120
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000218	0.000189	0.000186	0.000186	0.000140

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496854-1	L1496854-2	L1496854-3	L1496854-4	L1496854-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-JUL-14	26-JUL-14	25-JUL-14	25-JUL-14	25-JUL-14
	Sampled Time	09:55	10:30	11:17	12:02	14:10
	Client ID	WAL-39-S	WAL-40-S	TPS-43-S	TPS-44-S	TPN-70-S
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00050	0.00051	0.00052
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.44	0.43	0.51	0.52	0.51
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.332	0.321	<0.050	<0.050	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.519	0.511	1.15	1.11	1.16
	Strontium (Sr)-Total (mg/L)	0.0190	0.0192	0.0103	0.0102	0.0104
	Sulfur (S)-Total (mg/L)	0.98	0.98	1.66	1.64	1.72
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000044	0.000043	0.000044	0.000046	0.000045
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0032	0.0035	<0.0010	0.0013	0.0014
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00026	0.00023	0.00016	0.00016	0.00016
	Barium (Ba)-Dissolved (mg/L)	0.00182	0.00187	0.00297	0.00305	0.00287
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	3.91	3.90	2.18	2.17	2.21
	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)	0.00075	0.00074	0.00036	0.00039	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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	1.15	1.14	0.88	0.88	0.89
	Manganese (Mn)-Dissolved (mg/L)	0.000737	0.000772	0.00242	0.00235	0.00309
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000144	0.000128	0.000194	0.000193	0.000205
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496854-6	L1496854-7	L1496854-8	L1496854-9	L1496854-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	25-JUL-14	25-JUL-14	25-JUL-14	25-JUL-14	26-JUL-14
	Sampled Time	14:35	15:17	16:02		
	Client ID	TPN-71-S	TPE-70-S	TPE-71-S	JULY-CREMP-DUP-1	JULY-CREMP-DUP-2
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00051	0.00051	0.00052	0.00051	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.51	0.55	0.52	0.54	0.45
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	<0.050	0.066	0.062	0.062	0.321
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.13	0.854	0.874	0.888	0.503
	Strontium (Sr)-Total (mg/L)	0.0104	0.0115	0.0112	0.0112	0.0190
	Sulfur (S)-Total (mg/L)	1.70	1.33	1.32	1.34	1.00
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000042	0.000050	0.000044	0.000054	0.000043
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0014	0.0026	0.0037	0.0027	0.0031
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00017	0.00055	0.00051	0.00050	0.00025
	Barium (Ba)-Dissolved (mg/L)	0.00317	0.00332	0.00298	0.00293	0.00183
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	2.22	2.67	2.60	2.61	3.89
	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)	0.00036	0.00037	0.00038	0.00036	0.00074
	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)	0.00052	<0.00050	0.00054	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.89	0.95	0.94	0.93	1.14
	Manganese (Mn)-Dissolved (mg/L)	0.00305	0.00107	0.00111	0.00114	0.000791
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000209	0.000176	0.000193	0.000176	0.000128
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496854-1	L1496854-2	L1496854-3	L1496854-4	L1496854-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-JUL-14	26-JUL-14	25-JUL-14	25-JUL-14	25-JUL-14
	Sampled Time	09:55	10:30	11:17	12:02	14:10
	Client ID	WAL-39-S	WAL-40-S	TPS-43-S	TPS-44-S	TPN-70-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.40	0.41	0.49	0.48	0.49
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.329	0.325	<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)	0.518	0.518	1.11	1.11	1.19
	Strontium (Sr)-Dissolved (mg/L)	0.0187	0.0187	0.00992	0.00983	0.0103
	Sulfur (S)-Dissolved (mg/L)	0.95	0.98	1.64	1.63	1.71
	Thallium (Tl)-Dissolved (mg/L)	0.000012	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000051	0.000040	0.000036	0.000038	0.000041
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1496854-6	L1496854-7	L1496854-8	L1496854-9	L1496854-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	25-JUL-14	25-JUL-14	25-JUL-14	25-JUL-14	26-JUL-14
	Sampled Time	14:35	15:17	16:02		
	Client ID	TPN-71-S	TPE-70-S	TPE-71-S	JULY-CREMP-DUP-1	JULY-CREMP-DUP-2
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.50	0.51	0.51	0.50	0.41
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	<0.050	0.053	0.055	0.057	0.319
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	0.000018	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.13	0.898	0.903	0.911	0.517
	Strontium (Sr)-Dissolved (mg/L)	0.0101	0.0111	0.0110	0.0110	0.0187
	Sulfur (S)-Dissolved (mg/L)	1.68	1.31	1.33	1.37	0.99
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000015	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000039	0.000041	0.000063	0.000045	0.000042
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<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	Sulfur (S)-Dissolved	MS-B	L1496854-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1496854-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1496854-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1496854-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1496854-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1496854-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1496854-1, -10, -2, -3, -4, -5, -6, -7, -8, -9

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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

Reference Information

States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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).

Reference Information

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.

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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

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.

L1496854-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC #

Page 1 of 1

(ALS) Environmental

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@azimuthgrou.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)		ALS Contact: Brent Mack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	AMONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-ICPMSDG-VA	MET-T-ICPMSDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA		Number of Containers
							F/P	P	F	P	P	F/P	F						
	WAL-39-S	26-Jul-14	9:55	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	WAL-40-S	26-Jul-14	10:30	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	TPS-43-S	25-Jul-14	11:17	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	TPS-44-S	25-Jul-14	12:02	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	TPN-70-S	25-Jul-14	14:10	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	TPN-71-S	25-Jul-14	14:35	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	TPE-70-S	25-Jul-14	15:17	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	TPE-71-S	25-Jul-14	16:02	Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	July-CREMP-DUP-1	25-Jul-14		Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9
	July-CREMP-DUP-2	26-Jul-14		Water	x	x	x	x	x	x	x	x	x	x	x	x	x		9

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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
Martin Theriault	28-Jul-14	8:30	Jacqui	Aug5	9:40	20.8 °C				

20.4
21.4

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 04-AUG-14
Report Date: 11-AUG-14 16:16 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1497120

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers: 10-380682
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1497120-1	L1497120-2			
	Description	WATER	WATER			
	Sampled Date	19-JUL-14	19-JUL-14			
	Sampled Time	17:00	05:30			
	Client ID	SP-70-S	SP-71-S			
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.233	0.201			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1497120-1	L1497120-2			
	Description	WATER	WATER			
	Sampled Date	19-JUL-14	19-JUL-14			
	Sampled Time	17:00	05:30			
	Client ID	SP-70-S	SP-71-S			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	13.3	13.3			
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.62	0.63			
	Fluoride (F) (mg/L)	0.067	0.067			
	Nitrate (as N) (mg/L)	<0.0050	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.152	0.161			
	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)	0.0041	0.0089			
	Silicate (as SiO2) (mg/L)	<0.50	<0.50			
	Sulfate (SO4) (mg/L)	3.51	3.49			
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanide, Free (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.47	1.40			
	Total Organic Carbon (mg/L)	1.50	1.27			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0092	0.0083			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00025	0.00026			
	Barium (Ba)-Total (mg/L)	0.00245	0.00248			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Total (mg/L)	3.39	3.42			
	Chromium (Cr)-Total (mg/L)	0.00012	<0.00010			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	<0.0010 DLB	<0.0010 DLB			
	Iron (Fe)-Total (mg/L)	0.024	0.023			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.00055	<0.00050			
	Magnesium (Mg)-Total (mg/L)	1.09	1.11			
	Manganese (Mn)-Total (mg/L)	0.00219	0.00189			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000112	0.000105			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1497120-1	L1497120-2			
	Description	WATER	WATER			
	Sampled Date	19-JUL-14	19-JUL-14			
	Sampled Time	17:00	05:30			
	Client ID	SP-70-S	SP-71-S			
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.48	0.50			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	0.188	0.189			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	0.644	0.658			
	Strontium (Sr)-Total (mg/L)	0.0155	0.0153			
	Sulfur (S)-Total (mg/L)	1.17	1.20			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.000049	0.000046			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	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)	0.0020	0.0032			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00022	0.00022			
	Barium (Ba)-Dissolved (mg/L)	0.00249	0.00246			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Dissolved (mg/L)	3.49	3.49			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00051	0.00053			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.00050	0.00052			
	Magnesium (Mg)-Dissolved (mg/L)	1.11	1.11			
	Manganese (Mn)-Dissolved (mg/L)	0.000961	0.00105			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000098	0.000114			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1497120-1	L1497120-2			
	Description	WATER	WATER			
	Sampled Date	19-JUL-14	19-JUL-14			
	Sampled Time	17:00	05:30			
	Client ID	SP-70-S	SP-71-S			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	0.48	0.48			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	0.179	0.182			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	0.665	0.637			
	Strontium (Sr)-Dissolved (mg/L)	0.0150	0.0151			
	Sulfur (S)-Dissolved (mg/L)	1.19	1.21			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000037	0.000040			
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			
	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)
Method Blank	Copper (Cu)-Total	MB-LOR	L1497120-1, -2
Method Blank	Lead (Pb)-Total	MB-LOR	L1497120-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1497120-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1497120-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1497120-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1497120-1, -2
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1497120-1, -2
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1497120-1, -2
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1497120-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L1497120-2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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.

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-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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).

Reference Information

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.

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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-380682

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 Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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:	
Company:	Agnico-Eagle Mines Ltd.	☑ Standard ☐ Other		☑	Regular Service (Default)
Contact:	Ryan VanEngen	☑ PDF ☑ Excel		☐	Rush Service (2-3 Days)
Address:	Meadowbank Division PO Box 540 Baker Lake Nun.	Email 1: meadowbank.e[illegible]@agnicoeagle.com		☐	Priority Service (1 Day or ASAP)
		Email 2:		☐	Emergency Service (<1 Day / Wkend) - Contact ALS
Phone:	867 793 4610x6759 Fax:			Analysis Request	
Invoice To:	☑ Same as Report	Indicate Bottles: Filtered / Preserved (F/P) →		P	P P
Company:	Agnico-Eagle Mining Ltd.	**Client / Project Information:**			
Contact:	Accounts Payable-Meadowbank Division	Job #: CREMP			
Address:	email electronic invoice to rvanengen@agnico-eagle.com	PO/AFE:			
Sample		Legal Site Description:			
Phone:	Fax:	Quote #: Q21514			
Lab Work Order # (lab use only)		**ALS Contact:** Chrisine Herrod	**Sampler** (Initials):		

Sample #	Sample Identification (This description will appear on the report)	Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	Chloro A	Cyanide total	DOC/DKN/TDN/TDP/DNH3	General chemistry (BC)	Tot. Metals	Diss. Metals	tot. Mercury	diss. Mercury	NUT/TOC/COD/TN/NH3/Phen		Hazardous?	Highly Contaminated?	Number of Containers
	SP-70-S	19-Jul-14	17:00	Water	X	X	X	X	X	X	X	X	X				
	SP-71-S	19-Jul-14	17:30	Water	X	X	X	X	X	X	X	X	X				

Short Holding Time

● *Rush Processing*

L1497120-COFC

Guidelines / Regulations	Special Instructions / Hazardous Details
	Please use "low range anion" analysis

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 specified on the adjacent worksheet.

Relinquished By:	M. Theriault	Date & Time:	2014-07-21	Received By:	Paul	Date & Time:	4 Aug 9:40	Sample Condition (lab use only)	
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature 20.8/ 20.4/21.4	Samples Received in Good Condition? Y / N (If no provided details)

10- 380682

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 1

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: AEM	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: Ryan VanEngen.	Select: PDF ✓ Excel ✓ Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: Meadowbank division PO Box 540 Baker Lake Nunavut	Email 1: meadowbank.environment@agnicoeagle.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
Phone: 867-793-4610 (6838) Fax:	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #: CREMP	(Indicate Filtered or Preserved, F/P)
Company: AEM Ltd	PO / AFE:	
Contact: Accounts Payable Meadowbank division	LSD:	
Address: email electronic invoice		
Phone: Fax:	Quote #:	
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	Chloro. A	Cyanide	DOC/DNU/TDN/TDP	DWH3	General chemistry	total metal	diss. metal	tot. mercury	diss. mercury	NUT: NH3/NO3	TU/TP/NH3/PHENOL	Number of Containers
	SP-70-S	19-07-14	17h00	water	x	x	x		x	x	x	x	x	x		9
	SP-71-S	19-07-14	17h30	water	x	x	x		x	x	x	x	x	x		9

Short Holding Time

Rush Processing

L1497120-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Please use low "Range Anion" Analyse

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 specified on the back page of the white - report copy.

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:	Observation Yes / No ? If Yes add
M. Theriault	2014-07-21	9h30	Paul	Aug 4	9:40	20.8 20.4 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — GENF 18.01 F

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 10-SEP-14
Report Date: 19-SEP-14 17:39 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1515830

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 19-SEP-14 17:32

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515830-1	L1515830-2	L1515830-3	L1515830-4	
	Description					
	Sampled Date	03-SEP-14	03-SEP-14	03-SEP-14	03-SEP-14	
	Sampled Time	09:40	11:00	00:40	13:30	
	Client ID	INUG-60-S	INUG-61-S	PDL-33-S	PDL-34-S	
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.243	0.204	0.159	0.154	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515830-1	L1515830-2	L1515830-3	L1515830-4	L1515830-5
	Description					
	Sampled Date	03-SEP-14	03-SEP-14	03-SEP-14	03-SEP-14	03-SEP-14
	Sampled Time	09:40	11:00	00:40	13:30	
	Client ID	INUG-60-S	INUG-61-S	PDL-33-S	PDL-34-S	EB-2
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5.61	5.72	8.85	9.04	<0.50
Anions and Nutrients	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)	0.73	0.73	0.60	0.60	<0.10
	Fluoride (F) (mg/L)	0.063	0.064	0.039	0.039	<0.020
	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	<0.0020	0.0021	<0.0020
	Phosphorus (P)-Total (mg/L)	0.0026	<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)	0.88	0.88	1.63	1.63	<0.50
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.78	1.63	1.52	1.58	<0.50
	Total Organic Carbon (mg/L)	2.05	2.08	1.88	1.83	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0143	0.0099	0.0048	0.0060	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00010	0.00011	0.00018	0.00019	<0.00010
	Barium (Ba)-Total (mg/L)	0.00206	0.00185	0.00201	0.00196	<0.000050
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.000013	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	1.16	1.16	2.23	2.24	<0.050
	Chromium (Cr)-Total (mg/L)	0.00013	0.00011	0.00013	<0.00010	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00085	<0.00050	0.00055	0.00052	<0.00050
	Iron (Fe)-Total (mg/L)	0.021	0.016	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	0.000125	<0.000050	<0.000050	<0.000050	0.000080
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	0.70	0.73	0.79	0.79	<0.10
	Manganese (Mn)-Total (mg/L)	0.00198	0.00150	0.000866	0.000920	<0.000050
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00058	0.00058	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515830-6				
	Description					
	Sampled Date					
	Sampled Time					
	Client ID	TRAVEL BLANK				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	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				
	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)	<0.50				
Cyanides	Cyanide, Total (mg/L)	<0.0050				
	Cyanide, Free (mg/L)	<0.0050				
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)	<0.00010				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000010				
	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)	<0.00050				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.000050				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515830-1	L1515830-2	L1515830-3	L1515830-4	L1515830-5
	Description					
	Sampled Date	03-SEP-14	03-SEP-14	03-SEP-14	03-SEP-14	03-SEP-14
	Sampled Time	09:40	11:00	00:40	13:30	
	Client ID	INUG-60-S	INUG-61-S	PDL-33-S	PDL-34-S	EB-2
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.38	0.40	0.36	0.35	<0.10
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.112	0.118	0.128	0.133	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.633	0.569	0.490	0.483	<0.050
	Strontium (Sr)-Total (mg/L)	0.00687	0.00672	0.00944	0.00933	<0.00020
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	0.59	0.61	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000047	0.000044	0.000025	0.000023	<0.000010
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0021	0.0022	0.0013	0.0016	<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	0.00015	0.00015	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00175	0.00171	0.00193	0.00187	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	1.12	1.13	2.24	2.29	<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)	0.00033	0.00030	0.00039	0.00040	<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	0.000071	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.69	0.70	0.79	0.81	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.000492	0.000490	0.000333	0.000335	<0.000050
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	0.00051	0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515830-6				
	Description					
	Sampled Date					
	Sampled Time					
	Client ID	TRAVEL BLANK				
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	<0.10				
	Selenium (Se)-Total (mg/L)	<0.00010				
	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)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.0010				
	Zinc (Zn)-Total (mg/L)	<0.0030				
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)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L1515830-1	L1515830-2	L1515830-3	L1515830-4	L1515830-5
		Description					
		Sampled Date	03-SEP-14	03-SEP-14	03-SEP-14	03-SEP-14	03-SEP-14
		Sampled Time	09:40	11:00	00:40	13:30	
		Client ID	INUG-60-S	INUG-61-S	PDL-33-S	PDL-34-S	EB-2
WATER							
Dissolved Metals	Potassium (K)-Dissolved (mg/L)		0.39	0.39	0.35	0.35	<0.10
	Selenium (Se)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)		0.094	0.091	0.120	0.125	<0.050
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		0.534	0.537	0.472	0.462	<0.050
	Strontium (Sr)-Dissolved (mg/L)		0.00607	0.00620	0.00888	0.00879	<0.00020
	Sulfur (S)-Dissolved (mg/L)		<0.50	<0.50	0.55	0.58	<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)		<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)		0.000030	0.000037	0.000019	0.000019	<0.000010
	Vanadium (V)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515830-6				
	Description					
	Sampled Date					
	Sampled Time					
	Client ID	TRAVEL BLANK				
Grouping	**Analyte**					
WATER						
Dissolved Metals	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)					
	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)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L1515830-4	PDL-34-S	WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1515830-1, -2, -3, -4, -5
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1515830-1, -2, -3, -4, -5
Duplicate	Chromium (Cr)-Dissolved	DLA	L1515830-1, -2, -3, -4, -5
Duplicate	Silver (Ag)-Dissolved	DLA	L1515830-1, -2, -3, -4, -5
Duplicate	Titanium (Ti)-Dissolved	DLA	L1515830-1, -2, -3, -4, -5
Duplicate	Vanadium (V)-Dissolved	DLA	L1515830-1, -2, -3, -4, -5
Duplicate	Bromide (Br)	DLM	L1515830-1, -2, -3, -4, -5, -6
Duplicate	Nitrite (as N)	DLM	L1515830-1, -2, -3, -4, -5, -6
Duplicate	Bromide (Br)	DLM	L1515830-1, -2, -3, -4, -5, -6
Duplicate	Nitrite (as N)	DLM	L1515830-1, -2, -3, -4, -5, -6
Duplicate	Nitrate (as N)	DLM	L1515830-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1515830-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Dissolved Organic Carbon	MS-B	L1515830-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Total	MS-B	L1515830-3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515830-1, -2, -3, -4, -5

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:

Reference Information

ALS Test Code	Matrix	Test Description	Method Reference**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.			
CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A
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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 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 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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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.

** 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 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: qmann@azimuthgrou.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 #: Q39603		
Lab Work Order # (lab use only)	L1515830	ALS Contact: Brent Mack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDS-VA	MET-T-BCMDS-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	INUG-60-S	03-Sep-14	9:40		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	INUG-61-S	03-Sep-14	11:00		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	PDL-33-S	03-Sep-14	12:40		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	PDL-34-S	03-Sep-14	13:30		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	EB-2	03-Sep-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9

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
Morgan Finley	4-Sep-14		JN	Sep 10	11:30	°C				

GENF 20.00 Front

15.8/15.2/15/13/12.5/14.9/13.3/14/12

Short Holding Time
Rush Processing



L1515830-COFC

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 10-SEP-14
Report Date: 19-SEP-14 17:34 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1515838

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515838-1	L1515838-2	L1515838-3	L1515838-4	
	Description	Water	Water	Water	Water	
	Sampled Date	30-AUG-14	30-AUG-14	30-AUG-14	30-AUG-14	
	Sampled Time					
	Client ID	TE-72-S	TE-73-S	TEFF-33-S	TEFF-34-S	
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.179	0.179	0.132	0.110	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515838-1	L1515838-2	L1515838-3	L1515838-4	
	Description	Water	Water	Water	Water	
	Sampled Date	30-AUG-14	30-AUG-14	30-AUG-14	30-AUG-14	
	Sampled Time					
	Client ID	TE-72-S	TE-73-S	TEFF-33-S	TEFF-34-S	
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	9.15	7.67	5.53	5.93	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	0.0110	<0.0050	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	0.63	0.59	0.55	0.56	
	Fluoride (F) (mg/L)	0.071	0.067	0.058	0.059	
	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	
	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)	2.70	2.28	1.89	1.98	
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.32	1.23	1.08	1.13	
	Total Organic Carbon (mg/L)	1.69	1.59	1.51	1.49	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0331	0.0241	0.0121	0.0139	
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00017	0.00012	0.00010	<0.00010	
	Barium (Ba)-Total (mg/L)	0.00240	0.00238	0.00201	0.00214	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Calcium (Ca)-Total (mg/L)	2.20	1.81	1.26	1.36	
	Chromium (Cr)-Total (mg/L)	0.00014	0.00014	<0.00010	<0.00010	
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	0.00051	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	0.047	0.035	0.015	0.015	
	Lead (Pb)-Total (mg/L)	0.000061	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.00055	0.00051	<0.00050	<0.00050	
	Magnesium (Mg)-Total (mg/L)	0.77	0.69	0.53	0.55	
	Manganese (Mn)-Total (mg/L)	0.00174	0.00162	0.00115	0.00127	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000078	0.000062	<0.000050	<0.000050	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515838-1	L1515838-2	L1515838-3	L1515838-4	
	Description	Water	Water	Water	Water	
	Sampled Date	30-AUG-14	30-AUG-14	30-AUG-14	30-AUG-14	
	Sampled Time					
	Client ID	TE-72-S	TE-73-S	TEFF-33-S	TEFF-34-S	
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	0.43	0.39	0.36	0.37	
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Total (mg/L)	0.220	0.197	0.116	0.121	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	0.632	0.590	0.554	0.544	
	Strontium (Sr)-Total (mg/L)	0.0109	0.00883	0.00699	0.00723	
	Sulfur (S)-Total (mg/L)	0.88	0.80	0.64	0.65	
	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)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.000085	0.000063	0.000036	0.000038	
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.0064	0.0053	0.0026	0.0045	
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	0.00012	<0.00010	<0.00010	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.00223	0.00204	0.00199	0.00200	
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Calcium (Ca)-Dissolved (mg/L)	2.32	1.89	1.31	1.41	
	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)	0.00051	0.00042	0.00032	0.00034	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	0.000054	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Magnesium (Mg)-Dissolved (mg/L)	0.82	0.72	0.55	0.58	
	Manganese (Mn)-Dissolved (mg/L)	0.000885	0.000706	0.000415	0.000431	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000079	<0.000050	<0.000050	<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	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515838-1	L1515838-2	L1515838-3	L1515838-4	
	Description	Water	Water	Water	Water	
	Sampled Date	30-AUG-14	30-AUG-14	30-AUG-14	30-AUG-14	
	Sampled Time					
	Client ID	TE-72-S	TE-73-S	TEFF-33-S	TEFF-34-S	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.43	0.40	0.36	0.36	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Dissolved (mg/L)	0.186	0.159	0.099	0.108	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	0.649	0.612	0.552	0.558	
	Strontium (Sr)-Dissolved (mg/L)	0.0110	0.00901	0.00681	0.00725	
	Sulfur (S)-Dissolved (mg/L)	0.92	0.78	0.65	0.67	
	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)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000063	0.000048	0.000027	0.000029	
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	0.0018	<0.0010	<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)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1515838-1, -2, -3, -4
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1515838-1, -2, -3, -4
Duplicate	Chromium (Cr)-Dissolved	DLA	L1515838-1, -2, -3, -4
Duplicate	Silver (Ag)-Dissolved	DLA	L1515838-1, -2, -3, -4
Duplicate	Titanium (Ti)-Dissolved	DLA	L1515838-1, -2, -3, -4
Duplicate	Vanadium (V)-Dissolved	DLA	L1515838-1, -2, -3, -4
Duplicate	Bromide (Br)	DLM	L1515838-1, -2, -3, -4
Duplicate	Nitrite (as N)	DLM	L1515838-1, -2, -3, -4
Duplicate	Bromide (Br)	DLM	L1515838-1, -2, -3, -4
Duplicate	Nitrite (as N)	DLM	L1515838-1, -2, -3, -4
Duplicate	Nitrate (as N)	DLM	L1515838-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Dissolved Organic Carbon	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515838-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515838-1, -2, -3, -4

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

Reference Information

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA Water Nitrate in Water by Ion Chromatography EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA Water Sulfate by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310 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 5310 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.

CN-FREE-CFA-VA Water 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-CFA-VA Water 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-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 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 (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.

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.

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.

** 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 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@azimuthgrou.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)	L1515838	ALS Contact: Brent Mack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	TE-72-S	30-Aug-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TE-73-S	30-Aug-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TEFF-33-S	30-Aug-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TEFF-34-S	30-Aug-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9

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
Morgan Finley	1-Sep-14		JH	Sept 10	11:30	5-8°C				

GENF 20.00 Front

15/15.2/15/13/12.5/14.9/13.3/14/12

Short Holding Time
Rush Processing



L1515838-COFC

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 10-SEP-14
Report Date: 19-SEP-14 17:35 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1515843

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515843-1	L1515843-2	L1515843-3	L1515843-4	L1515843-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	31-AUG-14	31-AUG-14	31-AUG-14	31-AUG-14	31-AUG-14
	Sampled Time	15:20	15:40	16:10	16:30	17:00
	Client ID	BAP-33-S	BAP-34-S	BPJ-33-S	BPJ-34-S	BBD-33-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.310	0.342	0.203	0.210	0.183

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515843-6	L1515843-7			
	Description	Water	Water			
	Sampled Date	31-AUG-14	31-AUG-14			
	Sampled Time	17:20				
	Client ID	BBD-34-S	DUP-3			
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.284	0.201			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515843-1 Water 31-AUG-14 15:20 BAP-33-S	L1515843-2 Water 31-AUG-14 15:40 BAP-34-S	L1515843-3 Water 31-AUG-14 16:10 BPJ-33-S	L1515843-4 Water 31-AUG-14 16:30 BPJ-34-S	L1515843-5 Water 31-AUG-14 17:00 BBD-33-S
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	65.2	65.0	42.4	48.6	12.2
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0051	<0.0050	0.0051	0.0053	<0.0050
	Bromide (Br) (mg/L)	0.603	0.591	0.362	0.432	<0.050
	Chloride (Cl) (mg/L)	172	169	104	124	9.00
	Fluoride (F) (mg/L)	0.073	0.073	0.067	0.069	0.060
	Nitrate (as N) (mg/L)	0.0187	0.0188	0.0178	0.0195	0.0077
	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	0.0021	0.0022
	Phosphorus (P)-Total (mg/L)	0.0025	<0.0020	<0.0020	0.0026	0.0024
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	24.9	24.4	15.2	18.0	1.78
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050		<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050		<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.08	2.98	3.17	3.01	3.02
	Total Organic Carbon (mg/L)	3.32	3.56	3.50	3.47	3.35
Total Metals	Aluminum (Al)-Total (mg/L)	0.0099	0.0080	0.0092	0.0085	0.0099
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00015	0.00016	0.00017	0.00015	0.00017
	Barium (Ba)-Total (mg/L)	0.0194	0.0201	0.0191	0.0203	0.0208
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.043	0.047	0.027	0.035	0.013
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	6.17	6.48	4.54	5.09	3.21
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	0.00012	0.00010	0.00012
	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	0.011	0.014	0.012	0.012
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.00214	0.00232	0.00164	0.00200	0.00125
	Magnesium (Mg)-Total (mg/L)	12.5	13.2	7.44	9.25	2.90
	Manganese (Mn)-Total (mg/L)	0.00264	0.00252	0.00353	0.00339	0.00252
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000137	0.000141	0.000095	0.000114	0.000060
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515843-6	L1515843-7			
	Description	Water	Water			
	Sampled Date	31-AUG-14	31-AUG-14			
	Sampled Time	17:20				
	Client ID	BBD-34-S	DUP-3			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	11.6	47.3			
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	0.0073			
	Bromide (Br) (mg/L)	<0.050	0.438			
	Chloride (Cl) (mg/L)	5.62	126			
	Fluoride (F) (mg/L)	0.042	0.073			
	Nitrate (as N) (mg/L)	0.0055	0.0197			
	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)	0.0021	0.0020			
	Phosphorus (P)-Total (mg/L)	0.0028	<0.0020			
	Silicate (as SiO2) (mg/L)	<0.50	<0.50			
	Sulfate (SO4) (mg/L)	1.07	18.5			
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanide, Free (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.03	3.05			
	Total Organic Carbon (mg/L)	3.33	3.37			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0084	0.0098			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00014	0.00017			
	Barium (Ba)-Total (mg/L)	0.0200	0.0203			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	<0.010	0.036			
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Total (mg/L)	2.67	5.11			
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00010			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	<0.00050	0.00441			
	Iron (Fe)-Total (mg/L)	0.010	0.013			
	Lead (Pb)-Total (mg/L)	<0.000050	0.000165			
	Lithium (Li)-Total (mg/L)	0.00098	0.00199			
	Magnesium (Mg)-Total (mg/L)	1.39	9.30			
	Manganese (Mn)-Total (mg/L)	0.00219	0.00360			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000052	0.000114			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515843-1	L1515843-2	L1515843-3	L1515843-4	L1515843-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	31-AUG-14	31-AUG-14	31-AUG-14	31-AUG-14	31-AUG-14
	Sampled Time	15:20	15:40	16:10	16:30	17:00
	Client ID	BAP-33-S	BAP-34-S	BPJ-33-S	BPJ-34-S	BBD-33-S
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	3.85	4.07	2.36	2.89	1.01
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.136	0.143	0.120	0.118	0.082
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	88.7	93.8	50.4	66.2	15.9
	Strontium (Sr)-Total (mg/L)	0.0827	0.0851	0.0537	0.0664	0.0307
	Sulfur (S)-Total (mg/L)	8.34	8.69	4.78	6.04	1.56
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000062	0.000068	0.000050	0.000057	0.000045
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0017	0.0021	0.0024	0.0027	0.0027
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00012	0.00011	0.00012	0.00012	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0185	0.0192	0.0184	0.0203	0.0194
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.039	0.040	0.024	0.029	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	6.05	6.04	4.55	4.96	2.61
	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	0.00046	0.00028	0.00034	0.00034
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000096	<0.000050	0.000076	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00213	0.00222	0.00164	0.00187	0.00102
	Magnesium (Mg)-Dissolved (mg/L)	12.2	12.1	7.54	8.79	1.38
	Manganese (Mn)-Dissolved (mg/L)	0.00133	0.00143	0.00204	0.00220	0.000698
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000115	0.000114	0.000088	0.000095	<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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515843-6	L1515843-7			
	Description	Water	Water			
	Sampled Date	31-AUG-14	31-AUG-14			
	Sampled Time	17:20				
	Client ID	BBD-34-S	DUP-3			
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.55	2.89			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	0.081	0.125			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	3.30	68.7			
	Strontium (Sr)-Total (mg/L)	0.0206	0.0674			
	Sulfur (S)-Total (mg/L)	<0.50	6.11			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.000038	0.000056			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0046			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0030	0.0030			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00011	0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.0191	0.0195			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.010	0.029			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Dissolved (mg/L)	2.57	4.88			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00028	0.00032			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.00103	0.00183			
	Magnesium (Mg)-Dissolved (mg/L)	1.27	8.54			
	Manganese (Mn)-Dissolved (mg/L)	0.000758	0.00221			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000097			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515843-1 Water 31-AUG-14 15:20 BAP-33-S	L1515843-2 Water 31-AUG-14 15:40 BAP-34-S	L1515843-3 Water 31-AUG-14 16:10 BPJ-33-S	L1515843-4 Water 31-AUG-14 16:30 BPJ-34-S	L1515843-5 Water 31-AUG-14 17:00 BBD-33-S
Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**						
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	3.73	3.74	2.39	2.72	0.52
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.118	0.120	0.097	0.104	0.057
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	84.3	84.7	47.7	60.9	3.23
	Strontium (Sr)-Dissolved (mg/L)	0.0782	0.0765	0.0515	0.0604	0.0196
	Sulfur (S)-Dissolved (mg/L)	8.12	8.02	4.64	5.66	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000053	0.000052	0.000044	0.000046	0.000033
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0011

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515843-6	L1515843-7			
	Description	Water	Water			
	Sampled Date	31-AUG-14	31-AUG-14			
	Sampled Time	17:20				
	Client ID	BBD-34-S	DUP-3			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.49	2.65			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	0.054	0.097			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.41	60.4			
	Strontium (Sr)-Dissolved (mg/L)	0.0191	0.0592			
	Sulfur (S)-Dissolved (mg/L)	<0.50	5.43			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000033	0.000048			
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			
	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)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1515843-1, -2, -3, -4, -5, -6, -7
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1515843-1, -2, -3, -4, -5, -6, -7
Duplicate	Chromium (Cr)-Dissolved	DLA	L1515843-1, -2, -3, -4, -5, -6, -7
Duplicate	Silver (Ag)-Dissolved	DLA	L1515843-1, -2, -3, -4, -5, -6, -7
Duplicate	Titanium (Ti)-Dissolved	DLA	L1515843-1, -2, -3, -4, -5, -6, -7
Duplicate	Vanadium (V)-Dissolved	DLA	L1515843-1, -2, -3, -4, -5, -6, -7
Duplicate	Bromide (Br)	DLM	L1515843-1, -2, -3, -4, -5, -6
Duplicate	Nitrite (as N)	DLM	L1515843-1, -2, -3, -4, -5, -6
Duplicate	Bromide (Br)	DLM	L1515843-1, -2, -3, -4, -5, -6
Duplicate	Nitrite (as N)	DLM	L1515843-1, -2, -3, -4, -5, -6
Duplicate	Nitrate (as N)	DLM	L1515843-1, -2, -3, -4, -5, -6
Duplicate	Nitrite (as N)	DLM	L1515843-7
Duplicate	Nitrate (as N)	DLM	L1515843-7
Duplicate	Bromide (Br)	DLM	L1515843-7
Duplicate	Nitrite (as N)	DLM	L1515843-7
Duplicate	Fluoride (F)	DLM	L1515843-7
Duplicate	Nitrite (as N)	DLM	L1515843-7
Duplicate	Nitrate (as N)	DLM	L1515843-7
Duplicate	Total Organic Carbon	M	L1515843-1, -2, -3, -4, -5, -6, -7
Duplicate	Dissolved Organic Carbon	M	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515843-1, -2, -3, -4, -5, -6, -7

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
M	A peak has been manually integrated.
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**

Reference Information

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-DIS-LOW-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA 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 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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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.

** 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 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@azimuthgrou.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)	L1515843	ALS Contact: Brent Mack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLORCA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	BAP-33-S	31-Aug-14	15:20		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	BAP-34-S	31-Aug-14	15:40		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	BPJ-33-S	31-Aug-14	16:10		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	BPJ-34-S	31-Aug-14	16:30		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	BBD-33-S	31-Aug-14	17:00		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	BBD-34-S	31-Aug-14	17:20		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	DUP-3	31-Aug-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9

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:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Morgan Finley	3-Sep-14		JK	8 Sept 10	1130	°C				

GENF 20.00 Front

15.8/15/15.2/13/12.5/14.9/13.3/14/12

Short Holding Time

● *Rush Processing*

L1515843-COFC

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 10-SEP-14
Report Date: 19-SEP-14 17:44 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1515855

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 19-SEP-14 17:39

Brent Mack
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515855-1	L1515855-2	L1515855-3	L1515855-4	L1515855-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-AUG-14	26-AUG-14	26-AUG-14	26-AUG-14	26-AUG-14
	Sampled Time	10:19	09:30	11:35	11:15	14:20
	Client ID	TPS-45-S	TPS-46-S	TPN-72-S	TPN-73-S	TPE-72-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.098	0.079	0.073	0.089	0.145

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515855-6	L1515855-7	L1515855-8	L1515855-9	L1515855-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-AUG-14	26-AUG-14	27-AUG-14	27-AUG-14	27-AUG-14
	Sampled Time	14:00		15:00	16:00	17:00
	Client ID	TPE-73-S	DUP-1	SP-72-S	SP-73-S	WAL-41-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.124	0.106	0.153	0.152	0.309

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515855-11	L1515855-12			
	Description	Water	Water			
	Sampled Date	27-AUG-14	27-AUG-14			
	Sampled Time	16:40				
	Client ID	WAL-42-S	DUP-2			
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.322	0.148			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515855-1 Water 26-AUG-14 10:19 TPS-45-S	L1515855-2 Water 26-AUG-14 09:30 TPS-46-S	L1515855-3 Water 26-AUG-14 11:35 TPN-72-S	L1515855-4 Water 26-AUG-14 11:15 TPN-73-S	L1515855-5 Water 26-AUG-14 14:20 TPE-72-S
Sample ID / **Description** / **Sampled Date** / **Sampled Time** / **Client ID**						
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	8.65	8.73	9.04	9.08	10.7
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0112	0.0107	0.0110	0.0113	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.74	0.73	0.74	0.74	0.67
	Fluoride (F) (mg/L)	0.067	0.067	0.067	0.067	0.078
	Nitrate (as N) (mg/L)	0.0564	0.0551	0.0534	0.0530	0.0093
	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
	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)	4.84	4.83	4.89	4.89	4.20
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.28	1.31	1.24	1.32	1.26
	Total Organic Carbon (mg/L)	1.54	1.73	1.51	1.43	1.64
Total Metals	Aluminum (Al)-Total (mg/L)	0.0065	0.0067	0.0081	0.0062	0.0131
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00021	0.00022	0.00023	0.00022	0.00064
	Barium (Ba)-Total (mg/L)	0.00309	0.00330	0.00358	0.00317	0.00334
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	2.15	2.23	2.36	2.20	2.77
	Chromium (Cr)-Total (mg/L)	0.00011	<0.00010	0.00013	0.00011	0.00015
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00060	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	0.014	<0.010	0.022
	Lead (Pb)-Total (mg/L)	0.000068	0.000155	0.000524	0.000083	<0.000050
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	0.85	0.88	0.92	0.86	0.99
	Manganese (Mn)-Total (mg/L)	0.00234	0.00244	0.00278	0.00240	0.00149
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000287	0.000218	0.000255	0.000227	0.000212
	Nickel (Ni)-Total (mg/L)	0.00050	<0.00050	0.00061	0.00052	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1515855-6	L1515855-7	L1515855-8	L1515855-9	L1515855-10
Description	Water	Water	Water	Water	Water
Sampled Date	26-AUG-14	26-AUG-14	27-AUG-14	27-AUG-14	27-AUG-14
Sampled Time	14:00		15:00	16:00	17:00
Client ID	TPE-73-S	DUP-1	SP-72-S	SP-73-S	WAL-41-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	10.6	9.05	13.7	13.5	15.4
Anions and Nutrients Ammonia, Total (as N) (mg/L)	<0.0050	0.0106	<0.0050	<0.0050	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	0.66	0.73	0.65	0.65	0.68
Fluoride (F) (mg/L)	0.078	0.067	0.071	0.071	0.052
Nitrate (as N) (mg/L)	0.0087	0.0553	<0.0050	<0.0050	<0.0050
Nitrite (as N) (mg/L)	<0.0010	0.0011	<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
Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	0.0023
Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	0.76
Sulfate (SO4) (mg/L)	4.15	4.83	3.69	3.66	3.13
Cyanides Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.24	1.21	1.51	1.43	1.78
Total Organic Carbon (mg/L)	1.65	1.44	1.83 M	1.74	2.08
Total Metals Aluminum (Al)-Total (mg/L)	0.0161	0.0070	0.0144	0.0145	0.0124
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00062	0.00022	0.00031	0.00030	0.00037
Barium (Ba)-Total (mg/L)	0.00331	0.00321	0.00254	0.00251	0.00188
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)-Total (mg/L)	2.81	2.24	3.64	3.75	4.22
Chromium (Cr)-Total (mg/L)	0.00016	0.00016	0.00013	0.00015	<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	0.00058	0.00067	0.00084
Iron (Fe)-Total (mg/L)	0.025	0.012	0.032	0.034	0.034
Lead (Pb)-Total (mg/L)	0.000055	<0.000050	<0.000050	0.000076	<0.000050
Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium (Mg)-Total (mg/L)	1.00	0.90	1.16	1.19	1.23
Manganese (Mn)-Total (mg/L)	0.00156	0.00241	0.00165	0.00155	0.00193
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.000229	0.000222	0.000142	0.000131	0.000222
Nickel (Ni)-Total (mg/L)	0.00051	0.00051	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515855-11	L1515855-12	L1515855-13	L1515855-14	
	Description	Water	Water	Water	Water	
	Sampled Date	27-AUG-14	27-AUG-14	27-AUG-14		
	Sampled Time	16:40		19:30		
	Client ID	WAL-42-S	DUP-2	EB-1	TRAVEL BLANK	
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	15.6	13.7	<0.50	<0.50	
Anions and Nutrients	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)	0.67	0.65	<0.10	<0.10	
	Fluoride (F) (mg/L)	0.052	0.071	<0.020	<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	
	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)	0.0022	<0.0020	<0.0020	<0.0020	
	Silicate (as SiO2) (mg/L)	0.71	<0.50	<0.50	<0.50	
	Sulfate (SO4) (mg/L)	3.12	3.69	<0.50	<0.50	
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.79	0.80	<0.50 M	<0.50	
	Total Organic Carbon (mg/L)	1.80 M	1.81 M	<0.50 M	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0128	0.0150	<0.0030	<0.0030	
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00034	0.00028	<0.00010	<0.00010	
	Barium (Ba)-Total (mg/L)	0.00180	0.00260	<0.000050	<0.000050	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Calcium (Ca)-Total (mg/L)	4.20	3.79	<0.050	<0.050	
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00013	<0.00010	<0.00010	
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	0.00084	0.00062	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	0.036	0.034	<0.010	<0.010	
	Lead (Pb)-Total (mg/L)	0.000063	0.000067	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Magnesium (Mg)-Total (mg/L)	1.22	1.20	<0.10	<0.10	
	Manganese (Mn)-Total (mg/L)	0.00197	0.00152	<0.000050	<0.000050	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000189	0.000218	<0.000050	<0.000050	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515855-1 Water 26-AUG-14 10:19 TPS-45-S	L1515855-2 Water 26-AUG-14 09:30 TPS-46-S	L1515855-3 Water 26-AUG-14 11:35 TPN-72-S	L1515855-4 Water 26-AUG-14 11:15 TPN-73-S	L1515855-5 Water 26-AUG-14 14:20 TPE-72-S
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.52	0.50	0.56	0.47	0.54
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.054	0.055	<0.050	<0.050	0.080
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.20	1.26	1.35	1.22	1.05
	Strontium (Sr)-Total (mg/L)	0.0105	0.0109	0.0113	0.0108	0.0124
	Sulfur (S)-Total (mg/L)	1.67	1.71	1.77	1.64	1.48
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000053	0.000055	0.000053	0.000051	0.000061
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0020	0.0020	0.0024	0.0024	0.0036
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00018	0.00016	0.00017	0.00019	0.00058
	Barium (Ba)-Dissolved (mg/L)	0.00311	0.00319	0.00332	0.00320	0.00316
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	2.10	2.11	2.20	2.21	2.69
	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	0.00035	0.00032	0.00034	0.00037
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000078	<0.000050	0.000059	0.000065
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.83	0.84	0.86	0.87	0.96
	Manganese (Mn)-Dissolved (mg/L)	0.00191	0.00183	0.00183	0.00189	0.000842
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000211	0.000184	0.000191	0.000211	0.000214
	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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515855-6 Water 26-AUG-14 14:00 TPE-73-S	L1515855-7 Water 26-AUG-14 DUP-1	L1515855-8 Water 27-AUG-14 15:00 SP-72-S	L1515855-9 Water 27-AUG-14 16:00 SP-73-S	L1515855-10 Water 27-AUG-14 17:00 WAL-41-S
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.56	0.52	0.51	0.49	0.42
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.090	0.055	0.215	0.233	0.440
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.03	1.20	0.707	0.718	0.547
	Strontium (Sr)-Total (mg/L)	0.0121	0.0106	0.0165	0.0161	0.0210
	Sulfur (S)-Total (mg/L)	1.44	1.66	1.27	1.30	1.08
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000063	0.000053	0.000052	0.000048	0.000062
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	0.0032	<0.0030
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	0.0021	0.0029	0.0044	0.0041
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00055	0.00017	0.00025	0.00024	0.00029
	Barium (Ba)-Dissolved (mg/L)	0.00294	0.00297	0.00238	0.00227	0.00178
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	2.67	2.18	3.59	3.55	4.18
	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)	0.00035	0.00028	0.00051	0.00047	0.00069
	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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.95	0.87	1.14	1.13	1.21
	Manganese (Mn)-Dissolved (mg/L)	0.000788	0.00185	0.000579	0.000604	0.000627
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000184	0.000175	0.000112	0.000114	0.000179
	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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515855-11 Water 27-AUG-14 16:40 WAL-42-S	L1515855-12 Water 27-AUG-14 DUP-2	L1515855-13 Water 27-AUG-14 19:30 EB-1	L1515855-14 Water TRAVEL BLANK	
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	0.44	0.50	<0.10	<0.10	
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Total (mg/L)	0.426	0.223	<0.050	<0.050	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	0.534	0.712	<0.050	<0.050	
	Strontium (Sr)-Total (mg/L)	0.0198	0.0165	<0.00020	<0.00020	
	Sulfur (S)-Total (mg/L)	1.05	1.33	<0.50	<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)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.000050	0.000052	<0.000010	<0.000010	
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	0.0027	0.0044	<0.0010		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00028	0.00027	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.00190	0.00252	<0.000050		
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Dissolved (mg/L)	4.23	3.60	<0.050		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00070	0.00052	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	0.000082	0.000070	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Magnesium (Mg)-Dissolved (mg/L)	1.23	1.14	<0.10		
	Manganese (Mn)-Dissolved (mg/L)	0.000843	0.000720	0.000095		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000184	0.000133	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515855-1	L1515855-2	L1515855-3	L1515855-4	L1515855-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	26-AUG-14	26-AUG-14	26-AUG-14	26-AUG-14	26-AUG-14
	Sampled Time	10:19	09:30	11:35	11:15	14:20
	Client ID	TPS-45-S	TPS-46-S	TPN-72-S	TPN-73-S	TPE-72-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.47	0.49	0.48	0.49	0.54
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	0.068
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.16	1.20	1.18	1.17	0.971
	Strontium (Sr)-Dissolved (mg/L)	0.0101	0.0100	0.0103	0.0103	0.0115
	Sulfur (S)-Dissolved (mg/L)	1.59	1.57	1.62	1.60	1.36
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000044	0.000042	0.000042	0.000042	0.000050
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515855-6 Water 26-AUG-14 14:00 TPE-73-S	L1515855-7 Water 26-AUG-14 DUP-1	L1515855-8 Water 27-AUG-14 15:00 SP-72-S	L1515855-9 Water 27-AUG-14 16:00 SP-73-S	L1515855-10 Water 27-AUG-14 17:00 WAL-41-S
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.49	0.49	0.49	0.48	0.43
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.069	<0.050	0.192	0.194	0.399
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.949	1.15	0.690	0.647	0.522
	Strontium (Sr)-Dissolved (mg/L)	0.0114	0.00983	0.0154	0.0150	0.0194
	Sulfur (S)-Dissolved (mg/L)	1.35	1.59	1.24	1.20	1.02
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000050	0.000037	0.000041	0.000040	0.000043
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0011

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1515855-11 Description: Water Sampled Date: 27-AUG-14 Sampled Time: 16:40 Client ID: WAL-42-S	Sample ID: L1515855-12 Description: Water Sampled Date: 27-AUG-14 Client ID: DUP-2	Sample ID: L1515855-13 Description: Water Sampled Date: 27-AUG-14 Sampled Time: 19:30 Client ID: EB-1	Sample ID: L1515855-14 Description: Water Client ID: TRAVEL BLANK	
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.43	0.48	<0.10		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	0.411	0.188	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	0.520	0.673	<0.050		
	Strontium (Sr)-Dissolved (mg/L)	0.0194	0.0160	<0.00020		
	Sulfur (S)-Dissolved (mg/L)	1.03	1.23	<0.50		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000044	0.000044	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Dissolved (mg/L)	0.0018	0.0023	<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)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bromide (Br)	DLM	L1515855-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1515855-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bromide (Br)	DLM	L1515855-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1515855-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLM	L1515855-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Total Organic Carbon	M	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Dissolved Organic Carbon	M	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1515855-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1515855-1, -10, -11, -12, -13, -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.
M	A peak has been manually integrated.
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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

Reference Information

ANIONS-CL-LOW-IC-VA Water Low level Chloride by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA Water Fluoride by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA Water Nitrite in Water by Ion Chromatography EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA Water Nitrate in Water by Ion Chromatography EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA Water Sulfate by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310 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 5310 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.

CN-FREE-CFA-VA Water 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-CFA-VA Water 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-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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.

** 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 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 #: Meadowbank Surfacewater		
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #: Q39503		
Lab Work Order # (lab use only)	L1515855	ALS Contact: Brent Mack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOWIC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLORGA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	TPS-45-S	26-Aug-14	10:19		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TPS-46-S	26-Aug-14	9:30		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TPN-72-S	26-Aug-14	11:35		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TPN-73-S	26-Aug-14	11:15		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TPE-72-S	26-Aug-14	14:20		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TPE-73-S	26-Aug-14	14:00		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	DUP-1	26-Aug-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	SP-72-S	27-Aug-14	15:00		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	SP-73-S	27-Aug-14	16:00		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	WAL-41-S	27-Aug-14	17:00		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	WAL-42-S	27-Aug-14	16:40		X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	DUP-2	27-Aug-14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	9

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
Morgan Finley	28-Aug-14		JK	8/29/14	11:30	5.8 °C				

GENF 2700 Front

15/15.2/13/12.5/14.9/13.3/14/12

Short Holding Time
Rush Processing

L1515855-COFC

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)	L1515855			ALS Contact:	Brent Mack	Sampler:																		
Sample #	Sample Identification (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type		ANIONS-ALI-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLORDA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers			
	EB-1			27-Aug-14	19:30			X	X	X	X		X	X	X	X	X	X	X	X	X	B		
	Travel Blank																							

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
Morgan Finley	28-08014		JH	29/10	1130	15.8°C				

15/15.2/13/12.5/14.9/13.3/14/12



L1515855-COFC

AZIMUTH CONSULTING GROUP INC.
ATTN: Morgan Finley
304-2537 Beacon Avenue
Sidney BC V8L 1Y3

Date Received: 10-SEP-14
Report Date: 19-SEP-14 18:35 (MT)
Version: FINAL

Client Phone: 778-426-0112

Certificate of Analysis

Lab Work Order #: L1515866

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK CREMP 2014 SEDIMENT
C of C Numbers:
Legal Site Desc: British Columbia

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-1 Soil/Sed/Waste 26-AUG-14 15:40 TPE-1	L1515866-2 Soil/Sed/Waste 26-AUG-14 15:40 TPE-2	L1515866-3 Soil/Sed/Waste 26-AUG-14 15:40 TPE-3	L1515866-4 Soil/Sed/Waste 26-AUG-14 15:40 TPE-4	L1515866-5 Soil/Sed/Waste 26-AUG-14 15:40 TPE-5
SOIL						
Physical Tests	Moisture (%)	82.9	84.0	87.4	86.6	86.6
	pH (1:2 soil:water) (pH)	5.90	5.86	6.12	6.16	6.14
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	4.27	5.55	1.41	1.78	1.05
	% Silt (0.063mm - 4um) (%)	67.3	62.7	68.2	67.2	69.6
	% Clay (<4um) (%)	28.4	31.8	30.4	31.0	29.4
	Texture	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.21	2.90	3.86	3.59	3.89
Metals	Aluminum (Al) (mg/kg)	26400	26800	24500	23600	25400
	Antimony (Sb) (mg/kg)	0.27	0.22	0.29	0.26	0.27
	Arsenic (As) (mg/kg)	22.1	18.0	19.8	19.0	20.9
	Barium (Ba) (mg/kg)	114	121	119	114	112
	Beryllium (Be) (mg/kg)	1.77	1.97	1.71	1.69	1.75
	Bismuth (Bi) (mg/kg)	2.56	2.75	2.43	2.33	2.40
	Cadmium (Cd) (mg/kg)	0.152	0.146	0.338	0.259	0.172
	Calcium (Ca) (mg/kg)	2190	1960	2500	2240	2490
	Chromium (Cr) (mg/kg)	146	110	142	129	158
	Cobalt (Co) (mg/kg)	18.4	17.2	17.9	17.0	18.1
	Copper (Cu) (mg/kg)	57.9	59.4	54.1	50.8	52.1
	Iron (Fe) (mg/kg)	48800	44200	46600	48600	46600
	Lead (Pb) (mg/kg)	23.4	23.5	21.9	20.2	21.4
	Lithium (Li) (mg/kg)	49.3	52.0	47.6	44.6	46.6
	Magnesium (Mg) (mg/kg)	11300	10300	10700	10200	11400
	Manganese (Mn) (mg/kg)	1640	926	2440	2460	1790
	Mercury (Hg) (mg/kg)	0.0171	0.0138	0.0162	0.0129	0.0178
	Molybdenum (Mo) (mg/kg)	4.34	4.15	3.94	4.02	3.93
	Nickel (Ni) (mg/kg)	80.0	67.3	110	92.5	84.1
	Phosphorus (P) (mg/kg)	458	468	453	404	453
	Potassium (K) (mg/kg)	4880	5020	4340	4120	4510
	Selenium (Se) (mg/kg)	0.58	0.57	0.81	0.78	0.76
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	170	170	160	150	170
	Strontium (Sr) (mg/kg)	20.2	19.2	19.7	18.6	20.3
	Thallium (Tl) (mg/kg)	0.404	0.437	0.460	0.423	0.382
	Tin (Sn) (mg/kg)	<2.0	2.0	2.4	<2.0	2.0
	Titanium (Ti) (mg/kg)	977	960	816	800	874

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-6 Soil/Sed/Waste 26-AUG-14 15:40 TPE-COMP	L1515866-7 Soil/Sed/Waste 22-AUG-14 TPN-1	L1515866-8 Soil/Sed/Waste 22-AUG-14 TPN-2	L1515866-9 Soil/Sed/Waste 22-AUG-14 TPN-3	L1515866-10 Soil/Sed/Waste 22-AUG-14 TPN-4
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	86.8	32.9	77.0	55.4	50.6
	pH (1:2 soil:water) (pH)		6.22	5.71	6.04	6.02
Particle Size	% Gravel (>2mm) (%)		0.75	<0.10	1.72	0.23
	% Sand (2.0mm - 0.063mm) (%)		76.3	17.5	47.2	21.3
	% Silt (0.063mm - 4um) (%)		16.8	59.0	37.7	46.7
	% Clay (<4um) (%)		6.09	23.5	13.3	31.8
	Texture		Loamy sand	Silt loam	Loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)		0.24	2.21	0.65	0.79
Metals	Aluminum (Al) (mg/kg)		10300	21500	16600	25100
	Antimony (Sb) (mg/kg)		<0.10	0.13	0.11	0.20
	Arsenic (As) (mg/kg)		5.57	10.2	10.6	17.1
	Barium (Ba) (mg/kg)		37.3	102	71.6	111
	Beryllium (Be) (mg/kg)		0.49	1.19	0.99	1.42
	Bismuth (Bi) (mg/kg)		0.56	1.39	1.05	1.46
	Cadmium (Cd) (mg/kg)		<0.050	0.075	<0.050	0.079
	Calcium (Ca) (mg/kg)		1080	1860	1500	1960
	Chromium (Cr) (mg/kg)		69.6	133	98.8	131
	Cobalt (Co) (mg/kg)		6.77	10.6	9.22	15.1
	Copper (Cu) (mg/kg)		19.9	53.7	37.7	56.1
	Iron (Fe) (mg/kg)		16700	21200	27900	37100
	Lead (Pb) (mg/kg)		7.21	15.9	11.8	18.0
	Lithium (Li) (mg/kg)		20.1	37.0	31.2	52.2
	Magnesium (Mg) (mg/kg)		5610	9840	8050	11500
	Manganese (Mn) (mg/kg)		251	267	342	744
	Mercury (Hg) (mg/kg)		<0.0050	0.0087	<0.0050	0.0058
	Molybdenum (Mo) (mg/kg)		0.74	1.24	1.38	3.37
	Nickel (Ni) (mg/kg)		35.5	74.0	49.6	74.3
	Phosphorus (P) (mg/kg)		246	530	438	410
	Potassium (K) (mg/kg)		1470	3520	2710	4280
	Selenium (Se) (mg/kg)		<0.20	0.29	<0.20	<0.20
	Silver (Ag) (mg/kg)		<0.10	0.12	<0.10	<0.10
	Sodium (Na) (mg/kg)		<100	130	<100	140
	Strontium (Sr) (mg/kg)		10.2	18.1	14.9	19.7
	Thallium (Tl) (mg/kg)		0.114	0.242	0.181	0.314
	Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)		431	697	636	932

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1515866-11 Description: Soil/Sed/Waste Sampled Date: 22-AUG-14 Sampled Time: Client ID: TPN-5	Sample ID: L1515866-12 Description: Soil/Sed/Waste Sampled Date: 22-AUG-14 Sampled Time: Client ID: TPN-COMP	Sample ID: L1515866-13 Description: Soil/Sed/Waste Sampled Date: 27-AUG-14 Sampled Time: 08:40 Client ID: TPS-1	Sample ID: L1515866-14 Description: Soil/Sed/Waste Sampled Date: 27-AUG-14 Sampled Time: 08:40 Client ID: TPS-2	Sample ID: L1515866-15 Description: Soil/Sed/Waste Sampled Date: 27-AUG-14 Sampled Time: 08:40 Client ID: TPS-3
SOIL						
Physical Tests	Moisture (%)	35.4	53.7	84.0	85.4	79.6
	pH (1:2 soil:water) (pH)	6.16		6.21	5.98	5.78
Particle Size	% Gravel (>2mm) (%)	2.34		<0.10	1.81	0.32
	% Sand (2.0mm - 0.063mm) (%)	11.5		5.19	4.32	8.01
	% Silt (0.063mm - 4um) (%)	44.3		66.0	69.7	66.1
	% Clay (<4um) (%)	41.8		28.8	24.2	25.6
	Texture	Silty clay loam		Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.22		3.29	3.83	2.49
Metals	Aluminum (Al) (mg/kg)	26200		25700	23100	24000
	Antimony (Sb) (mg/kg)	0.18		0.20	0.22	0.17
	Arsenic (As) (mg/kg)	13.4		9.43	14.0	26.8
	Barium (Ba) (mg/kg)	130		118	98.9	98.3
	Beryllium (Be) (mg/kg)	1.16		1.50	1.43	1.48
	Bismuth (Bi) (mg/kg)	1.44		1.66	1.56	1.52
	Cadmium (Cd) (mg/kg)	0.117		0.240	0.182	0.139
	Calcium (Ca) (mg/kg)	2400		2090	1670	1600
	Chromium (Cr) (mg/kg)	110		124	114	120
	Cobalt (Co) (mg/kg)	17.4		14.4	16.5	12.8
	Copper (Cu) (mg/kg)	30.0		61.6	65.5	61.7
	Iron (Fe) (mg/kg)	37700		27300	29000	39000
	Lead (Pb) (mg/kg)	20.0		19.8	18.9	18.8
	Lithium (Li) (mg/kg)	62.7		44.1	36.7	42.3
	Magnesium (Mg) (mg/kg)	12200		10800	9570	10500
	Manganese (Mn) (mg/kg)	829		395	563	461
	Mercury (Hg) (mg/kg)	0.0054		0.0130	0.0167	0.0081
	Molybdenum (Mo) (mg/kg)	3.63		1.87	3.05	1.62
	Nickel (Ni) (mg/kg)	71.6		82.4	72.3	69.3
	Phosphorus (P) (mg/kg)	478		388	431	755
	Potassium (K) (mg/kg)	5150		4250	3610	3750
	Selenium (Se) (mg/kg)	<0.20		0.47	0.70	0.42
	Silver (Ag) (mg/kg)	<0.10		0.13	0.14	0.11
	Sodium (Na) (mg/kg)	170		150	140	130
	Strontium (Sr) (mg/kg)	22.5		19.5	15.9	15.4
	Thallium (Tl) (mg/kg)	0.376		0.307	0.271	0.255
	Tin (Sn) (mg/kg)	<2.0		<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	1270		754	630	737

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-16 Soil/Sed/Waste 27-AUG-14 08:40 TPS-4	L1515866-17 Soil/Sed/Waste 27-AUG-14 08:40 TPS-5	L1515866-18 Soil/Sed/Waste 27-AUG-14 08:40 TPS-COMP	L1515866-19 Soil/Sed/Waste 02-SEP-14 13:45 SP-1	L1515866-20 Soil/Sed/Waste 02-SEP-14 13:45 SP-2
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	82.7	76.1	82.0	83.8	83.5
	pH (1:2 soil:water) (pH)	5.83	5.70		5.94	6.04
Particle Size	% Gravel (>2mm) (%)	<0.10	0.84		<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	12.6	50.6		2.05	2.12
	% Silt (0.063mm - 4um) (%)	64.0	38.3		65.8	67.4
	% Clay (<4um) (%)	23.4	10.3		32.2	30.5
	Texture	Silt loam	Loam / Sandy loam		Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.58	2.03		3.63	3.74
Metals	Aluminum (Al) (mg/kg)	21500	14900		29200	28800
	Antimony (Sb) (mg/kg)	0.17	0.13		0.28	0.25
	Arsenic (As) (mg/kg)	10.4	6.52		47.3	39.1
	Barium (Ba) (mg/kg)	95.6	67.0		132	128
	Beryllium (Be) (mg/kg)	1.37	0.93		2.29	2.34
	Bismuth (Bi) (mg/kg)	1.24	0.82		2.55	2.61
	Cadmium (Cd) (mg/kg)	0.292	0.167		0.234	0.275
	Calcium (Ca) (mg/kg)	1860	1440		2370	2200
	Chromium (Cr) (mg/kg)	106	68.0		89.2	85.2
	Cobalt (Co) (mg/kg)	11.1	7.93		18.7	18.1
	Copper (Cu) (mg/kg)	52.0	32.9		86.9	84.5
	Iron (Fe) (mg/kg)	25500	18800		71900	71300
	Lead (Pb) (mg/kg)	16.6	12.0		23.6	22.9
	Lithium (Li) (mg/kg)	36.8	28.6		49.9	48.0
	Magnesium (Mg) (mg/kg)	9320	6750		10200	9990
	Manganese (Mn) (mg/kg)	337	250		2660	2270
	Mercury (Hg) (mg/kg)	0.0117	0.0093		0.0280	0.0253
	Molybdenum (Mo) (mg/kg)	2.18	1.39		8.05	7.83
	Nickel (Ni) (mg/kg)	70.1	44.2		66.1	70.3
	Phosphorus (P) (mg/kg)	565	303		583	662
	Potassium (K) (mg/kg)	3380	2390		4920	4890
	Selenium (Se) (mg/kg)	0.58	0.35		0.61	0.63
	Silver (Ag) (mg/kg)	0.15	<0.10		<0.10	<0.10
	Sodium (Na) (mg/kg)	130	<100		170	170
	Strontium (Sr) (mg/kg)	15.8	13.0		21.7	20.9
	Thallium (Tl) (mg/kg)	0.249	0.173		0.394	0.408
	Tin (Sn) (mg/kg)	<2.0	<2.0		<2.0	<2.0
	Titanium (Ti) (mg/kg)	683	566		837	822

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-21 Soil/Sed/Waste 02-SEP-14 13:45 SP-3	L1515866-22 Soil/Sed/Waste 02-SEP-14 13:45 SP-4	L1515866-23 Soil/Sed/Waste 02-SEP-14 13:45 SP-5	L1515866-24 Soil/Sed/Waste 02-SEP-14 13:45 SP-COMP	L1515866-25 Soil/Sed/Waste 29-AUG-14 11:00 TE-1
SOIL						
Physical Tests	Moisture (%)	83.4	84.6	84.3	83.7	68.5
	pH (1:2 soil:water) (pH)	6.09	6.19	6.34		5.82
Particle Size	% Gravel (>2mm) (%)	<0.10	0.21	<0.10		<0.10
	% Sand (2.0mm - 0.063mm) (%)	2.69	2.42	1.78		47.8
	% Silt (0.063mm - 4um) (%)	61.1	68.5	68.6		43.2
	% Clay (<4um) (%)	36.2	28.9	29.6		8.98
	Texture	Silty clay loam	Silt loam	Silt loam		Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.09	3.85	3.71		1.63
Metals	Aluminum (Al) (mg/kg)	30700	29500	27400		12100
	Antimony (Sb) (mg/kg)	0.26	0.26	0.26		0.11
	Arsenic (As) (mg/kg)	34.4	34.7	28.4		7.48
	Barium (Ba) (mg/kg)	133	129	126		54.0
	Beryllium (Be) (mg/kg)	2.26	2.32	2.07		1.00
	Bismuth (Bi) (mg/kg)	2.67	2.55	2.43		1.05
	Cadmium (Cd) (mg/kg)	0.212	0.228	0.268		0.060
	Calcium (Ca) (mg/kg)	2200	2500	2030		1330
	Chromium (Cr) (mg/kg)	89.9	92.9	83.3		30.6
	Cobalt (Co) (mg/kg)	17.1	17.5	16.2		5.07
	Copper (Cu) (mg/kg)	91.2	84.2	78.9		28.5
	Iron (Fe) (mg/kg)	62800	62400	56100		22000
	Lead (Pb) (mg/kg)	23.9	24.1	22.2		10.8
	Lithium (Li) (mg/kg)	52.0	48.8	46.4		23.4
	Magnesium (Mg) (mg/kg)	10500	10400	9660		4670
	Manganese (Mn) (mg/kg)	2250	2440	2540		354
	Mercury (Hg) (mg/kg)	0.0287	0.0288	0.0291		0.0108
	Molybdenum (Mo) (mg/kg)	8.46	8.21	5.85		2.04
	Nickel (Ni) (mg/kg)	67.9	67.7	70.9		19.2
	Phosphorus (P) (mg/kg)	542	593	581		389
	Potassium (K) (mg/kg)	5190	4980	4660		2230
	Selenium (Se) (mg/kg)	0.49	0.65	0.71		0.32
	Silver (Ag) (mg/kg)	<0.10	<0.10	0.11		<0.10
	Sodium (Na) (mg/kg)	160	170	170		100
	Strontium (Sr) (mg/kg)	21.0	22.3	19.7		10.8
	Thallium (Tl) (mg/kg)	0.406	0.396	0.386		0.181
	Tin (Sn) (mg/kg)	<2.0	2.0	<2.0		<2.0
	Titanium (Ti) (mg/kg)	903	868	847		605

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-26 Soil/Sed/Waste 29-AUG-14 11:00 TE-2	L1515866-27 Soil/Sed/Waste 29-AUG-14 11:00 TE-3	L1515866-28 Soil/Sed/Waste 29-AUG-14 11:00 TE-4	L1515866-29 Soil/Sed/Waste 29-AUG-14 11:00 TE-5	L1515866-30 Soil/Sed/Waste 29-AUG-14 11:00 TE-COMP
SOIL						
Physical Tests	Moisture (%)	78.9	80.1	81.8	85.0	79.8
	pH (1:2 soil:water) (pH)	5.54	5.67	5.87	6.10	
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	
	% Sand (2.0mm - 0.063mm) (%)	18.6	18.9	7.22	3.09	
	% Silt (0.063mm - 4um) (%)	67.0	62.3	69.4	75.3	
	% Clay (<4um) (%)	14.4	18.9	23.4	21.6	
	Texture	Silt loam	Silt loam	Silt loam	Silt loam	
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.51	2.34	2.48	3.42	
Metals	Aluminum (Al) (mg/kg)	20300	18400	20600	20000	
	Antimony (Sb) (mg/kg)	0.18	0.14	0.17	0.18	
	Arsenic (As) (mg/kg)	11.1	14.3	22.6	19.9	
	Barium (Ba) (mg/kg)	99.4	85.1	104	100	
	Beryllium (Be) (mg/kg)	1.74	1.41	1.72	1.73	
	Bismuth (Bi) (mg/kg)	1.87	1.63	1.89	1.90	
	Cadmium (Cd) (mg/kg)	0.187	0.141	0.185	0.224	
	Calcium (Ca) (mg/kg)	1900	1570	1490	1850	
	Chromium (Cr) (mg/kg)	52.2	46.4	52.0	50.9	
	Cobalt (Co) (mg/kg)	8.19	9.34	12.5	11.1	
	Copper (Cu) (mg/kg)	50.1	46.1	51.5	52.7	
	Iron (Fe) (mg/kg)	36600	45800	61400	52600	
	Lead (Pb) (mg/kg)	19.0	16.6	18.3	19.2	
	Lithium (Li) (mg/kg)	38.5	35.2	39.4	40.2	
	Magnesium (Mg) (mg/kg)	7630	6790	7440	7270	
	Manganese (Mn) (mg/kg)	520	637	1580	2740	
	Mercury (Hg) (mg/kg)	0.0180	0.0190	0.0180	0.0254	
	Molybdenum (Mo) (mg/kg)	2.76	6.71	7.14	7.15	
	Nickel (Ni) (mg/kg)	35.3	31.3	40.9	41.7	
	Phosphorus (P) (mg/kg)	791	537	786	503	
	Potassium (K) (mg/kg)	3810	3410	3780	3660	
	Selenium (Se) (mg/kg)	0.68	0.52	0.65	0.85	
	Silver (Ag) (mg/kg)	0.18	0.11	<0.10	0.15	
	Sodium (Na) (mg/kg)	170	140	150	150	
	Strontium (Sr) (mg/kg)	17.1	13.8	14.6	16.2	
	Thallium (Tl) (mg/kg)	0.342	0.290	0.350	0.345	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	978	822	845	744	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1515866-31	L1515866-32	L1515866-33	L1515866-34	L1515866-35
	Description:	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
	Sampled Date:	30-AUG-14	30-AUG-14	30-AUG-14	30-AUG-14	30-AUG-14
	Client ID:	TEFF-1	TEFF-2	TEFF-3	TEFF-4	TEFF-5
SOIL						
Physical Tests	Moisture (%)	86.5	84.1	85.6	85.9	84.7
	pH (1:2 soil:water) (pH)	6.16	6.30	6.17	5.97	6.08
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	0.10	<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	1.60	4.07	2.17	2.57	3.30
	% Silt (0.063mm - 4um) (%)	73.5	64.3	71.0	66.8	66.7
	% Clay (<4um) (%)	24.9	31.7	26.7	30.7	30.0
	Texture	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.26	3.08	3.53	3.46	3.37
Metals	Aluminum (Al) (mg/kg)	17900	22700	19700	21800	20900
	Antimony (Sb) (mg/kg)	0.18	0.12	0.16	0.16	0.15
	Arsenic (As) (mg/kg)	13.4	10.2	23.9	11.4	14.8
	Barium (Ba) (mg/kg)	116	104	165	111	103
	Beryllium (Be) (mg/kg)	1.43	1.75	1.72	1.80	1.69
	Bismuth (Bi) (mg/kg)	1.44	1.76	1.56	1.73	1.64
	Cadmium (Cd) (mg/kg)	0.378	0.116	0.563	0.179	0.129
	Calcium (Ca) (mg/kg)	1690	1560	1450	1780	1520
	Chromium (Cr) (mg/kg)	44.2	52.9	45.5	51.6	49.0
	Cobalt (Co) (mg/kg)	13.8	11.8	15.4	14.0	12.1
	Copper (Cu) (mg/kg)	45.1	49.2	54.7	49.8	50.0
	Iron (Fe) (mg/kg)	70700	37600	98300	44800	54900
	Lead (Pb) (mg/kg)	17.1	18.7	17.4	18.3	17.8
	Lithium (Li) (mg/kg)	37.5	46.1	37.3	43.8	41.4
	Magnesium (Mg) (mg/kg)	6280	7710	6460	7480	7130
	Manganese (Mn) (mg/kg)	4650	1750	6380	3740	1960
	Mercury (Hg) (mg/kg)	0.0194	0.0141	0.0159	0.0134	0.0150
	Molybdenum (Mo) (mg/kg)	6.33	4.07	9.10	4.78	6.10
	Nickel (Ni) (mg/kg)	54.4	34.6	79.5	38.8	33.5
	Phosphorus (P) (mg/kg)	495	463	1470	456	800
	Potassium (K) (mg/kg)	3390	4320	3700	4210	4040
	Selenium (Se) (mg/kg)	0.96	0.43	0.86	0.57	0.67
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	150	150	170	170	160
	Strontium (Sr) (mg/kg)	16.1	15.8	15.4	17.0	15.7
	Thallium (Tl) (mg/kg)	0.369	0.378	0.508	0.391	0.354
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	673	843	717	802	779

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1515866-36	L1515866-37	L1515866-38	L1515866-39	L1515866-40
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	30-AUG-14	26-AUG-14	27-AUG-14	28-AUG-14	29-AUG-14
Sampled Time					
Client ID	TEFF-COMP	DUP-1	DUP-2	DUP-3	DUP-5
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	86.1	84.6	85.5	91.0	69.4
pH (1:2 soil:water) (pH)		5.92	5.93	6.29	5.92
Particle Size % Gravel (>2mm) (%)		<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)		5.65	3.82	1.76	47.7
% Silt (0.063mm - 4um) (%)		67.8	68.0	83.9	41.9
% Clay (<4um) (%)		26.6	28.1	14.4	10.4
Texture		Silt loam	Silt loam	Silt loam	Loam / Sandy loam
Organic / Inorganic Carbon Total Organic Carbon (%)		3.31	3.80	10.8	1.55
Metals Aluminum (Al) (mg/kg)		25600	23000	17300	11500
Antimony (Sb) (mg/kg)		0.23	0.20	0.40	<0.10
Arsenic (As) (mg/kg)		19.5	13.6	51.5	7.85
Barium (Ba) (mg/kg)		106	101	96.7	53.0
Beryllium (Be) (mg/kg)		1.80	1.42	1.31	1.02
Bismuth (Bi) (mg/kg)		2.36	1.61	1.72	1.03
Cadmium (Cd) (mg/kg)		0.149	0.179	0.417	0.066
Calcium (Ca) (mg/kg)		2010	1650	3700	1240
Chromium (Cr) (mg/kg)		134	114	51.0	29.8
Cobalt (Co) (mg/kg)		16.7	15.5	8.44	5.10
Copper (Cu) (mg/kg)		53.1	65.4	134	29.0
Iron (Fe) (mg/kg)		45800	28500	36300	22400
Lead (Pb) (mg/kg)		21.0	19.3	30.2	10.9
Lithium (Li) (mg/kg)		48.1	34.5	27.8	23.5
Magnesium (Mg) (mg/kg)		10800	9510	6410	4600
Manganese (Mn) (mg/kg)		1510	539	330	359
Mercury (Hg) (mg/kg)		0.0164	0.0155	0.101	0.0104
Molybdenum (Mo) (mg/kg)		4.04	2.93	9.72	2.08
Nickel (Ni) (mg/kg)		73.1	71.9	47.2	19.3
Phosphorus (P) (mg/kg)		396	466	789	459
Potassium (K) (mg/kg)		4240	3700	2970	2140
Selenium (Se) (mg/kg)		0.62	0.78	0.96	0.31
Silver (Ag) (mg/kg)		<0.10	0.14	0.59	<0.10
Sodium (Na) (mg/kg)		140	150	160	<100
Strontium (Sr) (mg/kg)		17.6	15.8	24.4	10.6
Thallium (Tl) (mg/kg)		0.375	0.285	0.278	0.166
Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)		857	669	541	532

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1515866-41	L1515866-42	L1515866-43	L1515866-44	L1515866-45
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	31-AUG-14	31-AUG-14	28-AUG-14	28-AUG-14	28-AUG-14
Sampled Time			10:30	10:30	10:30
Client ID	DUP-6	DUP-7	WAL-1	WAL-2	WAL-3
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	52.3	43.8	91.2	91.1	91.7
pH (1:2 soil:water) (pH)	5.92	6.49	6.25	6.39	6.33
Particle Size % Gravel (>2mm) (%)	<0.10	0.37	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm) (%)	52.6	65.2	1.87	2.06	1.40
% Silt (0.063mm - 4um) (%)	42.0	30.6	85.0	84.3	84.3
% Clay (<4um) (%)	5.43	3.83	13.1	13.6	14.3
Texture	Sandy loam	Sandy loam / Loamy sand	Silt	Silt	Silt
Organic / Inorganic Carbon Total Organic Carbon (%)	1.79	0.37	11.0	9.97	10.7
Metals Aluminum (Al) (mg/kg)	7970	6120	16800	18800	18800
Antimony (Sb) (mg/kg)	0.19	0.12	0.40	0.37	0.40
Arsenic (As) (mg/kg)	4.73	3.41	48.5	39.4	29.6
Barium (Ba) (mg/kg)	342	117	95.3	107	103
Beryllium (Be) (mg/kg)	0.50	0.35	1.32	1.45	1.41
Bismuth (Bi) (mg/kg)	0.30	<0.20	1.69	1.90	1.82
Cadmium (Cd) (mg/kg)	0.082	<0.050	0.406	0.469	0.449
Calcium (Ca) (mg/kg)	2700	2160	3640	3740	3790
Chromium (Cr) (mg/kg)	21.5	18.7	49.8	53.0	52.9
Cobalt (Co) (mg/kg)	5.50	4.72	8.26	8.54	8.61
Copper (Cu) (mg/kg)	9.92	4.63	131	144	137
Iron (Fe) (mg/kg)	16300	13000	35100	33200	28300
Lead (Pb) (mg/kg)	7.53	5.07	29.7	31.8	31.7
Lithium (Li) (mg/kg)	11.3	9.2	27.0	30.6	30.7
Magnesium (Mg) (mg/kg)	4320	3790	6220	6860	6930
Manganese (Mn) (mg/kg)	163	656	321	300	272
Mercury (Hg) (mg/kg)	0.0085	0.0057	0.0669	0.0570	0.0604
Molybdenum (Mo) (mg/kg)	1.11	1.45	9.32	8.97	8.07
Nickel (Ni) (mg/kg)	13.8	10.9	47.0	51.2	49.4
Phosphorus (P) (mg/kg)	670	707	778	624	709
Potassium (K) (mg/kg)	1970	1320	2830	3130	3200
Selenium (Se) (mg/kg)	<0.20	<0.20	0.91	1.05	1.02
Silver (Ag) (mg/kg)	<0.10	<0.10	0.59	0.67	0.62
Sodium (Na) (mg/kg)	230	180	150	160	170
Strontium (Sr) (mg/kg)	53.9	37.8	23.5	25.2	25.3
Thallium (Tl) (mg/kg)	0.101	0.064	0.277	0.297	0.297
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)	465	334	457	520	530

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-46 Soil/Sed/Waste 28-AUG-14 10:30 WAL-4	L1515866-47 Soil/Sed/Waste 28-AUG-14 10:30 WAL-5	L1515866-48 Soil/Sed/Waste 28-AUG-14 10:30 WAL-COMP	L1515866-49 Soil/Sed/Waste 23-AUG-14 PDL-1	L1515866-50 Soil/Sed/Waste 23-AUG-14 PDL-2
SOIL						
Physical Tests	Moisture (%)	88.6	88.3	91.0	74.0	74.4
	pH (1:2 soil:water) (pH)	6.50	6.38		6.04	5.88
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10		<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	6.83	7.67		15.2	14.8
	% Silt (0.063mm - 4um) (%)	81.1	80.4		73.8	72.6
	% Clay (<4um) (%)	12.1	12.0		11.0	12.6
	Texture	Silt	Silt		Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	6.61	7.79		2.33	2.40
Metals	Aluminum (Al) (mg/kg)	21200	17500		19500	20200
	Antimony (Sb) (mg/kg)	0.35	0.42		0.20	0.24
	Arsenic (As) (mg/kg)	21.4	21.1		9.76	8.84
	Barium (Ba) (mg/kg)	119	95.7		92.5	101
	Beryllium (Be) (mg/kg)	1.61	1.30		0.87	0.97
	Bismuth (Bi) (mg/kg)	2.05	1.65		0.77	0.80
	Cadmium (Cd) (mg/kg)	0.456	0.486		0.256	0.324
	Calcium (Ca) (mg/kg)	3790	3600		2030	2450
	Chromium (Cr) (mg/kg)	58.9	48.6		128	131
	Cobalt (Co) (mg/kg)	8.45	7.84		10.5	10.9
	Copper (Cu) (mg/kg)	136	122		42.5	42.4
	Iron (Fe) (mg/kg)	29600	24200		24400	25200
	Lead (Pb) (mg/kg)	32.4	29.4		12.0	13.3
	Lithium (Li) (mg/kg)	38.2	32.0		27.9	29.0
	Magnesium (Mg) (mg/kg)	8000	6840		10500	10800
	Manganese (Mn) (mg/kg)	322	260		265	279
	Mercury (Hg) (mg/kg)	0.0364	0.0418		0.0058	0.0063
	Molybdenum (Mo) (mg/kg)	5.80	5.03		1.24	1.80
	Nickel (Ni) (mg/kg)	52.4	46.1		80.5	81.7
	Phosphorus (P) (mg/kg)	583	564		387	431
	Potassium (K) (mg/kg)	3580	3030		2500	2650
	Selenium (Se) (mg/kg)	0.90	0.84		0.38	0.38
	Silver (Ag) (mg/kg)	0.44	0.44		0.16	0.19
	Sodium (Na) (mg/kg)	170	160		<100	<100
	Strontium (Sr) (mg/kg)	26.9	24.5		20.3	23.7
	Thallium (Tl) (mg/kg)	0.294	0.267		0.145	0.166
	Tin (Sn) (mg/kg)	<2.0	<2.0		<2.0	<2.0
	Titanium (Ti) (mg/kg)	662	579		531	590

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-51 Soil/Sed/Waste 23-AUG-14 PDL-3	L1515866-52 Soil/Sed/Waste 23-AUG-14 PDL-4	L1515866-53 Soil/Sed/Waste 23-AUG-14 PDL-5	L1515866-54 Soil/Sed/Waste 23-AUG-14 PDL-COMP	L1515866-55 Soil/Sed/Waste 23-AUG-14 INUG-1
SOIL						
Physical Tests	Moisture (%)	72.6	68.0	76.8	73.6	78.8
	pH (1:2 soil:water) (pH)	5.39	6.30	6.14		5.86
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	<0.10		<0.10
	% Sand (2.0mm - 0.063mm) (%)	19.7	8.02	12.6		7.15
	% Silt (0.063mm - 4um) (%)	67.9	70.6	69.8		68.6
	% Clay (<4um) (%)	12.4	21.3	17.7		24.2
	Texture	Silt loam	Silt loam	Silt loam		Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.87	1.63	2.74		2.81
Metals	Aluminum (Al) (mg/kg)	16400	23000	19900		22800
	Antimony (Sb) (mg/kg)	0.19	0.26	0.22		0.14
	Arsenic (As) (mg/kg)	208	141	8.83		8.69
	Barium (Ba) (mg/kg)	72.5	138	98.1		119
	Beryllium (Be) (mg/kg)	0.76	1.11	0.93		1.46
	Bismuth (Bi) (mg/kg)	0.67	1.02	0.74		1.16
	Cadmium (Cd) (mg/kg)	0.082	0.634	0.296		0.178
	Calcium (Ca) (mg/kg)	1760	1880	2420		2000
	Chromium (Cr) (mg/kg)	110	144	127		110
	Cobalt (Co) (mg/kg)	11.8	25.0	10.4		9.35
	Copper (Cu) (mg/kg)	33.4	66.9	42.5		45.5
	Iron (Fe) (mg/kg)	62500	65300	24700		26000
	Lead (Pb) (mg/kg)	11.0	16.2	12.9		12.5
	Lithium (Li) (mg/kg)	22.5	29.6	27.4		29.5
	Magnesium (Mg) (mg/kg)	8970	11100	10500		9710
	Manganese (Mn) (mg/kg)	406	4660	274		305
	Mercury (Hg) (mg/kg)	0.0084	0.0065	0.0073		0.0128
	Molybdenum (Mo) (mg/kg)	3.66	10.3	1.82		1.72
	Nickel (Ni) (mg/kg)	62.0	192	79.1		72.8
	Phosphorus (P) (mg/kg)	1580	544	424		780
	Potassium (K) (mg/kg)	2180	2980	2630		3450
	Selenium (Se) (mg/kg)	0.38	0.23	0.41		0.59
	Silver (Ag) (mg/kg)	0.10	<0.10	0.19		0.15
	Sodium (Na) (mg/kg)	<100	<100	<100		150
	Strontium (Sr) (mg/kg)	19.3	22.7	23.1		25.9
	Thallium (Tl) (mg/kg)	0.131	0.297	0.160		0.203
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		<2.0
	Titanium (Ti) (mg/kg)	474	601	588		678

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-56 Soil/Sed/Waste 23-AUG-14 INUG-2	L1515866-57 Soil/Sed/Waste 23-AUG-14 INUG-3	L1515866-58 Soil/Sed/Waste 23-AUG-14 INUG-4	L1515866-59 Soil/Sed/Waste 23-AUG-14 INUG-5	L1515866-60 Soil/Sed/Waste 23-AUG-14 INUG-COMP
SOIL						
Physical Tests	Moisture (%)	76.3	81.5	82.3	80.6	80.6
	pH (1:2 soil:water) (pH)	5.91	5.74	5.40	5.08	
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	
	% Sand (2.0mm - 0.063mm) (%)	17.6	4.95	2.49	3.42	
	% Silt (0.063mm - 4um) (%)	63.5	71.7	75.3	67.1	
	% Clay (<4um) (%)	18.9	23.4	22.2	29.5	
	Texture	Silt loam	Silt loam	Silt loam	Silt loam	
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.23	3.38	3.79	3.13	
Metals	Aluminum (Al) (mg/kg)	22100	23400	16900	20200	
	Antimony (Sb) (mg/kg)	<0.10	0.13	0.14	0.15	
	Arsenic (As) (mg/kg)	5.74	9.70	138	69.1	
	Barium (Ba) (mg/kg)	113	129	100	116	
	Beryllium (Be) (mg/kg)	1.26	1.45	1.06	1.26	
	Bismuth (Bi) (mg/kg)	1.12	1.24	0.94	1.12	
	Cadmium (Cd) (mg/kg)	0.072	0.274	0.157	0.174	
	Calcium (Ca) (mg/kg)	2090	1940	1510	1520	
	Chromium (Cr) (mg/kg)	108	116	80.0	97.6	
	Cobalt (Co) (mg/kg)	9.01	10.5	10.6	11.4	
	Copper (Cu) (mg/kg)	39.4	49.3	35.3	43.7	
	Iron (Fe) (mg/kg)	24200	29900	109000	72000	
	Lead (Pb) (mg/kg)	12.0	13.2	10.3	11.6	
	Lithium (Li) (mg/kg)	30.1	28.9	20.6	23.7	
	Magnesium (Mg) (mg/kg)	9700	10000	7220	8440	
	Manganese (Mn) (mg/kg)	291	358	1090	452	
	Mercury (Hg) (mg/kg)	0.0113	0.0168	0.0221	0.0176	
	Molybdenum (Mo) (mg/kg)	1.43	3.44	8.35	5.91	
	Nickel (Ni) (mg/kg)	67.9	87.4	58.8	66.4	
	Phosphorus (P) (mg/kg)	648	914	2530	1860	
	Potassium (K) (mg/kg)	3320	3340	2590	3130	
	Selenium (Se) (mg/kg)	0.41	0.60	0.57	0.73	
	Silver (Ag) (mg/kg)	0.15	0.19	0.15	0.17	
	Sodium (Na) (mg/kg)	130	150	120	140	
	Strontium (Sr) (mg/kg)	26.1	23.7	18.8	21.2	
	Thallium (Tl) (mg/kg)	0.172	0.224	0.167	0.199	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	657	587	466	611	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-61 Soil/Sed/Waste 01-SEP-14 11:20 BBD-1	L1515866-62 Soil/Sed/Waste 01-SEP-14 11:20 BBD-2	L1515866-63 Soil/Sed/Waste 01-SEP-14 11:20 BBD-3	L1515866-64 Soil/Sed/Waste 01-SEP-14 11:20 BBD-4	L1515866-65 Soil/Sed/Waste 01-SEP-14 11:20 BBD-5
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	31.6	40.3	21.0	34.0	30.7
	pH (1:2 soil:water) (pH)	6.99	5.89	6.20	6.35	6.40
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	1.64	1.76	<0.10
	% Sand (2.0mm - 0.063mm) (%)	90.5	54.0	94.3	45.0	84.6
	% Silt (0.063mm - 4um) (%)	8.04	40.9	3.32	43.1	13.2
	% Clay (<4um) (%)	1.45	5.05	0.78	10.2	2.13
	Texture	Sand	Sandy loam	Sand	Loam / Sandy loam	Sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.18	0.47	<0.10	0.28	0.21
Metals	Aluminum (Al) (mg/kg)	4100	6370	3080	6530	4840
	Antimony (Sb) (mg/kg)	<0.10	<0.10	<0.10	0.11	<0.10
	Arsenic (As) (mg/kg)	2.75	6.13	2.01	3.63	2.78
	Barium (Ba) (mg/kg)	48.4	68.5	23.7	76.6	52.7
	Beryllium (Be) (mg/kg)	<0.20	0.28	<0.20	0.31	0.20
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd) (mg/kg)	<0.050	0.052	<0.050	<0.050	<0.050
	Calcium (Ca) (mg/kg)	1380	1920	734	2180	1430
	Chromium (Cr) (mg/kg)	9.62	13.4	4.98	14.7	9.65
	Cobalt (Co) (mg/kg)	2.94	4.18	2.07	4.52	3.33
	Copper (Cu) (mg/kg)	2.97	6.28	2.58	5.54	3.71
	Iron (Fe) (mg/kg)	9290	12400	6050	11900	9280
	Lead (Pb) (mg/kg)	3.08	5.81	1.94	5.58	3.70
	Lithium (Li) (mg/kg)	6.2	8.6	5.5	9.0	7.4
	Magnesium (Mg) (mg/kg)	2650	3580	2040	3400	2990
	Manganese (Mn) (mg/kg)	243	198	90.0	223	171
	Mercury (Hg) (mg/kg)	<0.0050	0.0062	<0.0050	<0.0050	<0.0050
	Molybdenum (Mo) (mg/kg)	<0.50	0.64	<0.50	0.79	<0.50
	Nickel (Ni) (mg/kg)	5.97	8.42	4.16	8.53	6.50
	Phosphorus (P) (mg/kg)	409	668	283	695	407
	Potassium (K) (mg/kg)	660	1090	470	1340	790
	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)	100	160	<100	150	100
	Strontium (Sr) (mg/kg)	27.1	36.4	19.2	38.6	29.3
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	0.056	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	239	342	152	388	263

* 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				
		L1515866-66 Soil/Sed/Waste 01-SEP-14 11:20 BBD-COMP	L1515866-67 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-1	L1515866-68 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-2	L1515866-69 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-3	L1515866-70 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-4
SOIL						
Physical Tests	Moisture (%)	27.3	50.7	54.9	49.8	44.4
	pH (1:2 soil:water) (pH)		6.53	6.32	6.17	6.44
Particle Size	% Gravel (>2mm) (%)		0.77	0.19	0.89	0.14
	% Sand (2.0mm - 0.063mm) (%)		33.6	19.4	21.9	23.4
	% Silt (0.063mm - 4um) (%)		57.2	69.0	66.8	65.7
	% Clay (<4um) (%)		8.42	11.4	10.4	10.7
	Texture		Silt loam	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)		0.64	0.83	0.68	0.51
Metals	Aluminum (Al) (mg/kg)		8260	8990	8160	9330
	Antimony (Sb) (mg/kg)		0.12	0.12	0.12	0.13
	Arsenic (As) (mg/kg)		25.6	30.3	58.4	35.6
	Barium (Ba) (mg/kg)		118	115	146	112
	Beryllium (Be) (mg/kg)		0.40	0.42	0.37	0.38
	Bismuth (Bi) (mg/kg)		<0.20	0.23	0.21	0.23
	Cadmium (Cd) (mg/kg)		0.075	0.089	0.064	0.061
	Calcium (Ca) (mg/kg)		2470	2390	2540	2810
	Chromium (Cr) (mg/kg)		19.0	21.0	19.0	20.7
	Cobalt (Co) (mg/kg)		6.95	6.96	6.13	6.02
	Copper (Cu) (mg/kg)		7.83	9.34	8.36	8.78
	Iron (Fe) (mg/kg)		22100	23000	27700	23300
	Lead (Pb) (mg/kg)		8.56	9.89	8.28	9.32
	Lithium (Li) (mg/kg)		10.6	11.9	10.8	11.6
	Magnesium (Mg) (mg/kg)		4450	4990	4450	4840
	Manganese (Mn) (mg/kg)		1150	1050	1110	943
	Mercury (Hg) (mg/kg)		0.0102	0.0140	0.0080	0.0077
	Molybdenum (Mo) (mg/kg)		1.64	1.55	1.84	1.55
	Nickel (Ni) (mg/kg)		12.2	13.6	11.5	12.6
	Phosphorus (P) (mg/kg)		1170	1050	1620	1240
	Potassium (K) (mg/kg)		1530	1590	1520	1800
	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)		240	270	240	220
	Strontium (Sr) (mg/kg)		45.3	45.0	47.2	54.4
	Thallium (Tl) (mg/kg)		0.068	0.070	0.063	0.071
	Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)		415	355	374	504

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-71 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-5	L1515866-72 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-COMP	L1515866-73 Soil/Sed/Waste 31-AUG-14 08:30 BAP-1	L1515866-74 Soil/Sed/Waste 31-AUG-14 08:30 BAP-2	L1515866-75 Soil/Sed/Waste 31-AUG-14 08:30 BAP-3
SOIL						
Physical Tests	Moisture (%)	45.7	48.8	42.1	52.9	43.7
	pH (1:2 soil:water) (pH)	7.01		6.01	5.84	5.79
Particle Size	% Gravel (>2mm) (%)	0.52		0.16	<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	41.1		80.4	64.4	63.1
	% Silt (0.063mm - 4um) (%)	49.9		17.5	30.1	32.3
	% Clay (<4um) (%)	8.48		1.95	5.44	4.58
	Texture	Silt loam		Loamy sand	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.53		0.43	1.35	0.55
Metals	Aluminum (Al) (mg/kg)	8310		4310	6910	5890
	Antimony (Sb) (mg/kg)	0.11		0.11	0.16	0.14
	Arsenic (As) (mg/kg)	9.59		3.18	4.13	4.66
	Barium (Ba) (mg/kg)	107		242	320	282
	Beryllium (Be) (mg/kg)	0.37		0.29	0.42	0.32
	Bismuth (Bi) (mg/kg)	<0.20		<0.20	<0.20	<0.20
	Cadmium (Cd) (mg/kg)	0.064		<0.050	0.066	<0.050
	Calcium (Ca) (mg/kg)	2460		1670	2430	2120
	Chromium (Cr) (mg/kg)	18.5		13.8	19.6	17.5
	Cobalt (Co) (mg/kg)	6.48		3.20	4.89	4.43
	Copper (Cu) (mg/kg)	7.70		4.51	8.73	6.03
	Iron (Fe) (mg/kg)	17500		10700	14900	13700
	Lead (Pb) (mg/kg)	8.61		3.94	6.78	5.61
	Lithium (Li) (mg/kg)	10.6		6.6	10.4	8.9
	Magnesium (Mg) (mg/kg)	4380		2670	3890	3490
	Manganese (Mn) (mg/kg)	2230		113	145	142
	Mercury (Hg) (mg/kg)	0.0095		<0.0050	0.0081	0.0078
	Molybdenum (Mo) (mg/kg)	1.39		<0.50	0.82	0.51
	Nickel (Ni) (mg/kg)	11.9		8.05	12.2	10.3
	Phosphorus (P) (mg/kg)	797		558	775	643
	Potassium (K) (mg/kg)	1580		1020	1700	1420
	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)	180		130	190	160
	Strontium (Sr) (mg/kg)	49.5		35.5	48.0	40.3
	Thallium (Tl) (mg/kg)	0.072		<0.050	0.082	0.067
	Tin (Sn) (mg/kg)	<2.0		<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	445		240	394	322

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-76 Soil/Sed/Waste 31-AUG-14 08:30 BAP-4	L1515866-77 Soil/Sed/Waste 31-AUG-14 08:30 BAP-5	L1515866-78 Soil/Sed/Waste 31-AUG-14 08:30 BAP-COMP	L1515866-79 Soil/Sed/Waste 31-AUG-14 11:30 BES-1	L1515866-80 Soil/Sed/Waste 31-AUG-14 11:30 BES-2
SOIL						
Physical Tests	Moisture (%)	41.5	37.1	47.2	42.3	32.3
	pH (1:2 soil:water) (pH)	6.17	6.51		6.52	7.53
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10		0.23	0.50
	% Sand (2.0mm - 0.063mm) (%)	68.5	73.8		71.9	82.3
	% Silt (0.063mm - 4um) (%)	28.2	23.7		25.2	15.4
	% Clay (<4um) (%)	3.24	2.51		2.64	1.79
	Texture	Loamy sand	Loamy sand		Loamy sand	Sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.45	0.35		0.37	0.21
Metals	Aluminum (Al) (mg/kg)	5630	4780		6020	4670
	Antimony (Sb) (mg/kg)	0.17	0.13		0.11	0.12
	Arsenic (As) (mg/kg)	7.71	7.57		3.33	2.28
	Barium (Ba) (mg/kg)	337	374		107	127
	Beryllium (Be) (mg/kg)	0.35	0.31		0.33	0.28
	Bismuth (Bi) (mg/kg)	<0.20	<0.20		<0.20	<0.20
	Cadmium (Cd) (mg/kg)	<0.050	<0.050		<0.050	<0.050
	Calcium (Ca) (mg/kg)	2050	2080		1940	1900
	Chromium (Cr) (mg/kg)	17.6	15.9		18.3	15.4
	Cobalt (Co) (mg/kg)	4.36	3.83		4.58	3.60
	Copper (Cu) (mg/kg)	5.33	4.36		4.87	3.17
	Iron (Fe) (mg/kg)	13100	13500		12400	10700
	Lead (Pb) (mg/kg)	4.98	4.10		4.55	3.53
	Lithium (Li) (mg/kg)	8.0	6.8		8.7	7.4
	Magnesium (Mg) (mg/kg)	3350	2890		3820	3130
	Manganese (Mn) (mg/kg)	165	238		618	320
	Mercury (Hg) (mg/kg)	0.0057	<0.0050		0.0056	<0.0050
	Molybdenum (Mo) (mg/kg)	0.96	0.50		0.50	<0.50
	Nickel (Ni) (mg/kg)	9.99	8.76		10.7	9.09
	Phosphorus (P) (mg/kg)	676	756		597	530
	Potassium (K) (mg/kg)	1350	1170		1280	970
	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)	180	150		170	120
	Strontium (Sr) (mg/kg)	43.5	41.0		36.0	32.7
	Thallium (Tl) (mg/kg)	0.076	0.054		0.053	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0		<2.0	<2.0
	Titanium (Ti) (mg/kg)	340	330		326	299

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515866-81 Soil/Sed/Waste 31-AUG-14 11:30 BES-3	L1515866-82 Soil/Sed/Waste 31-AUG-14 11:30 BES-4	L1515866-83 Soil/Sed/Waste 31-AUG-14 11:30 BES-5	L1515866-84 Soil/Sed/Waste 31-AUG-14 11:30 BES-COMP	L1515866-91 Soil/Sed/Waste 22-AUG-14 TPN-5 DUP
SOIL						
Physical Tests	Moisture (%)	38.7	44.8	36.8	36.2	37.6
	pH (1:2 soil:water) (pH)	6.30	6.55	6.44		6.23
Particle Size	% Gravel (>2mm) (%)	<0.10	0.42	1.00		4.01
	% Sand (2.0mm - 0.063mm) (%)	64.0	67.9	66.6		14.0
	% Silt (0.063mm - 4um) (%)	32.1	28.5	28.6		50.4
	% Clay (<4um) (%)	3.84	3.13	3.80		31.6
	Texture	Sandy loam / Loamy sand	Loamy sand	Loamy sand		Silty clay loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.33	0.43	0.32		0.25
Metals	Aluminum (Al) (mg/kg)	6100	6220	5850		23500
	Antimony (Sb) (mg/kg)	0.13	0.17	0.12		0.17
	Arsenic (As) (mg/kg)	4.45	3.47	3.05		13.0
	Barium (Ba) (mg/kg)	89.7	119	72.1		111
	Beryllium (Be) (mg/kg)	0.31	0.33	0.29		1.07
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20		1.23
	Cadmium (Cd) (mg/kg)	<0.050	<0.050	<0.050		0.112
	Calcium (Ca) (mg/kg)	2080	2120	2090		2030
	Chromium (Cr) (mg/kg)	17.4	18.2	16.9		107
	Cobalt (Co) (mg/kg)	4.61	4.67	4.27		15.4
	Copper (Cu) (mg/kg)	4.82	4.84	4.58		27.9
	Iron (Fe) (mg/kg)	13300	13300	12500		35400
	Lead (Pb) (mg/kg)	5.30	4.97	4.87		16.6
	Lithium (Li) (mg/kg)	8.7	8.8	8.4		50.5
	Magnesium (Mg) (mg/kg)	3650	3780	3500		10700
	Manganese (Mn) (mg/kg)	1570	644	359		724
	Mercury (Hg) (mg/kg)	0.0068	0.0067	0.0055		<0.0050
	Molybdenum (Mo) (mg/kg)	0.99	0.61	<0.50		3.68
	Nickel (Ni) (mg/kg)	9.99	10.6	9.60		66.4
	Phosphorus (P) (mg/kg)	694	671	661		428
	Potassium (K) (mg/kg)	1300	1330	1180		4440
	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)	150	170	140		170
	Strontium (Sr) (mg/kg)	38.0	38.3	35.1		19.9
	Thallium (Tl) (mg/kg)	0.053	0.076	<0.050		0.346
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		<2.0
	Titanium (Ti) (mg/kg)	316	376	347		1240

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515866-92				
	Description	Soil/Sed/Waste				
	Sampled Date	23-AUG-14				
	Sampled Time					
	Client ID	INUG-5 DUP				
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	79.7				
	pH (1:2 soil:water) (pH)	5.25				
Particle Size	% Gravel (>2mm) (%)	<0.10				
	% Sand (2.0mm - 0.063mm) (%)	4.96				
	% Silt (0.063mm - 4um) (%)	68.8				
	% Clay (<4um) (%)	26.3				
	Texture	Silt loam				
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.12				
Metals	Aluminum (Al) (mg/kg)	23700				
	Antimony (Sb) (mg/kg)	0.18				
	Arsenic (As) (mg/kg)	79.9				
	Barium (Ba) (mg/kg)	129				
	Beryllium (Be) (mg/kg)	1.41				
	Bismuth (Bi) (mg/kg)	1.31				
	Cadmium (Cd) (mg/kg)	0.185				
	Calcium (Ca) (mg/kg)	1740				
	Chromium (Cr) (mg/kg)	116				
	Cobalt (Co) (mg/kg)	13.2				
	Copper (Cu) (mg/kg)	50.8				
	Iron (Fe) (mg/kg)	83000				
	Lead (Pb) (mg/kg)	13.5				
	Lithium (Li) (mg/kg)	28.0				
	Magnesium (Mg) (mg/kg)	9780				
	Manganese (Mn) (mg/kg)	509				
	Mercury (Hg) (mg/kg)	0.0187				
	Molybdenum (Mo) (mg/kg)	6.84				
	Nickel (Ni) (mg/kg)	76.4				
	Phosphorus (P) (mg/kg)	2120				
	Potassium (K) (mg/kg)	3830				
	Selenium (Se) (mg/kg)	0.84				
	Silver (Ag) (mg/kg)	0.20				
	Sodium (Na) (mg/kg)	170				
	Strontium (Sr) (mg/kg)	25.3				
	Thallium (Tl) (mg/kg)	0.241				
	Tin (Sn) (mg/kg)	<2.0				
	Titanium (Ti) (mg/kg)	717				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515866-1	L1515866-2	L1515866-3	L1515866-4	L1515866-5
	Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
	Sampled Date	26-AUG-14	26-AUG-14	26-AUG-14	26-AUG-14	26-AUG-14
	Sampled Time	15:40	15:40	15:40	15:40	15:40
	Client ID	TPE-1	TPE-2	TPE-3	TPE-4	TPE-5
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)	19.0	20.6	16.3	15.9	16.0
	Vanadium (V) (mg/kg)	47.6	45.4	43.2	41.7	44.7
	Zinc (Zn) (mg/kg)	117	120	115	110	112
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	L1515866-6 Soil/Sed/Waste 26-AUG-14 15:40 TPE-COMP	L1515866-7 Soil/Sed/Waste 22-AUG-14 TPN-1	L1515866-8 Soil/Sed/Waste 22-AUG-14 TPN-2	L1515866-9 Soil/Sed/Waste 22-AUG-14 TPN-3	L1515866-10 Soil/Sed/Waste 22-AUG-14 TPN-4
SOIL						
Metals	Uranium (U) (mg/kg)		6.38	16.3	11.8	19.4
	Vanadium (V) (mg/kg)		19.3	37.6	30.2	44.1
	Zinc (Zn) (mg/kg)		44.0	89.5	69.2	106
Aggregate Organics	Mineral Oil and Grease (mg/kg)	<500				
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 (%)	91.3				
	Surrogate: Chrysene d12 (%)	102.0				
	Surrogate: Naphthalene d8 (%)	87.7				
	Surrogate: Phenanthrene d10 (%)	98.4				
	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	L1515866-11 Soil/Sed/Waste 22-AUG-14 TPN-5	L1515866-12 Soil/Sed/Waste 22-AUG-14 TPN-COMP	L1515866-13 Soil/Sed/Waste 27-AUG-14 08:40 TPS-1	L1515866-14 Soil/Sed/Waste 27-AUG-14 08:40 TPS-2	L1515866-15 Soil/Sed/Waste 27-AUG-14 08:40 TPS-3
SOIL						
Metals	Uranium (U) (mg/kg)	17.1		18.7	18.5	17.3
	Vanadium (V) (mg/kg)	48.6		41.3	40.5	41.0
	Zinc (Zn) (mg/kg)	105		112	97.2	94.4
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 (%)		95.2			
	Surrogate: Chrysene d12 (%)		99.7			
	Surrogate: Naphthalene d8 (%)		92.3			
	Surrogate: Phenanthrene d10 (%)		97.3			
	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

Grouping	Analyte	L1515866-16 Soil/Sed/Waste 27-AUG-14 08:40 TPS-4	L1515866-17 Soil/Sed/Waste 27-AUG-14 08:40 TPS-5	L1515866-18 Soil/Sed/Waste 27-AUG-14 08:40 TPS-COMP	L1515866-19 Soil/Sed/Waste 02-SEP-14 13:45 SP-1	L1515866-20 Soil/Sed/Waste 02-SEP-14 13:45 SP-2
SOIL						
Metals	Uranium (U) (mg/kg)	15.6	9.52		24.2	24.2
	Vanadium (V) (mg/kg)	37.1	25.5		43.4	43.3
	Zinc (Zn) (mg/kg)	95.7	66.5		126	126
Aggregate Organics	Mineral Oil and Grease (mg/kg)			<500		
Hydrocarbons	EPH10-19 (mg/kg)			<400 DLHM		
	EPH19-32 (mg/kg)			<400 DLHM		
	LEPH (mg/kg)			<400		
	HEPH (mg/kg)			<400		
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 (%)			94.0		
	Surrogate: Chrysene d12 (%)			94.8		
	Surrogate: Naphthalene d8 (%)			91.5		
	Surrogate: Phenanthrene d10 (%)			92.5		
	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	L1515866-21 Soil/Sed/Waste 02-SEP-14 13:45 SP-3	L1515866-22 Soil/Sed/Waste 02-SEP-14 13:45 SP-4	L1515866-23 Soil/Sed/Waste 02-SEP-14 13:45 SP-5	L1515866-24 Soil/Sed/Waste 02-SEP-14 13:45 SP-COMP	L1515866-25 Soil/Sed/Waste 29-AUG-14 11:00 TE-1
SOIL						
Metals	Uranium (U) (mg/kg)	25.0	24.7	21.4		10.3
	Vanadium (V) (mg/kg)	46.0	46.4	41.3		19.8
	Zinc (Zn) (mg/kg)	130	130	119		72.7
Aggregate Organics	Mineral Oil and Grease (mg/kg)				<500	
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)				<0.010 DLHM	
	Acenaphthylene (mg/kg)				<0.010 DLHM	
	Anthracene (mg/kg)				<0.010 DLHM	
	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)				<0.010 DLHM	
	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 (%)				90.9	
	Surrogate: Chrysene d12 (%)				96.5	
	Surrogate: Naphthalene d8 (%)				91.3	
	Surrogate: Phenanthrene d10 (%)				89.9	
	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	L1515866-26 Soil/Sed/Waste 29-AUG-14 11:00 TE-2	L1515866-27 Soil/Sed/Waste 29-AUG-14 11:00 TE-3	L1515866-28 Soil/Sed/Waste 29-AUG-14 11:00 TE-4	L1515866-29 Soil/Sed/Waste 29-AUG-14 11:00 TE-5	L1515866-30 Soil/Sed/Waste 29-AUG-14 11:00 TE-COMP
SOIL						
Metals	Uranium (U) (mg/kg)	18.0	15.9	18.6	18.0	
	Vanadium (V) (mg/kg)	32.6	29.1	32.2	31.6	
	Zinc (Zn) (mg/kg)	94.3	85.4	99.1	99.4	
Aggregate Organics	Mineral Oil and Grease (mg/kg)					<500
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 (%)					87.3
	Surrogate: Chrysene d12 (%)					95.5
	Surrogate: Naphthalene d8 (%)					84.4
	Surrogate: Phenanthrene d10 (%)					92.0
	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	L1515866-31 Soil/Sed/Waste 30-AUG-14 TEFF-1	L1515866-32 Soil/Sed/Waste 30-AUG-14 TEFF-2	L1515866-33 Soil/Sed/Waste 30-AUG-14 TEFF-3	L1515866-34 Soil/Sed/Waste 30-AUG-14 TEFF-4	L1515866-35 Soil/Sed/Waste 30-AUG-14 TEFF-5
SOIL						
Metals	Uranium (U) (mg/kg)	17.6	22.8	19.8	22.0	20.9
	Vanadium (V) (mg/kg)	28.7	35.1	31.0	34.0	33.0
	Zinc (Zn) (mg/kg)	92.6	99.4	114	100	97.3
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	L1515866-36 Soil/Sed/Waste 30-AUG-14 TEFF-COMP	L1515866-37 Soil/Sed/Waste 26-AUG-14 DUP-1	L1515866-38 Soil/Sed/Waste 27-AUG-14 DUP-2	L1515866-39 Soil/Sed/Waste 28-AUG-14 DUP-3	L1515866-40 Soil/Sed/Waste 29-AUG-14 DUP-5
SOIL						
Metals	Uranium (U) (mg/kg)		18.0	18.4	14.6	10.2
	Vanadium (V) (mg/kg)		44.0	40.3	26.6	19.4
	Zinc (Zn) (mg/kg)		107	98.9	116	56.4
Aggregate Organics	Mineral Oil and Grease (mg/kg)	<500				
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 (%)	85.2				
	Surrogate: Chrysene d12 (%)	88.2				
	Surrogate: Naphthalene d8 (%)	86.3				
	Surrogate: Phenanthrene d10 (%)	82.9				
	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	L1515866-41 Soil/Sed/Waste 31-AUG-14 DUP-6	L1515866-42 Soil/Sed/Waste 31-AUG-14 DUP-7	L1515866-43 Soil/Sed/Waste 28-AUG-14 10:30 WAL-1	L1515866-44 Soil/Sed/Waste 28-AUG-14 10:30 WAL-2	L1515866-45 Soil/Sed/Waste 28-AUG-14 10:30 WAL-3
SOIL						
Metals	Uranium (U) (mg/kg)	2.56	1.20	14.1	15.9	15.1
	Vanadium (V) (mg/kg)	27.9	19.1	26.1	28.2	27.9
	Zinc (Zn) (mg/kg)	39.9	27.2	110	117	116
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	L1515866-46 Soil/Sed/Waste 28-AUG-14 10:30 WAL-4	L1515866-47 Soil/Sed/Waste 28-AUG-14 10:30 WAL-5	L1515866-48 Soil/Sed/Waste 28-AUG-14 10:30 WAL-COMP	L1515866-49 Soil/Sed/Waste 23-AUG-14 PDL-1	L1515866-50 Soil/Sed/Waste 23-AUG-14 PDL-2
SOIL						
Metals	Uranium (U) (mg/kg)	14.9	13.6		8.13	8.21
	Vanadium (V) (mg/kg)	32.2	26.1		33.8	35.1
	Zinc (Zn) (mg/kg)	112	109		77.0	86.4
Aggregate Organics	Mineral Oil and Grease (mg/kg)			<500		
Hydrocarbons	EPH10-19 (mg/kg)			<900 DLHM		
	EPH19-32 (mg/kg)			<900 DLHM		
	LEPH (mg/kg)			<900		
	HEPH (mg/kg)			<900		
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 (%)			91.0		
	Surrogate: Chrysene d12 (%)			95.1		
	Surrogate: Naphthalene d8 (%)			85.7		
	Surrogate: Phenanthrene d10 (%)			92.3		
	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

Grouping	Analyte	L1515866-51 Soil/Sed/Waste 23-AUG-14 PDL-3	L1515866-52 Soil/Sed/Waste 23-AUG-14 PDL-4	L1515866-53 Soil/Sed/Waste 23-AUG-14 PDL-5	L1515866-54 Soil/Sed/Waste 23-AUG-14 PDL-COMP	L1515866-55 Soil/Sed/Waste 23-AUG-14 INUG-1
SOIL						
Metals	Uranium (U) (mg/kg)	6.03	12.5	7.91		17.0
	Vanadium (V) (mg/kg)	30.0	41.1	34.3		36.0
	Zinc (Zn) (mg/kg)	61.7	101	82.9		83.3
Aggregate Organics	Mineral Oil and Grease (mg/kg)				<500	
Hydrocarbons	EPH10-19 (mg/kg)				<300 DLHM	
	EPH19-32 (mg/kg)				<300 DLHM	
	LEPH (mg/kg)				<300	
	HEPH (mg/kg)				<300	
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 (%)				84.2	
	Surrogate: Chrysene d12 (%)				82.7	
	Surrogate: Naphthalene d8 (%)				81.4	
	Surrogate: Phenanthrene d10 (%)				84.2	
	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	L1515866-56 Soil/Sed/Waste 23-AUG-14 INUG-2	L1515866-57 Soil/Sed/Waste 23-AUG-14 INUG-3	L1515866-58 Soil/Sed/Waste 23-AUG-14 INUG-4	L1515866-59 Soil/Sed/Waste 23-AUG-14 INUG-5	L1515866-60 Soil/Sed/Waste 23-AUG-14 INUG-COMP
SOIL						
Metals	Uranium (U) (mg/kg)	15.6	17.6	11.9	15.0	
	Vanadium (V) (mg/kg)	35.0	37.4	26.7	32.3	
	Zinc (Zn) (mg/kg)	77.5	95.2	73.4	84.3	
Aggregate Organics	Mineral Oil and Grease (mg/kg)					<500
Hydrocarbons	EPH10-19 (mg/kg)					<400 DLHM
	EPH19-32 (mg/kg)					<400 DLHM
	LEPH (mg/kg)					<400
	HEPH (mg/kg)					<400
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 (%)					88.7
	Surrogate: Chrysene d12 (%)					86.7
	Surrogate: Naphthalene d8 (%)					87.6
	Surrogate: Phenanthrene d10 (%)					86.5
	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

Sample ID	L1515866-61	L1515866-62	L1515866-63	L1515866-64	L1515866-65
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	01-SEP-14	01-SEP-14	01-SEP-14	01-SEP-14	01-SEP-14
Sampled Time	11:20	11:20	11:20	11:20	11:20
Client ID	BBD-1	BBD-2	BBD-3	BBD-4	BBD-5
Grouping / **Analyte**					
SOIL					
Metals					
Uranium (U) (mg/kg)	0.579	1.13	0.470	1.90	0.696
Vanadium (V) (mg/kg)	12.3	16.0	7.54	19.8	12.6
Zinc (Zn) (mg/kg)	17.0	25.4	13.7	24.0	19.1
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	L1515866-66	L1515866-67	L1515866-68	L1515866-69	L1515866-70
	Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
	Sampled Date	01-SEP-14	01-SEP-14	01-SEP-14	01-SEP-14	01-SEP-14
	Sampled Time	11:20	07:45	07:45	07:45	07:45
	Client ID	BBD-COMP	BPJ-1	BPJ-2	BPJ-3	BPJ-4
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)		1.70	1.87	1.74	1.84
	Vanadium (V) (mg/kg)		22.6	23.4	22.9	24.1
	Zinc (Zn) (mg/kg)		36.3	40.7	34.5	37.6
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 (%)	81.7				
	Surrogate: Chrysene d12 (%)	110.5				
	Surrogate: Naphthalene d8 (%)	80.8				
	Surrogate: Phenanthrene d10 (%)	104.0				
	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	L1515866-71 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-5	L1515866-72 Soil/Sed/Waste 01-SEP-14 07:45 BPJ-COMP	L1515866-73 Soil/Sed/Waste 31-AUG-14 08:30 BAP-1	L1515866-74 Soil/Sed/Waste 31-AUG-14 08:30 BAP-2	L1515866-75 Soil/Sed/Waste 31-AUG-14 08:30 BAP-3
SOIL						
Metals	Uranium (U) (mg/kg)	1.66		1.06	2.12	1.50
	Vanadium (V) (mg/kg)	22.3		16.2	24.4	21.2
	Zinc (Zn) (mg/kg)	36.0		19.2	32.7	27.8
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 (%)		122.7			
	Surrogate: Naphthalene d8 (%)		87.9			
	Surrogate: Phenanthrene d10 (%)		117.9			
	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	L1515866-76 Soil/Sed/Waste 31-AUG-14 08:30 BAP-4	L1515866-77 Soil/Sed/Waste 31-AUG-14 08:30 BAP-5	L1515866-78 Soil/Sed/Waste 31-AUG-14 08:30 BAP-COMP	L1515866-79 Soil/Sed/Waste 31-AUG-14 11:30 BES-1	L1515866-80 Soil/Sed/Waste 31-AUG-14 11:30 BES-2
SOIL						
Metals	Uranium (U) (mg/kg)	1.35	1.10		1.07	0.998
	Vanadium (V) (mg/kg)	19.7	18.8		18.8	16.5
	Zinc (Zn) (mg/kg)	24.6	22.4		27.1	19.1
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)			0.0185		
	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 (%)			94.0		
	Surrogate: Chrysene d12 (%)			105.9		
	Surrogate: Naphthalene d8 (%)			93.7		
	Surrogate: Phenanthrene d10 (%)			98.1		
	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	L1515866-81	L1515866-82	L1515866-83	L1515866-84	L1515866-91
Description	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
Sampled Date	31-AUG-14	31-AUG-14	31-AUG-14	31-AUG-14	22-AUG-14
Sampled Time	11:30	11:30	11:30	11:30	
Client ID	BES-3	BES-4	BES-5	BES-COMP	TPN-5 DUP
Grouping / **Analyte**					
SOIL					
Metals Uranium (U) (mg/kg)	1.20	1.23	1.21		14.3
Vanadium (V) (mg/kg)	19.0	19.4	18.2		43.0
Zinc (Zn) (mg/kg)	24.9	25.3	22.7		93.2
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 (%)				80.6	
Surrogate: Chrysene d12 (%)				112.7	
Surrogate: Naphthalene d8 (%)				80.4	
Surrogate: Phenanthrene d10 (%)				105.0	
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

	Sample ID	L1515866-92				
	Description	Soil/Sed/Waste				
	Sampled Date	23-AUG-14				
	Sampled Time					
	Client ID	INUG-5 DUP				
Grouping	**Analyte**					
SOIL						
Metals	Uranium (U) (mg/kg)	17.8				
	Vanadium (V) (mg/kg)	37.6				
	Zinc (Zn) (mg/kg)	99.1				
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

Grouping	Analyte	L1515866-85 Filter 26-AUG-14 FILTER SWIPE-1	L1515866-86 Filter 27-AUG-14 FILTER SWIPE-2	L1515866-87 Filter 28-AUG-14 FILTER SWIPE-3	L1515866-88 Filter 29-AUG-14 FILTER SWIPE-5	L1515866-89 Filter 31-AUG-14 FILTER SWIPE-6
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
SWAB						
Metals	Aluminum (Al)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Antimony (Sb)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Arsenic (As)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Barium (Ba)-Total (mg)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Beryllium (Be)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Cadmium (Cd)-Total (mg)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Cobalt (Co)-Total (mg)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Copper (Cu)-Total (mg)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Iron (Fe)-Total (mg)	0.0063	0.0072	<0.0030	0.0083	0.0046
	Lead (Pb)-Total (mg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Manganese (Mn)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Nickel (Ni)-Total (mg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Phosphorus (P)-Total (mg)	<0.030	<0.030	<0.030	<0.030	<0.030
	Potassium (K)-Total (mg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Selenium (Se)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Silver (Ag)-Total (mg)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sodium (Na)-Total (mg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Strontium (Sr)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Thallium (Tl)-Total (mg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tin (Sn)-Total (mg)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Titanium (Ti)-Total (mg)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vanadium (V)-Total (mg)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Zinc (Zn)-Total (mg)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1515866-90				
	Description	Filter				
	Sampled Date	31-AUG-14				
	Sampled Time					
	Client ID	FILTER SWIPE-7				
Grouping	**Analyte**					
SWAB						
Metals	Aluminum (Al)-Total (mg)	<0.020				
	Antimony (Sb)-Total (mg)	<0.020				
	Arsenic (As)-Total (mg)	<0.020				
	Barium (Ba)-Total (mg)	<0.0010				
	Beryllium (Be)-Total (mg)	<0.00050				
	Bismuth (Bi)-Total (mg)	<0.020				
	Cadmium (Cd)-Total (mg)	<0.0010				
	Calcium (Ca)-Total (mg)	<0.20				
	Chromium (Cr)-Total (mg)	<0.0020				
	Cobalt (Co)-Total (mg)	<0.0010				
	Copper (Cu)-Total (mg)	<0.0010				
	Iron (Fe)-Total (mg)	0.0138				
	Lead (Pb)-Total (mg)	<0.0040				
	Lithium (Li)-Total (mg)	<0.0010				
	Magnesium (Mg)-Total (mg)	<0.010				
	Manganese (Mn)-Total (mg)	<0.00050				
	Molybdenum (Mo)-Total (mg)	<0.0030				
	Nickel (Ni)-Total (mg)	<0.0050				
	Phosphorus (P)-Total (mg)	<0.030				
	Potassium (K)-Total (mg)	<0.20				
	Selenium (Se)-Total (mg)	<0.020				
	Silver (Ag)-Total (mg)	<0.0010				
	Sodium (Na)-Total (mg)	<0.20				
	Strontium (Sr)-Total (mg)	<0.00050				
	Thallium (Tl)-Total (mg)	<0.020				
	Tin (Sn)-Total (mg)	<0.0030				
	Titanium (Ti)-Total (mg)	<0.0010				
	Vanadium (V)-Total (mg)	<0.0030				
	Zinc (Zn)-Total (mg)	<0.00050				

* 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	L1515866-12, -18, -30, -36, -48, -54, -6, -60, -78
Duplicate	EPH19-32	DLHM	L1515866-12, -18, -30, -36, -48, -54, -6, -60, -78
Duplicate	Acenaphthene	DLM	L1515866-66, -72, -84
Duplicate	Anthracene	DLM	L1515866-66, -72, -84
Duplicate	Chrysene	DLM	L1515866-66, -72, -84
Duplicate	Copper (Cu)	DUP-H	L1515866-1, -10, -11, -2, -3, -4, -5, -7, -8, -9
Duplicate	Uranium (U)	DUP-H	L1515866-1, -10, -11, -2, -3, -4, -5, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
DLM	Detection Limit Adjusted due to sample matrix effects.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

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 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

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Reference Information

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. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-MG-ICP-VA	Swab	Metals in Swab 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 swab material, using a combination of nitric acid and hydrochloric acid. Instrumental analysis of the swab 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
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

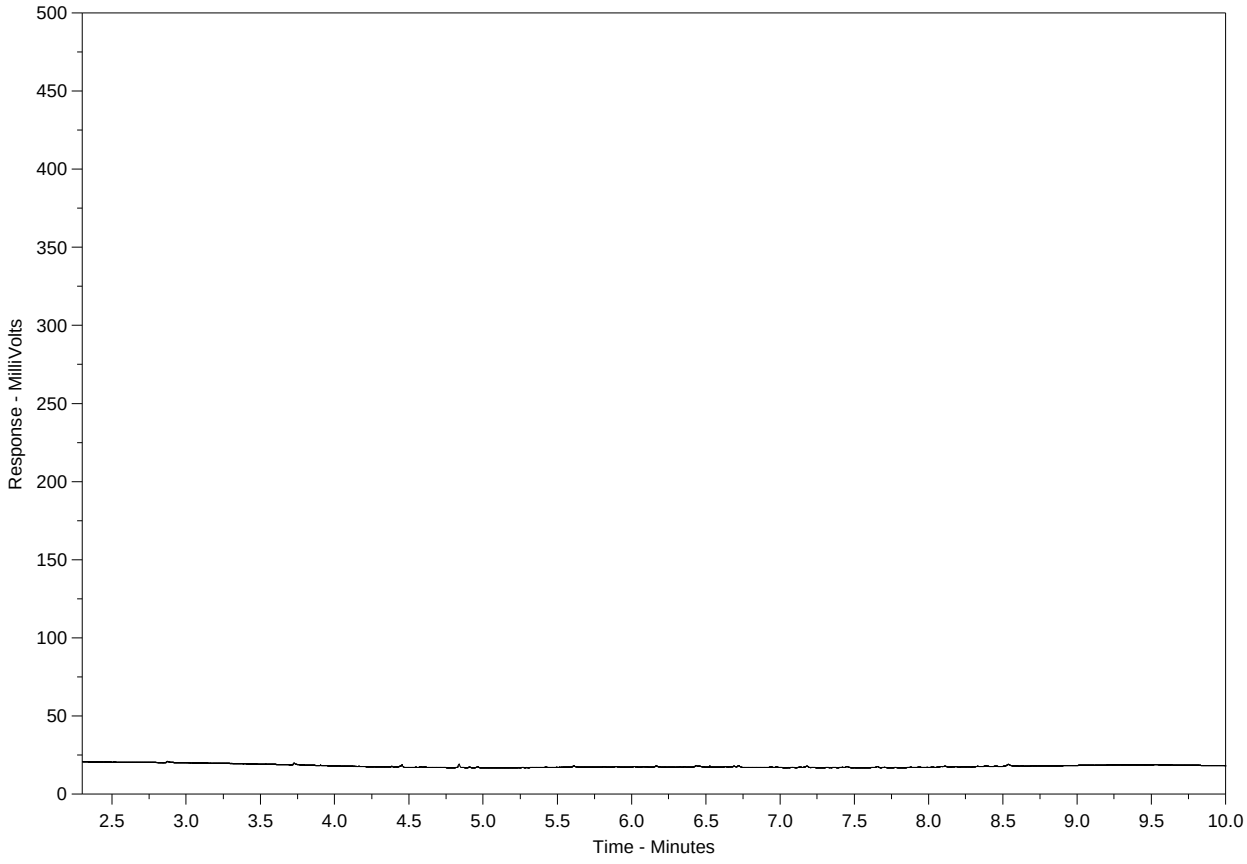
GLOSSARY OF REPORT TERMS

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.

Hydrocarbon Distribution Report

ALS Sample ID: L1515866-6
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.

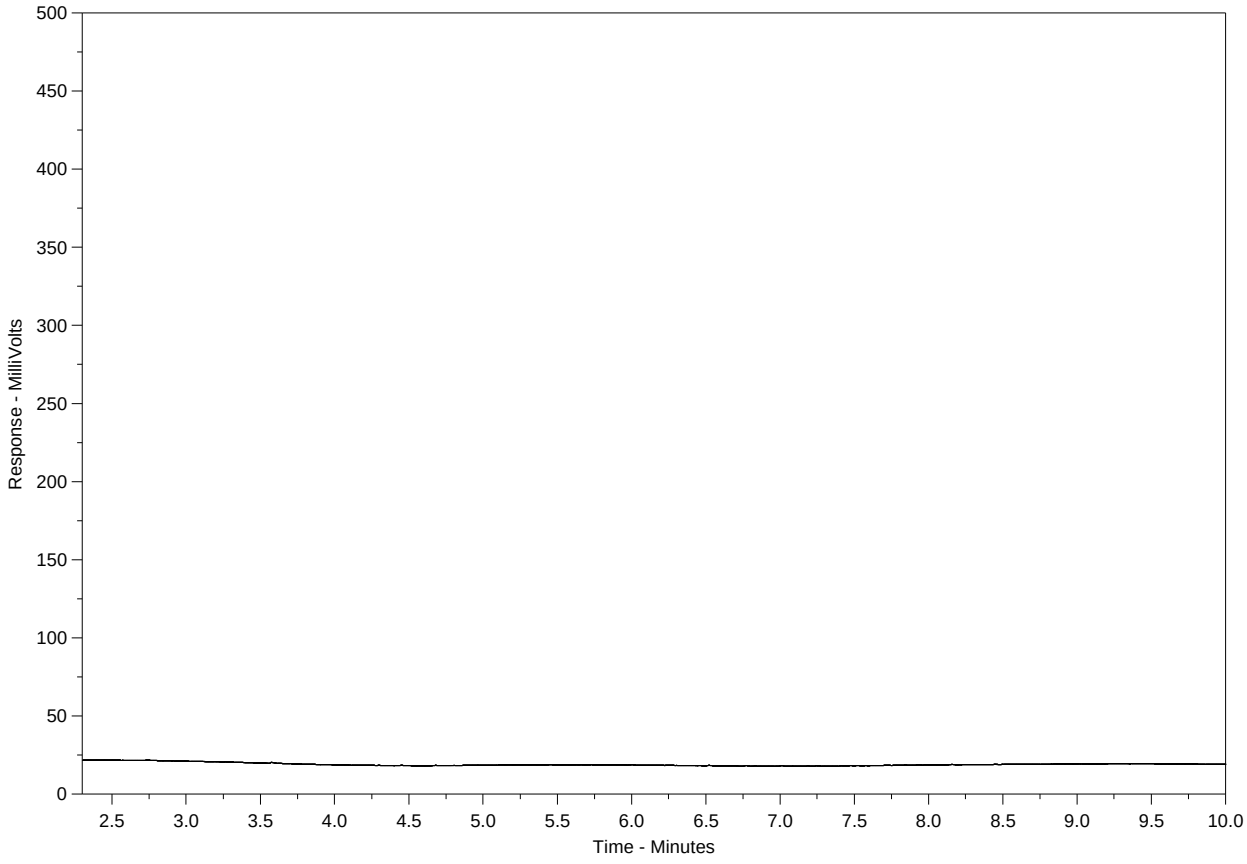
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-12
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.

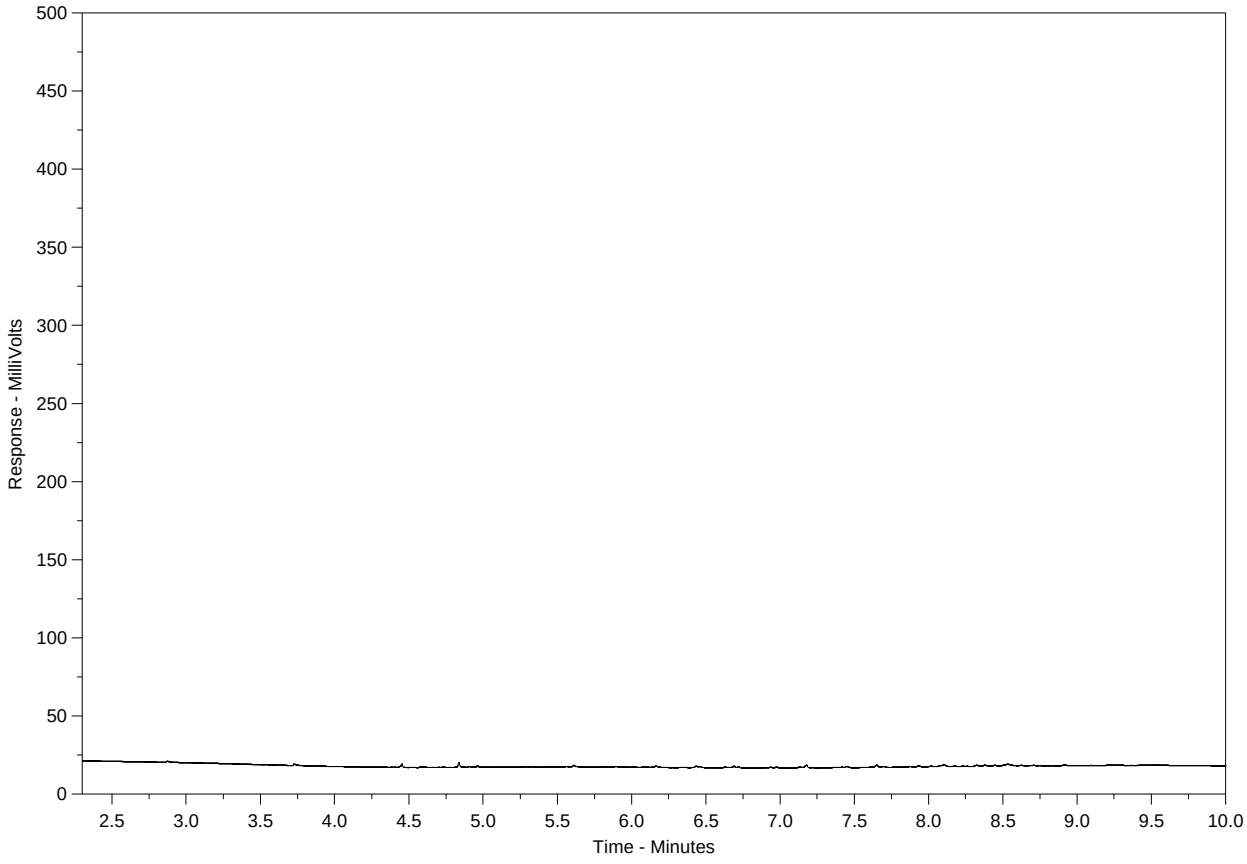
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-18
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.

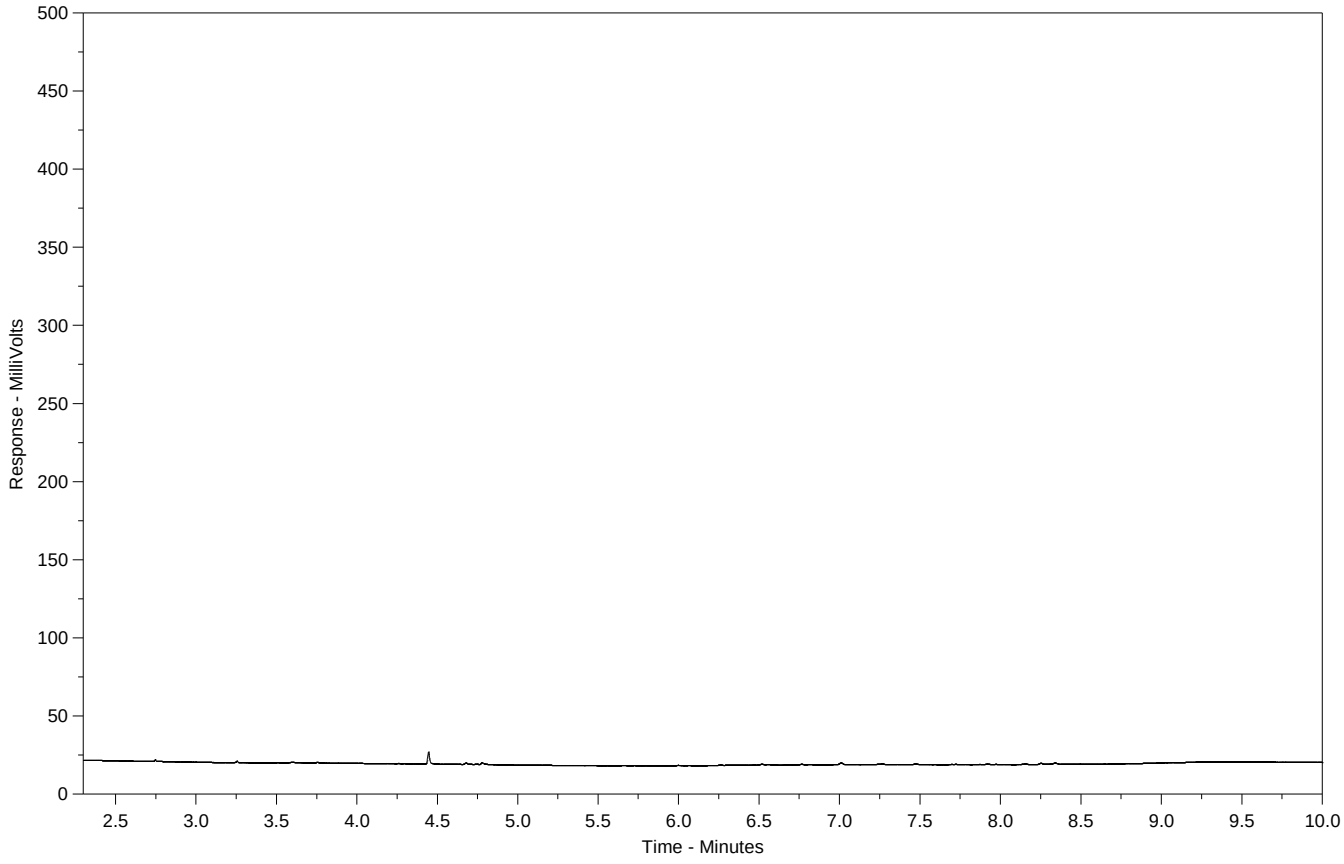
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-24
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.

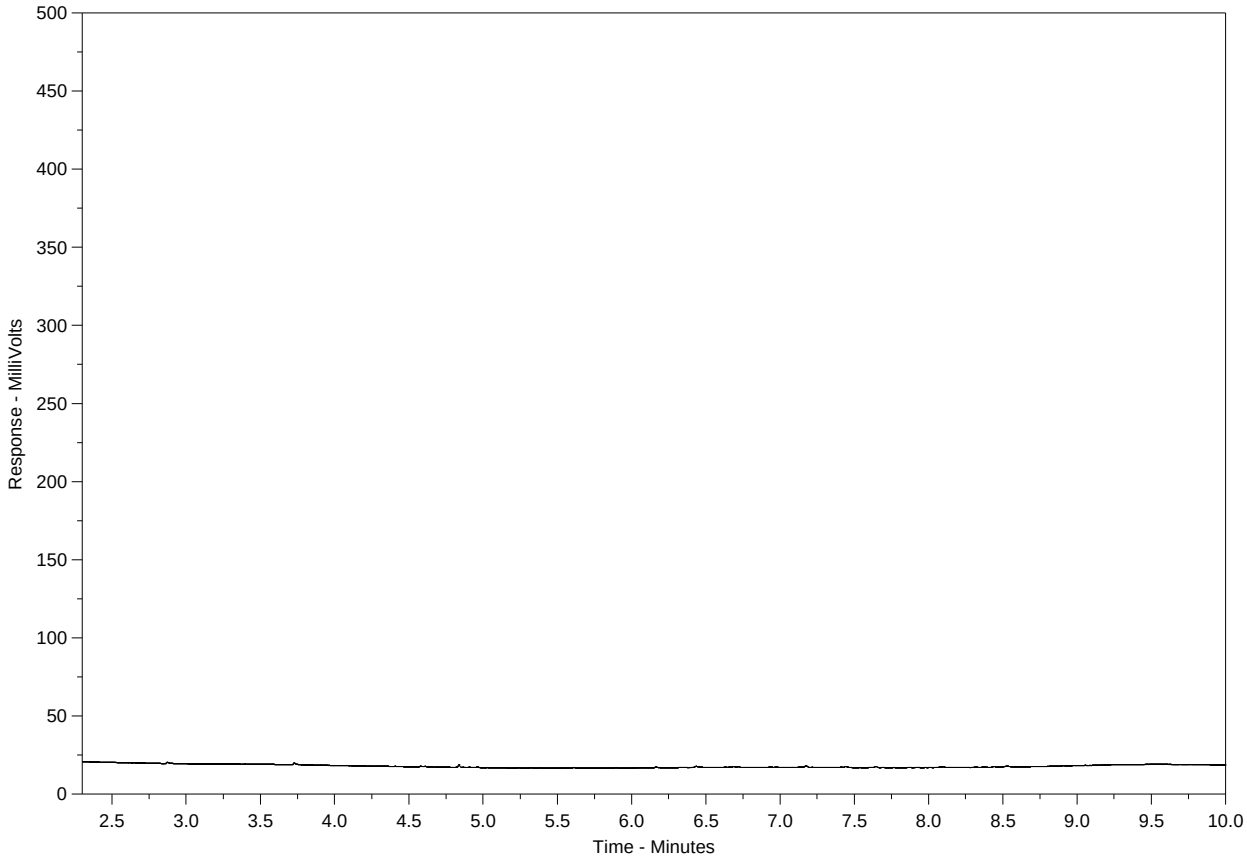
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-30
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.

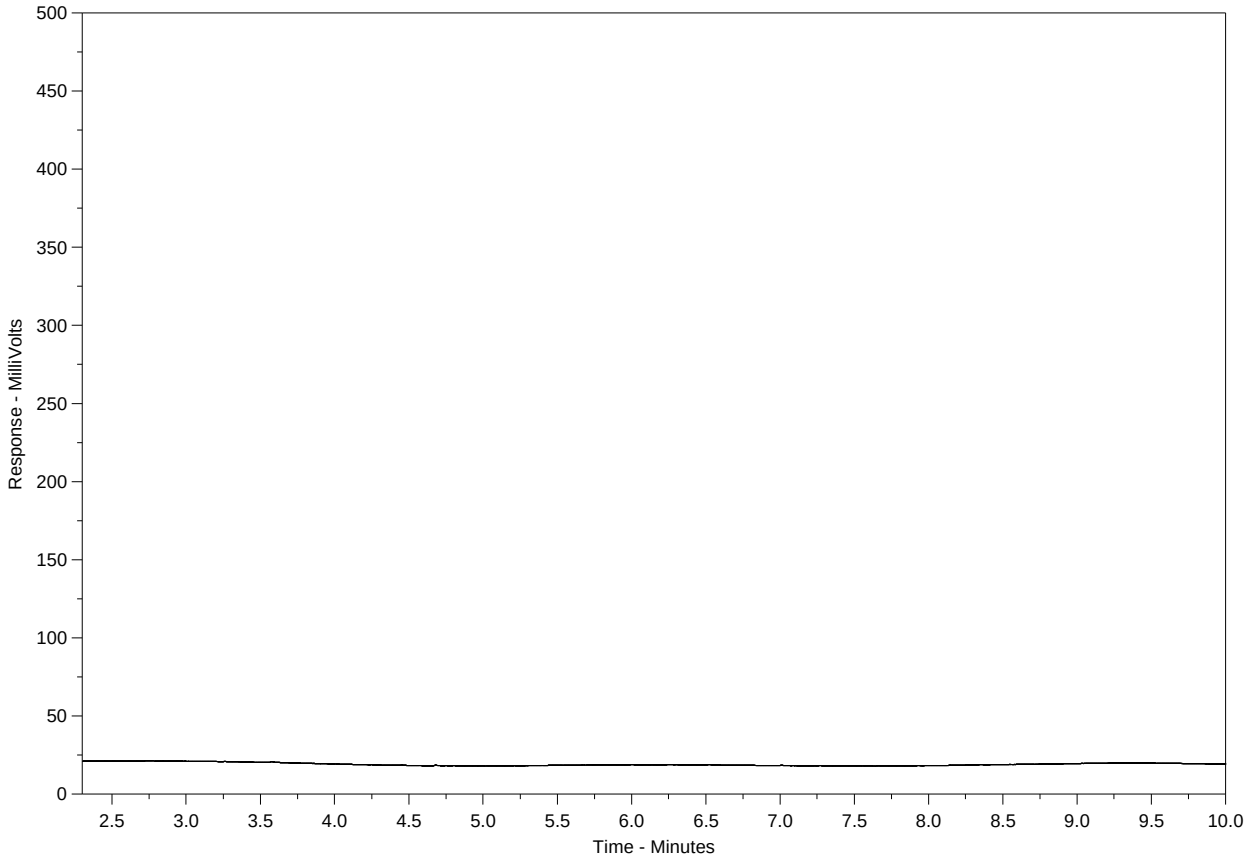
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: WG1949642-5#L1515866-30
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.

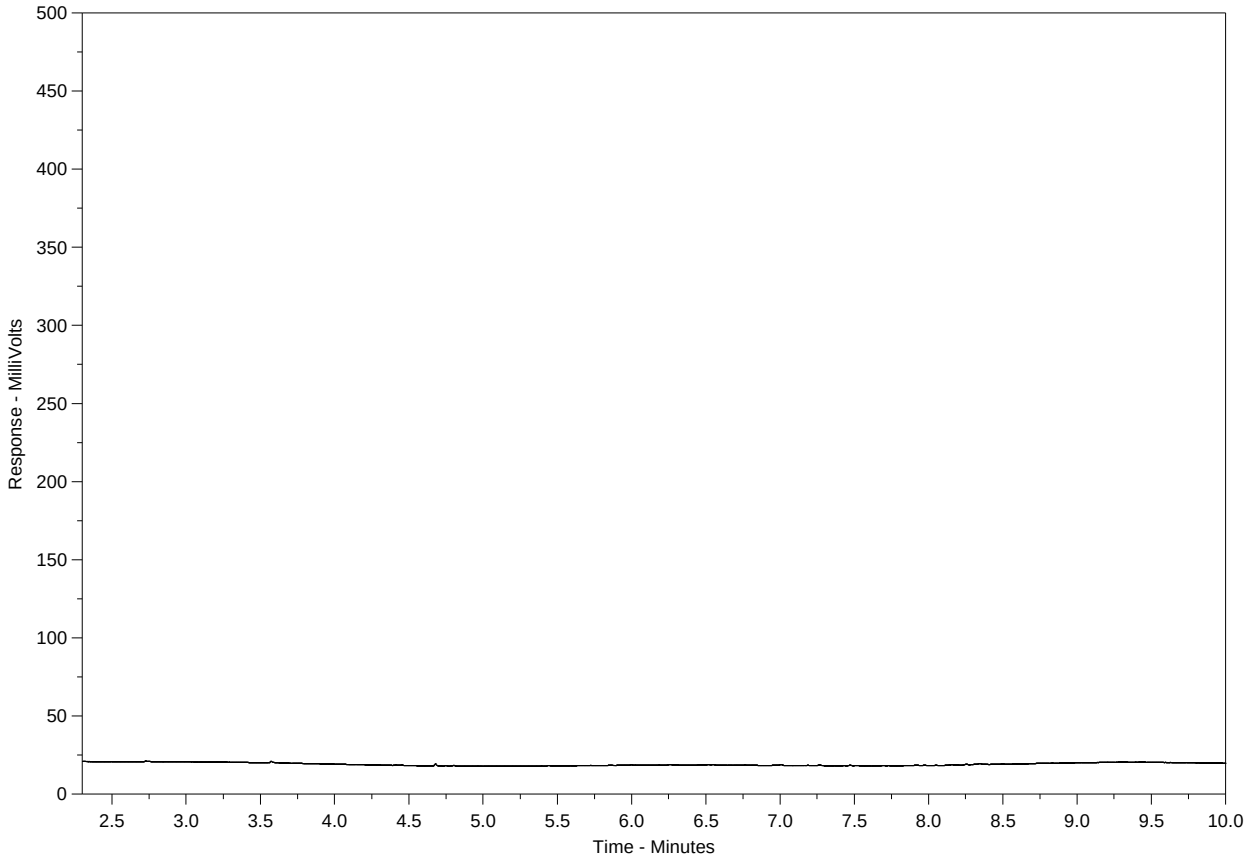
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-36
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.

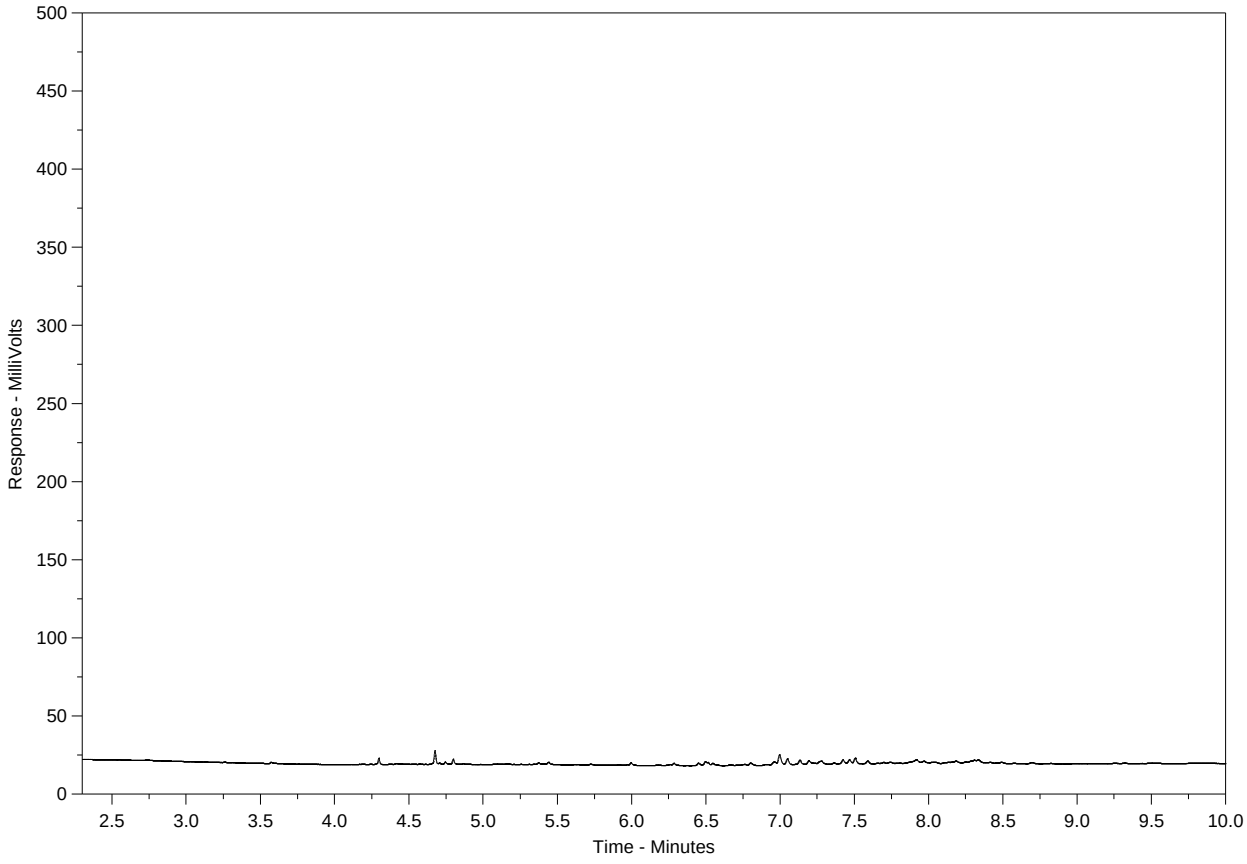
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-48
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.

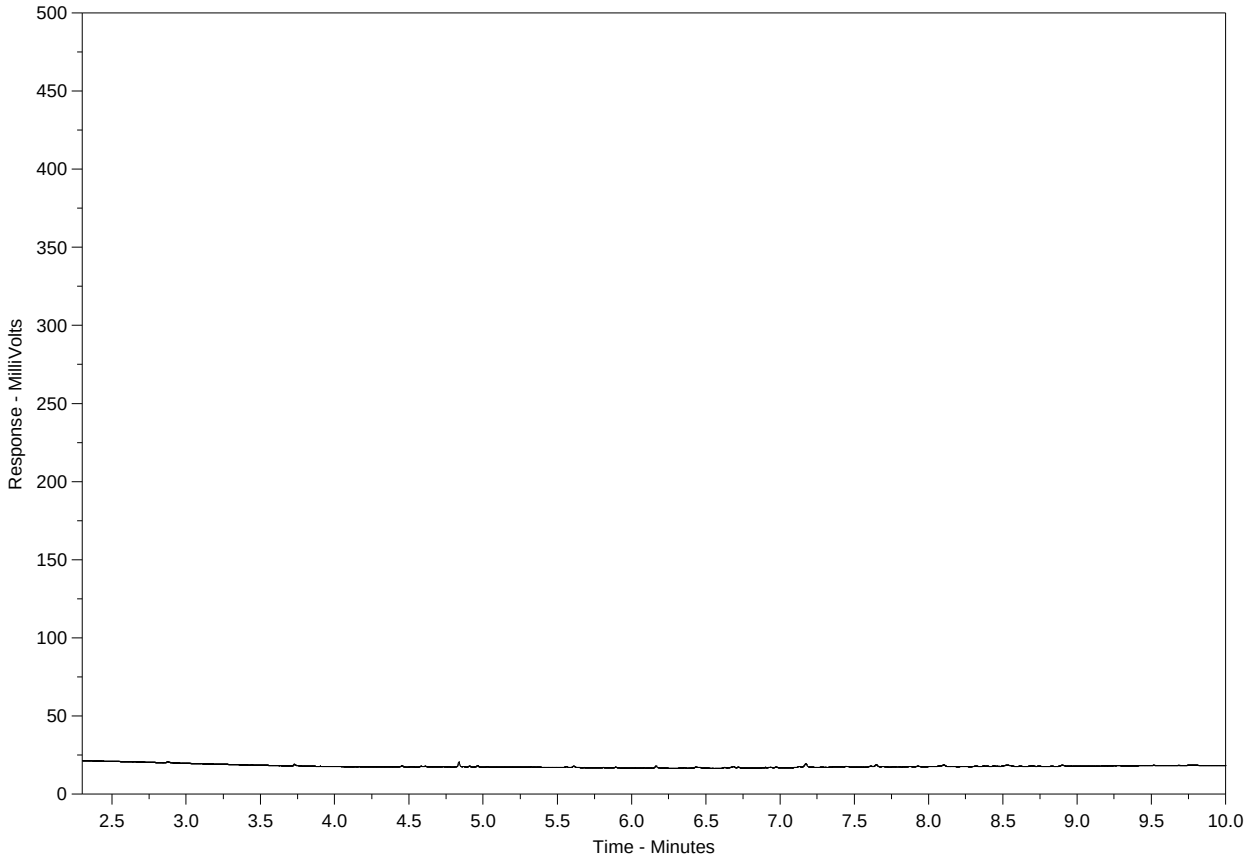
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-54
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.

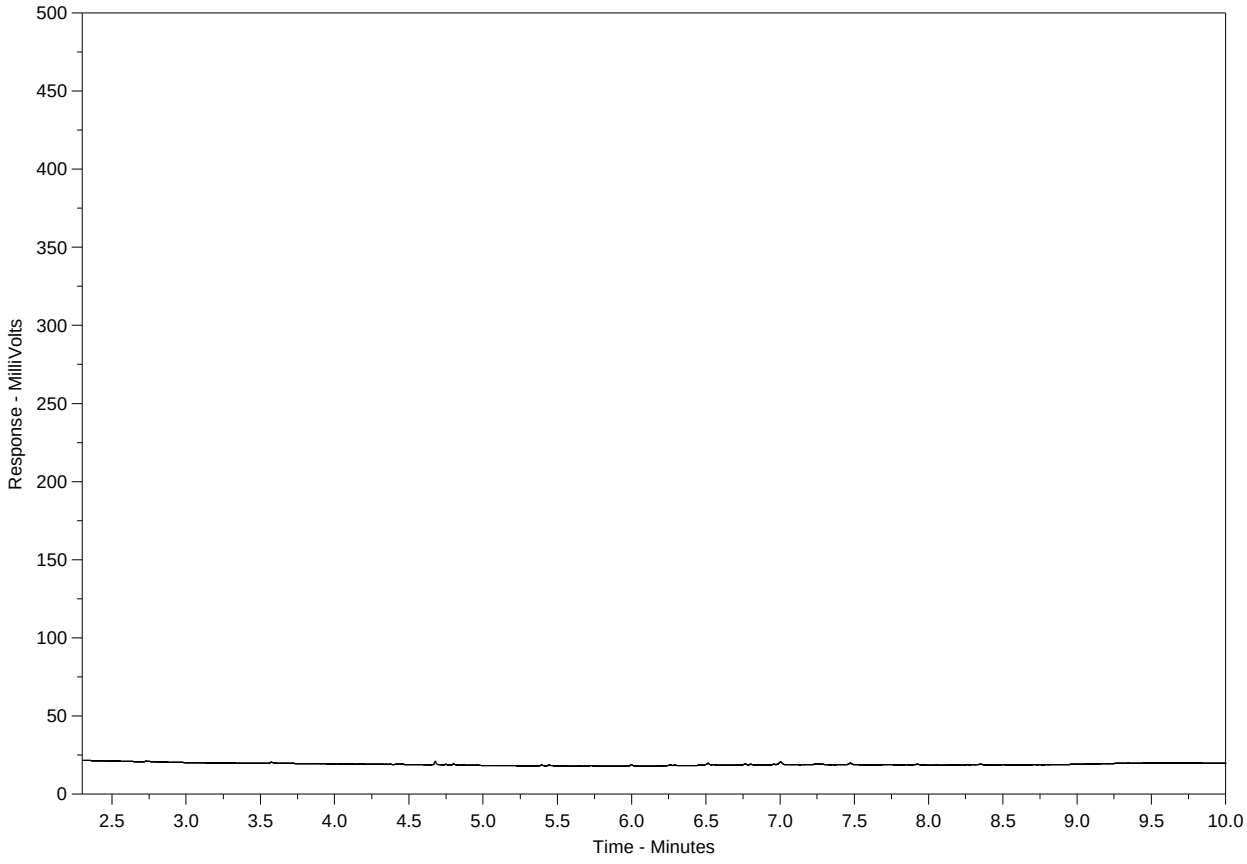
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-60
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.

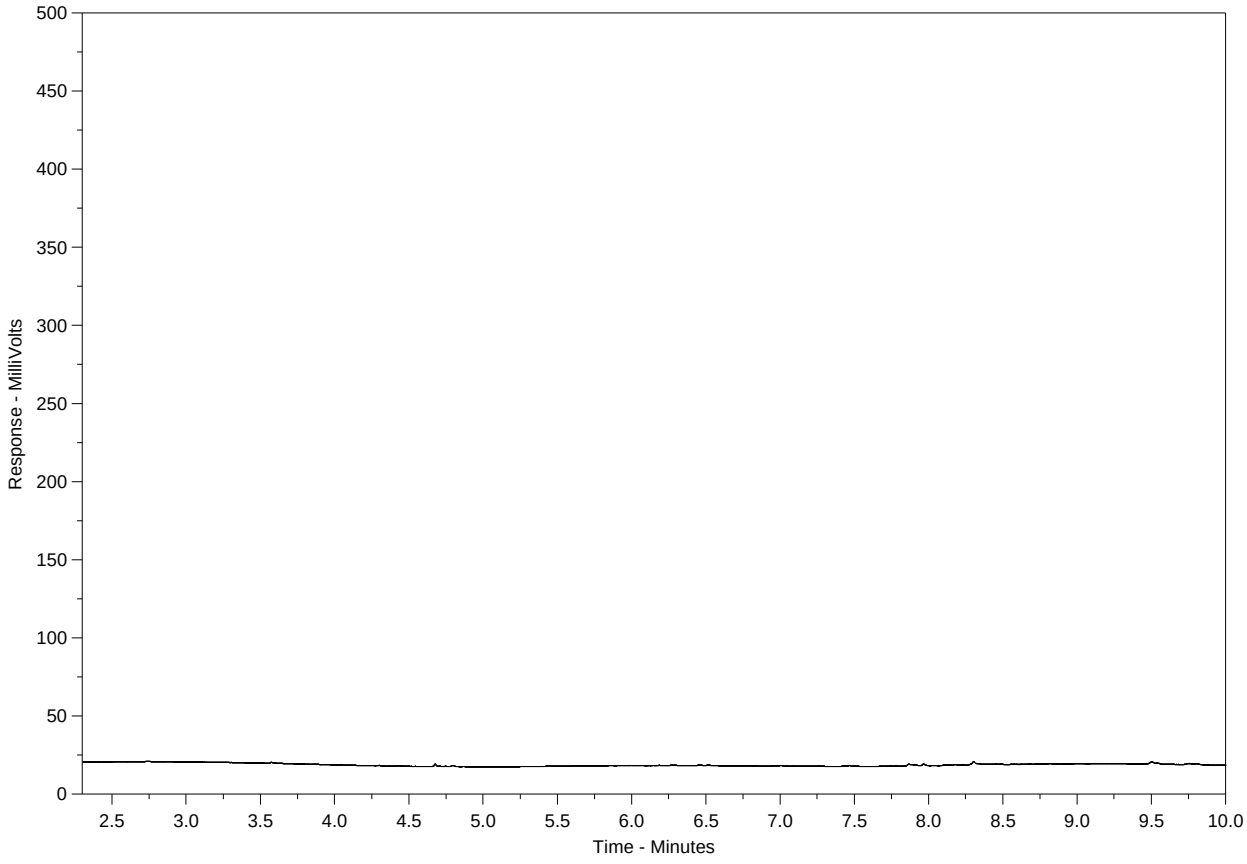
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-66
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.

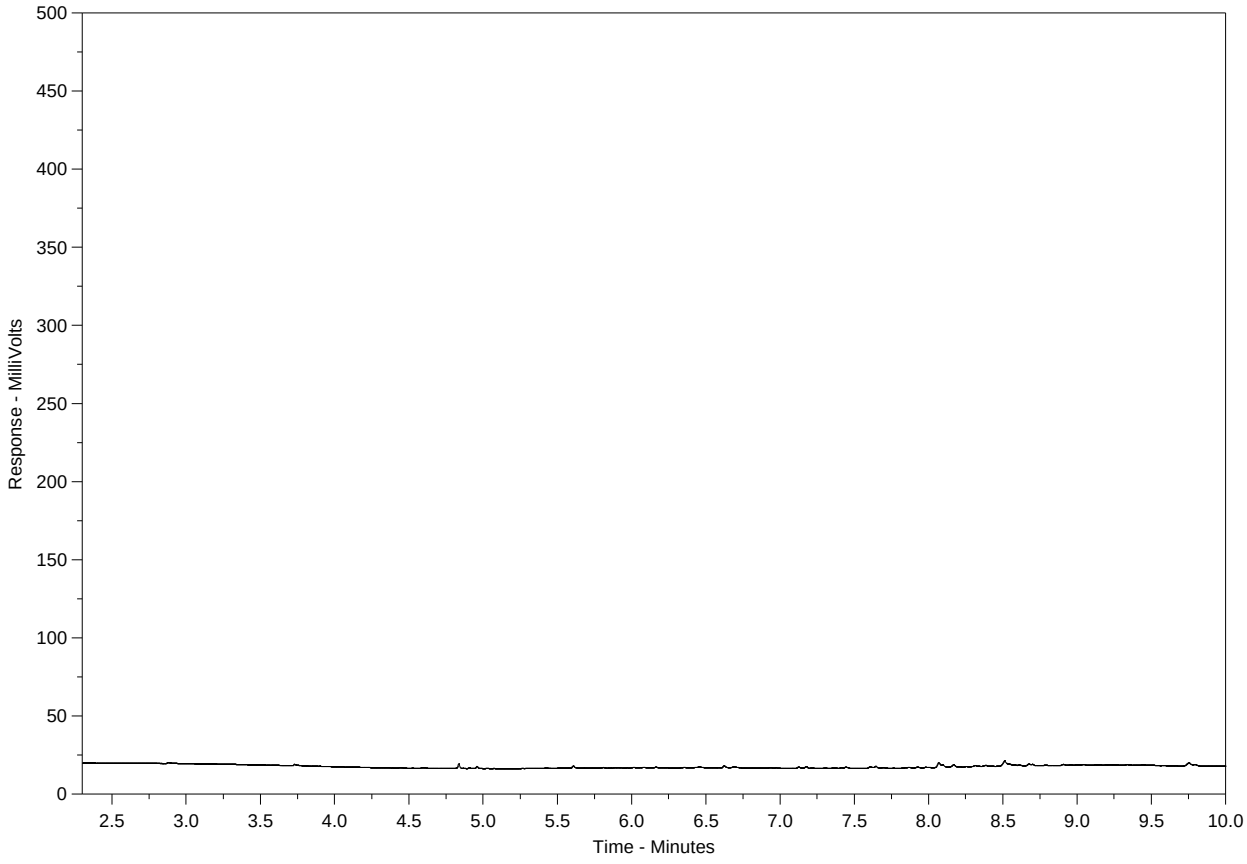
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-72
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.

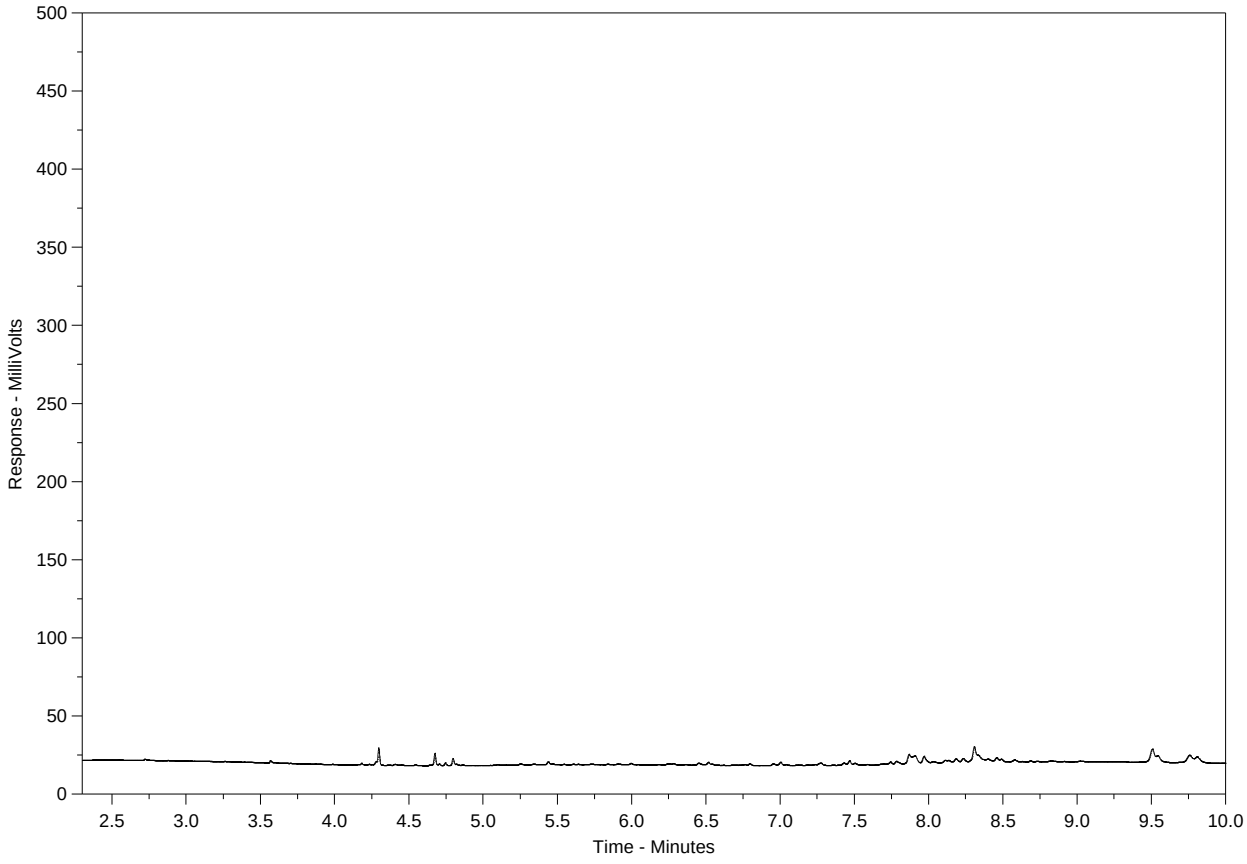
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-78
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.

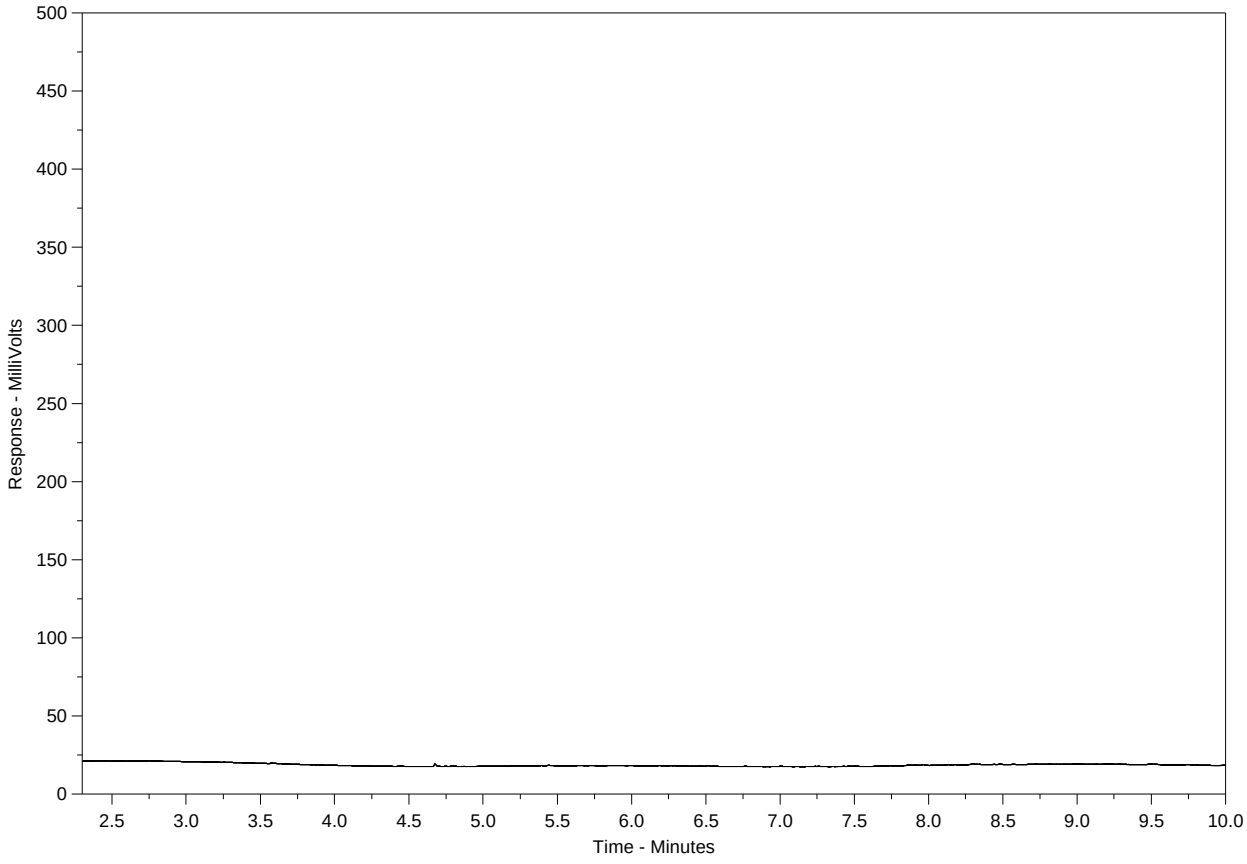
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1515866-84
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.

L1515866-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1410

Report To		Reporting		Service Requested
Company:	Azimuth	Distribution:	☐Fax ☐Mail ☑Email	⊕Regular (Standard Turnaround Times - Business Days) - R
Contact:	Morgan Finley	☐Ciriteria on Report (select from Guidelines below)		○Priority (3 Days) - surcharge will apply - P
Address:	304-2537 Beacon Avenue Sidney, British Columbia Canada, V8L1Y3	Report Type:	☑Excel ☑Digital	○Priority (2 Days) - surcharge will apply - P2
		Report Format:		○Emergency (1-2 day) -- surcharge will apply - E
		Report Email(s):	mfinley@azimuthgroup.ca gmann@azimuthgroup.ca efranz@azimuthgroup.ca	○Same Day or Weekend Emergency - surcharge will apply - E2
				○Specify date required - X
Phone:	7784260112 Fax:			
Invoice To	☑Email ☑Mail	EDD Format:		**Analysis Requests**
Company:	Azimuth	EDD Email(s):		
Contact:	Morgan Finley			
Address:	304-2537 Beacon Avenue Sidney, British Columbia Canada, V8L1Y3	**Project Info**		
		Job #:	Meadowbank CREMP 2014 Sediment	
		PO/AFE:		
Email:	mfinley@azimuthgroup.ca	LSD:	British Columbia	
Phone:	7784260112	Quote #:	Q38011	
Lab Work Order # (lab use only)	L1515866	ALS Contact:	Sampler:	

Sample #	Sample Identification (This will appear on the report)	Coordinates Longitude	Coordinates Latitude	Date	Time	Sample Type	Number of Containers	Total Metals, pH, Moisture	Grain Size, TOC	PAHs, LEPHs, HEPHs, Mineral Oil, Grease	Filter	Please indicate below Filtered, Preserved or both (F, P, F/P)
1	TPE-1			Aug 26	15 40	Soil/Sed/Waste	2	R	R			
2	TPE-2			"	"	Soil/Sed/Waste	2	R	R			
3	TPE-3			"	"	Soil/Sed/Waste	2	R	R			
4	TPE-4			"	"	Soil/Sed/Waste	2	R	R			
5	TPE-5			"	"	Soil/Sed/Waste	2	R	R			
6	TPE-COMP			"	"	Soil/Sed/Waste	1			R		
7	TPN-1			Aug 22		Soil/Sed/Waste	2	R	R			
8	TPN-2			"		Soil/Sed/Waste	2	R	R			

(See page 2 for further samples)

Short Holding Time
Rush Processing

Special Instructions/Comments	The questions below must be answered for water samples (check Yes or No)	Guidelines
	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
Morgan Finley	Sept 4		JL	Sept 10	11:30	15.8/°C				

15/15.2/13/12.5/14.9/13.3/14/12



L1515866-COFC

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1410

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	Grain Size, TOC	PAHs, LEPHs, HEPHs, Mineral Oil, Grease	Filter																
							Please indicate below Filtered, Preserved or both(F, P, F/P)																				
9	TPN-3			AUG 22		Soil/Sed/Waste	2	R	R																		
10	TPN-4			"		Soil/Sed/Waste	2	R	R																		
11	TPN-5			"		Soil/Sed/Waste	2	R	R																		
12	TPN-COMP			"		Soil/Sed/Waste	1			R																	
13	TPS-1			AUG 27	8.40	Soil/Sed/Waste	2	R	R																		
14	TPS-2			"	"	Soil/Sed/Waste	2	R	R																		
15	TPS-3			"	"	Soil/Sed/Waste	2	R	R																		
16	TPS-4			"	"	Soil/Sed/Waste	2	R	R																		
17	TPS-5			"	"	Soil/Sed/Waste	2	R	R																		
18	TPS-COMP			"	"	Soil/Sed/Waste	1			R																	
19	SP-1			SEPT 2	13:45	Soil/Sed/Waste	2	R	R																		
20	SP-2			"	"	Soil/Sed/Waste	2	R	R																		
21	SP-3			"	"	Soil/Sed/Waste	2	R	R																		
22	SP-4			"	"	Soil/Sed/Waste	2	R	R																		
23	SP-5			"	"	Soil/Sed/Waste	2	R	R																		
24	SP-COMP			"	"	Soil/Sed/Waste	1			R																	
25	TE-1			AUG 29	11:00	Soil/Sed/Waste	2	R	R																		
26	TE-2			"	"	Soil/Sed/Waste	2	R	R																		
27	TE-3			"	"	Soil/Sed/Waste	2	R	R																		
28	TE-4			"	"	Soil/Sed/Waste	2	R	R																		
29	TE-5			"	"	Soil/Sed/Waste	2	R	R																		
30	TE-COMP			"	"	Soil/Sed/Waste	1			R																	
31	TEFF-1			AUG 30		Soil/Sed/Waste	2	R	R																		
32	TEFF-2			"		Soil/Sed/Waste	2	R	R																		
33	TEFF-3			"		Soil/Sed/Waste	2	R	R																		
34	TEFF-4			"		Soil/Sed/Waste	2	R	R																		
35	TEFF-5			"		Soil/Sed/Waste	2	R	R																		

(See page 3 for further samples)

JM sept 10 11:30 15-8/15/15.2/13/12-5/14-9/13.3/14/12

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	Grain Size, TOC	PAHs, LEPHs, HEPHs, Mineral Oil, Grease	Filter														
							Please indicate below Filtered, Preserved or both(F, P, F/P)																		
36	TEFF-COMP			AUG 30		Soil/Sed/Waste	1			R															
37	DUP-1			AUG 26		Soil/Sed/Waste	2	R	R																
38	DUP-2			AUG 27		Soil/Sed/Waste	2	R	R																
39	DUP-3			AUG 25		Soil/Sed/Waste	2	R	R																
40	~~DUP-4~~					Soil/Sed/Waste	2	R	R																
40	DUP-5			AUG 29		Soil/Sed/Waste	2	R	R																
41	DUP-6			AUG 31		Soil/Sed/Waste	2	R	R																
42	DUP-7			AUG 31		Soil/Sed/Waste	2	R	R																
	~~DUP-8~~					Soil/Sed/Waste	2	R	R																
43	WAL-1			AUG 28	10:30	Soil/Sed/Waste	2	R	R																
44	WAL-2			"	"	Soil/Sed/Waste	2	R	R																
45	WAL-3			"	"	Soil/Sed/Waste	2	R	R																
46	WAL-4			"	"	Soil/Sed/Waste	2	R	R																
47	WAL-5			"	"	Soil/Sed/Waste	2	R	R																
48	WAL-COMP			"	"	Soil/Sed/Waste	1			R															
49	PDL-1			AUG 23		Soil/Sed/Waste	2	R	R																
50	PDL-2			"		Soil/Sed/Waste	2	R	R																
51	PDL-3			"		Soil/Sed/Waste	2	R	R																
52	PDL-4			"		Soil/Sed/Waste	2	R	R																
53	PDL-5			"		Soil/Sed/Waste	2	R	R																
54	PDL-COMP			"		Soil/Sed/Waste	1			R															
55	INUG-1			AUG 23		Soil/Sed/Waste	2	R	R																
56	INUG-2			"		Soil/Sed/Waste	2	R	R																
57	INUG-3			"		Soil/Sed/Waste	2	R	R																
58	INUG-4			"		Soil/Sed/Waste	2	R	R																
59	INUG-5			"		Soil/Sed/Waste	2	R	R																
60	INUG-COMP			"		Soil/Sed/Waste	1			R															

(See page 4 for further samples)

JH Sept 10 11:30 [5.8/15/15.2/13/12.5/14.9/13.3/14/12



L1515866-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1410

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	Grain Size, TOC	PAHs, LEPHs, HEPHs, Mineral Oil, Grease	Filter													
							Please indicate below Filtered, Preserved or both(F, P, F/P)																	
61	BBD-1			SEPT 1	11:20	Soil/Sed/Waste	2	R	R															
62	BBD-2			"	"	Soil/Sed/Waste	2	R	R															
63	BBD-3			"	"	Soil/Sed/Waste	2	R	R															
64	BBD-4			"	"	Soil/Sed/Waste	2	R	R															
65	BBD-5			"	"	Soil/Sed/Waste	2	R	R															
66	BBD-COMP			"	"	Soil/Sed/Waste	1			R														
67	BPJ-1			SEPT 1	745	Soil/Sed/Waste	2	R	R															
68	BPJ-2			"	"	Soil/Sed/Waste	2	R	R															
69	BPJ-3			"	"	Soil/Sed/Waste	2	R	R															
70	BPJ-4			"	"	Soil/Sed/Waste	2	R	R															
71	BPJ-5			"	"	Soil/Sed/Waste	2	R	R															
72	BPJ-COMP			"	"	Soil/Sed/Waste	1			R														
73	BAP-1			AUG 31	830	Soil/Sed/Waste	2	R	R															
74	BAP-2			"	"	Soil/Sed/Waste	2	R	R															
75	BAP-3			"	"	Soil/Sed/Waste	2	R	R															
76	BAP-4			"	"	Soil/Sed/Waste	2	R	R															
77	BAP-5			"	"	Soil/Sed/Waste	2	R	R															
78	BAP-COMP			"	"	Soil/Sed/Waste	1			R														
79	BES-1			AUG 31	1130	Soil/Sed/Waste	2	R	R															
80	BES-2			"	"	Soil/Sed/Waste	2	R	R															
81	BES-3			"	"	Soil/Sed/Waste	2	R	R															
82	BES-4			"	"	Soil/Sed/Waste	2	R	R															
83	BES-5			"	"	Soil/Sed/Waste	2	R	R															
84	BES-COMP			"	"	Soil/Sed/Waste	1			R														
85	FILTER SWIPE-1			AUG 26		Soil/Sed/Waste	1				R													
86	FILTER SWIPE-2			AUG 27		Soil/Sed/Waste	1				R													
87	FILTER SWIPE-3			AUG 28		Soil/Sed/Waste	1				R													

(See page 5 for further samples)

JH dept 10 11:30 15.8/15/15.2/13/12.5/14.9/13 3/14/12

L1515866-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1410

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	Grain Size, TOC	PAHs, LEPHs, HEPHs, Mineral Oil, Grease	Filter	Please indicate below Filtered, Preserved or both (F, P, F/P)
	~~FILTER SWIPE-4~~					Soil/Sed/Waste	1				R	
88	FILTER SWIPE-5			AUG 29		Soil/Sed/Waste	1				R	
89	FILTER SWIPE-6			AUG 31		Soil/Sed/Waste	1				R	
90	FILTER SWIPE-7			AUG 31		Soil/Sed/Waste	1				R	
	~~FILTER SWIPE-8~~					Soil/Sed/Waste	1				R	
91	TRN-5 DUP			AUG 22								
92	INUG-5 DUP			AUG 23								

JR Sept 10 11:30 15.8/15/15.2/13/12.5/14.9/15.3
14.1/12

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 10-SEP-14
Report Date: 25-SEP-14 10:44 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1515898

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK CREMP 2014 CORING
C of C Numbers:
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-1 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-1	L1515898-2 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-2	L1515898-3 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-3	L1515898-4 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-4	L1515898-5 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-5
SOIL						
Physical Tests	Moisture (%)	86.9	86.8	89.7	91.7	87.1
	pH (1:2 soil:water) (pH)	6.38	6.35	6.19	6.18	6.10
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.78	3.38	3.02	3.82	3.59
Metals	Aluminum (Al) (mg/kg)	28200	23500	26700	24500	25800
	Antimony (Sb) (mg/kg)	0.22	0.20	0.22	0.26	0.23
	Arsenic (As) (mg/kg)	14.9	16.1	17.2	20.5	19.5
	Barium (Ba) (mg/kg)	117	101	117	108	117
	Beryllium (Be) (mg/kg)	1.92	1.62	1.85	1.81	1.83
	Bismuth (Bi) (mg/kg)	2.47	1.99	2.28	2.29	2.32
	Cadmium (Cd) (mg/kg)	0.135	0.110	0.156	0.175	0.212
	Calcium (Ca) (mg/kg)	2140	1880	2030	2330	2270
	Chromium (Cr) (mg/kg)	134	105	127	146	144
	Cobalt (Co) (mg/kg)	13.5	14.9	16.0	16.0	17.4
	Copper (Cu) (mg/kg)	57.5	47.5	55.6	52.8	53.6
	Iron (Fe) (mg/kg)	37200	40400	43700	46400	45400
	Lead (Pb) (mg/kg)	22.4	18.6	21.4	21.1	20.5
	Lithium (Li) (mg/kg)	53.1	46.3	55.3	49.0	47.1
	Magnesium (Mg) (mg/kg)	11200	9570	11100	10900	11000
	Manganese (Mn) (mg/kg)	614	1170	1080	1440	1980
	Mercury (Hg) (mg/kg)	0.016	0.012	0.0150	0.0196	0.016
	Molybdenum (Mo) (mg/kg)	3.46	3.62	3.83	3.97	3.84
	Nickel (Ni) (mg/kg)	72.0	59.7	71.7	75.2	83.1
	Phosphorus (P) (mg/kg)	475	402	409	485	458
	Potassium (K) (mg/kg)	4960	4090	4750	4280	4380
	Selenium (Se) (mg/kg)	0.66	0.62	0.62	0.91	0.93
	Silver (Ag) (mg/kg)	0.11	<0.10	<0.10	0.13	<0.10
	Sodium (Na) (mg/kg)	190	150	170	170	170
	Strontium (Sr) (mg/kg)	19.3	17.0	19.0	19.4	19.2
	Thallium (Tl) (mg/kg)	0.383	0.335	0.402	0.371	0.403
	Tin (Sn) (mg/kg)	4.3	3.7	3.1	5.4	3.6
	Titanium (Ti) (mg/kg)	1090	958	1050	898	945
	Uranium (U) (mg/kg)	18.9	15.5	18.4	16.5	16.0
	Vanadium (V) (mg/kg)	48.0	39.4	46.6	44.1	43.7
	Zinc (Zn) (mg/kg)	130	99.1	114	108	109

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-6 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-6	L1515898-7 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-7	L1515898-8 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-8	L1515898-9 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-9	L1515898-10 Soil/Sed/Waste 26-AUG-14 14:50 TPE-SC-10
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	85.0	91.2	88.5	89.2	88.3
	pH (1:2 soil:water) (pH)	6.07	6.20	6.10	6.15	6.13
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.96	4.09	3.52	3.75	3.03
Metals	Aluminum (Al) (mg/kg)	25800	24900	26000	24400	24800
	Antimony (Sb) (mg/kg)	0.83	0.24	0.22	0.23	0.22
	Arsenic (As) (mg/kg)	12.5	16.2	18.3	17.5	22.6
	Barium (Ba) (mg/kg)	123	119	141	111	141
	Beryllium (Be) (mg/kg)	2.52	1.86	1.82	1.79	1.76
	Bismuth (Bi) (mg/kg)	3.18	2.38	2.37	2.23	2.31
	Cadmium (Cd) (mg/kg)	0.22	0.206	0.379	0.159	0.493
	Calcium (Ca) (mg/kg)	2040	2430	2290	2340	2230
	Chromium (Cr) (mg/kg)	96.3	113	108	135	120
	Cobalt (Co) (mg/kg)	16.0	15.7	17.1	16.2	25.2
	Copper (Cu) (mg/kg)	55.7	51.8	53.9	48.1	52.7
	Iron (Fe) (mg/kg)	37000	43300	47000	42700	66200
	Lead (Pb) (mg/kg)	22.3	20.3	20.1	20.1	19.2
	Lithium (Li) (mg/kg)	50	47.8	46.8	44.7	43.4
	Magnesium (Mg) (mg/kg)	9540	9830	9960	10400	9920
	Manganese (Mn) (mg/kg)	1070	1820	3790	1620	11900
	Mercury (Hg) (mg/kg)	<0.018	0.0174	0.016	0.017	0.012
	Molybdenum (Mo) (mg/kg)	4.9	3.75	3.90	3.64	4.57
	Nickel (Ni) (mg/kg)	75.4	75.5	112	71.5	159
	Phosphorus (P) (mg/kg)	370	427	414	399	421
	Potassium (K) (mg/kg)	4910	4630	4590	4100	4160
	Selenium (Se) (mg/kg)	0.93	1.06	1.00	0.92	0.97
	Silver (Ag) (mg/kg)	0.62	<0.10	<0.10	0.10	<0.10
	Sodium (Na) (mg/kg)	<400 DLIS	200	180	170	170
	Strontium (Sr) (mg/kg)	19.8	20.3	20.0	19.5	19.6
	Thallium (Tl) (mg/kg)	1.06	0.405	0.480	0.378	0.524
	Tin (Sn) (mg/kg)	<8.0 DLIS	3.8	3.5	3.3	3.8
	Titanium (Ti) (mg/kg)	1170	941	1020	923	936
	Uranium (U) (mg/kg)	18.7	16.1	16.6	14.7	15.9
	Vanadium (V) (mg/kg)	43.0	41.6	42.5	41.5	41.3
	Zinc (Zn) (mg/kg)	117	111	121	103	125

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1515898-11	L1515898-12	L1515898-13	L1515898-14	L1515898-15
	Description:	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste	Soil/Sed/Waste
	Sampled Date:	26-AUG-14	28-AUG-14	28-AUG-14	28-AUG-14	28-AUG-14
	Sampled Time:		16:20	16:20	16:20	16:20
	Client ID:	DUP-SC-1	TPE-B-SC-1	TPE-B-SC-2	TPE-B-SC-3	TPE-B-SC-4
SOIL						
Physical Tests	Moisture (%)	76.0	93.6	92.5	91.2	95.3
	pH (1:2 soil:water) (pH)	6.24	6.01	5.72	5.96	6.19
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.69	7.41	5.08	4.57	8.41
Metals	Aluminum (Al) (mg/kg)	31500	20000	26700	23100	19700
	Antimony (Sb) (mg/kg)	0.19	0.19	0.27	0.32	0.19
	Arsenic (As) (mg/kg)	11.9	8.37	19.5	16.9	6.56
	Barium (Ba) (mg/kg)	141	99.0	143	110	104
	Beryllium (Be) (mg/kg)	2.01	1.34	2.09	1.68	1.38
	Bismuth (Bi) (mg/kg)	2.94	1.42	2.44	2.18	1.51
	Cadmium (Cd) (mg/kg)	0.070	0.323	0.308	0.209	0.377
	Calcium (Ca) (mg/kg)	2010	2780	2290	2520	2860
	Chromium (Cr) (mg/kg)	109	113	115	122	77.2
	Cobalt (Co) (mg/kg)	15.0	8.62	10.5	15.7	7.42
	Copper (Cu) (mg/kg)	57.7	45.4	75.7	46.9	48.6
	Iron (Fe) (mg/kg)	43200	23500	50600	42700	20600
	Lead (Pb) (mg/kg)	24.0	14.6	20.7	21.3	15.9
	Lithium (Li) (mg/kg)	69.6	35.7	43.6	41.8	37.9
	Magnesium (Mg) (mg/kg)	12400	8660	9460	9640	7620
	Manganese (Mn) (mg/kg)	829	275	359	2020	263
	Mercury (Hg) (mg/kg)	0.0076	0.0361	0.0326	0.0295	0.0388
	Molybdenum (Mo) (mg/kg)	3.83	1.77	7.39	3.86	1.53
	Nickel (Ni) (mg/kg)	65.6	63.8	76.6	76.8	57.2
	Phosphorus (P) (mg/kg)	300	385	445	423	401
	Potassium (K) (mg/kg)	5890	3540	4470	4080	3600
	Selenium (Se) (mg/kg)	0.24	0.80	1.18	0.92	0.91
	Silver (Ag) (mg/kg)	<0.10	0.36	0.24	0.14	0.29
	Sodium (Na) (mg/kg)	190	190	210	200	200
	Strontium (Sr) (mg/kg)	20.1	19.9	19.7	20.5	20.5
	Thallium (Tl) (mg/kg)	0.454	0.271	0.371	0.380	0.299
	Tin (Sn) (mg/kg)	3.3	3.6	3.3	3.7	4.5
	Titanium (Ti) (mg/kg)	1300	818	1030	967	877
	Uranium (U) (mg/kg)	23.2	13.3	24.2	15.1	14.9
	Vanadium (V) (mg/kg)	53.6	32.9	45.3	40.1	29.6
	Zinc (Zn) (mg/kg)	132	95.4	130	115	92.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-16 Soil/Sed/Waste 28-AUG-14 16:20 TPE-B-SC-5	L1515898-17 Soil/Sed/Waste 28-AUG-14 16:20 TPE-B-SC-6	L1515898-18 Soil/Sed/Waste 28-AUG-14 16:20 TPE-B-SC-7	L1515898-19 Soil/Sed/Waste 28-AUG-14 16:20 TPE-B-SC-8	L1515898-20 Soil/Sed/Waste 28-AUG-14 16:20 TPE-B-SC-9
Sample ID / **Description** / **Sampled Date** / **Sampled Time** / **Client ID**						
SOIL						
Physical Tests	Moisture (%)	92.6	88.5	92.6	89.5	88.1
	pH (1:2 soil:water) (pH)	6.38	6.22	6.19	6.26	6.20
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.10	3.00	4.17	3.18	3.77
Metals	Aluminum (Al) (mg/kg)	23600	25600	23100	25100	21900
	Antimony (Sb) (mg/kg)	0.30	0.22	0.23	0.27	0.26
	Arsenic (As) (mg/kg)	9.52	13.0	14.6	20.6	19.3
	Barium (Ba) (mg/kg)	137	122	135	127	105
	Beryllium (Be) (mg/kg)	1.57	1.77	1.58	1.79	1.58
	Bismuth (Bi) (mg/kg)	1.81	2.33	2.15	2.39	2.28
	Cadmium (Cd) (mg/kg)	0.450	0.184	0.488	0.285	0.140
	Calcium (Ca) (mg/kg)	2710	2010	2190	1950	2240
	Chromium (Cr) (mg/kg)	108	102	109	130	108
	Cobalt (Co) (mg/kg)	8.99	13.5	14.5	19.0	14.6
	Copper (Cu) (mg/kg)	50.1	51.6	49.5	53.2	44.9
	Iron (Fe) (mg/kg)	26100	37200	42800	58700	49900
	Lead (Pb) (mg/kg)	16.7	20.4	21.1	20.9	20.8
	Lithium (Li) (mg/kg)	40.9	45.6	42.2	43.6	41.0
	Magnesium (Mg) (mg/kg)	8880	9290	9030	9990	8580
	Manganese (Mn) (mg/kg)	293	2210	5690	5050	7310
	Mercury (Hg) (mg/kg)	0.0234	0.0162	0.0222	0.0176	0.0221
	Molybdenum (Mo) (mg/kg)	3.43	3.56	3.96	4.56	4.37
	Nickel (Ni) (mg/kg)	67.4	65.5	117	93.4	65.9
	Phosphorus (P) (mg/kg)	375	425	359	407	425
	Potassium (K) (mg/kg)	4330	4840	4240	4430	3950
	Selenium (Se) (mg/kg)	0.95	0.89	0.93	1.04	1.03
	Silver (Ag) (mg/kg)	0.27	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	210	220	190	190	180
	Strontium (Sr) (mg/kg)	21.0	19.2	19.5	18.1	19.3
	Thallium (Tl) (mg/kg)	0.546	0.416	0.458	0.413	0.321
	Tin (Sn) (mg/kg)	3.5	3.3	3.1	3.3	4.6
	Titanium (Ti) (mg/kg)	947	1050	874	1000	871
	Uranium (U) (mg/kg)	17.1	16.7	15.5	16.8	14.6
	Vanadium (V) (mg/kg)	38.0	42.2	38.4	43.1	37.1
	Zinc (Zn) (mg/kg)	112	111	116	117	101

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-21 Soil/Sed/Waste 28-AUG-14 16:20 TPE-B-SC-10	L1515898-22 Soil/Sed/Waste 28-AUG-14 16:20 DUP-SC-2	L1515898-23 Soil/Sed/Waste 26-AUG-14 11:40 TPN-SC-1	L1515898-25 Soil/Sed/Waste 26-AUG-14 11:40 TPN-SC-3	L1515898-27 Soil/Sed/Waste 26-AUG-14 11:40 TPN-SC-5
SOIL						
Physical Tests	Moisture (%)	89.4	92.6	86.0	67.9	78.8
	pH (1:2 soil:water) (pH)	6.26	6.22	6.12	6.05	6.10
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.94	5.92	3.54	1.20	2.01
Metals	Aluminum (Al) (mg/kg)	24200	22600	17500	11400	12200
	Antimony (Sb) (mg/kg)	0.26	0.16	0.20	<0.10	<0.10
	Arsenic (As) (mg/kg)	17.2	7.92	9.34	6.62	5.05
	Barium (Ba) (mg/kg)	108	123	67.6	41.8	43.0
	Beryllium (Be) (mg/kg)	1.67	1.45	1.08	0.60	0.63
	Bismuth (Bi) (mg/kg)	2.26	1.51	1.11	0.64	0.64
	Cadmium (Cd) (mg/kg)	0.140	0.296	0.076	<0.050	<0.050
	Calcium (Ca) (mg/kg)	2370	2740	1800	1050	1120
	Chromium (Cr) (mg/kg)	136	110	118	66.4	94.7
	Cobalt (Co) (mg/kg)	16.2	8.86	9.09	6.52	6.70
	Copper (Cu) (mg/kg)	49.0	44.4	47.7	23.4	23.5
	Iron (Fe) (mg/kg)	44700	24800	24000	18500	17500
	Lead (Pb) (mg/kg)	20.4	15.4	15.1	8.00	8.12
	Lithium (Li) (mg/kg)	44.0	42.4	29.3	21.7	23.1
	Magnesium (Mg) (mg/kg)	10200	9070	8280	5540	6520
	Manganese (Mn) (mg/kg)	1480	285	249	248	199
	Mercury (Hg) (mg/kg)	0.0162	0.0221	0.0132	<0.0050	0.0064
	Molybdenum (Mo) (mg/kg)	3.87	1.65	2.00	1.37	0.94
	Nickel (Ni) (mg/kg)	70.8	64.2	57.0	35.6	44.7
	Phosphorus (P) (mg/kg)	391	402	568	161	233
	Potassium (K) (mg/kg)	4310	4230	2560	1750	1800
	Selenium (Se) (mg/kg)	0.92	0.73	0.50	<0.20	0.23
	Silver (Ag) (mg/kg)	<0.10	0.29	0.13	<0.10	<0.10
	Sodium (Na) (mg/kg)	190	230	130	<100	<100
	Strontium (Sr) (mg/kg)	19.9	21.4	16.8	11.8	11.3
	Thallium (Tl) (mg/kg)	0.377	0.307	0.190	0.118	0.122
	Tin (Sn) (mg/kg)	3.8	4.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	973	960	530	463	452
	Uranium (U) (mg/kg)	16.5	14.7	14.0	7.33	7.60
	Vanadium (V) (mg/kg)	41.7	35.2	34.6	20.0	20.6
	Zinc (Zn) (mg/kg)	109	95.6	73.8	48.0	50.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-29 Soil/Sed/Waste 26-AUG-14 11:40 TPN-SC-7	L1515898-31 Soil/Sed/Waste 26-AUG-14 11:40 TPN-SC-9	L1515898-33 Soil/Sed/Waste 02-SEP-14 13:45 DUP-SC-3	L1515898-34 Soil/Sed/Waste 27-AUG-14 08:10 TPS-SC-1	L1515898-35 Soil/Sed/Waste 27-AUG-14 08:10 TPS-SC-2
SOIL						
Physical Tests	Moisture (%)	86.0	42.3	87.1	93.1	91.3
	pH (1:2 soil:water) (pH)	6.21	6.34	6.07	6.08	5.96
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.12	0.65	4.88	5.71	4.49
Metals	Aluminum (Al) (mg/kg)	20300	12300	26100	22200	24900
	Antimony (Sb) (mg/kg)	0.19	<0.10	0.35	0.38	0.29
	Arsenic (As) (mg/kg)	19.4	4.89	29.3	46.4	20.1
	Barium (Ba) (mg/kg)	82.1	47.3	126	103	108
	Beryllium (Be) (mg/kg)	1.23	0.64	1.93	1.68	1.75
	Bismuth (Bi) (mg/kg)	1.33	0.62	2.29	1.74	1.80
	Cadmium (Cd) (mg/kg)	0.068	<0.050	0.207	1.10	0.251
	Calcium (Ca) (mg/kg)	1580	963	2650	2110	1890
	Chromium (Cr) (mg/kg)	125	67.4	97.0	113	123
	Cobalt (Co) (mg/kg)	16.2	7.17	15.9	31.0	21.4
	Copper (Cu) (mg/kg)	53.0	20.9	69.6	76.4	72.6
	Iron (Fe) (mg/kg)	38300	18400	56100	48600	38700
	Lead (Pb) (mg/kg)	16.2	7.55	22.4	30.8	22.5
	Lithium (Li) (mg/kg)	36.4	26.8	43.5	34.6	39.7
	Magnesium (Mg) (mg/kg)	9330	6120	9590	9060	10200
	Manganese (Mn) (mg/kg)	989	277	3220	1560	1290
	Mercury (Hg) (mg/kg)	0.0096	<0.0050	0.0348	0.0318	0.0208
	Molybdenum (Mo) (mg/kg)	2.85	0.86	5.46	6.24	4.99
	Nickel (Ni) (mg/kg)	61.4	40.8	67.0	109	80.5
	Phosphorus (P) (mg/kg)	430	179	567	628	617
	Potassium (K) (mg/kg)	3200	1910	4490	3460	4000
	Selenium (Se) (mg/kg)	0.38	<0.20	0.83	1.19	1.03
	Silver (Ag) (mg/kg)	<0.10	<0.10	0.21	0.25	0.18
	Sodium (Na) (mg/kg)	130	<100	190	170	170
	Strontium (Sr) (mg/kg)	16.0	10.2	23.3	18.5	18.1
	Thallium (Tl) (mg/kg)	0.237	0.138	0.386	0.412	0.342
	Tin (Sn) (mg/kg)	2.3	<2.0	5.5	3.1	3.1
	Titanium (Ti) (mg/kg)	635	494	727	600	701
	Uranium (U) (mg/kg)	16.4	6.60	18.5	19.3	20.3
	Vanadium (V) (mg/kg)	36.8	20.1	40.1	41.0	44.6
	Zinc (Zn) (mg/kg)	82.9	53.5	110	129	108

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-36 Soil/Sed/Waste 27-AUG-14 08:10 TPS-SC-3	L1515898-37 Soil/Sed/Waste 27-AUG-14 08:10 TPS-SC-4	L1515898-38 Soil/Sed/Waste 27-AUG-14 08:10 TPS-SC-5	L1515898-39 Soil/Sed/Waste 02-SEP-14 13:45 SP-SC-1	L1515898-41 Soil/Sed/Waste 02-SEP-14 13:45 SP-SC-3
SOIL						
Physical Tests	Moisture (%)	88.8	87.1	83.3	88.8	89.9
	pH (1:2 soil:water) (pH)	5.95	5.96	5.64	5.99	6.08
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.00	3.96	3.45	4.69	3.87
Metals	Aluminum (Al) (mg/kg)	25200	21200	17600	26700	28600
	Antimony (Sb) (mg/kg)	0.25	0.19	0.18	0.33	0.22
	Arsenic (As) (mg/kg)	62.4	9.96	8.95	41.3	14.0
	Barium (Ba) (mg/kg)	106	98.4	75.0	127	134
	Beryllium (Be) (mg/kg)	1.71	1.30	1.16	2.03	2.11
	Bismuth (Bi) (mg/kg)	1.97	1.27	1.00	2.28	2.34
	Cadmium (Cd) (mg/kg)	0.171	0.110	0.193	0.255	0.188
	Calcium (Ca) (mg/kg)	1770	2120	1570	2650	2470
	Chromium (Cr) (mg/kg)	128	105	80.8	90.5	85.9
	Cobalt (Co) (mg/kg)	18.5	12.1	9.37	14.2	12.0
	Copper (Cu) (mg/kg)	77.5	49.1	41.3	73.4	71.1
	Iron (Fe) (mg/kg)	55600	26800	22500	70700	37000
	Lead (Pb) (mg/kg)	23.3	17.8	15.6	22.8	21.7
	Lithium (Li) (mg/kg)	41.2	35.3	31.8	44.1	50.6
	Magnesium (Mg) (mg/kg)	10300	9150	7620	9550	9960
	Manganese (Mn) (mg/kg)	1080	484	278	2630	654
	Mercury (Hg) (mg/kg)	0.0151	0.016	0.0130	0.0326	0.0266
	Molybdenum (Mo) (mg/kg)	7.46	1.55	2.27	7.60	4.57
	Nickel (Ni) (mg/kg)	74.6	65.5	51.0	64.0	68.1
	Phosphorus (P) (mg/kg)	821	635	393	644	496
	Potassium (K) (mg/kg)	4020	3480	2930	4590	4900
	Selenium (Se) (mg/kg)	0.81	0.62	0.41	0.81	0.50
	Silver (Ag) (mg/kg)	0.12	0.16	0.11	0.20	0.14
	Sodium (Na) (mg/kg)	160	150	130	210	200
	Strontium (Sr) (mg/kg)	17.0	17.9	14.0	23.6	22.0
	Thallium (Tl) (mg/kg)	0.306	0.246	0.228	0.369	0.398
	Tin (Sn) (mg/kg)	2.6	2.2	<2.0	4.5	4.9
	Titanium (Ti) (mg/kg)	718	794	686	741	854
	Uranium (U) (mg/kg)	21.0	14.8	11.7	19.1	21.3
	Vanadium (V) (mg/kg)	45.5	36.6	31.3	41.0	41.8
	Zinc (Zn) (mg/kg)	106	90.1	81.9	114	132

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-43 Soil/Sed/Waste 02-SEP-14 13:45 SP-SC-5	L1515898-45 Soil/Sed/Waste 02-SEP-14 13:45 SP-SC-7	L1515898-47 Soil/Sed/Waste 02-SEP-14 13:45 SP-SC-9	L1515898-49 Soil/Sed/Waste 28-AUG-14 DUP-SC-4	L1515898-50 Soil/Sed/Waste 29-AUG-14 TE-SC-1
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	88.8	89.0	86.3	93.7	70.8
	pH (1:2 soil:water) (pH)	6.07	6.13	5.90	7.11	6.16
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.59	5.05	4.40	13.8	1.39
Metals	Aluminum (Al) (mg/kg)	23600	26000	25600	9090	13900
	Antimony (Sb) (mg/kg)	0.29	0.31	0.31	0.21	0.10
	Arsenic (As) (mg/kg)	37.4	28.0	31.2	21.7	5.63
	Barium (Ba) (mg/kg)	117	120	141	48.5	64.2
	Beryllium (Be) (mg/kg)	1.86	2.03	1.92	0.70	1.11
	Bismuth (Bi) (mg/kg)	2.17	2.30	2.23	0.80	1.23
	Cadmium (Cd) (mg/kg)	0.214	0.167	0.345	0.218	0.081
	Calcium (Ca) (mg/kg)	2270	2810	2470	3030	1520
	Chromium (Cr) (mg/kg)	75.6	86.8	86.0	26.6	33.6
	Cobalt (Co) (mg/kg)	18.6	13.7	17.3	4.29	5.64
	Copper (Cu) (mg/kg)	70.8	70.6	71.4	65.1	31.2
	Iron (Fe) (mg/kg)	78700	53900	65400	16800	21200
	Lead (Pb) (mg/kg)	21.6	22.9	22.6	15.5	13.0
	Lithium (Li) (mg/kg)	40.7	44.4	44.2	15.4	28.7
	Magnesium (Mg) (mg/kg)	8480	9490	9200	3460	5240
	Manganese (Mn) (mg/kg)	2950	1720	5710	139	284
	Mercury (Hg) (mg/kg)	0.0299	0.0338	0.0358	0.0765	0.0126
	Molybdenum (Mo) (mg/kg)	6.31	5.48	6.59	4.40	2.23
	Nickel (Ni) (mg/kg)	56.7	58.0	70.5	26.7	23.2
	Phosphorus (P) (mg/kg)	564	586	593	599	435
	Potassium (K) (mg/kg)	3880	4430	4450	1690	2770
	Selenium (Se) (mg/kg)	0.87	0.88	0.98	0.50	0.28
	Silver (Ag) (mg/kg)	0.17	0.20	0.22	0.28	<0.10
	Sodium (Na) (mg/kg)	160	200	210	110	110
	Strontium (Sr) (mg/kg)	19.1	23.2	22.7	18.7	12.5
	Thallium (Tl) (mg/kg)	0.336	0.369	0.381	0.140	0.241
	Tin (Sn) (mg/kg)	7.9	6.4	6.3	2.9	<2.0
	Titanium (Ti) (mg/kg)	613	749	766	316	731
	Uranium (U) (mg/kg)	18.2	18.6	18.6	7.14	12.4
	Vanadium (V) (mg/kg)	36.7	39.8	39.6	13.8	23.0
	Zinc (Zn) (mg/kg)	109	114	116	58.7	65.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-52 Soil/Sed/Waste 29-AUG-14 TE-SC-3	L1515898-54 Soil/Sed/Waste 29-AUG-14 TE-SC-5	L1515898-56 Soil/Sed/Waste 29-AUG-14 TE-SC-7	L1515898-58 Soil/Sed/Waste 29-AUG-14 TE-SC-9	L1515898-60 Soil/Sed/Waste 29-AUG-14 DUP-SC-6
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
SOIL						
Physical Tests	Moisture (%)	80.7	83.1	85.8	86.0	69.8
	pH (1:2 soil:water) (pH)	5.62	5.84	6.29	6.34	5.92
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.37	2.03	3.30	3.87	1.28
Metals	Aluminum (Al) (mg/kg)	21900	18500	22200	24200	11300
	Antimony (Sb) (mg/kg)	0.18	0.12	0.26	0.21	<0.10
	Arsenic (As) (mg/kg)	8.77	7.10	15.9	18.3	8.74
	Barium (Ba) (mg/kg)	99.8	82.6	106	112	49.5
	Beryllium (Be) (mg/kg)	1.87	1.43	1.87	2.04	0.99
	Bismuth (Bi) (mg/kg)	1.97	1.72	2.31	2.19	0.98
	Cadmium (Cd) (mg/kg)	0.104	0.081	0.115	0.156	<0.050
	Calcium (Ca) (mg/kg)	1840	1590	2080	2210	1230
	Chromium (Cr) (mg/kg)	53.5	45.8	55.0	58.6	27.1
	Cobalt (Co) (mg/kg)	9.60	7.90	11.5	12.4	4.97
	Copper (Cu) (mg/kg)	51.0	44.1	54.5	61.7	26.6
	Iron (Fe) (mg/kg)	37700	30400	45200	49100	23200
	Lead (Pb) (mg/kg)	19.8	16.4	21.5	22.2	10.5
	Lithium (Li) (mg/kg)	43.8	37.3	45.0	46.3	23.9
	Magnesium (Mg) (mg/kg)	7820	6620	7890	8380	4310
	Manganese (Mn) (mg/kg)	354	319	1680	1760	335
	Mercury (Hg) (mg/kg)	0.0200	0.0180	0.0239	0.0274	0.0085
	Molybdenum (Mo) (mg/kg)	2.78	2.22	4.90	5.49	2.35
	Nickel (Ni) (mg/kg)	35.1	28.2	39.7	41.7	17.9
	Phosphorus (P) (mg/kg)	637	439	466	607	415
	Potassium (K) (mg/kg)	4420	3620	4260	4720	2160
	Selenium (Se) (mg/kg)	0.64	0.43	0.74	1.09	0.28
	Silver (Ag) (mg/kg)	0.13	<0.10	0.12	0.16	<0.10
	Sodium (Na) (mg/kg)	210	160	170	220	<100
	Strontium (Sr) (mg/kg)	18.2	14.8	17.9	19.2	10.2
	Thallium (Tl) (mg/kg)	0.371	0.314	0.578	0.416	0.185
	Tin (Sn) (mg/kg)	2.2	<2.0	3.4	4.1	<2.0
	Titanium (Ti) (mg/kg)	1070	889	873	1010	591
	Uranium (U) (mg/kg)	19.4	16.2	19.9	21.1	10.3
	Vanadium (V) (mg/kg)	34.8	29.0	34.6	37.6	18.9
	Zinc (Zn) (mg/kg)	99.3	80.6	108	114	51.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-61 Soil/Sed/Waste 30-AUG-14 09:30 TEFF-SC-1	L1515898-62 Soil/Sed/Waste 30-AUG-14 09:30 TEFF-SC-2	L1515898-63 Soil/Sed/Waste 30-AUG-14 09:30 TEFF-SC-3	L1515898-64 Soil/Sed/Waste 30-AUG-14 09:30 TEFF-SC-4	L1515898-65 Soil/Sed/Waste 30-AUG-14 09:30 TEFF-SC-5
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	90.0	90.9	88.1	88.4	88.0
	pH (1:2 soil:water) (pH)	6.18	6.06	5.90	6.18	5.77
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.85	4.21	4.02	3.97	3.46
Metals	Aluminum (Al) (mg/kg)	22800	21200	25000	22400	22100
	Antimony (Sb) (mg/kg)	0.19	0.18	0.18	0.17	0.18
	Arsenic (As) (mg/kg)	10.7	9.87	11.3	8.30	12.9
	Barium (Ba) (mg/kg)	112	102	123	108	166
	Beryllium (Be) (mg/kg)	1.79	1.69	1.85	1.77	1.78
	Bismuth (Bi) (mg/kg)	1.72	1.63	1.93	1.73	1.69
	Cadmium (Cd) (mg/kg)	0.198	0.135	0.137	0.212	0.241
	Calcium (Ca) (mg/kg)	1940	1850	2100	1900	1990
	Chromium (Cr) (mg/kg)	52.3	48.9	56.3	50.5	49.1
	Cobalt (Co) (mg/kg)	9.89	10.4	12.6	10.6	25.6
	Copper (Cu) (mg/kg)	51.2	44.1	56.6	48.8	53.1
	Iron (Fe) (mg/kg)	37500	35400	42600	31800	61800
	Lead (Pb) (mg/kg)	19.6	19.2	21.2	20.0	19.1
	Lithium (Li) (mg/kg)	46.0	43.3	49.8	46.8	45.1
	Magnesium (Mg) (mg/kg)	7340	6870	8000	7200	7130
	Manganese (Mn) (mg/kg)	2810	1530	2250	1790	16800
	Mercury (Hg) (mg/kg)	0.0205	0.0180	0.0185	0.0195	0.0183
	Molybdenum (Mo) (mg/kg)	5.38	3.76	4.69	2.86	5.13
	Nickel (Ni) (mg/kg)	39.5	33.1	36.9	45.8	41.4
	Phosphorus (P) (mg/kg)	473	419	524	456	490
	Potassium (K) (mg/kg)	4340	4000	4670	4310	4160
	Selenium (Se) (mg/kg)	0.80	0.69	0.74	0.79	0.84
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	200	200	210	200	190
	Strontium (Sr) (mg/kg)	18.7	17.7	20.3	18.5	19.3
	Thallium (Tl) (mg/kg)	0.389	0.355	0.410	0.397	0.460
	Tin (Sn) (mg/kg)	3.8	23.6	4.8	4.0	5.1
	Titanium (Ti) (mg/kg)	789	733	833	775	788
	Uranium (U) (mg/kg)	21.7	19.8	23.9	21.7	21.2
	Vanadium (V) (mg/kg)	34.2	32.5	36.9	33.8	34.0
	Zinc (Zn) (mg/kg)	99.6	93.4	106	101	110

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-66 Soil/Sed/Waste 30-AUG-14 09:30 DUP-SC-7	L1515898-67 Soil/Sed/Waste 28-AUG-14 10:21 WAL-SC-1	L1515898-69 Soil/Sed/Waste 28-AUG-14 10:21 WAL-SC-3	L1515898-71 Soil/Sed/Waste 28-AUG-14 10:21 WAL-SC-5	L1515898-73 Soil/Sed/Waste 28-AUG-14 10:21 WAL-SC-7
SOIL						
Physical Tests	Moisture (%)	89.5	92.8	93.9	92.7	92.9
	pH (1:2 soil:water) (pH)	5.66	6.37	6.51	6.51	6.62
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.28	11.8	11.6	7.98	8.16
Metals	Aluminum (Al) (mg/kg)	15300	18400	20100	25300	23100
	Antimony (Sb) (mg/kg)	0.24	0.38	0.44	0.41	0.42
	Arsenic (As) (mg/kg)	23.8	32.1	67.0	29.1	21.6
	Barium (Ba) (mg/kg)	215	89.1	114	133	132
	Beryllium (Be) (mg/kg)	1.30	1.35	1.50	1.98	1.71
	Bismuth (Bi) (mg/kg)	1.27	1.65	2.02	2.43	2.31
	Cadmium (Cd) (mg/kg)	0.480	0.401	0.512	0.505	0.557
	Calcium (Ca) (mg/kg)	1610	3990	4490	4220	4050
	Chromium (Cr) (mg/kg)	35.9	52.3	58.0	70.8	64.6
	Cobalt (Co) (mg/kg)	25.4	8.69	9.97	10.1	9.87
	Copper (Cu) (mg/kg)	41.9	128	159	176	158
	Iron (Fe) (mg/kg)	119000	27200	47900	37100	32400
	Lead (Pb) (mg/kg)	16.7	29.8	34.8	37.9	37.8
	Lithium (Li) (mg/kg)	30.4	30.7	32.0	42.4	41.8
	Magnesium (Mg) (mg/kg)	5050	6840	7090	8940	8470
	Manganese (Mn) (mg/kg)	23100	283	381	325	339
	Mercury (Hg) (mg/kg)	0.0217	0.0658	0.0769	0.0463	0.0445
	Molybdenum (Mo) (mg/kg)	15.8	7.12	11.4	8.38	6.39
	Nickel (Ni) (mg/kg)	69.5	49.4	55.8	62.1	58.5
	Phosphorus (P) (mg/kg)	632	814	1000	852	683
	Potassium (K) (mg/kg)	2920	3420	3510	4350	4040
	Selenium (Se) (mg/kg)	1.01	0.95	1.14	1.09	0.98
	Silver (Ag) (mg/kg)	0.12	0.61	0.67	0.61	0.58
	Sodium (Na) (mg/kg)	140	180	190	220	200
	Strontium (Sr) (mg/kg)	16.3	27.7	30.1	30.3	29.4
	Thallium (Tl) (mg/kg)	0.424	0.340	0.310	0.346	0.354
	Tin (Sn) (mg/kg)	3.2	4.6	4.0	5.1	4.4
	Titanium (Ti) (mg/kg)	513	638	646	857	828
	Uranium (U) (mg/kg)	15.9	14.6	17.3	19.0	17.8
	Vanadium (V) (mg/kg)	24.5	26.9	30.9	38.0	34.9
	Zinc (Zn) (mg/kg)	93.7	116	124	135	125

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-75 Soil/Sed/Waste 28-AUG-14 10:21 WAL-SC-9	L1515898-78 Soil/Sed/Waste 27-AUG-14 DUP-SC-5	L1515898-79 Soil/Sed/Waste 03-SEP-14 00:40 PDL-SC-1	L1515898-80 Soil/Sed/Waste 03-SEP-14 00:40 PDL-SC-2	L1515898-81 Soil/Sed/Waste 03-SEP-14 00:40 PDL-SC-3
SOIL						
Physical Tests	Moisture (%)	92.3	88.7	83.0	87.1	93.8
	pH (1:2 soil:water) (pH)	6.67	6.09	5.66	5.92	5.65
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.59	5.53	2.24	3.27	5.77
Metals	Aluminum (Al) (mg/kg)	20700	22300	20900	23400	19500
	Antimony (Sb) (mg/kg)	0.48	0.28	0.22	0.32	0.38
	Arsenic (As) (mg/kg)	17.0	24.4	11.6	40.9	12.5
	Barium (Ba) (mg/kg)	115	101	88.2	96.4	104
	Beryllium (Be) (mg/kg)	1.68	1.42	0.98	1.21	0.96
	Bismuth (Bi) (mg/kg)	1.96	1.73	0.91	1.09	0.82
	Cadmium (Cd) (mg/kg)	0.589	0.422	0.110	0.225	0.330
	Calcium (Ca) (mg/kg)	3920	1930	2050	2320	2770
	Chromium (Cr) (mg/kg)	57.9	117	135	152	124
	Cobalt (Co) (mg/kg)	9.15	21.8	11.7	21.6	11.0
	Copper (Cu) (mg/kg)	147	66.8	45.9	59.4	48.9
	Iron (Fe) (mg/kg)	24600	37700	31400	45800	28200
	Lead (Pb) (mg/kg)	34.1	23.1	14.3	16.8	15.7
	Lithium (Li) (mg/kg)	39.1	35.4	28.3	29.9	25.8
	Magnesium (Mg) (mg/kg)	7740	9410	10700	11300	9830
	Manganese (Mn) (mg/kg)	277	1550	310	1970	301
	Mercury (Hg) (mg/kg)	0.0336	0.0259	0.0092	0.0151	0.0209
	Molybdenum (Mo) (mg/kg)	5.97	5.58	2.09	3.53	2.30
	Nickel (Ni) (mg/kg)	53.4	85.4	79.6	104	82.1
	Phosphorus (P) (mg/kg)	553	557	562	570	622
	Potassium (K) (mg/kg)	3660	3590	2830	3140	2750
	Selenium (Se) (mg/kg)	1.02	0.94	0.51	0.47	0.58
	Silver (Ag) (mg/kg)	0.52	0.19	0.11	<0.10	0.28
	Sodium (Na) (mg/kg)	190	160	110	120	170
	Strontium (Sr) (mg/kg)	28.0	17.2	22.5	24.9	24.4
	Thallium (Tl) (mg/kg)	0.326	0.317	0.183	0.215	0.204
	Tin (Sn) (mg/kg)	4.7	3.6	<2.0	8.0	2.5
	Titanium (Ti) (mg/kg)	853	568	581	522	530
	Uranium (U) (mg/kg)	17.4	18.8	8.48	10.9	7.73
	Vanadium (V) (mg/kg)	31.3	41.2	37.3	40.5	34.6
	Zinc (Zn) (mg/kg)	130	108	79.0	89.9	81.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-82 Soil/Sed/Waste 03-SEP-14 00:40 PDL-SC-4	L1515898-83 Soil/Sed/Waste 03-SEP-14 00:40 PDL-SC-5	L1515898-84 Soil/Sed/Waste 03-SEP-14 10:00 INUG-SC-1	L1515898-85 Soil/Sed/Waste 03-SEP-14 10:00 INUG-SC-2	L1515898-86 Soil/Sed/Waste 03-SEP-14 10:00 INUG-SC-3
SOIL						
Physical Tests	Moisture (%)	82.1	85.5	84.6	90.4	89.6
	pH (1:2 soil:water) (pH)	5.59	5.91	5.50	5.89	5.35
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.64	3.30	3.45	4.19	4.67
Metals	Aluminum (Al) (mg/kg)	20500	20600	22400	18900	22500
	Antimony (Sb) (mg/kg)	0.27	0.29	0.18	0.18	0.19
	Arsenic (As) (mg/kg)	27.3	40.8	93.9	14.4	15.9
	Barium (Ba) (mg/kg)	88.0	87.2	113	88.4	127
	Beryllium (Be) (mg/kg)	0.94	1.01	1.24	1.12	1.42
	Bismuth (Bi) (mg/kg)	0.94	0.90	1.19	1.02	1.27
	Cadmium (Cd) (mg/kg)	0.125	0.151	0.122	0.151	0.300
	Calcium (Ca) (mg/kg)	1980	2210	2080	1860	2050
	Chromium (Cr) (mg/kg)	130	131	106	100	117
	Cobalt (Co) (mg/kg)	14.3	19.0	11.1	17.4	11.2
	Copper (Cu) (mg/kg)	45.8	46.5	44.1	39.8	53.1
	Iron (Fe) (mg/kg)	36700	44900	81500	45000	43400
	Lead (Pb) (mg/kg)	15.4	15.1	13.2	12.2	15.5
	Lithium (Li) (mg/kg)	27.3	25.6	27.5	25.0	28.4
	Magnesium (Mg) (mg/kg)	10000	10000	9300	8440	9760
	Manganese (Mn) (mg/kg)	616	2170	707	3050	480
	Mercury (Hg) (mg/kg)	0.0664	0.0167	0.0185	0.0193	0.0338
	Molybdenum (Mo) (mg/kg)	2.33	2.98	6.29	3.38	3.79
	Nickel (Ni) (mg/kg)	81.5	87.8	65.1	71.8	79.8
	Phosphorus (P) (mg/kg)	503	548	2370	524	1120
	Potassium (K) (mg/kg)	2860	2810	3520	3130	3760
	Selenium (Se) (mg/kg)	0.40	0.55	0.67	0.56	0.71
	Silver (Ag) (mg/kg)	<0.10	0.12	0.13	<0.10	0.21
	Sodium (Na) (mg/kg)	110	120	170	140	200
	Strontium (Sr) (mg/kg)	22.2	23.2	26.4	24.3	26.6
	Thallium (Tl) (mg/kg)	0.188	0.190	0.209	0.231	0.228
	Tin (Sn) (mg/kg)	<2.0	3.1	2.6	2.8	2.2
	Titanium (Ti) (mg/kg)	548	504	588	665	679
	Uranium (U) (mg/kg)	8.39	8.40	14.8	14.7	17.5
	Vanadium (V) (mg/kg)	35.8	35.8	35.4	32.5	39.2
	Zinc (Zn) (mg/kg)	78.5	79.3	84.4	75.1	100

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-87 Soil/Sed/Waste 03-SEP-14 10:00 INUG-SC-4	L1515898-88 Soil/Sed/Waste 03-SEP-14 10:00 INUG-SC-5	L1515898-89 Soil/Sed/Waste 31-AUG-14 11:20 BBD-SC-1	L1515898-91 Soil/Sed/Waste 31-AUG-14 11:20 BBD-SC-3	L1515898-93 Soil/Sed/Waste 31-AUG-14 11:20 BBD-SC-5
SOIL						
Physical Tests	Moisture (%)	88.1	86.6	38.1	39.3	24.0
	pH (1:2 soil:water) (pH)	5.69	5.69	6.71	6.34	6.37
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.76	4.27	0.44	0.43	<0.10
Metals	Aluminum (Al) (mg/kg)	24000	20300	5080	6080	3860
	Antimony (Sb) (mg/kg)	0.15	0.17	<0.10	<0.10	<0.10
	Arsenic (As) (mg/kg)	7.92	158	3.81	9.03	3.11
	Barium (Ba) (mg/kg)	131	103	59.1	67.2	30.2
	Beryllium (Be) (mg/kg)	1.51	1.39	0.23	0.25	<0.20
	Bismuth (Bi) (mg/kg)	1.30	1.22	<0.20	<0.20	<0.20
	Cadmium (Cd) (mg/kg)	0.228	0.141	<0.050	<0.050	<0.050
	Calcium (Ca) (mg/kg)	2130	1730	1500	1860	991
	Chromium (Cr) (mg/kg)	125	109	10.9	12.6	6.40
	Cobalt (Co) (mg/kg)	10.9	11.7	4.13	4.46	2.83
	Copper (Cu) (mg/kg)	49.7	48.1	4.44	5.60	2.98
	Iron (Fe) (mg/kg)	30300	116000	12100	13200	7620
	Lead (Pb) (mg/kg)	14.4	14.2	4.67	5.37	2.24
	Lithium (Li) (mg/kg)	32.5	25.4	7.2	7.7	6.7
	Magnesium (Mg) (mg/kg)	10700	9090	3240	3510	2620
	Manganese (Mn) (mg/kg)	364	977	483	324	149
	Mercury (Hg) (mg/kg)	0.0208	0.0322	<0.0050	0.0052	<0.0050
	Molybdenum (Mo) (mg/kg)	2.53	8.23	<0.50	<0.50	<0.50
	Nickel (Ni) (mg/kg)	82.4	68.2	7.37	7.90	4.87
	Phosphorus (P) (mg/kg)	841	4220	499	684	364
	Potassium (K) (mg/kg)	3850	3130	860	1090	620
	Selenium (Se) (mg/kg)	0.69	0.72	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	0.17	0.18	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	170	140	130	170	<100
	Strontium (Sr) (mg/kg)	26.7	21.6	30.1	36.0	24.4
	Thallium (Tl) (mg/kg)	0.223	0.199	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	3.4	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	708	499	256	325	160
	Uranium (U) (mg/kg)	17.3	16.0	0.821	1.01	0.381
	Vanadium (V) (mg/kg)	40.5	35.5	14.6	15.9	9.31
	Zinc (Zn) (mg/kg)	96.2	90.2	23.0	25.2	16.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-95 Soil/Sed/Waste 31-AUG-14 11:20 BBD-SC-7	L1515898-97 Soil/Sed/Waste 31-AUG-14 11:20 BBD-SC-9	L1515898-99 Soil/Sed/Waste 31-AUG-14 11:20 DUP-SC-9	L1515898-100 Soil/Sed/Waste 31-AUG-14 07:45 BPJ-SC-1	L1515898-102 Soil/Sed/Waste 31-AUG-14 07:45 BPJ-SC-3
SOIL						
Physical Tests	Moisture (%)	33.3	23.8	31.2	52.3	58.4
	pH (1:2 soil:water) (pH)	5.82	6.33	6.08	6.25	6.30
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.30	<0.10	0.28	0.65	0.93
Metals	Aluminum (Al) (mg/kg)	7850	3800	6910	8470	9300
	Antimony (Sb) (mg/kg)	0.13	<0.10	0.11	0.13	0.15
	Arsenic (As) (mg/kg)	4.91	2.81	4.57	9.43	17.0
	Barium (Ba) (mg/kg)	70.0	38.5	71.7	126	128
	Beryllium (Be) (mg/kg)	0.41	<0.20	0.30	0.39	0.46
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	0.22
	Cadmium (Cd) (mg/kg)	<0.050	<0.050	<0.050	0.091	0.092
	Calcium (Ca) (mg/kg)	2740	1100	2620	2460	2520
	Chromium (Cr) (mg/kg)	17.7	6.84	16.1	20.7	21.8
	Cobalt (Co) (mg/kg)	5.38	2.82	5.22	7.74	8.26
	Copper (Cu) (mg/kg)	7.23	2.55	6.09	8.77	10.2
	Iron (Fe) (mg/kg)	14900	8270	13600	18900	22100
	Lead (Pb) (mg/kg)	6.97	2.64	6.16	8.75	9.79
	Lithium (Li) (mg/kg)	10.4	5.9	9.3	11.1	11.5
	Magnesium (Mg) (mg/kg)	4030	2500	3710	4710	5150
	Manganese (Mn) (mg/kg)	268	152	303	3500	1830
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050	<0.0050	0.0108	0.0112
	Molybdenum (Mo) (mg/kg)	1.30	<0.50	1.39	1.70	1.79
	Nickel (Ni) (mg/kg)	10.2	5.08	8.97	13.8	14.3
	Phosphorus (P) (mg/kg)	920	299	950	900	1170
	Potassium (K) (mg/kg)	1750	600	1480	1630	1790
	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)	190	<100	150	250	320
	Strontium (Sr) (mg/kg)	48.2	24.8	42.4	47.2	51.3
	Thallium (Tl) (mg/kg)	0.076	<0.050	0.059	0.082	0.089
	Tin (Sn) (mg/kg)	3.1	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	502	222	457	414	425
	Uranium (U) (mg/kg)	2.50	0.482	2.27	2.01	2.15
	Vanadium (V) (mg/kg)	24.5	11.0	21.8	24.6	25.6
	Zinc (Zn) (mg/kg)	28.7	15.9	25.4	41.0	45.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-104 Soil/Sed/Waste 31-AUG-14 07:45 BPJ-SC-5	L1515898-106 Soil/Sed/Waste 31-AUG-14 07:45 BPJ-SC-7	L1515898-108 Soil/Sed/Waste 31-AUG-14 07:45 BPJ-SC-9	L1515898-110 Soil/Sed/Waste 31-AUG-14 DUP-SC-10	L1515898-111 Soil/Sed/Waste 31-AUG-14 BAP-SC-1
SOIL						
Physical Tests	Moisture (%)	47.5	42.4	46.6	60.2	38.0
	pH (1:2 soil:water) (pH)	6.21	6.15	6.13	6.25	6.69
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.60	0.51	0.52	1.02	0.44
Metals	Aluminum (Al) (mg/kg)	9590	8550	6730	9460	4660
	Antimony (Sb) (mg/kg)	0.14	0.12	0.12	0.15	0.13
	Arsenic (As) (mg/kg)	32.7	68.1	11.8	9.53	5.75
	Barium (Ba) (mg/kg)	116	147	111	147	292
	Beryllium (Be) (mg/kg)	0.39	0.38	0.33	0.42	0.26
	Bismuth (Bi) (mg/kg)	0.21	0.21	<0.20	0.23	<0.20
	Cadmium (Cd) (mg/kg)	0.080	<0.050	0.067	0.103	<0.050
	Calcium (Ca) (mg/kg)	2840	2620	2000	2740	1670
	Chromium (Cr) (mg/kg)	21.7	19.1	16.1	22.1	14.5
	Cobalt (Co) (mg/kg)	6.44	6.22	6.29	8.74	3.86
	Copper (Cu) (mg/kg)	9.98	8.45	7.10	9.79	4.09
	Iron (Fe) (mg/kg)	23500	29700	17600	21100	12500
	Lead (Pb) (mg/kg)	9.70	8.79	7.50	9.86	3.68
	Lithium (Li) (mg/kg)	11.5	10.7	8.9	11.8	7.3
	Magnesium (Mg) (mg/kg)	5070	4660	3930	5200	3110
	Manganese (Mn) (mg/kg)	936	1220	3580	4260	324
	Mercury (Hg) (mg/kg)	0.0104	0.0077	0.0087	0.0116	<0.0050
	Molybdenum (Mo) (mg/kg)	1.28	1.88	1.89	1.79	<0.50
	Nickel (Ni) (mg/kg)	13.4	11.5	10.5	15.1	8.38
	Phosphorus (P) (mg/kg)	1150	1780	806	969	493
	Potassium (K) (mg/kg)	1820	1520	1170	1780	1080
	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)	270	250	200	330	140
	Strontium (Sr) (mg/kg)	52.4	47.8	37.2	50.2	39.1
	Thallium (Tl) (mg/kg)	0.074	0.057	0.057	0.088	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	477	379	291	453	292
	Uranium (U) (mg/kg)	1.92	1.81	1.53	2.02	0.978
	Vanadium (V) (mg/kg)	25.4	22.7	19.9	25.0	16.4
	Zinc (Zn) (mg/kg)	41.3	35.1	32.1	46.6	19.2

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-112 Soil/Sed/Waste 31-AUG-14 BAP-SC-2	L1515898-113 Soil/Sed/Waste 31-AUG-14 BAP-SC-3	L1515898-114 Soil/Sed/Waste 31-AUG-14 BAP-SC-4	L1515898-115 Soil/Sed/Waste 31-AUG-14 BAP-SC-5	L1515898-116 Soil/Sed/Waste 31-AUG-14 BES-SC-1
Sample ID / **Description** / **Sampled Date** / **Sampled Time** / **Client ID**						
SOIL						
Physical Tests	Moisture (%)	37.4	34.4	46.6	38.4	49.0
	pH (1:2 soil:water) (pH)	5.62	5.96	5.90	6.30	6.65
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.44	0.31	0.84	0.37	0.58
Metals	Aluminum (Al) (mg/kg)	5360	4590	6200	4710	6890
	Antimony (Sb) (mg/kg)	0.13	0.12	0.14	0.11	0.13
	Arsenic (As) (mg/kg)	3.03	2.36	6.43	5.19	3.87
	Barium (Ba) (mg/kg)	382	387	341	326	172
	Beryllium (Be) (mg/kg)	0.31	0.26	0.37	0.28	0.37
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd) (mg/kg)	<0.050	<0.050	<0.050	<0.050	0.058
	Calcium (Ca) (mg/kg)	2020	2060	2160	2020	2020
	Chromium (Cr) (mg/kg)	15.5	13.8	17.4	13.9	22.2
	Cobalt (Co) (mg/kg)	3.89	3.36	4.63	3.96	5.90
	Copper (Cu) (mg/kg)	6.48	4.04	6.25	4.08	5.85
	Iron (Fe) (mg/kg)	13300	11900	15000	12200	14200
	Lead (Pb) (mg/kg)	4.44	4.03	5.33	4.26	5.60
	Lithium (Li) (mg/kg)	8.1	7.0	9.7	7.1	10.3
	Magnesium (Mg) (mg/kg)	3150	2670	3630	2840	4490
	Manganese (Mn) (mg/kg)	124	108	187	484	671
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050	0.0060	<0.0050	0.0070
	Molybdenum (Mo) (mg/kg)	<0.50	<0.50	0.53	0.64	0.55
	Nickel (Ni) (mg/kg)	8.96	7.95	10.4	8.37	14.1
	Phosphorus (P) (mg/kg)	692	685	703	697	729
	Potassium (K) (mg/kg)	1310	1130	1470	1080	1470
	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)	150	130	220	150	240
	Strontium (Sr) (mg/kg)	44.6	41.4	45.2	37.6	37.5
	Thallium (Tl) (mg/kg)	0.054	<0.050	0.062	0.050	0.073
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	358	339	400	316	334
	Uranium (U) (mg/kg)	1.32	1.16	1.54	1.14	1.39
	Vanadium (V) (mg/kg)	18.8	18.7	20.9	17.2	20.6
	Zinc (Zn) (mg/kg)	21.5	18.7	26.5	20.6	31.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1515898-117 Soil/Sed/Waste 31-AUG-14 BES-SC-2	L1515898-118 Soil/Sed/Waste 31-AUG-14 BES-SC-3	L1515898-119 Soil/Sed/Waste 31-AUG-14 BES-SC-4	L1515898-120 Soil/Sed/Waste 31-AUG-14 BES-SC-5	L1515898-121 Soil/Sed/Waste 31-AUG-14 DUP-SC-11
SOIL						
Physical Tests	Moisture (%)	33.5	46.1	48.0	40.0	48.4
	pH (1:2 soil:water) (pH)	6.61	6.75	6.59	6.65	5.85
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.29	0.51	0.50	0.36	0.89
Metals	Aluminum (Al) (mg/kg)	4900	6350	6450	5490	7210
	Antimony (Sb) (mg/kg)	<0.10	0.11	0.16	0.13	0.15
	Arsenic (As) (mg/kg)	2.52	3.55	3.85	3.15	3.90
	Barium (Ba) (mg/kg)	123	144	150	87.8	365
	Beryllium (Be) (mg/kg)	0.27	0.33	0.39	0.30	0.38
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	0.27	<0.20	<0.20
	Cadmium (Cd) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Calcium (Ca) (mg/kg)	1740	2010	2120	1980	2260
	Chromium (Cr) (mg/kg)	15.4	18.1	18.6	15.9	19.1
	Cobalt (Co) (mg/kg)	3.69	4.87	5.05	4.21	4.95
	Copper (Cu) (mg/kg)	3.40	5.02	4.94	4.09	7.55
	Iron (Fe) (mg/kg)	10700	12900	13200	12100	15700
	Lead (Pb) (mg/kg)	3.78	5.10	5.43	4.30	6.13
	Lithium (Li) (mg/kg)	7.6	9.2	9.6	7.9	10.0
	Magnesium (Mg) (mg/kg)	3200	3890	3940	3340	4030
	Manganese (Mn) (mg/kg)	370	527	451	705	149
	Mercury (Hg) (mg/kg)	<0.0050	0.0070	0.0071	0.0055	0.0072
	Molybdenum (Mo) (mg/kg)	<0.50	0.50	0.58	0.58	0.60
	Nickel (Ni) (mg/kg)	9.09	11.3	11.6	9.45	11.5
	Phosphorus (P) (mg/kg)	545	725	672	686	716
	Potassium (K) (mg/kg)	1030	1360	1370	1140	1780
	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)	130	200	210	150	230
	Strontium (Sr) (mg/kg)	31.5	37.9	39.0	33.9	47.4
	Thallium (Tl) (mg/kg)	<0.050	0.063	0.195	0.060	0.084
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	282	348	341	311	425
	Uranium (U) (mg/kg)	0.931	1.25	1.28	1.10	1.85
	Vanadium (V) (mg/kg)	15.6	18.7	19.2	17.2	23.9
	Zinc (Zn) (mg/kg)	20.4	27.0	27.9	22.9	30.6

* 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	Zinc (Zn)	B	L1515898-1, -10, -11, -2, -23, -25, -27, -29, -3, -31, -34, -35, -36, -37, -38, -4, -5, -6, -7, -8, -9
Method Blank	Zinc (Zn)	B	L1515898-12, -13, -14, -15

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.
DLIS	Detection Limit Adjusted: Insufficient Sample

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

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. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

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.

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.

** 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
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA

Reference Information

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.

L1515898-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1411

Report To			Reporting		Service Requested
Company:	Azimuth		Distribution:	☐Fax ☐Mail ☑Email	◉Regular (Standard Turnaround Times - Business Days) - R
Contact:	Morgan Finley		☐Ciriteria on Report (select from Guidelines below)		○Priority (3 Days) - surcharge will apply - P
Address:	304-2537 Beacon Avenue Sidney, British Columbia Canada, V8L1Y3		Report Type:	☑Excel ☑Digital	○Priority (2 Days) - surcharge will apply - P2
			Report Format:		○Emergency (1-2 day) – surcharge will apply - E
			Report Email(s):	mfinley@azimuthgroup.ca gmann@azimuthgroup.ca efranz@azimuthgroup.ca	○Same Day or Weekend Emergency - surcharge will apply - E2
					○Specify date required - X
Phone:	7784260112	Fax:			Analysis Requests
Invoice To	☑Email	☑Mail	EDD Format:		
Company:	Azimuth		EDD Email(s):		
Contact:	Morgan Finley				
Address:	304-2537 Beacon Avenue Sidney, British Columbia Canada, V8L1Y3		**Project Info**		
			Job #:	Meadowbank CREMP 2014 Coring	
			PO/AFE:		
Email:	mfinley@azimuthgroup.ca		LSD:	British Columbia	
Phone:	7784260112		Quote #:	Q38011	

Lab Work Order # (lab use only)	L1515898	ALS Contact:	Sampler:

Sample #	Sample Identification (This will appear on the report)	Coordinates Longitude	Coordinates Latitude	Date	Time	Sample Type	Number of Containers	TOC, Metals, pH	Please indicate below Filtered, Preserved or both(F, P, F/P)
1	TPE-SC-1			AUG 26	14:50	Soil/Sed/Waste	1	R	
2	TPE-SC-2			"	"	Soil/Sed/Waste	1	R	
3	TPE-SC-3			"	"	Soil/Sed/Waste	1	R	
4	TPE-SC-4			"	"	Soil/Sed/Waste	1	R	
5	TPE-SC-5			"	"	Soil/Sed/Waste	1	R	
6	TPE-SC-6			"	"	Soil/Sed/Waste	1	R	
7	TPE-SC-7			"	"	Soil/Sed/Waste	1	R	
8	TPE-SC-8			"	"	Soil/Sed/Waste	1	R	

Short Holding Time

● *Rush Processing*

(See page 2 for further samples)

Special Instructions/Comments	The questions below must be answered for water samples (check Yes or No)	Guidelines
	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
Morgan Finley	Sept 4		JK	Sept 10	11:30	15.8 °C				

15/15.2/13/12.5/14.9/13.3/14/12



L1515898-COFC

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1411

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests		
		Longitude	Latitude				Number of Containers	TOC, Metals, pH	Please indicate below Filtered, Preserved or both(F, P, F/P)
9	TPE-SC-9			AUG 26	14:50	Soil/Sed/Waste	1	R	
10	TPE-SC-10			"	"	Soil/Sed/Waste	1	R	
11	DUP-SC-1			AUG 26		Soil/Sed/Waste	1	R	
12	TPE-B-SC-1			AUG 28	16:20	Soil/Sed/Waste	1	R	
13	TPE-B-SC-2			"	"	Soil/Sed/Waste	1	R	
14	TPE-B-SC-3			"	"	Soil/Sed/Waste	1	R	
15	TPE-B-SC-4			"	"	Soil/Sed/Waste	1	R	
16	TPE-B-SC-5			"	"	Soil/Sed/Waste	1	R	
17	TPE-B-SC-6			"	"	Soil/Sed/Waste	1	R	
18	TPE-B-SC-7			"	"	Soil/Sed/Waste	1	R	
19	TPE-B-SC-8			"	"	Soil/Sed/Waste	1	R	
20	TPE-B-SC-9			"	"	Soil/Sed/Waste	1	R	
21	TPE-B-SC-10			"	"	Soil/Sed/Waste	1	R	
22	DUP-SC-2			AUG 28	"	Soil/Sed/Waste	1	R	
23	TPN-SC-1			AUG 26	11:40	Soil/Sed/Waste	1	R	
24	TPN-SC-2			"	"	Archive	1	R	
25	TPN-SC-3			"	"	Soil/Sed/Waste	1	R	
26	TPN-SC-4			"	"	Archive	1	R	
27	TPN-SC-5			"	"	Soil/Sed/Waste	1	R	
28	TPN-SC-6			"	"	Archive	1	R	
29	TPN-SC-7			"	"	Soil/Sed/Waste	1	R	
30	TPN-SC-8			"	"	Archive	1	R	
31	TPN-SC-9			"	"	Soil/Sed/Waste	1	R	
32	TPN-SC-10			"	"	Archive	1	R	
33	DUP-SC-3			SEPT 2	13:45	Soil/Sed/Waste	1	R	
34	TPS-SC-1			AUG 27	8:10	Soil/Sed/Waste	1	R	
35	TPS-SC-2			"	"	Soil/Sed/Waste	1	R	

(See page 3 for further samples)

JVL Sept 10 11:30 15.8/15/15.2/13/12.5/14.9/13.3/14/12



L1515898-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1411

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests		
		Longitude	Latitude				Number of Containers	TOC, Metals, pH	Please indicate below Filtered, Preserved or both(F, P, F/P)
36	TPS-SC-3			AUG27	8:10	Soil/Sed/Waste	1	R	
37	TPS-SC-4			"	"	Soil/Sed/Waste	1	R	
38	TPS-SC-5			"	"	Soil/Sed/Waste	1	R	
39	SP-SC-1			~~AUG~~ SEP 2	13 45	Soil/Sed/Waste	1	R	
40	SP-SC-2			"	"	Archive	1	R	
41	SP-SC-3			"	"	Soil/Sed/Waste	1	R	
42	SP-SC-4			"	"	Archive	1	R	
43	SP-SC-5			"	"	Soil/Sed/Waste	1	R	
44	SP-SC-6			"	"	Archive	1	R	
45	SP-SC-7			"	"	Soil/Sed/Waste	1	R	
46	SP-SC-8			"	"	Archive	1	R	
47	SP-SC-9			"	"	Soil/Sed/Waste	1	R	
48	SP-SC-10			"	"	Archive	1	R	
49	DUP-SC-4			AUG ~~28~~		Soil/Sed/Waste	1	R	
50	TE-SC-1			AUG 29		Soil/Sed/Waste	1	R	
51	TE-SC-2			"		Archive	1	R	
52	TE-SC-3			"		Soil/Sed/Waste	1	R	
53	TE-SC-4			"		Archive	1	R	
54	TE-SC-5			"		Soil/Sed/Waste	1	R	
55	TE-SC-6			"		Archive	1	R	
56	TE-SC-7			"		Soil/Sed/Waste	1	R	
57	TE-SC-8			"		Archive	1	R	
58	TE-SC-9			"		Soil/Sed/Waste	1	R	
59	TE-SC-10			"		Archive	1	R	
60	DUP-SC-6			AUG29		Soil/Sed/Waste	1	R	
61	TEFF-SC-1			AUG 30	9:30	Soil/Sed/Waste	1	R	
62	TEFF-SC-2			"	"	Soil/Sed/Waste	1	R	

(See page 4 for further samples)

Jk Sept 10 11:30 15.8/15/15.2/13/12.5/14.9/13.3
14/12



L1515898-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1411

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests		
		Longitude	Latitude				Number of Containers	TOC, Metals, pH	Please indicate below Filtered, Preserved or both(F, P, F/P)
63	TEFF-SC-3			AUG 30	9:30	Soil/Sed/Waste	1	R	
64	TEFF-SC-4			"	"	Soil/Sed/Waste	1	R	
65	TEFF-SC-5			"	"	Soil/Sed/Waste	1	R	
66	DUP-SC-7			AUG 30		Soil/Sed/Waste	1	R	
67	WAL-SC-1			AUG 28	10:21	Soil/Sed/Waste	1	R	
68	WAL-SC-2			"	"	Archive	1	R	
69	WAL-SC-3			"	"	Soil/Sed/Waste	1	R	
70	WAL-SC-4			"	"	Archive	1	R	
71	WAL-SC-5			"	"	Soil/Sed/Waste	1	R	
72	WAL-SC-6			"	"	Archive	1	R	
73	WAL-SC-7			"	"	Soil/Sed/Waste	1	R	
74	WAL-SC-8			"	"	Archive	1	R	
75	WAL-SC-9			"	"	Soil/Sed/Waste	1	R	
76	WAL-SC-10			"	"	Archive	1	R	
77	DUP-SC-8			SEPT 3		Soil/Sed/Waste	1	R	
78	DUP-SC-5			AUG 27		Soil/Sed/Waste	1	R	
79	PDL-SC-1			SEPT 3	12:40	Soil/Sed/Waste	1	R	
80	PDL-SC-2			"	"	Soil/Sed/Waste	1	R	
81	PDL-SC-3			"	"	Soil/Sed/Waste	1	R	
82	PDL-SC-4			"	"	Soil/Sed/Waste	1	R	
83	PDL-SC-5			"	"	Soil/Sed/Waste	1	R	
84	INUG-SC-1			SEPT 3	10:00	Soil/Sed/Waste	1	R	
85	INUG-SC-2			"	"	Soil/Sed/Waste	1	R	
86	INUG-SC-3			"	"	Soil/Sed/Waste	1	R	
87	INUG-SC-4			"	"	Soil/Sed/Waste	1	R	
88	INUG-SC-5			"	"	Soil/Sed/Waste	1	R	
89	BBD-SC-1			AUG 31	11:20	Soil/Sed/Waste	1	R	

(See page 5 for further samples)

Jul Sept 10 11:30 15.8/15/15.2/13/12.5/14.9/13.3/14/12



L1515898-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1411

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests		
		Longitude	Latitude				Number of Containers	TOC, Metals, pH	Please Indicate below Filtered, Preserved or both(F, P, F/P)
90	BBD-SC-2			AUG 31	11:20	Archive	1	R	
91	BBD-SC-3			"	"	Soil/Sed/Waste	1	R	
92	BBD-SC-4			"	"	Archive	1	R	
93	BBD-SC-5			"	"	Soil/Sed/Waste	1	R	
94	BBD-SC-6			"	"	Archive	1	R	
95	BBD-SC-7			"	"	Soil/Sed/Waste	1	R	
96	BBD-SC-8			"	"	Archive	1	R	
97	BBD-SC-9			"	"	Soil/Sed/Waste	1	R	
98	BBD-SC-10			"	"	Archive	1	R	
99	DUP-SC-9			AUG 31		Soil/Sed/Waste	1	R	
100	BPJ-SC-1			AUG 31	7:45	Soil/Sed/Waste	1	R	
101	BPJ-SC-2			"	"	Archive	1	R	
102	BPJ-SC-3			"	"	Soil/Sed/Waste	1	R	
103	BPJ-SC-4			"	"	Archive	1	R	
104	BPJ-SC-5			"	"	Soil/Sed/Waste	1	R	
105	BPJ-SC-6			"	"	Archive	1	R	
106	BPJ-SC-7			"	"	Soil/Sed/Waste	1	R	
107	BPJ-SC-8			"	"	Archive	1	R	
108	BPJ-SC-9			"	"	Soil/Sed/Waste	1	R	
109	BPJ-SC-10			"	"	Archive	1	R	
110	DUP-SC-10			AUG 31		Soil/Sed/Waste	1	R	
111	BAP-SC-1			AUG 31		Soil/Sed/Waste	1	R	
112	BAP-SC-2			"		Soil/Sed/Waste	1	R	
113	BAP-SC-3			"		Soil/Sed/Waste	1	R	
114	BAP-SC-4			"		Soil/Sed/Waste	1	R	
115	BAP-SC-5			"		Soil/Sed/Waste	1	R	
116	BES-SC-1			AUG 31		Soil/Sed/Waste	1	R	

(See page 6 for further samples)

JR Sept 10 11:30 15.8/15/15.2/13/12.5/14.9/13.3/14

12

L1515898-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free : 1 800 668 9878
www.alsglobal.com

COC #: OL-1411

Sample #	Sample Identification (This will appear on the report)	Coordinates		Date	Time	Sample Type	Analysis Requests																			
		Longitude	Latitude				Number of Containers	TOC, Metals, pH																		
								Please indicate below Filtered, Preserved or both(F, P, F/P)																		
117	BES-SC-2			AUG 31		Soil/Sed/Waste	1	R																		
118	BES-SC-3			"		Soil/Sed/Waste	1	R																		
119	BES-SC-4			"		Soil/Sed/Waste	1	R																		
120	BES-SC-5			"		Soil/Sed/Waste	1	R																		
121	DUP-SC-11			AUG 31		Soil/Sed/Waste	1	R																		

JH sept 10 11:30 15.8/15/15.2/13/12.5/14.9/13.3/14.1

12

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 18-SEP-14
Report Date: 30-SEP-14 16:30 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1519915

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACE WATER
C of C Numbers:
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1519915-1	L1519915-2			
	Description	water	water			
	Sampled Date	10-SEP-14	10-SEP-14			
	Sampled Time	09:35	10:08			
	Client ID	PDL-31-S	PDL-32-S			
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.152	0.182			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1519915-1	L1519915-2			
	Description	water	water			
	Sampled Date	10-SEP-14	10-SEP-14			
	Sampled Time	09:35	10:08			
	Client ID	PDL-31-S	PDL-32-S			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	8.82	8.78			
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.61	0.61			
	Fluoride (F) (mg/L)	0.040	0.039			
	Nitrate (as N) (mg/L)	<0.0050	<0.0050			
	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)	<0.0020	<0.0020			
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0029			
	Silicate (as SiO2) (mg/L)	<0.50	<0.50			
	Sulfate (SO4) (mg/L)	1.65	1.65			
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanide, Free (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.83	2.02			
	Total Organic Carbon (mg/L)	1.55	1.96			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0054	0.0067			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00015	0.00016			
	Barium (Ba)-Total (mg/L)	0.00184	0.00194			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Total (mg/L)	2.16	2.16			
	Chromium (Cr)-Total (mg/L)	0.00010	0.00014			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00054	0.00068			
	Iron (Fe)-Total (mg/L)	<0.010	0.013			
	Lead (Pb)-Total (mg/L)	0.000228	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050			
	Magnesium (Mg)-Total (mg/L)	0.75	0.75			
	Manganese (Mn)-Total (mg/L)	0.000983	0.000936			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000071			
	Nickel (Ni)-Total (mg/L)	0.00055	0.00057			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1519915-1	L1519915-2			
	Description	water	water			
	Sampled Date	10-SEP-14	10-SEP-14			
	Sampled Time	09:35	10:08			
	Client ID	PDL-31-S	PDL-32-S			
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.35	0.34			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	0.121	0.129			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	0.521	0.504			
	Strontium (Sr)-Total (mg/L)	0.00875	0.00932			
	Sulfur (S)-Total (mg/L)	0.54	0.61			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.000024	0.000024			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	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)	0.0013	0.0024			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00014	0.00015			
	Barium (Ba)-Dissolved (mg/L)	0.00194	0.00192			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Dissolved (mg/L)	2.24	2.22			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00046	0.00056			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	0.000051	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050			
	Magnesium (Mg)-Dissolved (mg/L)	0.78	0.78			
	Manganese (Mn)-Dissolved (mg/L)	0.000219	0.000307			
	Mercury (Hg)-Dissolved (mg/L)	<0.000050 DLM	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050			
	Nickel (Ni)-Dissolved (mg/L)	0.00052	0.00055			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1519915-1	L1519915-2			
	Description	water	water			
	Sampled Date	10-SEP-14	10-SEP-14			
	Sampled Time	09:35	10:08			
	Client ID	PDL-31-S	PDL-32-S			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.37	0.36			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	0.123	0.122			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	0.513	0.512			
	Strontium (Sr)-Dissolved (mg/L)	0.00907	0.00944			
	Sulfur (S)-Dissolved (mg/L)	0.54	0.56			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000020	0.000021			
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			
	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)
Duplicate	Aluminum (Al)-Dissolved	DLA	L1519915-1, -2
Duplicate	Beryllium (Be)-Dissolved	DLA	L1519915-1, -2
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1519915-1, -2
Duplicate	Chromium (Cr)-Dissolved	DLA	L1519915-1, -2
Duplicate	Lead (Pb)-Dissolved	DLA	L1519915-1, -2
Duplicate	Silver (Ag)-Dissolved	DLA	L1519915-1, -2
Duplicate	Tin (Sn)-Dissolved	DLA	L1519915-1, -2
Duplicate	Titanium (Ti)-Dissolved	DLA	L1519915-1, -2
Duplicate	Zinc (Zn)-Dissolved	DLA	L1519915-1, -2
Duplicate	Beryllium (Be)-Dissolved	DLA	L1519915-1, -2
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1519915-1, -2
Duplicate	Chromium (Cr)-Dissolved	DLA	L1519915-1, -2
Duplicate	Lead (Pb)-Dissolved	DLA	L1519915-1, -2
Duplicate	Titanium (Ti)-Dissolved	DLA	L1519915-1, -2
Duplicate	Vanadium (V)-Dissolved	DLA	L1519915-1, -2
Duplicate	Cadmium (Cd)-Dissolved	DLM	L1519915-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Silicate (as SiO2)	MS-B	L1519915-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1519915-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519915-1, -2

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

Reference Information

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA Water Nitrate in Water by Ion Chromatography EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA Water Sulfate by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310 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 5310 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.

CN-FREE-CFA-VA Water 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-CFA-VA Water 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-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 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 (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.

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.

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.

** 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 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@azimuthgrou.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 #:	Meadowbank Surfacewater	
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:	Q39503	
Lab Work Order # (lab use only)		ALS Contact:	Brent Mack	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BC-MDG-VA	MET-T-BC-MDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	PDL-31-S	10-Sep-14	9:35	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	PDL-32-S	10-Sep-14	10:08	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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	10-Sep-14	8:30	JN	Sep 18	10:30	11.4 °C				

GENF 20.00 Front

12/12/13

L1519915-COFC

Short Holding Time

Rush Processing

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 18-SEP-14
Report Date: 01-OCT-14 13:03 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1519931

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1519931-1	L1519931-2	L1519931-3	L1519931-4	
	Description	water	water	water	water	
	Sampled Date	14-SEP-14	14-SEP-14	14-SEP-14	14-SEP-14	
	Sampled Time	09:30	09:50	10:37	10:45	
	Client ID	TEF-36-S	TEF-35-S	TEF-75-S	TEF-74-S	
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.118	0.131	0.179	0.141	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1519931-1 water 14-SEP-14 09:30 TEF-36-S	L1519931-2 water 14-SEP-14 09:50 TEF-35-S	L1519931-3 water 14-SEP-14 10:37 TEF-75-S	L1519931-4 water 14-SEP-14 10:45 TEF-74-S	
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	6.02	6.15	8.62	9.23	
Anions and Nutrients	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)	0.58	0.58	0.62	0.63	
	Fluoride (F) (mg/L)	0.064	0.065	0.074	0.076	
	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	
	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	0.0022	0.0025	
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Sulfate (SO4) (mg/L)	2.05	2.06	2.55	2.73	
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.32	1.28	1.56	1.48	
	Total Organic Carbon (mg/L)	1.26	1.32	1.36	1.46	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0100	0.0119	0.0236	0.0225	
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00011	0.00013	
	Barium (Ba)-Total (mg/L)	0.00199	0.00191	0.00214	0.00209	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Calcium (Ca)-Total (mg/L)	1.44	1.43	2.10	2.19	
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	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	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	0.012	0.013	0.029	0.029	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.00053	<0.00050	0.00051	<0.00050	
	Magnesium (Mg)-Total (mg/L)	0.60	0.58	0.76	0.78	
	Manganese (Mn)-Total (mg/L)	0.00126	0.00130	0.00145	0.00130	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000096	<0.000050	0.000069	0.000080	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1519931-1 water 14-SEP-14 09:30 TEF-36-S	L1519931-2 water 14-SEP-14 09:50 TEF-35-S	L1519931-3 water 14-SEP-14 10:37 TEF-75-S	L1519931-4 water 14-SEP-14 10:45 TEF-74-S	
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)	0.39	0.39	0.43	0.43	
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Total (mg/L)	0.124	0.123	0.193	0.191	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	0.542	0.528	0.596	0.580	
	Strontium (Sr)-Total (mg/L)	0.00754	0.00728	0.0101	0.0103	
	Sulfur (S)-Total (mg/L)	0.70	0.70	0.86	0.87	
	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)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.000044	0.000046	0.000069	0.000063	
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.0016	0.0017	0.0032	0.0039	
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00012	0.00012	
	Barium (Ba)-Dissolved (mg/L)	0.00200	0.00199	0.00211	0.00220	
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Calcium (Ca)-Dissolved (mg/L)	1.44	1.48	2.16	2.34	
	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)	0.00026	0.00025	0.00036	0.00040	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000119	
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.00059	
	Magnesium (Mg)-Dissolved (mg/L)	0.59	0.60	0.78	0.82	
	Manganese (Mn)-Dissolved (mg/L)	0.000352	0.000339	0.000590	0.000549	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	0.000063	0.000069	
	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	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1519931-1	L1519931-2	L1519931-3	L1519931-4	
	Description	water	water	water	water	
	Sampled Date	14-SEP-14	14-SEP-14	14-SEP-14	14-SEP-14	
	Sampled Time	09:30	09:50	10:37	10:45	
	Client ID	TEF-36-S	TEF-35-S	TEF-75-S	TEF-74-S	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.40	0.39	0.44	0.45	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Dissolved (mg/L)	0.099	0.106	0.165	0.171	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	0.555	0.557	0.628	0.661	
	Strontium (Sr)-Dissolved (mg/L)	0.00734	0.00746	0.00999	0.0110	
	Sulfur (S)-Dissolved (mg/L)	0.70	0.67	0.85	0.90	
	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)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000031	0.000034	0.000049	0.000053	
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<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)
Duplicate	Aluminum (Al)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Beryllium (Be)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Chromium (Cr)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Lead (Pb)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Silver (Ag)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Tin (Sn)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Titanium (Ti)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Zinc (Zn)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Beryllium (Be)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Chromium (Cr)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Lead (Pb)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Titanium (Ti)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Vanadium (V)-Dissolved	DLA	L1519931-1, -2, -3, -4
Duplicate	Cadmium (Cd)-Dissolved	DLM	L1519931-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Silicate (as SiO2)	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1519931-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1519931-1, -2, -3, -4

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

Reference Information

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA Water Nitrate in Water by Ion Chromatography EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA Water Sulfate by Ion Chromatography APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310 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 5310 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.

CN-FREE-CFA-VA Water 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-CFA-VA Water 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-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 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 (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.

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.

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.

** 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 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@azimuthgrou.ca		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vangengen@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)	[redacted]	ALS Contact: Brent Mack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBON-DOC-VA	CARBON-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-RCMDG-VA	MET-T-BCMOG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
[redacted]																			
[redacted]	TEFF-36-S	14-Sep-14	9:30	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
[redacted]	TEFF-35-S	14-Sep-14	9:50	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
[redacted]																			
[redacted]	TE-75-S	14-Sep-14	10:37	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
[redacted]	TE-74-S	14-Sep-14	10:45	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
[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

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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 T	15-Sep-14	7:00	JN	Sep 18	10:30	11.4 °C				

GENF 20.00 Front

12/12/13

L1519931-COFC

Short Holding Time

Rush Processing

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 24-SEP-14
Report Date: 07-OCT-14 17:01 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1522472

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers: 1
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1522472-1	L1522472-2	L1522472-3		
	Description	Water	Water	Water		
	Sampled Date	15-SEP-14	15-SEP-14	16-SEP-14		
	Sampled Time	10:52	11:11	14:30		
	Client ID	SP-75-S	SP-74-S	CREMP SEPT EB-1		
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	13.7	13.7	<0.50		
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	0.70	0.70	<0.10		
	Fluoride (F) (mg/L)	0.072	0.071	<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		
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020		
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50		
	Sulfate (SO4) (mg/L)	3.87	3.85	<0.50		
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050		
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.08	1.80	0.52		
	Total Organic Carbon (mg/L)	1.78	2.01	<0.50		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0106	0.0101	<0.0030		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Total (mg/L)	0.00026	0.00026	<0.00010		
	Barium (Ba)-Total (mg/L)	0.00257	0.00244	0.000128 RRV		
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Total (mg/L)	3.70	3.57	0.086		
	Chromium (Cr)-Total (mg/L)	0.00019	0.00011	<0.00010		
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)	0.00059	0.00059	<0.00050		
	Iron (Fe)-Total (mg/L)	0.020	0.021	<0.010		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000203 RRV		
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Magnesium (Mg)-Total (mg/L)	1.18	1.14	<0.10		
	Manganese (Mn)-Total (mg/L)	0.00135	0.00122	<0.000050		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	0.000139	0.000173	<0.000050		
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1522472-1	L1522472-2	L1522472-3		
	Description	Water	Water	Water		
	Sampled Date	15-SEP-14	15-SEP-14	16-SEP-14		
	Sampled Time	10:52	11:11	14:30		
	Client ID	SP-75-S	SP-74-S	CREMP SEPT EB-1		
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050		
	Potassium (K)-Total (mg/L)	0.50	0.48	<0.10		
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)	0.231	0.231	<0.050		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	0.745	0.719	<0.050		
	Strontium (Sr)-Total (mg/L)	0.0171	0.0167	0.00038		
	Sulfur (S)-Total (mg/L)	1.34	1.28	<0.50		
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.000047	0.000050	<0.000010		
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	0.0034	0.0024	0.0012		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00050 RRV		
	Arsenic (As)-Dissolved (mg/L)	0.00024	0.00024	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.00237	0.00235	0.000233		
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Dissolved (mg/L)	3.61	3.60	0.150		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	0.00012		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00054	0.00057	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.00726		
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Magnesium (Mg)-Dissolved (mg/L)	1.15	1.14	<0.10		
	Manganese (Mn)-Dissolved (mg/L)	0.000551	0.000507	0.000137		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000127	0.000146	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1522472-1	L1522472-2	L1522472-3		
	Description	Water	Water	Water		
	Sampled Date	15-SEP-14	15-SEP-14	16-SEP-14		
	Sampled Time	10:52	11:11	14:30		
	Client ID	SP-75-S	SP-74-S	CREMP SEPT EB-1		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.50	0.47	<0.10		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	0.214	0.210	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	0.715	0.718	<0.050		
	Strontium (Sr)-Dissolved (mg/L)	0.0158	0.0161	0.00065		
	Sulfur (S)-Dissolved (mg/L)	1.24	1.24	<0.50		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000040	0.000044	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	0.0088		

* 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	L1522472-1, -2, -3
Duplicate	Fluoride (F)	DLM	L1522472-1, -2, -3
Duplicate	Nitrite (as N)	DLM	L1522472-1, -2, -3
Duplicate	Nitrate (as N)	DLM	L1522472-1, -2, -3
Matrix Spike	Silicate (as SiO2)	MS-B	L1522472-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1522472-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1522472-1, -2, -3
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1522472-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L1522472-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L1522472-1, -2, -3

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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

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.

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.

** 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

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.

L1522472-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@azimuthgrou.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)	L1522472	ALS Contact:	Brent Mack	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	SP-75-5	15-Sep-14	10:52	Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8
	SP-74-5	15-Sep-14	11:11	Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8
	CREMP SEPT EB-1	16-Sep-14	14:30	Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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 T	17-Sep-14	7:00	JN	Sept 24	8140	13 °C				

GENF 20.00 Front

Short Holding Time

Rush Processing

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 25-SEP-14
Report Date: 07-OCT-14 18:07 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1523347

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1523347-1	L1523347-2	L1523347-3	L1523347-4	L1523347-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14
	Sampled Time	17:00	16:30	16:00	15:30	15:00
	Client ID	BAP-36-S	BPJ-35-S	BPJ-36-S	BBD-35-S	BBD-36-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.437	0.314	0.300	0.227	0.230

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L1523347-6	L1523347-7	L1523347-8	L1523347-9	L1523347-10
		Description	WATER	WATER	WATER	WATER	WATER
		Sampled Date	20-SEP-14	20-SEP-14		15-SEP-14	15-SEP-14
		Sampled Time	15:00	15:30			
		Client ID	INNUG-62-S	INNUG-63-S	SEPT-CREMP-DUP-1	SP-74-S	SP-75-S
FILTER							
Plant Pigments	Chlorophyll a (ug)		0.160	0.212	0.415	0.240	0.228

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1523347-1	L1523347-2	L1523347-3	L1523347-4	L1523347-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14
Sampled Time	17:00	16:30	16:00	15:30	15:00
Client ID	BAP-36-S	BPJ-35-S	BPJ-36-S	BBD-35-S	BBD-36-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	93.6	82.5	63.5	32.0	26.4
Anions and Nutrients Ammonia, Total (as N) (mg/L)	<0.0050	0.0053	<0.0050	<0.0050	<0.0050
Bromide (Br) (mg/L)	0.89	0.81	0.601	0.216	0.171
Chloride (Cl) (mg/L)	263	231	171	61.7	48.5
Fluoride (F) (mg/L)	<0.20 DLM	<0.20 DLM	0.072	0.062	0.060
Nitrate (as N) (mg/L)	<0.050 DLM	<0.050 DLM	0.0218	0.0117	0.0119
Nitrite (as N) (mg/L)	<0.010 DLM	<0.010 DLM	<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)	0.0033	0.0038	0.0043	0.0032	<0.0020
Phosphorus (P)-Total (mg/L)	<0.0020	0.0028	0.0024	0.0031	0.0043
Silicate (as SiO2) (mg/L)	<0.50	<0.50	0.71	<0.50	<0.50
Sulfate (SO4) (mg/L)	36.9	32.4	24.9	9.32	7.42
Cyanides Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	3.60	3.55	3.86	3.33	3.55
Total Organic Carbon (mg/L)	3.56	3.76	3.59	3.67	3.46
Total Metals Aluminum (Al)-Total (mg/L)	0.0119	0.0191	0.0157	0.0120	0.0145
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00013	0.00014	0.00016	0.00014	0.00012
Barium (Ba)-Total (mg/L)	0.0202	0.0214	0.0195	0.0198	0.0199
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	0.079	0.066	0.054	0.024	0.020
Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)-Total (mg/L)	8.00	6.96	6.13	3.81	3.48
Chromium (Cr)-Total (mg/L)	0.00012	0.00014	0.00014	0.00015	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	0.00141
Iron (Fe)-Total (mg/L)	0.014	0.028	0.026	0.018	0.021
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000071
Lithium (Li)-Total (mg/L)	0.00367	0.00321	0.00266	0.00151	0.00138
Magnesium (Mg)-Total (mg/L)	18.5	15.4	12.7	5.21	4.00
Manganese (Mn)-Total (mg/L)	0.00163	0.00276	0.00297	0.00265	0.00265
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.000193	0.000165	0.000139	0.000073	0.000071
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1523347-6 WATER 20-SEP-14 15:00 INNUG-62-S	L1523347-7 WATER 20-SEP-14 15:30 INNUG-63-S	L1523347-8 WATER SEPT-CREMP-DUP-1		
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5.62	5.66	90.2		
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	0.88		
	Chloride (Cl) (mg/L)	0.74	0.74	262		
	Fluoride (F) (mg/L)	0.065	0.064	<0.20 DLM		
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.050 DLM		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.010 DLM		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010		
	Phosphorus (P)-Total Dissolved (mg/L)	0.0026	0.0026	0.0030		
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0022	<0.0020		
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50		
	Sulfate (SO4) (mg/L)	0.88	0.89	36.6		
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050		
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.88	2.22	3.42		
	Total Organic Carbon (mg/L)	1.91	2.25	3.49		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0078	0.0080	0.0241		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00016		
	Barium (Ba)-Total (mg/L)	0.00166	0.00178	0.0211		
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	0.071		
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Total (mg/L)	1.14	1.14	7.81		
	Chromium (Cr)-Total (mg/L)	0.00014	0.00017	0.00019		
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	0.014	0.015	0.037		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000274		
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	0.00334		
	Magnesium (Mg)-Total (mg/L)	0.72	0.72	17.8		
	Manganese (Mn)-Total (mg/L)	0.00125	0.00144	0.00223		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	0.000187		
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1523347-1	L1523347-2	L1523347-3	L1523347-4	L1523347-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14
	Sampled Time	17:00	16:30	16:00	15:30	15:00
	Client ID	BAP-36-S	BPJ-35-S	BPJ-36-S	BBD-35-S	BBD-36-S
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	5.61	4.67	3.90	1.67	1.31
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.151	0.149	0.137	0.091	0.093
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	136	114	92.4	33.6	23.8
	Strontium (Sr)-Total (mg/L)	0.123	0.104	0.0873	0.0430	0.0356
	Sulfur (S)-Total (mg/L)	12.7	10.6	8.41	3.26	2.40
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000070	0.000071	0.000058	0.000048	0.000047
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB	LAB	LAB
	Dissolved Metals Filtration Location	LAB	LAB	LAB	LAB	LAB
	Aluminum (Al)-Dissolved (mg/L)	0.0021	0.0018	0.0023	0.0028	0.0018
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00012	0.00013	0.00012	0.00011	0.00011
	Barium (Ba)-Dissolved (mg/L)	0.0208	0.0196	0.0196	0.0184	0.0193
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.073	0.056	0.047	0.024	0.019
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	7.83	7.10	5.89	3.88	3.55
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	0.00010	0.00012	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00028	0.00028	0.00029	0.00034	0.00030
	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)	0.00349	0.00269	0.00251	0.00147	0.00141
	Magnesium (Mg)-Dissolved (mg/L)	18.0	15.7	11.8	5.41	4.25
	Manganese (Mn)-Dissolved (mg/L)	0.000778	0.00164	0.00171	0.00114	0.00102
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000188	0.000159	0.000140	0.000081	0.000075
	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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1523347-6	L1523347-7	L1523347-8		
	Description	WATER	WATER	WATER		
	Sampled Date	20-SEP-14	20-SEP-14			
	Sampled Time	15:00	15:30			
	Client ID	INNUG-62-S	INNUG-63-S	SEPT-CREMP-DUP-1		
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050		
	Potassium (K)-Total (mg/L)	0.40	0.39	5.47		
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)	0.106	0.111	0.160		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	0.564	0.563	142		
	Strontium (Sr)-Total (mg/L)	0.00640	0.00633	0.121		
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	12.8		
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.000038	0.000040	0.000086		
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB		
	Dissolved Metals Filtration Location	LAB	LAB	LAB		
	Aluminum (Al)-Dissolved (mg/L)	0.0018	0.0024	0.0032		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00013		
	Barium (Ba)-Dissolved (mg/L)	0.00166	0.00165	0.0194		
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	0.066		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Dissolved (mg/L)	1.11	1.12	7.57		
	Chromium (Cr)-Dissolved (mg/L)	0.00010	0.00015	0.00012		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00042	0.00035	0.00037		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	0.013		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000062	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	0.00323		
	Magnesium (Mg)-Dissolved (mg/L)	0.69	0.70	17.3		
	Manganese (Mn)-Dissolved (mg/L)	0.000511	0.000501	0.000906		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	0.000204		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1523347-1	L1523347-2	L1523347-3	L1523347-4	L1523347-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14	20-SEP-14
	Sampled Time	17:00	16:30	16:00	15:30	15:00
	Client ID	BAP-36-S	BPJ-35-S	BPJ-36-S	BBD-35-S	BBD-36-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	5.42	4.75	3.61	1.71	1.38
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.123	0.114	0.099	0.067	0.062
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	137	120	86.1	35.5	25.9
	Strontium (Sr)-Dissolved (mg/L)	0.117	0.104	0.0815	0.0435	0.0368
	Sulfur (S)-Dissolved (mg/L)	12.3	10.8	7.99	3.38	2.58
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000064	0.000053	0.000055	0.000038	0.000040
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0011	<0.0010	<0.0010	0.0017

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1523347-6	L1523347-7	L1523347-8		
	Description	WATER	WATER	WATER		
	Sampled Date	20-SEP-14	20-SEP-14			
	Sampled Time	15:00	15:30			
	Client ID	INNUG-62-S	INNUG-63-S	SEPT-CREMP-DUP-1		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.37	0.37	5.36		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	0.094	0.089	0.117		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	0.542	0.568	139		
	Strontium (Sr)-Dissolved (mg/L)	0.00608	0.00610	0.112		
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50	12.4		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000031	0.000037	0.000075		
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Dissolved (mg/L)	0.0014	0.0025	0.0021		

* 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	L1523347-1, -2
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1523347-1, -2
Duplicate	Lead (Pb)-Dissolved	DLA	L1523347-1, -2
Duplicate	Silver (Ag)-Dissolved	DLA	L1523347-1, -2
Duplicate	Tin (Sn)-Dissolved	DLA	L1523347-1, -2
Duplicate	Titanium (Ti)-Dissolved	DLA	L1523347-1, -2
Duplicate	Vanadium (V)-Dissolved	DLA	L1523347-1, -2
Duplicate	Bromide (Br)	DLM	L1523347-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Phosphorus (P)-Total	MS-B	L1523347-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Dissolved Organic Carbon	MS-B	L1523347-1, -2, -3, -4, -5, -7, -8
Matrix Spike	Phosphorus (P)-Total Dissolved	MS-B	L1523347-5
Matrix Spike	Dissolved Organic Carbon	MS-B	L1523347-6
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1523347-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1523347-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1523347-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1523347-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1523347-1, -2
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1523347-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L1523347-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L1523347-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L1523347-1, -2, -3, -4, -5, -6, -7, -8

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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.

Reference Information

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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	APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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

Reference Information

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.

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.

** 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 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@azimuthgrou.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 #:	Meadowbank Surfacewater			
Company:		PO / AFE:				
Contact:		LSD:				
Address:						
Phone:	Fax:	Quote #:	Q39503			
Lab Work Order # (lab use only)	L1523347	ALS Contact:	Brent Mack	Sampler:		

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	BAP-36-S	20-Sep-14	17:00	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	BPJ-35-S	20-Sep-14	16:30	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	BPJ-36-S	20-Sep-14	16:00	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	BBD-35-S	20-Sep-14	15:30	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	BBD-36-S	20-Sep-14	15:00	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	Innug-62-S	21-Sep-14	15:00	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	Innug-63-S	21-Sep-14	15:30	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	Sept-CREMP-DUP-1			Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	SP-74-S	15-Sep-14		Water					x										
	SP-75-S	15-Sep-14		Water					x										

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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
Martin T	21-Sep-14	9:00	JH	Sep 25	8:40	13 °C				

GENF 20.00 Front

13

Short Holding Time

Rush Processing 6

L1523347-COFC

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 02-OCT-14
Report Date: 14-OCT-14 18:06 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1527050

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers: 1
Legal Site Desc:

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1527050-1	L1527050-2	L1527050-3		
	Description	Water	Water	Water		
	Sampled Date	22-SEP-14	22-SEP-14			
	Sampled Time	14:00	14:30			
	Client ID	WAL-44-S-S	WAL-43-S	SEPT-CREMP-DUP-2		
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.256	0.262	0.233		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1527050-1 Water 22-SEP-14 14:00 WAL-44-S-S	L1527050-2 Water 22-SEP-14 14:30 WAL-43-S	L1527050-3 Water SEPT-CREMP-DUP-2		
Sample ID		L1527050-1	L1527050-2	L1527050-3		
Description		Water	Water	Water		
Sampled Date		22-SEP-14	22-SEP-14			
Sampled Time		14:00	14:30			
Client ID		WAL-44-S-S	WAL-43-S	SEPT-CREMP-DUP-2		
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	15.6	15.8	15.7		
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	0.0121		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	0.68	0.72	0.69		
	Fluoride (F) (mg/L)	0.052	0.054	0.054		
	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)	0.0027	0.0026	0.0024		
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.020 DLM		
	Silicate (as SiO2) (mg/L)	0.75	0.74	0.74		
	Sulfate (SO4) (mg/L)	3.33	3.43	3.40		
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050		
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.97	1.86	1.82		
	Total Organic Carbon (mg/L)	1.97	1.95	1.97		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0071	0.0075	0.0083		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Total (mg/L)	0.00027	0.00027	0.00026		
	Barium (Ba)-Total (mg/L)	0.00185	0.00184	0.00185		
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Total (mg/L)	4.16	4.27	4.25		
	Chromium (Cr)-Total (mg/L)	0.00011	0.00012	<0.00010		
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)	0.00080	0.00081	0.00084		
	Iron (Fe)-Total (mg/L)	0.017	0.017	0.017		
	Lead (Pb)-Total (mg/L)	0.000066	0.000074	0.000099		
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Magnesium (Mg)-Total (mg/L)	1.22	1.26	1.25		
	Manganese (Mn)-Total (mg/L)	0.00119	0.00111	0.00115		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	0.000200	0.000199	0.000183		
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1527050-1	L1527050-2	L1527050-3		
	Description	Water	Water	Water		
	Sampled Date	22-SEP-14	22-SEP-14			
	Sampled Time	14:00	14:30			
	Client ID	WAL-44-S-S	WAL-43-S	SEPT-CREMP-DUP-2		
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050		
	Potassium (K)-Total (mg/L)	0.43	0.45	0.43		
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)	0.432	0.438	0.440		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	0.543	0.554	0.567		
	Strontium (Sr)-Total (mg/L)	0.0203	0.0208	0.0207		
	Sulfur (S)-Total (mg/L)	1.10	1.13	1.12		
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.000046	0.000047	0.000048		
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	0.0012	0.0011		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00026	0.00024	0.00024		
	Barium (Ba)-Dissolved (mg/L)	0.00170	0.00176	0.00174		
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Dissolved (mg/L)	4.19	4.29	4.22		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00072	0.00070	0.00071		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Magnesium (Mg)-Dissolved (mg/L)	1.24	1.25	1.25		
	Manganese (Mn)-Dissolved (mg/L)	0.000374	0.000363	0.000289		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000165	0.000171	0.000171		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1527050-1	L1527050-2	L1527050-3		
	Description	Water	Water	Water		
	Sampled Date	22-SEP-14	22-SEP-14			
	Sampled Time	14:00	14:30			
	Client ID	WAL-44-S-S	WAL-43-S	SEPT-CREMP-DUP-2		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.46	0.43	0.42		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	0.423	0.430	0.411		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	0.556	0.555	0.556		
	Strontium (Sr)-Dissolved (mg/L)	0.0198	0.0200	0.0199		
	Sulfur (S)-Dissolved (mg/L)	1.06	1.07	1.09		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000042	0.000038	0.000040		
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<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	Orthophosphate-Dissolved (as P)	MS-B	L1527050-1, -2, -3
Matrix Spike	Phosphorus (P)-Total	MS-B	L1527050-3
Matrix Spike	Total Organic Carbon	MS-B	L1527050-1, -2, -3
Matrix Spike	Dissolved Organic Carbon	MS-B	L1527050-2, -3
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1527050-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1527050-1, -2, -3
Matrix Spike	Boron (B)-Dissolved	MS-B	L1527050-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1527050-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1527050-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1527050-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L1527050-1, -2, -3

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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

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-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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

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.

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.

** 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

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.

L1527050-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

ALS Environmental

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@azimuthgrou.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 #:	Q39603			
Lab Work Order # (lab use only)			ALS Contact:	Brent Mack	Sampler:		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	WAL-44-S-S	22-Sep-14	14:00	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	Wal-43-S	22-Sep-14	14:30:00 PM	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	Sept-CREMP-DUP-2			Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	9

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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
Martin T	23-Sep-14	9:00	JK	6ep2	11:30	13/13/C				

GENF 20.00 Front

14

Short Holding Time

Rush Processing

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 02-OCT-14
Report Date: 15-OCT-14 17:16 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1527171

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 15-OCT-14 17:09

Brent Mack
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1527171-1	L1527171-2	L1527171-3	L1527171-4	L1527171-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	02-OCT-14	02-OCT-14	02-OCT-14	02-OCT-14	02-OCT-14
	Sampled Time	15:20	15:20	15:20	15:20	15:20
	Client ID	TPE-74-S	TPS-48-S	TPS-47-S	TPE-75-S	TPN-74-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug/L)	0.170	0.163	0.118	0.128	0.109

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1527171-6				
Description	WATER				
Sampled Date	02-OCT-14				
Sampled Time	15:20				
Client ID	TPN-75-S				
Grouping **Analyte**					
FILTER					
Plant Pigments Chlorophyll a (ug/L)	0.128				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1527171-1 WATER 02-OCT-14 15:20 TPE-74-S	L1527171-2 WATER 02-OCT-14 15:20 TPS-48-S	L1527171-3 WATER 02-OCT-14 15:20 TPS-47-S	L1527171-4 WATER 02-OCT-14 15:20 TPE-75-S	L1527171-5 WATER 02-OCT-14 15:20 TPN-74-S
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	10.5	9.05	9.03	16.8	9.05
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	0.0092	0.0088	<0.0050	0.0076
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.67	0.73	0.73	0.67	0.73
	Fluoride (F) (mg/L)	0.077	0.065	0.066	0.077	0.065
	Nitrate (as N) (mg/L)	0.0096	0.0553	0.0545	0.0106	0.0526
	Nitrite (as N) (mg/L)	<0.0010	0.0012	0.0011	<0.0010	0.0013
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total Dissolved (mg/L)	0.0026	0.0033	0.0025	0.0028	<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)	4.33	4.88	4.87	4.35	4.92
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.38	1.49	1.54	1.33	1.48
	Total Organic Carbon (mg/L)	1.76	1.80	1.44	1.50	1.55
Total Metals	Aluminum (Al)-Total (mg/L)	0.0095	0.0068	0.0055	0.0105	0.0056
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00011	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00048	0.00019	0.00017	0.00046	0.00018
	Barium (Ba)-Total (mg/L)	0.00276	0.00294	0.00289	0.00292	0.00288
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	2.51	2.16	2.11	2.61 DTC	2.18
	Chromium (Cr)-Total (mg/L)	0.00014	0.00012	0.00015	0.00014	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	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.016	<0.010	<0.010	0.016 DTC	<0.010
	Lead (Pb)-Total (mg/L)	0.000071	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00053
	Magnesium (Mg)-Total (mg/L)	0.90	0.85	0.84	0.94	0.86
	Manganese (Mn)-Total (mg/L)	0.00104	0.00177	0.00178	0.00108	0.00168
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000207	0.000265	0.000204	0.000193	0.000203
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1527171-6	L1527171-7			
	Description	WATER	WATER			
	Sampled Date	02-OCT-14	02-OCT-14			
	Sampled Time	15:20	15:20			
	Client ID	TPN-75-S	AEM CREMP - ALS TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	9.17	<0.50			
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0079	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.74	<0.10			
	Fluoride (F) (mg/L)	0.065	<0.020			
	Nitrate (as N) (mg/L)	0.0530	<0.0050			
	Nitrite (as N) (mg/L)	0.0012	<0.0010			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total Dissolved (mg/L)	0.0023	0.0032			
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020			
	Silicate (as SiO2) (mg/L)	<0.50	<0.50			
	Sulfate (SO4) (mg/L)	4.93	<0.50			
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanide, Free (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.38	<0.50			
	Total Organic Carbon (mg/L)	1.44	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0050	<0.0030			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00018	<0.00010			
	Barium (Ba)-Total (mg/L)	0.00275	<0.000050			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Total (mg/L)	2.08	<0.050			
	Chromium (Cr)-Total (mg/L)	0.00012	<0.00010			
	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)	0.00059	<0.00050			
	Magnesium (Mg)-Total (mg/L)	0.81	<0.10			
	Manganese (Mn)-Total (mg/L)	0.00150	<0.000050			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000187	<0.000050			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1527171-1 WATER 02-OCT-14 15:20 TPE-74-S	L1527171-2 WATER 02-OCT-14 15:20 TPS-48-S	L1527171-3 WATER 02-OCT-14 15:20 TPS-47-S	L1527171-4 WATER 02-OCT-14 15:20 TPE-75-S	L1527171-5 WATER 02-OCT-14 15:20 TPN-74-S
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.50	0.51	0.49	0.51 DTC	0.51
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.068	0.054	<0.050	0.076 DTC	0.059
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.958	1.16	1.16	0.979	1.16
	Strontium (Sr)-Total (mg/L)	0.0109	0.0101	0.0100	0.0112	0.0103
	Sulfur (S)-Total (mg/L)	1.49	1.69	1.70	1.46 DTC	1.73
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000051	0.000048	0.000043	0.000050	0.000044
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0020	0.0027	0.0021	0.120 DTC	0.0021
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00016	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00047	0.00018	0.00017	0.00065	0.00018
	Barium (Ba)-Dissolved (mg/L)	0.00284	0.00298	0.00290	0.00939 DTC	0.00286
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000256 DTC	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	2.64	2.20	2.18	4.96 DTC	2.20
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00094 DTC	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00013	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00039	0.00042	0.00038	0.00434 DTC	0.00037
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	0.153 DTC	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000065	<0.000050	0.00324 DTC	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.00121	0.00059
	Magnesium (Mg)-Dissolved (mg/L)	0.95	0.86	0.87	1.08	0.86
	Manganese (Mn)-Dissolved (mg/L)	0.000517	0.00152	0.00129	0.00621 DTC	0.00119
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000203	0.000195	0.000188	0.000351 DTC	0.000177
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00067	<0.00050	0.00150 DTC	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	0.053	<0.050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1527171-6	L1527171-7			
	Description	WATER	WATER			
	Sampled Date	02-OCT-14	02-OCT-14			
	Sampled Time	15:20	15:20			
	Client ID	TPN-75-S	AEM CREMP - ALS TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.48	<0.10			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	<0.050	<0.050			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	1.10	<0.050			
	Strontium (Sr)-Total (mg/L)	0.00967	<0.00020			
	Sulfur (S)-Total (mg/L)	1.63	<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)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.000040	<0.000010			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0021				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00015				
	Barium (Ba)-Dissolved (mg/L)	0.00290				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	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)	0.00034				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.00063				
	Magnesium (Mg)-Dissolved (mg/L)	0.87				
	Manganese (Mn)-Dissolved (mg/L)	0.00119				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000180				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1527171-1 WATER 02-OCT-14 15:20 TPE-74-S	L1527171-2 WATER 02-OCT-14 15:20 TPS-48-S	L1527171-3 WATER 02-OCT-14 15:20 TPS-47-S	L1527171-4 WATER 02-OCT-14 15:20 TPE-75-S	L1527171-5 WATER 02-OCT-14 15:20 TPN-74-S
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.54	0.52	0.53	0.85 DTC	0.51
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.055	<0.050	<0.050	0.233 DTC	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.983	1.15	1.18	2.93 DTC	1.16
	Strontium (Sr)-Dissolved (mg/L)	0.0111	0.0100	0.0101	0.0146 DTC	0.0101
	Sulfur (S)-Dissolved (mg/L)	1.52	1.71	1.70	4.78 DTC	1.71
	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	0.00184 DTC	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000044	0.000035	0.000035	0.000073 DTC	0.000037
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0061	0.0021	0.0198 DTC	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1527171-6	L1527171-7			
	Description	WATER	WATER			
	Sampled Date	02-OCT-14	02-OCT-14			
	Sampled Time	15:20	15:20			
	Client ID	TPN-75-S	AEM CREMP - ALS TRAVEL BLANK			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.50				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	1.15				
	Strontium (Sr)-Dissolved (mg/L)	0.0101				
	Sulfur (S)-Dissolved (mg/L)	1.71				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.000040				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	<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	Orthophosphate-Dissolved (as P)	MS-B	L1527171-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Total Organic Carbon	MS-B	L1527171-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Dissolved Organic Carbon	MS-B	L1527171-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sulfate (SO4)	MS-B	L1527171-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Boron (B)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1527171-1, -2, -3, -4, -5, -6

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.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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.

Reference Information

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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	APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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

Reference Information

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.

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.

** 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.

L1527171-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page ____ of ____

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company:	AZIMUTH Consulting group	Standard:	Other (specify):	Regular (Standard Turnaround Times - Business Days)
Contact:	Eric Frenz	Select: PDF	Excel Digital Fax	Priority (2-4 Business Days) - 50% surcharge - Contact ALS to confirm TAT
Address:	218-2902 West Broadway Vancouver, BC V6K 2G8	Email 1:		Emergency (1-2 Business Days) - 100% Surcharge - Contact ALS to confirm TAT
		Email 2:		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	604-730-1220 Fax:			

Invoice To	Same as Report ? (circle) Yes or No (If No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:**	**Sampler:**

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS	CN	TOC	DOC	TOTAL MET	DISS. MET	TOTAL MER.	DIS. MER.	CHLOROA				Number of Containers
	TPE-74-S	Oct2/14	15:20Pm		X	X	X	X	X	X	X	X	X				8
	TPS-48-S	Oct2/14	15:20Pm		X	X	X	X	X	X	X	X	X				8
	TPS-47-S	Oct2/14	15:20Pm		X	X	X	X	X	X	X	X	X				8
	TPE-75-S	Oct2/14	15:20Pm		X	X	X	X	X	X	X	X	X				8
	TPN-74-S	Oct2/14	15:20Pm		X	X	X	X	X	X	X	X	X				8
	TPN-75-S	Oct2/14	15:20Pm		X	X	X	X	X	X	X	X	X				8
	AEM CREMP-Ms Travel Blank	Oct2/14	15:20Pm		X	X	X	X	MET		MER						6

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

SAMPLES RECEIVED WITHOUT CHAIN OF CUSTODY (CofC)

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 specified on the back page of the white - report copy.

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 / No ? If Yes add SIF
			Chris	OCT2/14	15:20Pm	14 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — GENF 18.01 Front

* PREDICTED ANALYSIS * CONFIRM WITH CLIENT *

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 12-NOV-14
Report Date: 21-NOV-14 11:48 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1545458

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFACEWATER
C of C Numbers: 1
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545458-1	L1545458-2	L1545458-3	L1545458-4	L1545458-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	02-NOV-14	02-NOV-14	02-NOV-14	02-NOV-14	02-NOV-14
	Sampled Time	09:48	10:17	11:12	11:56	10:17
	Client ID	WAL-45-S	WAL-46-S	SP-76-S	SP-77-S	NOV-DUP-1
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.326	0.244	0.219	0.136	0.341

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1545458-1 Water 02-NOV-14 09:48 WAL-45-S	L1545458-2 Water 02-NOV-14 10:17 WAL-46-S	L1545458-3 Water 02-NOV-14 11:12 SP-76-S	L1545458-4 Water 02-NOV-14 11:56 SP-77-S	L1545458-5 Water 02-NOV-14 10:17 NOV-DUP-1
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	16.9	16.6	14.3	14.2	16.5
Anions and Nutrients	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)	0.71	0.69	0.75	0.73	0.70
	Fluoride (F) (mg/L)	0.054	0.053	0.074	0.073	0.053
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	0.0052	<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	<0.0020	0.0024	<0.0020
	Phosphorus (P)-Total (mg/L)	0.0021	<0.0020	<0.020 DLM	0.0022	0.0027
	Silicate (as SiO2) (mg/L)	0.96	0.97	0.55	0.59	1.01
	Sulfate (SO4) (mg/L)	3.56	3.51	4.15	4.00	3.51
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.12	1.98	1.85	1.75	2.10
	Total Organic Carbon (mg/L)	2.10	2.01	1.75	2.07	2.10
Total Metals	Aluminum (Al)-Total (mg/L)	0.0042	0.0043	0.0059	0.0066	0.0047
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00027	0.00026	0.00022	0.00023	0.00029
	Barium (Ba)-Total (mg/L)	0.00196	0.00198	0.00252	0.00238	0.00194
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	4.34	4.53	3.72	3.73	4.53
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00011	<0.00010	0.00013	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00082	0.00087	0.00059	0.00064	0.00078
	Iron (Fe)-Total (mg/L)	0.013	0.012	0.013	0.015	0.013
	Lead (Pb)-Total (mg/L)	<0.000050	0.000092	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	1.29	1.33	1.21	1.19	1.34
	Manganese (Mn)-Total (mg/L)	0.000842	0.000793	0.000648	0.000673	0.000777
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000167	0.000189	0.000136	0.000140	0.000245
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545458-6				
	Description	Water				
	Sampled Date	02-NOV-14				
	Sampled Time	08:00				
	Client ID	NOV-EB-1				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	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				
	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)	<0.50				
Cyanides	Cyanide, Total (mg/L)	<0.0050 SRU				
	Cyanide, Free (mg/L)	<0.0050 SRU				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50				
	Total Organic Carbon (mg/L)	1.12 SP				
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)	<0.00010				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000010				
	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)	<0.00050				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.000050				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1545458-1 Water 02-NOV-14 09:48 WAL-45-S	L1545458-2 Water 02-NOV-14 10:17 WAL-46-S	L1545458-3 Water 02-NOV-14 11:12 SP-76-S	L1545458-4 Water 02-NOV-14 11:56 SP-77-S	L1545458-5 Water 02-NOV-14 10:17 NOV-DUP-1
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.49	0.49	0.53	0.51	0.48
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.412	0.434	0.228	0.242	0.433
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	0.000021	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.572	0.581	0.756	0.750	0.578
	Strontium (Sr)-Total (mg/L)	0.0200	0.0216	0.0167	0.0164	0.0213
	Sulfur (S)-Total (mg/L)	1.20	1.26	1.39	1.38	1.25
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000045	0.000044	0.000044	0.000042	0.000045
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0020	0.0012	0.0016	0.0013	0.0015
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00023	0.00025	0.00023	0.00022	0.00023
	Barium (Ba)-Dissolved (mg/L)	0.00187	0.00188	0.00240	0.00229	0.00185
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	4.59	4.48	3.76	3.73	4.47
	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)	0.00077	0.00070	0.00049	0.00050	0.00079
	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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	1.33	1.31	1.20	1.19	1.30
	Manganese (Mn)-Dissolved (mg/L)	0.000220	0.000145	0.000253	0.000194	0.000140
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000150	0.000172	0.000129	0.000130	0.000163
	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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545458-6				
	Description	Water				
	Sampled Date	02-NOV-14				
	Sampled Time	08:00				
	Client ID	NOV-EB-1				
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	<0.10				
	Selenium (Se)-Total (mg/L)	<0.00010				
	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)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.0010				
	Zinc (Zn)-Total (mg/L)	0.0109				
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)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	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)	<0.00050				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	<0.000050				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545458-1	L1545458-2	L1545458-3	L1545458-4	L1545458-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	02-NOV-14	02-NOV-14	02-NOV-14	02-NOV-14	02-NOV-14
	Sampled Time	09:48	10:17	11:12	11:56	10:17
	Client ID	WAL-45-S	WAL-46-S	SP-76-S	SP-77-S	NOV-DUP-1
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.48	0.47	0.51	0.50	0.45
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.431	0.415	0.217	0.226	0.417
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.581	0.568	0.757	0.723	0.566
	Strontium (Sr)-Dissolved (mg/L)	0.0211	0.0209	0.0165	0.0162	0.0210
	Sulfur (S)-Dissolved (mg/L)	1.21	1.18	1.40	1.35	1.19
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000039	0.000041	0.000041	0.000039	0.000039
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0055	<0.0010	<0.0010	<0.0010	0.0017

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545458-6				
	Description	Water				
	Sampled Date	02-NOV-14				
	Sampled Time	08:00				
	Client ID	NOV-EB-1				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	<0.10				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	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)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	<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)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Arsenic (As)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Beryllium (Be)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Lead (Pb)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Selenium (Se)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Silver (Ag)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Tin (Sn)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Titanium (Ti)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Duplicate	Vanadium (V)-Dissolved	DLA	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Tin (Sn)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1545458-1, -2, -3, -4, -5, -6

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.
SP	Sample was Preserved at the laboratory
SRU	Sample Received Unpreserved. Results may be biased low for indicated parameter(s)

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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

Reference Information

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 5310 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.

CN-FREE-CFA-VA Water 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-CFA-VA Water 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-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

Reference Information

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.

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.

** 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

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.

L1545458-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@azimuthgrou.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220 Fax:	Email 3: ryan.vanengen@agniceagle.com	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	
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)		ALS Contact: Brent Mack	Sampler:

ALS Sample # (lab use only)	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMOG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	WAL-45-S	02-Nov-14	9:48	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	WAL-46-S	02-Nov-14	10:17	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	SP-76-S	02-Nov-14	11:12	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	SP-77-S	02-Nov-14	11:56	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	NOV-OUP-1	02-Nov-14	10:17	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	NOV-EB-1	02-Nov-14	8:00	Water	x	x	x		x	x	x	x	x	x	x	x	x	x	8

Please Indicate below Filtered, Preserved or both (F, P, F/P)

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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
Martin T	21-Sep-14	9:00	Paige	Nov. 2	10:15	11.12°C				

GENF 20.00 Front

Short Holding Time

Rush Processing

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 12-NOV-14
Report Date: 21-NOV-14 12:18 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1545526

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	L1545526-1	L1545526-2			
	Description	water	water			
	Sampled Date	03-NOV-14	03-NOV-14			
	Sampled Time	11:09	11:44			
	Client ID	TPE-76-S	TPE-77-S			
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.171	0.104			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545526-1	L1545526-2			
	Description	water	water			
	Sampled Date	03-NOV-14	03-NOV-14			
	Sampled Time	11:09	11:44			
	Client ID	TPE-76-S	TPE-77-S			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	10.8	10.8			
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0056	0.0057			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.67	0.66			
	Fluoride (F) (mg/L)	0.073	0.074			
	Nitrate (as N) (mg/L)	0.0150	0.0135			
	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)	0.0022	0.0023			
	Phosphorus (P)-Total (mg/L)	0.0022	<0.0020			
	Silicate (as SiO2) (mg/L)	<0.50	<0.50			
	Sulfate (SO4) (mg/L)	4.42	4.35			
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanide, Free (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.52	1.58			
	Total Organic Carbon (mg/L)	1.70	1.67			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0064	0.0081			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00039	0.00047			
	Barium (Ba)-Total (mg/L)	0.00254	0.00284			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Total (mg/L)	2.77	2.76			
	Chromium (Cr)-Total (mg/L)	0.00010	0.00012			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	<0.00050	0.00101			
	Iron (Fe)-Total (mg/L)	0.013	0.015			
	Lead (Pb)-Total (mg/L)	<0.000050	0.000069			
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050			
	Magnesium (Mg)-Total (mg/L)	0.96	0.96			
	Manganese (Mn)-Total (mg/L)	0.000791	0.000840			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000191	0.000201			
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545526-1	L1545526-2			
	Description	water	water			
	Sampled Date	03-NOV-14	03-NOV-14			
	Sampled Time	11:09	11:44			
	Client ID	TPE-76-S	TPE-77-S			
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	0.52	0.51			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	0.067	0.076			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	0.924	1.00			
	Strontium (Sr)-Total (mg/L)	0.0113	0.0120			
	Sulfur (S)-Total (mg/L)	1.53	1.47			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.000046	0.000049			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	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)	0.0023	0.0015			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00039	0.00044			
	Barium (Ba)-Dissolved (mg/L)	0.00275	0.00279			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Dissolved (mg/L)	2.76	2.76			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00037	0.00036			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050			
	Magnesium (Mg)-Dissolved (mg/L)	0.95	0.96			
	Manganese (Mn)-Dissolved (mg/L)	0.000361	0.000339			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000183	0.000176			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1545526-1	L1545526-2			
	Description	water	water			
	Sampled Date	03-NOV-14	03-NOV-14			
	Sampled Time	11:09	11:44			
	Client ID	TPE-76-S	TPE-77-S			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.51	0.49			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	0.054	0.056			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	1.00	0.981			
	Strontium (Sr)-Dissolved (mg/L)	0.0117	0.0114			
	Sulfur (S)-Dissolved (mg/L)	1.46	1.45			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000040	0.000040			
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			
	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)
Duplicate	Fluoride (F)	DLM	L1545526-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L1545526-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L1545526-1, -2

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**
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-LOW-IC-VA	Water	Low level Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.

ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0

This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 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 5310 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.

CN-FREE-CFA-VA	Water	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-CFA-VA	Water	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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

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 procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

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.

Reference Information

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.

** 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 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@azimuthgrou.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)		ALS Contact: Brent Mack	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-FLOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLORO-A-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	TPE-76-S	03-Nov-14	11:09	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	9
	TPE-77-S	03-Nov-14	11:44	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	9

L1545526-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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 T	4-Nov-14	8:00	Paige	Nov.12	10:15	11,12°C				

GENF 20.00 Front

Short Holding Time

- *Rush Processing*

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 18-DEC-14
Report Date: 30-DEC-14 16:35 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1560404

Project P.O. #: NOT SUBMITTED
Job Reference: MEADOWBANK SURFAE WATER
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 30-DEC-14 16:24
ADDITIONAL 30-DEC-14 16:11

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	L1560404-1	L1560404-2	L1560404-3	L1560404-4	L1560404-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	28-NOV-14	28-NOV-14	28-NOV-14	29-NOV-14	29-NOV-14
	Sampled Time	14:18	14:44	14:44	10:42	11:13
	Client ID	TE-76-S	TE-77-S	NOV-DUP-2	INUG-65-S	INUG-64-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.257	0.224	0.233	0.095	0.131

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1560404-9	L1560404-10			
	Description	WATER	WATER			
	Sampled Date	30-NOV-14	30-NOV-14			
	Sampled Time	11:16	11:45			
	Client ID	TPN-76-S	TPN-77-S			
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.098	0.089			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1560404-1	L1560404-2	L1560404-3	L1560404-4	L1560404-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	28-NOV-14	28-NOV-14	28-NOV-14	29-NOV-14	29-NOV-14
Sampled Time	14:18	14:44	14:44	10:42	11:13
Client ID	TE-76-S	TE-77-S	NOV-DUP-2	INUG-65-S	INUG-64-S
Grouping	**Analyte**				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	7.63	6.45	6.43	6.12	5.89
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0082	0.0079
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.63	0.60	0.60	0.79	0.77
	Fluoride (F) (mg/L)	0.067	0.065	0.065	0.068	0.068
	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	<0.0020	<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)	2.47	2.18	2.16	0.98	0.93
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.67	1.27	1.41	1.96	1.96
	Total Organic Carbon (mg/L)	1.49	1.33	1.59	2.02	1.94
Total Metals	Aluminum (Al)-Total (mg/L)	0.0070	0.0062	0.0058	0.0056	0.0060
	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	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.00222	0.00218	0.00206	0.00178	0.00177
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	1.93	1.58	1.58	1.25	1.22
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00011	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	<0.00050	<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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	0.73	0.63	0.64	0.75	0.74
	Manganese (Mn)-Total (mg/L)	0.000591	0.000683	0.000749	0.000827	0.000768
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000057	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1560404-6	L1560404-7	L1560404-8	L1560404-9	L1560404-10
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	29-NOV-14	29-NOV-14	29-NOV-14	30-NOV-14	30-NOV-14
Sampled Time		16:10	16:30	11:16	11:45
Client ID	NOV-TRAVEL BLANK	NOV-DI BLANK	NOW-EB-2	TPN-76-S	TPN-77-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	<0.50	<0.50	<0.50	9.69	9.62
Anions and Nutrients Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0147	0.0147
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	<0.10	<0.10	<0.10	0.79	0.80
Fluoride (F) (mg/L)	<0.020	<0.020	<0.020	0.076	0.076
Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0622	0.0628
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	0.0011	0.0012
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)	<0.30	<0.30	<0.30	5.28	5.33
Cyanides Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	<0.50	0.67	<0.50	1.64	1.41
Total Organic Carbon (mg/L)	<0.50	<0.50	<0.50	1.36	1.48
Total Metals Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	<0.0030	0.0043	0.0040
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	0.00018	0.00020
Barium (Ba)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.00316	0.00312
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000019	<0.000010
Calcium (Ca)-Total (mg/L)	<0.050	<0.050	<0.050	2.34	2.41
Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00016	<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	0.000063	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium (Mg)-Total (mg/L)	<0.10	<0.10	<0.10	0.91	0.94
Manganese (Mn)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.00120	0.00137
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.000205	0.000208
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1560404-11				
	Description	WATER				
	Sampled Date	30-NOV-14				
	Sampled Time	16:00				
	Client ID	NOV-EB-3				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	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				
	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)	<0.0050				
	Cyanide, Free (mg/L)	<0.0050				
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)	<0.00010				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000010				
	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)	0.011				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.00050				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.000050				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1560404-1 WATER 28-NOV-14 14:18 TE-76-S	L1560404-2 WATER 28-NOV-14 14:44 TE-77-S	L1560404-3 WATER 28-NOV-14 14:44 NOV-DUP-2	L1560404-4 WATER 29-NOV-14 10:42 INUG-65-S	L1560404-5 WATER 29-NOV-14 11:13 INUG-64-S
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.42	0.40	0.41	0.39	0.38
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.141	0.120	0.117	0.116	0.111
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.641	0.611	0.610	0.588	0.584
	Strontium (Sr)-Total (mg/L)	0.00983	0.00826	0.00841	0.00698	0.00688
	Sulfur (S)-Total (mg/L)	0.86	0.73	0.76	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000041	0.000041	0.000038	0.000042	0.000037
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0017	0.0017	0.0015	0.0017	0.0028
	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)	0.00213	0.00203	0.00203	0.00177	0.00170
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	1.89	1.55	1.55	1.23	1.18
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00033	0.00034	0.00024	0.00031	0.00030
	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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.70	0.62	0.62	0.74	0.72
	Manganese (Mn)-Dissolved (mg/L)	0.000201	0.000230	0.000188	0.000076	0.000065
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000062	<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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1560404-6 WATER 29-NOV-14 NOV-TRAVEL BLANK	L1560404-7 WATER 29-NOV-14 16:10 NOV-DI BLANK	L1560404-8 WATER 29-NOV-14 16:30 NOW-EB-2	L1560404-9 WATER 30-NOV-14 11:16 TPN-76-S	L1560404-10 WATER 30-NOV-14 11:45 TPN-77-S
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	<0.10	<0.10	<0.10	0.51	0.54
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	<0.050	<0.050	<0.050	1.25	1.27
	Strontium (Sr)-Total (mg/L)	<0.00020	<0.00020	<0.00020	0.0112	0.0114
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	<0.50	1.76	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000042	0.000042
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0034	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		<0.0010	0.0024	0.0018	0.0020
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)		<0.00010	<0.00010	0.00019	0.00018
	Barium (Ba)-Dissolved (mg/L)		<0.000050	0.000100	0.00303	0.00303
	Beryllium (Be)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)		<0.050	<0.050	2.36	2.34
	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)		<0.00020	<0.00020	0.00046	0.00035
	Iron (Fe)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)		<0.000050	0.000385 DTC	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)		<0.10	<0.10	0.92	0.92
	Manganese (Mn)-Dissolved (mg/L)		<0.000050	<0.000050	0.000963	0.000973
	Mercury (Hg)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)		<0.000050	<0.000050	0.000186	0.000185
	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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1560404-11				
	Description	WATER				
	Sampled Date	30-NOV-14				
	Sampled Time	16:00				
	Client ID	NOV-EB-3				
Grouping	**Analyte**					
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	<0.10				
	Selenium (Se)-Total (mg/L)	<0.00010				
	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)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.0010				
	Zinc (Zn)-Total (mg/L)	0.0055				
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)	0.000055				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	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)	<0.00050				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	<0.000050				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1560404-1	L1560404-2	L1560404-3	L1560404-4	L1560404-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	28-NOV-14	28-NOV-14	28-NOV-14	29-NOV-14	29-NOV-14
	Sampled Time	14:18	14:44	14:44	10:42	11:13
	Client ID	TE-76-S	TE-77-S	NOV-DUP-2	INUG-65-S	INUG-64-S
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.42	0.37	0.37	0.36	0.40
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.131	0.109	0.104	0.100	0.100
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.607	0.579	0.574	0.568	0.563
	Strontium (Sr)-Dissolved (mg/L)	0.00942	0.00809	0.00785	0.00672	0.00642
	Sulfur (S)-Dissolved (mg/L)	0.81	0.74	0.73	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000037	0.000032	0.000030	0.000031	0.000030
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0018	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1560404-6 WATER 29-NOV-14 NOV-TRAVEL BLANK	L1560404-7 WATER 29-NOV-14 16:10 NOV-DI BLANK	L1560404-8 WATER 29-NOV-14 16:30 NOW-EB-2	L1560404-9 WATER 30-NOV-14 11:16 TPN-76-S	L1560404-10 WATER 30-NOV-14 11:45 TPN-77-S
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)		<0.10	<0.10	0.53	0.50
	Selenium (Se)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	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)		<0.050	<0.050	1.18	1.21
	Strontium (Sr)-Dissolved (mg/L)		<0.00020	<0.00020	0.0108	0.0109
	Sulfur (S)-Dissolved (mg/L)		<0.50	<0.50	1.72	1.75
	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)		<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)		<0.000010	<0.000010	0.000039	0.000040
	Vanadium (V)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)		<0.0010	0.0023	0.0014	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1560404-11				
	Description	WATER				
	Sampled Date	30-NOV-14				
	Sampled Time	16:00				
	Client ID	NOV-EB-3				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	<0.10				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	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)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				

* 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
L1560404-5	INUG-64-S	WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Manganese (Mn)-Total	MB-LOR	L1560404-1, -10, -11, -2, -3, -4, -5, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1560404-1, -2, -3, -4, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
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**
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 5310 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 5310 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-CFA-VA	Water	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-CFA-VA	Water	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.

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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

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 a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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.

Reference Information

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.

** 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.

L1560404-COFC

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Page 1 of 1

ALS Environmental

Short Holding Time

Rush Processing

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@azimuthgrou.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)		ALS Contact: Brent Mack	Sampler:	

Sample # (lab use only)	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLORCA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	TE-76-S	28-Nov-14	14:18	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	TE-77-S	28-Nov-14	14:44	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	NOV-DUP-2	28-Nov-14	14:44	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	INUG-65-S	29-Nov-14	10:42	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	INUG-64-S	29-Nov-14	11:13	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	NOV-TRAVEL BLANK	29-Nov-14		Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8
	NOV-D1 BLANK	29-Nov-14	16:10	Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8
	NOV-EB-2	29-Nov-14	16:30	Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8
	TPN-76-S	30-Nov-14	11:16	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	TPN-77-S	30-Nov-14	11:45	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	NOV-EB-3	30-Nov-14	16:00	Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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	1-Dec-14	9:30	Paige	Dec 1 8	1040	6.5, 6 °C				

GENF 20.00 Front

AZIMUTH CONSULTING GROUP INC.
ATTN: Eric Franz
218 - 2902 West Broadway
Vancouver BC V6K 2G8

Date Received: 31-DEC-14
Report Date: 09-JAN-15 17:59 (MT)
Version: FINAL

Client Phone: 604-730-1220

Certificate of Analysis

Lab Work Order #: L1563236

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	L1563236-1	L1563236-3	L1563236-4	L1563236-5	L1563236-6
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	18-DEC-14	18-DEC-14	18-DEC-14	18-DEC-14	19-DEC-14
	Sampled Time	10:44	11:07	15:24	16:05	11:01
	Client ID	WAL-48-S	WAL-47-S	SP-79-S	SP-78-S	INUG-66-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.113	0.086	0.102	0.155	0.077

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1563236-7	L1563236-8	L1563236-9	L1563236-10	L1563236-11
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	19-DEC-14	19-DEC-14	19-DEC-14	19-DEC-14	20-DEC-14
	Sampled Time	11:32	11:32	13:52	14:43	10:17
	Client ID	INUG-67-S	DEC-DUP-1	TPN-79-S	TPN-78-S	TE-78-S
Grouping	**Analyte**					
FILTER						
Plant Pigments	Chlorophyll a (ug)	0.074	0.077	0.040	0.044	0.116

* 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	L1563236-12 WATER 20-DEC-14 11:10 TE-79-S	L1563236-13 WATER 20-DEC-14 11:52 TPE-79-S	L1563236-14 WATER 20-DEC-14 11:52 DEC-DUP-2	L1563236-15 WATER 20-DEC-14 12:20 TPE-78-S	
FILTER							
Plant Pigments	Chlorophyll a (ug)		0.192	0.092	0.061	0.057	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1563236-1	L1563236-3	L1563236-4	L1563236-5	L1563236-6
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	18-DEC-14	18-DEC-14	18-DEC-14	18-DEC-14	19-DEC-14
Sampled Time	10:44	11:07	15:24	16:05	11:01
Client ID	WAL-48-S	WAL-47-S	SP-79-S	SP-78-S	INUG-66-S
Grouping	**Analyte**				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	15.9	17.2	11.7	17.1	5.76
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0177	0.0173	0.0102	0.0070	0.0100
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.74	0.71	0.84	0.87	0.77
	Fluoride (F) (mg/L)	0.056	0.055	0.080	0.083	0.067
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	0.0073	0.0088	<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
	Phosphorus (P)-Total (mg/L)	0.0025	<0.0020	<0.0020	0.0029	0.0022
	Silicate (as SiO2) (mg/L)	1.04	0.97	0.79	0.63	<0.50
	Sulfate (SO4) (mg/L)	3.73	3.58	4.44	4.82	0.94
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.12	2.04	2.19	1.35	1.82
	Total Organic Carbon (mg/L)	2.35	2.00	2.12	2.18	1.96
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	<0.0030	0.0036	0.0044
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00030	0.00029	0.00027	0.00030	0.00011
	Barium (Ba)-Total (mg/L)	0.00206	0.00200	0.00257	0.00302	0.00160
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	4.77	4.63	4.37	4.33	1.19
	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)	0.00086	0.00078	0.00073	0.00068	<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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	1.40	1.37	1.39	1.40	0.72
	Manganese (Mn)-Total (mg/L)	0.000573	0.000577	0.000458	0.000449	0.000669
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000178	0.000192	0.000144	0.000157	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1563236-7	L1563236-8	L1563236-9	L1563236-10	L1563236-11
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	19-DEC-14	19-DEC-14	19-DEC-14	19-DEC-14	20-DEC-14
Sampled Time	11:32	11:32	13:52	14:43	10:17
Client ID	INUG-67-S	DEC-DUP-1	TPN-79-S	TPN-78-S	TE-78-S
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	5.95	6.06	9.70	9.70	8.12
Anions and Nutrients Ammonia, Total (as N) (mg/L)	0.0095	0.0092	0.0163	0.0193	0.0054
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	0.79	0.78	0.78	0.78	0.69
Fluoride (F) (mg/L)	0.069	0.068	0.072	0.072	0.070
Nitrate (as N) (mg/L)	<0.0050	<0.0050	0.0614	0.0606	<0.0050
Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0011	<0.0010	<0.0010
Orthophosphate-Dissolved (as P) (mg/L)	0.0019	<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)	0.0025	0.0024	0.0025	0.0024	<0.0020
Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Sulfate (SO4) (mg/L)	0.96	0.95	5.23	5.24	2.65
Cyanides Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	1.80	1.87	1.28	1.51	1.46
Total Organic Carbon (mg/L)	1.80	2.03	1.47	1.79	1.43
Total Metals Aluminum (Al)-Total (mg/L)	0.0039	0.0032	0.0032	0.0033	0.0043
Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00021	0.00021	0.00013
Barium (Ba)-Total (mg/L)	0.00173	0.00173	0.00325	0.00300	0.00250
Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)-Total (mg/L)	1.21	1.20	2.31	2.31	1.99
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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium (Mg)-Total (mg/L)	0.74	0.73	0.93	0.93	0.78
Manganese (Mn)-Total (mg/L)	0.000629	0.000618	0.00112	0.00131	0.000685
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	0.000241	0.000195	0.000064
Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1563236-12	L1563236-13	L1563236-14	L1563236-15	L1563236-16
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	20-DEC-14	20-DEC-14	20-DEC-14	20-DEC-14	20-DEC-14
	Sampled Time	11:10	11:52	11:52	12:20	13:45
	Client ID	TE-79-S	TPE-79-S	DEC-DUP-2	TPE-78-S	DEC-EB-1
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	11.4	11.7	11.7	11.4	<0.50
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0064	0.0132	0.0141	0.0131	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.80	0.75	0.75	0.76	<0.10
	Fluoride (F) (mg/L)	0.078	0.084	0.084	0.081	<0.020
	Nitrate (as N) (mg/L)	0.0062	0.0166	0.0165	0.0274	<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
	Phosphorus (P)-Total (mg/L)	0.0025	<0.0020	0.0022	<0.0020	<0.0020
	Silicate (as SiO2) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate (SO4) (mg/L)	3.50	4.89	4.89	5.00	<0.30
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	1.46	1.40	1.59	<0.50
	Total Organic Carbon (mg/L)	1.68	1.57	1.56	1.59	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0044	0.0041	0.0042	0.0041	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00032	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00020	0.00052	0.00050	0.00042	<0.00010
	Barium (Ba)-Total (mg/L)	0.00290	0.00313	0.00318	0.00333	<0.000050
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	2.92	2.85	2.96	2.80	<0.050
	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)	0.00058	<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	0.00826	<0.000050	<0.000050	0.000118
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Total (mg/L)	1.07	1.06	1.08	1.05	<0.10
	Manganese (Mn)-Total (mg/L)	0.000619	0.000618	0.000604	0.000630	<0.000050
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000101	0.000200	0.000216	0.000196	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1563236-1 WATER 18-DEC-14 10:44 WAL-48-S	L1563236-3 WATER 18-DEC-14 11:07 WAL-47-S	L1563236-4 WATER 18-DEC-14 15:24 SP-79-S	L1563236-5 WATER 18-DEC-14 16:05 SP-78-S	L1563236-6 WATER 19-DEC-14 11:01 INUG-66-S
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.49	0.49	0.56	0.57	0.38
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.470	0.454	0.348	0.279	0.104
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.647	0.609	0.804	0.932	0.571
	Strontium (Sr)-Total (mg/L)	0.0247	0.0238	0.0214	0.0209	0.00660
	Sulfur (S)-Total (mg/L)	1.30	1.24	1.56	1.65	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000041	0.000043	0.000049	0.000049	0.000036
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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	0.0014
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00024	0.00026	0.00016	0.00029	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00181	0.00197	0.00181	0.00311	0.00164
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	4.29	4.64	3.08	4.46	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)	0.00071	0.00077	0.00048	0.00063	0.00031
	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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	1.25	1.36	0.98	1.46	0.70
	Manganese (Mn)-Dissolved (mg/L)	0.000194	0.000205	0.000101	0.000181	0.000088
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000161	0.000178	0.000097	0.000151	<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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1563236-7 WATER 19-DEC-14 11:32 INUG-67-S	L1563236-8 WATER 19-DEC-14 11:32 DEC-DUP-1	L1563236-9 WATER 19-DEC-14 13:52 TPN-79-S	L1563236-10 WATER 19-DEC-14 14:43 TPN-78-S	L1563236-11 WATER 20-DEC-14 10:17 TE-78-S
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.38	0.40	0.52	0.55	0.48
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.100	0.102	<0.050	<0.050	0.146
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.592	0.582	1.26	1.27	0.692
	Strontium (Sr)-Total (mg/L)	0.00689	0.00670	0.0110	0.0101	0.0102
	Sulfur (S)-Total (mg/L)	<0.50	<0.50	1.76	1.74	0.94
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000036	0.000039	0.000046	0.000042	0.000044
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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	0.0038	0.0015	0.0011	0.0011
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00018	0.00018	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00173	0.00179	0.00313	0.00317	0.00237
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	1.19	1.22	2.35	2.34	1.98
	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)	0.00030	0.00038	0.00035	0.00034	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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	0.72	0.73	0.93	0.94	0.77
	Manganese (Mn)-Dissolved (mg/L)	0.000063	0.000217	0.000876	0.000965	0.000176
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000059	0.000184	0.000195	0.000054
	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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1563236-12 WATER 20-DEC-14 11:10 TE-79-S	L1563236-13 WATER 20-DEC-14 11:52 TPE-79-S	L1563236-14 WATER 20-DEC-14 11:52 DEC-DUP-2	L1563236-15 WATER 20-DEC-14 12:20 TPE-78-S	L1563236-16 WATER 20-DEC-14 13:45 DEC-EB-1
WATER						
Total Metals	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	0.53	0.54	0.55	0.56	<0.10
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	0.211	0.068	0.064	0.071	<0.050
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.848	1.14	1.14	1.17	<0.050
	Strontium (Sr)-Total (mg/L)	0.0149	0.0127	0.0134	0.0129	<0.00020
	Sulfur (S)-Total (mg/L)	1.19	1.63	1.67	1.68	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000049	0.000049	0.000052	0.000047	<0.000010
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
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)	0.0011	0.0012	<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)	0.00014	0.00046	0.00045	0.00037	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.00285	0.00318	0.00325	0.00331	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	2.87	2.94	2.92	2.84	<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)	0.00046	0.00037	0.00037	0.00034	<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)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	1.04	1.07	1.07	1.05	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.000252	0.000071	0.000072	0.000079	<0.000050
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000089	0.000189	0.000202	0.000186	<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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1563236-1 WATER 18-DEC-14 10:44 WAL-48-S	L1563236-3 WATER 18-DEC-14 11:07 WAL-47-S	L1563236-4 WATER 18-DEC-14 15:24 SP-79-S	L1563236-5 WATER 18-DEC-14 16:05 SP-78-S	L1563236-6 WATER 19-DEC-14 11:01 INUG-66-S
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.45	0.46	0.37	0.61	0.35
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.427	0.451	0.240	0.276	0.091
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.562	0.632	0.555	0.966	0.555
	Strontium (Sr)-Dissolved (mg/L)	0.0215	0.0218	0.0140	0.0207	0.00644
	Sulfur (S)-Dissolved (mg/L)	1.15	1.22	1.07	1.69	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000035	0.000040	0.000029	0.000046	0.000033
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0016	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1563236-7 WATER 19-DEC-14 11:32 INUG-67-S	L1563236-8 WATER 19-DEC-14 11:32 DEC-DUP-1	L1563236-9 WATER 19-DEC-14 13:52 TPN-79-S	L1563236-10 WATER 19-DEC-14 14:43 TPN-78-S	L1563236-11 WATER 20-DEC-14 10:17 TE-78-S
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.39	0.41	0.51	0.52	0.44
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.094	0.099	<0.050	<0.050	0.137
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.568	0.591	1.23	1.26	0.682
	Strontium (Sr)-Dissolved (mg/L)	0.00631	0.00650	0.00981	0.0111	0.0101
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50	1.75	1.80	0.93
	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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000033	0.000034	0.000036	0.000040	0.000037
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1563236-12 WATER 20-DEC-14 11:10 TE-79-S	L1563236-13 WATER 20-DEC-14 11:52 TPE-79-S	L1563236-14 WATER 20-DEC-14 11:52 DEC-DUP-2	L1563236-15 WATER 20-DEC-14 12:20 TPE-78-S	L1563236-16 WATER 20-DEC-14 13:45 DEC-EB-1
Sample ID		L1563236-12	L1563236-13	L1563236-14	L1563236-15	L1563236-16
Description		WATER	WATER	WATER	WATER	WATER
Sampled Date		20-DEC-14	20-DEC-14	20-DEC-14	20-DEC-14	20-DEC-14
Sampled Time		11:10	11:52	11:52	12:20	13:45
Client ID		TE-79-S	TPE-79-S	DEC-DUP-2	TPE-78-S	DEC-EB-1
WATER						
Dissolved Metals	Potassium (K)-Dissolved (mg/L)	0.54	0.58	0.56	0.55	<0.10
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	0.206	0.062	0.061	0.064	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.815	1.11	1.12	1.12	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.0141	0.0127	0.0127	0.0123	<0.00020
	Sulfur (S)-Dissolved (mg/L)	1.21	1.73	1.64	1.68	<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)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000042	0.000044	0.000043	0.000039	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0017	<0.0010	<0.0010	<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)
Duplicate	Bromide (Br)	DLM	L1563236-1, -10, -11, -12, -13, -14, -15, -16, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1563236-1, -10, -11, -12, -13, -14, -15, -16, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLM	L1563236-1, -10, -11, -12, -13, -14, -15, -16, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1563236-14, -5, -6
Matrix Spike	Dissolved Organic Carbon	MS-B	L1563236-5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1563236-1, -10, -11, -12, -13, -14, -15, -16, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1563236-1, -10, -11, -12, -13, -14, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1563236-13
Matrix Spike	Ammonia, Total (as N)	MS-B	L1563236-13

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**
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 5310 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 5310 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-CFA-VA	Water	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-CFA-VA	Water	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.

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-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

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 filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

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 procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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 APHA 3030 B&E / EPA SW-846 6020A

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 hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

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.

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

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.

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.

** 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.

L1563236-COFC

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

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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@azimuthgrou.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220	Fax:		Email 3:	ryan.vansengen@agniceagle.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)				ALS Contact:	Brent Mack	Sampler:		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ANIONS-ALL-IC-VA	ANIONS-CL-LOW-IC-VA	CARBONS-DOC-VA	CARBONS-TOC-VA	CHLOROA-VA	CN-FREE-CFA-VA	CN-TOTAL-CFA-VA	MET-D-BCMDG-VA	MET-T-BCMDG-VA	NH3-F-VA	P-T-COL-VA	P-TD-COL-VA	SILICATE-COL-VA	PO4-DO-COL-VA	Number of Containers
	WAL-48-S	18-Dec-14	10:44	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	DEC-TRAVEL BLANK	18-Dec-14	-	Water															6
	WAL-47-S	18-Dec-14	11:07	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	SP-79-S	18-Dec-14	15:24	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	SP-78-S	18-Dec-14	16:05	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	INUG-66-S	19-Dec-14	11:01	Water	x	x	x	x	X	x	x	x	x	x	x	x	x	x	9
	INUG-67-S	19-Dec-14	11:32	Water	x	x	x	x	X	x	x	x	x	x	x	x	x	x	9
	DEC-DUP-1	19-Dec-14	11:32	Water	x	x	x	x	X	x	x	x	x	x	x	x	x	x	9
	TPN-79-S	19-Dec-14	13:52	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	TPN-78-S	19-Dec-14	14:43	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Mercury, Metals, DOC, TOC and Cn were preserved. Diss. Mercury, Diss. Metals, DOC and Chloro A were filtered. Number of containers include the chloro A

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-Dec-14	9:30		DEC 31	8:30	0.3 °C				

0.2
0.8

GENF 20.00 Front

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(ALS) Environmental

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@azimuthgrou.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-730-1220	Fax:	Email 3:	ryan.yanengen@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			
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	TE-78-S	20-Dec-14	10:17	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	TE-79-S	20-Dec-14	11:10	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	TPE-79-S	20-Dec-14	11:52	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	DEC-DUP-2	20-Dec-14	11:52	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	TPE-78-S	20-Dec-14	12:20	Water	x	x	x	x	x	x	x	x	x	x	x	x	x	x	9
	DEC-EB-1	20-Dec-14	13:45	Water	x	x	x	x		x	x	x	x	x	x	x	x	x	8

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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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-Dec-14	9:30	[illegible]	22/12/31	8:30	0.7 °C				

GENF 20.00 Front